THE ECONOMICS OF FISHERIES

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

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Proceedings of a Round Table organized by the International Economic Association and held in Rome in September 1956, sponsored by the Food and Agriculture Organization of the United Nations.

Edited by
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PREFACE

The International Economic Association was founded under the auspices of Unesco in September 1950. Each year since then a Round Table has been held with papers and discussion centred upon a single major topic or branch of the discipline. Succeeding conferences have been devoted to the following subjects: Long Term International Balance (1950), Monopoly and Competition (1951), The Business Cycle in the Post-War World (1952), The Determinants of Economic Progress (1953), Wage Determination (1954), The Economics of International Migration (1955), and The Economics of Fisheries (1956).

The last Round Table on the economic problems of fisheries was organized at the request of, and in collaboration with, the Food and Agriculture Organization of the United Nations Ralph Turvey, Reader in Economics at the London School of Economics and Political Science (University of London) undertook to form the programme and, in consultation with Mr. F. Popper, of F.A.O., to find experts willing to contribute papers. These papers were circulated well in advance among the participants and the meeting was held in Rome in the summer of 1956, immediately after the first Congress of the I.E.A.

The background papers of this Round Table are printed in this volume, together with a short résumé of the discussion, prepared by Mr. Jack Wiseman, also of the London School of Economics and Political Science. Since the economic problems of fisheries have hitherto been relatively neglected by the economists, it is hoped that the studies presented here will stimulate further research in this important field.

Erik Lindahl
(President of the International
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Members were invited to participate in the Round Table as individuals. The views expressed by them are their own, and not those of any organisations by which they are employed or with which they may be associated.

INTRODUCTION

by Ralph Turvey

(Programme Chairman)

The reader of this volume must bear in mind that it is a by-product of a Round Table. The papers were written to serve as a basis of discussion rather than with a view to publication and the reports of the discussions cannot hope to be as interesting to a reader as the discussions themselves were to the participants. The reader must not expect to find any agreed conclusions or any summary of findings: none were reached. Instead he will meet many stimulating ideas, conflicts of opinion and suggestions for research. It is clear that fisheries and fish marketing constitute an area of study where the economist can make a significant contribution; it is also clear that this work has barely begun.

The problems examined in the following nine papers and discussions cover only some of the economic aspects of fisheries and fish marketing. Two papers consider cost conditions in fishing, one with particular reference to wages. The problem of fishery regulation is treated in no less than three papers, one of which refers to a particular case - the North Sea. Marketing is the subject of two papers, both marketing at the port and distribution inland being examined. In addition there is a discussion of many of the same problems with particular reference to poor countries. Lastly the problems of Iceland's fisheries are considered.

In this introduction, which is primarily directed to fellow economists, I shall endeavour to show the relevance of economic theory to problems of the fishing industry. The views expressed are only my own, in the sense that they reflect my particular interests and because I should not expect any of the other participants to agree with all I say. Nevertheless, the bulk of what follows is drawn from the papers and discussions, though only a few aspects of the problems dealt with in the following pages are touched upon here.

Perhaps the most universal feature of the world's fisheries is the high degree of uncertainty attached to estimates of the proceeds of the catch. This risk (I am not distinguishing risk from uncertainty) has a quantity element and a price element. The former arises both because the total catch of a whole fishery may vary from one season to another and because of the differences in the catch of one boat on successive trips. The price risk is important because of the perishability of fresh fish: there can be no variations of stocks to even out fluctuations in supply.

To the extent that price changes spring from variations in the catch, the two elements of risk partly offset one another. But this offset reduces the variability of proceeds only for a large number of boats or, for a single boat, between one season and another. For a single boat within one season, however, there is a much lower probability that the price will be high when the catch is low. The risk borne by the owner of a single boat is therefore greater than that borne by the owner of a fleet. Even if his share of total catch is too

small to affect price, he runs a lower quantity risk because to some extent the fluctuations in the catches of his various boats will offset one another.

The importance of risk naturally varies a great deal between different fisheries. This is just one instance of the fact that the differences between different fisheries are as important as the similarities, so that generalizations must all be qualified. In a general essay such as this it would, however, be monotonous to hedge every statement and to interlard the text with notes on the exceptions. I shall therefore illustrate the diversity of fisheries by briefly examining some of the factors which make risk of varying importance and thereafter proceed with the necessary inaccuracy of general statements.

One factor which affects the degree of quantity risk is extremely obvious: the amount of fish caught will vary from trip to trip to a different extent according to the area, the weather, and the kind of fish. In some cases, however, the variability may show itself in the length of the trip rather than in the amount of catch. Distant water trawlers from Hull, for example, may stay in Northern waters long enough to fill up: they have refrigeration and are able to stay at sea for a long time. In this case the quantity risk is reduced by using capital intensive methods. But many other factors affect the length of trip which fishermen are able or prepared to make. It is said, for instance, that Malay fishermen doubt the fidelity of their wives too much to be willing to be away at night!

The price risk depends partly upon the volatility of the demand curve and partly upon its elasticity. The elasticity of demand depends, inter alia, upon consumers' tastes and upon the behaviour of distributors' margins. Thus if, for whatever reason, the retail prices of fresh fish are rigid, distributors' margins will vary inversely with prices at the port and the demand for fresh fish at the port will have a very low elasticity.

One almost universal feature of fisheries is a system of remuneration of labour where at least a substantial portion of earnings depends upon the value of the catch. In its purest form this "share system" involves the payment of an agreed fraction of the proceeds from the catch to each member of the crew. In other cases there is a combination of a fixed element and a share of proceeds net of certain costs. The prevalence of such an unusual wage system - there are few parallels in other branches of activity - naturally leads one to wonder whether it is related to the equally universal riskiness of fishing.

Certainly risk is not the only explanatory factor, but it can plausibly be argued that it is an important one. The reason is that the sharing system involves a division of risk between the owner of capital and labour. Where the owner has only small resources, he may be in no better a position to bear fluctuations in receipts than the fishermen. Thus the amount of employment offered will be larger with the share system than without.

Some confirmation of the idea that risk partly accounts for the existence of the share system can be obtained by examining fisheries where the degree of risk is relatively low. From the discussion above of the determinants of the degree of risk it appears that in trawler fishing run by large firms the quantity

risk is smaller than in the case of single-boat inshore and near-water fishing. Furthermore, such firms may have sufficient capital to bear fluctuations in revenue. Now it is just in the case of such fisheries that the share element in the remuneration of labour is relatively small, which supports the argument.

The prevalence of the share system and the riskiness of the industry make analysis in terms of short-run supply curves rather difficult. Firstly, the quantity risk means that the relation between inputs (and thus cost) on the one hand and output on the other is stochastic. Secondly, the price risk means that the value of any given size of catch cannot be known in advance, so that today's price can hardly be represented as determining today's input in any simple manner. Thirdly, the share element in labour remuneration makes an important item of cost dependent upon demand, so that cost and revenue are not independent.

To a large extent, however, these difficulties have more to do with the geometry of supply curves than with understanding the fishing industry. Even within a fishing season, particularly good catches or high prices may stimulate some increase in inputs: for example by boats putting to sea in poor weather when the catch is likely to be lower than usual. The possibilities naturally vary between fisheries, but in general a greater responsiveness might be expected to favourable expectations held before a season commences. For example, fishing may begin earlier, multi-purpose fishing boats may be shifted from other uses, laid-up boats may be put in commission again, and so on.

In the long run, with all factors variable, the concept of a supply curve makes more sense, as the three difficulties listed above are lessened. In looking forward over a longer period, temporary ups and downs may be disregarded, so that some simple expected relation between fishing inputs and catch may be assumed to enter into decision-making. Similarly, the average price expected to rule over some years (or an expected trend) is as reasonable a concept for the analysis of fisheries as in any other type of primary production. Furthermore, in the long run the amount earned by labour must be related to employment and earning opportunities available elsewhere, so that the form of payment is of less significance. Thus we may usefully regard the average output rate towards which a fishery is moving as a function of the price level of the fish generally expected to rule over a coming period. The nature of this function depends upon the supply conditions of the factors of production in the normal way. One point deserves particular notice in the case of fisheries, however, namely that differences in skill and in attitudes to risk (and estimates of it) will be an important factor in making for an upward-sloping curve. Indeed, so far as labour is concerned it is possible that some fishermen are attracted by the riskiness of earnings so that their supply price is lower than their opportunity earnings.

If the supply curve is taken in a broad Marshallian sense, it may be downward-sloping. This could be the case if a permanent increase in demand led to the creation of a more specialized fishing fleet and improved complementary facilities. But until some case studies are made, not much more can be said.

So far as the consumer demand side is concerned, not much research seems to have been done. A certain amount can be deduced from the nature of the product and general knowledge concerning consumer tastes, but I shall not

repeat here what is said about this in one of the papers. Instead I shall briefly consider one aspect of the system of distribution: the mechanism by which fish prices are determined at the ports. Here the question relates not to an interpretation of price movements in demand and supply terms, but to the actual method of fixing prices: what conditions favour auctioning as against the conclusion of contracts covering deliveries over a period?

These are not exclusive alternatives, for there are other possibilities when restrictions upon competition exist. For example a fishermen's co-operative or some regulatory agency might act as a monopoly, charging discriminatory prices to different kinds of buyer. On the other hand some restrictive practices, such as limitation of the catch, can operate quite successfully whether sale is by auction, by contract, or made through a co-operative or state selling agency.

An auction system will not work efficiently unless there is a certain minimum number of buyers. Thus in small ports where the catch is insufficient to provide employment for more than a few buyers, we may expect either sale by contract or despatch of the fish to auction at some larger centre. The minimum number of buyers, however, is only a necessary condition, not a sufficient one. In order to go further, therefore, we have to ask what an auction can do that contracts cannot. One such function is to provide price differentials according to quality; contracts can do this only to a limited extent. The reason is that it requires a grading system which is simple to specify and to operate and which is widely recognised so that disputes will be minimised. Thus where buyers are sensitive to complicated quality differentials, and inspection and selection of lots is necessary, and as this involves display of the fish and different prices for different lots, an auction (or something similar) is the most suitable procedure.

Contracts necessarily mean stable prices, perhaps for a whole season, while with an auction system prices can vary from day to day, or even within the day. Thus auctions have an advantage over contracts for the allocation of a fluctuating catch to a fluctuating demand when demand is fairly elastic so that the market can be cleared on most days. If the fish were not perishable, of course, the fluctuations could be dealt with by variations in stocks (and the auction system would be superior to contracts only if stock-holding were most efficiently carried out as a specialist operation). But most fish is too perishable for this.

If this argument is correct, it means that auctions are more likely to exist where fluctuations in the catch are large, where fluctuations in demand are important and where the elasticity of demand is considerable. These factors obviously depend upon the type of fish, since biological factors determine the variability of the catch and different species may have different demand patterns. But where several species are caught together the characteristics of the main catch will probably determine the nature of the marketing system. It is not worth while to have separate arrangements for the "by-products".

The canneries on the west coast of North America normally buy fish on contract rather than at auctions. As a partial test of the above hypotheses we can therefore show that the factors adduced suffice to account for the use of

contracts in this particular case. Firstly, many of the canneries are dispersed along the coast, so that at several ports there are only one or a few buyers. Auctions there are thus not possible. Secondly, quality differences such as size are less important than in the demand for fresh fish by retailers. Thirdly, demand is steady since the canned product can be stored to meet fluctuations in final demand and since profitable operation requires that the canneries operate at as near capacity as possible. Lastly, demand may have a fairly low elasticity because of this need to operate near capacity, due to the fact that the marginal processing cost is low relatively to the average cost owing to heavy overheads.

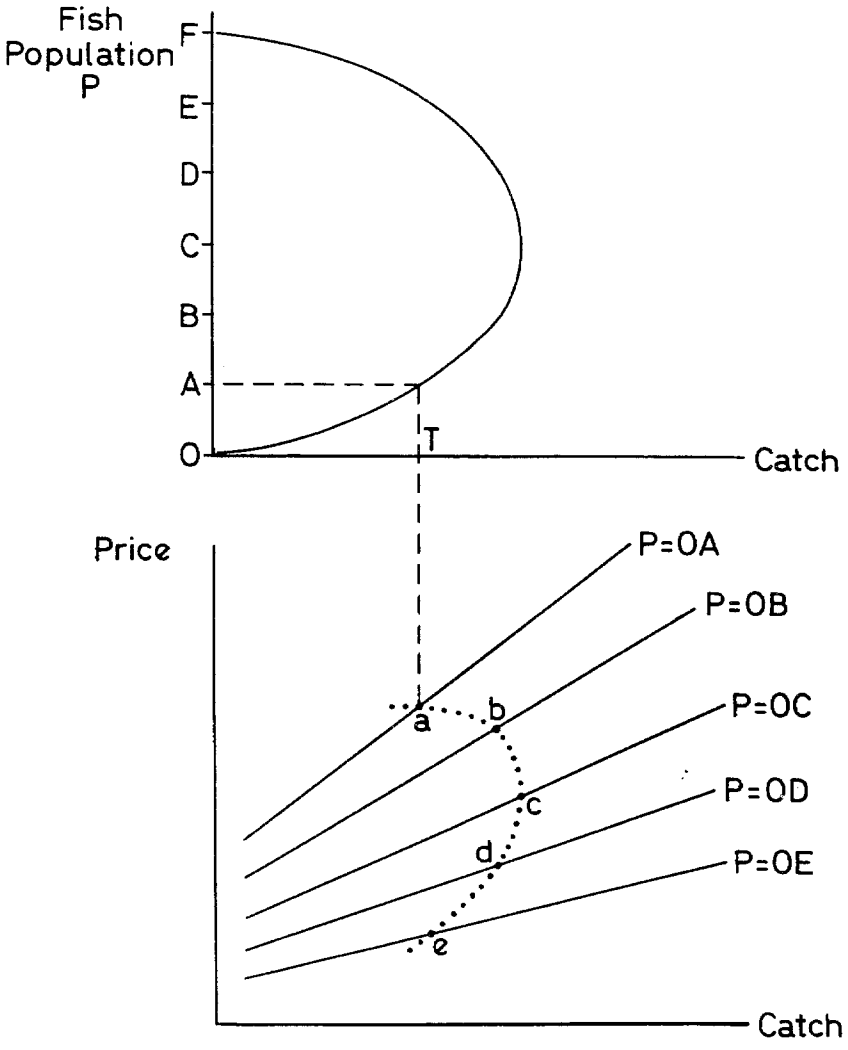
The inland marketing of fish, the fisheries of poor countries and the problems of an economy highly dependent upon the export of fish are all the subjects of papers and discussions in this volume. I shall not discuss them here, however, but instead will examine a topic which is probably of greater interest to most economists: the "conservation" problem. This is too large a topic to be surveyed generally. I propose to consider only one aspect which illustrates the way in which economic analysis can be applied.

While the cost of fishing depends partly upon the size of the fish population, the latter is obviously affected by the size of the catch. There is thus a close interaction between economic and biological factors and any full analysis of the size of a particular fishery must pay regard to both. The problem is not merely one of intellectual interest, since it must form the background to any examination of "conservation" measures. Some fisheries are already the subject of regulations designed to conserve the fish stock and it is important to judge these schemes from an economic as well as a biological viewpoint. It has, indeed, been argued that undue neglect of the economic viewpoint has led to the setting up of arrangements which benefit the fish but not humanity! Some instances are given in the papers and discussions in this volume.

Although the authors of the papers printed here, and other writers (1) have contributed a great deal to the subject, much remains to be done. Thus quite apart from limitations of space it is not possible for me to do more than to outline an approach to a static analysis and to introduce some of the matters which require further examination. It is convenient to start with the Marshallian supply curve discussed earlier in this introduction. This is long-run in the sense that both capital and labour are variable, but it assumes a given stock of fish. A higher fish population would mean a lower cost for any given catch, and vice versa. Thus to bring population into the analysis we have to use a whole set of supply curves, one for each population size. Five curves are drawn in the lower part of diagram 0.1. (See page ix.) The uppermost of these curves, for example, is the supply curve when the fish population is OA.

So much for the effect of population upon catch. We now turn to the relationship running in the opposite direction. In stationary equilibrium the catch must equal the natural population increase, for if the catch were not equal to this increase the population would not be stationary. The upper part of diagram 0.1. shows natural increase (equals catch in equilibrium) as a function of population. At low levels of population births will be correspondingly low (in absolute numbers) while at high levels the correspondingly high number of

(1) Notably Milner B. Schaefer.


Fish
Population
P
F
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B
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O
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Catch
Price
P=OA
P=OB
P=OC
P=OD
P=OE
a
b
c
d
e
Catch

Diagram 0.1.

births will be offset by a large number of deaths. At population OF the two will be equal; this is the equilibrium population in the absence of predation by man. Thus the highest sustainable catch occurs at some intermediate level, round about a population of OC.

The upper half of the diagram shows the sustainable catch at a population of OA to be OT. Thus the only point on the supply curve with a population of OA which is permanently sustainable is at a. Similarly with points b, c, d, e, on the other supply curves. The dotted line which is the locus of such points therefore shows the set of combinations of price and catch which can be continuously maintained under perfect competition. Its position or shape would be changed by (a) an alteration in the natural environment of the fish, (b) a change in fishing techniques due to innovation, or (c) by a change in the supply of any of the factors of production to the fishery in question (which may induce changes in fishing techniques).

We can now consider the relation between the competitive equilibrium and the social optimum by examining three cases in turn (2). Firstly, suppose that equilibrium exists at a point on the dotted line above point c. In this case the same catch could be obtained with a much smaller use of resources - for instance at e instead of a. The social cost of obtaining this saving would be the temporary sacrifice of catch necessary to allow the fish population to expand from OA to OE. Some form of regulation would be necessary both to secure this adjustment and to maintain the new equilibrium position where demand price is much in excess of supply price.

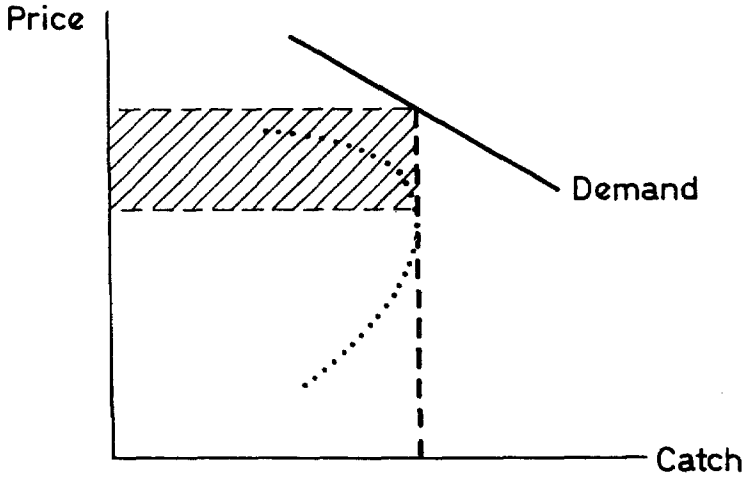

Diagram 0.2.

Secondly, suppose that the demand curve lies above the dotted line for the whole of its length, as in diagram 0.2. In this case with free entry to the industry, more resources would be used than required and the rest of the community would pay an amount equal to the shaded area in excess of what is necessary.

(2) Divergences between marginal social cost and marginal private cost due to a change in the number of vessels directly affecting the catch of other vessels (e.g. in crowded fishing grounds) are not taken into account here.

Fishermen would not be richer in proportion to this, however, as the amount of labour and capital in the fishery would be such as to afford these factors an income equal to their opportunity earnings (3). Under these conditions measures which caused resources to withdraw from the industry could be designed so as to raise G.N.P. while fully compensating any losers.

Thirdly, suppose that the demand curve cuts the dotted line below the point of maximum sustainable catch and that there is equilibrium at the point of intersection J (in diagram 0.3.) on the supply curve S/d. The dashed curve M is drawn as marginal to the dotted line. It is argued in the discussion of paper III that the optimal position is indicated by the intersection of M with the demand curve at K, giving production at L on the supply curve S/e.

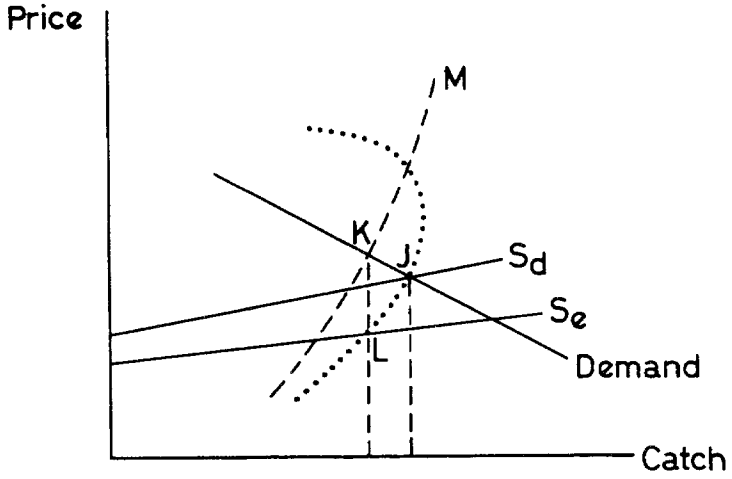

Diagram 0.3.

One difficulty with this is that, assuming perfect competition in the fishery and free entry to it, the supply curves such as S/d and S/e are curves of marginal cost excluding rent (to the intramarginal factors) and thus of average cost including rent. The curve M derived from them therefore includes not only the opportunity cost of the additional factors needed to expand the catch but also the increment in the rent of the intramarginal factors as their returns are bid up. Thus (except where S/d, S/e etc. are infinitely elastic) M shows the marginal cost to the non-fishing community, which exceeds marginal opportunity cost. The point on the dotted line where demand price equals marginal opportunity cost will therefore lie to the right of L unless the supply curves are infinitely elastic.

There is a further much more serious difficulty with the proposition that L is the optimum point. The debunkers of welfare economics have taught us that propositions such as this require the optimal welfare conditions to be fulfilled everywhere else in the economy. Unless we assume this to be the case we cannot say a priori whether L is superior to J.

(3) Higher rents would be earned by the intra-marginal fishermen, however.

This problem does not arise in the first and second of our three cases. There it was shown that the same catch could be obtained with a smaller use of resources; the resulting gain could be distributed in whatever manner was considered fair. Thus while the analysis shows the possibility of improvement, it tells us nothing about an optimal situation. In none of the three cases is there any reason to suppose that the optimal situation is that of maximum sustainable yield.

The improvement which is possible in both the first and second cases can be achieved only by measures which permanently reduce the amount of resources employed in the fishery. The fall in the cost of catching the same amount of fish will create an excess of demand price over supply price which must therefore be prevented from encouraging any net reflux of resources. This requires either that the gap between demand price and supply price is closed (for example by imposing a tax on fish) or that it is prevented from encouraging an influx of resources by some control upon entry to the fishery. If the former is done, the rent created by the more efficient use of the scarce resource accrues to the taxing authority, while if new entry is prevented the rent accrues to the fishermen. The choice of measures must therefore depend partly upon opinions about fairness in income distribution.

Apart from this distributional aspect of the problem, there is a good deal to be said about the choice of an appropriate means of regulation. Suppose, for example, that the device used is a licence fee of so much per fishing vessel. This might lead to some unnecessary inefficiency in methods, since vessels would become larger and be manned more intensively. An ad valorem tax on the catch would not have this effect on production methods.

This analysis of the conservation problem is entirely static; the processes of change have been neglected. It suffers from other limitations as well, and the reader of the following pages will find many questions raised which I have not considered here. As in the other discussions, no firm conclusions are reached: far more problems were posed than solved. The participants in the Round Table therefore ended their meetings with plenty of ideas for further work. If this volume shows the reader that its subject is a fruitful area for research it will have served its purpose.

I. A NOTE ON COSTS IN FISHERIES

by G. M. Gerhardsen

1. INTRODUCTION

Alfred Marshall is one of the few economists who have made reference to costs in fisheries (1). His conclusion is that "normal being taken to refer to a short period of time an increase in the amount demanded raises the normal supply price" while under certain conditions "normal being taken to refer to a long period of time the normal price of fish would decrease with the increase in demand". Since this was written a number of changes have occurred in the fishing industry but few economists if any have paid much attention to the impact of costs upon fish prices. The field still lies unexplored and the purpose of the following notes is only to point out some problems which deserve attention.

It is well established that the possibilities of planning in fisheries are limited because output is difficult to predict. These and other hazards of fishery enterprise have made it difficult to attract capital and the fishing industry has tended to lag behind in industrial development.

In order to understand the cost problem in fisheries we must keep in mind the primary characteristics of the industry, the hunting element, the huge fluctuations in occurrence and the importance of weather conditions. Our limited knowledge of the sea, its changing currents and temperatures and all the aquatic life which this environment supports must be acknowledged. But it is also necessary to take into account the human factor, differences in skill and endurance and, not least, differences in environment and upbringing.

As an example of the latter it may be mentioned that the Portuguese have no serious problems in recruiting for the Newfoundland and Greenland Fisheries while in Norway it is difficult, and in some other countries it would be impossible.

A very striking example of the risks involved in fishing and the differences which exist between boats with respect to the yield of one specific season may be quoted (2) from the Norwegian purse seine fishery for tuna. In the 1953 season, when a total catch of some 7,700 tons was taken, 166 boats had a catch of less than 5 tons per boat, 121 only 5-25 tons, 72 had 25-50 tons, 23 had 50-75 tons and 4 had 75-100 tons. Only 4 had a catch of more than 100 tons of tuna. The average catch per boat was 16.5 tons.

Conditions in 1954 were more or less similar to those of 1953. It was indicated by the fishermen's sales board that 40 tons per boat would be necessary to meet the costs and give the fishermen a fair income but some 80 per cent of the fleet fell below this requirement.

(1) Alfred Marshall, Principles of Economics, Eighth Edition, London, 1936, pp. 369-371.
(2) From the Annual Reports of the Tuna Sales Board in Norway.

The financial hazards of this fishery were further underlined in the 1956 tuna season with less than 2,000 tons as a total catch. It seems fair to conclude that such a fishery can hardly be conducted with a specialized fleet which is only capable of exploiting this particular resource. Tuna fishing can only be considered as an incidental activity of multi-purpose boats which would otherwise be idle at this time of the year. They "survive" a poor season too, because the distribution of overhead costs between seasons is very flexible and they know that, say, the winter herring season is likely to be more successful.

In the following most of the emphasis will be placed on cost in fishing but in due course attention should also be paid to the fact that the processing industries are often equally affected and influenced by the uncertainties. This is particularly true of the major processing industries which take a large part of the catch; those which can pay well but only need a small part of the catch are better off. We must also recognize the very close interplay between processing and trade on one hand and fishing on the other.

Difficult though it is to determine unit costs in fisheries, it is a fact that fish prices are now often fixed on the basis of some sort of cost calculations and estimates. In Norway, for instance, which is the country I know best, there has been for a number of years a price fixing scheme and although due regard has been given to what the market can bear, cost estimates have also played an important part in the negotiations between the Government and representatives of the industry. It might also be said that the fishermen have become more conscious of cost problems and have improved their book-keeping. It is only to be regretted that more research has not been done with respect to it.

As the basis for the fishery fluctuates so much and as, therefore, the economic risk involved is so great it is easy to understand that small boat fishery with relatively small investment still prevails in many countries. It is also understandable that the lay (share) system for giving labour its recompense has been so common in fisheries. The system had its origin at a time when boats and gear were owned jointly by the crew and while there is a trend away from joint ownership the lay system gives much-needed flexibility to the individual enterprise.

Over the last fifty years or so there has been much talk about declining returns in fishing. This is based on the idea that when a certain stock of fish is being excessively exploited the yield of each boat will decline and as the costs do not vary much with the quantity, it will be difficult to make ends meet. Declining profits in certain fisheries have even been taken to indicate "overfishing". As biologists often use the term in a sense which - although Marshall also uses it once - is different from the general usage in production economics, some confusion is caused and our discussion might help to clarify this.

In our times when the need for fishery management is so much in the foreground it might also be fitting to point out that one of the most important factors to be taken into account when considering fishery regulations is the price of the product. If, for some external reason such as meat shortages, fish prices go up, then this will encourage the fishermen to continue fishing even if the yield is declining. If, on the other hand, fish prices decline

then this might be the best protection the stocks could get, for the fishermen do not consider costs in their historical perspective but rather in relation to total turnover and this is determined not only by the quantity caught but also by the price obtained. Again there may be changes in the cost structure which affect total costs one way or the other. The introduction of bigger boats and more effective and reliable propulsion makes the fisherman less dependent on weather conditions and helps him to distribute his costs over a greater number of days.

By referring to changing fish prices I am touching on one of the important provisions underlying Scott Gordon's line of thought in his very interesting, and I may say, pioneering article (3) of 1954. He assumes that fish prices remain constant and apart from possible reductions in fish stocks neither he nor Anthony Scott, who wrote equally well about the same subject in 1955, (4) seem to be much impressed by the many ups and downs in fishing industries, Both authors refer to the cost problem incidental to their description of the characteristics of a common property resource, so long neglected by economists, but some of their conclusions, and particularly the provisions on which they are based, are of great significance for cost problems in general. It is my hope that by bringing in a few examples from outside Canada it will be possible to throw some further light on these problems and to point out some paths which might profitably be followed in future cost research related to fisheries. Some reference to Scott Gordon's and Scott's papers will, therefore, be made in the short sections which follow.

2. COST INVESTIGATIONS

In the following a comparison is made between the total annual turnover and a few cost items in some large and some rather small fishing boats.

TABLE I. 1.

Costs and Annual Turnover of Fishing Boats

(Averages per vessel in 1953)

	Hull trawlers (a)		Norwegian 50-60 ft. boats (b)	
	£	%	N.Kr.	%
Earnings from catch	66,025	100.0	79,382	100.0
Fuel/coal	16,654	25.2	6,982	8.8
Repairs	7,092	10.7	5,619	7.1
Crew's remuneration	17,571	26.6	36,948	46.6
Depreciation of vessel	10,346	15.7	7,000	8.8

Sources:

(a) White Fish Authority: Fourth Annual Report and Accounts for the Year Ended 31st March, 1955, Her Majesty's Stationary Office, London, 1955.

(b) "Lönnsomhetsundersökelser basert på fiskefarkosters årsdrift", Fiskets Gang, No. 1, 1954, Bergen, Norway.

(3) H. Scott Gordon, "The Economic Theory of a Common-Property Resource: The Fishery", Journal of Political Economy, Volume LXII, No. 2, 1954, University of Chicago Press, Chicago, Ill., U.S.A.

(4) Anthony Scott, "The Fishery: The Objectives of Sole Ownership", Journal of Political Economy, Vol. LXIII, No, 2, 1954, University of Chicago Press, Chicago, Ill., U.S.A.

The purpose of these figures is to indicate (1) the great difference in the orders of magnitude and (2) the differences which exist with respect to the relative importance of the various cost items. As several items were not immediately comparable they had to be excluded here but it is to be hoped that some empirical research will be devoted to international comparisons of cost structure; this would greatly extend the usefulness of national cost investigations.

Often the purpose of cost investigations has been to compare various types of craft engaged in the same kind of fishing to see which of them is doing best over a number of years; less attention has been paid to the impacts of cost on fish prices. Lately cost investigations have also been used for the purpose of giving subsidies a maximum effect.

One striking feature might be pointed out on the basis of the above: on the big boats the percentage of the catch value which is paid for labour (to the crew) is much smaller than on the small boats. There are several suitable examples of such differences. In Sweden cost investigations have shown that on small boats (insurance value S.Kr. 10,000 to 20,000) nearly 50 per cent of the catch value was paid for labour while on the bigger boats (insurance value S.Kr. 140,000 to 180,000) this percentage figure was only about 41 (5). On small rowing boats using single line and hook the percentage figure will exceed 90.

Harden F. Taylor refers to an entirely different kind of cost investigation (6). He compares the costs of fishery products with those of agricultural products and arrives at the conclusion that "the bulk fisheries yield food values in protein and fat at far lower cost at the point of production than that of land animals".

This leads us to speculate about the unfairness in the present situation and to reiterate Bismarck's statement about herring being so low in price only because it was abundant. There is reason to believe that with the advancement of food technology there will be a wider recognition of fish as food and this, it is hoped from the producers' point of view, will have a favourable impact on prices. This again may facilitate the exploitation of resources which are as yet inaccessible owing to the high costs involved. Meanwhile the industry must operate on the basis of prices to be obtained in the market and these are at the moment tending downwards rather than upwards, thus putting new demands on the producers' flexibility with respect to his cost structure.

3. ELASTICITY OF SUPPLY

It might now be time to revert to Marshall's conclusions with respect to fish prices in the short run and speculate a little about the cost curves for different methods of fishing in the short and long run. Unfortunately, very little has been done in this field and one can hardly do more than give some examples and point to some general principles.

(5) Ingemar Gerhard, Västkustfisket, dess organisationer och ekonomi, Svenska Västkustfiskarnes Centralförbund, Gothenburg, Sweden, 1955.

(6) Harden F. Taylor and associates, Survey of Marine Fisheries of North Carolina, University of North Carolina Press, U.S.A., 1951.

One might easily give examples of rising cost curves (indicating diminishing returns) if the quantity is to be increased at short notice. The fishing season might be extended in time to start earlier or to continue longer than usual and the catches are then not as good as in the peak season. Or it might be extended geographically so that for instance the fringe of the fish stocks are exploited. This may also mean operation in rougher weather, such as in the earlier part of the Norwegian Winter Herring season, a factor which in itself reduces catches and increases overheads.

What happens in such cases of rising unit costs in fisheries is that the input of production agents is no longer in the same "harmonious" relations as formerly. We consider the situation as a "snapshot" at one point of time and find one kind of "diminishing returns". This situation, obviously, will only be possible if there is the inducement of a corresponding increase in the price obtained for the products.

As pointed out by Scott (7) the supply curve "(with the price given by the world market situation) will be made up by the addition of the relevant portions of the supply curves of individual fisherren".

One of Scott Gordon's basic assumptions is that the product price does not change with an increase in catch, for, as he puts it, "the assumption of a fixed product price is reasonable, since our analysis deals with one fishing ground, not the fishery as a whole". (8) If we relax this assumption we may take examples from the Norwegian cod fishery at Lofoten. As it is all one stock of fish, yielding annually say 100,000 tons, it must be considered one fishing ground but a rather important one. With the present minimum prices at a fairly high level prices obtained tend to be constant but in the poor fishing seasons such as in the early 1950's prices far in excess of the minimum prices were obtained, due to competition between a large number of buyers. Conversely in good seasons prices tend downwards. One of the points is that in, say, the stockfish trade, there is only a relatively small market paying the highest prices for the commodity, other markets cannot support similar prices for the raw material. Cost considerations in the individual firms have an inflationary effect on prices to fishermen, particularly when it has been established that the season is not going to be a very successful one.

"Diminishing returns" in this sense must be distinguished clearly from the more biological meaning which is related to experience over a certain period of time and which is used to convey the relationship between a decline in yield and the decline in a given fish stock (9). Here the time element has been taken into account for considerations of decline in fish stocks are always long-term considerations. The question now is whether and how the long-term considerations taken into account by the fishermen differ from the overall and long-term line of thought with respect to the stocks.

(7) Op. cit., p. 120.

(8) Op. cit., p. 136.

(9) Although there are certain details in it which I would like to express differently now, I might perhaps refer to my article on "Production Economics in Fisheries", published in Revista de Economia, Lisbon, Portugal, 1952.

From the individual master fisherman's (entrepreneur's) point of view, it would be senseless to be over-concerned about the decline in fish stocks and try to do something about it by reducing his fishing effort. He must abide by any regulation introduced to achieve wise management (10) of fishery resources and may even help in enforcing such regulations but apart from that his guiding principle must be to obtain the biggest profit possible with a minimum of total input. In these considerations of the economy of his firm, decline in fish stocks is but one of the many factors which he takes into account in his simultaneous approach to the many problems of business management.

While Scott refers to the cost curve of an individual fishing enterprise in his attempt to show that Scott Gordon's conclusions only hold true in the long run, neither Scott nor Scott Gordon say much about the cost curve of the individual firm. It is to be hoped, therefore, that our discussion may clarify some of the issues involved.

In order to facilitate discussion we might make a distinction between the fisherman's reaction to (a) declining returns from the fish stock and (b) changes in fish prices obtained and (c) changes in the prices of productive agents, assuming for a while that technology remains unchanged,

As to the question of whether the cost curve is rising (as indicated for the short run) or whether it has the opposite trend we may distinguish between those stocks that are noticeably overfished and stocks which are fairly abundant. (Fortunately there are still plenty in the latter category).

When the demand to which he first reacts by a short-term adjustment of his output proves to be of a more permanent nature the wise master fisherman (entrepreneur) makes a more extensive and long-lasting adjustment of his production process. Thus for instance the growing demand from the expanding industrial population of Europe was met with bigger and better boats exploiting resources farther away from home.

Faced with a declining quantitative return from fishing the North Sea, the manager of an individual fishing enterprise may find it advisable to use less capital equipment and, perhaps, less manpower. It might be better to have, say, a smaller loading capacity in the craft when the quantity of the catch is smaller (although not necessarily less valuable).

Many of those who have discussed the over-fishing problem of the North Sea so far may not have paid sufficient attention to the fact that the fleet consists of individual boats owned by individual firms with individual judgments and individual decisions. In some respects we may find the North Sea situation a gloomy one, but the fact remains that fishermen have made a profit there throughout the fifty-year period in which the over-fishing problem has been discussed. Gordon blames the biologists for not paying sufficient attention to the human element: "On the whole, biologists tend to treat the fisherman as an exogenous element in their analytical model, and the behaviour of fishermen is not made

(10) The term "management" of resources is often to be preferred to "conservation" as it conveys better the meaning which most biologists have in mind.

into an integrated element of a general and systematic "bionomic theory" ". (11) This sounds like a slight exaggeration but there is no doubt some truth to it. A further study of the "firm" in fisheries would have helped in extending the argument, verifying some conclusions and, perhaps, analysing some of the assumptions. In the Pacific halibut fishery the boats and their equipment are fairly uniform but this is not the case in the North Sea fishery. Many fishing methods are used to exploit the same stocks. The craft differ in size, design and methods of propulsion. They come from different countries, they are differently financed and their managers are often confronted with different markets. In the same type of fishery such as Danish seining the number of men used may vary from two in certain Norwegian ports to eight or more in Scotland.

In these circumstances it is only a rough approximation to assume that fishing effort is increased (or reduced) by changing the number of craft, which are taken to be uniform. European fishery biologists no doubt understand these problems and appreciate the difficulties in measuring effort in North Sea fisheries in a uniform manner. (They are not suggesting quantitative regulation of the fisheries but rather more indirect measures for the purpose of resource management). I imagine they too would welcome economists describing the economic consequences of the various measures which are proposed as resource management, as they manifest themselves in costs and profit on individual boats of various kinds and for the industry as a whole. This, no more than biological research, can be done with test-tubes; it must, even more than biological research, be carried out in the industry itself.

In the master fisherman's long-term considerations he does not compare one point of time with another. It is not in this manner that the time element enters the picture. For his planning the time element only means that he may count on a certain stability. He may invest in lasting capital goods such as fishing craft. And the processing and trade people with whom he is associated will erect shore facilities. Transport may be arranged etc. The law of diminishing returns is still valid and applies to all factors. But now everybody can adjust themselves to it.

Another point which we want to investigate is the extent to which fishing vessels can draw their catches from different fishing grounds.

Many European fishing craft are multi-purpose craft. Several years ago I referred to the problem which this creates for the fisherman-entrepreneur as the "combinatior problem". Naturally, he chooses that fishery which he expects to give the greatest profit (provided the crew is willing to go along) but his evaluations are always made a priori and he runs a considerable risk in view of the rapid changes which might occur in any fishery. Yet, from the point of view of one individual fishery, participation is often very flexible. The owner of a craft may even temporarily sacrifice any contribution to overhead costs just to be able to keep the craft in operation. He still tries to make each season as profitable as possible. The bigger boats which can also operate on the coastal banks will only be at Lofoten at the peak of the season.

(11) Op. cit., p. 128.

As simultaneous failures of different seasons are rare, the combination of several fishing seasons during a year provides a certain insurance against complete failure. An example of such a combination in Norway is purse-seining for winter herring in January-March, cod fishing off Greenland (with trawl or long-line) in May-September. When vessels are designed for two or more fisheries which are so different in nature, it goes without saying that their design is in a way a compromise. If, somehow, demand for a certain fish species increased, then specialization of craft might open up some possibilities of rationalization and this again might lead to reductions in cost. Generally speaking, long-term increase in demand may well enable the fisherman to arrange his production in a more effective manner and thus, as Marshall (12) puts it, "the normal price of fish would decrease with an increase in demand", implying that costs have been reduced However, with the history of European fisheries as a background, it is not very realistic to discuss long-term adjustments without referring to technological changes. This will be done in the section which follows.

4. FLUCTUATIONS IN COSTS AND COST DETERMINANTS

(a) GENERAL COMMENT ON FLUCTUATIONS

The demand for a "sustained maximum yield" from a given fish stock has been repeated ad absurdum. The term puts too much emphasis on the naturalistic, romantic approach to fisheries and it puts man and his needs too much in the background. If the purpose of our activities is to benefit man (i.e. consumers and producers) then a steady quantity is certainly not a realistic target.

The point is that the economic conditions in fishing are subject to large fluctuations. Fish schools change their spawning and feeding migrations and they vary greatly in abundance. Prices of the various cost items are changing. Coal and fuel oil, gear and boats have undergone rather large changes over the last fifty years or so and the master fisherman has had to adjust his production to meet these changes so that fishing might continue to render a profit. Lack of sufficient speed in such adjustments rather than "over-fishing" is often the reason why fishing does not pay a profit to the owners of the equipment and give the operatives an adequate income.

In addition to and often coinciding with these changes there are technological changes. A few decades after the introduction of steam engines in the fishing fleet, which revolutionized fishing in countries such as Germany and the United Kingdom, the internal combustion engine suitable for smaller craft and, not least, the reversible pit propeller led to a second industrial revolution which had a greater impact on fishing in the United States and Scandinavia. The last two decades are marked by a considerable improvement in small engines and winches, improvements in boat design, the wider use of new fishing methods, such as the Danish seine and, above all, the introduction of diesel and semi-diesel engines in all types of fishing craft. Electronic devices for fishing and navigation also deserve mentioning.

(12) Op. cit., p. 371.

It goes without saying that all these technological changes have necessitated considerable changes in fish production methods and have had a considerable impact on costs and on fish prices. It might well be for all we know today that these changes have helped progressive fishermen in their effort to cope with the changes which continued exploitation has brought about in the North Sea fish stocks, thus enabling them to continue their service to the European fish markets.

History shows that in the same fishing areas some fishermen who in time took cognizance of the changes were able to make a profit while others who failed to recognize the situation or lacked the necessary finances were lagging behind with obsolescent craft and equipment and operated at a loss with low recompense to the labour force.

(b) REINVESTMENT CYCLES

Experience has shown that when fishing gives good profits much will be invested in fishing craft - by far the biggest capital item. Conversely when profits are low investment will fall off and existing craft will be lacking in maintenance. A special investigation on the basis of the Norwegian 1940 registry of fishing craft shows that of the decked motor boats which were then in commission almost 2,000 were built in 1915-19 while only some 840 were built in the following five-year period:

TABLE I. 2.

Age of Decked Norwegian Fishing Craft in 1940

Years of construction	Number	Per cent of total
Before 1900	52	4.2
1900 - 04	443	3.6
1905 - 09	1,122	9.1
1910 - 14	1,936	15.9
1915 - 19	2,116	17.2
1920 - 24	843	6.9
1925 - 29	1,451	11.8
1930 - 34	1,592	13.0
1935 - 39	1,661	13.5
Not accounted for	606	4.9
TOTAL	12,290	100.0

Source: G.M. Gerhardsen, Vare Fiskerier I, Bergen, 1946, p. 110.

The effect of the very limited building of new boats in the early 1920's was aggravated by the failure to keep existing boats in sufficient repair and the reinvestment need was badly felt in the 1930's when the boats built during the First World War were due for replacement. Despite considerable marketing problems which made price subsidies necessary for most white fish landings in Norway during 1935-39 a loan and grant scheme for new construction

in the Norwegian fishing fleet was also launched by the Government. Now again the boats which were built at that time are being replaced and will be replaced at an accelerating rate in the years to come.

The lack of new construction and the extensive destruction of craft during the Second World War made it necessary to invest much in fishing craft during the late 1940's. It may be said truthfully that the fleet has now been reconstructed at a fairly high standard. In the long run the concentration on reconstruction will however most likely lead to an almost equally intense reinvestment need some 10 to 15 years hence, depending a little on how far and how soon innovations such as stern trawling and/or freezing at sea gain momentum.

(c) COST AND LABOUR SUPPLY

-Scott Gordon seems to draw the general conclusion that ".....fishermen are not wealthy" and "by and large, the only fisherman who becomes rich is one who makes a lucky catch or one who participates in a fishery that is put under a form of social control that turns the open resource into property rights". (13) This conclusion is no doubt true if we accept all the underlying assumptions: that there is no fishing - induced change in product prices and factor prices, that there are no diminishing returns in fishing, etc.

"Wealth" and "rich" are difficult terms to use; in a more precise econometric investigation, which I hope will be forthcoming, they must even be discarded altogether. However, in my interpretation of these hazy terms a good number of able fishermen have become "rich" and, by the standards of their environment, "wealthy", in Norway, even if we don't include whaling in "fisheries". In recent years it has been quite common for an ordinary fisherman to get a share of some N. Kr. 5,000 from the 2-3 months' winter herring season. This is 50 per cent of what an average industrial worker (to say nothing about an average farmer) makes in a year. Master fishermen and skippers make a multiple of this amount (in addition to what they might get as capitalist profit if they have shares in the equipment). As product prices are fixed beforehand in the herring fishery they remain stable throughout the season, but all factor prices vary with the catch and its value and there have been no signs of over-fishing. Admittedly, however, each man is backed by a considerable amount of capital equipment: a fact which, as in agriculture and shipping, is essential in explaining the level of income.

There are great differences even in "luck" but I wonder whether the idea of the "lucky catch" often stems from failure to recognize differences in skill, experience, initiative, field of interest, etc. Investment in modern fishing boats simply cannot be based on hopes of a lucky strike. Yet there are always lots of uncertainties left in fisheries and the recent labour shortage has revived the problem of incentives. There is apparently a trend away from the gambling element. The fisherman may have become more realistic in his thinking about the industry. He too wants security and even when chances of a fair share in fishing operations are good, shore work, which is now easily available, is being preferred. The profit margin in fisheries needs to be pretty

(13) Op. cit., p. 132.

high to attract a sufficient labour force. The British distant water fishing fleet and the Norwegian purse seining fleet have apparently managed to achieve this. Thus in the Norwegian cod fishery off Greenland, although fish stocks are abundant, boat owners have to promise their men employment in the winter herring season where boosted demands have coincided with a favourable run of herring and considerable technological developments in catching techniques. Yet it is only the new and costly boats with excellent crew accommodation that can be fairly certain of obtaining sufficient crews for the Greenland season. In the Netherlands no fishing vessels go even as far as Icelandic waters.

It is natural and understandable that fishing boat owners and Governments too are concerned about the problems of recruiting. They do much to encourage it in the form of guaranteed minimum share schemes. And it is important to ensure the services of a sufficiently great number of young people in the industry. The labour force cannot be reduced too fast but it holds true for fisheries as for other industries that a higher degree of capitalization is likely to give the operative a better income. The fisherman is inefficient because he is poor and poor because he is inefficient and is thus, like many farmers, caught in a vicious circle from which he can only escape through more capitalized activities.

Recent experience has proved that fishermen are just as mobile as other labour. There is reason to believe that the apparent immobility observed around 1930 was not due to any special psychological reasons peculiar to fisheries but was rather due to the lack of opportunities elsewhere for themselves and the equipment which they owned. Now that so many of them have been able to improve their lot and other opportunities are available they not only seek employment in other industries but also, at considerable risk, venture into new fields of fisheries.

The rise in living standards which we are now experiencing has already begun to show its impact on costs in fisheries. Not only do the fishermen require a better income. They also require better accommodation on board, thus putting new demands on the design and the size of fishing craft. Moreover, the introduction of minimum share schemes, of subsidies and of measures aiming at evening out the heavy fluctuations in fishermen's incomes have an effect on the flexibility of costs and, consequently, on fish prices. As the pace of this development varies from one community to another and, above all, as the starting point is different when comparing one country with another, considerable differences are likely to arise in international competition.

DISCUSSION

The discussion was opened by HILDEBRANDT, who made a series of points of comments and criticism. The points made followed roughly the order of the paper, and are given here in that order:-

(1) Purely scientific research should be distinguished from fishery management. GERHARDSEN's discussion of the use of cost estimates to fix fish prices was unsatisfactory; the fixing of prices by "what the market will bear" was only a question of management. What was the 'right' price? only econometric research could give an answer. The speaker asserted that in Holland their cost-calculations can be guaranteed as an accountant would guarantee his report.

(2) HILDEBRANDT agreed with GERHARDSEN as to the value of economic research and as to the importance of book-keeping as a tool of management in the fishing industry.

(3) The argument for cost-research as a basis for pricing was unsatisfactory insofar as most fish was sold by auction. In the short run, supply and demand, not costs, would fix prices. In the longer run, costs did affect prices, but only quantitative research could show how.

(4) The suggestion that some fishing behaviour was explicable as a lottery was unconvincing.

(5) Was GERHARDSEN's discussion of the influence of the share system on flexibility a statement of fact or simply an assertion? In his own experience, HILDEBRANDT had discovered that while the optimum size for a shrimp fishing vessel was indicated by research to be around 80-100 h.p., owners believed the right size to be 40 h.p., because they treated all labour-payments as costs. It was a question of owners' and fishermen's attitude to the system.

(6) The speaker did not agree that low prices need be fatal to fishermen; at worst they affected only marginal producers. But:-

(a) The industry's cost structure was flexible because crews shared in both profit and loss.

(b) Boats could operate at prices covering running costs and the minimum payment the crew would accept. Usually, technical obsolescence was what determined the life of marginal fishermen.

(7) In relation to the discussion of elasticity of supply, qualitative views were not useful, and quantitative estimates were made difficult by lack of data. But the term "diminishing returns" should be left to the biologists. Degressive and progressive costs was a better description; this was what GERHARDSEN was talking about. We should distinguish the <u>biological</u> problems of optimal stock and optimal total catch, and the <u>economic</u> problem of maximum net yield from the optimal catch.

(8) GERHARDSEN emphasised the importance of technical changes and of fluctuations in costs and changes in the cost-determinants. This was a matter of particular importance to the small fisherman, who was unable to follow changes because of lack of capital. There was a special problem of finance which might be discussed in a later session.

GERHARDSEN said in reply that he was generally unconvinced by the introductory comments. He was not satisfied that we should treat pure economic research as the only matter of interest. Studies such as SCOTT GORDON's were of interest and value, but his own leaning was towards something of more immediate application to fishery problems - hence the reference to price policy in his paper. It was necessary to understand the industry, the nature of the sea, inability to see the resource, and so on. Co-operation with biologists and others was more profitable than isolation. The suggestion that costs were not useful for pricing without complete information was wrong. Somebody had to take decisions and it was unrealistic to aim at knowing all before acting. Norwegian data were in fact extensive.

GERHARDSEN saw no need to abandon the term "diminishing returns", while agreeing that HILDEBRANDT's terms were quite clear. He agreed that when a fishery industry in one country consisted of small firms and was in competition with an industry containing large units, it would need special institutions to give it the advantages of size. At the same time, the Fisheries Bank set up in Norway was often criticised for not granting sufficient loans to its clients.

The proposition about flexibility and the share system was an hypothesis whose plausibility was supported by history - e.g. the survival of small firms in Norway and elsewhere in the crisis of the 1930's, because it was easier to reduce labour costs than in other industries. However, the effects of the system on the fisherman's standard of living might to-day be unacceptable.

CRUTCHFIELD initiated a discussion on supply conditions. He made the proposition that input-output relationships were so unstable in fishing that short- or even long-run maximising behaviour of the traditional kind was not relevant to the fishing industry. In support of this, it was also suggested (SCOTT GORDON) that risk-attitudes in the industry might in some cases have negative discounting values. TURVEY accepted the instability, but thought that it should not prevent a formalisation of the decision-taking process, possibly by use of the techniques developed by SHACKLE and others for handling uncertainty problems. GERHARDSEN said that firms used common sense but would take advice from the biologists, who were established. There was certainly need for econometric and other research, but the economist must also take care to communicate; agencies were needed to establish liaison with the fishermen.

Dissatisfaction was also expressed with traditional analysis by CASSADY, who wanted discussion in terms of three time-periods (short, medium and long run) rather than the usual two. This would reduce confusions created because people made different implicit assumptions about the period being considered. He thought his argument was strengthened by a comment from SCOTT GORDON, who said that the period distinction was important to an understanding of investment; there was usually some excess capacity, so that demand increases led to supply

increases in the short period, but induced no new investment unless the conditions persisted in the longer period. TURVEY dissented; the need was not for more runs but for acceptance of the irreversibility of the supply curve. If, following an increase in capacity, demand fell back to its former level, the reduction in output would depend on such matters as the ease of leaving the particular occupation, the availability of a second-hand market for ships and prices on it, and so on.

TURVEY pointed out that opposite assertions had been made about the elasticity of supply of fish. Was this a contradiction or a difference of view? GERHARDSEN replied that he thought that the differences arose from differences in product. In the Norwegian winter herring industry, for example, an increase in demand would produce no change at all during the season, when producers would already be working at capacity because the herring might go or fishing be prevented by storms. But if the high prices had been expected, the fishing season would have started earlier and there would possibly be more searching of fiords for 'detachments' of herring at a time when the fleet would otherwise be moving into other activities such as sealing. CRUTCHFIELD also emphasised the need to distinguish the responsiveness of supply of different kinds of fish. Thus in Canada increased demand in most instances would lead to increased effort and larger catches. In the case of salmon and halibut, however, where supply was limited by law, such an increase would cause costs to increase without affecting total supply.

SZCZEPANIK argued that costs could be discussed only in relation to the theory of the firm, and propounded such a theory which he thought relevant. During his recent trip he had not found fishing firms doing accounting on the east coast of Malaya or near Bombay, but this did not mean they were not maximising.

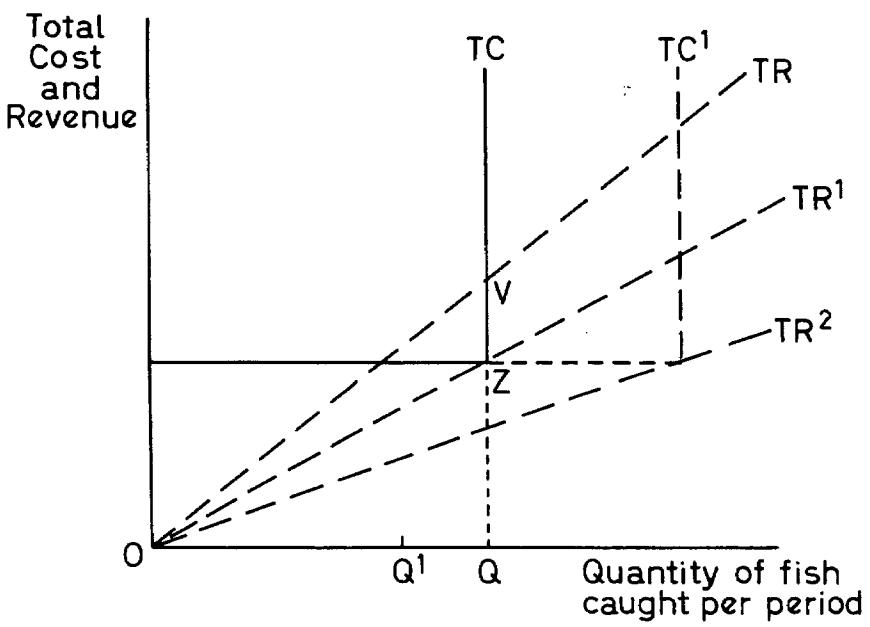

Diagram I.1.

In Diagram I.1. the shape of the total cost curve TC relevant to the firm's decisions was determined by the following factors:-

(a) The costs comprised the cost of technical capital and the value of subsistence food carried.

(b) The quantity of output of a fishing unit had a fixed upper limit given by capacity, even taking luck into account.

The total revenue curve TR was derived from the fixing of the price of fish by auction or by contracts with middlemen.

The maximising output would be OQ - the capacity output in space and time. VZ was profit, though not in the pure economic sense since it included the distributive shares of fishermen in the family unit. In fact, OQ would not be the usual output, because of luck reducing the catch (e.g. to OQ_1). This would reduce surplus value or result in a loss. A more important reason for small surplus value, however, was that middlemen tried to force prices down, so that the total revenue curve became TR_1. The creation of a more efficient fishing unit would move the vertical section of the cost curve to the right - TC_1. This could be done by such things as fish finders, and would increase surplus value. Or fixed costs could be lowered by 'mechanisation' of catching which enabled a reduction in the subsistence fund.

In SZCZEPANIK's experience, such changes did not increase the surplus value accruing to the fisherman, but caused a decline in the price of the catch; the total revenue curve shifted to TR_2. In the light of this analysis, the only way to help the fisherman was to play with prices - either by eliminating the middleman and his share of surplus value or by using some kind of stabilisation, fixing prices at a level fair to consumers and giving a reasonable standard of living to producers. The ideal was the co-ordination of mechanisation and price output control by a marketing organisation, price control being the best policy if such an organisation did not exist.

The model was criticised by a number of speakers, who objected to the cost-definitions used and pointed out that the speaker was using a very narrow and special definition of the firm and of the maximising time-period. SCOTT pointed out that there were very many more reasons for increasing costs than SZCZEPANIK had admitted. Many of these had been listed in GERHARDSEN's paper. Also, if the analysis was extended from a single vessel to the fleet or industry further reasons for increasing costs appeared.

POPPER felt that the topics discussed might be reduced to a study of the factors of fishing input and their variations over time. Arising out of this were questions of the nature of supply curves and of cost conditions. Such a study would be of great value, whether the information were in respect of the short run for particular industries or in respect of the long run and related to general development policies and resources management questions.

POPPER suggested a number of questions that he thought of interest in this context:

Conventional analysis treated labour as a short-run variable factor, capital as a fixed factor. Was this reasonable for fishing? What in fact was the shape of the supply curve of fishermen's labour? Was it peculiar and, if so, why? What was the nature of the peculiarity and did it vary between fisheries?

POPPER's own conclusion would be that not many generalisations were possible. It was necessary to consider particular cases and circumstances. The information of GERHARDSEN's paper, for example, raised interesting questions about the shape of supply curves which would be important in a study of the Norwegian fishing industry but might be less relevant elsewhere.

ROBINSON agreed with POPPER's general position. Confusion was created by treating non-homogeneous things as homogeneous. In particular, inshore and distant water fishing should be distinguished. The GERHARDSEN example was misleading in this respect. Inshore fishing might be compared with the family farm, insofar as it was carried on by small units often organised on a family basis. Distant water fishing was more similar to the organisation of the 18th. and 19th. century Merchant Adventurers; a series of joint enterprises out of which some ships earned profits and others did not. The initial investment was small in the case of inshore fishing, but was much more considerable for other types. Distant water fishing could well be compared with industrial enterprise; such questions of whether to send ships to sea or lay them up were of importance. Tramp shippers did work out lay-up and avoidable costs and marginal costs, for example the cost of getting to the River Plate in order to work the area. Were not distant water fishermen nearer in nature to those tramps than to inshore fishermen?

ROBINSON raised the further point that nothing had been said about fish wastage. A large proportion of the fish caught did not in fact reach the market. Research was going on into refrigeration and handling to improve the condition of the fish at market, and interesting questions arose in relation to distant fishing as to the relative advantages of rapid transit by improved engines etc. and better 'keeping' by such means as refrigeration. If there were diminishing returns in fishing, were these problems of getting to market not of great importance.

GERHARDSEN thought that ROBINSON over-simplified the situation. In the United Kingdom a distinction between at least three types of fishing (inshore, middle and distant water) was used, but these terms would be given different interpretations in different countries and what is distant to the United Kingdom may be near to Norway. The boats included in his example were there because they were in competition; the Hull fishermen travelled greater distances and boats had to be of a larger size. Thus when deriving supply curves, labour was found to be a more significant element in Norway than in Hull. In Grimsby, a trawler owner expected a skipper to earn £7,000 per annum; capital was important enough to make wage-payments much less relevant to policy decisions than in Norway. There was much truth in ROBINSON's comparison with the farmer. In Norway 30,000 people followed both occupations, and transferred their business habits between them. But there was a growing distinction - fishing and techniques of handling boats were being affected by the technical changes in fishing. GERHARDSEN and VAN DYK also made comments on the wastage problem. The O.E.E.C.

survey of 1950 indicated that more than 50 per cent of the fish caught was 2 weeks old when it reached European consumers. This was the most important European problem. Various attempts had been made to solve it, including:

(1) The British factory ship trawler, which was being emulated by the USSR.

(2) The British method of freezing on the conventional trawler, which had not so far proved successful. Food technologists had improved methods of handling on board, but this could not be an entire solution. One unanswered question was how well the consumer would take to frozen fish.

(3) Increasing speed. Speed had increased from a possible 8-9 knots in the 1930's to 15 with a possibility of reaching even 17 to-day.

The most rational solution in Europe would be for trawlers to be able to land in other countries, but of course this raised all kinds of political questions.

ZOETEWEIJ was struck by GERHARDSEN's comments on the need for data and the collection of information. It might be useful to consider further what types of information should be obtained about costs, and why. GERHARDSEN mentioned some types, but others might be more important. The impact of costs on prices that GERHARDSEN was interested in discovering might be relatively trivial, in that prices would follow costs sooner or later. The use of costs to determine price policy was in any case dubious. Were cost-plus systems desirable? More important might be such specific information about cost-functions as:

(1) Costs as a function of distance.

(2) Costs as a function of length of season.

(3) Costs as a function of the size of ship-owning enterprises.

These were illustrative only; it would be useful to add to them by discussion as a guide to further research.

GERHARDSEN was in broad agreement with the high priority that ZOETEWEIJ assigned to cost research in general, as were other members of the group. It had to be remembered, in GERHARDSEN's view, that the small firm structure was often retained for reasons other than costs, and that public institutions could be used to give the benefits of scale economies.

II. FISHERMEN'S REMUNERATION

by H. Zoeteweij *

This paper records some information on systems of fishermen's remuneration prevailing in sea fishing (excluding whaling). In most cases fishermen's earnings depend wholly or largely on the value of the catch, under a large variety of arrangements. This extreme form of profit sharing (1) sharply distinguishes the fishing industry from practically all other industries in respect of labour remuneration and cost. Some tentative observations are made on the probable reasons for this feature of the industry and on certain possible effects thereof.

In the time available it has not been possible to attempt an exhaustive or even balanced examination of available data on fishermen's remuneration and the information on which the analysis is based constitutes a somewhat restricted sample. The analysis and conclusions suggested should accordingly be interpreted with caution.

PATTERNS OF FISHERMAN'S REMUNERATION

A survey conducted by the I.L.O., (2) based on data available in 1947-49 but in certain cases referring to earlier dates, reveals that systems under which earnings depend entirely on the value of the catch were the general rule in Australia, Belgium, Canada, Chile, Denmark, France, Greece, Iceland, India, Northern Ireland, Norway, Scotland, Sweden, Turkey and the United States. Other systems include: in Australia, a daily wage plus "basket money" in steam-trawling; in Belgium, a combination of fixed monthly wages and a percentage in the catch on board company-owned boats; in Canada, a similar system in part of Atlantic salt-fish trawling; in Chile, monthly or daily wages plus a bonus depending on the value and type of the catch for fishermen working for larger enterprises; in the Faroe Islands, a weekly wage plus a share in the value of the catch with a guaranteed monthly minimum on board trawlers landing fresh fish; in Finland, wages with or without a share in the catch in certain types of fishing; in France, fixed monthly wages plus a share in the value of the catch on board trawlers operating more than 50 miles from the coast; in Greece, monthly wages for a declining minority of trawlers; in Iceland, fixed wages plus a bonus on the

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(1) In certain cases also loss-sharing: in United States Pacific Coast fishing, when the "net stock" (gross proceeds of the catch minus contractual deductions - including the boat owner's share (sic)) is negative, a portion of the loss is charged to each member of the crew (see James A. Crutchfield, "Collective Bargaining in the Pacific Coast Fisheries: the Economic Issues", Industrial and Labor Relations Review, July 1955, p. 542.

(2) International Labour Office, Conditions of Work in the Fishing Industry, Geneva, 1952, p. 49 et seq.

proceeds of the catch for trawler crews; in Ireland, wages per two weeks' trip plus poundage on the proceeds (skippers' and mates' commission based on proceeds of catch only); in the Netherlands, a share in the value of the catch with a guaranteed weekly minimum in herring drifting and fixed monthly wages (not for skippers) plus a share in the value of the catch in trawling; in New Zealand, a minimum weekly wage in trawling; in Norway, fixed wages for certain technical crews (stewards, stokers and so on) on the largest vessels, and crew's option of fixed wages or wages plus share in the value of the catch in Arctic fishing; in Poland, weekly wage plus a share in the value of the catch in deep-sea trawling; in South Africa, weekly or monthly wage plus commission on size of the catch in trawling, piece rates in shark and line fishing; in England and Wales, in deep-sea trawling skippers and mates share in the net proceeds of the catch with a guaranteed daily minimum, and other crew receive a fixed monthly wage plus poundage on gross earnings; on board drifters, share in net earnings with guaranteed weekly minimum; in Scotland, weekly wage for certain technical crew members in herring fishing, daily wages plus a share in the value of the catch (skippers and mates receiving only a share but with daily minima) on board steam trawlers; in the United States, in certain cases a combination of weekly and monthly earnings with a share in the catch for captains, mates and specialized personnel (engineer, radio operator, cook), piece rates in Alaska cod fishing. Under current collective agreements in Western Germany there are monthly wages (though not for skippers) plus fixed amounts per unit of catch in salt herring fishing; wages (not for skippers) plus a share in the value of the catch for fresh herring and other deep-sea fishing.

Actual arrangements defining the share of the crew and of individual crew members in the catch differ widely in detail. In certain cases the share is determined merely by the size of the catch, in most cases by its value. In the latter event the practice is to deduct from gross proceeds certain items of expenditure and to divide the rest in fixed proportions between the vessel and gear and the crew. The share going to the vessel and gear includes depreciation, interest, taxes and profits; that going to the crew includes remuneration for labour. An important question, on which arrangements differ widely, concerns the distribution of running costs, including the cost of supplies (fuel, ice, water, food), loss of gear and selling costs (such as auction fees). Some or all of these items may be deducted from gross proceeds and the shares determined on the remaining net receipts. It is clear that where this is done such items are in effect divided between vessel and crew in the same proportions as net proceeds are distributed. Sometimes, however, some of these items are fully deducted from the crew's share and in other cases (when the crew's share is determined on gross proceeds) they are entirely at the charge of the shipowner. It is also interesting to note that in certain cases, where the arrangements were made by collective agreement, different rates of remuneration are stipulated according to the size, age and type of the ship. Table II.1., extracted from collective agreements for deep-sea fishing in Western Germany, illustrates this point. (3)

(3) See also the collective agreements in the Netherlands, tabled in International Labour Office, op.cit., p. 61. To the extent that remuneration is governed by collective agreements, the crew's share in Norway also decreases as the size of the vessel increases; ibid, p.65.

RATIONALE OF THE SHARE SYSTEM AND OF ITS VARIATIONS (4).

In discussing fishermen's remuneration it is necessary to distinguish between two types of enterprise according to the size and nature of the individual undertaking. On the one hand there are those very large segments of the industry which are organized on the basis of small and very small boat-owning units, the vessel and gear being the property of the skipper and/or of some or all members of the crew. This is the typical form of enterprise in the Scandinavian countries and to a large extent also in Canada, the United States and France as well as in sizeable sectors of the German, Netherlands and Scottish fishing industries - particularly those engaged in coastal fishing. (5) On the other hand there is that sector, sometimes called "industrial fishing", where the ships and gear are owned by companies or private persons, each of whom usually possesses more than one ship. This type of enterprise is found, for example, in British, German, French and Netherlands herring fishing and deep-sea trawling, in Iceland and the Faroe Islands and in some United States and Canadian fishing.

TABLE II. 1.

A. Deep-Sea Fishing, Western Germany

	Monthly wage DM	Percentage share in value of catch of ships built		
		up to 1926	1927-36	after 1936
Captain (i)	-	6	6	6
First mate	275	1.4	1.20	1.0
Sailor	215	0.7	0.60	0.5
Cook	220	0.8	0.72	0.6
First engineer	290	1.4	1.20	1.0
Stoker	220	0.7	0.60	0.5

(i) After one year's service.

(4) The term "share system" is used in the following to include any system of fishermen's remuneration under which at least a substantial proportion of earnings depends directly on the size or value of the catch.

(5) It is, of course, also the general rule in inshore fishing which is, however, not under discussion here.

B. Salt Herring Fishing, Western Germany

	Monthly wage DM	Wage in DM per barrel caught on board:			
		motor vessels		luggers	
		> 1300 brls.	< 1300 brls.	< 1000 brls.	< 800 brls.
Captain	-	4 %	4.125%	4.25%	4.50%
First mate	220	0.41	0.43	0.46	0.50
Sailor	170	0.29	0.31	0.34	0.36
First Engineer	500	but at least 50 DM per month total earnings more than first mate			

Source: Tarif-Vertrag für die Besatzungen der deutschen Hochseefischerei-Fahrzeuge, 1955, and Tarif-Vertrag für die Besatzungen der Fahrzeuge der grossen deutschen Heringsfischerei (Loggerfischerei), 1956.

A discussion of the factors determining the preponderance of one or the other type of organization in a country's fisheries would be beyond the scope of this paper. Since the division coincides roughly with that between labour - and capital - intensive fishing it seems, however, reasonable to assume that these factors are all related to the relative profitability of near and distant water operations, to the question of whether fishing is season or not, (6) to the availability of the entrepreneurship and capital needed for distant water fishing, and to the availability of materials (such as wood in the case of Scandinavia) for the construction of cheap small vessels. In the largest European fishing nation, Norway, fishing is distinctly seasonal in nature (7) and the most important fishing grounds are quite near the mainland; small-scale enterprise, therefore, is the normal form of organization. In other countries larger enterprises have developed side by side with a small-scale enterprise sector, each group having its own field of work (different types and quality of product) without apparently any vigorous direct competition between them. (8)

In the first group of enterprise (9) the crew is often composed of relatives or friends; labour contracts, if existing at all, may be rather informal; relations between owners and such other crew members as there may be do not always

(6) Stuart Jamieson and Percy Gladstone ("Unionism in the Fishing Industry of British Columbia", The Canadian Journal of Economics and Political Science, February 1950, p.4) mention that public conservation policies have encouraged small-scale ownership and operation on the Pacific Coast by restricting fishing time and techniques. On factors favouring small-scale enterprise, cf. also Gregory and Barnes, North Pacific Fisheries, American Council Institute of Pacific Relations, 1939, p.84 et seq.

(7) Of 75,000 fishermen, only 34,800 were occupied full-time in 1945.

(8) Of course there is sometimes competition between large and less large firms within the sector of industrial fishing. This is referred to below. It may also be noted that in Sweden, where steam trawling by companies had been of considerable importance at the beginning of the century, this type of enterprise is reported to have practically disappeared because "it has had difficulty in competing with the motor trawlers owned by the fishermen themselves" (I.L.O., op.cit., p.18).

(9) See for example, Christian Hessle and Sigmund Verständig, Fishermen's Organizations and the Regulation of Fish Prices in Sweden, draft of a monograph prepared for FAO, mimeographed, December 1955, p.85 et seq.

follow the usual pattern of labour-management relations, of employers and employed: decisions as to the timing, place and method of fishing may be taken jointly and the skipper may not receive a higher share in proceeds than do other crew members (although if he is the owner he receives also the share going to the vessel); while in many other cases relations of authority and property are more similar to those between employers and workers in other industries, the social climate is determined more by common than by conflicting interests and one does not normally find in this sector trade unions in the sense of organizations promoting the interests of workers against those who employ them. There are often, however, organizations through which owners and crews jointly defend their common interests. In this sector the usual form of remuneration is the share system pure and simple.

In the sector of "industrial fishing" including, for example, distant water trawling, on the other hand, there are sharp distinctions between capital, management and labour. There is little or no personal link between owners and crews; the latter, although in some countries not regarded as wage-earners in a legal or administrative sense, feel and organize as workers with the specific aim of defending their interests against those who for all practical purposes are their employers. In this category, too, the share system pure and simple is often applied, although the modalities of the system are formally laid down and negotiated in collective agreements through a process of bargaining which may be very bitter and has often given rise to serious industrial disputes. As noted in the previous section, other forms of remuneration have, however, also been developed in this sector, especially the guaranteed minimum and the fixed basic wage. Nevertheless, in these cases too a large proportion of the crew's earnings is dependent on the size or the value of the catch. What are the reasons for this peculiar method of remunerating labour?

From the shipowners' point of view there seem to be two obvious advantages in the share system. Firstly, largely for reasons independent of the crew's efforts, fishing is a risky undertaking insofar as the quantity as well as the price of the product is highly uncertain per trip, that is, in the short run. (10) (We shall refer occasionally to risks in respect of the size of the catch as the "quantity risk", to those in respect of the value of the product as the "price risk"). Heavy overheads in the nature of a fixed wage bill might ruin smaller shipowners after a few unlucky trips. Secondly, even trade union leaders admit "that the men's hearts might not be in a task presented at midnight under relatively stormy conditions on the banks if the men were on 'wages' ". (11) This is a particularly strong ground for applying an incentive system of remuneration. Other reasons for providing a stimulus to adequate performance are the need for chasing better quality fish and for careful handling of the product (which readily deteriorates) on board to preserve quality and therefore price, and, when the crew's share is dependent directly on receipts net of the cost of

(10) More precisely: the frequency-curve of positive and negative outcomes of different sizes per trip will be relatively flat, many unfavourable results being matched by many favourable results of comparable size. As observed in the text, this means that to the small shipowner of limited resources the occupation as such is risky; to shipowners having greater resources, however, the occupation (viewed as a frequently repeated undertaking of trips) is probably not more risky than other industries concerned with the primary production of not-too-basic foodstuffs, such as the growing of vegetables. Risks of wreckage etc. are, of course, insurable and do not add to the economic hazardousness of the trade.

(11) Donald J. White, The New England Fishing Industry, Harvard University Press, 1954, p. 100.

supplies (such as fuel, water, ice) and loss of gear, the possibility of economizing on these items.

The risk aspect of crew remuneration is particularly important to small shipowning units such as the one owner-operator/one vessel enterprise. It is less crucial when the ships become larger (so that labour cost as a proportion of total cost falls and longer trips can be made over wider areas), (12) when more ships are owned by one company (so that the risk is spread over more vessels) and when the owner disposes of sufficient financial resources to hold out over a somewhat longer period, covering several voyages over which the risk can be spread. These points suggest that the share system pure and simple would be less essential to larger companies than to small shipowning undertakings. (13) This presumably explains the fact noted above that deviations from the system under which the crew's remuneration depends solely on the value of the catch are so often found in trawling, which is frequently undertaken with larger vessels requiring relatively high investment and often owned by larger companies. Furthermore, it may be noted incidentally that where a guaranteed minimum is applied the owners have a natural interest in keeping the period over which the final settlement is made relatively long in order to spread the short-run risk over a larger number of trips, whereas the crews have an equally natural interest in reducing the length of this period because a larger proportion of bad trips is made up for by the shipowners' guarantee instead of by the crews' own income from good trips during the same period of settlement. (14) The shorter the period, the more closely systems of guaranteed minima approach the fixed wage plus share variant. Thus, the only difference between guarantees and fixed wages appears to be one of the degree in which very short-run risks are divided between owners and crews.

(12) Longer trips presumably tend to reduce the quantity risk and in some cases permit of increasing the length of the fishing season. Insofar as longer trips also involve longer travelling time to and from the fishing grounds one might also argue that there is an economic case for having part of the fishermen's remuneration determined as a fixed wage because the crew is paid during travelling time mainly for its presence on board rather than for any special efforts dependent on incentives. Gregory and Barnes (op.cit., p. 201) note that a fixed amount of "run money" paid in addition to a piece-rate in Alaska salmon fishing originated in the days of sailing ships when the men were expected to work the vessel transporting them from their residence in the States as well as to do a certain amount of work in the canneries.

(13) See also the following table, communicated by the I.L.O. Correspondent in Tokyo:

	Number and Type of Fishing Undertakings and Systems of Remuneration in Japan		
	Personal ownership of vessel	Joint enterprise, workers and owners	Company ownership of vessel
Shares "pure and simple"	31,516 (79.1%)	9,253 (76.9%)	1,134 (42.3%)
Guaranteed minimum	2,122 (5.3%)	1,017 (8.5%)	690 (25.7%)
Fixed wages plus share	1,881 (4.7%)	844 (7.0%)	770 (28.7%)
Fixed wages "pure and simple"	4,340 (10.9%)	916 (7.0%)	88 (3.3%)
Total	39,859 (100%)	12,030 (100%)	2,682 (100%)

(14) For example, in Netherlands herring drifting, where a guaranteed weekly minimum applies, the period of settlement originally was the whole fishing season (about 24 weeks). In 1952 the period was cut into three sub-periods and there has since been strong trade union pressure for settlement per month or per trip. A general advantage to the ship owners of settlement over longer periods, whether there is a guaranteed minimum or not, may at times be reduction in labour turnover.

Factors reducing the short-run price risks of the trade include, of course, price stabilization schemes through straightforward application of equalization funds and similar devices (as in Scandinavia, Western Germany, the Netherlands and the United Kingdom) and concentration of fleets in a smaller number of companies, as well as price stabilization through an increase in the durability of the product. The latter factor seems to be relevant in explaining the difference between systems of remuneration in German salt herring and other fishing: since herring can be stored more easily than other fish it is less risky to operate a system of fixed prices while remunerating the crew in the form of piece-rates. (15) Freezing fish on board could have the same effect: longer trips could be made and the short-term price risk reduced.

The incentive aspect of the share system remains relevant irrespective of reductions in risks. Therefore, systems under which earnings are entirely unrelated to the catch remain exceptional although it is understandable that non-fishing specialized crew (engineers, radio operators and so forth) are in a few cases given a limited or no direct financial interest in the outcome of the trip.

From the point of view of the crews (not considering for the moment those who are co-proprietors of vessel or gear or both) the advantages of the share system are perhaps less obvious. Indeed the system sharply contrasts with the general trend of labour and Government policies aiming at security and stability of workmen's earnings and, at least in certain countries, with trade union objections of principle to the usual forms of profit-sharing even where the variable component of earnings depending on profits is no more than a small fraction of total workers' income. (16) Still, trade unions of fishermen seem to accept the continued application and even introduction or re-introduction of the system in one form or another. (17)

(15) Of course, "piece-rates" in this case differ from those normally applied in manufacturing insofar as (a) the premium is divided among the crew as a whole and is not directly related to the individual worker's efficiency and (b) output is in any case determined to a large extent by factors beyond the crew's control. A disadvantage of piece-rates from the shipowners' point of view would seem to be that they remove the incentive to seek and preserve good quality. In this respect piece-rates may have the same effect on the crews as guaranteed minimum prices are alleged to have on crews and shipowners alike.

(16) See for example, Henri Jourdan, La Participation Ouvrière aux Bénéfices, Arme de Combat du Patronat, Paris 1947; A. Vermeulen, "Collective Profit Sharing", International Labour Review, June 1953; the views of the Swedish Federation of Trade Unions in a note in Initiatives, No. 5, Paris, November 1954, p.24; and an article by Egon Tuchtfeld in Gewerkschaftliche Monatshefte, June 1950.

(17) White mentions a case where a rather substantial monthly wage (plus piece-rates) had been achieved but where this system was subsequently dropped without serious attempts on the part of the union to restore it, even though the share system pure and simple was firmly believed by the workers to be an object of considerable abuse by the shipowners/fish dealers (Donald J. White, op.cit., pp. 58-99. See, however, also p.177). Gladstone and Jamieson (loc. cit., May 1950, p.154) note that in the early 'nineties fishermen in British Columbia were paid a flat daily wage; a few years later they were on a piece-rate basis. Apparently, fixed wages were also common in 17th century Dutch herring fishing; see H.A. Kranenburg, De Zeevisscherij van Holland in den Tijd der Republiek, Amsterdam, H. J. Paris, 1946, p.102.

It seems likely that in the long run average earnings under the share system will be higher than they would be if workers on board were paid fixed wages. For one thing the assumption of risk commands an income, and to the extent that part of the short-run risks of the trade are shifted to the crew the latter should be able to negotiate for a larger share in average proceeds than would otherwise be possible. Perhaps fishermen are, indeed, prepared to gamble on their income to a larger extent than ordinary wage-earners if by doing so they may obtain a somewhat higher average income. The very strong excitement which accompanies the hauling of the net, and hopes of an exceptionally good trip each time the men go out, may be inherently attractive features of fishing under a share system. However this may be, it scarcely can be an adequate explanation for the workers' acceptance of the system.

An additional element which should be taken into consideration presumably is the incentive aspect of the system. By agreeing to this form of remuneration the men assume, as it were, the cost of supervising most effectively their own and, since the premium depends on collective effort, also their colleagues' performance. While they would presumably prefer a given fixed and guaranteed income to the same or even a somewhat higher income under the share system, the difference between actual average earnings and the level to which the shipowners could reasonably be expected to agree as a fixed contractual amount lacking incentive would in all likelihood be too large to make such a proposition on balance attractive to the crew. As we have suggested above, if the risk element of fixed wage payments to the shipowner decreases he may be prepared to take over from the crew their part in the risk-bearing by agreeing to a relatively small fixed wage or guaranteed minimum. On the other hand, the workers' interest in wages and guaranteed minima will fall pari passu with a decrease in risks. Therefore, while technical progress and price stalilization offer economic opportunities for agreement on fixed wages or guarantees in a large number of countries, organized labour may not press for such guarantees. This may explain why, whereas in some countries guarantees have been introduced and have from time to time been raised, in other countries the share system pure and simple continues to be applied in conditions which are otherwise not very different.

However, the incentive aspect does not disappear even when the risks of the trade are reduced. It seems unlikely that, so long as fishing results depend to a large extent on deliberate efforts by the crews, fixed payments could become such a large proportion of total earnings as to blunt the incentive effect of the component dependent on the size or value of the catch. Where this critical limit between fixed and variable components of total earnings would be located it is difficult to say. (18)

THE VARIABILITY OF LABOUR COST

As we have seen above, an important feature of the share system is that labour costs vary with the revenue of the undertaking, thereby mitigating to a

(18) In Germany and Holland the ratio between fixed or guaranteed and total earnings in the sectors where these systems are applied seems to lie between 1:3 and 1:2.

more or less important extent the shipowners' risks involved in fluctuations of proceeds due to sharp variations in price and quantity. This presumably makes for viable fishing industries larger than those which would otherwise be possible at the prevailing levels of average and marginal productivity in the industry and with its existing organization. (19) Secondly, it may be presumed that as a result of the incentive effects of the system labour productivity in the industry is considerably higher than it would otherwise be, given the size and nature of vessels, gear and methods of operation. For both reasons it would appear that the effects of the system on the allocation of resources and on general economic welfare tend to be favourable.

It may be and indeed has been argued, however, that the system has at the same time an influence in the opposite direction. As was mentioned above, the share going to the vessel represents the shipowner's depreciation, interest, profit income and taxes. It is normally a fixed share in proceeds net of actual running costs only, irrespective of the actual amount of investment in the vessel and gear. Since, therefore, any increase in proceeds due to new investment has to be shared automatically with the crew, there may be an inducement to shipowners to keep such investment low. Investment leading to modernization and higher productivity of the industry may be discouraged and fishing may tend to remain a backward activity compared with industries where labour cost is fixed per unit of time.

Clearly, the seriousness of this possible adverse effect of the share system on investment and innovation depends on at least two factors: firstly, on the relative size of the shares going to the vessel and the crew; secondly, on the degree of rigidity in arrangements for the sharing of proceeds.

As regards the first point, it is quite clear that the share going to labour is a rather high proportion of total costs and revenues in the industry, as may be apparent from the following illustrations: in the United States "one of the most common agreements ... is the 40-60 lay, i.e. 40 per cent of the net proceeds, after deducting the joint expenses, to the vessel and 60 per cent to the crew". (20) In English drifting 7/16ths of the boat's net earnings are normally shared by the crew (21); in Scottish steam drifting one-third of net proceeds goes to the crew, and on board motor drifters three-eighths; under Norwegian collective agreements 26-32 per cent of the gross value of the catch goes to the crew; in Dutch drifting 27-28 per cent of gross proceeds minus 7 per cent. (22)

(19) These are important qualifications of the ceteris paribus type; for example, had there not been this possibility of reducing short-run risks, the industry might have tended more than it actually has done to organize in larger and perhaps more efficient shipowning units.

(20) I.L.O., op.cit., p.77.

(21) Ibid, p. 71. It should also be noted that in English drifting there is what in practice amounts to a guaranteed minimum.

(22) Here, too, there is a guaranteed minimum.

It further appears that, while the bases of computation, i.e., the nature and size of deductions from gross proceeds, are sometimes changed, the actual percentages of distribution seem to be fairly constant over long periods.(23) While in certain cases the percentage going to the crew under collective agreements varies with the age, size or power of the vessel, these differences are very small. One important cause of rigidity in the arrangements for the distribution of proceeds may be that it is difficult for the trade unions to concede a specific alteration of percentages even when the higher productivity of modern vessels and gear requiring large investments might seem to justify this. The reason is that any acceptance on the unions' part of a particular lower percentage might expose their membership to substantial uncertainty as regards income: the men know more or less what they have but the net result of smaller shares in the catch of a new type of ship cannot be predicted. Furthermore, even if they were prepared to consider the adjustment of shares to investment and similar factors, the unions would presumably demand a voice in company policies, and many shipowners would find this unacceptable.

In the small enterprise sector of most countries arrangements for the distribution of proceeds appear to vary widely as between fishing ports, types of vessel, nature of the relation between skipper and crew, type of fishing, and so on; in other countries this diversity seems to be less. There is little evidence to show whether and how these arrangements may easily be altered over time. (24)

It is also true that in certain countries difficulties in the fishing industry have been ascribed to lack of investment and innovation. In the literature on this question (25), however, the existence of the share system is not mentioned as a cause of obsolescence. The latter is commonly ascribed to such factors as the prolonged depression of the 'thirties which, together with the impossibility of building ships during the war, accounts for the unfavourable age structure of certain fleets; to organization of the industry in small ship-

(23) For example, for herring in the Netherlands, A.Hoogendijk Jz., De Grootvisscherij op de Noordzee, p.111, published in 1895, puts the percentage going to the crew at 27 5/8 of gross proceeds minus 3 per cent; under current collective agreements the percentage varies according to the type of vessel between 27 and 28 of gross proceeds minus 7 per cent (including 4 per cent deduction to be paid into a price stabilization fund, the cost of which is therefore borne by crew and vessel-owners in the same proportions as total proceeds are distributed). As stated above, there is now a guaranteed minimum.

(24) According to I.L.O. (op.cit., p.62) in Norway "the owners of equipment benefit from any net income derived from this equipment". It is, however, not clear from this source what the form of the arrangement is.

(25) A.G.U. Hildebrandt, De Nederlandse Zeevisserij, Utrecht, 1947, pp.37, 62 and 72, and Economisch-Statistische Berichten, 5 May 1955, p.428; Scottish Home Department, Report of the Committee on the Herring Industry, Edinburgh, 1944, Cmd. 6503, p.11; R.K. Kelsall and associates, "The White Fish Industry", Further Studies in Industrial Organization, M.P. Fogarty, Editor, London 1948, p.114 et seq.-(Aberdeen), p.161 (Fleetwood) and p.170; it also seems that the German drifting (in contrast to the trawling) fleet and a large part of the Belgian fishing fleet are in difficulty in part because of obsolescence.

owning units, the size of which denies them access to the capital market; to technical difficulties encountered in modernizing equipment and layout on board old vessels; to competition from countries which have lower labour costs or are located more favourably in relation to the fishing grounds: and to sheer lack of initiative. (26)

Therefore, if there is a relation between lack of investment and the share system the latter is only one among a number of factors, at least some of which seem to be more important. In a number of cases on which information is available, there appears to be a desire to invest which remains unsatisfied because of lack of funds so that the problems which might have been the result of the share system are not relevant.

The question to what extent the share system may cause a slowing-down of investment cannot be satisfactorily answered without more information than was available to the author. (27) Some tentative observations suggesting that its importance should not be exaggerated may, however, be in order.

Firstly, while a constant share in proceeds is not stipulated formally in other industries, it is not certain whether in practice, with wage increases negotiated annually or biennially, shares in, for example, manufacturing industries do not remain rather constant, too. For the economy as a whole distributive shares have, of course, been remarkably stable in several countries even though all industrialized economies are gradually becoming more and more capital-intensive. Of course, statistics on this question and their interpretation are open to question. In any case they hide divergent developments within individual industries, and even if shares in certain industries are found to have been more or less constant over longer periods without any sign of inadequacy of investment this does not at all mean that therefore the modernization of fisheries is not significantly hampered by the share system. But it is perhaps worth observing that constant shares as such do not constitute anything very extraordinary.

(26) The importance of initiative is particularly clear from the analysis given of developments in the white fish industry in Hull compared with other British ports in Kelsall, op.cit.; for a discussion of the importance of the size of companies, see ibid, p.160, and Hildebrandt, De Nederlandse Zeevisserij, loc.cit. Foreign competition through low wages in New England and Belgium is mentioned in White, op.cit., pp.6, 129, and J. van Thillo, Economisch-Statistische Berichten, 6 October 1954, p. 796, respectively.

(27) In interviews with German shipowners' representatives the latter did not believe that the influence on investment could be every significant. Mr. A.G.U. Hildebrandt of the Netherlands Agronomic Institute Fisheries Department considered that the tendency for depreciation and interest as a percentage of total cost to increase while the percentage going to labour remained constant might well adversely affect prosperity in the industry. He also recalled that in the case of Dutch shrimp fishing he had found that the engine power normally used was far below the economic optimum. Under share arrangements then prevailing, investment in more powerful engines was, however, not attractive to the shipowners. He had found later that stronger engines had been installed but that at the same time the percentage of proceeds going to the vessel had been increased.

Secondly, so long as fishing remains a profitable activity at all, ships will have to be replaced regularly. Small and not too costly improvements will automatically be incorporated in the new ships anyway. An old ship will be replaced by a more modern ship, perhaps not as large and perfect as might otherwise be technically possible, but the quality of the fleet will improve as long as the fleet is not contracting.

Again, as long as it is at all profitable to engage in fishing, productivity has to increase at a rate permitting of a gradual increase in fishermen's earnings pari passu with labour earnings in other occupations. This is necessary simply in order to call forth the requisite supply of labour. It is true that most fishermen are not particularly "mobile" in the sense that they would easily move to occupations on land, but it suffices that there should be only a marginal minority of people who would be prepared to take up other occupations if these were better remunerated. In any case many fishermen appear to be quite willing to take up jobs in merchant shipping (which to them is a more comfortable occupation). (28)

Fourthly, in any case the men easily transfer affection to more modern or larger vessels which provide higher earnings. (29) In view of the fact that normally there will be regular replacement of very old by new vessels, owners in general will tend to improve medium-aged ships as far as possible lest they find themselves with a second-rate crew or without a crew at all.

Fifthly, while a systematic depressive influence of the share system on investment and innovation might perhaps be expected if entrepreneurial investment decisions were taken on the basis of finely-calculated comparisons between prospective yields and, say, the rate of interest, these decisions are probably not normally made in such a way. When considering whether or not to commit his capital, if he has it, to a new type of vessel or an expensive piece of fish-detecting or preserving equipment, the shipowner has to decide on the basis of a more or less conservative subjective estimate of the order of magnitude of yields. If these estimated yields, which are essentially uncertain, greatly exceed the cost of the innovation, he will make the investment. If they do not, he will not invest. Very important improvements will be attractive to the shipowner irrespective of the existence of the share system. Unattractive improvements will not be undertaken, but a good many of these might not have been introduced in the absence of the share system either. In this train of thought it may further be argued that the risk of failure in making an innovation is reduced to the extent that failure automatically involves some reduction in labour cost. Risk of failure being a deterrent to investment, it could be said that this reduc-

(28) A.G.U. Hildebrandt ("Contactgroep Opvoering Productiviteit", Visserij-Coöperatie, The Hague, 1953. p.54) gives as the main reason for the rapid organization of Swedish fishermen after the war "the high Swedish standard of living and wages which made it necessary to organize fishermen with a view to achieving better economic results and thus keeping the fishermen in the industry". On questions of labour supply see also Kelsall, op.cit., pp. 108, 128.

(29) This is perhaps the main reason why in some cases, noted above, collective agreements provide for percentage crew shares which are smaller for larger and more modern ships.

tion through adjustment of labour cost, taken by itself, might tend to stimulate new investment and perhaps cancel a good deal of the opposite effect of an increase in labour cost where the investment is successful.

These considerations, as was mentioned above, are put forward merely as tentative comments on the possible importance of the influence of the share system on the pace of investment and innovation in the industry. They do not demonstrate that there is no such influence. To the extent that they are valid they suggest that improvements not involving considerable extra investment will be introduced irrespective of the existence of the share system in the process of regular replacement of the fleet, which will continue so long as fishing remains a remunerative activity at all. On the other hand, very important improvements will also be introduced irrespective of the existence of the share system. This would leave the possibility of a depressive influence on an intermediate type of innovations involving heavy investment but not expected or subsequently found to be so attractive as to make them worth making under existing arrangements for distribution of proceeds, although the innovations might have been undertaken if the shares had been more flexible than they seem to be. Such improvements may then be postponed to a date when they become necessary, for example in order to ensure an increase in fishermen's earnings in step with other workers' earnings, or when they have become possible because of the growth of national incomes and markets. In certain cases they may not be undertaken at all. This intermediate group of innovations may or may not be large. On the whole, a number of important technical improvements seem to have found widespread application both before and after the war. Whether there exist many technically possible improvements which have not been applied, the author cannot judge. Whatever the answer may be, any disadvantage which the system may be found to have through an impact on investment is, of course, matched to some extent by the two favourable effects of the system on productivity mentioned at the beginning of this section. (30)

CONCORDANT AND CONFLICTING INTERESTS

Since both shipowners and crews have a direct and parallel interest in the value of the catch, and since the price of the product in many cases, such as in manufacturing or transport and so on, cannot be set by decision of the producer/employer but is determined by short-run fluctuations in supply and demand, the share system could in principle be a basis for harmonious industrial relations and provide considerable scope for joint action with a view to achieving high and stable prices.

In the small enterprise sector of the industry this has indeed sometimes happened. Thus, in certain countries, especially in Norway, Sweden and Denmark, many employers and workers are members of the same occupational organizations rather than of separate trade unions and employers' organizations. (31)

(30) It is another question, of course, whether improved productivity could lead to a much higher output, given the limited total supply of fish.

(31) Such organizations as the Swedish West Coast Fishermen's Union have been called "trades unions" (Hessle and Verständig, op.cit., p.32) but their membership includes skipper/owners as well as non-owning crew members.

In other cases, such as German and Dutch cutter fishing, there are no such joint organizations, or crew members may not bother to join them although membership is open to them; there may be shipowners' associations but the degree of organization among other crew members is low and efforts to affiliate them to trade unions existing in the industrial fishing sectors have had little effect.

Where joint membership organizations exist, their activities have been largely directed at some means or other of affecting the level and stability of prices, including measures to regulate the supply of fish, (32) co-operative selling (in Norway to the extent that auctions play hardly any role in the pricing process), co-operative purchase of supplies, and so on. (33)

In the industrial fishing sector, on the other hand, it is common to find separate owners' and crew organizations, often a high degree of organization among crew members, collective bargaining and the industrial conflicts which this often involves. (34) Fundamentally, of course, there is in this sector the same common interest in high and stable prices. This explains, for example, why levies on proceeds to be paid into price stabilization funds may be deducted from gross receipts, implying that the crew participate in the financing of such schemes. The absence of personal links and the differences in social status and in distribution of property between owners and crews are, however, conducive to a differentiation of interests in this sector. Technical and marketing problems become more the exclusive function of the owners/managers, while the crews become more anxious to see and defend their interests against those of the owners in such matters as the quality of quarters and food supplies, safety, greater stability of earnings, and so on.

Real conflicts of interests emerge when the owners include commercial functions in their activities. They may act as suppliers of ships' provisions or as buyers of fish or both. In doing so they assume interests which in principle are flatly opposed to those of the crews and the share system is in danger of becoming the origin of a sphere of distrust and dispute. One reason why the owners may wish to take an interest in both commercial ends of fishing operations is obvious enough. The owners have to share with the crew an agreed proportion of proceeds of the catch. Any money earned over and above this portion, however, is fully theirs. Therefore, if shares are calculated on earnings net of the cost of supplies (35) there is a possibility of raising the proportion of owners'

(32) See for example, Hessle and Verständig, op.cit., p. 31 et seq.

(33) Another interesting feature of Norwegian herring fishing appears to be that through the operation of the equalization fund of Norges Sildesalslag fishermen receive uniform prices over each period of settlement irrespective of the actual prices at the times when their fish was landed; the day-to-day price risk thus seems to have been eliminated completely. Due account is, of course, taken of the quality delivered by the fishermen (Visserij-Coöperatie, op.cit., p.34).

(34) It is interesting to note, however, that there are no workers' organizations or collective agreements in British herring fishing (I.L.O., op.cit., pp.154 and 156).

(35) And a fortiori when certain supplies are entirely deducted from the crews' share (see White, op.cit., pp. 69, 72).

earnings by selling the supplies at high prices to the vessel, profits on these supplies being larger than the fall in the owners' share in the net proceeds of the catch. At the other end, owners can raise their income at the expense of the crew if they succeed in buying the product at a low price from the vessel and selling it at normal prices to wholesalers or retailers, the profits on the latter transaction again being larger than the fall in the shipowners' share in net proceeds of the catch.

An interesting description of the structure of the white fish and subsidiary industries at Aberdeen in 1943 well illustrates the nature and some of the effects of the combination of shipowning and provisioning functions (36) :

> "The Aberdeen Steam Trawling and Fishing Company ... for instance are trawler owners, fish salesmen ... ice manufacturers, net manufacturers, engineers and ship repairers, and coal merchants ... Since each part is a financial unit it is possible for the trawling company to show a loss while the subsidiaries show profits". "Men who sit on the boards of subsidiary firms draw their directors' fees and profit and so make quite a good income, while the actual trawling firm is returning a loss. Thus it is maintained that many interests thrive while the production side languishes. Probably those who suffer most are the crew, for they are paid on a share basis".
>
> "The provision of supplies to trawlers and the repair of engines and ships and other related matters could with advantage be rationalized. Indeed, some trawler owners declare that they would willingly submerge their own subsidiary services in a large undertaking to be run co-operatively for the benefit of the trawlers... There is little doubt, however, that this rationalization could not be effected by the industry as at present constituted. Interests are so varied that it is impossible to secure agreement on any of these major points without the weight of Government authority". (37)

The difficulties which may arise when shipowners engage in fish dealing have been described for Boston in White's study on the New England fishing industry. (38) In this particular case trouble centred around the "sell-over" - an arrangement permitting a dealer to challenge the quality of the fish after a certain quantity had been removed from the vessel. If his challenge was upheld the fish remaining in the vessel had to be auctioned a second time, usually bringing a lower price, all buyers including the complainant being eligible to bid at the sell-over. It was believed by the crews that the operators were colluding in order to keep prices low through this mechanism which in any case was governed by somewhat vague Exchange rules, and in their view "the tolling of the bell" to announce a sell-over was really the ringing of the "burglar alarm". (39)

(36) Prof. H. Hamilton in Kelsall, op.cit., p.117 et seq.
(37) Cf. also on Grimsby, ibid, pp. 137 et seq., 143, and on Fleetwood, p. 162.
(38) Op.cit., pp. 75 et seq. and 136 et seq.
(39) Ibid, p.79.

White suggests that these difficulties could be remedied by improvements of the rules of the sell-over. It is possible that this would have sufficed.

However, if the structure of the market permits it, as it seemed to do in the case mentioned above, there is always the danger of collusion among the buyers. Crutchfield, describing collective bargaining in the Pacific Coast fisheries, concluded that in this market where the number of buyers (who in this case were not shipowners) is rather small "there is a strong presumption that deviations from competitive behaviour are persistent and widespread. (40) In Aberdeen, despite the number of merchants engaged, competition among merchants was restricted because it was common practice for groups of merchants to act collectively in their dealings with fish salesmen. (41) In British Columbia practically all of the 44 strikes tabled by Gladstone and Jamieson first arose from disputes over the question of fish prices. (42)

On the other hand, in Western Germany, where the largest trawling companies have considerable interests in the distribution and processing of fish, no serious difficulties seem to have arisen between the companies and the crews on the question of prices. The reason may perhaps have been divergency of interests among the trawling fish-dealing companies and between these and other fish dealers, which may have made collusion more difficult to achieve. (43)

While the problem of conflicting interests between shipowners and crews when the former engage in fish dealing, does not seem to have been very serious in the past, it may assume greater importance in the future if there should be an increasing tendency for shipowners to take a more active interest in the marketing and processing of the product. It is perhaps not unreasonable to expect such a development to take place because (a) shipowners may find it necessary to break through dealers' price rings at the auction as well as the retail level in order to expand markets through a reduction in wholesale and retail margins; (b) they may wish to seek an expansion of the market by providing better preserving facilities at all levels of distribution than the merchants may be able or willing to operate.

OTHER QUESTIONS

In the preceding pages a few problems have been discussed relating to the system of remuneration by shares. There undoubtedly are further and possibly more important problems connected with this system. Two such questions may be mentioned here without further analysis, both in order to limit the size of this note and because insufficient information was available to assess the importance of these problems from a general point of view.

(40) Op.cit., p.547.

(41) Hamilton in Kelsall, op.cit., p. 123 et seq.

(42) Op.cit., p.147. In some cases they included conflicts between canneries/shipowners and the crews employed by them; in other cases between independent small shipowners and the companies.

(43) Nordsee, the owner of 60 trawlers, also operates two fish-meal factories, two fish-canning plants and 250 retail outlets; the second-largest trawling company, G.E.G., which is owned by consumers' co-operatives, trade unions and a number of Länder, is also engaged in distribution and processing. Each of these companies carries retail sales equivalent to 15 per cent of total fish-retailing in the country (A.G.U. Hildebrandt, De Duitse Zeevisserij, Landbouw-Economisch Instituut, Rapport No. 215, The Hague 1954, p.32).

Firstly, in continuation of the preceding section on differences of interest, attention may be drawn to the fact that there are sometimes divergencies of interest between larger and smaller shipowners as regards mechanisms for the stabilization of prices. The larger companies may feel that in agreeing to such schemes they are merely limiting their own markets by helping smaller operators to keep alive. Where part of the scheme is financed by the crews the question may arise as to where the trade unions' interest lies: should they support the price stabilization scheme and thereby the smaller companies? Or should they take sides with the larger companies who are able to offer higher guaranteed minima or fixed wages than the smaller ones and whose more modern fleets may offer better conditions of work and employment as well as more favourable prospects as regards earnings?

Secondly, questions have arisen in certain countries in connection with the status of fishermen paid by shares, because these fishermen were not formally regarded as wage-earners. In the United States this has given rise to difficulties under the anti-trust legislation because unions were charged with illegal action when taking collective measures for the betterment of their members' position. In other countries fishermen paid by shares pure and simple have not been considered eligible for benefits under social security legislation. Reasons given for such exclusions have included (1) difficulties in assessing the earnings on which premiums have to be determined, (2) the industry's inability to pay the premiums, and (3) the fact that providing benefits normally accruing to wage-earners would upset the existing system of human relations in the small enterprise sector because it would accentuate differences in status between owners and crews. (44) Among these arguments, the first seems trivial because it is purely administrative; the second is not in itself concerned with the application of the share system; and whatever the merits of the third argument may be, it does not seem an adequate ground for depriving fishermen of important social benefits. (45)

(44) The latter argument is mentioned in Rapport der Commissie van Onderzoek naar de Arbeidstoestanden in het Visserijbedrijf, The Hague, August 1951, p.97.

(45) Related to this question is the fact that fishermen are usually excluded from legislation concerning working hours. This, however, seems to be more because of the nature of the occupation than of the nature of the system of remuneration. Some regulation by law of working hours between voyages might be found desirable and might then be linked with schemes for the restriction of catches where such restrictions are applied for the purpose of conservation of seafood resources.

DISCUSSION

The discussion was opened by BOWEN, who put before the meeting what he thought to be the important questions raised by the paper.

ZOETEWEIJ drew attention to the wide extent of the share system in very varied conditions. Why was this? What were its consequences? ZOETEWEIJ did not answer these questions fully.

On the reasons for the share system, ZOETEWEIJ had pointed out the fixed proportions in the division of ownership of gear, etc. But this was not universal; fishermen might own particular pieces of equipment, as in Whitby, or a selling company (a port monopoly) might provide the equipment. These people used a share system, but one different from the Scandinavian. This had a bearing on the average cost discussion: fishermen must meet the cost of their boat over its life, and how long it took to do this (or go bankrupt) would depend on luck. Supply was therefore inelastic over the life of the boat. Labour costs were also inelastic, because the skipper of the small boat must keep his crew.

BOWEN listed three other incentives to use the share system given by ZOETEWEIJ:

(1) There was an incentive for careful handling of catches.

(2) The system encouraged cost-minimisation in respect of things charged against the share.

(3) Risk shifting.

To those, BOWEN suggested the addition of:

(4) Trade unions accepted the system because it gave them the right of access to information about profits, etc., and so helped them to get better terms when conditions permitted.

(5) Both fishermen and their fish handlers were difficult to discipline on factory lines, so that a system of 'incentive by share' was more successful in persuading them to work hard.

(6) Sociological factors; the nature of the fishing community might encourage shares. Studies in Hull had suggested that fishermen had remained a very tight community despite the high wages earned by some of them.

(7) The share system made use of the 'psychology of the big pay packet' in a way that a fixed wage could not do.

(8) There was much competition between boats and boat owners. Restrictive agreements between boats were ineffective, and a keen crew meant a competitive advantage.

On the consequences of the share system, BOWEN thought that ZOETEWEIJ had some interesting hypotheses. But where was the evidence? If ZOETEWEIJ was right in arguing that the share system and lack of innovation went together, it should be possible to find some evidence. Bowen knew of none. Was such a relationship likely? BOWEN's own hunch would be that it was not. So many other factors were significant that the share system probably did not much affect innovation. BOWEN said that he agreed with ZOETEWEIJ's suggestion that the 'wage' was in fact fixed at the level necessary to call forth the requisite supply of labour (GERHARDSEN had said the same thing in the earlier paper). This was certainly true for countries with full employment, such as Britain. But what this meant was that the share system must be the consequence of other things. Problems of the determination of share sizes and of investment decision were quite separate. It was significant that the system operated in ports where the fleets in use were of quite different ages.

TURVEY suggested that BOWEN's introduction invited a division of discussion by

(a) the causes and

(b) the effects of the share system.

Beginning with causes, it might be useful to try to find the differences between situations in which the system existed and others in which it did not.

CRUTCHFIELD pointed out in this regard that Oregon fishermen had varied between the share system and others. MACKENZIE explained that certain minor groups of Canadian fishermen were remunerated on a purely wage basis, notably the crews attached to the two or three salmon traps operating in Pacific coast waters. Perhaps the significant fact here was that the catch was almost entirely independent of the effort expended by the fishing crews.

BOWEN said that the system could be expected to break down when owners extended their interests and the interests of owners and crews diverged, for example, when owners also operated fish meal plants. But strain did not necessarily develop; in Hull, owners of this type had kept the system because of its other advantages.

POPPER found the causes that had been suggested for the prevalence of the share system unsatisfactory. The system was different from that found elsewhere; why did we not find other examples or degrees of it in other industries? The share system did follow a pattern; the pure and simple share prevailed where capital was least important. Thus in North-West India, a man owned a boat, others fished from it and kept their own catch, paying him a fee for transport. The pattern could be explained by the fact that where the common stock was a free good, normal cost-allocation procedures were thrown out, and a system concerned with the other principal inputs was needed. Labour was the principal input where little capital was used, and the share system was appropriate to it. As one moved away from this situation, the system became less fundamental in importance and the nature of the shares became less 'pure'.

HILDEBRANDT said that the history of the share system in Holland indicated the great importance of incentive and of labour as the major item in costs. To-day fishermen were not interested in costs but in yields; a different system was needed when much capital was used.

SCOTT GORDON accepted most of ZOETEWEIJ's reasons for the share system. Buy why did it persist in industrial fishing? Was it due to a 'psychology of the hunt'? CRUTCHFIELD also agreed with the reasons given by ZOETEWEIJ and thought that the argument was supported by the acceptance of sharing by unions who adopted a generally 'tough' approach. Some of these fisheries were not at all primitive; the system was not relevant only to primitive conditions.

GERHARDSEN drew attention to the importance of differences in skill which helped to explain the existence of sharing, as the system enabled good masters to attract good men. In principle the Norwegian minimum income scheme for fishermen might be opposed by the best masters, who got least from it. The scheme might kill the share system. It was also relevant that fishing was an open industry, and small boats and industrial fishing units could operate side by side (the proportion of one-man boats was actually increasing in Norway). The small man had the possibility of 'lucky strikes' and the attractiveness of the share system in such conditions might affect the attitude of the big boats to its use by themselves.

ROBINSON referred to POPPER's argument that the share system was peculiar to fishing. But in fact it occurred in share-cropping and in other occupations and also (as WISEMAN had just pointed out to him) in the apparently quite different industry of cutlery manufacture in Sheffield. In this latter case, GERHARDSEN's remarks on the importance of a skilful 'team head' appeared to be relevant.

The importance of the selling system was emphasised by VAN DYK. Where fish was sold by auction, sharing was encouraged because fishermen knew the ruling prices. There was a different situation when fish went for salting, etc. and these conditions favoured the replacement of the share system by a fixed wage. In situations such as that described by ZOETEWEIJ where the trawlermen went into selling, fishermen tended to become less interested in the share system because they could not get a clear view of supply and demand conditions.

In CASSADY's view, it was useful to separate the imposition of the system by the employer and its acceptance by the worker. For illustration, when the motion picture industry was not unionised people worked very long hours on a salary basis. Why? There were always more people than jobs. Why no sharing? A profit sharing system had now developed, but for other reasons.

TURVEY asked what were the necessary conditions for the existence of share systems? He suggested that they were a sort of piece rate, but of a kind that could not be measured in one dimension and so had to be determined by value. In coal-mining, in contrast, it would be difficult to operate such a system because there was no simple basis for the distribution of overheads.

At this point, ZOETEWEIJ was asked to comment on the discussion so far.

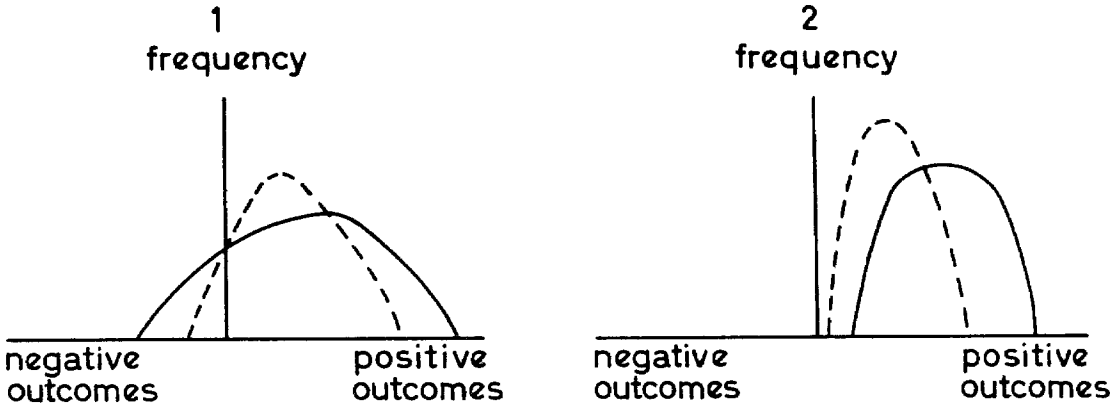
He felt that the comments indicated that his paper had gone a long way towards providing an explanation of the situation. In relation to the parallels in other industries pointed out by ROBINSON, ZOETEWEIJ nevertheless considered the fishing industry to be largely unique. There was heavy reliance on workers doing the best possible job; a direct dependence on individual initiative. Closer but not entirely satisfactory parallels were provided by waiters or commercial travellers who effected sales. ZOETEWEIJ was interested in, and in broad agreement with, the further reasons for the share system given by BOWEN. He was not satisfied that common property was an important factor: yields would still be unpredictable without it, and it was risks of this kind that were important. GERHARDSEN's emphasis on the skill of the skipper was important. On VAN DYK, ZOETEWEIJ considered that if there were more vertical integration there would be less sharing. But productivity might fall in consequence: the incentive effects of sharing affected both skipper and crew.

Discussion now turned to the effects of the share-system. ROBINSON referred to BOWEN's introduction. He was not satisfied with the investment argument. The share-system provided owners with an assurance that wages would vary with the degree of prosperity, and this ought to encourage investment.

TURVEY suggested that sharing had two kinds of effect on investment:

(a) If an investment was successful, the return to the capitalist would be less than the marginal productivity of capital.

(b) If an investment was unsuccessful, the capitalist would bear less of the cost.



Diagrams II.1&2.

These were opposite possibilities; which was dominant would depend upon the nature of the investment. Diagram II.1 illustrated his point. The solid line gave a frequency distribution of the possible financial outcomes of investment if all risks were borne by the owner as with a wage-system. Sharing shifted the frequency distribution to the dotted curve, labour taking part of the gain or bearing part of the loss. The modal gain and the possibility of large loss both fell. This sort of situation would pertain where there was a large range of possible outcomes. Diagram II.2 illustrated a situation in which there was no possibility of loss. Here the share system offered only a disincentive to investment. Thus, the share system might encourage investment where this was in risky ventures (the first diagram) but would not do so in cases such as that illustrated in his second diagram.

ROBINSON pointed out that capital was scarce. The share system economised capital for the owner in any risk-circumstances; he could get more trawlers for the same capital sum. TURVEY thought this a different point from his own, which was concerned with a decision as to whether to buy one trawler.

LIENESCH said that in full employment the share system failed to attract enough skilled crews.

BOWEN agreed that there were imaginable conditions in which ROBINSON's argument might apply and he was also willing to accept the logic of TURVEY's diagram. But the arguments were not relevant to conditions as they had been since World War II. His own point was that the big (distant water) trawler owner tended to disregard shares in conditions of full employment, and regarded labour costs as a datum of so much per man and so much per crew. These costs were negligible compared with the investment costs. The parameters of the problem were not constant; for example, a change in the value of particular fishing grounds would cause trade unions to re-open discussion of sliding scales. ROBINSON might be right for the conditions of the 1930's, but certainly not at present.

ZOETEWEIJ asked LIENESCH if it was the share system or the actual level of earnings that was failing to attract crew in Holland. LIENESCH said that it was a fact that you could not get enough skilled men; crews were very uneven in quality. At the same time, in a small Netherlands fishery operated mostly by families and using a share system, the rate of investment in new vessels was enormous. Everything depended on the type of fishery.

SCOTT asked what kind of investment it was that the share system encouraged or discouraged? What seemed to have been discussed was the same kind of investment as in the past. But TURVEY's classification was less satisfactory than one in terms of capital-saving or capital-using investment. If a possible new investment was capital-using there was likely to be opposition to it because of the need to change relative shares, but if it was capital-saving there was every incentive to introduce it because the system need not be affected. CRUTCHFIELD commented that re-negotiation when technical changes occurred was not impossible, and that the alternative to the system was trade unions, so that the same sort of disincentive effects to investment might occur by unions insisting on a share in 'productivity' increases. There was therefore no reason to think

that the share system had any special effects.

SCOTT GORDON said that ZOETEWEIJ had been cautious in his paper, and rightly so. We were not at all sure how the share system affected investment. But there was no substantive difference between the system and other situations where trade unions used the 'ability to pay' argument. On the other hand there was an implication that the industry was under-capitalised. This was not so; it was probably over-capitalised, from a long-run equilibrium viewpoint. The problem was not the amount but the type of capital. There was need for bigger rather than more trawlers. Here the limitations on size were much stronger on the side of the capital market; loan capital was not available in large amounts. The industry was over-capitalised in total but under-capitalised in units. BOWEN suggested that the borrowing difficulties were due to bottlenecks behind the industry (for example in landing facilities and distribution) which caused risks to increase with size.

POPPER expressed disagreement with the view that there was nothing wrong with the share system from an investment point of view. Unless the marginal product of an investment was big enough to pay both the labour share and the rest it would not be adopted. But it might with a trade union; the union would have to accept a smaller increase. The additional risk with the share system was that it would not be possible to re-negotiate shares. The argument was even stronger if a trade union was not a necessary alternative to the share system; in this case sharing was a clear obstacle to investment.

MACKENZIE pointed out that fleet development always involved questions of re-negotiation of shares. The rigidities were social and could be very strenuous.

TURVEY said that CRUTCHFIELD took the view that the investment effects of sharing would be similar to those of unionisation; it had also been suggested that shares could be re-negotiated downwards. But where there were industry-wide agreements, individual owners would not be in a position to rely on re-negotiation, and it was individual owners who invested.

Referring back to ROBINSON's original argument, CRUTCHFIELD argued that in the case of many fishing industries the inherent risks of investment were such that alternatives to the share system simply did not exist.

SCOTT GORDON raised two new points on ZOETEWEIJ's paper:

(1) The point was made that the conflict of interest between fishermen and owners was minor until the owners became processors. There was in fact a tendency in this latter direction which should be discussed. On the Atlantic coast of Canada, for example, there was reason to believe that processors owning trawlers ran their trawlers at zero profit or perhaps even at a loss, so as to lower fish prices and be able to buy from others more cheaply. Price setting by processors was undesirable and needed attention.

(2) ZOETEWEIJ referred to social security provision for fishermen. Such provision was of long standing, but had lagged behind that provided for others

in some respects, because of the difficulties of implementation. SCOTT GORDON questioned the proposition that the difficulties of providing unemployment insurance could be disregarded as being simply administrative. They were administrative, but were not therefore trivial, as Canadian experience had demonstrated. In fact, the Canadian scheme would begin next year, and SCOTT GORDON expected it to result in fishermen being subsidised by the rest of the community during their period of 'normal unemployment'.

GERHARDSEN discussed the effects of the existence of the share system on the price formation process in Norway. If the fisherman had a fixed wage-income, he would try to improve his annual wage by bargaining, so that technical improvement could be used to lower prices if necessary. As things were, fishermen talked in terms of prices, and this made the downward adjustment of prices difficult.

CRUTCHFIELD referred to DONALD WHITE's work, which showed that the introduction of company-owned trawlers in New England had caused dissension on Boston Exchange because manipulation of the Exchange had become easier. WHITE believed this might be taken care of by changes in the rules, but CRUTCHFIELD questioned this. It was not simply a question of trawler ownership, but of the importance of large buyers. On the West coast of America there were four buyers making 75 per cent of the purchases in most markets. This resulted in non-competitive behaviour and in more processing rather than in large profits, and there was a consequent exploitation of immobility.

III. OPTIMAL UTILIZATION AND THE CONTROL OF FISHERIES

by Anthony Scott

1. INTRODUCTION

The outlines preparing the participants in this Round Table were (with respect to this paper) unintentionally ambiguous: one of them ambitiously directed me to consider "further" the optimal allocation of resources between types of fish, fishing grounds, methods of fishing and overtime; the other more prudently advised me to hope less to answer problems than to raise new questions. I have gratefully taken refuge in the shelter of the second directive, for while the answering of the problems of allocation of resources does not easily yield to the pressure of concentrated study, it may reveal further problems that complicate the previous methods by which the problem may be considered.

2. ALLOCATION AMONG INDUSTRIES

Professor Scott Gordon was, probably, the first economist to raise within a coherent theoretical framework the allocation problems posed by the fishery as a type of common-property resource. (1) He contrasted the fishery with the more familiar private property industry such as farming. In his paper Professor Gordon first reminded us that the sole-owner of a farm will attempt to maximize the rent on his farm. If the owners of all other fixed resources attempt to do likewise, and if the owners of labour and other variable inputs seek out the best return, they will all achieve in a final static equilibrium, the optimum allocation of factors among the various uses (or fixed resources). This final equilibrium may be described in a literary way by saying that when it has been achieved, no owner of a factor can better his position by changing the employment of the factor; no resource owner can better his rent by changing the amount of each factor that he employs; and no resource or part of one could produce a higher net return than with the quantity of factors now exploiting it.

The same equilibrium is described more precisely (for labour) by saying that in it, the return to similar units of labour is the same in every employment (labour cannot better itself), that every owner pays for each worker a price equal to its marginal product (he maximizes his rent) and that therefore throughout the economy the marginal product of labour (of uniform quality) is the same.

Professor Scott Gordon has demonstrated that since fishing grounds are not private property, there is no proprietor to limit the employment of labour when the rent on the ground is maximized. Instead of finding a level where the price of labour equals its marginal product, employment finds a higher level

(1) H. Scott Gordon, "The Economic Theory of a Common-Property Resource: The Fishery", Journal of Political Economy, April 1954, pp. 124-42. See also Anthony Scott, "The Fishery: The Objectives of Sole Ownership", Journal of Political Economy, April 1955, pp. 116-24.

where the price equals the average product. On each ground an equilibrium is reached where in comparison with private ownership the total catch is higher, total employment is higher, and rent is lower (possibly zero). In the rest of the economy, if labour is mobile, the marginal product of labour is the same as the average product in fishing.

The first thing to ask is whether this is really a bad thing. What effect has it on the fishery? Professor Scott Gordon answered this question by writing: "This is why fishermen are not wealthy, despite the fact that the fishery resources of the sea are the richest and most indestructible known to man. By and large, the only fisherman who becomes rich is one who makes a lucky catch or one who participates in a fishery that is put under a form of social control that turns the open resource into property rights". (2)

Now this, I feel, is not quite correct. The rice lands of China and South-East Asia are also of fabulous fertility and durability. The peasants who work them are also very poor, and their mobility between occupations and their opportunity costs are low. So far there is no difference between the fishery and the rice farm. The difference arises first when we observe that in such countries high rent incomes are appropriated by the landholding class. Because they hold the land as their own, they are able in effect to act as employers who hire only enough farmers to maximize the rent of land. Hence the fact of private property does not bring wealth to the workers on a rich resource, but only to the rentier, who may be an absentee.

The lowness of the fisherman's income then, is due first to his low opportunity costs, which are low because he is geographically or industrially unadaptable. (3)

Secondly, his poverty relative to the rest of the economy might be argued to be due to the fact that most Western farmers are (unlike the peasants in a rice economy who only earn the equivalent of wages) also the recipients of quasi-rent on their capital goods. But the boat-owner also gets a return on capital as far as the share system will allow it, so it is not the quasi-rent that makes the difference. Fishing analyses include nets and boats in the factor "effort", but (apart from the working of the share system) there is no reason arising from common property why there should not be interest and profit to be made from having the right type of equipment at the right time.

We are left, then, with the conclusion that the low incomes in fishing relative to those in farming arise from the fact that the typical farmer of the Western world receives a return that is a mixture of rent, interest, profit and wage; while the return of the fisherman (a) omits rent - indeed there is none to receive, (b) includes a wage - but this may be lower than the farmers' wage because of immobility (low opportunity cost) and (c) includes some profit and interest - but these too may be low both because the share system gives capital a low return and the immobility of capital may give it a low opportunity cost.

(2) loc. cit., p. 132.

(3) See Professor Scott Gordon, op.cit., on this, however, at p. 132.

Hence we see that the allocation of resources to the fishery may be too generous for three reasons: the share system, low mobility, and common-property. If the economy is to put the fisherman and the farmer on the same bases, methods must be found for adjusting all three of these matters. Common-property is certainly not a good thing, but neither is it the only factor making for poverty. To put it another way, the fisherman is much like the farmer's hired man, who receives only his labour opportunity costs; he is not much like the prosperous farmer who receives rent and profit as well.

In the second place, for the purposes of discussion at least, I am tempted to go farther in this examination of the ill-effects of common-property and to suggest that when one takes the distribution of income into account, the mis-allocation of society's resources that results from having too many fishermen is not, from the rest of society's point of view, a bad thing. The sufferers are the fishermen. This proposition may be examined by asking: If fishermen were employed by proprietors of detached fishing grounds, so that many were displaced and moved eventually to other jobs, would the gain to the rest of society be over-balanced by

(a) the higher incomes of the remaining fishermen, plus

(b) the higher incomes to be paid to displaced fishermen in their new jobs, plus

(c) the probable increase in the price of fish (in the absence of innovation in catching methods) ?

I am inclined to think that most of the gain would accrue to those still in fishing. There would still be a gain for the rest of the world as long as the "terms of trade" for fish did not rise, but if the price of fish rose a great deal, it is not impossible that the rest of society would long for the good old days when they exploited the fisherman.

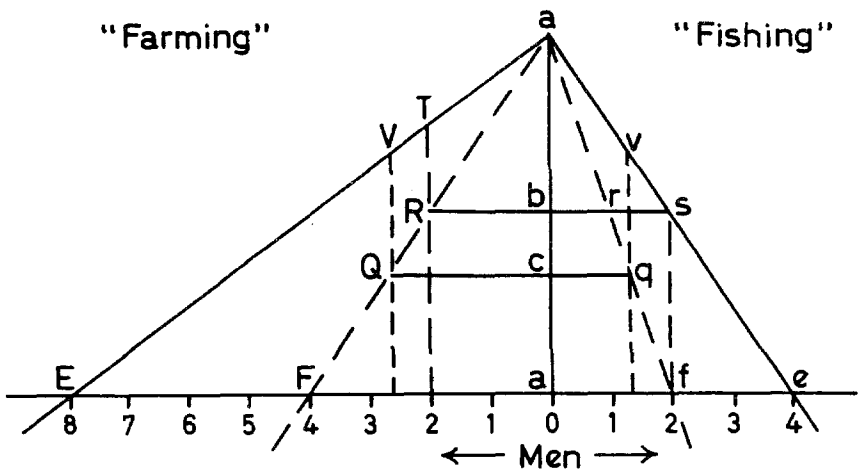


Diagram III.1.

Diagram III.1. may illustrate the point. The right-hand side shows the average and marginal productivity curves for "fishing" effort (all fishing in the economy) and the left-hand side shows, with horizontal scale reversed, the average and marginal productivity curves for "farming" (representing the alternative use for fishing labour). Labour is assumed to get the same return in either sector - there is no immobility. We start with four units of labour, applying two in each industry. In fishing we have effort over-applied so that there is no rent and (by accident) zero marginal product. In farming the return to labour is equal to its marginal product. Then farmers will receive rent equal to aRb. In the entire economy the wage or price of labour will be equal to db.

Now let us assume that the fisheries all become private property. There will be decreased employment there, (4) and since the men are assumed to be mobile, more of the total of four units will have to be employed in farming. First, taken as a unit, the whole economy is better off because the total product (the area under both the marginal curves) is larger. If income were redistributed equally in both situations, everyone would have more. If we examine the actual distribution of gains we see that throughout the economy, with four units and with the return of labour equal in both industries, the equilibrium wage will be equal to cd. Wages go down by bc and the rent of land and fisheries rise to aQc and aqc respectively.

To make our point, we must neglect the difference between wages and rent in the new situation and assume that the fishing grounds are communally owned by the fishermen, and that every farmer owns his land. Then the average productivity in each industry tells us how well an average individual in each sector is making out. In farming, inevitably, the farmer is worse off (though the new arrivals in the industry may take the poorer land and the old farmers stay comfortably off). In fishing, the fishermen are better off since the average product has jumped from the level of s to y. On this basis, fishermen gain and farmers do not lose much. (If they confined the new recruits to labouring or to marginal land, they would not lose at all.) But on the average the farming world has not reaped the gain of the change. If, in addition, the terms of trade for fish improve so that curve ae rises vertically relatively to aE, there may be an absolute loss to the farming world.

These outcomes depend upon the elasticity of marginal product - that is upon the position and the slope of the two curves. With different slopes and positions - and with curved functions - a variety of outcomes could be obtained. I have only suggested one, to illustrate my point. This point is that even if political economists and their audiences may accept the point that there is misallocation of labour in the fisheries under common-property resource ownership, the economist must also demonstrate that society has much to gain by remedying the situation. As things develop in the above model, a fisheries tenure reform would benefit fishermen a good deal more than the rest of the world.

3. FOUR FORCES AFFECTING LANDINGS

Our next task (though the last is far from finished) is to review the

(4) If the fishery was being over-utilized. See below for a fuller statement.

forces affecting the return from a particular fishery. What is meant, for example, by the assertion that as more effort is applied the average and marginal products fall? Unfortunately, four distinct phenomena may be mixed together here.

(a) Diminishing returns. Within a given fishing vessel, the application of more labour time may mean that the most efficient proportion of labour, leisure and capital is passed. The cost per unit of fishing-effort may rise. It may become increasingly difficult to maintain the ship and its equipment; the hold of the ship may be inadequate for the amount caught so that frequent wasteful returns for unloading are required; the crew may become tired and inefficient.

This is the kind of diminishing returns that would be experienced if an inexhaustible fishery, exploited by a single crew, attempted to increase its weekly catch without changing the capital equipment or the techniques employed. It is the same kind of diminishing returns as in the classical law of variable proportions, showing the profitability of keeping some optimum proportion between labour and capital.

Because there are so many fishing vessels and so many men in each fishery, this kind of diminishing return is rarely to be observed. But it would certainly exist in the short run if the fishery was on a private-property basis, and if a sole-owner attempted to increase his landings.

(b) External diseconomies. Beyond the scope of any vessel, but within a fishery, there may be interference with the efficiency of fishing, built up by the number of vessels. Many coastal fisheries afford relatively few good fishing spots, depending as they do upon advantageous reefs, banks, bays, narrows, shallows, flats or rapids. Since such natural advantages for fishing are often scarce. the more vessels there are fishing, the less the efficiency of each vessel. (Against this, however, we must offset the greater efficiency of finding fish when there are more vessels out Indeed, the greater difficulty in catching fish when the fish population is low (as opposed to the likelihood of decimating the population) is a diseconomy of scale). The point has nothing to do with fish population. While there may be an inexhaustible stock of fish, there may be a scarcity of locations to fish from. The point has much in common with the external diseconomies found in other resources, such as petroleum, ground water and game. It is also to be found in connection with the use of (common-property) highways where it is properly referred to as "congestion".

In the petroleum industry, quite apart from the question of the limited amount of oil in a pool being drilled for by competing producers, there is a question about the optimum number of wells drilled. More than this optimum will mean that all drillers together have higher costs, without an equal or proportionate gain in the number of barrels pumped. Each new driller deprives his neighbours of the gas pressure that drives oil up to the surface. In the case of water underground, an increase in the number of users means a fall in the water table, so that the pumping costs of all users rise. In the case of wild animals, an increase in the number of hunters may alarm the game, so that the task of each hunter is more difficult. And on highways, increase in the number of vehicles may imply that each moves more expensively. In each case, then, there is no question of the "population" or stock that is available to be used. The stock

may be unchanged, or inexhaustible. What changes is not the physical population (or in the case of highways, the amount of highway) but the cost that each user experiences in attempting to capture a portion of the population.

Diseconomies (a) and (b) are not independent. In one fishery, exploited mainly by small fishermen, there may be little internal diseconomy: a man and his boat can with equal average ease cast twenty or forty lines. Yet another fishery may be dominated by large vessel owners or charterers who themselves experience the losses that their own attempts to increase effort impose upon vessels already in use. Further, both the internal and external economy effects outlined above may be swamped by the effect of local shortages that falsify our assumption that factors are homogeneous by necessitating the use of unsuitable or exhausted labour, obsolete vessels, or worn equipment.

If we are, as in the following pages, interested in the long-run equilibrium of the fishery, most of these internal and external economies cancel out. Only a shortage of natural fishing places, or a permanent local shortage of labour, skill or capital are likely to cause the cost of effort to be other than a linear function of labour input. On the other hand, if we are interested in the short run, all the causes of increasing costs, both internal or external, are likely to be relevant for finding the year-to-year position of the fishery.

(c) Population. This point differs from (b) above. Admittedly, it requires considerable refinement of definition to distinguish in economic language the shortage of fishing places from a shortage of fish. If more effort is applied to a fishery, the achievement of that extra effort may be a source of extra expense or inconvenience to every competitor in the fishery. If it is, it is here classified in (b) above. If, in addition, the extra effort may reduce the stock of fish so that the equilibrium catch is permanently reduced, we classify it as a "population" effect (c).

This is something that can only happen to a population or biological resource with its own internal principles of reproduction and survival. With other resources, the population effect occurs only once, not as a permanently available principle of management. A coal resource, for example, may cost more to mine as the shaft is deepened. But since the mine cannot be replenished, little use can be made of the principle by the manager in reaching an "equilibrium". The economy may switch from coal to a substitute, but this is of no comfort to the coal mine operators. A ground water resource, on the other hand, is replenished by nature, so that its managers could decide upon a rate of use which they could maintain indefinitely at a certain cost per gallon. A forest, too, is replaced slowly by nature, so that forest owners can decide upon a rate of cutting that will give them the best combination of timber, cost and timing.

So it is with the fishery. The stock of fish at any time is in process of growing. Its growth (caused by its own reproductive force, which exceeds its natural death rate) would be indefinite if it were not that food shortages, physical habitat limitations and predators slow down the absolute time rate of growth as total population increases; eventually they prevent further growth. If any of these limiting factors increases in intensity, the population is depleted, then begins to grow more vigorously toward its previous size.

One of the "predators" is the fisherman. His efforts can reduce the population to such a low level that fish are literally scarce. If he maintains this effort, the population and the catch will remain small. On the other hand natural predators that depend upon a certain fishery for food will themselves suffer and shrink in numbers if their predacity reduces the fishery to the point of real scarcity. The fish population can then grow back toward a maximum level, though predators may also increase in number, and inhibit the rate of growth. Clearly we must know the ecology of the whole ocean to know how far any population may grow.

Thus at any level, there is an absolute time rate of increase in the population. (dP/dT, where P is population and T is time.) If the population is very small, the breeding stock is too small to achieve a large time rate of increase. If it is very large, the force of outside predators, etc., will be so great that the time rate of increase in the stock will not be great. Thus at any level of population there is one rate of catching fish that will keep the population at just that size: the time rate of increase that would exist in the absence of the fishing effort. And the proposition works the other way: if a rate of catching is begun and continued, there is a level to which the population will move which will increase at just the rate required to keep the landings stable indefinitely (ceteris paribus in the ecological world). (5)

As our third type of diminishing return, then, we are faced with the opinion that (i) the greater the sustained effort, the smaller will be the population and the smaller the catch that can be permanently produced by that small permanent population. (ii) At the other extreme, the smaller the effort, the greater the population, and the smaller again the catch that can be permanently drawn from a population of that large size. (iii) In between, there will be other levels of effort that, if continued indefinitely, would result in intermediate-sized populations that will have natural rates of growth compatible with larger annual catches.

This is shown in a revised version of the diagram which, originally adapted from work by Professor Scott Gordon, I published in the Journal of Political Economy in June, 1955. (Diagram III.2.)

The only change in the structure of this diagram from that previously published is that the population curve has been shown as double-valued with respect to landings. This is the graphic counterpart of the discussion above.

(5) This is my understanding of the idea of "equilibrium catch" implicit in Professor Scott Gordon's paper, loc. cit., p. 137, and expounded in greater detail in "Some Aspects of the Dynamics of Populations Important to the Management of the Commercial Marine Fisheries", by Milner B. Schaefer, Bulletin of the Inter-American Tropical Tuna Commission, Vol. 1 No. 2, La Jolla, California, 1954. Mr. Schaefer has very kindly shown me a further paper on this subject which he will shortly publish. It appears to me that while one need not accept the specific shapes of curves that he suggests, one cannot but be impressed with this way of putting the basic idea that a rate of landings that is in equilibrium with a certain population is the same as the natural time rate of increase of that population in the absence of the fishing effort.

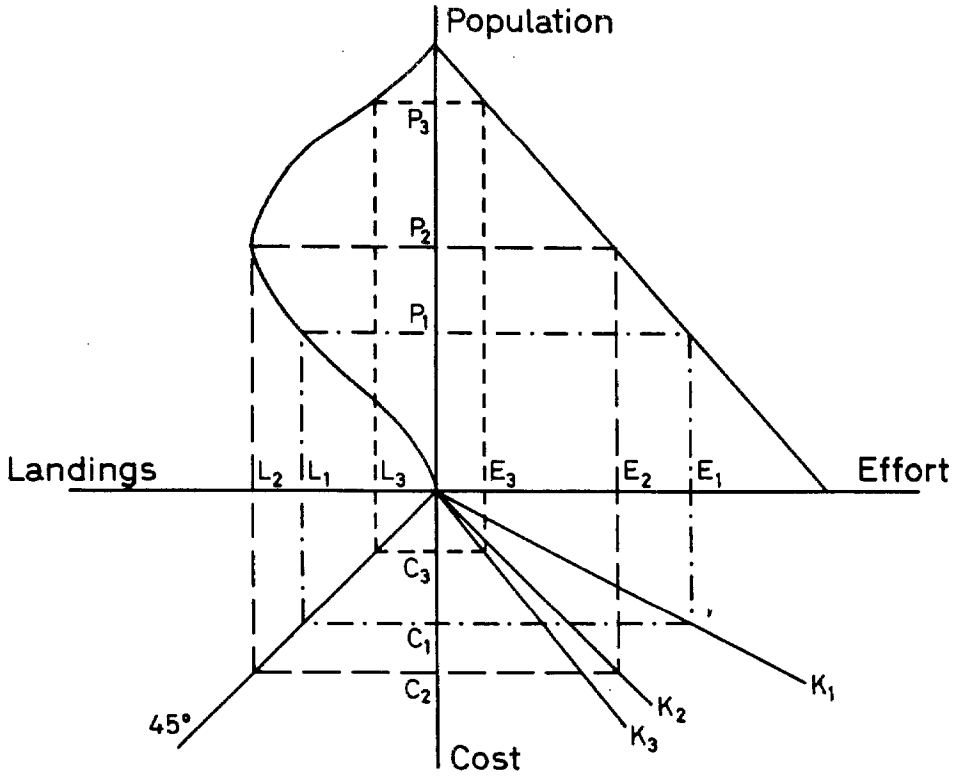


Diagram III. 2.

It should be emphasized that this is an equilibrium picture of a competitive fishery. It shows things as they would look if an equilibrium in the economic system coincided with a biological - and ecological - equilibrium. (6) The outcome is partly what one would expect from common sense, but it has a curious characteristic.

As the diagram is drawn, the operative variable is the cost function (K). Conforming to what has become conventional, the function has been drawn as a straight line, but it is possible to relax this assumption considerably without substantially changing the outcome. If the fishery experienced permanent internal or external diseconomies (or economies) of scale, the straight line in the north-east quadrant would be appropriately curved. Diseconomies would cause a curvature concave to the origin. It will be seen that for each line K there is a unique equilibrium for the whole system, given that cost, C, is to equal L, the value of landings. Generally speaking, these solutions conform to intuition: the higher the cost of effort, the less effort is purchased, and the greater the population that therefore survives fishing. This is an economically satisfying

(6) In Mr. Schaefer's article there is a discussion of the route by which the population might approach a given equilibrium level.

situation since a steep cost curve presumably symbolizes a high opportunity cost for fishermen, perhaps reflecting a stronger demand for industrial goods than for fish.

The curious result is that the level of landings does not rise monotonically. Because of the population principle outlined earlier, the low cost curve K_1 is in long-run equilibrium with high effort and low landings ("overfishing"); higher costs K_2 with less effort and more landings ("maximum yield"); and the really high costs of fishing effort of curve K_3 are in equilibrium with very little effort and landings which are less than the maximum. (In the original papers by Professor Scott Gordon and myself, the range from P_2 to origin O was omitted). If one sought the "maximum yield" L_2, as a long-run equilibrium of a competitive fishery, it would be necessary to make the effort E_2.

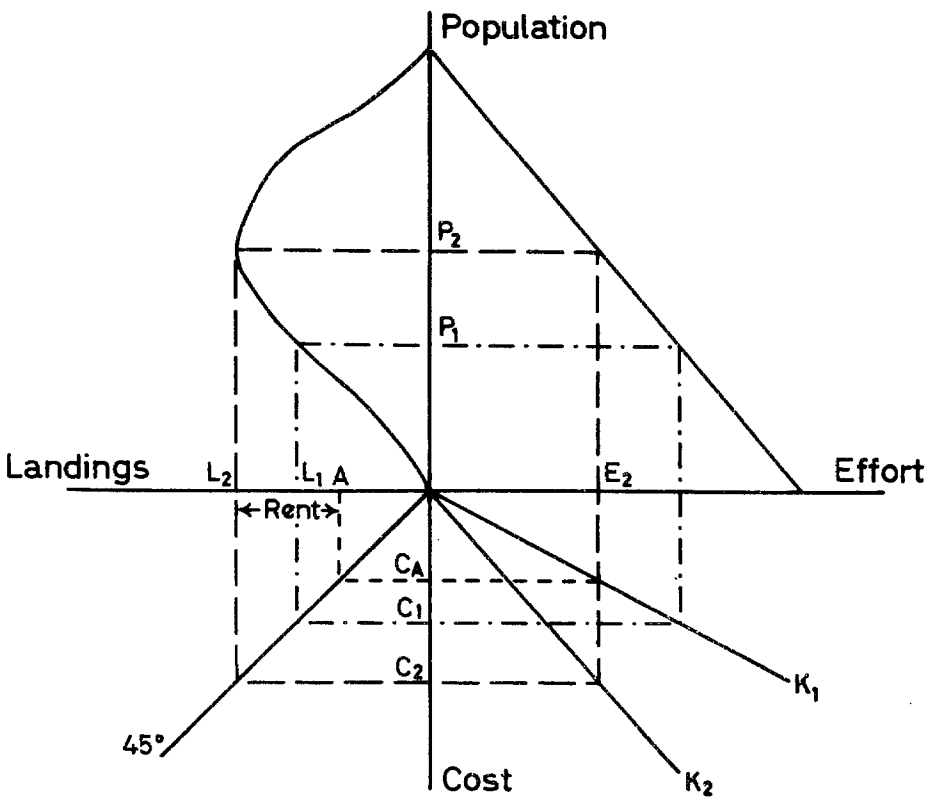


Diagram III. 3.

Diagram III.3. presents the same set of curves and the same cost curves. It is now assumed that there is a desire to manage this fishery as a sole-ownership ("monopoly", but not a sole seller of fish). We may imagine either that one proprietor has been given title to the fishery, or else that a communal group or the government is running it to maximize rent as a sole-owner would.

The competitively exploited fishery discussed above had an equilibrium

in which total cost is equal to total landings. A sole-ownership on the other hand, is run so that rent is maximized, that is, so that on the diagram there is the greatest difference possible between L and C (both in value terms). Two situations present themselves, distinguished by costs relative to the cost curve that would give maximum landings under pure competition.

(i) If the cost curve is less than K_2 (e.g., K_1), we can say at once that the owner will never hire more effort than E_2. For if he did, his labour bill would increase beyond E_2 but his landings would fall below L_2, and his rent would fall. This solution, with the maximized rent, is shown in diagram III.3.

Would he (with costs less than shown by K_1) hire less effort than E_2 ? It is unlikely. Only if the decline in his landings (represented by the combined slopes of the two population curves: population-landings function and popula - tion effort) was less than the decline in his costs would he find it advantageous to hire effort other than E_2. Apart from this special case, we may conclude that a sole-owner would, when the cost curve is lower than K_2, hire effort equal to the amount that would be used in equilibrium of a competitive fishery when the cost curve is equal to K_2.

(ii) When the cost curve is above K_2, the solution suggested in my original paper stands. It is shown in diagram III.4., (although this diagram cannot demonstrate that the rent DB is the maximum rent, which requires either algebra or a very large-scale diagram for its trial-and-error location). It will be seen that in the particular situation covered by the diagram, the sole-owner would find it profitable to reduce his effort purchases. His landings would also fall, but less than his costs.

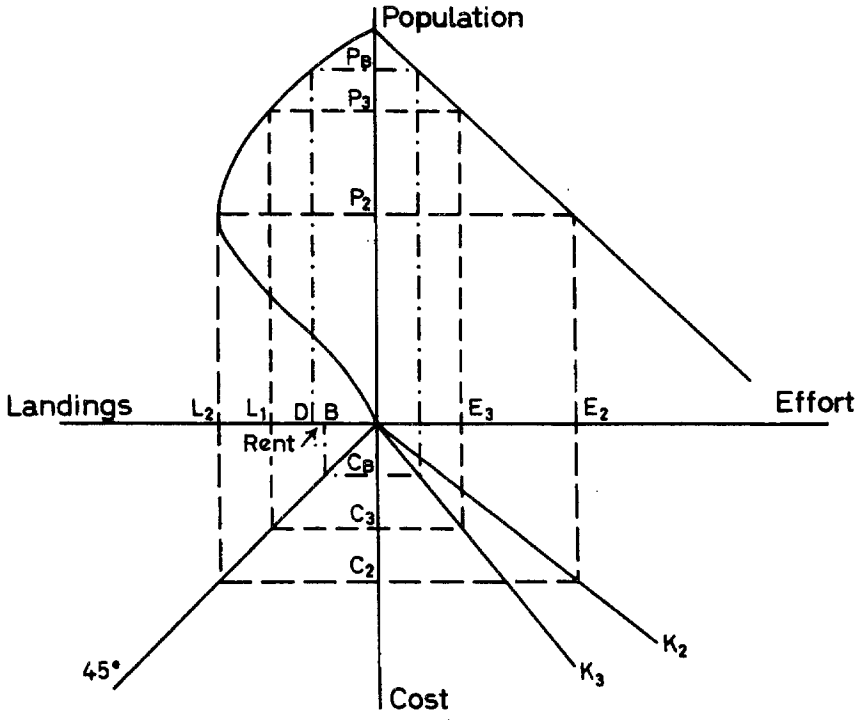


Diagram III.4.

We have here another approach to the original proposition that an increase in effort will dissipate rent. In both situations there is an original situation in which a small number of fishermen earn a rent. In both situations the rent attracts workers from other industries till the effort increases and the population decreases so far that there is no rent. With respect to landings, however, competition gives a smaller catch than sole-ownership would in the first case; but in the second, competition actually gives a higher catch than the rent-maximizing ownership would yield. (Presumably those who prefer the maximum catch to the maximum economic efficiency of the industry should advocate sole ownership in the first situation, but unrestricted fishing in the second, if the choice of controls is restricted to two methods of management).

There is a good deal more to be said about population (c), the third force operating on landings, than we have discussed above, particularly with respect to methods of control. But to complete the list, let us turn first to the fourth type:

(d) Allocation over time. By this phrase I refer to the fact that static equilibrium is not an end in itself. The life span of commercial fish, I am told, runs from perhaps two years for some species up to fifty years for others, and a generation is therefore a long period in human terms. To get a fish population into equilibrium with the economic system may take many fish generations, even if the economic system is otherwise in equilibrium. If it too is growing and changing, equilibrium may be centuries in arriving.

Meantime, demands for labour and fish will alter. The demand for protein, about which the biologists so often warn us, may suddenly become more pressing; fish prices may rise. This is likely to occur much more rapidly than the leisurely equilibrium process can adjust to it. In other words, the wages implicit in the cost function in our diagram are not fixed; and the demand implicit in the landings curve will alter with changes in consumer income, fish sticks' flavour, war, famine, tariffs, transport costs and techniques. What is needed is the ability to operate a fishery with respect to this anticipated alteration in cost and demand. Why work the population toward biological equilibrium if the demand is disappearing? - why not exhaust the stock? (There are undoubtedly some good reasons why not, but a move in that direction may be rational). Why not flood the market with cheap fish, caught by drawing down stocks for a while, so as to change the pattern of demand over the long run? (This would require monopoly, but sole ownership would help). Why now allow the stock to build up toward the range of maximum landings while labour costs are high and demand low, or at least demand is smaller than it is expected to be later?

In other words, why not encourage disinvestment and investment in the fishery as year-to-year adjustments dictate? The rents described earlier are achievable only through investment or disinvestment in the stock. Such actions will provide an eventual equilibrium. But equilibrium is much less an end than the ability to manage the fishery flexibly: to anticipate yields if planned horizons become foreshortened, and the contrary if expectations are disappointed.

Such actions, which are a part of efficiency of the economy, are impossible unless unified control of each fishery is achieved. The best parallel

is seen in the actions of government authorities over oil fields, who cut down the allowable yield of a field when the price falls below what is believed to be "normal". I believe that there is also a suspicion that the Pacific herring control paid more attention to the market for its product than purely biological objectives would require; which is what one would wish it to do, if its forecasting studies are reliable.

4. METHODS OF REGULATION

Though in the outline of the Round Table, I am asked to deal with methods of regulation, I do so with some misgiving. since the practical aspects of such methods are largely unknown to me.

It has been suggested in the discussion so far that the magnitude of internal and external economies or diseconomies in competitive fisheries discussed in (a) and (b) in section 3 are unknown but are suspected of not being large. This may be true, but I suspect that if such fisheries were privately owned they would be rapidly developed with new and perhaps labour-saving techniques. This would certainly occur in the West coast salmon and halibut fisheries. If there are such economies to be earned. it would follow that the method of regulation would be better if it gave an incentive to economise on effort rather than giving an incentive to circumvent quota restrictions, taxes, or subsidies.

To be specific, it might be argued that other fisheries should follow the leadership of those that are now governed by fishing regulations as to time, place or size. Such regulations are from the present point of view less than ideal since they force the competitive members of the industry to build larger ships, buy heavier gear, and spend longer at sea to catch what may after all be only a slightly different amount than would be caught under unrestricted fishing conditions.

On the other hand, such regulations may force the industry, under the pressure to catch as many fish as possible during an open season, to adopt better methods or invent new techniques. Such innovations may actually reduce the social cost of bringing in a certain catch. Whatever cost reduction is achieved is likely to be offset by the increasingly shortened season resulting from using better methods to land a catch of predetermined size.

As regards (c) in section 3, the rent of a fishery is likely to be competed away by too much effort applied to a given population. The theoretical optimum population, catch and effort are suggested in the diagrams. How are such optima to be achieved?

In the first place, it should be possible to work with a competitive fishery and move along the effort axis on the diagram so that the optimum-rent solution is reached. I say it should be, because although it is easy to determine the best course of action when all the biological and cost facts are known, the shape of the population-landings curve makes it very difficult to know how far to move.

The general rule appears to be complicated: When the cost curve is

K_2, reduce the competitively determined effort till it is just sufficient to bring in the maximum equilibrium catch, that is, to E_2; but when it is above K_2 reduce it rather less (so as to obtain the outcome of diagram III.4). It would be pleasant to be able to advocate that the amount of effort to be used should always be E_2, but when labour has high opportunity costs relative to this catch, an input of effort such as E_2 would mean expanding the fishery and running it at a social loss.

Assume, however, that the best amount of effort has been determined. How is the input to be reduced? One proposal is a limit on the number of fishermen, or, in order to avoid wasteful expansion of the fleet, on the number of men and ships. In other words, the state might assume a property right of the kind the owner of a toll-road or of a common carrier does, and charge for the "privilege" of fishing. Those who bought a "privilege" would of course attempt, once again, to catch as many fish as possible, and catches per ship would rise. The number of privileged fishermen might have to be further reduced, but eventually a number would be reached which would be the equivalent of a sole-owner's maximum-rent use of effort.

One efficiency-maximizing aspect of this arrangement is that the rent of the fishery would accrue to the fishermen. Those who were the most efficient would be able to offer the most rent, stated either as a percentage share of the catch, or as an absolute sum of money. The less efficient fishermen would be eliminated from the industry. The government would accept the highest bids until the right number of privileges had been granted. In order to keep some incentive going, bidding for privileges would have to be allowed at wide intervals, related to the willingness of men to move into and out of the industry.

A large amount of the rent would be recaptured by the government, in bids for privileges: in perfect competition all the rent would be recaptured. It does not matter here what is done with these funds. At the outset they might be used to resettle displaced and disappointed fishermen, or merely to compensate them, over a given period, for the loss of their traditional livelihood. In later years, and generations, the money could be redistributed among the privileged fishermen, if this procedure would not appreciably change the number that would bid under given circumstances. Or, the state could keep the rent, as landlord. I know of no ethical reason why either of these courses should be preferred, but if it is desired to put fishermen as much as possible in the same position as farmers, the redistribution among the privileged few would be the preferred course. This method would keep the rent of fishing among fishermen, just as the rent of agricultural land is responsible for making many farmers wealthy. Finally, in view of the tremendous scientific complexity of deciding upon the sole-ownership scale of the industry, a good deal of the money would be required for communal purposes such as administration and policing, research, and, not least, paying subsidies for the destruction of predators on the administered fishery.

Police would be necessary to keep the members of other fisheries on their grounds, and to help the research staff keep track of the amount and type of effort being used. Research would be necessary to revise estimates of the population, the optimum catch, and the optimum effort. Further, if point (d)

of the previous section is relevant, it would be useful to keep track of markets and price and cost trends, so that the users of the fishery could invest or disinvest in their stock. Since fisheries are not independent of one another, it would be necessary to determine the best balance between the sizes of adjoining fisheries which prey on one another or compete for the same oceanic environment of food and location. It would be possible to use the price system to decide which of two competing fisheries was to prevail.

It seems to be quite obvious that this solution is a mere variant of the sole-ownership solution in all its stark simplicity.

The sole-owner might be a co-operative association of all the fishermen using the fishery at a certain date, but it is difficult to imagine such a group decisively reducing the amount of effort in a short period. To succeed, it would have to charge a fee for admission to the association, so that many of the problems and features of the government "privilege" organization would appear here as well.

The sole-owner might also be a capitalist in the usual sense, who buys his charter for the whole fishery from the state and runs it as a business thereafter, just as a farmer does who buys land from the state. He would presumably hire the boats on the fishery, rather than chartering them. Indeed, in the limiting case, he would own them and would hire the crews just as a farmer employs hired men. If he was a strong bargainer, the fishermen would, just as now, receive only their opportunity cost, and would not necessarily benefit from the change in arrangement. But if the bargaining power of the fishermen was stronger, they could argue themselves into a position where much of the rent of the fishery accrued to them.

Since in most parts of the world fishermen and ships participate during the year in several fisheries, not confining themselves to a single fish population, the situation would in fact arise where a "privilege" system would find a boat and crew holding privileges in several fisheries at once. A market in such "privileges" might arise as men retired, ships were damaged, or individuals decided upon changing combinations of activity throughout the year. If there were no need periodically to change the number of "privileges", the government could allow this market to allocate them, and no re-bidding would be necessary in successive years. Indeed, once the number is determined and granted, there is no need from the point of view of allocation to collect bids.

Similarly, under sole-ownership, fishermen would probably belong to several co-operatives; and individual proprietors would hire men and ships working in a different fishery each season.

In the second place, it might be possible to fix the catch rather than the amount of effort.

I am personally dubious that in the conditions of my model this would be efficient. Fixing the amount of the catch in absolute terms has been shown to increase the misallocation of effort by inducing more investment and labour effort, in seasonal peaks, without increasing the catch or return per worker.

What about subsidies and taxes? A tax on the catch, that increased in rate as the amount caught in a season cumulated, would have much the same bad effect as a quota system. The incentive to build up effort in the earlier part of the season would be increased. Similarly, a tax on catch at the rate which depended upon the amount each boat landed would merely build up the incentive to add to the number of boats.

It seems that the best tax would be one levied on the fishermen or on total outfits. It should be levied at a rate which kept their number down to the required effort input; obviously, in equilibrium it would be much like the "privilege" system. (A subsidy could also be paid for not fishing, but it would be difficult to know how to administer this once the system got under way: who should receive it?) Such a tax system would not differentiate among those who were most keen to fish or were the best fishermen, and might have some unfortunate allocational effects. It seems to me therefore less useful than a practice of charging for fishing "privileges" or for sole (or co-operative) ownership.

DISCUSSION

The discussion was opened by ZOETEWEIJ, who gave an elaboration of the point made by both SCOTT and SCOTT GORDON about misallocation due to common property in resources. If two fishing grounds were available which differed in their returns to effort, for example because of differing distances from port, fishermen would use the more productive one, but if many did so, there might be external diseconomies and marginal productivity on the nearer ground would be below the average. If one man moved to the further ground, and if there was a large difference between average and marginal productivity on the near ground, his return would be above the marginal productivity on the nearer ground (but still below the average productivity of the latter) indicating clear misallocation of resources, since the marginal productivities should be the same on all grounds. But even that one man would not move from the nearer ground, because his catch there would be higher than his catch on the other ground. This could be solved by sole-ownership of the resource, in which case the marginal productivity would be equalized everywhere. The importance of this allocational problem turned on the question whether external diseconomies frequently occurred on a significant scale. From SCOTT's paper it appeared, however, that this was rather doubtful.

SCOTT asked in his paper whether misallocation of resources was necessarily bad, since the only sufferers were the fishermen, who were exploited by society. He seemed to be under the impression that the loss suffered by the fishermen was matched, at least to some extent, by some benefit going to the rest of society, which was exploiting the fishermen. The poverty of the fishermen was chiefly the result of immobility, rather than being due to the existence of a common property resource. Sole-ownership might lead to greater efficiency, but one would expect profits to be at the competitive level irrespective of common property. If a few fishermen were directed to grounds where their marginal productivity was higher than on the usual grounds, or into other occupations where this was the case, either society would get the same amount of fish with less effort, or more fish for the same effort; the fishermen would presumably always earn competitive profits. In other words, if anybody could at all be said to be exploited due to 'common property" it was society, not the fishermen.

SCOTT had said that under the present system too much effort was being applied to fishing, but was this a reason for discouraging further investment? The common property element was inherent in the system, and unaffected by the abundance or scarcity of capital. To reduce costs under the present system, more capital might still be needed.

In SCOTT GORDON's article, common property was given as the cause of low incomes, but SCOTT appeared less certain of this. Not all fishermen were in fact poor, but if they were assumed to be according to SCOTT this could be due to three causes:

(1) The existence of common property, which meant that no rent was earned by fishermen. This could be said to be a cause of poverty in a very restricted sense only.

(2) The lack of mobility of labour - probably the only clear cause of poverty.

(3) Low capital yields resulting from the share system (which ZOETEWEIJ did not believe) and lack of capital mobility. (Yet this seemed inconsistent with the fact that in some countries there was felt to be a shortage of capital).

SCOTT's diagrams III.2, 3 and 4 dealt with the problem of reaching two simultaneous equilibria, the biological and the economic, assuming that the aim was to keep the fish population stable. It might never be possible to achieve these simultaneously.

ZOETEWEIJ asked two final questions. Firstly, how far was it realistic to assume that when the fishing season was reduced there was a tendency for more capital intensive methods to be used? To this SCOTT GORDON replied that the chain of causation ran the other way, from over-capitalisation to a shortening of the season, if limitation on size of catch were imposed. Secondly, ZOETEWEIJ asked whether there was any reason why the proceeds of the competitive bidding referred to by SCOTT should be distributed to the fishermen.

TURVEY took up certain difficulties in the second half of the paper. SCOTT dealt with two reasons on the cost side why resources were misallocated in fishing, the first being external diseconomies.

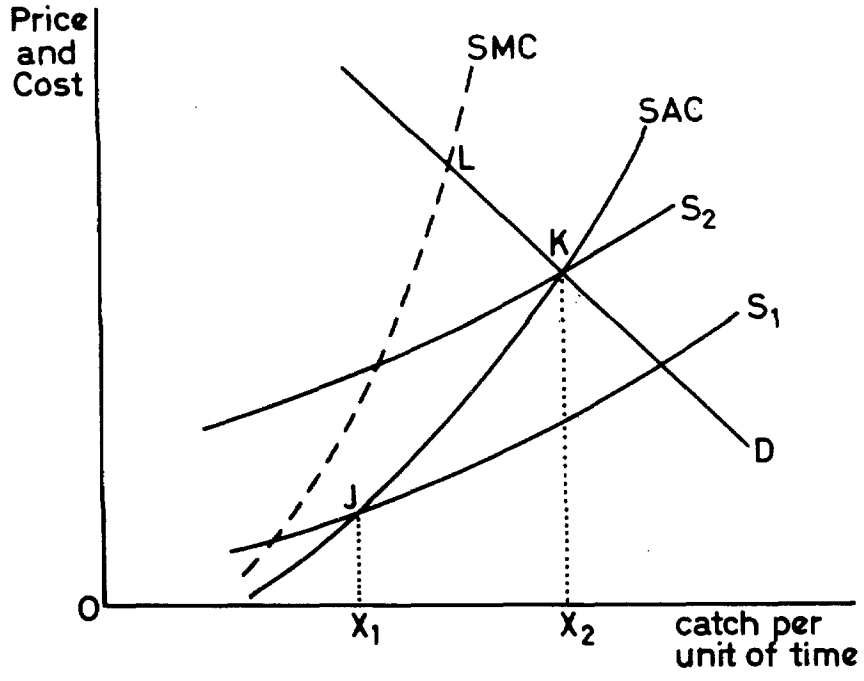


Diagram III.5.

Ignoring the possibility of a rising supply curve due to the first cause, TURVEY said that the supply price of fish was a function (a) of the amount caught per unit of time and (b) of the stock of fish. In diagram III.5. the curve S_1 showed the supply price as a function of (a) assuming a given stock of

fish; S_2 showed it on the assumption of a smaller stock. (The curves rose because of a less than infinitely elastic supply to the industry of the factors of production such as labour, capital, fuel, etc.). A continuing catch of, say, OX_1, was consistent with maintenance of the stock of fish assumed for S_1. Similarly with OX_2 and S_2. Thus points J and K were the only points on the curves S_1 and S_2 respectively which could be maintained in the long run; at any other rates of catch the fish stock would gradually rise or fall. The locus of points such as J and K therefore constituted the curve of social average cost (SAC) which took into account the effect of the rate of fishing upon the stock of fish. The curve SMC was the corresponding marginal curve. If the demand curve were D, the long-run equilibrium position, both biological and economic, would be K. But the optimum position was L, so that the desirable policy was to charge a licence fee equal to the excess of SMC over SAC at L, which would give the same effect as sole ownership of the entire resource. SCOTT agreed with TURVEY's diagram, especially as an interpretation of GORDON's diagram in his original article. His (SCOTT's) diagram was merely an expansion of this, to bring out the point of the double equilibrium, biological and economic. The point was that the additional demand could lead to a larger catch without depletion, because of the bell-shape of the curve of rate of population growth. Thus one could have, in TURVEY's diagram, a line S_2 below S_1, and a curve SAC which was downward sloping.

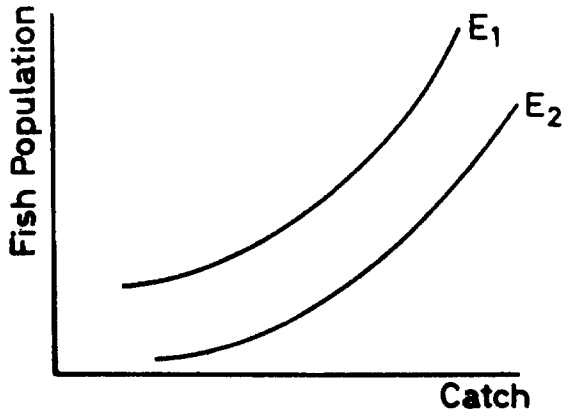


Diagram III.6.

TURVEY produced a second diagram III.6 to show the biological assumption behind his first diagram, plotting the fish population against the catch, where E_1 and E_2 were lines of equal effort.

GORDON said that the curve drawn in the N.W. quadrant of SCOTT's diagrams III.2, 3 and 4 (rate of growth of population of a fish stock of a given species) was much closer to the latest biological theory than were earlier ones. It was a double valued function; the same size catch could consist either of a small number of large fish or a large number of small ones, depending on the age composition of the population. SCOTT went on to explain the biologists' theory of population dynamics, which was that since the rate of increase of a given species was a curvilinear function of population size there might be not one but many states of equilibrium, each the result of a given population size and a given rate of fishing, without depletion. In the absence of human predation an ogival curve would describe the position (see diagram III.7). This curve showed a low

rate of growth at both a very large or a very small population size and a more rapid one for the intermediate sizes. This was because when the population was small, its reproductive ability would be low, whereas when the population was large, it would have a high rate of natural mortality. If we took the first difference of this curve, we had that shown in the N.W. quadrant of the diagrams in SCOTT's paper, approximately bell-shaped. The size of the stock could be kept constant at a number of different levels, provided that the amount of the catch was equal to the net rate of recruitment at that particular population level. But the age distribution of the fish would be different in each half of the curve, and since consumers did show preference for certain fish sizes over others, the curve of value would differ from that of quantity, although it too would probably have some kind of bell-shape.

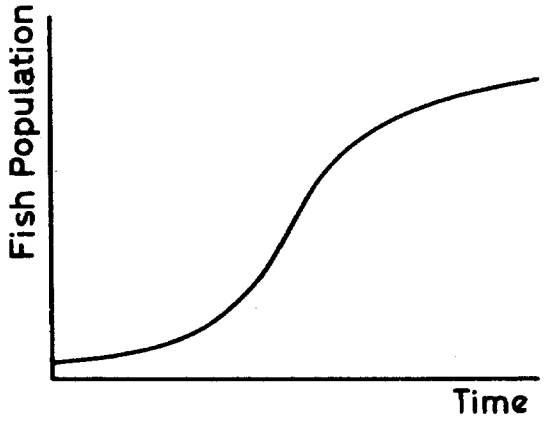


Diagram III.7.

CRUTCHFIELD pointed out that moving from one population size to another might disturb the ecological balance so that it might not be possible to return to the original position on the ogival curve.

The divergence of economic and biological aims was discussed. POPPER stressed that the thing to be maximized was income, not tonnage, but the biologists felt strongly about their criterion of maximum sustainable yield (weight). GERHARDSEN said that they in Norway were aware of the problems involved. In the North Sea, conservation measures had taken the form of restrictions on mesh size, which affected the size of the fish caught not necessarily in conformity with the preferences of consumers. An additional complication was that consumer size preferences for the same fish differed in different countries, so different patterns of prices resulted. POPPER also pointed out that mesh regulations would change the slope of the ogival population curve, and that in TURVEY's first diagram, the line SAC might even become backward-sloping when one tried to obtain a production in excess of the maximum the resource was capable of yielding.

CRUTCHFIELD said that the degree and type of malallocation of resources needed attention. If waterfront markets were purely monopsonistic, this would have almost the same result as sole-ownership, resulting in reduction of catch and conservation of the resource. If one had a co-operative, with restrictions on membership, the economic rent could be collected for the members. In the

case of the Pacific halibut fishery, one found a tendency towards quasi-monopsony without the exclusion of new entrants, whether processors or fishermen, and hence over-capitalisation. One could imagine a situation of bilateral monopoly with both the fishermen and the buyers organised, and a wide range of price results. Again taking the halibut, the quota system had resulted in a shortening of the fishing season, which had meant that a higher proportion of the catch must be frozen, and that boats stayed at sea longer in order to get a full load, since they knew that there would be no time to make another trip before the quota was full and all fishing must cease. One also got an uneconomic geographic distribution of fishing, preference being given to the nearer grounds. CRUTCHFIELD thought that where there was regulation of fishing effort, there was a strong tendency to have smaller fishing units, and also more diversified units, capable of taking several types of fish. This diversification might go far beyond what was economically valid.

SCOTT GORDON agreed with ZOETEWEIJ that the common property nature of the resource was not responsible for the poverty of the fishermen, who were not in fact always poor, at least in the short run. Farmers who were intramarginal remained permanently well off, whereas in fishing all fishermen were marginal and higher incomes could only be due to a lucky catch or to short-run innovational gains. SCOTT had compared the poverty of the fishermen to that of the rice farmers of South-East Asia, but in this case somebody got the rent, even if not the right people, and this was an improvement from the economic point of view. In guiding government policy, the economist's objective must be to make society better off, not merely the fishermen. He must be an economist in respect of fisheries, not on behalf of them.

There was a general debate on the causes of poverty of fishermen, it being pointed out that one would expect people to get their competitive profits in fishing as in any other occupation, since if they failed to do so they would move out. The relevance of the ownership of the resource was questioned, since if fishery incomes were significantly below others, this might be due to immobility. Other speakers questioned the relative immobility of fishermen, and it was said that there were no strong reasons to think that fishermen got less than their opportunity-cost incomes, and that Canadian experience indicated considerable mobility. The problem was not that fishermen were poor because they did not obtain the rent from the resource, but that society was the poorer because nobody got the rent.

SCOTT GORDON said that in SCOTT's diagram III.1., the proper comparison should be between three groups of people rather than two, the three being those who had been farmers before and remained so, those who had been fishermen before and remained so, and those who had been fishermen before and had become farmers. If we assumed no price effects of the shift, and if we assumed that the ex-fishermen were marginal farmers, then the first group was no worse off, the second group was better off, and the third group was at least not worse off.

TURVEY pointed out that this neglected the terms of trade effects. Because of the greater output of farm produce compared with fish, the price of the former must fall relative to the latter, and all farmers might be worse off. It was evident that a value judgment was involved, that the improvement of the

fishermen's lot was worth more than the bad effect of the terms of trade on the farmers. Perhaps one could compensate the farmers by using the proceeds of the fishing licences.

Other speakers pointed out that except under the most peculiar assumptions, society as a whole must be the better for the shift, since less effort and resources would be wasted in fishing. However, the time element and the sociological and other problems involved in making the shift should not be forgotten.

SCOTT GORDON said it was hard to demonstrate that the existence of a common property resource caused over-capitalization. However, since total revenue must equal total cost, including rent, in the absence of rent the gap between the two would be filled by an increase in capital costs. We had seen this in the case of Pacific halibut and Canadian lobster grounds.

GERHARDSEN commented on an earlier statement, that the economist's interest was in maximising income and not the quantity of fish, by pointing out that this might have to be modified in the case of the under-developed countries whose need for food was so great that the profit aspect might have to be neglected. He said that his objection to the biologists' aim of maximum sustainable yield was more to the sustainable element that to the maximum. Clearly there were situations in which it might be desirable, as SCOTT suggested in his paper, to deplete or even wipe out the stock. During World War II, this might have been the case. Another point was that the natural causes of fluctuations, independent of the effect of fishing, were sometimes so strong that they far outweighed any results of fishery management.

He stated that in an effort to deal with the problem of over-crowding on certain fishing grounds, regulations had been established for certain Norwegian fisheries whereby the ocean was divided into strips, some being allotted to the smaller fishermen and others to the more modern mechanized vessels, as an indirect subsidy to the smaller and less efficient producers.

GERHARDSEN also suggested that the management of fisheries had much in common with that of forests. It was not realistic to aim at the simultaneous achievement of biological and economic optima; the best thing would be to have biological regulations of such a form as to permit an economic balance.

CRUTCHFIELD said that in the American Northwest, national forests were exploited by offering logging rights by competitive bidding, which had produced an effective biological and economic allocation. ROBINSON mentioned the related problems of grazing on common lands.

Various speakers discussed the effect of having competitive bidding for licences to fish, both in terms of the effect on the quality of the fishermen remaining and in terms of the distribution of licence receipts. On the one hand, one would expect the most efficient producers to remain under a licensing system, but on the other hand Norwegian experience of a falling fishery population had indicated that the most energetic members went into other occupations, leaving the elderly and unenterprising. It was necessary to distinguish between the long- and short-run effects. As to the distribution of licence income, CRUTCHFIELD

said that if it were distributed to the fishermen, it would be discounted in the bidding for licences, and that in any case it should go to the community as a whole, at least after the displaced fishermen had been helped to move to new occupations.

In summing up the discussion, SCOTT observed that the share system might be consistent with too much capital of the wrong form. The effect of a quota system might be in the same direction, since even if one got smaller boats rather than larger, there might still be too many.

He pointed out certain omissions from the discussion, one being the element of time, of how quickly we might wish to move, taking into account the questions of expected future prices and human population growth. Most of his diagrams had described equilibrium positions, but had shown nothing about how to reach them. M. B. Schaefer, a fisheries biologist, had suggested ways in which the biological equilibrium could be reached, but we did not know whether this was consistent with economic equilibrium. Another omission was a discussion of the actual methods of control, whether through licences or otherwise.

FURTHER NOTE BY ANTHONY SCOTT

I am very grateful indeed for ZOETEWEIJ's careful and perceptive comments on my paper, and for the constructive discussion that followed, which, being prolonged into subsequent sessions, moved gradually into realms not mentioned in my paper. ZOETEWEIJ rightly emphasises the external-diseconomy and over-investment aspects of common-property fisheries, and I regret that they were rather lost sight of in the seminar's subsequent concentration on population questions. TURVEY's diagram III.5., which is also used again in the discussion of LIENESCH's paper on the North Sea Fisheries, shows the short-run supply curve moving upward. As I point out in the LIENESCH discussion, there is a long-run fishing situation where external-diseconomies and over-investment might cause the S curve to shift in this way, giving the implied sloping SAC curve drawn by TURVEY. But this outcome is by no means as certain as, for example, the traditional proposition that the long-run SAC curve of agriculture is upward-sloping, because it does not depend on the technology of fishing so much as on its institutional (common-property) characteristics.

When we come to what I later called the "intermediate run", when population growth or decline may change the costs of fishing, a similar observation must be made. If the fishery has never before been exploited (by the technique assumed to prevail for the entire period of analysis), then the S curve will shift up as the catch increases, as in diagram III.5. But since we are discussing effects in a period longer than the short run, the catch measured on the axis is an equilibrium catch (that is, it is a catch that can be biologically sustained for many periods). In that case, we must also consider the supply curve of a depleted fishery. To increase the catch, some sort of management or conservation programme will be necessary. If it succeeds, the S curve will in the intermediate run shift downward, as the population rises, and fish become easier to catch. It may also shift further downward, if the external-diseconomies of too many vessels are reduced as a part of the management programme; on the other hand it may experience offsetting upward shifts if the management programme does not prevent

new entry, and too many vessels and too much investment is allowed for the increased catch.

The upshot would seem to be that TURVEY's shifting curves show the special case of a new fishery characterised by over-investment and/or by overfishing. But the supply curves of old fisheries can in the intermediate and long runs be shifted in either direction by management programmes. I say nothing about new techniques; they would presumably cause the S curve to shift down.

On the short run, GERHARDSEN's paper and HILDEBRANDT's comments revealed that I had omitted the most important cause of an upward-sloping supply curve. By confining my comment in 3(a) to a single vessel on a single ground, I neglected the differences between individual vessels and skippers with respect to ability, determination and luck. When more than one vessel is considered, we get, as in the usual short-run supply curve, a positive slope.

On the question of licensing, I am inclined to feel that if we follow ZOETEWEIJ and CRUTCHFIELD and deprive the fishermen of the economic rent collected from the sale of privileges, we put fishing at a disadvantage relative to other industries. It is true that the rent of a farm is capitalised over the years, and in static equilibrium it is probably a cost to the occupier. But equilibrium is never reached in a growing economy, and the rent provides incentive to intensify land use, and to allocate effort to agriculture. Unless fishermen also receive part of their resource's rent the incentive to fish will be relatively less than that of farming. This point could be dealt with in practice by auctioning the fishing privileges at infrequent intervals, and allowing the holders to reap the rents from growing demand and new methods in the intervals. But if this were done, auctions would be politically unpopular. I have no objection, in other words, to the re-distribution of licence income to the fisherman, even if it is discounted in the bidding, as long as the bidding system results in the entry of only the best fishermen and as long as the number of fishermen is restricted. Only if the poorer fishermen are more attracted by the re-distribution than the efficient fishermen, would there be on efficiency grounds a case for withholding the rent from the industry altogether.

IV. OBSTACLES TO AGREEMENT ON CONTROL IN THE FISHING INDUSTRY

by H. Scott Gordon

The purpose of this conference is to discuss the economic problems of the fishing industry. This means, I take it, that the object of each paper is to raise those problems which ought to be discussed under its heading rather than to put forward a thesis or to offer definite and particular solutions. Such terms of reference are especially welcome to the writer of this paper, for the questions that must be considered under the title of "Obstacles to Agreement on Control" do not lend themselves to the degree of theoretical abstraction or simplification necessary to the promulgation of a thesis. It is moreover the case, that many of the problems I intend to raise have no 'solutions', except such as consist in that sharpening of human evaluation and judgment which results from a greater awareness of their existence, character, and ramifications.

I propose to interpret the title which has been given to me rather broadly. We should discuss, I think, not only those obstacles which arise from the failure to work out or appreciate what the objectives of control ought to be but also those which lie in the way of the achievement of even well understood objectives, because of conflicts of interests and the like. In the discussion which follows I do not intend to hold to such a dichotomy of problems, but I would like to begin by raising certain questions which are primarily of a theoretical character and which bear their chief reference to the problem of defining the objectives of control in the fishing industry.

Some of the participants in this conference may be familiar with my recent papers on the economic theory of the fishing industry, or with Professor Scott's book on conservation. (1) If so you will know the degree of significance that both of us have attached to the fact that most fisheries are exploited under conditions of tenure which make the resource the common property of all who wish to use it. To be sure, fisheries within national boundaries are usually reserved to the use of that nation's fishermen, and also, the licencing of fishermen is practised by many countries, but this does not necessarily or usually alter the common-property nature of the resource. The consequence of this form of resource tenure is both theoretically clear and plainly observable in practice. The resource, being unowned, can yield no economic rent - what surplus of return over cost a fishery might have been made to yield is dissipated either through misallocation of fishing activity, the extension of fishing activity beyond the point of optimum input and output, by over-capitalisation and other forms of excess input in the industry, and by other means. The result of this is that

(1) H. Scott Gordon, "An Economic Approach to the Optimum Utilization of Fishing Resources", Journal of the Fisheries Research Board of Canada, 1953; "The Economic Theory of a Common-Property Resource: The Fishery", Journal of Political Economy, 1954.
A.D. Scott, Natural Resources: The Economics of Conservation, University of Toronto Press, 1955. See also Professor Scott's "The Fishery: The Objectives of Sole Ownership", Journal of Political Economy, 1955.

the fishery, a rich and self-renewing resource, almost invariably provides a poor livelihood for the great bulk of those engaged in its exploitation.

The dissipation of the potential net yield of the resource is not unique to the fishing industry. It is, I think, the experience of all industries in which the resource is common property. In petroleum, the disastrous results of unrestrained competitive drilling from a common pool are now clearly and generally appreciated. The new petroleum industry of Western Canada is subject to a complex of regulations which, while their object may well be to maximize the royalty revenue of the Government, has come close to achieving the objective of rational economic utilization of the resource. Overcoming the difficulties and avoiding the consequences of common-property tenure is certain to be far more difficult in the fishing industry than in petroleum production. There are a few simple cases where the resource is relatively sedentary, as is the lobster of the Canadian Atlantic Coast. There are here a few areas where a common-property resource has been turned into the community property of a limited number of fishermen. But despite the dramatic improvement that has resulted in such cases, it has proved extremely difficult to extend the practice, even within the lobster fishery. When one moves from such a simple case to a fishery like that of the North Sea, for example, where a variety of highly mobile species are exploited by thousands of fishermen of a dozen different nations, it seems hopeless to seek solutions in the direction of dividing up the common-property resource into a number of community properties such that within each community the individual fisherman would be able to identify his welfare with that of the community as a whole.

In the case of fisheries like the North Sea or the continental shelf of Canada and the New England States, no other conclusion seems possible but that the fishery resource must be considered as the property of a general governmental authority. Such an authority may be able to regulate its exploitation in such a manner as to achieve desired objectives. There are, I know, many difficulties of a practical nature which will stand in the way of such a programme. At this point, however, I would like to draw your attention to a theoretical difficulty which may be of considerable importance. Let us suppose, in order to show the point, that the objective of the fishery is to achieve the maximum net economic yield - the maximum difference between total value of landings and total cost of fishing. (I am aware that this is undoubtedly a far too simple presentation of the case, as I will indicate further below, but it will serve to demonstrate the point I am making here.) This total cost must include the opportunity incomes of fishermen. Suppose then, the fishermen of two nations, A and B, exploit the resource in question and that the general standard of living of country A is significantly higher than that of B. The result of this is that the achievement of the economically optimum degree of exploitation calls for a more intense fishing when looked at from the standpoint of country B than when looked at from country A. That is to say, there is not one unique optimum level of fishing intensity but two; and for a fishery like that of the North Sea there may be eight or a dozen different and equally rational solutions. We have here a problem, the solution of which will require all the resources of thought and imagination not only of the economic theorist but also of diplomats and administrators. I will return later in this paper to consider some additional problems which devolve from the international character of many fisheries.

We shall have to draw on the economic theorist for further light on some other questions, perhaps as difficult as that outlined in the preceding paragraph. At this point I will do no more than mention these questions, in order to provide a basis for discussion.

The first of these questions is raised with admirable clarity by Professor Scott in his book on conservation to which I have already referred. The conservation problem is essentially one which requires a dynamic formulation. To conserve means to postpone the use of a resource. The economic justification of conservation is the same as that of any capital investment - by postponing utilization we hope to increase the quantity available for use at a future date. In the fishing industry we may allow fish to grow and to reproduce so that the stock at a future date will be greater than it would be if we attempted to catch as much of it as possible at the present time. Put in such general terms, conservation is an unexceptionable objective, but it needs to be made far more specific before it can be applied to any actual fishery. In theoretical terms this means that the optimum degree of exploitation of a fishery must be defined as a time function of some sort. That is to say, it is necessary to arrive at an optimum which is a catch per unit of time, and one must reach this objective through consideration of the interaction between the rate of catch, the dynamics of fish populations, and the economic time-preference schedule of the community or the interest rate on invested capital. This is a very complicated problem and I suspect that we will have to look to the mathematical economists for assistance in clarifying it.

The dynamics of fish populations is a matter for the biologist rather than the economist. It has received considerable attention in the past and continues to demand substantial research effort. The whole subject is, of course, relevant to the formulation of a rational economic policy of resource utilization in the fishery, but there is one specific aspect of population dynamics that is worth singling out for attention. Most of the fish species that man uses for food are carnivores. When species that are used by man feed on other species that are also used by man, we are presented with a complex interrelationship which must be disentangled before a rational policy of utilization can be fixed upon. To perform this disentangling is a matter for the economist as well as the biologist, for different species of fish bring different prices per pound in the market and moreover, different sizes of the same species often have different market values. It is therefore a matter of direct economic interest to know the effect that fishing activity will have on the relative numbers and the average size of species that are connected together by predator-prey relationships. One thing at any rate is certain - a policy such as is in operation on the Pacific Coast of North America, where both seals and salmon are protected against man, is quite meaningless. By protecting the salmon we provide more food for seals, and by protecting seals we provide more predators for salmon, and at this stage, there is no way of telling whether we come out ahead of the game or not. The only thing we can really say with confidence in such a case is that the seals are better off.

Competition between species presents a problem that is similar in nature to the question of the comparative value of a fishery as against some other industry that may be an alternative user of the same resources or area. This problem

seldom arises in open sea fisheries but it is an important one in the case of river and lake fisheries. The question of salmon versus electric power is a very lively issue on the Canadian Pacific Coast at the present time. Aside from raising the question of the necessity of better methods of evaluating the contribution of an industry to the income and welfare of a nation, the main point I wish to make in this connection is that we must beware of the romanticism that has coloured public discussion of this problem and the narrowness of view which, all too often, has characterized the approach of fisheries biologists in this matter. The task of the fisheries economist, like that of other economists, is to contribute to the general welfare of society. If investigation and analysis show that hydro-electric power is worth more than salmon, there is no reason for the fisheries economist to be unhappy at the result. Those who have woven a romantic mystique around the fishing industry or who have private interests in the continuance of a certain segment of it, will always welcome the aid of "expert authority" but there is no reason why the fisheries economist should give it.

In the foregoing paragraphs I have touched on the vital question of conservation policy in the fishery. This whole question requires at this time extensive and fundamental re-examination. It is my belief that most conservation policies that are now in operation fail to achieve a rational economic objective and many of them are detrimental to the progress of the fishing industry, the incomes of fishermen, and the welfare of society.

The most important reasons, I think, why even carefully designed conservation policies have often failed to achieve rational economic objectives is due to the failure to appreciate the nature of economic objectives and to see the significance of the common property nature of fishery resources. No strong argument can be made for the point of view, widely held by biologists, that the objective of fisheries conservation policy is the maintenance of the maximum sustained physical yield from the resource. Such an objective neglects altogether the fact that in order to catch fish we must use up other valuable goods and services. We burn oil, coal, gasoline, we use up steel and wood and other materials, we even use up other fish which we employ to bait the hooks to catch the fish we want. That is to say in short, the objective of maximum sustained yield pays attention only to the physical output of the industry and takes no account of the inputs which constitute the cost, to fishermen and to society, of carrying on fishing activity. Very often, the objective of maximum sustained yield is supported on the ground that there is a general shortage of food and more especially of protein foods, which justifies one in disregarding the cost of oil and steel and other things incurred in the process of catching fish. This view was advanced so strongly recently by a personal correspondent that I could not resist reminding him of the biblical dictum that "man does not live by bread alone" and adding that he lives even less by fish alone. The presentation of the case for regarding protein foods as objects of special human concern could perhaps be understood if made by members of those countries where the pressure of population on food supplies is strong, but it is advanced as a conservation proposition just as vigorously by North American conservationists and biologists. In the face of the immense current over-production of food products in North America it is difficult to understand this - and if it is suggested that the North American surpluses are primarily grains, not proteins, everyone knows that hogs and cattle are able to transform grain into protein rather well.

Neglect of the cost side of the question has had the result that certain conservation programmes are regarded as successful by biologists when from the economic point of view they are palpable failures. The most conspicuous case in point is, I think, the Pacific halibut programme. This programme has been hailed many times as the outstanding case of successful fisheries conservation policy, yet I feel quite certain that it must go down in the economic annals as one of the clearest cases of failure. We must admit that the stocks of halibut have risen greatly since the treaty of co-operation was made in 1924. We may give the Control Commission some or even all of the credit for this change, but along with the increase in stock has come a great expansion in the fishing fleet and numbers of fishermen. This fleet now catches in a few weeks a quota of halibut that formerly took several months. The industry is heavily over-capitalized and its potential net returns are dissipated by higher costs. At the present time, markets are strong and fish stocks are high, yet the halibut fishery is again beset by economic difficulties. There is a lesson here that must be learned if we are ever to achieve success in fisheries policy.

The Pacific halibut case is by no means the worst. Indeed it might well be argued that the mechanism by which its economic objectives were frustrated is a subtle one and that even in economic circles it was not too well appreciated. But what is to be said for those "conservation" programmes that consist in placing legal restrictions or prohibitions on the more efficient methods of exploitation? Such restrictions have been and continue to be extreme. Until 1952, for example, the fishermen of Bristol Bay, Alaska, were legally confined to the use of sailboats! One can, I suppose, say that fish are being "conserved" when efficient fishing methods are prohibited by law, but surely the deleterious effect of such regulations upon the economic welfare of fishermen and the community at large is perfectly clear.

The prohibition of efficient catching methods as an instrument of conservation policy raises the next problem which should be discussed. In Canada the fishing industry is a technologically backward one. Innovation proceeds very slowly and the capital investment process is very primitive. I have heard it said that the same is true in the fisheries of many other nations and if that is the case, it is a phenomenon that calls for some explanation. Part of this explanation lies undoubtedly in the riskiness of the industry and part also in the temporary character of innovational gains which, again, is due in part to the common property nature of the resource. These factors do not however explain completely the backwardness of the industry in accepting and adopting technical innovations.

The history of the trawler in Canadian Atlantic waters is a case that may serve to illustrate the difficulties that often lie in the way of technological progress in the fishing industry. The trawler first appeared in Canadian waters during the early years of the present century. When the "Wren", an English-built vessel, began to fish out of Canso in 1908, the opposition of traditional fishermen was immediately aroused. The weight of their argument was placed on conservationist grounds - that trawling was destructive of small fish and feeding grounds, and so on. Despite the fact that the British Royal Commission of 1885 had carefully inquired into these contentions and dismissed them, the Canadian Government enacted legislation to restrict the operations of

trawlers. These restrictions were extended and strongly enforced, and by the opening of World War II only three trawlers were operating out of Canadian Atlantic ports. Canada could, of course, do nothing to prevent the operation of foreign trawlers outside the three mile limit and the effect of the restrictions was that the American fleet made far more use of grounds for which Canada had a great locational advantage that did the Canadian fleet. The Canadian policy was sharply reversed at the end of the war and the Government began to subsidize the construction of small trawlers to be owned by small groups of fishermen. A great expansion of the Canadian fleet followed and, as the superior location of Canadian ports began to have its effect, the American fleet, which had grown large because of the pre-war Canadian restrictions, began to encounter difficulties. This is an important part of the historical background of the strong submissions now being made by New England fishermen for higher tariffs against Canadian and other foreign caught fish.

A careful reading of the history of Canadian trawling conveys two lessons:

(1) fishermen who can have no property right in the resource may attempt to acquire a kind of property right in the market for fish through restrictions on fishing methods different from their own and by means of tariffs; and

(2) restriction on technological innovation builds up vested interests in the obsolete methods which not only make the innovation even more difficult to achieve but, when it is finally made, create unnecessary hardship in the industry.

The economic interpretation of the object of fisheries policy - that it is net returns not maximum physical yield that is desired - is a proposition that many biologists and fisheries administrators now seem prepared to accept. Yet they have often also drawn attention to the political and social elements of the case. The economist should, of course, not disregard these elements any more than any other investigator, but I wonder whether these factors have not been over-stated. We may disregard the statement, which one frequently encounters, that it should be the object of fisheries policy to create employment opportunities for fishermen. The problem of unemployment is one that must be treated on a far broader basis than this. If we attempted to maintain full employment industry by industry and region by region we would produce such ossification in the economy that we would all surely be much poorer as a consequence.

The appeal for special consideration in this regard for fishermen and fishing communities must rest on the proposition that fishermen are exceptionally immobile both geographically and industrially. This is generally thought to be the case and, indeed, I have advanced it myself in the past as an important characteristic of the fishing industry. Recent experience in Canada however challenges this view quite seriously. We have found that fishermen will move long distances to take advantage of better fishing opportunities, and that they do not have any extraordinarily great reluctance to go into other industries when fishing has ceased to provide a livelihood.

The questions I would like to raise then are these: Are fishermen really less mobile than other workers? Is the Canadian experience due to the

exceptionally dynamic character of the Canadian economy at the present time or has it shown that one of our basic preconceptions about our fishermen is groundless? What has been the experience of other countries when the government has tried to encourage relocation of fishermen or recruitment of fishermen to other occupations?

Up to this point, I have referred only to the primary phase of the fishing industry. Other phases are examined explicitly by the authors of other papers. Yet we should not lose sight of the fact that it is the efficiency of the whole operation that concerns us, and that one part of it is dependent upon the performance of others. In considering the proper integration of the primary fishery with the next phase of the industry - processing - the most important factors may be grouped under two headings:

(1) the geographic location of processing plants, and

(2) the time-flow of raw material.

To speak of the geographic location of processing plants is also to discuss the location of the home ports of the fishing fleet. The innovations in processing and preservation that have come about in recent years have had very distinct locational implications. These new techniques are most suitable to land-based plant. This means that plant and ports should be closer to the fishing grounds and, by implication in most cases, farther from the markets than before. The difficulties created by this are clearly seen when it means that fishing and processing should be carried on in one country in order to serve the markets of another. This, of course, raises questions of international trade and protection of a very difficult sort. The current controversy between the New England industry and the Canadian Atlantic Coast industry is again a case in point. It may be that the future holds technological changes which will make the factory ship universally efficient, even in the fresh fish trade. If this should happen, the locational advantage of fishing ports may well shift from the fishing grounds toward the market. This will solve certain of the present difficulties of international trade but it will also raise some new ones which are already on the horizon - for example, the definition of "territorial waters".

The time-flow of raw material is significant to the efficiency of fish processing plants as it is to any other manufacturing establishment. In the past, the flow of raw fish has been characterized by sharp seasonal and even weekly fluctuations. The result of this is higher overhead costs in the processing industry. Measures that would smooth out these fluctuations are worth considerable attention. Similarly one must be wary of control mechanisms, such as the Pacific halibut quota regulations, which have the effect of further exaggerating the peaks and hollows of processing plant operations.

In the preceding pages, problems of control which have international implications have been touched upon. Such questions are worthy of special attention. International questions will however also have increasing importance in the primary phase of the fishing industry. The trend of technological innovation in the future may have the effect of increasing the international character of many fisheries, and rational fisheries management may encounter its greatest

difficulties in formulating acceptable and workable arrangements for those resources utilized by more than one sovereign nation. Some of these difficulties have already been referred to, such as the problem of determining the optimum fishing intensity when a resource is exploited by nations with different standards of living and the problem of competing ports.

Suppose, however, that we do succeed in placing an international fishery under a form of control that is likely to achieve economic objectives. Such a programme will necessitate, among other things, limitation of entry into the fishery. How will the prescribed quota of fishermen or boats be allocated between different nations? Or, an even more difficult problem, how will the allocation be altered if a change in the relative importance of different fishing ports is desirable as a result of technological advances or shifts in the location of fish stocks?

Such problems will present practical difficulties of the highest order and it is clear that in the future, international law relating to the sea will have to pay far more attention to the fishing industry, and its economic problems, than it has in the past. We will probably encounter these questions first in the shape of the territorial waters issue. A great extension of territorial waters recognized in international law would convert international fisheries into national ones and to that extent it would ease some of the practical problems of fisheries management. Such a solution has many difficulties, however, especially for a region such as the North Sea, and it is by no means certain that in the long run it would be the best solution of the problem. It is however likely to be the one first advanced and this emphasises the necessity of fisheries economists having something to contribute to the discussion at that time.

DISCUSSION

The discussion was introduced by LIENESCH, who expressed his general agreement with SCOTT GORDON's argument. He then offered some comments on points that he thought of interest:

(1) The North American fishing industry had a much shorter history than those of Europe. This probably made comparisons with other industries less difficult there, as there was not the same attitude of romanticism towards fishermen nor the same relationships with naval enterprises. The European fishing communities also tended to be isolated, possibly as a means of protection, and this had caused the industries to lag in technical development and often to depend on support from governments.

(2) SCOTT GORDON's main point was that it was of no use to invest in fishing as long as fish stocks were "common property". This attitude had not been accepted by those responsible for the regulations, funds, loans etc. established to improve the welfare of fishermen in pre-war years. The North Sea overfishing convention did show more understanding of the problem. But in Holland at least fishing policy was apt to be governed as much by sentiment and wishful thinking as by economic considerations.

(3) While agreeing with SCOTT GORDON about the immobility of fishermen, LIENESCH thought it important to recognise the importance of local conditions and of the development of other industries. As soon as labour was scarce and relatively well-paid in other occupations, fishermen did move, but they went back to fishing when it became profitable to do so.

(4) Over-investment did occur, but only in the northern hemisphere; LIENESCH saw no evidence of it elsewhere. It was interesting to note the low rate of profit on the capital invested in large up-to-date vessels in Britain and Western Germany. Indeed, LIENESCH questioned whether these investments could be justified on objective economic grounds. Distribution was also an important matter for investment and profit; the new possibilities of "ready to cook" consumers' packages were attractive in this respect.

(5) World political developments indicated that governments of coastal states had become very concerned about the good health of the fish stocks - particularly of stocks within coastal waters. There had been a growing and general trend towards the extension of such coastal waters, not only in Iceland and Norway but also in Latin America (Chile, Peru, Ecuador) and in many British colonies. Insofar as fishing was on continental slopes, this development inhibited modernisation of equipment for deep-water or distant-water fisheries. In near-water fisheries the situation was different; the return to investment was much better. The market situation was also relevant; near-water catches found a good demand and were not usually mass products. Again problems of agreement and control were less difficult inside coastal waters; outside, super-national bodies with regulatory powers were the only possibility, as in the case of the regulations in force in the North Sea.

(6) The conclusion that it was necessary to limit the size of fishing units to avoid over-investment was unavoidable. The Lowestoft research laboratory had done interesting work on the effects of over-fishing, but the complications in practice were very great, as SCOTT GORDON's discussion of the integration of different values and different sizes brought out. Problems of this kind had already caused difficulties between the Governments concerned in the North Sea convention; they should not be solved by the current views of the industry itself but by the objective recommendations of biologists, mathematicians and economists. Fisheries were a world resource and their optimum use could not be decided solely by commercial interests.

(7) In relation to SCOTT GORDON's comments on fishing and protein deficiency, the over-production of grain to be fed to hogs in North America was similarly uneconomical.

(8) Could not the halibut programme, which received much criticism from economists, be interpreted as the concentration of landings in a short period, fishermen then taking part in other activities for the rest of the year? Sugar and potato meal factories, and even canning plants, were operated similarly. In Holland, a similarly regulated fishery existed in the former Zuider Zee. Two small powerful boats could manage the catch in the absence of regulation, but this would create problems for those displaced; human and social factors could not be ignored.

(9) The United Nations was about to consider a draft protocol concerned with the international law regulating control and exploitation of the sea. SCOTT GORDON's paper brought out two controversial viewpoints, one in favour of extending territorial zones (in the interest of fish stocks), the other in favour of international agreements to protect fish stocks in international seas. Which idea should be supported depended on the particular situation, but the United Nations decision would have an important influence on the nature of future investment in the fishing industry.

TURVEY proposed that the discussion be kept general, leaving the North Sea case for subsequent consideration and taking examples from elsewhere for the present. It had been agreed in the previous session that over-fishing did take place; now they might consider:

(a) Possible preventive measures and their drawbacks.

(b) The problems of reaching agreement.

Examples of measures would be:-

(1) Control of mesh sizes;

(2) Delimitation of fishing area;

(3) Limitations of size of catch;

(4) Prohibition of particular techniques;

(5) Imposition of a closed season.

Agreement problems would include such questions as:-

(1) How to divide the revenues obtained from licensing;

(2) Where the fish caught had more than one use. or more than one type was caught, the various markets might be of different importance in different countries, creating different attitudes to proposals for control.

(3) Control by mesh size might cause disagreement about the "best" size and also quarrels stemming from differences in national tastes for varying sizes of fish;

(4) Any control measure might have differing effects in different countries because of variations in fishing techniques;

(5) Countries might be unwilling to accept control because of a desire to preserve fishing communities on social grounds.

The group might try to find out where actual conflicts seemed to arise, and whether economists could offer any kind of "optimal" solution to the problem. It would also be valuable to examine disputes about territorial waters, but this might be better left for later.

POPPER said that it had been assumed that the aim of international agreements was control to ensure optimum exploitation of the resource. This might be useful as a basis for discussion, but many measures in fact had other objectives. For example, there were cases of seasons being fixed in order to prevent the over-supply of particular markets, and gear restrictions were ofter aimed at the protection of one type of producer from another, possibly in another country. Should the discussion not begin by a consideration of the question: What are the reasonable objectives of an international management programme? It also had to be appreciated that assumptions such as those made in earlier papers about factor mobility were reasonable in their context but were unsatisfactory for present purposes.

CASSADY added that if the economist was to prescribe for the future he must know where he stood in relation to the biologist. The facts about future yields needed careful study. We had to ask (a) What was the sustainable maximum yield? (b) How could it be obtained (a biological question)? (c) How to get agreement by countries to appropriate policies?

Referring to POPPER's comment, SCOTT suggested that the example he (SCOTT) had used in paper III might be adapted: we could consider a situation with only one species, and with competitive fishermen geographically isolated in two different countries. The international nature of the fishery raised two new questions:-

(a) How large should the catch be?

(b) What should each of the two countries get?

(b) was a serious question, but unlikely to be settled by economic criteria. Settlement by treaty, with each country getting half the catch. or a share determined by some past average, or something equally arbitrary, was more likely.

(a) was the question raised by SCOTT GORDON in his paper. As he pointed out, standards of living, wages, etc., in the two countries might vary. If so, the optima (of effort, catch, etc.) would be different if only A used the resource and if only B used it. Could these optima be reconciled or not? It was at this point that POPPER's immobilities became relevant.

There would be one case where the optima would in fact be the same: the case where both countries had wage rates of a general level such that it would pay them. operating alone, to move to the point of maximum value yield (situation K_2 in diagram III.2.). But if one was in situation K_3 and one in situation K_1 in his (SCOTT's) diagram, the position was hopeless. as it was with both in positions above K_2.

K_1 was likely to be the most typical situation. The optimum for any one country would then require it to cut down rather than increase the amount of labour. It could then try to get agreement in terms of some concept of maximum value yield.

ZOETEWEIJ was uneasy about SCOTT's separation of the determination of the total catch and its division; the idea of the second being a diplomatic question was unsatisfactory. The procedure might be reversed, with countries deciding through diplomatic channels how much they wanted to conserve fish - as, for example, in the North Sea case. Countries would disagree, but this problem was not more difficult that one requiring SCOTT's complicated total optimum apparatus. Thus, countries might agree on the total catch and on the procedures for limitation, and then leave shares to be decided by international competition. This might be a simpler way to approach the problem. SCOTT's "diplomatic" argument was also commented on by MACKENZIE, who said that diplomatic considerations alone could not decide the matter, as social and economic problems must be involved for the fishing communities of the countries concerned.

GERHARDSEN made several points:

(1) Norway had never used the conservation argument, as LIENESCH suggested in his introduction, but had rather demanded more space for its fishermen. In the case of Iceland conservation was the main argument.

(2) In considering the form of treaties, the type of people making them should be remembered. GERHARDSEN was impressed by LIENESCH's distinction between Europe and North America; in America biologists were in administrative positions, and this affected the regulations. They included such people as lawyers, but not so many biologists. Getting economic thinking into treaties would depend upon who was there. He agreed that there were other, diplomatic, problems, and gave the example of a South American country with no access to the sea supporting a 200-mile coastal limit.

CRUTCHFIELD thought that economists should make a direct attack on ineffective and wrong types of measure. He gave some illustrations from his own country:-

(1) Regulations restricting the catching and reduction of fish for oil. This appeared to be based on a concept of "waste", although the price of fish for reduction was higher than for other purposes.

(2) Restrictions by means of closed seasons and areas, with the real intention of restricting total fishing. These measures were probably a total failure, but raised costs.

(3) Restrictions on employment, such as the "grandfather clause" used in Alaska. This restricted fishing to the families of those who had fished earlier, and resulted in over-fishing in some areas and under-fishing in others.

(4) Restrictions on types of gear, stated to be needed because the gear was too efficient.

MACKENZIE said that it was necessary to look behind the arguments put forward for restriction to find the real reasons. Thus, CRUTCHFIELD's first example was stimulated by canners and curers wishing to stabilize their supplies. SCOTT GORDON questioned whether all that was needed was more knowledge about the economic factors at work. He gave a Canadian example. In 1885, a Royal Commission showed the biological assumptions about disturbance of breeding grounds, on which English regulations against trawlers had been based, to be wrong. There is clear evidence that Canadian authorities had carefully studied a copy of the Commission's Report six months before regulations were introduced there, ostensibly on these same grounds. The real motives were in fact political.

TURVEY said that for restriction to pay off socially, reduction in the aggregate costs of the industry was not enough. Resources might move out of the industry and there still be a net loss. What happened to labour, etc., because of the conservation measures themselves was not adequate evidence.

GERHARDSEN cited the discovery by Norwegian fishermen in 1935 of the gill-net being an effective gear for catching halibut. Catches became very large and prices fell drastically within two years. The restrictions were introduced. The gill-net was not prohibited, though the biologists wished to prohibit it in order to prevent over-fishing. Instead, a close season was decreed. Prices then rose, and it was likely that the fish stock increased again.

SCOTT GORDON said that the essential biological fact about the effects of fishing on stock numbers was that the reproductive capacity of fish was very, very high. Statistics supported the view that the size of a fish population was not related to the number of potential spawners. The effect of fishing was not on spawning but on average age.

POPPER took up SCOTT GORDON's discussion of competition between trawlers and small boats to illustrate some of the obstacles to international agreements. Suppose in country A capital was expensive and labour cheap. Fishing was con-

tinuous by small boats, and there was some sort of equilibrium situation. In country B, which was distant, capital was cheap and labour expensive. This country now equipped trawlers to fish the grounds used by A very extensively, until the yield was very low. The trawlers then switched elsewhere and did the same again, returning to A's grounds when the fish had recovered. If we only considered B, or if the two were part of one country, such a situation might be satisfactory. But in the conditions postulated the fishermen in A suffered, and could not move to B. TURVEY said this was the SCOTT problem again, and GERHARDSEN thought that POPPER was describing the Britain:Iceland situation.

TURVEY thought the idea of an optimum for country A and an optimum for country B useful. POPPER's case treated the demand and cost conditions of each country separately. But both countries fished. With free trade, the demand and cost curves could be added to get an optimum. With separate markets it should still be possible to get an equilibrium position. POPPER objected that the cost curves were not independent: the user costs fell on the non-user. TURVEY argued that demand price in each country could still be equated with marginal social cost.

LIENESCH said that in fact fishing grounds were on continental shelves, which countries tried to protect irrespective of theoretical considerations. The small boat case led to political protection against big trawlers, and TURVEY's case was too much in the air to be useful. TURVEY suggested that the use of theory was to discover standards, not to be realistic about particular cases. LIENESCH believed that such an approach was impractical.

A discussion followed as to the theoretical consequences of free trade. POPPER asked whether free trade would give a unique optimum. SCOTT GORDON said that it would not; only a "second-best" optimum would ensue because only products, and not factors, would be free to move. But SCOTT argued that not even the second-best optimum was likely without free trade which brought the argument back to POPPER's proposition that the social optima would diverge. POPPER thought that it was established that there was a need to transfer the social user costs of the fishing grounds from the "poor" industry to the "capitalised" industry. But how?

TURVEY suggested that the damage A did to B by catching one fish was equal to the damage B would do to A by catching one. Therefore the licence charge needed per fish to ensure optimum utilisation would be the same for each country. The distribution question would then be concerned solely with the allocation of revenues. SCOTT demurred; B might lose only to-day, but A would lose tomorrow as well because of the effects on the future fish stock. POPPER said that this user cost was imposed by the rich country (B), not by the catch made by the poor one (A).

SCOTT GORDON asked if this did not assume that A was near the fishing grounds and regarded them as its property. POPPER thought not; to A the fish stock was limited as the fishermen were immobile, but to B it was unlimited as their fishermen could move to other grounds. SCOTT thought it might be better to leave out mobility and put the proposition in terms of relative wage levels, but POPPER thought this less striking.

TURVEY said that two things were wrong. First, there was no free trade. Second, there were no restrictions on fishing. Since the welfare conditions were not fulfilled elsewhere, we could not consider equality of marginal cost and price as an ideal. Therefore, the paper did not help unless there was an additional assumption that there was no free trade. SCOTT GORDON and TURVEY agreed that free trade meant freedom to fish and to land anywhere. POPPER was not sure that the second-best optimum idea was not a valuable one.

LIENESCH agreed that both the big mobile trawlers and the question of distribution raised difficult issues. It was essential, however, to consider areas when discussing regulation. Circumstances were very different, in the Northern and the Southern Hemispheres. It was pointless to discuss both in relation to the same standard.

In order to avoid disagreement about problems of allocation TURVEY proposed that the group might limit itself to cases of overall regulation with no sharing arrangements. Were there any such agreements?

CRUTCHFIELD gave details of one: that between Canada and the United States on the Fraser River. Fishing was fairly unrestricted unless someone began catching more fish, when one of the fleets was "closed" to equalise the position. The result of the policy had been a great increase in the number of vessels and a shorter and shorter employment period for the vessels.

MACKENZIE took up the last point; this shorter employment period had resulted from increasing efficiency. CASSADY added that restraint itself created efficiency in fishing. SCOTT GORDON said that this was an issue he had been waiting to take up in relation to conservation measures of the kind listed initially by TURVEY. A conservation measure was likely to have no good effects at all unless attention was paid to the "open doors" by which the measure might be evaded, e.g. the use of more or bigger boats to circumvent a close season. Some sort of complex of measures was needed.

TURVEY agreed, and asked if there was any scheme of this nature that did not need shares. SCOTT GORDON thought there was, but the scheme would not also take care of such things as shifts in the location of ports should this become necessary because of technical changes. For example, if radiation processing became successful, vessels would become processors and ports should therefore shift to market areas. This would involve a re-allocation of the catch. BOWEN thought that the discussion of this question showed a conflict of emphasis. There were ways round conservation by restriction, but there were also ways round licensing.

CRUTCHFIELD said that it should be possible to say what was required of a good conservation policy, assuming agreement on the physical quantity to be caught. The question of numbers having been decided, the fish technician ought to be able to say what was the least cost method of getting the fish, and what were the right port areas to minimise aggregate costs to the consumer. But when the question arose of dividing the catch between nations, CRUTCHFIELD gave up. GERHARDSEN thought that in this context it would be useful to discuss the North Sea. Management measures there had come close to achieving what was possible.

The advantage of the area was that the fish were varied, prices were high and there was agreement as to the need to manage the stocks. The biologists had presented papers which had been generally accepted and which would serve as a basis for future regulation.

CRUTCHFIELD took up LIENESCH's earlier argument, that a shorter period of halibut fishing simply gave fishermen the opportunity to fish other species and so represented an economy. He questioned this:

(a) One third of the vessels were idle outside the halibut season. They were poorly adapted to other purposes.

(b) Movement into other fisheries required modifications of vessels and extra equipment.

(c) The "invaded" fishers found themselves with a similar problem and began to catch halibut, so that there was a generalised over-capitalisation.

As evidence, the total British Columbia catch was the same as in 1933, despite changes in the type and number of craft used.

TURVEY referred this argument back to that of SCOTT, earlier. It seemed to follow that the type of conservation used might make no difference to the efficiency or inefficiency of the overall situation. GERHARDSEN said that this was not true of Western countries. If fishermen were doing well, the measures would be acceptable, but if not they would expect the government to adopt different policies. CRUTCHFIELD illustrated TURVEY's point: if the demand for halibut rose with a constant (controlled) catch, there was entry until returns were just adequate to keep the fishermen in. The fisherman was no better off and the community suffered because of the excess resource use. In reply to CASSADY, he said that entry in his example would be from the Pacific Coast industry. CASSADY pointed out that the community might be better off if there was under-employment outside.

SCOTT GORDON had described and discussed fishing under community management. SCOTT, who in his own paper had suggested co-operative management of large fisheries using a scheme much like the sale of privileges by a government, wished to know more about this. Were new members excluded, or did they have to pay fees, or what? MACKENZIE said that the Canadian lobster season regulations varied geographically so that fishermen in particular districts were prevented from neighbourhood encroachment. This facilitated co-operation.

SCOTT GORDON said that he had had the case in mind of two small Atlantic Coast lobster fisheries. Without official intervention, the local fishermen (they numbered dozens only) had decided that only they should fish there. The entry limit was provided by the pooling of the shares of those who fell out. The scheme was operative because of the small number of fishermen, who could police themselves and observe the effects of their actions. Similar schemes suggested elsewhere met with no response. Outsiders were excluded by being shot at. MACKENZIE pointed out that the scheme had been given stimulus by the improving lobster market.

VAN DYK said we needed to know both the optimum from a biological point of view and also from the point of view of consumer demand. The first might be greater than the second. Policy should then be conservative. It was not worth while to discuss licensing because licence-owners would try to obtain a rent, so that consumers would bear the charge. Why not leave countries to limit their catch to the demand optimum as indicated, and not worry about such things as over-investment? This was not the only industry where it happened and it could be questioned how much the consumer suffered.

CRUTCHFIELD disagreed. If an optimum physical catch could be established, licensing procedure would not affect the consumer. Supply and demand would fix the price. The licence would restrict numbers to those who could take the catch when fishing fully. The licence would be paid out of cost-savings stemming from the better use of resources. VAN DYK suggested that licensees would be able to take a profit by regulating days of landing. SCOTT GORDON said that this was the proposition that a small number of licensees would encourage monopoly, and CRUTCHFIELD saw no reason why such a monopoly should arise if the number of licensees was increased until the requisite catch was taken. It might be true that licences encouraged associations, but new entrants would be permitted and in any case he would expect demand elasticity and the difficulties of agreement to be too great for effective monopoly to arise. TURVEY drew attention to the need to distinguish licences to fish and a tax per fish caught. The first would have a sale value. GERHARDSEN thought CRUTCHFIELD's scheme would require anti-monopoly legislation.

SCOTT gave an illustration of what he thought to be the real problem. Suppose 100 vessels were available and only 80 were wanted. Only 80 licences would be sold. These vessels would then fish as hard as possible because the incentive to make a large catch was still there. When the time came to renegotiate, only 60 licences might be issued, and so on. This might well create monopoly dangers over time, as GERHARDSEN believed. Also, it was likely that "integrated" capitalists would buy licences to protect their own crews. The number of owners would then be smaller than the number of licences - a more dangerous situation still.

MACKENZIE pointed out that the discussion was assuming the international problem to be solved. A licence scheme for one country would be ineffective if other countries could fish.

CRUTCHFIELD said that he now wanted to withdraw some of his arguments against VAN DYK, whose point was in fact well taken. His own views had been influenced by conditions in the United States, where the possibility of significant increases in halibut prices, for example, through restriction of output was limited by the cross-elasticity of demand for such things as meat. In such circumstances monopoly power was not likely to be important, but it might be different elsewhere.

ZOETEWEIJ asked if the dangers of monopoly were not inherent in all methods of trying to reduce fishing, and not just in licensing. SCOTT agreed. But vessels were adaptable. If measures restricted the number of fish but allowed many entrants, then the reduction achieved in the number of vessels was

less because of the increase in non-specialisation. CRUTCHFIELD pointed out that licences themselves implied a restriction of entry.

TURVEY asked if it could be said that the danger of restrictive practices was less if a tax on fish and not a licence to fish was used. A tax added the social cost to the private cost, but left entry to the industry free. SCOTT thought that there would still be an incentive to get in early while the tax was low, but TURVEY replied that there could be a high tax throughout. The level would be determined by point L in his diagram III.5. SCOTT said he was considering the beginning-season situation, with a tax rising through the season. TURVEY explained that this was not his case; the tax was to be at the level estimated to give the required catch over the season as a whole. SCOTT still questioned whether specialisation and entry would be unaffected.

BOWEN took up the very special case in which the fishermen policed themselves. This might be all right. But if the government had to do the policing, fishermen must be unwilling to accept the restrictions. Those left in gained by being in, but had to pay tax. The gain to fishermen over and above the tax might be positive, but still not sufficiently large to get support for the scheme and help with the policing of it. BOWEN gave some illustrations of the problems: what to do about those who were excluded, fishermen coming from distant coastal ports, accidental catches made when fishing for other fish, and so on. It was absurd to discuss the problem without recognising the administrative difficulties. What science did seem to show was that fewer ships would be a good thing in some circumstances though not in others. But this was not to say that licensing was the right way to do it.

CRUTCHFIELD thought the administrative difficulties less of a problem than BOWEN had suggested. The general method was to exercise control at the landing point; it was illegal to buy halibut except as authorised. The incidental catch difficulty was also easily dealt with in the halibut scheme.

V. SPECIAL PROBLEMS OF FISHERIES IN POOR COUNTRIES

by E. S. Kirby and E. F. Szczepanik

I. INTRODUCTION

Though the experience and study of the authors, and instances in the following lines, are largely drawn from the region of Asia and the Far East, reference in this paper is broadly to all the "poor" countries. Our aim is to draw attention to the significant differences between such countries and those which are economically more advanced at the present day, in respect of fishery; to identify some at least of the special features and difficulties which distinguish the case of the less advanced countries, and attempt some analysis of the conditions of a solution.

(a) THE MEANING OF THE TERM "POOR COUNTRIES"

By "poor" countries we mean those which it was formerly fashionable to call "backward", but which are nowadays more frequently referred to as "underdeveloped". It is necessary to note that none of these three epithets is altogether satisfactory, or altogether welcome, in this day and age.

The designations "poor" or "backward" tend to be resented to some extent; most of the communities concerned will acknowledge them only in a limited economic sense, believing themselves to be not inferior in the cultural, social or non-material aspects of life. It must therefore be strongly warned at the outset that quite different value-judgments are broadly involved, in the field of study now in question. These communities, in a different state of evolution, are indeed faced with problems of "scarce means"; but may have "given ends" quite different from those of our advanced societies.

The expression "underdeveloped" is a purely relative term, and can technically be applied to practically every country in the world, resource-utilization being everywhere below the maximal or the optimal. It is however true that, in comparison with economically "developed" countries, there is usually in "underdeveloped" economies a far larger and more chronic gap between the actual and optimal output. (1) As a result, they remain "poor" in the sense of a low level of national income per head. In addition to this basic feature, many other criteria of underdevelopment can easily be listed. (2)

W. W. Rostow has recently stressed (3) the importance of the phase in economic development - previously termed the stage when development becomes "self-generating" - which he calls the "take-off". Of all the Asian countries, he finds that only India and China are in the "take-off"-attempting stage at present (though Japan has been airborne for some time). Hong Kong might perhaps also be considered as in the "take-off" situation; its post-war industrialization has been swift and effective, and about 30 per cent of the exports of Hong Kong (which has

(1) See E.F. Szczepanik, "The Elements of the Theory of Growth Acceleration", Economics and Finance in Indonesia, Vol. VII, no. 8, 1954.

(2) See E.S. Kirby, "General Criteria of Economic Development" and "Analytical Criteria of Economic Development", Far Eastern Economic Review, Vol. XVII, 1954.

(3) W.W. Rostow, "The Take-off into Self-Sustained Growth", Economic Journal, March 1956.

a volume of shipping equal to Liverpool or Antwerp) are now of local manufacture. Moreover, the rate of capital accumulation in Hong Kong has reached the crucial level of about 10 per cent of national income. (4) According to Rostow, a transition from relatively stagnant to substantial, regular rise in net national product per capita, under typical population conditions, requires that the proportion of national product productively invested move from somewhere in the vicinity of 5 per cent to something in the vicinity of 10 per cent. (5) Apart from the exceptions mentioned above, the remaining Asian countries are "pre-take-off" economies, where the savings and investment rates probably come to under 5 per cent of net national product. Whether the take-off period in India and China will, in fact, be successful remains still to be seen.

To summarize, "poor", "backward" and "underdeveloped" (or undeveloped) are key-words in the analysis of problems of fisheries in the countries with which we are concerned in this paper. Poverty is the most basic handicap of the countries or regions concerned. They suffer from a fundamental scarcity of almost all factors of production: capital, enterprise and skilled labour; or, in respect of such factors as are relatively plentiful (e.g. unskilled labour or fishery resources), they are situationally unable to apply them immediately to productive use. The aspect of underdevelopment is equally stressed - and necessarily in the same conjunction. These countries are simultaneously aware of the need for development, of the potential for it, and of their present poverty as a barrier to it. But for our considerations, the aspect of "backwardness" is still most significant, since the primary-producing communities concerned are usually of the most primitive, isolated, autarchic or rusticated types.

(b) FISHERY AND THE PROBLEM OF ECONOMIC GROWTH

In many poor countries the whole problem of economic development can be reduced to the question of how to secure food for the population. The bulk of the population in these countries is either starving or - at best - undernourished. (6)

Lack of animal protein is often the main cause of malnutrition in poor countries, as is shown by the statistics in Table V.1. on the following page.

This table clearly indicates that substantial improvement of nutritional standards could be achieved through increasing fish consumption. The case of India is perhaps the most characteristic. If India raised the consumption of fish to the level of Japan or Norway her standard of nutrition would be three times better.

A humanitarian policy of economic development in poor countries calls for a rapid increase in the output of staple food commodities. In many instances, little can be done in this respect; and therefore the development of appropriate substitutes becomes imperative. Fish is perhaps the most adequate substitute that can be obtained. It appears that the possibility of planned development of

(4) See R.A. Ma and E.F. Szczepanik, The National Income of Hong Kong, Hong Kong University Press, 1955.
(5) W.W. Rostow, op.cit., p.34.
(6) According to R.I. Crane, Aspects of Economic Development in South Asia, Institute of Pacific Relations, New York 1954, p.1, in India the bulk of the population gets less than 15 ounces of food per day.

the fishing industry in poor countries has hitherto been generally neglected. We should like to note, however, that in the Soviet Union the period of planned economic development from 1928 onwards has been characterized by the introduction, often compulsorily, of fish as a staple component of the normal diet. We feel that this possibility now deserves more serious attention in poor countries. For the developed countries this would mean the financing of ship- and boat-building, the development of storage and canning facilities in poor countries, of ports, of navigation on inland waterways, and thus the handling of water-conservancy projects, etc. In the past, railway booms often acted as generators of economic development. It is possible that in poor countries a similar role could now be performed by the development of fishing and waterborne transport.

TABLE V.1.

Daily per capita Intake of Animal Protein and Protein from Fish in 1952/53.

Country	Animal protein	Protein from fish	Percentage of animal protein intake contributed by fish
	(grams per day)		(%)
Norway	53.0	9.8	18
France	43.0	3.0	7
Chile	26.5	4.7	18
Japan	12.9	9.9	77
Ceylon	10.9	7.9	72
Pakistan	10.3	0.4	4
Philippines	9.6	4.0	42
India	5.6	0.4	7

Source: FAO: Problems of Fishery Expansion (Paper No. 55/6/3683), prepared by FAO for Regional Consultation on the Selective Expansion of Agricultural Production and Consumption, Ceylon, 20–25 June 1955.

As far as we know, this problem has never been seriously studied as a major economic proposition, although some aspects of it have received the attention of scientists. From the point of view of economic growth, the following specific aspects of fishery production deserve attention: (7)

(i) Fishery can be regarded as a powerful income-generator because it stimulates the growth of a very large number of subsidiary industries, such as boat- and ship-building and repairing, fishing gear production, ice manufacture, cold storage, transport, etc. In some countries fishery has contributed to the development of several new industries, such as those connected with artificial fibres or electronics. In the Far East, Japan provides the best illustration of this thesis.

(7) An outline of the analysis which follows was presented originally by E.F. Szczepanik in "Economic Analysis of Fishery in the Far East", Far Eastern Economic Review, Vol. XIX, 1955.

(ii) The expansion of fishery production is a good instance of a "balanced development" programme. It results in a rapid increase in the output of consumers' goods. Fishery development, therefore, may even be a suitable target of an inflationary policy. In terms of W.A. Lewis's analysis, (8) the first stage of such a policy could be relatively short and mild because growing output may check the rise in prices.

(iii) Entry limitations in fishery are almost negligible. This is due not only to a comparatively small necessary minimum of fixed and working capital, but also to the conditions of ownership of natural resources. In contrast to agriculture, where almost everywhere land is privately owned, nothing of this kind exists in fishery. With the exception of some inland-water fisheries, the only limitations imposed on the process of exploitation of fishery resources are government licences, and their use is a matter of policy. Thus fisheries are much more communal property than is any other natural resource. It is because of this lack of ownership that the poorest sections of the community in many areas all over the world have drifted into fishing.

(iv) Apart from providing employment and at least subsistence earnings, fishery development in poor countries is often a partial solution for housing shortage. "Pescatorization" implies therefore not only an occupational shift, but also a geographical transfer of labour away from land and towards the sea. Fishing boats in poor countries are at the same time workshops and homes for entire families. Thus capital directed towards fishery development can simultaneously achieve two purposes. This point is of particular importance for underdeveloped economies which are characterized by high population pressure.

To sum up, the theoretical advantages are fairly obvious; fishery development provides a solution of food (and often housing)problems, it opens the way for numerous labour-absorbing industries, it should produce multiplier and accelerator effects without the fear of imminent bottlenecks. In many poor countries fishing has an old-established tradition; This too is an important factor. What must be changed is the technique, the extent of the market, both internal and external, and the development of numerous secondary industries connected with fishing. If models are required, the pattern should be that of Norway or Portugal rather than of England. But in general the fact that economics as a science has developed so much in advanced Western countries causes many economists to be inclined to solve the economic problems of other countries in terms of models and theoretical structures applicable only to Great Britain or to countries which followed a similar path of development. In fact, we urgently need both new tools of analysis and further historical analogies, to make economics a universally applicable science.

2. GENERAL ANALYSIS OF HANDICAPS IN FISHERY DEVELOPMENT

Having stated the case for fishery as a potential generator of an overall economic take-off, let us now consider the question why such a course of development has not taken place in the countries with which we are concerned.

Before much progress can be made in the study of this problem, there will

(8) W.A. Lewis, The Theory of Economic Growth, 1955.

have to be greater clarity as to the role played by the following factors: How far is the absence of fishery development due to actual deficiency of the basic resources? How far to ignorance or under-estimation? How far to lack of capital? How far to organizational weakness?

(a) IDENTIFICATION OF RESOURCES

Theoretically, in order to have the physical conditions for fishery development, the basic resource, the fish stocks in the sea or in the inland waters, must be absolutely large. This condition, on the whole, exists everywhere. "The potential fisheries resources of the Non-Self-Governing Territories (all over the world) are great. The West African territories, for instance, are bordered by a continental shelf that forms a potential fishing area of over 250,000 square kilometres. The Pacific and Indian Oceans also offer great possibilities for development. Secondly, the yield of natural inland fisheries can be substantially increased. Thirdly, regular supplies of animal proteins can be obtained by means of fish farming on land which is unsuitable for other cultivation." (9) The above applies generally to almost all poor countries.

Relative, however, to the very large and growing population of these areas - much more than half the human race - the resources may not be so large as to give grounds for unrestrained optimism. The fact is that the world's fish stocks - like basic resources of many other types - are still largely unproven. For instance, "it has yet to be proved that large-scale, highly capitalized fishing will pay in tropical waters generally. It seems that, in tropical waters, fish are seldom to be found in such concentrations that a fishing enterprise with high daily expenses can take enough fish daily to cover expenses and make a reasonable profit. There have been rare exceptions to this general rule: tuna fishing by the United States and Japan in Western and Eastern Pacific waters and trawling by Ceylon off the Southern tip of India have proved successful, but on the other hand there have been not a few failures in such enterprises". (10)

It therefore appears that in many cases the physical, i.e. geographical and biological, possibility of large-scale utilization and development of fishery resources must be examined. In this respect, as in so many other development activities in the poor countries, a very large part of work and initiative must fall to governments and to international agencies. This is not easy. The first task must really be to undertake a major drive, in education and publicity, to arouse consciousness of these problems, and bring them into focus in the public thinking. A factual and objective assessment of the basic resources is the fundamental prerequisite; until this is made, expectations regarding any great extension and improvement of fishery must be tempered with due caution.

(b) IGNORANCE AND LACK OF CAPITAL

Identification of the main reasons for the present underdevelopment of the existing and proved fishery resources, and the way in which they are interconnected, is the next step. The list of these reasons may be drawn up, for example, as follows, and publicity given to the ways in which each deficiency

(9) United Nations, Special Study on Economic Conditions and Development in Non-Self-Governing Territories, 1952, p.129.

(10) Ibid, p.134.

can be remedied: (11)

Equipment and knowledge are deficient: there is lack of adequate boats, lack of mechanical power to operate boats and fishing gear, lack of knowledge about the fishing grounds, their location and quality, and of efficient methods of catching fish.

Further there is lack of knowledge of the best methods of handling, keeping, processing and distributing the product. Fishermen are largely restricted to nearby fishing grounds. They depend on the uncertainties of the weather and also of the market. At some times there is a glut of fish, and at others a shortage. The fishermen operate on very narrow margins, without much incentive to improve their operation of the industry. The lack of large and stable demand for their products is commonly recognized.

Insufficiency of demand for fisheries products is indeed due in some part to lack of purchasing power among the population of poor countries. It is due in at least equal (if not larger) part, however, to prejudices or irrational preferences for or against certain types of fish products, or forms of preparation or preservation; also to lack of appreciation of the nutritive value of aquatic products; or simply to lack of availability, owing to which no market has ever been created in some areas. The potential demand could thus be enormously extended by educational policies and some direct encouragement to new developments in consumers' habits.

F.A.O.'s general recommendations are that fisheries policies and plans in this respect must be integrated and co-ordinated with the general development policies and plans of governments and authorities, central and local. But there is a special warning that much of the investment and effort must appear "indirect", from the point of view of the "orthodox" or penny-watching habit of mind of smaller governments, colonial services, etc., since, in such fields as this, research work, "academic" investigations or experimental "projects" are of particular importance. (12)

(c) ORGANIZATIONAL WEAKNESS

Further hindrances to development are connected with inadequate organization. It should be noted that efficient organization of the industry, especially on the distribution side, is hindered in many places by the existence of monopolistic structures, highly rigid channels of trade and transport, and other customary or accepted restrictions. Such general obstacles and the lack of facilities which would secure external economies (common services such as research and information, testing of quality, provision of major marketing facilities and the like), mean that only central governments and local authorities can undertake the work of improvement on a sufficiently wide and systematic basis.

Regrettably, insufficient attention is being paid to the industry and insufficient information is available, even on the higher planes of these societies.

(11) The following account is based on the F.A.O. paper, Problems of Fishery Expansion (Paper No. 55/6/3683).

(12) See E.S. Kirby, "Fisheries Improvement in East Asia: Economic and General Aspects", Far Eastern Economic Review, Vol. XIX, No.16, Oct. 20, 1955, pp.482–3.

The statistical situation is far from satisfactory. On the general planning level, not enough attention is drawn, in non-specialist publications, to problems of fisheries. The latter are far from having their due place and from being properly co-ordinated in general policy and planning. Even the United Nations - apart from the specialized work under the F.A.O. - may be somewhat to blame in this respect: for example, fisheries received some attention in the ECAFE Surveys between 1947 and 1951, but subsequently there is scarcely any reference in this series to fisheries problems or progress.

Meanwhile, in some countries at any rate, the government fishery organizations and services are also weak, inadequately staffed, inexperienced or under-equipped. There is great room for them to learn. Study courses or conferences for pooling experience, such as the Fishery Statistics Course held in Bangkok in 1952, or the Fish Marketing Training Centre held in Hong Kong in 1954, the Fish Culture Training Centre in Indonesia in 1955, and others, preferably extending over a whole region, offer great possibilities for mutual benefit and improvement. Much benefit has resulted from the systematic work of the Indo-Pacific Fisheries Council, sponsored by F.A.O. in 1948. (13) All this, however, often amounts to a mere beginning only.

(d) POSSIBILITIES AND EXAMPLES OF IMPROVEMENT

Where all or most of these difficulties have been overcome, there has been remarkable development of fisheries. The chief example in the Eastern Hemisphere is Japan, which is now the greatest fish producing country in the world. Annual production in Japan was $3\frac{1}{4}$ million tons before the war. At the end of the war this had declined to about 2 million tons, but now it is rising again to $4\frac{1}{4}$ million tons - that is, to a larger figure than before the war, despite the fact that in the post-war period Japanese fishermen have been excluded from some of their most productive fishing grounds. The Japanese fishers exploit nearby fishing areas very intensively, but a large part of their success is due to great help from the government in research, marketing organization, and technical and financial assistance to the basic equipment of the industry.

In India there has also been considerable progress since the war. In Bombay (for example) the annual fish production has been raised since the end of the war from about 50,000 tons to about 85,000 tons, and many fishing boats have been mechanized, while the marketing arrangements have been greatly improved. Hong Kong has also become a famous centre of improvement in these respects, and its Fish Marketing Organization is a model for other countries.

Outside the Asian region a number of other places may be cited as examples of recent and rapid development. In the Union of South Africa production was about 100,000 tons a year at the end of the war, and has now quadrupled. Great increases have also taken place in South West Africa and in many countries of South America. In all these areas, government assistance has played a significant part.

To conclude, in most poor countries the area covered by fisheries could

(13) See E.F. Szczepanik, "Indo-Pacific Fisheries Council", Far Eastern Economic Review, Vol. XIX, No. 18, Nov. 1955.

be greatly extended. The techniques of production, distribution and marketing could be radically improved. Moreover, a much better utilization of fish products could be effected. The amount available for consumption could be greatly increased by cutting out waste, which is very heavy, through the extension of storage and refrigeration facilities. New outlets for fish products could be developed, in such directions as the use of fish manure and for animal feeding. Even in the range of fish products used for human consumption, outlets are restricted by many prejudices and consumer habits which could be overcome by judicious publicity.

The general analysis of handicaps in fishery development presented above indicates, however, how enormous is the range of problems involved. Their multitude and extent are in themselves an answer to the question why fisheries in poor countries still remain underdeveloped. In the subsequent sections of this paper we shall attempt, in turn, to analyse some of the basic problems in greater detail.

3. UTILIZATION OF NATURAL RESOURCES AND METHODS OF PRODUCTION

(a) IDLE RESOURCES

It has been well said that the greatest of the obstacles to the development of fisheries, greater and more primary than capital shortage or technical difficulties, is ignorance. Ignorance of opportunities and possibilities is the most widespread characteristic of fishing, considered as a world industry.

It is in these connections that we must begin to emphasize the stark contrast between the developed and underdeveloped parts of the world, from the point of view of fisheries. For an effective graphical illustration, see the map on page 56 of the Oxford Economic Atlas of the World. (14) It shows how something like 80 per cent of the world's fish catch is in the hands of countries (mostly highly developed, and all in the Northern Hemisphere) which occupy something like 15 per cent of the world's shoreline.

We may cite a statement recently made in Communist China, on the underutilization of fishery resources, (15) as an interesting example:

"Our country abounds with aquatic resources; and was the earliest country to engage in fish breeding. Fishing grounds in our territorial waters amount to 436,000 square miles, occupying the first place in the world. If the world's average yield per square mile of fishing grounds is 10 tons of fish a year, we can produce 4,360,000 tons of fish annually. The total area of rivers and lakes in our country amounts to 300 million mow, which may yield 1,500,000 tons of fish a year at the yearly rate of 10 catties per mow. Besides, the acreage of ponds and paddy fields in which fish may be bred is about 300-400 million mow, capable of yielding 1,500,000 tons of fish a year. In total, the annual output of fish throughout the country may reach at least 7,360,000 tons. This quantity of fish is the equivalent of the meat of 20,000,000 head of cattle,

(14) Oxford University Press, 1954.

(15) Chiang Hai, "Development of Aquatic Products Enterprises in China", Shih Shih Shou Tse (Current Events), No. 7, April 10, 1956, (In Chinese).

or 70,000,000 pigs, or of 300,000,000 sheep". These figures should be compared with 2.4 million tons of fishery output currently produced in China.

How is this general condition of under-utilization to be explained?

(b) SECTORAL ANALYSIS

In order to answer this question, three technical levels or sectors must be distinguished in the industry as a whole; and it must be recognized that in the underdeveloped regions these three levels are much more distinct and disparate than in the advanced countries. In the underdeveloped countries they appear practically as three separate branches of the industry, with the lower - less mechanized and less scientific - levels predominating.

On the production side, the three divisions are:

A. Offshore and near-sea fishing.

This is comparatively local-based, or zonal. It utilizes small craft. It is primarily concerned with demersal stocks.

B. Inland fishery.

Lakes and pond culture are so far mainly in question. In some Asian countries fish culture in paddy-fields, and sometimes in tanks, also figures. River-fishing is extraordinarily little developed in the poor countries. This is usually no less local-based, and is closely linked with agriculture.

C. Deep-sea or longer-range fishing.

This is primarily dependent on pelagic stocks. In this field there is distinctly higher mechanization and more occupational and geographical specialization, as well as a wider market basis, up to the point of entering substantially into international trade.

Clearly, A, the offshore, purely local and primitive - largely mere subsistence - type of activity predominates in the poor countries, and this explains why their fishery output is so low compared with that of developed countries. More particularly, type A predominates heavily in South and South-East Asia, the central part of the region which is here specially considered. As we move towards its North-Eastern part (to Hong Kong and China, and on to Japan) inland and fish culture activities B, and the more highly-organized deep-sea activities C, tend here and there, as a general rule, to show more development already. At the same time, the degree of urbanization, of economic and social evolution away from the subsistence and non-monetarized basis shows a very similar correlation from A through B to C.

It is analytically useful to bear this perspective in mind throughout. Thus we may note that various key indicators or developmental factors vary between the three sectors. For example, the degree of capitalization is lowest in A, rising through B to C. Insofar as development policy seeks to find less

capital-intensive methods, it may favour sector A or B, but to the extent that industrialization is the criterion, the stress will be as far as possible on C. Propensities and abilities to save and invest, and thus the possibilities of mobilization of domestic capital, are low in A, moderate in B, and relatively high in C. The scope and applicability of foreign aid or technical assistance are in the reverse order, descending from C to A. The prospects of increasing returns to education, organizational effort, etc., may well be greatest in sector B, next greatest in C, and least in A. Community projects may be most applicable to A, whereas extension services would be most applicable in sphere B.

Marketing, distribution and consumption broadly reflect the same pattern. They are similarly localized and restricted in scale - in the poor countries much more markedly than in the advanced ones - by the three sectors, in the order of A, B and C above. Broadly speaking, the offshore catch reaches consumption on a local or district scale; the inland catch may attain a district to national scale; the deep-sea catch more surely markets on a national scale, and beyond it into international trade.

To conclude this part of our analysis, we would stress the necessity and economy of correlating and integrating all fishery plans and projects into the general structure and balance of planning and policy in each national case; this is rather insufficiently realized at present. The location of each type of activity obviously demands correlation with general plans of transport development and the like; but it may less easily be perceived, for instance, that a project for inland fisheries development might share its overhead costs rather widely with projects in such domains as public health, education, co-operativization, etc., in an overall rural development scheme.

4. LABOUR : SOCIOLOGICAL ASPECTS

(a) THE INTEGRATION OF LABOURER, CAPITALIST AND ENTREPRENEUR IN A PRODUCING GROUP

It is clear that the approach, over a wide part of our topic, must be very largely that of the sociologist or the social anthropologist. Only at a few points, as yet, can we go very far from a background of pre-capitalistic social conditions into analysis in purely economic terms.

This applies most strongly to the labour factor and to the first and second of our three sectors of the industry - A offshore fishery and B inland fishery. A represents very largely the primitive village society, in its various aspects, merging into the peasant society. B broadly represents the agricultural, peasant, traditionalist category. C, deep-sea fishery, takes us into the world of the more urbanized, evolved and modernized communities or groups.

Professor Firth, in his outstanding work on this topic (16) conjoins the terms "fishermen" and "peasant economy": "A Malay or Indonesian fishing economy has close structural analogies with a peasant economy and ..... may even be treated as a species of it". But, he stresses, "the term 'peasant' if applied

(16) Raymond Firth, Malay Fishermen: Their Peasant Economy, London, 1946, pp. 22–27, and passim.

to Oriental peoples has a rather different meaning than when applied, as it historically is, to a European community".

The relationship to the land factor is different; tribal, village, clan or other social-group forms of ownership and organization may figure, rather than individual forms. "The concept of a set of independent producers has then to be modified to one of an interconnected producing group". The connections may be economic, marital, residential, cultural, and of many other kinds. Often there is a dual economy of fishery and agriculture, with division of labour between the seasons, between the sexes, or in other ways. The forms and sub-types are many, but in general "the economy does not function mainly by its dependence on external markets, nor do its providers of capital constitute a separate class, nor has its elementary capitalism developed any concomitants of extensive wage-labour and complete divorce of the worker from control of the means of production". Equipment is drastically simple. Production, distribution, ownership, management rewards and other functions are not highly differentiated. Economic relationships "reach out" far beyond the immediate economic actions, into such realms as obligations of kinship and other social relations.

Professor Firth warns, however, against the impression that the behaviour is "non-economic" from a Westerner's point of view. The same processes, essentially, are at work: but in a much more complex framework and conditioning. Thus we must avoid ex ante speculation based on human nature in general, abstain from "transference of ideas about our own" (westernized) "ways of behaving", and observe empirically.

(b) A COMPARISON WITH AGRICULTURE

An instructive way towards understanding the functioning of the producing group in fisheries in poor countries is to draw a comparison with agriculture. Especially cogent points, from such an analysis as Professor Firth's, are the following:-

Whereas agricultural yield is seasonal, the yield from fishery is one of daily increments. Long-term planning is still necessary to the fishermen, but short-term planning looms relatively larger. There is much opportunity for the entry (and exit) of the marginal worker - even casual work. The fisherman's income is uncertain and irregular, "he must think of saving in smaller increments ..... For both (the farmer and the fisherman) saving lies in abstention. But while for the agriculturalist it is the problem of abstention from drawing on a store already there, for the fisherman it is the problem of abstention in order to accumulate a store". The agriculturalist's storage problem, further, is almost entirely one of space; "but the fisherman's catch.....needs more labour and equipment for its preservation. Hence the tendency to a greater development of middlemen....". We shall revert to this problem of middlemen in sections 6 and 7 of this paper.

Professor Firth notes, further, that "the agriculturalist's main crop is usually also his staple food, but the fisherman does not live mainly on fish. For him exchange ..... (or part-time agriculture) is a necessity". "The nature of the production unit is different also". Agriculture is widely a whole-family,

or whole-village, affair. Fishing is wholly for men, in the work at sea, though women and children can participate in the secondary processes ashore. Fishing offers more scope for co-operation in moderately large groups; but "with this there is more tendency for complex systems of distributing the earnings to arise". Finally, investment in fishery is less permanent than investment in land; "the provision of capital is apt to involve risks of a different order, and to attract investors of a different type". (17)

In none of these aspects can labour in fisheries be treated, therefore, in abstraction from the complex social backgrounds, or analysed separately as a factor of production.

(c) CLASS LIMITATIONS AND IGNORANCE

There are two other main features which must be mentioned as bearing especially on the labour aspect and as strongly influencing the sociological background.

The first of these features is the fact that fishing is at best a low-class occupation. There are sometimes strong prejudices against the fisher-folk. In Buddhist countries, for instance, from Ceylon eastwards, fishing tends to be regarded as ignoble, since it involves the taking of animal life. Even in Japan, a faint aura of the eta (outcast) still hangs over some aspects of the industry.

Connected with this is ignorance. It affects all levels of the industry; though most greatly, of course, the backward workers in the subsistence sector A, somewhat less the inland sector B, and distinctly less the "modernized" sector C.

Fishermen in poor countries are heavily ridden by superstition, custom, convention and prejudices. Often they have, at best, a "rule of thumb" knowledge of the best fishing grounds, methods, etc., or depend on almanacs and fortune-tellers. An extreme instance may be cited from Sierra Leone, where fishermen are controlled by "middlewomen", and fear that these women may harm them by means of magic. (18) Market knowledge is of course widely lacking, and there is also lack of knowledge of internal economies, possibilities or advantages of division of labour, etc. External economies are to a wide extent non-existent, or their possibilities uncomprehended. Knowledge of the importance and uses of by-products, oil, manure, etc., is extremely limited and badly diffused.

(d) THE PROBLEM OF INDEBTEDNESS

The other feature which is particularly important from the economic point of view is the prevalence of indebtedness, which is a chronic condition, deeply ingrown into such societies and strongly characterizing their relationships of dependence. "A recent report by the Fishery Office, Aden, which applies almost anywhere, puts the position clearly: insolvency has become the normal

(17) Firth, loc. cit.

(18) Report on the Sea Fisheries of Sierra Leone, Freetown, 1947, p. 32.

state of the majority of Aden fishermen. It is a fact that a large part of the fishing population actually prefers to be in debt ..... the more heavily a man is in debt, the more certainly will his creditor support him through hard times in order to exploit him in the future". (19)

We should not think, however, that the indebtedness is cheerfully accepted by the fishery folk in poor countries in general. On the contrary, it is commonly regarded as one of the main evils of the fisherman's life. Seldom, however, can he see any other way out but sing:

"The fish are hard to net;
Taxes are heavy, we are in debt.
From father to son -
Poor are the fishermen, every one!" (20)

Indebtedness, as a permanent feature, is detrimental to any prospects of fishery development. It kills production incentives because the fisherman fears constantly that any increase in his effort will be immediately appropriated by the middlemen, either in the form of repayment of debt or through lowering the prices. The solution of this incentive problem is thus of very great importance.

Concluding this section of our analysis, we have to stress that as far as the labour factor is concerned there is enormous scope for education, on the most elementary as well as the vocational plane. There is a need for thinking constantly in terms not of a single worker or wage-earner, but of a "producing group". Instead of a wage-system, the share-system is the predominant one; therefore the economic position of the "producing group" and its members is highly sensitive to changes in the market price of the product. Often, the instability of the fishermen's income makes them an easy prey to unscrupulous merchants. All this shows that the way to improvement, in the labour field of fishery economics in poor countries, is through the re-organization of the system of financing and marketing of fishery products.

5. CAPITAL

As was pointed out in the introduction, the basic difference between pre-take-off and take-off economies concerns the rate of capital accumulation; in the former case this is about 5 per cent of the net national product, but reaches about 10 per cent in the take-off economies. Thus in "poor countries" there is a general shortage of capital. No wonder, therefore, that capital is very deficient in the fishery sector of these underdeveloped economies. We shall try to offer in this section some observations concerning the possibilities of improvement in this respect. (21)

(a) THE NATURE AND AVAILABILITY OF CAPITAL

Capital employed in fishery consists essentially of three items: craft,

(19) United Nations, Special Study on Economic Conditions and Development in Non-Self-Governing Territories, 1952, p. 135.

(20) Free translation of a Chinese folk-song, "Song of the Fishing Lights".

(21) The following analysis is a restatement of the arguments presented by E.F. Szczepanik in "Economic Analysis of Fishery in the Far East", Far Eastern Economic Review, Vol. XIX, No. 22, Dec. 1955.

gear and the means of subsistence. Financing connected with the provision of the means of subsistence for the fishermen is comparatively easy, although it cannot be neglected. Financing to secure technological capital, however, presents a difficult problem. As far as craft is concerned, the use of the traditional sailing boat, a junk, is wide-spread all over the Far East, if this region is taken again as an example. Technical progress has proved, however, that it is not the most efficient unit, from the point of view of both labour and capital utilization: better returns can be obtained from bigger boats and, generally, from mechanized vessels. But transition to the new type of fishing craft involves a heavy capital outlay. Similarly, technical progress has revolutionized the type of gear used in modern fishery. This also requires capital. As a rule, neither long-term finance to modernize craft nor short-term finance to modernize gear is available to fishermen in the poor countries in sufficient amounts; hence the solution of the problem of financing this process is the basic condition of fishery development. This does not mean that the necessary capital does not exist at all. Quite often the problem consists only in finding the most appropriate channels of short- and long-term finance: private, co-operative or governmental.

On the whole it is true, however, that the costs of improvements by way of better boats, engines, fishing equipment, handling, storage, processing and transport facilities are quite beyond the resources of the private undertakings. The fishermen are usually heavily in debt, while the merchants, even if they wish, cannot afford the facilities required to extend distribution. In some cases the volume of fish supplies may require but cannot justify the cost of even the most modest facilities, except perhaps where these can be shared with other commodities; but little has been done in this direction. Cheap loan capital is a prerequisite of expansion in fisheries in virtually all stages of production and marketing, but the commercial risks involved are too great for private investors to accept, and Government sources are as yet inadequate.

(b) RISK AND INSURANCE

The risks connected with fishery financing are comparatively very large and this explains the high cost of fishery finance, i.e. high interest rates demanded by the fishery financiers. Thus the primary condition for improving the flow of capital to fisheries in the poor countries is the reduction of inherent risks. Several methods to deal with this problem can be suggested.

(i) Spreading of information obtained by oceanographic, meteorological and biological research, as well as by the study of the methods of fish finding and catching, is the first way. It substantially contributes to the reduction of fishery risks but does not entirely eliminate them.

(ii) Combination and compensation of risks comes next. Various examples of this way of dealing with risk can be quoted: fishing for different species by the same economic unit; combination of deep-sea fishing with coastal fishing; fishing with different methods by the same enterprise, etc. All these examples point to one common principle, viz. that through the operation of the law of large numbers, unfavourable events may be compensated by favourable events. From the economic point of view, this principle amounts to the establishment of an obvious

case in favour of a large fishing enterprise.

(iii) Thirdly, there is insurance. It is not applicable to all kinds of fishery risks. No insurance company will guarantee the price or volume of catches; but craft can be insured, as well as gear and the life of the fisherman. This method, moreover, could be made available not only to large fishing units. Even small fishermen can use it if proper insurance facilities are organized.

A practical scheme of fish-boat insurance was inaugurated in Japan in 1937. It consists of a system of mutual insurance of boats and fishing gear and is run by the fishing boat insurance associations which are formed for this purpose by the boat owners. The Government maintains a special fishing boat re-insurance account which re-insures 90 per cent of the total insurance sums. In 1953 there were altogether 53 fishing boats insurance associations. 12,160 vessels were insured for the sum of about $20 million. (22) We believe that similar insurance schemes could be initiated in many underdeveloped countries. This would however involve, as in Japan, active participation of the government as re-insurer; or alternatively, the organization would have to be nation-wide in order to secure sufficiently large coverage to reduce the insurance premium as much as possible.

(iv) Although price is not subject to insurance, the degree of price fluctuation can also be diminished. One way is to use storing as a sort of buffer-stocks policy. Another way is to spread market information; in Japan for example, fishing units at sea are in radio communication with a number of markets and direct their fish to the markets with highest prices, thus levelling the price all over the country at a fairly stable figure.

(c) POSSIBILITIES OF AN INCREASE IN CAPITAL SUPPLY

Important means of lowering the cost of fishery financing are: the reduction of fishery risks; insurance; price stabilization; and the improvement of financing-channels. None of them, however, provide a radical remedy for the overall shortage of capital available for fishery development in poor countries. To find such a solution, we have to go carefully through the list of the potential sources of capital in underdeveloped countries. The list is not a novelty to modern economists. (23) It includes:

(i) Savings;
(ii) Taxes and levies;
(iii) Loans;
(iv) Foreign aid;
(v) Foreign investment;
(vi) Better utilization of opportunities offered by foreign trade;
(vii) Money creation;
(viii) Community development projects.

(22) See E.F. Szczepanik "A Survey of Fish Marketing in the Indo-Pacific Region", FAO Report No. 404, First FAO/ETAP International Fish Marketing Training Centre, Rome, 1955, p.80.

(23) See E.F. Szczepanik, "The Elements of the Theory of Growth Acceleration", Economics and Finance in Indonesia, Vol. 7, No. 8, Aug. 1954, pp. 493--494.

In theory, all these sources of capital formation can be applied for the purpose of fishery development. The accent on some of them may vary from country to country according to specific conditions. To ensure that the capital flowing from these sources is directed into fishery it is, however, first of all necessary to bring this sector of the national economies into national economic development plans or programmes at an appropriate level. This is much easier in centrally planned economies than in free-enterprise economies. Thus in China the current five-year plan envisages the output of aquatic products to reach 2,807,000 tons by 1957, suitable fishery investment being undertaken for this purpose. Moreover, at their recent national conference, the representatives of the employees and workers of aquatic products enterprises pledged that already in 1956 their output will reach 3,040,000 tons, i.e. double China's highest pre-war annual output. (24) It is doubtful whether such a drive would be possible in a non-totalitarian country, but this example is certainly striking and deserving of consideration.

We believe that the planned increase in China's fishery output will be due not so much to the increase in capital outlay as to an increase in labour productivity. For the fishermen it may thus mean simply more "sweat and toil", but for the nation as a whole it will amount to an increase in the working capital, in the sense of an enlarged "subsistence fund" enabling the employment of industrial workers. They, in turn, will eventually produce capital goods necessary for the fisheries and the process may be self-perpetuating and cumulative. But the basic conditions on which this process depends seem to be twofold:

(i) The fishermen should obtain guaranteed wages, and possibly bonuses for extra output above a certain level;

(ii) The State should ensure that, in the planned output of capital goods, fishery needs are sufficiently provided for.

In an unplanned free-market economy neither of these conditions is automatically secured. Fishermen seldom, if ever, get daily wages. Their earnings depend on the volume of catches, on fluctuations in demand, and often on the whims of the middlemen. Under such conditions, there is no incentive for an increase in productivity. If real output goes up, owing to the bounty of nature, it does not automatically become the source of new savings and capital formation in the macro-economic sense. The increased output may be wasted, or prices paid to the fishermen may be depressed, leaving only higher profit margins for the monopolistically organized middlemen. The failure of the marketing system, based on middlemen, to provide the fishermen with opportunities for saving and investment in their own industry, is commonly recognized. It is proved by the age-long poverty of fishing communities in all underdeveloped countries.

The remedy for the inadequacy of opportunities for saving available to fishermen in poor countries is usually seen in radical institutional changes, all centering around the marketing problem. Co-operative marketing societies, functioning in conjunction with a public marketing organization, cannot only eliminate the middlemen but also provide a sound system of compulsory saving for

(24) See Chiang Hai, op. cit.

the fishermen. Hong Kong affords an example. (25) Furthermore, those societies can organize credit facilities for their members for the purpose of investment in craft, gear, equipment, etc. The main difficulty usually experienced by such co-operative marketing schemes concerns the question of price stabilization, which involves costly storing, refrigerating or processing facilities. Fishermen's co-operative societies are seldom able to undertake such heavy capital outlays; therefore prices still fluctuate according to supply, the demand being usually fairly stable. Hence further and more radical measures have normally to be invoked. Governments or public authorities should provide the necessary capital. Without such help no substantial improvement can be expected.

But the governments in poor countries are themselves poor. Opportunities for increased taxation seldom exist. An increase in the taxes imposed on middlemen would usually result in the shifting of the incidence of the tax onto either the fishermen or the consumers. We believe that there is nevertheless a possibility of imposing irregular levies on the middlemen from time to time, for the specific purpose of building up fishery development funds. As far as we know, this suggestion has never yet been put into practice. It seems to be worth trying.

In addition to fishery development levies, governments can raise internal or external loans for this purpose. A certain amount of such bonds could probably be placed among the middlemen and the fishermen's co-operative societies. Firms providing various types of fishery equipment could also be regarded as potential subscribers.

These and other policies in the internal capital market are well worth pursuing; but it seems unlikely that they would produce a large flow of funds. (26) This leads us, therefore, to external loans. In British colonial territories, the Colonial Development and Welfare Fund has often been made available for this purpose. The size of these loans and grants has not however been very large, as far as fishery is concerned. Perhaps larger claims could be made if the colonial governments were more certain that they knew how to use these funds. It is well known that colonial governments are usually very reluctant to float loans of any kind abroad; this may be explained partly by the lack of technical experts who would use such funds, and partly by the absence of imaginative economic planning. We believe that the same applies to other colonial territories, besides those of the British Commonwealth.

However, the prospective foreign borrowers among poor countries are now chiefly the newly developing independent countries, rather than the remaining dependent colonies. These new nations' prospects of getting foreign loans are complicated by various political considerations. The general trend of current

(25) See J.T. Wakefield, "The Hong Kong Fish Marketing Organization", FAO Report No. 404, The First FAO/ETAP International Fish Marketing Training Centre, Rome 1955, pp. 30–47. As a rule, a 5 per cent deduction for savings is made from the proceeds of each co-operative member's catch sold at the wholesale fish markets run by the Hong Kong Fish Marketing Organization.

(26) Unless subscription to "Fishery Development Bonds" is made virtually compulsory, e.g. the Economic Construction Bonds in China.
See E.F. Szczepanik, "Four Years of Fiscal Policy in Communist China", Bulletin for International Fiscal Documentation, Vol. IX, No. 4, 1955.

opinion is in favour of loans granted by international financing institutions, which would not attach undesirable political "strings" to the loans. This solution is obviously commendable and we would like to stress the need of attracting, the attention of these institutions to the demand for fishery development. The difficulty in this respect is however one already mentioned above: a sound international financing institution would be reluctant to invest in a country which does not possess the necessary technical skills to man modern refrigeration plants, or to run an efficient marketing organization, etc. Thus capital investment projects are conditioned by general technical education in poor countries: the two problems should therefore be considered jointly.

On the international level the solution is normally found through U.N. Technical Assistance, which attempts to provide expert services, publications, courses, training centres, etc. The difficulties are connected not only with the scarcity of experts (such as naval architects, fishery biologists, fishery economists etc.) but also with the fact that the countries concerned often do not know what kind of experts they should seek to obtain.

As far as private foreign investment is concerned the difficulties are also numerous. Political risks are involved, besides such technical uncertainties as were described above. But there are also countervailing advantages. We have in mind mainly the considerations which may guide foreign investors interested in promoting the sale of capital goods which are necessary for fishery development, such as boats, motors, nets, electronic apparatus, etc. The possibility of attracting foreign capital of this kind should not be neglected. There are examples showing that this method is workable. In the Far East, Japanese private capital is perhaps the most active in fishery development. More of it would be forthcoming if the countries concerned considered this possibility more seriously. If models are required, we can mention the experience of Burma, where political risks are reduced by the organization of Burmese-Japanese fishing enterprises. (27) There is no reason why other capitalist countries of the West which have developed industries supplying capital goods for fisheries, should not also follow this method.

To complete our review of the potential sources of capital for fishery development, we should mention the possibility of utilizing, for this prupose, the opportunities offered by foreign trade. Several poor countries can offer a number of goods produced by them in exchange for foreign products. Examples are afforded by Ceylon (rubber and tea), Malaya (rubber), Indonesia (rubber and tin). The larger the potential export surpluses, the greater are the possibilities of earning foreign exchange for the purpose of buying capital goods necessary for fishery development. Fishery products themselves can be used in this policy. This requires, however, a conscious guidance of fishery production, so that it makes available for export the goods demanded abroad, such as oysters, sardines, crabs, glue, corals, pearls, etc. In general, such products must be comparatively light and valuable in order to reach markets as distant as possible. Several countries in the Far East, following mainly the Japanese example, have already embarked on this line of fishery export development. Suitable market research might help considerably in this respect.

(27) See E.F. Szczepanik: "A Survey of Fish Marketing in the Indo-Pacific Region", FAO Report No. 404, p.48.

If there are no other ways to accumulate capital for fishery development, the process of money creation can also be used. As we mentioned in the introductory section, inflationary sources can be applied to fishery development, because it leads to a fairly rapid increase in the output of consumers' goods and thus the danger of an excessive rise in prices can be greatly reduced. Such schemes as the construction of landing facilities, formation of fish ponds, building of market installations etc. can be financed by public authorities, on a moderate scale, from inflationary sources. Such projects seem to be suitable components of "community development" schemes. Thus these two development methods could be combined, with only a moderate amount of money creation involved.

To conclude, there is a great variety of ways and means to secure the flow of capital for fishery development in poor countries. Our analysis has indicated however that there must be first of all knowledge of what is wanted, and secondly the will to achieve these aims. In other words, there must be a dynamic factor initiating and sustaining fishery development. This brings us to the discussion of the entrepreneurial factor in fishery - the subject of the next section of this paper.

6. ENTERPRISE

It is commonly recognized that in the capitalistic countries the driving force of economic development is the "Schumpeterian hero" - the innovating entrepreneur. As N. Kaldor pointed out, "he is a promoter, a speculator, a gambler, the purveyor of economic expansion generally, and not just of the new techniques of production". (28) What is the situation in the poor countries' fisheries in this respect, and what remedies can be suggested?

(a) FISHERMEN, CO-OPERATIVES AND MIDDLEMEN

Entrepreneurship, conceived as risk-bearing, is primarily an art which requires an "adventurer's mind". If such minds, full of courage and imagination, are lacking in society, there is an entrepreneurial scarcity - a situation undoubtedly existing in most of the underdeveloped countries. It is also, however, a matter of training and education and, unfortunately, of all the kinds of education developed in the poor countries in connection with fishery, the education of fishery entrepreneurs is the most neglected.

Entrepreneurship is greatly influenced by the type of ownership of the enterprise. In fisheries in poor countries the family type of ownership has become the traditional one. The nature of the fishery enterprise, which necessitates utmost reliability and a spirit of companionship, easily explains this phenomenon. There is, therefore, a strong reason for continuing this tradition. From the consideration of family, there is an easy transition to other forms of social units most favourable for the development of fishery. Clans, certain racial or national groups exhibiting specific kinds of unity, even religious groups, etc. would all find a proper place in the sociological analysis of fishery enterprise. Proof of this thesis can easily be provided. In Hong Kong, for instance, fishermen are mainly Hakka or Hoklo people, differing greatly from the Cantonese

(28) N. Kaldor, "Economic Growth and Cyclical Fluctuations", Economic Journal, March 1954, p.71.

majority. (29) In Poland, Kaszub fishermen are almost a separate national group.

This part of our analysis can be concluded by stressing the great role performed by various voluntary associations, such as co-operatives, in fishery development. Fishermen's co-operative societies already have a well-established place in many underdeveloped countries and policy recommendations of national and international bodies, such as F.A.O. or the Indo-Pacific Fisheries Council, seem to follow this line. The role of co-operatives is particularly important in connection with the marketing side of entrepreneurial activity, and this will be be examined in the subsequent section of this paper.

We may also observe here that the co-operatives have an important role to perform in the field of manpower as well. Education, training, provision of various welfare services, safeguarding occupational interests, which in other industries are normally the duty of trade unions, all this can be adequately taken care of by the fishermen's co-operative societies.

Contrasted with these general possibilities of co-operative development, the organization of production and marketing in poor countries is based usually on small-scale scattered operations and narrow well-defined channels of trade. There is much wastage of effort in the arrangements for the collection and disposal of supplies. In many places a complex system of dealers and agents exists to handle disproportionately small quantities of fish. Fishermen are rarely associated in any co-operative effort, while the merchants associate mainly to protect their restricted turnover and high margins. There is a widespread lack of the administrative and commercial acumen required to organize the catching and disposal of larger quantities of fish.

As a result, in common with many underdeveloped industries, the fishery undertakings are often under monopolistic control. In the case of fisheries, however, these monopolies are strengthened by the extreme perishability of the product. In many places the fisherman is entirely dependent on the dealers for financial assistance to support him during slack seasons, and also for the disposal of his catches. The catch is the only security for loans advanced. In the absence of alternative outlets, the dealer is able to determine the fisherman's earnings, irrespective of the volume of his catch. The effect, as was pointed out in section 4 of this paper, is to perpetuate indebtedness and to destroy any incentives for increased production.

(b) THE POSSIBILITIES OF IMPROVEMENT

Economic history teaches us that the development of entrepreneurship is a very searching social process. Generally speaking, "under some human motivation or other, a group must come to perceive it to be both possible and good to undertake acts of capital investment; and, for their efforts to be tolerably successful, they must act with approximate rationality in selecting the directions toward which their enterprise is directed". (30) Normally, this entrepreneurial group must be moved by the profit motive, but "if human nature felt no temptation to take a chance, no satisfaction (profit apart) in constructing a

(29) See B. Ward, "A Hongkong Fishing Village", Journal of Oriental Studies, V, 1.1, No. 1, Hong Kong, 1954.

(30) W.W. Rostow, loc. cit., p.41.

factory, a railway, a mine or a farm, there might not be much investment merely as a result of cold calculation". (31) This Keynesian dictum can easily be extended to fishery.

Economic historians further point out that in the known cases of successful "take-off into self-sustained growth" usually some kind of leading elite emerged. According to Rostow, "what appears to be required for the emergence of such élites is not merely an appropriate value system but two further conditions: first, the new elite must feel itself denied the conventional routes to prestige and power by the traditional less acquisitive society of which it is a part; second, the traditional society must be sufficiently flexible (or weak) to permit its members to seek material advance (or political power) as a route upwards alternative to conformity". (32) Poor countries of Asia provide good proof of this thesis. In Malaya, Indonesia and the Philippines such an entrepreneurial élite has been formed by the Chinese immigrants. They have spread also to fisheries and have often become a classical instance of entrepreneurs-capitalists-merchants, popularly referred to as "middlemen". Unfortunately, being essentially a foreign element in native communities, they have become associated, rightly or wrongly, with the exploitation of fishermen. The resulting resentment, combined with rising new nationalism, has recently given rise to a tendency to replace the middlemen system by fishermen's co-operative societies. This development seems to be a healthy one and deserves full support. But the question to what extent the co-operatives can effectively replace the system of middlemen requires further basic study. It is gratifying to note here that the F.A.O. is aware of this need and steps have recently been taken to co-ordinate research in this field in several countries of the Indo-Pacific Region. (33) The results will probably be of importance to fisheries in all poor countries.

(c) FISHERY UNDER SOCIALISM: THE CASE OF CHINA

It is well known that in some of the poor countries the solution of fishery development is sought through socialism. At the beginning of this paper we mentioned the policy of the U.S.S.R. in this respect. More recently, similar policy aiming at planned increase of fishery output has been employed in Communist China. According to available information, (34) China's total output of aquatic products in 1955 was estimated at 2.4 million tons, 60 per cent more than the pre-war peak output figure, and an output of over 3 million tons is planned for 1956. It was further reported (35) that a total of 520,000 tons of fish was caught from rivers and lakes in 1955 (the total catch in 1952 having been 290,000 tons). It is planned that the catch should amount to 620,000 tons in 1956, to over 700,000 tons in 1957, and to more than 1,500,000 tons by 1962. The concrete measures to be adopted for this purpose are:

(i) Deep-sea fishing should be further developed in 1956 following the "basic materialization of fishery co-operation". More sailing junks, motorized sailing junks and trawlers of 50 tons and above should be provided. The fishing tech-

(31) J.M. Keynes, General Theory of Employment, Interest and Money, p. 150.
(32) W.W. Rostow, loc.cit., p. 42.
(33) The Universities of Bombay, Hong Kong and Malaya will participate in this project.
(34) Survey of China Mainland Press, published by the American Consulate General, Hong Kong, No. 1295, May 24, 1956, page 10.
(35) Survey of China Mainland Press, No. 1280, 39, May 2, 1956.

niques and appliances should be improved to raise the unit yield of the fishing fleets.

(ii) The Gulf of Tonkin should be opened as a place for fishing and the fishery bases in Paknoi, the Changkiang and others on Hainan Island should be expanded. The breeding of marine products should be developed.

(iii) It is planned to make use of large and small water conservancy projects, streams and reservoirs to breed fresh-water fish. Fish must be bred by those agricultural producer-co-operatives which are able to do so.

(iv) The places for the breeding of fresh-water fish and the equipment in the fry stations should be improved. Scientific methods for the breeding of fish should be promoted to prevent and control any outbreak of fish pests. Fry should be supplied on a large scale.

(v) Attention should be paid to safeguarding the fishery resources. The catching of small fish at random should be prohibited.

(vi) Simultaneously with these measures aiming at an increase in fishery output, it is planned that China should export 50 per cent more fish and other aquatic products in 1956 than in 1955. Exports to the Soviet Union and the People's Democracies will be more than doubled, it is planned. One hundred and ten varieties will be exported in 1956. Besides the usual exports of refrigerated and salted prawns and fish, scores of types of dried fish will be added.

It is not our purpose to assess the above-quoted figures. As a fishery development plan, the Chinese programme undoubtedly deserves attention. It stresses the basic ways towards improvement in the main fields and can be regarded as a practical model for many other poor countries.

In China, "basic materialization of fishery co-operation", as a solution to the entrepreneurial problem, seems to be accorded importance as a primary condition of fishery development. It seems to us that in this respect, at least, there is agreement between fishery economists, irrespective of their political creed. But the examination of the relative merits of the general socialist and capitalist framework exceeds the scope of this paper. As far as Communist China is concerned, the immediate comparison could be made with Taiwan, where the efforts of the Joint (Sino-American) Rural Reconstruction Commission are particularly praiseworthy. Unfortunately, the relevant productivity statistics, cost and price data, and rates of output growth for the two countries are not available at the moment.

One final point can still be raised in this section: the Communist plan for fishery development in China does not seem to include improvements in fish marketing or distribution. In non-communist countries, on the other hand, this problem is coming to the foreground. We shall discuss this matter in the section which follows.

7. MARKETING

Marketing problems can be conveniently studied under four headings: transport, wholesale marketing, retail marketing and international trade. (36)

(a) TRANSPORT

Transport begins at landing places and fishing ports. In this respect, the situation in poor countries is not satisfactory. In most countries landing facilities simply do not exist. Substantial improvements therefore have to be introduced.

The next stage consists in storing and preservation. In the Far East, the hot climate makes these facilities of the utmost importance, but ice factories and refrigerating plants are a rarity, so that fish storage and preservation, if available at all, are usually very expensive. Thus the processing industry should receive far greater attention than it does at present, all the more so because of its potential for creating a number of subsidiary labour-absorbing industries. Governmental initiative in this field would be very desirable.

The lack of suitable means of transport presents another bottleneck in the provision of an adequate and cheap supply of fish and fish products. It can be remedied by the construction and improvement of roads and railways, the provision of insulated trucks and rail cars as well as sea and river vessels, the supply of suitable containers, etc. In some countries, the future may depend on the development of air transport.

(b) WHOLESALE MARKETING

Studies of the situation in most countries reveal that the prevailing wholesale marketing system based on middlemen is detrimental both to the fishermen and to the consumers. There is, therefore, a general tendency to replace private dealers by the fishermen's co-operative societies. Fish merchants are accused of exploitation, monopolistic practices, retardation of technical progress, unhygienic handling of the products, etc. Sometimes, the merchant can however be exploited by dishonest fishermen who may fail to repay advances given to them. In fact, accusations of charging exorbitant prices can be proved only by an analysis of the cost and price structure. The risks connected with storing and transportation and the inherent instability of supply may often justify the high level of prices. Many of these risks can nevertheless be reduced or eliminated in a large-scale state or co-operative marketing organization because of the operation of the law of large numbers. This is perhaps a major scientific argument in favour of replacing private fish trading by state or co-operative trading. At the same time one must not forget that, as a rule, an essential part of the merchants' activities consists in the provision of capital to fishermen. If the co-operative or state marketing organizations cannot undertake this financial activity, there can be no grounds for expecting that they will completely solve the problem.

(36) For an exhaustive analysis of these problems, see E.F. Szczepanik, "A Survey of Fish Marketing in the Indo-Pacific Region", FAO Report No. 404: The First FAO/ETAP International Fish Marketing Training Centre, Rome 1955.

Like transport, the wholesale fish marketing facilities in poor countries are, as a rule, very unsatisfactory. Substantial improvements can be made as far as market installations are concerned.

It is commonly maintained that the system of open public auctions is the best method for selling fish in the wholesale markets. In most cases this actually takes place, although in certain countries there is a system of secret bidding. This practice could possibly be eliminated by suitable legislation.

It is often complained that excessive charges are levied by the private or public owners of the wholesale markets, for instance, by municipal bodies. Recommendations are put forward that the market should be run either by public corporations or by the fishermen's co-operative societies themselves.

(c) RETAIL MARKETING

The inadequacy of marketing facilities often applies also to retail fish markets. It is probably in this field that most could be done quickly and at not too great a cost. Organized state, co-operative or municipal action could bring positive results in the not too distant future, by the provision of more adequate premises, suitably equipped and supervised.

As a general rule, profit margins are usually highest in the retail trade but, except in special cases such as war-time emergency measures, prices in the retail trade are seldom controlled. Apart from maximum-price fixing in some countries, no special institutional measures to deal with this problem are applied. It is often suggested however that the fishermen's co-operative societies should also gradually take over the retail trade. In some countries a beginning has already been made in this. But there is a danger in this method, since it may lead to the complete monopolization of fish marketing by the co-operatives.

If competition among retailers cannot bring down profit margins to a reasonable level, the following remedies can be suggested: to promote consumers' co-operatives, or to introduce Government-owned retail shops, or to promote the integration of small retail enterprises.

In theory, general consumers' co-operatives could be encouraged to undertake the retail sale of fish. When employing this policy, however, it is necessary to remember that an important element in the promotion of consumers' co-operatives is the social composition of the population in a given district. Thus town planning may prove to be a decisive factor in the promotion of consumers' co-operatives. In rural areas, the community of consumers' interest is better realized, but the lack of suitable means of transport, and of a distributive network in general, is a very great handicap. This could be solved by the wide application of a multi-purpose "fish car", a mobile transport and selling unit, combined with suitable refrigerating facilities.

The advantage of state retail business consists chiefly in the possibility of providing model shops, and good examples may be an important factor for general improvement. Bearing in mind, however, the inevitable wastes of bureau-

cracy, it is doubtful whether this method could be employed on a large scale.

Finally, there is the method of integration of small retail businesses. Obviously this method may produce various evils connected with monopolization; but there are ways of controlling monopolies. It might be particularly worth while to experiment with the idea of co-partnership in the retail fish trade. The absorption of small enterprises by big ones may lead to substantial technical, commercial, financial, managerial and risk-bearing economies, and thus contribute both to the lowering of the selling price and to the improvement of the standards of selling.

(d) INTERNATIONAL TRADE

With the existing methods of fish storing, processing and transportation, the volume of international trade in fishery products in poor countries is normally small. From the point of view of the general economic development of these countries, this problem deserves serious attention. It appears that so far it has never been tackled systematically on an international plane. It is possible, however, that co-operation between national fish marketing organizations may greatly help in this respect.

International trade in fish and fish products has several aspects which require special consideration. Firstly, it may be an important method of earning foreign exchange so badly needed for the payment of various imports. Secondly, it often provides salutary competition, which brings down internal prices. Thirdly, in view of various prejudices against the consumption of fish prevailing in many countries, international trade presents an additional argument for the development of fishery: countries unwilling to consume fish should exploit their fisheries for export purposes, in order to exchange fish for other products acceptable in their diet. In this way, a raising of the standards of nutrition in the poor countries can be achieved.

6. CONCLUSIONS

Our main purpose in this paper was to identify the problems of fisheries in poor countries, and suggest lines of solution.

(a) We have found that fishery is usually one of the most backward sectors of underdeveloped economies. At the same time, it is the branch of industry through which a general economic "take-off" in these countries could be effected. The development of fisheries would directly increase the output of food and stimulate a number of labour-absorbing industries.

(b) It seems that in most poor countries the physical conditions for fishery expansion are present, but often the resources are not known or not proved. The low degree of exploitation can be explained primarily by the ignorance of the fishermen and by their lack of capital. Generally speaking, government efforts to tackle these problems have not yet been adequate.

(c) The activity in most poor countries is limited to off-shore fishing with primitive technical methods. Inland fisheries are insufficiently exploited and

deep-sea or longer-range fishing is almost undeveloped. In our opinion, great stress should be put on the development of these two neglected branches of the industry. The corresponding plans should be co-ordinated with other plans and policies for overall economic development.

(d) The labour factor in the poor countries' fisheries can seldom be separated from other factors. The approach should be through the concept of a "producing group", usually belonging to an inferior social class and thus likely to perpetuate ignorance and poverty. Any prospects of improvement in this respect depend therefore on radical changes in social outlook, in systems of financing, and in marketing the products.

(e) Owing to the high risks involved, the cost of capital available for fishery financing is usually very substantial. Education in the methods of dealing with risks, and the provision of insurance facilities, would greatly improve the situation. Apart from this, fundamental improvement in fishery finance depends on the transition from the middlemen system to a co-operative system. Major capital outlays can, however, be financed only by governments. For this purpose, a number of measures can be suggested, including levies on the middlemen, flotation of internal bonds, loans from international institutions, and investment by foreign firms supplying capital goods for the fishing industry. We would not exclude also some degree of money creation, which could be combined with various "community development" projects.

(f) It seems to us that capital for fishery development can usually be made available. It is not enough, however, to have potential sources of finance. More important, as far as poor countries are concerned, is the knowledge of what kinds of investment are desirable, the will to undertake them and an efficient administrative machinery. It is here that the basic conditions of fishery development in poor countries must be looked for. From this point of view, it appears that planned socialized economies may be in a more advantageous position than free-enterprise economies.

(g) The lack of entrepreneurship is marked; it is largely due to the circumstances already noted above, and their combined effect, and is broadly subject to the same remedies. The middlemen system in general, and the indebtedness of producers in particular, are primary obstacles to the development of initiative. Socialist policies (e.g. China) rely on a great development of producers' co-operatives to remedy this situation, with relatively little attention to improvements on the side of distribution.

(h) The reform and regeneration of transport and handling facilities of all kinds, the whole network of marketing in all its aspects, is however of equal importance. In this connection also, co-operativization - in this case mainly on the consumers' and distributors' side - is nowadays rightly regarded as the most immediate and practical way forward.

(i) The demand side requires no less attention than the supply and marketing side; ignorance, prejudice and backwardness prevail in the sphere of consumption, and here again education and organization are the basic requisites.

(j) In our final conclusions we would like to endorse the following policy statement of F.A.O., expressed at the Regional Consultation on the Selective Expansion of Agricultural Production and Consumption, held in Ceylon in June 1955:

"With regard to fishery development programmes, piece-meal approaches to special problems can rarely succeed, and one factor alone, namely the extreme perishability of the commodity, dictates a simultaneous approach to related problems in production and marketing, in order that the incentives, as well as the means, can be found to increase production. In practice this will involve a very considerable strengthening of most government services to undertake the work of research, technical training, administration, financial assistance, marketing organization and, in many cases, the creation of specially constituted development agencies."

(k) Finally, we also agree with F.A.O. that "in view of the fact that the marine fishing resources are often accessible to a number of countries, arrangements are necessary to ensure international co-operation for the co-ordination of research investigations and for any necessary regulatory measures. Moreover, the general scarcity of experience in fisheries work makes international co-operation even more desirable in order that such experience can be shared by countries having similar problems. No doubt there would also be opportunities for resolving questions of international trade".

(l) The importance of fishery in poor countries, and its possible part in their economic and social development, is very inadequately appreciated. It should be further publicized and studied, preferably under some internationally concerted programme, in which all the aspects involved would be considered in their interrelationship.

DISCUSSION

ROBINSON introduced the discussion. He said at once that the paper was very wide-ranging and he intended to select and comment upon topics of interest to himself. The problems were those of fisheries in 'poorer' countries; the term undeveloped was misleading and better avoided as a general description. There were really two groups of countries to be discussed, with only their poverty in common:

(a) The really undeveloped countries, such as Uganda, West Africa and parts of South America. These areas had considerable natural resources, but had not been developed because of such things as lack of enterprise, shortage of capital, and underpopulation.

(b) Areas like Southern Italy, and parts of China. These were poor but over-developed. They had large populations and much capital was already invested in them. The prime problem was one of alleviating poverty, and possibly of the provision of additional know-how to help improve the standard of living. It was necessary to be clear about which of these groups was under discussion.

ROBINSON thought that (b) was the most interesting. Group (a) raised significant issues, but they were less important than the problems of over-development and poverty.

The paper discussed questions of the 'take off into self-sustained growth' of the kind considered in ROSTOW's work. KIRBY and SZCZEPANIK were being rather optimistic if they believed that all countries could so take off. The 'take-off' was much more difficult than had been appreciated; not all the aircraft would get off the runway. In this respect, ROBINSON himself had been much impressed by the earlier work of SINGER, which threw light on what did help to get countries off. The 'Malthusian barrier' was not unlike the sound barrier. We had to get to a stage at which increases in income were not offset by increases in population; a rise in the standard of living was all too likely to produce a larger population within the same time-period.

Where did fishing fit into the problem of development? Development was likely to create two economic problems: a balance of payments problem and an inflation problem. The inflation was likely to be of a sectional character, making it of special importance in particular sectors of the economy, and food supply was likely to be the most dangerously affected. In Southern Italy, for example, the development plan had assumed a high income elasticity of demand for food, for the following reasons:

(1) Food was what people wanted to spend more on.

(2) The Italian problem was one of under-employment in agriculture. How could labour be withdrawn from family farms, where marginal productivity was low, to other activities such as public works? It was suggested that such a shift would create income for the worker to spend on food. But in the event members of his family consumed his share, which thus never reached the market.

The question was thus one of finding the extra food. The Italians hoped to increase yields in agriculture and so get it from home sources. But in the short period it must come from imports and so affect the balance of payments. This became even more likely when it was appreciated that the marginal demand would be not only for bulk foods but also for more calories for heavy workers, and that the general standard of food consumption was likely to rise. Chinese agriculture was built on $\frac{1}{2}$-1 acre of land per head, Indian on 1 acre, Western Europe and U.S.A. on around $2\frac{1}{2}$-3 acres. Protein was a large acreage consumer, so that the income-elasticity of demand for acres was also going to be high. The possibilities of increasing the supply of acre-consuming foodstuffs were not great in many countries. Something could be done, for example, by drainage schemes in Southern Italy and by irrigation in India, but the scope of such schemes was strictly limited. Yet imports provided an unsatisfactory solution as it would be impossible quickly to develop exports on the necessary scale, and export earnings were wanted to pay for capital imports, which food importation would therefore check. It was here that fisheries became relevant: they could help to provide a solution to the food and protein problem.

Fisheries had two remarkable advantages; they demanded no increase in acreages and they need not call on international division of labour since they could utilise the internal resources of the nation. From the statistics given by the authors, Japan and Ceylon, obtaining 77 per cent and 72 per cent respectively of their animal protein intake from fish, would appear to gave turned to fisheries as a solution to the food problem.

Looking at the matter as a general economist, ROBINSON suggested that his comments so far indicated where the topic of the paper fitted into the urgent question of underdeveloped 'poorer' countries. He then raised some more specific points on the paper itself.

(1) The authors recommended capital-intensive methods of development. What assumption had they made about interest rates in deciding upon the best techniques to be adopted? The importance of the opportunity-costs of capital should not be under-estimated. He (ROBINSON) suspected that the 'right' rate of interest to assume for this purpose would be in the region of 20-25 per cent; European or North American interest rates did not provide an appropriate criterion.

Given the possible alternative uses of capital, ROBINSON felt that we should probably be thinking more of labour-intensive methods of development. Did capitalistic methods really have an economic advantage?

(2) The discussion of possibilities of improvement in transport and handling was interesting; there was value in such improvement if we were looking to fisheries as a source of protein. But how much fish was generally eaten more than 100 miles from the sea? In Europe, he thought not much. Was it practicable in countries like India and China to get fish marketed inland by improvements of the suggested character, or would not river fishing be the only real possibility?

KIRBY was asked to comment on the introduction. He said that he was unhappy about ROBINSON's 'over-developed' description - for example in relation

to Italy. He agreed with ROBINSON's description, but the area was certainly not over-developed in terms of capital ratios. ROBINSON replied that he should look at Apulia; there was impressive capital development in public works, which was not in fact going to increase productivity very much. CASSADY asked if the authors did not accept the dichotomy described by ROBINSON, who intervened to say that KIRBY was right to be uneasy; the emphasis should properly be on over-population and under-population. KIRBY then said that he thought that they had covered themselves on this issue in the paper; they had said that India and China might not 'take off'. He himself thought the SINGER 'plateau' idea more acceptable.

Balance-of-payments crises did not always arise in the manner ROBINSON described. It was necessary to distinguish food-surplus and food-deficit countries. Much development planning was concerned with the latter group. ROBINSON replied that he had had India in mind.

KIRBY agreed with the emphasis on inflation and on the need for improvement in the composition of food supplies. In Asian countries outside India, dairy products were irrelevant as they were not used. There was also no upland cultivation. These facts emphasised the importance of fish as a source of protein supply.

In respect of interest rates, KIRBY believed the limits of labour intensity to have been reached already; he instanced Chinese 'garden cultivation', terracing and so on. Prospects in this direction were exhausted. The methods they proposed were not very capital-intensive, certainly less so than those used in Europe and the stress was rather on the possibilities of organisational change.

There had been much improvement in fish distribution in India. He had eaten fish in most parts of India and found it quite good, though there were some fishless areas in the centre. Distribution was also not too bad in China. In the case of Europe the proportion of fish consumed in coastal areas might be higher than elsewhere, but he thought that the difference between coastal and other areas was less in China. In reply to CASSADY, he explained that fish could be preserved fairly well. Ice cars were used in India, as well as devices like salting and drying which were usual in China. There was no inland consumption of fresh fish.

ZOETEWEIJ took up the question of labour intensive production in over-populated areas. This was a general problem in such countries which were able to fish. These countries had no highly organised capital market, but interest rates were not very much above those ruling elsewhere. ROBINSON had argued that a much higher one was appropriate, but there were arguments against this:

(1) If much labour was used in any particular type of production, the marginal rate of saving was likely to be low, which would be a serious matter in these countries.

(2) If (1) was valid, and labour-intensive methods were in fact used, this might well encourage increases in population.

(3) Productivity might increase much more slowly by the adoption of labour-

intensive rather than of capital-intensive methods.

(4) ROBINSON had argued that one of the main advantages of a growth in fish production would be as a defence against inflation. But for it to be effective in this respect, a quick growth in output would be required, and it was questionable whether this would be possible with a labour-intensive development of fisheries.

SZCZEPANIK supported KIRBY (his co-author) on the issue of capital- and labour-intensive methods of production. KIRBY was right to emphasise the practical difficulties of an extension of labour-intensive methods in fishing, which were similar to the difficulties found in agriculture. Larger mechanised boats did give a substantial increase in output, and enabled the substitution of deep sea for off-shore fishing. They (the authors) had not assumed any particular interest rate because of the diversity of the countries with which they were dealing. But if government sponsored investment were being considered then the relevant rate of interest would be much lower than ROBINSON suggested, say about 5 per cent. The same rate would be appropriate in the case of foreign loans. The returns to capital investment in fisheries would be worth while at such a rate, and would be very quick.

SZCZEPANIK also supported KIRBY's comments on organisation. Marketing reorganisation could greatly increase the earnings of fishermen and also their savings, so facilitating the repayment of loans. The requisite reorganisation might be achieved by such methods as co-operative enterprises; such 'communistic' methods were being tried by countries like India.

SCOTT asked if SZCZEPANIK's proposition that capital-intensive methods would provide quick returns and so aid the 'break-through' could not have another explanation. This might be a situation in which the rate of return was high, but the assets needed quick replacement and so constituted a perpetual drain of capital. Other types of investment (for example, dams) might be slower-yielding but give a higher net return over their life. He also thought that the appropriate interest rate to consider was the opportunity-cost rate and not the rate at which the I.B.R.D. might lend. Again, KIRBY might be right in saying there was not much possibility of increasing labour-intensity in the fisheries being discussed with the existing organisation. But the organisational changes could themselves be aimed at greater labour-intensity. In particular, something might be done about finance and the scale of borrowing available to fisheries. The technical inferiority of junks to motor vessels might have been proved, but this was not necessarily true of other types of sailing ships, which could be introduced by provision of borrowing facilities without any increase in capital intensity.

POPPER was not sure of the validity of SCOTT's capital-replacement argument. In many cases capital was distributed too widely and inefficiently. In India, for example, rafts had to be replaced every two or three years. Fishing methods were primitive but capital-consuming; the rafts could be replaced by more expensive boats which would last 8-10 times as long. A similar argument could be made about nets.

SCOTT GORDON said that the idea of increasing food supplies from the sea was a very worth-while one for countries with a serious food problem. Fishing had a short production period, and this was of value. But from a longer run viewpoint, the organisation of the industry was inefficient because of the common property resource problem. Consequently, there might be no net gains from expansion because although fish were produced, other resources were used up equally. The balance of payments might be no better. It was necessary to be sure that the industry produced a net yield.

CRUTCHFIELD considered that it would be necessary to consider the reorganisation of catching, marketing, etc., as one economic problem. If one thought of improvement as a whole, including for example processing and perhaps freezing, there were certain requirements of scale which themselves required minimum flows of fish if they were to be useful.

ROBINSON asked to what extent ignorance was important. He instanced the development of the Banks fisheries by Portuguese as well as French and English fishermen. This was a case of distant fishing with primitive apparatus. Was this impossible now? Was SCOTT's earlier argument not concerned with the same question? Some general discussion followed. POPPER said that the European situation was not typical; the underdeveloped areas did not have fishing grounds available in relatively distant waters. ROBINSON objected that the authors wanted bigger ships that would go further. POPPER explained that the need was for something in between; boats that could go further out, though not for very long distances. He accepted ROBINSON's suggestion of the Dogger Bank as illustrating the sort of distance he had in mind. KIRBY intervened to say that this was discussed in the paper; the only available range was the medium one.

At this point, TURVEY brought the discussion back to capital-intensity. The proposition had been put forward that development should use more men rather than more capital. It appeared that the choice was between (a) more men with more capital and (b) more capital with the same number of men. To carry their point, the authors had to show that (b) was better than (a).

SZCZEPANIK said that there was no other way of escape from inshore fishing; the need was to change the location of fishing. TURVEY asked if this implied that there was over-fishing at present, and ROBINSON said that while different boats might be needed to go further out, this did not necessarily imply a need for more capital per head.

BOWEN postulated a situation in which a high ruling interest rate - say 25 per cent - was general and unavoidable. SCOTT had compared capital invested in a dam and in fishing in terms of their respective rates of depletion. Was it not also important that a high interest rate would encourage investment in fishing if high short period returns were in fact available? Was there any evidence bearing on this?

CRUTCHFIELD said that if a given amount of fishing capacity was embodied in vessels of greater range and mobility because of capital-intensity, this must bring physical advantages in range of movement, ability to deliver catches in better condition and more suitable places and so on. This might be economically

worth while even if the physical catch per unit of total factor inputs was reduced. He thought that developments in North America could be explained in this way, and the same might be true elsewhere.

SCOTT thought that BOWEN's point was generally correct, though it was necessary to be careful when discussing the durability of an asset, which depended on such factors as the implied rate of interest and the periodicity of replacement.

The authors were asked if they wished to defend the capital intensity thesis further. SZCZEPANIK suggested that the alternative opportunities should be kept in mind. If the aim was to increase food production, fishery development offered much better prospects than agriculture. TURVEY said that this provided a case for developing fisheries, but not for capital-intensive methods. SZCZEPANIK replied that they relied mainly on the kind of arguments just put forward by CRUTCHFIELD: the greater productivity made possible by using different grounds, improvements in general speed and mobility.

ZOETEWEIJ felt that the discussion had been unfair to the paper. Why should we think in terms of a 25 per cent interest rate? ROBINSON gave no reason. On the other hand, there were arguments that if an increase in wage-goods was wanted, fishing could provide it, and more quickly by capital-intensive than by labour-intensive development. There was therefore a good case for using a low interest rate.

CASSADY thought that CRUTCHFIELD's position needed clarification. It was agreed that the whole production process needed to be considered. But this might well mean that the most efficient way to use capital would be to concentrate it in particular places. Thus, fish might continue to be caught by labour-intensive methods, and the capital used to provide motorised boats specialised in the transportation of the fleet and catches.

ROBINSON explained that he had intended his statistics to be illustrative rather than dogmatic. The figure of 25 per cent had been stimulated by a statement from the World Bank which suggested such a rate as appropriate. He could be quite wrong; the relevant interest rate might be much lower.

SCOTT GORDON said that the countries were fully exploiting fisheries of the present type, and had explored the regions available to present methods. So discussion had to concern itself with new regions and new methods. There had to be a widening of the range, either horizontally or vertically. This must mean more capital intensity: bigger or more powerful or better equipped boats. There were no longer any accidental discoveries of fishing grounds.

It was a mistake, argued POPPER, to think that the fishing grounds of underdeveloped countries were over-developed or over-exploited. The sorts of gain to be obtained from increased capital-intensity were, for example, that boats would be able to go out three times instead of once as at present. The case for capital-intensive methods rested on a declining marginal return to labour-intensive development; the yield from new and inefficient men was not worth while. The extent to which the necessary improvement could be obtained by reorganisation

and the actual nature of the consequent need to increase capital-labour ratios was a technical question. Of course, whether the capital-intensive methods would themselves be worth while, given the opportunity-cost uses of capital, was another matter, as ROBINSON had said. In relation to the discussion of interest rates, POPPER asked if ZOETEWEIJ was not saying that it might be useful to subsidise fishing, in effect, as part of a 'break-through' policy. Replying to CASSADY, he explained that the three trips became possible because the motorised vessels ceased to be reliant on winds. CASSADY thought that this example bore out his own earlier point; it might be possible to use one motor ship and many boats.

GERHARDSEN said, in reference to SCOTT GORDON, that new fishing discoveries were still being made, though these were planned and not accidental. On POPPER's argument, he commented that underdeveloped countries did not know their present grounds or what new ones might be available. POPPER agreed about the lack of knowledge of possibilities, but the point he had wished to make was that in general the incentive for these countries to search for new grounds was not because of the present ones being over-fished.

SZCZEPANIK said that there was a famine in Bombay last year. There need have been no famine if boats could have gone out further.

At this juncture, WISEMAN introduced a new facet of the paper for discussion and commentary by the authors. KIRBY and SZCZEPANIK appeared to be conscious of the need for entrepreneurship in the fishing industries of the countries they discussed, but the kinds of organisational methods that they proposed were in his view inimical to its development. Experience of marketing boards, particularly in Africa, showed that organisations of this type stifled rather than encouraged local entrepreneurship, by inhibiting the normal operation of the market and so removing economic incentives or pushing activity into unorthodox or inefficient channels such as smuggling, crop quality debasement (where profitable) and so on. He was very sceptical of arguments that suggested that the necessary entrepreneurial qualities were lacking in some countries. Ample evidence of such abilities, and of a normal response to commercial incentives, was to be found in actual behaviour of the type just cited, in the Reports of the Marketing Boards themselves in places like Nigeria and Uganda, and in the numbers of nationals of underdeveloped countries who carried on entrepreneurial activities in many parts of the world, such as the Chinese shopkeeper. WISEMAN was also of the view that entrepreneurship was not necessarily associated with capital-intensive production methods, but organised markets and arrangements for the dissemination of information were required if entrepreneurial units were to grow in scale.

ROBINSON asked what was to be done if there were no existing entrepreneurs? In his view, development in East Africa was held up for lack of entrepreneurship. Was the rate of development set by present entrepreneurship to be accepted, or should there be supplementation from outside? ROBINSON would support supplementation. The condition of progress was larger scale, and local enterprise could not be trained fast enough. But activities must be left which provided opportunities for building up local entrepreneurship. A case-study was to be found in Uganda. There were many fish but only a small local market and local entrepreneurs would never have begun to sell in the Nairobi market. It

required outside initiative to organise deliveries by air, a job the African could not have done.

TURVEY said that different forms of intervention should be distinguished:

(a) The type discussed in the paper: co-operatives. He would like to suggest that co-operatives succeeded because they were subsidised.

(b) Marketing boards which only tried to even out price fluctuations. (WISEMAN intervened to say that this was never yet the case in practice. Few Boards, if any, were in a position of monopoly or even in a position significantly to affect world prices. But they were in a position to stabilise the prices they paid to producers, simply by keeping these below world prices. The African Boards had accumulated large reserves in this way.)

(c) The ROBINSON type: the state did not check or control private activity but itself did particular things.

(d) Regulations for control purposes. These could cover many things: cleanliness, marketing points, licences, numbers of middlemen (it was often urged that there were too many) and so on.

Had the authors any comments?

SZCZEPANIK said he had some minor ones. First, the aim was to remove monopolistic practices; fishermen had to deal with organised buyers. Second, co-operatives or government agencies were necessary to create the necessary market installations.

TURVEY asked for an explanation of the statement in the paper that middlemen were detrimental to the development of the industry. SZCZEPANIK replied that the evil consisted in the exploitation of fishermen by low prices and excessive margins, cheating, high interest rates, etc. The market was full of imperfections. TURVEY asked why margins should be excessive in conditions of free entry?

SCOTT said that ROBINSON's argument did not support the authors. He (ROBINSON) was talking about a case where there was no marketing organisation, not an undesirable one. The paper seemed to be proposing the removal of a complete marketing structure, which would consequently need replacement. Why not simply remove the imperfections as their undesirable qualities were recognised? The dislike of middlemen was often the result of their being an entrenched social class; it was racial, not economic, in origin. A change in methods could alter the position of middlemen, and a piecemeal approach would be preferable to the wholesale introduction of co-operatives, which would be driven to employ either the same men or inexperienced ones.

ROBINSON said that he agreed broadly with SCOTT. When fishing was on a small scale, there was normally a local market and the organisation might be suitable for that scale of operations. If the scale, and therefore the market hinterland, was increased, the organisation might become unsuitable. He had been

trying to emphasise the difficulties of moving from the one situation to the other.

KIRBY concurred in ROBINSON's statement of the problem. But SCOTT's argument was unsatisfactory because the societies concerned were too complex for a piecemeal approach to be successful; things like differing religion provided obstacles. The role of government was to provide an alternative organisation to make ROBINSON's larger-scale co-ordination possible. This kind of thing had been done successfully in Hong Kong and somewhat less successfully in Singapore. It involved measures of the kind they had discussed in the paper, such as co-ordination of retailers for such things as the spreading of information. TURVEY asked why this called for control. KIRBY said that control was not necessarily envisaged, SZCZEPANIK that it might be needed, instancing fish sale in Karachi; there was in his view a need to control retailing in this instance in order to maintain standards. TURVEY said that he could not see that a case for control had been made out.

POPPER referred to TURVEY's difficulty in reconciling high monopoly profits and free entry. There was not free entry. The high degree of risk meant that either only some middlemen survived and/or monopoly was essential to survival. Once established, the middlemen would defend themselves by non-economic methods if necessary. The question thus arose: if it was desired to remove the monopoly profits, how could this be done? The structure must be altered, either by the kind of methods proposed in the paper or alternatively by getting at the reasons for the riskiness of entrepreneurship. These were partly concerned with supply fluctuations, partly with demand elasticity (including the demand for fish for preservation) and partly with the difficulties of protecting capital advanced to fishermen who might abscond.

This stimulated TURVEY to ask some further questions:

(1) If middlemen's activity was so risky, were their earnings excessive?

(2) FIRTH, writing on Malaya, had said that fishermen did their own marketing. This seemed to preserve freedom of entry. Could SZCZEPANIK say if it was a general phenomenon?

ROBINSON added a further question:

(3) Were the middlemen in the same position as in agriculture, advancing money on condition of sale through them, which acted as their security for the loan? Was this the way that monopoly power was preserved?

The authors answered question (3) affirmatively. SZCZEPANIK said that it was also relevant that fishermen did not know how much they owed. In reply to (1) he said that their argument was not so much that middlemen were excessive as that they were monopolistic and dishonest. It was impossible to generalise; in some places entry to the market was easy. The crucial problem was monopsony. On (2), SZCZEPANIK said that freedom of entry was usually small both for middlemen and for fishermen. It was difficult to enter either activity in a particular village, and it was this which created the vicious circle of poverty, debt and

poor marketing. Hence their belief that radical and wide action by governments was essential. Hong Kong, Burma and other countries had taken such steps.

CRUTCHFIELD said that in most areas (not just poor ones) the relevant region of distribution was not the same as the region of buying. This encouraged imperfection of competition at the buying points.

BOWEN remarked that SZCZEPANIK's comments put him in mind of the small ports of North Yorkshire and Scotland. These had the same problems of small numbers of buyers, indebtedness etc. At the moment they were prosperous, as a consequence of the other employment opportunities provided by full employment. If the authors wanted a permanent solution in backward areas they would have to look for something similar; They should consider not just the organisation of the fishing industry but also the ease of exit from it. The conditions usually existed in fishing for a strategic monopoly power to develop. The monopolist would not suffer whatever the conditions; the need was to prevent him from being in a position to abuse his power. He could not go far if exit was easy and rival merchants were a possibility.

KIRBY offered some general conclusions. They (the authors) had been concerned with practical issues rather than theorizing. They had not discussed the question of the necessary rate of interest, and could not provide a theoretical answer to it. But practically there was a universal belief in the advantages of mechanization. In Hong Kong and other places where mechanization had been used the results had been spectacular - a doubling of productivity. The type of mechanization was not very capital-intensive; it consisted mainly of using the same junks with engines. Advances had often been repaid in one season. There was a happy medium in the matter of capital-intensity. Junks had a very long life: they were used in China for 20 or 30 years or even longer.

In relation to the macro-economic view of the industry, countries differed from each other. Their support for the use of controls was coloured by experience in Hong Kong. The aim of the policy was to sustain free enterprise, and to bring out the pockets of enterprise and provide the necessary framework for them. Throughout Asia, the general basis of development was by national planning. Countries were not thinking of shifting people out of fishing; they wanted the dams as well. For such countries, the fishing industry fitted into the co-operative section of the planning structure, and practical discussion had to take account of that.

VI. THE CONTROL OF NORTH SEA FISHERIES

by G. Lienesch

From evidence gained about 1912 it became clear that fish stocks in the North Sea were not inexhaustible. The markedly bigger landings after World War I, during which sea fishery was severely restricted, seemed to indicate that a period without fishing effort was likely to be of benefit to fish stocks in the North Sea basin.

This insight was mainly due to the activities of the "International Council for the Exploration of the Sea", an organisation in which scientific explorers of the sea had been associated since the beginning of this century for the purpose of establishing rational co-operation. Fishery research was only part of the Council's activity, but from the outset it began collecting and publishing information on the catches of the fleets of I.C.E.S. member countries, nearly all of which are situated in North-Western Europe.

This information awakened more interest in fish stocks and catches in the North Sea and adjacent waters. Today research for the benefit of the fishing industry is one of the main activities of the I.C.E.S. Another result of the greater interest in the work of I.C.E.S. was that advice on certain measures concerning fisheries was tendered to member governments.

Thus some years ago, the I.C.E.S. recommended closing the Faxa Bay of Iceland to the fishing industry, because this bay was considered to be one of the most important breeding grounds for round fish. This advice was not followed, but later the Icelandic Government used some of the Council's arguments in the application of measures in the interest of the protection of fish stocks round Iceland.

In the years between 1920 and 1930 everything went well. Economic progress gave the impression that the alarm concerning any danger to the North Sea fish stocks had been sounded too early and there was little, if any, preparedness to make arrangements for exploitation in the various countries' joint interests. True, the work within the I.C.E.S. was continued regularly and improved but, being a scientific institute, the I.C.E.S. could not as yet induce the participating governments to adopt far-reaching solutions on behalf of fisheries.

When, about 1929, the economic depression began to make itself felt, other national preoccupations superseded the striving for international co-operation in North Sea fisheries. As the depression became more serious, the difficulties in the fishing industry increased. National solutions were sought in price and supply regulations, but it soon became clear that the yields of fishing activity were gradually declining. The industry tried to meet the decreasing returns by more intensive fishing, but landings were not increased by fishing longer and with heavier material.

In 1937 an attempt was made on the initiative of the United Kingdom to reach international agreement in fishery, but although the majority of the countries fishing the North Sea agreed to meet for this purpose, there was not enough

support for the initiative.

It has long been known that the North Sea possesses one of the largest fish stocks of the waters in the Northern hemisphere. Increased prosperity in the years after 1918 created greater demand for the consumption of seafood, while conditions were favourable for the extension of the fishing fleets, such as replacement of sailing vessels by steamers, better fishing gear and the introduction of icing of the fish caught, as well as better transport by land.

The compulsory restrictions of fishery during the two World Wars, as well as the experience gained in the years of depression, strongly promoted the striving for international consultation, as the statistics clearly showed that too heavy demands were being made on the North Sea fish stocks.

This is, in brief, the course of events which led to the conclusion of the "Convention for the Regulation of the Meshes of Fishing Nets and the Size Limits of Fish" in London in April 1946. During the years of the Second World War the idea which had been put forward in 1937 was not forgotten and when the British Government invited the governments of North-Western Europe to give their support to a convention for the preservation of a sound fishing industry in the North Sea and adjacent waters, they were in principle prepared to do so. That it took much pains to embody the diverging views and interests in one convention will be clear from the following points.

The countries round the North Sea have different fishing techniques, do not all fish on the same fishing grounds, have territorial fishery interest and emerged unequally from the war. One major fishery power, Germany, was not immediately admitted to the first discussions.

It is understandable that each country first wanted to regain its 1939 fishing level before making any concession.

The enormous progress in the technical field during the war years had not yet found application in the fishing industry. Such apparatus as the floating trawl, the echo-sounder and asdic were still unknown to fishermen. Nevertheless, the countries were prepared to enter into an agreement which could make a contribution towards rational fishing of the North Sea and the waters round Iceland and along the Norwegian coast.

The Convention was concluded in 1946, but its ratification took many years. The first acceptance by a Government was made on 1 July 1946, the last on 5 February 1953. Although Article 14 of the Convention provided for the possibility of making it effective for such countries as had ratified it in time, there was little preparedness to do so and parties had to wait until the last ratifications. The first meeting of the Permanent Commission (Article 12) charged with administration was then held without further delay in London, in September, 1953.

At this first meeting serious problems soon arose. Article 12 of Part III "The Constitution of a Permanent Commission" provides in paragraph 10 that "the contracting governments undertake to give effect to any recommendations of

the Commission for the extension or alteration of this Convention which has been carried unanimously at a meeting of the Commission and accepted by all contracting Governments not represented at the meeting".

The preamble limits the Convention to "(a Convention) for the regulation of the Meshes of Fishing Nets and the Size Limits of Fish", which means that paragraph 10 of Article 12 only applies to the mandate of the Permanent Commission as limited in the preamble. At the first meeting of the Permanent Commission it became clear that, for the time being, the commissioners did not wish to go further but would first await the effects of the measures envisaged by the Convention, largely in connection with controls and sanctions applied by the various countries on a national level.

After 1954 the various countries made statutory regulations for enforcement, but control presented many difficulties. Most fishermen waited until the Convention came into force before purchasing nets of the prescribed mesh. In some countries a period of 6 months was conceded to use up the old nets, in addition to the 12 months' transition period provided for by the 1953 protocol. But after these 6 months the next meeting of the Permanent Commission became imminent, and this meeting had power to alter the mesh, if it thought fit to do so.

At the meeting in May 1955 it became clear that the established regulations needed to be altered in the light of fishing practices. Denmark, for instance, requested a concession for the landing of undersized whiting as an additional catch of a newly developed fishery for immature herring as raw material for the fish meal industry. In view of the multilateral character of the Convention such a concession would have to apply alike to all participating countries.

But even more important was the proposal to make a distinction in the mesh for light and heavy trawls. The fishing industry holds the view that, given equal mesh, the selectivity of light trawls is more unfavourable than that of heavy trawls, notably for the species whiting and sole.

Paragraph 5 of Article 12 provides that "It shall be the duty of this Commission to consider whether the provisions of this Convention should be extended or altered. For this purpose the Commission shall where practicable consult the I.C.E.S."

As a result of the discussions in the Permanent Commission the advice of the I.C.E.S. was sought on the possible introduction of a smaller mesh than the one prescribed by the Convention and the possible admission of a specified percentage of undersized whiting with the herring catch for processing into fish meal.

The I.C.E.S. requested several fishery research institutes to collect information on how the catch is affected by the size of mesh in light and heavy trawls. This at the same time raised the question of what is meant by light trawls.

On the advice of the I.C.E.S. it was provisionally provided that, until 4 April 1957, the mesh for trawls should be reduced to 75 mm. and for the seine

to 70 mm. for the area where the 80 mm. mesh was provided for, while until May 1958 the additional catch in industrial herring fisheries might contain not more than 10 per cent undersized fish of the protected species.

Further difficulties arose with regard to measuring the size of mesh. Annex I of the Convention prescribes the measuring of the mesh as follows: ".... the minimum size of mesh for nets referred to shall be such that when the mesh is stretched diagonally lengthwise of the net a flat gauge (80, 75 or 70 mm.) broad and 2 mm. thick shall pass through it easily when the net is wet".

The term "passing easily" is hardly objective and cannot therefore provide a good yardstick for control. Besides, there are a great many nets in use which have not been manufactured mechanically in a factory, but by hand. A certain deviation from the average minimum size is hardly avoidable. A second question is where to measure the meshes and how many of them to get a real picture. All these matters had not really been raised before the Convention was given effect and the number of questions became greater than was expected.

An even more astonishing experience was that even fish can be measured in different ways, for instance, from tail-end to top-nose or from tail-root to gills. It is hardly to be believed that in scientific circles such simple questions may give rise to variations which make all but impossible the comparison of material to the collection of which much trouble and time has been given.

It should not be concluded, however, that there is now less preparedness to co-operate to secure the aim of the Convention than was the case in 1946.

In June 1954 the Federal German Republic acceded to the Convention so that the regulations for the enforcement of the Convention then became effective for German fishermen. It is understandable that the German commissioner too had some critical remarks. Amongst other things, he pointed out that in the shrimp fisheries for shrimp drying plants additional (second) catches are unavoidable, namely catches of sole and dab which belong to the species that are under protection of the regulations of the Convention.

The foregoing remarks on the difficulties in the application of the Convention do not apply equally to all participating countries and, in fact, do not apply to some at all. The difficulties mentioned, such as the measuring of the size of mesh, the additional catches of undersized protected fish in the fisheries for the fish meal industry and the temporary fixing of a smaller mesh for the trawl and the seine, arose from the first practical experience with the Convention. Other difficulties are also to be expected in connection with the endeavour to extend the character of the Convention.

The above-mentioned technical difficulties can be met by research. On the advice of the I.C.E.S. it has now been laid down what is to be understood by a light trawl, namely, a fishing gear which is not made of sisal or manila twine and is, besides, singly braided. So when materials other than sisal or manila have been used for the braiding of fishing gear, this gear is a light trawl (which for the time being must have a minimum mesh of 75 mm.).

It is possible to construct an apparatus which objectively measures the exact size of mesh.

On the other hand, it is far more difficult to fix the size of mesh most desirable for rational fishing as well as the right minimum length of the fish.

There is, indeed, a close correlation between the sizes of mesh and minimum size of fish, but simultaneous increase of the minimum size of fish and the size of mesh will not always lead to rational fishing. When marketable fish are not caught, these fish may sometimes be lost for future market supply, for when fish remain unnecessarily long in the sea, the chances of loss through causes other than catching increase accordingly.

As a result of the discussions in the Permanent Commission this biological problem is at present the subject of extensive research.

To this end the Permanent Commission in 1955 appointed an ad hoc committee of fishery biologists which was charged with the task of giving further advice in close contact with I.C.E.S. and I.C.N.A.F. on the problem concerning mesh size and minimum size of fish.

The remarkable thing in the short history of the Permament Commission is their repeated appeal to the advice of scientists. Although this may seem to retard progress, the result will be that objective, acceptable directives are issued. This is essential, because the representatives of the Governments in the Permanent Commission regularly consult with the organisations of their national fishing industries. As each country has made great investments in its sea fisheries and related industries, there may be a tendency to see the national viewpoint as the only right one.

Outsiders may thus get the impression that the 1946 Overfishing Convention, concluded with so much goodwill, is being intentionally neglected by the participating countries. Yet this is not the case. The idea that one country should not profit at the expense of another is of great importance and there is also a general feeling that the territory now covered by the Convention should, in the interests of the countries concerned, be divided into regions which should be more or less autonomously regulated, as is the case in the I.C.N.A.F. organisation. The following illustration may make this clear.

The fishing fleets of Germany, the Netherlands, Belgium and France catch herring and mackerel with the herring or mackerel trawl. The English fishermen use mainly drift nets for herring fishery, and the Norwegians catch their herring chiefly with the purse seine. The fleets of these nations do not normally visit the same fishing grounds in the same periods, though this happens sometimes.

When the present Convention was discussed at the 1946 meeting, production conditions were quite different from those of a few years later. A few figures may illustrate this.

TABLE VI. 1.

European Sea Fish production in 1952 in thousand metric tons on a landed weight basis.

	Pre-war level	Present level
Total output	5450	7000
For human consumption	4490	5370
Difference	960	1630

It is not within the scope of this paper to give a breakdown of the catches. Suffice it to say that the catches of herring and mackerel have strongly increased after World War II, amongst other things owing to the intensive use of the improved herring trawl, the application of echo-sounders, and the use of faster ships.

The heavy fishing of the herring stock is at present independent of any regulation of the Convention as regards minimum length of fish and minimum size of mesh. There is now a growing disposition to consider whether the time has not arrived to take steps in the interest of the herring and mackerel stocks.

The problem, however, is a complicated one, partly owing to recent developments in these fisheries. Before 1940 it was a seasonal industry, practised in the months of July, August and September and some further weeks in the English Channel. Drift net fishing for herring was operated in the months of June to December inclusive. Nowadays herring trawl fishing and, as far as possible, also mackerel fishing, go on for almost the whole year. The nets used for this purpose rightly have a small mesh.

Articles 5 and 6 of the Convention concern the sort of nets a vessel may carry on board and Article 6 specially provides that "vessels fishing for mackerel, clupeoid fishes, sand eels, smelts, eels, great weever, shrimps, prawns, nephrops or molluscs may carry on board and use nets having meshes of dimensions less than those so specified: provided that (a) any fishing instruments used by such vessels for the capture of any of the fish described in this Article shall not be used for the purpose of capturing other kinds of fish; and (b) any fish in excess of the percentage set out in Annex III to this Convention, of the species set out in Annex II to this Convention, which may be captured by such instruments and which are less than the minimum sizes prescribed in Annex II to this Convention shall be returned to the sea immediately after capture".

The use of small-meshed nets for the capture of herring or mackerel is not contrary to the Articles of the Convention. But now herring fishing goes on almost throughout the year, the herring shoals are not equally compact all through

the year, and herring shoals, large and small, are now detected by means of the echo-sounder and, in the near future, of the asdic. When herring is hunted by haddock or cod, these can be caught along with the herring. Herring or mackerel fishing is most remunerative for big trawlers with sufficiently strong engines. It is clear that the additional catch is thus caught mainly with nets not intended for the purpose of catching cod. This means a contravention of the Convention and fishermen are well aware of this. The difficulty is, however, on the one hand, to prevent this form of contravention and, on the other hand, to prove it a contravention.

There have already been some unilateral interpretations of the multilateral Convention measures to meet the difficulties experienced in practice, but this is not a solution in accordance with the aim of the Convention. The fixing of a required percentage of herring or mackerel in the landings to prove that these species have indeed been fished for, is not satisfactory, as one voyage may yield the required percentage and another may not. It is also possible to fix a different percentage for specified months of the year when herring and mackerel may be scarce, but this is not very satisfactory either because in one year there may be very good catches in January and not in the next year. This also applies to mackerel.

Moreover, there is Annex III of the Convention which reads: "In the fisheries set out in Article 6 of this Convention 10% by weight of each landing or part thereof which is not intended for human consumption in the form of fish may consist of undersized fish of the species set out in Annex II to this Convention."

The herring fishermen for the fish meal plants have got their escape clause and the fishermen who fish for catches for direct human consumption are of the opinion that they may expect something similar. They do in fact have it to some extent already, since nobody can prove that their catches with small-meshed nets of protected species have been made intentionally. The fishermen who have vessels that do not lend themselves to fishing with the herring trawl now consider their interests prejudiced, because they have to catch the protected species with the prescribed mesh. Because their equipment is not suited for herring fishing with the trawl, they commit an offence if they make use of nets with smaller meshes than prescribed, while they can easily be controlled if they go out fishing with the herring trawl. It should, however, be said that the ships with less power fish mainly for flat fish and whiting. The larger mesh (75 and 70 mm.) which is required on these vessels has already produced good results.

The total catches are not yet bigger, but the average size of the fish caught has increased and this has favourably affected market prices. It may be remarked that the Convention benefits the near water fisheries, by a better assortment of the fish caught and by saving the young undersized fish. Nevertheless it must be admitted that the herring/mackerel trawls catch decidedly undersized round fish, which are lost for reproduction because these fish die after staying in the cod-end for some hours.

The difficulties present themselves both on the national and the international level and the present Convention does not provide an effective solution.

Another problem is the present limitation of the area covered by the Convention. The southern boundary is a latitude of 48° North, which is a little north of the coast of Brittany (France). The fishermen living south of this line are not tied by the regulations of the Convention and this involves the French fishery authorities in conflicts. The French fisheries organisations have, on some points, serious objections to the provisions of the Convention - amongst other things, to the minimum sizes of some fish species and the mesh of trawl nets.

Since both Spain and Portugal are also members of the Convention it is logical that they should try to conclude a separate Convention with France with autonomous regulations suitable for the area which is prevalently fished by their fishermen. They do not intend to do so, however, without the consent of the present Permanent Commission. They wish to solve their difficulties in consultation with the Commission.

Another problem is the rapid development of the Danish fishery for young immature herring as basic material for the fish meal industry. This fishery was started after 1950 and now catches of about 200,000,000 kg. of herring per season are landed. An enormous quantity of immature herring is taken in this manner, but what the effect will be on the herring stock cannot yet be said; this point too will have to be studied further. The Danish Government has declared its willingness to put some check on the extension of this fishery for industrial purposes, but it will take some years before the effect of this fishery on the herring stocks in the North Sea will be known. The present development will certainly be closely watched, as in several fishing countries the herring and mackerel fisheries account for more than 50 per cent of the total sea fishery output (in Germany, Norway, Scotland, the Netherlands, Poland).

So far the Permanent Commission has held 5 meetings and consultations are going on to replace the present Convention with its patent defects by a new one better able to safeguard the important North Sea fishery against such a decline that recovery will not be possible at all, or at least not in sufficient measure.

In their present difficulties the participants in the Convention are not blind, for instance, to the splendid results of the halibut convention between the U.S.A. and Canada. It should, however, be borne in mind that an agreement between two interested countries on fishing for one species is simpler than an agreement on North Sea fisheries. Not only is the number of fish species far more numerous (cod, haddock, hake, plaice, witches, lemon soles, soles, turbot, brill, megrim, whitings, dabs are already protected, and further, herring and mackerel), but so is the number of participating countries (now 13). Fishing interests also diverge widely from country to country. If we consider that Norway is enormously interested in herring and cod, Iceland in cod and haddock as well as herring, Germany in rosefish and herring, England in all kinds of roundfish, the Netherlands in herring and flatfish (plaice and soles), Scotland in whitings, we can see that the situation of the fisheries in North-West European waters is complicated. It is, indeed, little short of a miracle that the member countries succeeded in unanimously passing the present Convention. That further development of existing co-operation is now seemingly held up is due to no relaxed

interest of the members of the Convention. The putting into operation of the 1946 Convention has given rise to problems to which the best solution has not yet been found, but the parties are prepared to look for it co-operatively and on objective, scientific lines.

All this was clearly confirmed at the 5th meeting of the Permanent Commission, which was held in May last. At this meeting the report of the ad hoc committee on the effect of the size of mesh and on the catch of fish was presented. This highly expert and scientifically well-documented material is, however, not easy to read, and it was therefore resolved that in each country an abstract of this report should be submitted to the industry so as to enable fruitful discussion.

The report is clearly in favour of a larger mesh for trawlnets and even envisages a mesh upwards of 80 mm.

As it will take some time before each country has formed an opinion on this report, it was resolved to extend by one year the period during which it is allowed to fish with trawls with a 75 mm. mesh. It was necessary to pass this resolution because otherwise the 80 mm. mesh regulation would automatically have taken effect in April 1957.

The report just mentioned may even lead to a larger mesh than 80 mm. and it is not a wise course to change the mesh regulations at too short intervals, as this is very costly and inconvenient.

Another important resolution taken during the last session of the Permanent Commission was the appointment of an adviser, whose task it will be to investigate, at the request of a government, the application of the Convention in the country concerned and to report thereon to the Permanent Commission. The Government of the U.K. has invited the adviser for such a visit and it may be expected that other countries will follow suit. In this way it is hoped to promote a more uniform application of the Convention and to gain better insight into the problems of the governments that adhered to the Convention.

The problem of the mixed fisheries, i.e. the use of herring/mackerel trawls, will now be studied by an ad hoc committee in which those countries which are faced with this problem are represented. At the meeting of the Permanent Commission no proposals were made which could solve this difficulty and it is not yet to be foreseen in what direction a solution will be found. The fact, however, that there is willingness to overcome the difficulties is an indication of the goodwill of the Commission. Probably some research will have to be done before soundly-based advice can be put before the plenary meeting of the Permanent Commission.

All this requires time and patience. The members concerned are, however, aware of the fact that they are charged with the responsibility for a very important source of food and means of subsistence and that too narrow a conception of their task may be fatal to all. The fishing industry shares this view but, of course, reserves the right of protest if its interests should be injured through partial measures.

DISCUSSION

The paper was introduced by SCOTT GORDON. He said that he had no personal experience of the North Sea fisheries, although anyone familiar with fisheries literature must know the North Sea case. Consequently, he intended to eschew matters of detail and confine himself to general principles. There was general agreement that the North Sea case was very interesting on account of its extreme complexity; it was a problem involving both many species and many countries. Even to understand the biological and economic relationships was difficult, and to propose control measures was even more so. Nevertheless it was a test case in control. More than one nation exploited the resource, and yet agreement had been reached. This made it of special interest to all concerned. SCOTT GORDON then raised a number of general questions:

The time-pattern of population fluctuations in the North Sea was determined by the biologists, but if one looked at the times at which people began to worry about fish stocks, it was difficult to believe that the concern was in fact due simply to fluctuations in the fish stock. If so, there was also a remarkable relationship with the business cycle which needed explaining. This was also true of other fisheries; worry about fish stocks came with depression. There was need for much more disentangling of the economic and the biological arguments. In Canada many measures, apparently biological, did have income and other economic problems behind them. Was the North Sea another instance of this?

The North Sea looked like another common property problem - over-exploitation by the industry in economic terms. Similarly, it appeared to be a case of inadequate control. The only method used was the size of mesh, and he did not think that this was of long-run benefit to the fishermen or to the exploiting nations considered as a whole. But it had to be recognised that mesh size was a very special method of control. All other attempts at control by altering the types of gear used substituted an inefficient for an efficient method. This was almost universally true of legal restrictions on types of gear, but it was not true of mesh size regulation, because fishermen tended to use meshes smaller than the economically efficient size. A larger mesh was both selective and easier to draw. Mesh regulation had consequently to be treated as an exceptional case.

Most regulation (of all types) of fisheries, even if it would benefit fishermen in the long run, did not do so in the short run; it was necessary to wait in order to gain. This was true both collectively and individually. Mesh regulations were peculiar in that they gave a short-run benefit both to the individual and to the group; all could catch more or the same quantity of fish as before. In the long run, there are reasons why the gain disappears and individual fishermen have an incentive to return to a smaller mesh. In the short run, therefore, fishermen can be got to agree to larger meshes. Later, the age-distribution of the stock is so altered that fishermen want to return to the smaller mesh again.

The paper raised another question deserving general consideration; that of combined fisheries. These were areas containing many species, so that it was not possible to fish with special gear for one species. In fishing for herring,

fishermen caught cod and whiting illegally, and this could not be prevented. Combined fisheries made control by the North Sea method, by special regulations for groups of fish, very difficult to enforce. He (SCOTT GORDON) would suggest that the appropriate scope of study was not the species but the ecology; an area with a fairly complete ecological system. What was required was not a study of cod and an isolated discussion on how many cod to catch, but consideration of the whole catch with a view to determining the optimum combined population and the optimum types of gear for catching all together. SCOTT GORDON did not know how to undertake such a study, but he did not think much progress would be made by considering individual fish and types of equipment as was done in the North Sea. Such a procedure was only valuable as a means of introducing nations to the idea of control.

CRUTCHFIELD asked if LIENESCH had any actual evidence of over-fishing. Were there any statistics? What was the nature of the over-fishing?

LIENESCH said that he agreed with SCOTT GORDON's ecological approach. But it was full of practical difficulties. In reply to CRUTCHFIELD, the International Council for the Exploration of the Sea had compiled statistics which showed a fall in catch per number of hours fished. This gave some indication of a fall in the return to fishing effort because stocks did not recover. No stocks had in fact disappeared in the North Sea, but modern techniques had so improved that it was possible to analyse landings, compare successive years, and draw inferences. In reply to CASSADY, LIENESCH said that an effort was made to eliminate other variables, but it was a question of evidence and the possible degree of scientific proof.

BOWEN said that he proposed to begin a controversy. SCOTT GORDON and LIENESCH were more in disagreement than had yet appeared. In his own paper, SCOTT GORDON had attacked the halibut convention while LIENESCH referred to its "splendid results". What were the reasons for the difference? This was not entirely clear, though they were obviously very big and concerned with the approach to the problems. SCOTT GORDON had distinguished between the general welfare purposes and the economic purposes of control. He had said, for example, that he might use restrictions on strictly economic grounds, but he considered the short-run problem only; there was no consideration of the possibility of the fish stock running out. SCOTT GORDON had also remarked on the harmful effects of inefficient methods. He (BOWEN) would agree for the short run, but in the long run there were off-setting gains - the fishermen could fish next year. This was important and should be considered.

VAN DYK was unable to understand SCOTT GORDON's argument that there might be short-period advantages but not long-run ones. In the long run the fish grew and a heavier weight could be achieved. Mesh size control led to a fall in cost of fishing because the larger size of mesh affected such items as fuel costs, but the quantity of fish taken would decline, especially at first. After 3-6 years, the weight of the catch might not suffer with mesh regulation, so that there was a better catch with lower costs. Was it necessary to condemn mesh regulation if it was in line with the spawning possibilities of the fish? The method had less unfavourable consequences than SCOTT GORDON suggested.

CRUTCHFIELD commented on the apparent contradiction indicated by BOWEN. The halibut and North Sea cases were different. CRUTCHFIELD himself and SCOTT GORDON would both oppose LIENESCH on halibut, but not on the North Sea case because the degree of the undesirable effects was much smaller. On VAN DYK's argument, CRUTCHFIELD agreed that there would be an initial increase in large sizes, but then SCOTT GORDON's entry effect would begin. Unless entry was somehow restricted, new fishermen would come in. Hence, without regulation other than mesh size, SCOTT GORDON must be right about the desire to return to smaller sizes, but he (CRUTCHFIELD) thought the method was still a good one, despite its long-run consequences.

SCOTT said that CRUTCHFIELD had anticipated his comments, but he would like to put the position in his own words to ensure that he had understood it. Earlier, they had not accepted CASSADY's suggestion of analysis in terms of a short, medium and long run. But in the present instance they did have three runs. Firstly, bigger nets etc. might bring immediate savings which could offset the smaller catch. VAN DYK and LIENESCH had both disagreed with this; catches would not be bigger in the short run. Secondly, the middle run would be determined by the growth in the size and age of fish and not by new entry. In this run the whole fishery was better off because the fish were bigger and their value higher. In this situation all (including SCOTT GORDON and VAN DYK) were agreed that it would pay individual fishermen to reduce mesh size, but would be in the general interest to have regulation, as all would benefit from it. Thirdly, in the (Marshallian) long run, the common property problem appeared. New entry might compete away the gains. LIENESCH seemed to have agreed about this in his earlier comments. Was this an accurate statement of the position?

TURVEY asked for comments on the three "runs" suggested. GERHARDSEN said that he would have liked to have available the biologists' reports referred to in the paper. He believed that these did distinguish something like the three runs described. They computed the reduction in catch by species after the mesh size increase, then the time taken for recovery to a point at which the earlier weight was being landed with the same or less effort. After this came the long-run considerations. He would accept SCOTT's thesis except for the possibility that the fleet might increase very quickly - possibly within one year. There was also the possibility that boats might do more trips. He thought that the immediate effect would include more intensive fishing and this should not be ignored. Freedom of entry and the fact that there was no limit to the catch were both important, as was the possibility of North Sea fishermen moving into other areas.

LIENESCH thought that there would be a stimulation of boat-building; such activity would increase quickly when catches improved. Such investment was undesirable. Other regulations would therefore be needed in the long run. But the North Sea situation had such complexities that it had taken eight years to get an accepted Convention, and adjustment was also likely to be protracted. In the meantime, countries would need to watch the increase in fishing effort carefully in the long-run interests of fish stocks. In his view, the time had already come for some kind of control. This was not easy because control stifled enterprise. Since there were also the general problems of agreement between countries, the difficulties were formidable.

In reply to TURVEY, SCOTT GORDON said that he could not improve the formulations of SCOTT and CRUTCHFIELD. It had been recognised that in the long run there was a possibility and probability that inputs would expand unless entry was closed, and that the gains on the revenue side could therefore be dissipated on the cost side.

TURVEY said that, in sum, the long-run effect with entry would be more fishing boats catching more fish with the level of remuneration of capital and labour in the industry much as before. SCOTT GORDON added in clarification of this that the economist, unlike the biologists, was clear that the objective was not to benefit the fish, or the biologists, or the fishermen, but the economy. TURVEY then suggested that it followed from his statement of the position that, since more fish were caught, the price of fish would fall. Other things being as before, the consumer must gain. Thus the regulation must be beneficial.

BJÖRNSSON agreed with SCOTT GORDON that the aim was to benefit the economy. Even if a biological optimum existed, was it of interest to economists? But, to quote Scitovsky, welfare depended on efficiency and equity. Agreement on policy became difficult once equity considerations were admitted: attention could be drawn to the poverty of Icelandic fishermen and so on. It might therefore be preferable to concentrate on the efficiency issue, though this might prove impossible in the event.

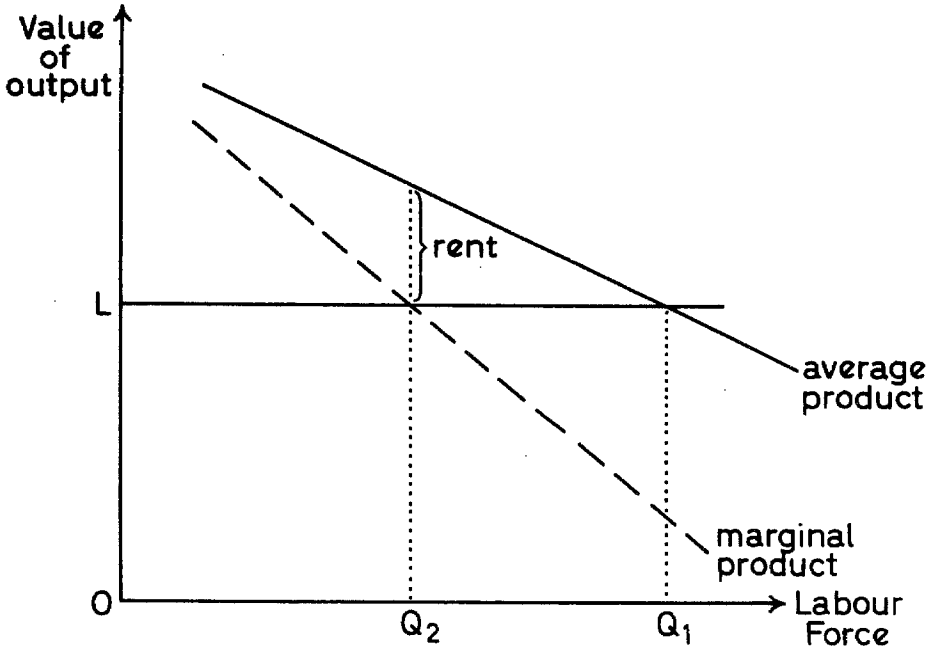


Diagram VI.1.

BJÖRNSSON said that a Danish economist, Jens Warming, had expressed views similar to those of SCOTT GORDON and SCOTT, arguing that it would always pay to limit fishing in order to raise marginal productivity to that in occupations such as agriculture in which there was private ownership. Diagram VI.1. treated the problem in terms of labour costs. Without control, the labour force

would be OQ_1, where average product = opportunity-cost wage OL. The "optimum" would be OQ_2, where marginal product = opportunity-cost wage. The excess of price above marginal product would be a "rent" of the common property resource, and the marginal product in fishing would be similar to that elsewhere.

TURVEY said that this helped in putting the question in another way. It could be argued that the North Sea scheme gave net benefit, although it would not produce an optimum situation. The SAC curve in his diagram III.5. would be shifted and an improved equilibrium situation, though not an optimum one, would result.

In GERHARDSEN's view, the North Sea problem needed to be considered in historical perspective. The Danes and Swedes had been making good profits by landing catches in England, at a time when English fishermen were making losses. In order to help the inefficient English fishermen, loan, grant and subsidy schemes were introduced. These were now having a considerable effect on entry and in keeping the marginal fishermen in. British boats were also becoming less inferior to Danish and Swedish. To measure the effects of control, it would be necessary to try to envisage a situation in which there were no subsidies and products could move freely. In such a situation there would have been a considerable decline in North Sea fishing by Great Britain, similar to that which had occurred in Norway.

GERHARDSEN also said that he agreed with SCOTT GORDON as to the benefits of the control to the economies concerned. But how to define such benefits? For his own country, the aims were:

(1) An indefinite supply of fish from the North Sea. Long-distance trawling was no substitute; the types and qualities of fish available were wrong.

(2) The desire to provide a fairly stable level of employment for fishermen. The long-run undesirability of a subsidy was agreed, but it was essential that fishermen should be able to do some kind of forecasting of prospects.

(3) The consumer wanted fish as cheaply as possible. There was a conflict of quality and price, since long distance trawling could provide cheap fish. Consumers must expect to pay something extra for the better North Sea types and for the assurance of continuity in their supply.

In relation to LIENESCH's evidence of over-fishing, GERHARDSEN pointed out that Pettersen, a Danish biologist, had referred to the reduced profitability of North Sea fishing and the probability that this was due to over-fishing as early as the 1890's.

SCOTT took up the discussion of the third type of "run". He agreed with GERHARDSEN that it could be quite short in some respects. He also agreed with TURVEY that there would be a fall in the price of fish, and referred to the point made earlier by ZOETEWEIJ (Paper II) when discussing common property, that the detrimental effects of new entry depended on the slope of the marginal productivity curve. Did LIENESCH believe that the new increase in effort stimulated by greater profitability was going to be such that the fish caught could have

been obtained with less inputs?

LIENESCH replied that it was too soon to give an answer. His own belief on the evidence to date was that a unit of effort would bring less and less return.

CRUTCHFIELD said that he would try to pull the discussion together in order to answer TURVEY. The difference between the halibut scheme and the one under discussion here was a matter of degree. The halibut scheme simply prevented increases in output. The North Sea scheme did not, so that there was a possibility of some increase in output and a gain to consumers. A part of the gain would be dissipated by entry, and sooner or later it would be necessary to check entry and hence to introduce new controls. At this stage TURVEY began to be right.

SCOTT GORDON referred to two points raised earlier. Firstly, he did not deny BOWEN's proposition that there might be long-run net benefits to the fish stock from fishing regulations, but if the aim was to restrict output, means other than forcing the use of inefficient methods were available. If these means were used, their population effects could be equally good. Secondly, CRUTCHFIELD's initial enquiry about the statistics on over-fishing was relevant to all later discussion. Biological estimates of population changes were carried out by expressing the catch of fish per unit of fishing effort as a function of the fish population. That is,

$$\frac{C}{E} = \underline{f}(P)$$

A change in the population would cause a change in the catch per unit effort. This formulation, however, demanded heroic assumptions, for example:

(1) That population was not a function of any other variable factor.

(2) That catch per unit effort was a <u>linear</u> function of population, and that there were constant average returns to fishing effort, population being constant.

(3) That effort was homogeneous and could be measured.

GERHARDSEN objected that SCOTT GORDON was over-simplifying. Biologists were much less simple in their approach, and took mortality and other influences into account. It was a pity that the recent biological literature had not been taken into account.

A biologist in the audience, Dr. BROWN, was invited to explain the biological approach. He said that biologists studied equilibria and shifts in them. Decisions about "undesirable" equilibria were a matter for economists. He supported GERHARDSEN's view; biologists developed their models to illustrate all relevant or possible factors. The models were quite complex and did try to take care of the kind of problems raised by SCOTT GORDON.

TURVEY pointed out that SCOTT GORDON was only concerned with quantified models, which might be much cruder than the theoretical models.

SCOTT GORDON said that the central point was that any species (say haddock) was in an ecological environment with other species. It was notionally possible to write a very large set of equations expressing all the relations between the species. From all this, the equilibrium population of haddock could be derived: $P_H = X$. Then a new predator could be introduced, man; and the new equilibrium would be lower than X. But this approach assumed that without man the equilibrium would be stable. Suppose this was not so. Suppose the situation was as in diagram VI.2. Then it was not certain what effect the new predator would have. This seemed to be true even if the refinements mentioned by GERHARDSEN were admitted. He (SCOTT GORDON) thought man a fairly negligible factor, and was consequently not convinced that there was ever over-fishing.

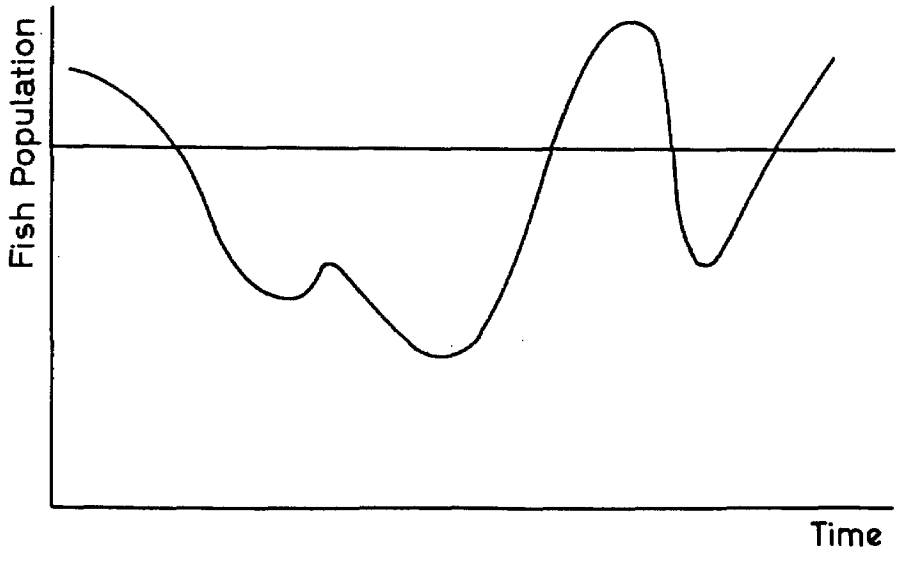


Diagram VI.2.

CRUTCHFIELD thought that SCOTT GORDON's remarks on the effects of human predation contentious. The supposition that predation was slight might be true for many species but would not always be valid. Man could make a very big difference in the case of slow growing, immobile and concentrated species such as halibut and possibly haddock.

ZOETEWEIJ asked if the long-term "entry-effect" was not more complicated than TURVEY's argument had suggested. The TURVEY proposition supported the view that mesh regulation would lead to an improved situation but not an optimum. But it might produce instability, under conditions of free entry, because of its effect in increasing the fish stock. In the first stage, over-fishing existed with average and total yields falling badly, with a consequential exodus of fishermen from the industry. When mesh size regulation was introduced a second stage would begin with more fish surviving to produce more offspring so that population would cease to fall and actually rise. Thus total and average yields would increase and as a third stage fishermen who had moved out in the first stage would move back. So over-fishing would start again and the cycle recommence. TURVEY said that he could not see why this need be so. He then presented a development of his earlier diagram, in order to sum up the argument and comment on ZOETEWEIJ. The biological assumptions he would make were his own and not

SCOTT's. In diagram VI.3. the demand and cost curves were the same as before. SAC = private MC = the supply curve (in the long run stationary equilibrium when landings and the fish stock were in equilibrium). In uncontrolled conditions, the market equilibrium would be at 1. It was agreed that 2 was better. A tax equal to the difference between the two curves (SAC and SMC) could be used to get the change. Instead, mesh regulation was adopted. This lowered the cost curves (SAC_1). If output was then stopped at the original level of OT, unit costs would have been reduced from 1 to 3. This was a clear gain: the same weight of fish obtained at less cost. Free entry would cause a shift to 4. This was not an optimum, as SMC was greater than price. The optimum would be 5. TURVEY therefore argued that the effect of mesh regulation was a movement from 1 to 4, and that this raised the sum of producers' and consumers' surplus. (If licensing had been used, the movement would have been 1 to 2 - once again an improvement.) 1 to 5 would be better still; this required mesh regulation plus a tax or licence. As to 4 and 3, 4 would be better if a was greater than b.

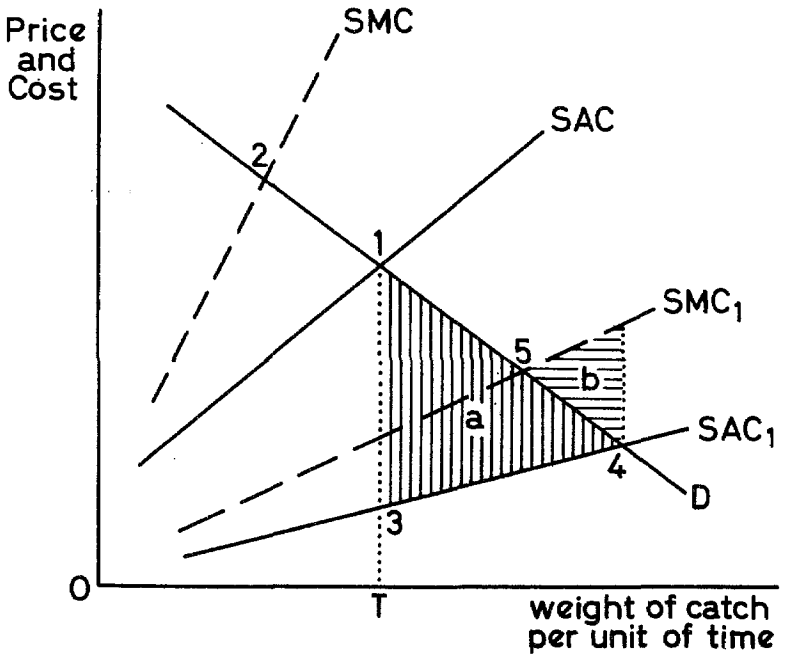


Diagram VI.3.

SCOTT GORDON asked if TURVEY's diagram VI.3. assumed that there were no price effects on input factors in the movement from 3 to 4. TURVEY replied that there were two reasons for a rising SAC curve: rising factor prices and effect of the rate of fishing on the stock of fish. POPPER asked why the curves showing the position after mesh regulation should lie below the others, and how far below they would be? In the North Sea, a bigger mesh brought technical advantages, but as the mesh grew these became less and less. TURVEY said that he had assumed that the North Sea mesh sizes were such that there were technical advantages to be gained by regulation. SCOTT said that the same conclusions could be reached by shifting the demand curve. TURVEY replied that he had followed earlier discussions in abstracting from changes in value per pound. POPPER and LIENESCH commented further on the assumptions made about mesh size.

POPPER pointed out that because of size preferences mesh size changes might increase or decrease the value of the catch per pound.

The diagrammatic formulation was accepted without further comment, and SCOTT raised some new points from the paper. LIENESCH had discussed the conflict of interest between the Danes, Spanish, Portuguese, French and others. It appeared to SCOTT that some of the conflict was of a kind described by GERHARDSEN earlier; it arose out of differences in national tastes for fish. Could this problem not be solved by freedom to land in each other's ports, the French selling their large sizes to Norway, all selling to the Norwegian reduction industry, and so on? Would this not be better than regulation of what countries could or could not do?

LIENESCH replied that SCOTT was proposing the economic integration of Europe. This was a very long-run proposition. The French and Spanish fished slightly different stocks. They agreed to mesh regulation, but their fish required that the actual mesh size should be different (e.g. the soles were rather smaller on the French fishing grounds) because of the need to divide the fishing by area. But it was not quite clear how the southern and northern areas were separated, which made agreement between the northern and the southern countries difficult. In respect of landings, it had to be recognised that countries wanted to keep their markets accessible to their own fishermen.

SCOTT then turned to inadvertent catching. Both LIENESCH and SCOTT GORDON had referred to this; the latter had argued from it that there was need for ecological study. SCOTT did not wish to deny the facts, but he wondered if inadvertent catching was really large enough to affect conservation? Or was it a problem of equity; some could get away with it, others not? both questions were serious, but the second was clearly less so than the first.

LIENESCH referred to the discussion of this topic by a committee of North Sea countries. They had found the effects of inadvertent catching to be much less than had been expected. New biological investigations showed the mixture caught by hand trawls to be a balance to the natural mortality of the second catch.

GERHARDSEN criticised the statistics of sea fish production in the paper. The statistics of pre-war and present landings included everything caught in Europe including the Mediterranean, and European catches in the Atlantic. Consequently, the statistics were not very relevant to the North Sea regulations. For example, one might think from them that the catch in the North Sea area had increased. This was not so; it was probably now near the pre-war level. LIENESCH agreed with the criticism. GERHARDSEN then turned to the references to over-fishing. In this respect, it was necessary to take note that the level of output had been fairly steady. It appeared that the over-fishing question had come up because demand had increased. GERHARDSEN also mentioned the Greenland cod fishery as an instance of a stock which was not over-exploited.

MACKENZIE said that the point of importance was that there were still vast areas of fish not touched at all. The net result of conservation in areas like the North Sea was unclear. There was a good deal of evidence that where

stock decline became apparent it was made good by expansion into other areas. An illustration of the possibilities was provided by the exclusion of the Japanese from North-West Pacific areas. Japanese catches were now larger than before the war, despite the exclusion, as a result of the exploitation of new grounds.

BOWEN asked LIENESCH how difficult the North Sea Convention was to implement? In the absence of any international body, policing by individual states must be necessary. BOWEN did not know how the Convention functioned in the North Sea itself, but he did know that fishermen operating out of South Wales found serious difficulties. A basic problem was created by the different interpretation placed upon laws and regulations in different countries.

LIENESCH agreed that lack of international control of enforcement was a source of weakness of the Convention. The Permanent Commission of the Executive of the Convention had accepted a proposal to nominate an adviser on inspection for the enforcement of the regulations. Countries would be able to give him information and invite him to visit them. TURVEY suggested that they should be able to ask the adviser to visit other countries, but LIENESCH was dubious about the practical possibility of this.

GERHARDSEN said that inspection had been a source of controversy in the control of whaling factory ships. Attempts to solve the problem by sending inspectors with the ships had often failed because the inspectors were of the same nationality and shared the fishermen's attitude to the regulations. There was a move to send inspectors of other nationalities, but many difficulties were being encountered.

GERHARDSEN also said that he agreed with SCOTT GORDON's correlation of the business cycle and worries about fish stocks for the North Sea. But the same might not be true of other areas or other fish. At present, for example, herring prices were being affected by an abundance of herring and by technical improvements; these were influences outside the ordinary business cycle.

VII. PORT MARKETS*

by Ian Bowen

INTRODUCTION

The present paper offers a brief survey of the existing organization, functioning and future prospects of port markets for fish, and is intended to discuss general problems of port marketing wherever they may arise. Reference is made to individual countries only by way of illustration. (1) The paper is divided into four sections, the first on the task of port markets, the second on selling methods and the commercial structure of the trade, the third on supply problems and costs, the fourth on future prospects, and on unresolved economic problems needing further investigation. Sufficiently accurate definitions of the terms used ("fish" for example or "port" or "market") will, it is hoped, become clear in the discussion - to attempt definitions here would unduly extend this introduction.

1. THE TASK OF THE PORT MARKET

1.1. Fresh fish, taken from sea or lake, has to be put on land, once the vessel transporting it has docked (or been pulled ashore), within a short time - ideally not more than a few hours - both because the fish is perishable and deteriorates soon in quality, and because of the costs that would otherwise have to be incurred for idle equipment and for intermittently employed personnel. Fishing vessels, on which perhaps ice but not low temperature refrigeration has been used to chill the fish, bring most of the world catch to land. The place of landing, most often a port, becomes a convenient place for a break in the chain of organization and also, in consequence, very frequently of ownership as well, although examples of both successful and unsuccessful attempts to integrate the two activities of catching and distributing can be found.

For these two reasons - the perishability of fish, and the specialized techniques of its procurement from the sea - most fresh fish caught in the world is sold, or at least changes ownership (having been contracted for in advance) at the ports soon after it has been landed. Since these general considerations apply to all fishing industries, it might seem sensible to anticipate, prior to a study of the facts, that all port markets display a basically similar pattern of organization, since their task (the commercial disposal of fresh fish) must everywhere be much the same. Such an anticipation can soon be shown to be incorrect, despite the likenesses that may be detected almost everywhere between the physical tasks of landing, and despatching inland, large quantities of fish.

The question of quality is crucial in marketing fish. It arises from

* This paper represents opinions reached at the end of a preliminary few months' survey of the industry. A more intensive study of British fish distribution is being carried out by Dr. R.A. Taylor, in the Department of Economics, Hull University, under my direction, with funds provided by the White Fish Authority.

(1) More data are readily available for Britain, France, Norway, Denmark, the United States, and Canada than for other major fishing countries, and this is the chief reason for any bias that may be detected in the illustrations, which have in practice been taken from "western" industrialized capitalist countries almost exclusively.

the perishability of the article, from the fact that it can easily be bruised or damaged, and from the great variability of size and condition of fish caught and landed. This gives rise to the commercial difficulty of sorting and grading the commodity adequately at each stage of its removal from the sea to the consumer, and of handling it both carefully and expeditiously. This, too, is part of the common problem of markets.

1.2. There are three reasons for the variety of means actually adopted in marketing. In the first place, fish landed is not by any means a homogeneous product, even from the relevant points of view. For example, there are differences in the marketing of herring, or other pelagic fish, and that of most demersal varieties. In Great Britain, herring happens to be sufficiently homogeneous in quality to be sold by sample, unlike the procedure for most sales of demersal fish in that country. In other countries, where the quality of herring in one catch (2) happens to be variable, selling by sample has either never existed, or has been tried and abandoned.

From a commercial - not of course necessarily from a zoological - point of view fish may be divided into three main groups: demersal, pelagic and crustaceans. Each of these has important (market) sub-heads - cod, other round fish and flatfish in the first group, herring, pilchards, menhaden, mackerel, tunny, etc., in the second, and various types of mollusc and crustacean in the third. In a full survey the different marketing arrangements followed for at least a dozen separate sub-groups would each need separate consideration. (3) Within each sub-group there are variations of size and quality.

The second point is that not only does the product landed vary, but its destination varies too; not all "fresh" fish landed is on its way to the fresh fish market. As Table VII.1. shows, only 41 per cent of the world catch was estimated to have been "marketed fresh" in 1954, and only some 27 per cent of North American fish. The rest went either into freezing, curing, canning or into some form of reduction into fishmeal or a so-called "by-product" of the industry.

Incidentally, the table shows that Europe "marketed fresh" 10 per cent less of its catch than did Asia. This was not due to any tendency to freeze a greater proportion of the catch, but was simply the obverse side of the fact that Europe sent a greater percentage of the fish caught to the various processors. In North America, by contrast, freezing, curing and canning absorbed 48 per cent of the total "round" fish caught. Hardly surprisingly, then, the marketing arrangements of the different areas tended to vary, both as consequence and cause of the varied end uses of the product.

In the third place, historical, geographical and general economic factors must, at any given time, play their part in determining the pattern of market organization actually to be found in any particular port - and since the

(2) Herring caught at a particular fishing ground will vary enormously in quality at different seasons of the year, and after processing may yield a different article – for example, three kinds of Dutch salted herring are called "matjes", "rolle" (full of roe), and "yle" (lean). See 16, p.68. (Numbered references are at the end of the paper).

(3) For a useful summary see 12, ch. 3.

TABLE VII. 1.

WORLD CATCH OF FISH, CRUSTACEANS, MOLLUSCS, ETC.,

For the World and Three Selected Continents

Live Weight Basis

Utilization	World	Per-centage	Selected continents					
			America, - North		Asia		Europe	
	Million m. tons	%	Million m. tons	%	Million m. tons	%	Million m. tons	%
TOTAL	27	100	3.25	100	5.29	100	5.92	100
Marketing fresh	11	41	0.88	27	2.62	50	2.35	40
Freezing	1	4	0.48	15	0.21	4	0.33	5
Curing	7	26	0.36	11	1.51	29	1.51	25
Canning	2	7	0.70	22	0.11	2	0.23	4
Reduction	4	15	0.76	23	0.82	15	1.40	24
Miscellaneous purposes	2	7	0.07	2	0.02	Ø	0.10	2
Offal for reduction	(1.5)	(6)	(0.34)	(11)	(—)	(—)	(0.70)	(12)

Source: FAO Yearbook of Fishery Statistics, Vol. IV, Part 1, Table 26, page 87.

NOTE: Data do not include aquatic mammals, for example whales, but cover both commercial and subsistence catch of of teleostean species, elasmobranchs, ganoids, crustaceans, molluscs, and other aquatic fauna and flora.

fish marketing pattern for any country is to a considerable extent the sum of the arrangements in operation in its particular ports, these factors have their effect on the national marketing pattern. Examples of these more general factors are the over-supply of merchants in ports for which the fishing grounds are no longer plentiful or for which the selling markets have disappeared; (4) changes in water access due to silting up of estuaries; or, in the economic field, the ratio of labour supply to capital, which enables an otherwise obsolete fishing technique to be carried on (such as the continued use of sail). The type of fishing that is most profitable in turn determines the market conditions. Or a country may need to export fish (its best comparative cost alternative), and so may consent to kinds of officially sponsored market quality control not tolerated elsewhere, as in some Scandinavian countries.

1.3. But to return to the common characteristics of all fishing ports - common despite the differences mentioned - there are several functions which they must perform. Whatever their size, fishing ports where fresh fish is landed need facilities for its landing, display, grading and sale (where required). The essential points usually are that the fish must be landed, shown and sorted. For this, there must be fishing port facilities.

Fresh fish usually has to be inspected by buyers, and always must be available at a place from which it can be readily removed for transport elsewhere, first for such processing as is required, then for despatch by road, rail or air. (5) Thus any place used as a fish dock must have some provision of landing gear, space for display, facilities for processing near at hand, and access. Requirements vary; for example, if fish is sold by sample, or by contract in advance, or after some processing such as salting or freezing at sea has taken place, the full process of display in a market may not be necessary before the fish passes to an inland market - if, on the other hand, more exact sorting is needed on the dock itself, as is done for Danish high quality fish, the dock facilities need to be greater.

The fish dock is usually the site of the port market, where such a market is required, for the reasons already given, and because of the heavy percentage of total fish weight to be divided to its various appropriate markets - offal to the fish meal works, fillets to inland buyers, best fish for freezing, worst for salting (or conversely), or whatever the divisions may be. The next stage of handling after fish has been landed is either by processors or by buyers who are either coastal wholesalers, (6) inland wholesalers, retailers, or institutional final consumers.

The coastal merchants themselves are often processors. They may or may not have their offices on the dock itself, and similarly their processing plants, but their actual first grading and buying operations are usually done there, or in premises nearby. Port markets are fish dock markets, with relative-

(4) e.g. the Welsh ports in the one case, whose fishing grounds have declined, or the German ports in the other (when they lost the East German markets).

(5) Air transport is used in Canada to a significant extent.

(6) Normally coastal wholesalers buy in the first instance and re-sell inland, but they sometimes re-sell to other coastal wholesalers; in some small ports retailers and other fish consumers buy direct from the fishermen.

ly few exceptions. For example, in Great Britain of 2,279 port wholesalers reporting to the White Fish Authority in 1952, some 1,426 had market stands; only 316 of them had refrigerated cold storage available; 361 (the figures are not exclusive) went in for quick or other freezing, and 558 for smoking and fish cake manufacture. All these minor processing activities would be carried out on the docks, or at premises situated as near as possible to the docks.

TABLE VII. 2.

World Catch of Fish, Crustaceans, Molluscs, etc.,

By Selected Countries, 1953

Live Weight Basis

Countries	Quantities	
	Million metric tons	%
Grand total	27.1	100.0
Canada (incl. Newfoundland)	0.9	3.4
United States (incl. Alaska)	2.4	8.8
China	3.0	11.1
Indonesia	0.6	2.3
Japan	4.6	16.9
France	0.5	1.9
Germany, Western	0.7	2.7
Norway	1.5	5.6
Spain	0.6	2.3
United Kingdom	1.1	4.2
U.S.S.R.	2.5	9.2
Other	8.7	31.6

Source: FAO Yearbook of Fishery Statistics, Vol.IV, Part I, Table 4.

1.4. The paramount importance of quality in the marketing of a perishable article means that one function of the port market must be to minimize the damage done in handling fish. Fresh fish for the inland markets, passing first through a port market, has to be handled twice at least at the port, since it has to be placed in transport as well as unloaded onto the quay. The first of these tasks is done by the fishermen in primitive organizations, and elsewhere by the trawler owners' or the fish dock owners' employees, or the employees of a statutory body responsible for dock labour. The second of these handlings is usually the responsibility of the merchants' (or wholesale agencies') employees, who box or otherwise pack the fish; this is sometimes done by the transport organizations.

Fish is thus handled at least three times in all, before leaving the port - by the fishermen, by the unloaders ("lumpers" or "bobbers"), and by the coastal wholesalers, or their employees. Further handling takes place at inland sales. (7)

But not all fresh white fish necessarily goes through two wholesale markets. In Great Britain, the port wholesaling firms have their own direct retailing customers inland. The same is true in France, Belgium, Germany and Austria. In Italy, on the other hand, it appears that in towns where an inland wholesale market exists all fish must by law be sent through that channel. (8)

Detailed information on the destination of fish landed in the ports is often hard to obtain, since port wholesaling firms very often regard their list of customers as a useful trade secret, and also because fish is imported overland from other ports to the larger fishing ports. This confuses any attempt statistically to "account for" the total fish landed in a particular port in a particular period, since overland movements of fish are nowhere statistically recorded.

1.5. The phenomenon of the re-selling of fish in port markets illustrates the point that a market, once erected, offers economic advantages no longer directly based upon the cluster of factors which originally determined its location and size. Port markets begin to provide the pure wholesaling function, like inland markets. The most famous (in name) of all inland fish markets, indeed, Billingsgate in London, is sited away even from any railway terminus, and at a point now not particularly easy of access by road owing to congested urbanization. It is there because the Thames was the original "roadway" for fishing vessels from the estuary, and because of current advantages of centralization.

For example, a relatively declining North-East coast fishing port in England, North Shields, nowadays imports overland about as much fish as is landed there from the sea; the very large and flourishing fishing port of Grimsby attracts fish from many of the smaller ports of the East coast; and some lobster is imported to Boulogne from England.

The function of a large market is, from the seller's point of view, to "make a good price" and from the buyer's to offer variety and relative certainty of supply. Hence, it is not paradoxical of the fishermen in the small ports to argue that if they had more fish they would get a higher price for it - although this seems at first to contradict the laws of demand. What they imply is that a more regular supply than nature allows them would turn the small port into a fair-sized market, more buyers would be attracted, so increased supplies would lead to increased prices.

If there is a poor market, or no market at all, as in some of the small French ports, the fishermen must either despatch their fish to an inland market, probably for sale on commission, or they must have recourse to the nearest large port market.

(7) A British Government report once stated: "The fish has been packed twice, at least on one of these occasions and possibly on both, and has been exposed for sale three times—at the port, at the inland wholesale market, on the shop slab. The passage from ship to consumer is thus fairly rapid, but in the course of it the fish comes in for much handling. See 19, para. 55.

(8) See 18.

1.6. The task of the port market is to get fish to the final consumer in the most suitable possible form, as expeditiously as possible. Many kinds of processing have developed at the ports and have affected in various ways the operations of the markets.

Processing at sea may have the effect of making several of the functions performed by the port market redundant or at least of making it necessary to change the organizational methods of selling fish on landing. For example, salting fish at sea might be done on long-term contract. Deep-freezing of fish at sea might be linked with disposal via depots not necessarily connected in any direct way with port wholesalers. Canners may buy fish in bulk in advance, as, of course, may fishmeal producers.

Some kinds of processing have, however, in practice had the effect of increasing the importance of the port wholesaling stage of distribution. The most striking example is the rise of filleting at the ports, in the years between the wars.

Filleting at major ports began on a large scale in the late 1920's. Its arrival was closely associated with the rise in importance of fried fish shop retailing (fish and chip shops) in the years of the economic depression and in the 1930's. There can be no doubt that the huge rise in the consumption of cod in the United Kingdon between 1923 and 1937 (from 130 thousand metric tons to 382 thousand) (9) - was assisted by the growth of filleting, and by the acceptance by the market of the filleted product. (10)

TABLE VII. 3.

Utilization of United States Catch, 1953

Live Weight Basis

Utilization	Quantities	
	Million metric tons	%
Grand total (i)	2,442	100.0
Marketing fresh	704	28.8
Freezing	254	10.4
Curing	34	1.4
Canning	622	25.5
Reduction	805	33.0
Miscellaneous purposes	23	0.9
Offal for reduction	(230)	(9.4)

Source: FAO Yearbook of Fishery Statistics, Vol. IV, Part I, Table 28, page 91.
(i) Includes some 60,000 tons of imported fish.

(9) See 10, Table 66.
(10) During the same period landings of "species similar to cod" approximately held their own (239 thousand tons in 1923 and 257 thousand tons in 1937).

In Boston, U.S.A., filleting was introduced at the port in 1921 by a Mr. Ward, who applied the process mainly to haddock. In White's view, the importance of filleting in New England was that it allowed dealers to develop some measure of monopolistic competition, since it was associated with "packaging" (wrapping in parchment paper, etc.), and hence with the marketing of a branded product. This led to the greater participation of chain retailers in both the fresh and frozen fish trade, presumably because they thought that "branded" fish sold more readily than unbranded. This particular aspect of the introduction of filleting does not seem to have been characteristic of developments in the United Kingdom. (11) On the contrary, the point usually made by spokesmen for the trade there is that the advent of filleting diminished rather than increased the degree of monopolistic competition. The product, filleted, became, so to speak, more anonymous. The moment of choice of good quality fish in the typical English retailing set-up typically occurred when the customer inspected a whole fish on the slab of a specialist fishmonger's shop. Filleting removed the occasion for this act of inspection. The customer now accepted, or rejected, the fish on the basis of her trust in the retailer, or otherwise. Complaints have been made, indeed, that filleting has over the years helped to reduce the customers' skill at discrimination in quality. (12) Certainly, the customers of the new major outlet, the fish and chips trade, had normally no knowledge at all as to the source of supply of the frier, who was, and still is, free to buy where he pleased.

Both in the United States and the United Kingdom the coming of filleting on a large scale had two other important consequences, both noted in the case of New England by White; (13) firstly, that it made possible the growth of a by-products industry, and secondly that by eliminating waste (50-60 per cent of total fish weight being removed by filleting) freight costs were reduced, and this had the effect of widening the area which the fish industry could economically serve.

In some European countries, notably France, filleting made little progress until after World War II. This slowness was ascribed by enquirers there partly to the "prejudice", or conservatism, of consumers, and partly to a production tax system which bore heavily on the sale of fillets. (14) In the German retail market fillets have proved more readily acceptable. (15)

Filleting, in the case of white fish, is the most striking example of a tendency that is operating in the case of other types of fish destined for the retail market, or for "secondary" consumers (fish friers, restaurants, hotels, etc.); and that is the tendency for more processing work to be done at the port

(11) See 14.
The Report of the Imperial Economic Committee on Fish commented: "The fish is filleted at the ports, the fillets wrapped in clean oil paper and packed in ice and despatched. These wrappings might well be used for advertisement and would appeal to the purchaser when they bore the name of a firm of good repute for the quality of its goods." The sentence in italics was a footnote in the original. So far as can be ascertained, the suggestion has never been very widely followed.

(12) This is based on statements made by representatives of fish wholesale firms in three major ports in the United Kingdom to interviewers in 1956.

(13) See 14, p.15.

(14) See 17, p.22.

(15) See 18, p.85.

and less near the point of consumption. An example is to be found in the crabbing industry in the North of England, a small specialized industry operated mainly from the smaller ports. In pre-World War II, and still more in pre-World War I days, crabs were often bought alive and boiled by the consumer at home; later, the retailer and fisherman took on a proportion of this work; now the port wholesaler most often does the boiling, and sometimes some further part of the preservation. Retailers thus save themselves the trouble of processing this item. Furthermore, the advent of deep-freeze factories enabled them to buy crab-meat not only cooked in shell, but shelled, pressed and cut into slabs. The change in practice has increased the function of processors at the ports, and some of these processors are basically merchants.

Filleting at the ports has had two enormously important economic consequences: firstly, in extending the range of the inland markets that can be economically served, since 45 to 55 per cent of the weight of the fish is removed and no longer needs transportation; and secondly, in promoting the rise of by-products industries using the bulk offal available in large ports. Both these effects enhanced the importance of the port markets, and enabled them to reap advantages from large-scale operations previously denied to them.

TABLE VII. 4.

Utilization of United Kingdom Catch, 1953

Live Weight Basis

Utilization	Quantities	
	Million metric tons	%
Grand total (i)	1,219	100.0
Marketing fresh	863	70.8
Freezing	41	3.4
Curing	151	12.4
Canning	14	1.2
Reduction	146	11.9
Miscellaneous purposes	4	3
Offal for reduction	(251)	(20.6)

Source: FAO Yearbook of Fishery Statistics, Vol. IV, Pt. I, table 28.
(i) Total U.K. supplies (British taking plus imports)

1.7. The only comparably important technological change has been the advent of freezing. Ice has, of course, been used for many decades. The purpose of freezing is to delay decay of the fish between the time of its catching and the time of its final consumption. The most that it can do is to diminish the rate at which the product deteriorates. It is therefore a process that is peculiarly adaptable to fishing industries where the consumer is necessarily situated at some distance, either in space or in time, from the economical source of supply.

Thus, it is not unnatural that in the United States, with its long hauls from the coast, freezing has been substantially developed more rapidly than in the United Kingdom, where every town and village can be supplied overnight with fish from a coastal market. In the latter country, more attention to deep-freezing was given at first for the herring industry, largely because of the extreme seasonal fluctuations in the landing of good quality herring. (16)

The main consequences of freezing on marketing methods are:

(a) New standards of quality have to be adopted at the buying stage, because in the long run a freezing business cannot be built up on the basis of an inferior product, (17) and it is uneconomic to use a fairly costly process on a poor raw material;

(b) Buying in time of gluts of good fish becomes possible, (18) giving the purchasers a buying advantage, but also, of course, giving the catchers a wider market to serve over the whole year;

(c) Staff and plant can be kept fairly fully employed, if many species of fish are handled, so offsetting seasonal fluctuations; (19)

(d) New outlets have to be exploited inland for sales to consumers - traditional retail outlets seem slow to adapt themselves to this trade;

(e) This may lead to integration in selling, as there seem to be disadvantages to freezers in supplying independent distributors with deep-frozen fish.

The wider use of freezing may lead also to some reduction in certain diseconomies in the existing wholesaling practices in distributing fish, such as the overlapping of sales services to the same retailer; it also helps to solve the problem of the small ports, with their high quality products and insufficient scale of local wholesaling activity. Finally, it fits in well with the modernization of transport.

A rival to freezing on land is freezing at sea, but since the results of the three methods now being experimentally tried are not definitive, the likely consequences of these changes will not be discussed - quantitatively they

(16) See 5, pp. 24 and 28. The Board says, with cheerful hyperbole: "Sales of quick-frozen herring and kippers were appreciably higher in 1955 than in 1954. The pioneer work of the Board and one notable commercial concern in this field has at long last caught the attention and fired the imagination of many individuals who have heretofore tended to decry it." The statistics in the report however show that quick-frozen herring consumed at home and abroad amounted to 3.0 per cent of the catch in 1955 against 2.8 per cent the year before. In addition, a considerable quantity of herring was frozen for later kippering. In its 1952 Report the Board made the interesting observation that - "gaps or fluctuations in supply need not be felt at the retail point of sale were the fishmonger and inland wholesaler seized of the opportunities for trade which are offered by the cold storing of quick-frozen herring at strategic points by the Board....Experience leads the Board to believe that there is far more resistance to quick-frozen fish from the distributive trade than there is from the consuming public..." 3, p.21.

(17) Some freezing, like some smoking and salting, of fish is done as a means of preventing a stale product, otherwise difficult to dispose of, from worse deterioration; fortunately, this use of freezing is on the decline in those countries for which information can be obtained.

(18) An advantage shared by buyers for other preserved fish markets, e.g. red herrings.

(19) Only two months of the year are difficult on this basis in Grimsby.

cannot be very large in the near future.

1.8. Port markets provide an important link in the distribution of a major source of protein, either by direct consumption or by some lengthier ecological process, and secondly, they are instances of a specialized location of economic activity. From both points of view, especially from the first, port markets, like other parts of the fishing industry, promote social and economic welfare, and therefore become a subject of concern to governments, central and local. Since port markets are a special case of marketing, the problem for economists is to understand and analyse the economies and diseconomies in which these forms of organization may result. Social benefits and costs are involved, especially from the aspect of public hygiene. A market, whether narrowly or broadly envisaged - whether as a simple place of exchange of commodities, or as a general term for interlocking systems of exchange (20) of many commodities widely dispersed over space and time - is a system of external relationships. Its economies for the individual firm must therefore be external and not internal. The typical internal economies of the firm also affect its costs.

External economies, defined for purposes of static cost analysis, refer to "the advantage derived by individual producers from the growth, not of their own individual undertakings, but of the industry in its aggregate", and Marshall distinguished these economies from those due to the general progress of the industrial environment. If the term "industry" is allowed to be flexible for different purposes, the contention that a market is an institution for the realization of certain external economies perhaps provides a reasonable basis for examining the success of a particular market. (21)

There are, of course, diseconomies as well as economies of scale. The most frequent are the consequences of the bidding up of scarce factor prices; in port markets this can have serious consequences for the quality of fish, as may such obvious diseconomies as result from physical overcrowding of the market. Any diseconomies must be deducted in assessing the net results of a market, regarded as a large-scale operation; their longer-term importance depends upon the elasticity of supply of the specific factors required.

What are the typical economies? Sraffa, in his well-known study, expressed scepticism as to their importance in industrial processes, but "rescued" them from oblivion by mentioning the better rendering of services, such as the development of transport, of skilled labour, of migration of labour and personnel to the places of work, the appearance of professional and trade associations, the development of market information, and the increase in technical information. All these sources of external economies have had considerable importance in helping to justify the existence of port markets in fish, and have worked, within a

(20) The British Report of 1927, already quoted (Cmd. 2934), remarks that "Great Britain may be considered as a single market in which arrivals of fish at any one port react upon the wholesale prices ruling at all ports" — although the Report goes on to point out that this fact was insufficient to procure a steady level in wholesale prices "in the present conditions of the trade." With changing techniques, the existing world market in fish products might become much more important, if commercial policies allowed.

(21) That there are economies of the market, as such, which increase with scale can be shown in Britain by two kinds of fact—that some port markets attract an increasing overland business (e.g. North Shields and Grimsby), fish being transported into these ports for sale despite their congestion and despatch problems; and that small ports realize poorer prices for catchers and consequently lose their supply of fish progressively, because there is an insufficient size of market.

range, in favour of large against small markets. (22)

Thus, the diseconomies of overcrowding and the difficulties arising therefrom - which severely restrict the capacity of the markets to fulfil the functions of grading, careful handling and accurate pricing - are counterbalanced by the basic advantages of centralized and specialized activity. Inland fish markets play their part too, and one of the most interesting problems of the future is to assess how far the diseconomies arising in the port markets themselves will be overcome by the adoption of new methods, or will lead to modifications in wholesaling location.

2. SELLING METHODS AND THE MARKET STRUCTURE

2.1. In Norway, the country which has developed a larger fishing industry in relation to population than any other except Iceland, all processing, sale or export of fish or fish products is prohibited by law unless the fish is bought through a recognized fishermen's organization. (23) The first organization to be formed was The Winter Herring Fishermen's Sales Organization (Norges Sildesalslag). The other big organization is the Norwegian Raw Fish Sales Organization (Norges Råfisklag), an association formed in 1938 with the sole right to first-hand marketing of most fish species caught in the northern part of Norway. Other associations cover nearly all fish and shellfish caught in Norway. (24)

These developments are relatively new. They followed upon the growth of the fishermen's unions. The Norges Fiskarlag, or national union of fishermen, was first formed in 1926. The men in the deep sea fishing fleet joined the Norwegian Seamen's Union.

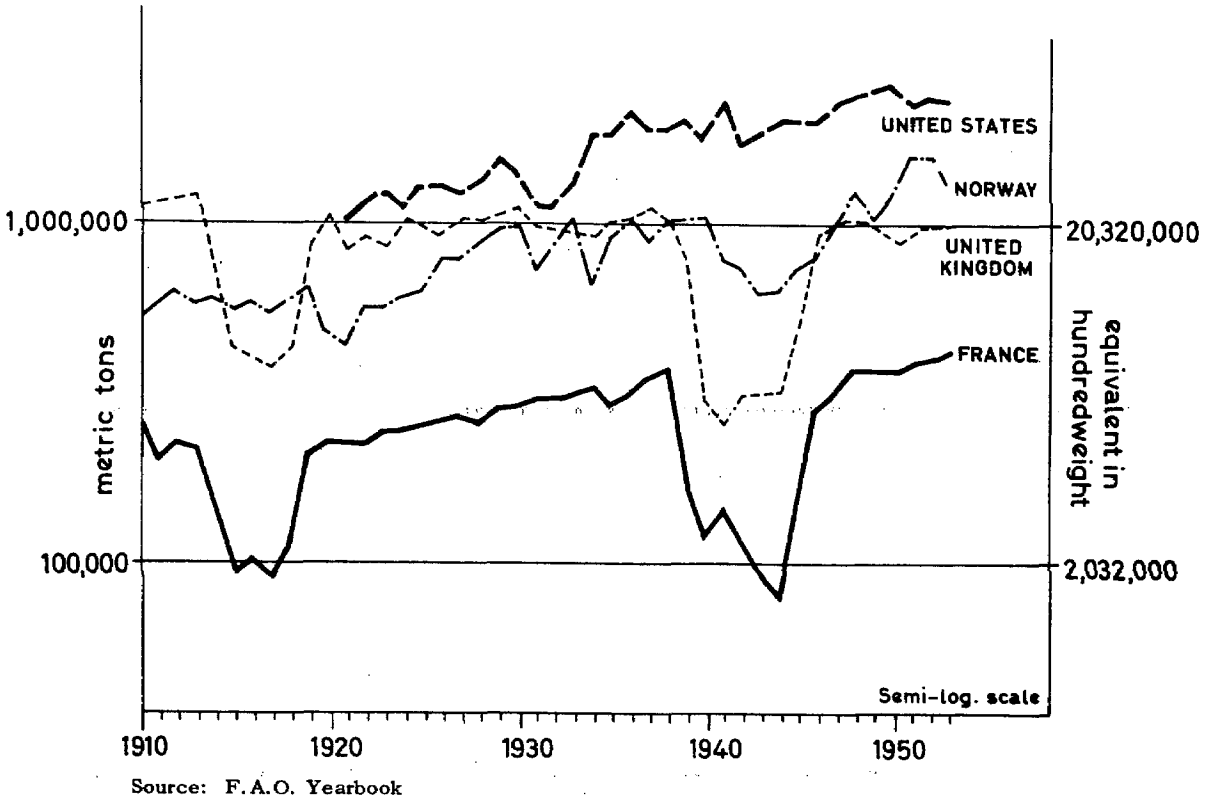
The purpose of the co-operative sales organization is stated to be that of creating "good and stable living conditions for the fishermen by ensuring them a reasonable minimum price for the catch". The economic pressure to form these societies came in the 1930's, when the demand for fish fluctuated violently from year to year, following the rapid rise of the industry from 1920 to 1930 (see diagram VII.1.).

Sales in Norway are carried out in various ways. Norges Sildesalslag directs the vessels to various unloading stations, and the settlement for the catch is paid through the association. Other organizations allow the individual fishermen to arrange for the sale of their own catch, but the sale is effected on contract forms drawn up by the association concerned, and at prices fixed in joint negotiations between the association and the governmental authorities. The Norwegian fisheries are largely fished by relatively small units as the fish is close to land, but there are some distant water trawlers, owned by larger owners who are grouped into three main federations. Since the members of the co-operatives are so numerous and so small, customers for the fish have to accept whatever risk is implied in receiving supplies from a great variety of sources.

(22) An example is the nightly preparation of an information sheet on the state of landings at all ports, to be available for merchants at dawn—only worth doing for a "large" port market.

(23) Under the Raw Fish Act (Räfiskloven) of 1938 (see 20, p. 182).

(24) Ibid.



Source: F.A.O. Yearbook
NOTE: The whole of Ireland is included in the U.K. for 1910-22

Diagram VII.1.
Total Fish Landings 1910-1953

It is a very important aspect of the Norwegian fishing industry that government aid has been sought for development of the export trade. Thus, cold storage plants and freezing units have attracted such aid. The Directorate of Fisheries, with its Government Fish Control Office, plans these plants and supervises the quality of the fish entering into refrigerated processes. A large staff is used to see that the standards laid down are exactly complied with; and processing methods are kept up to date by active liaison with governmental research units. "Klipfish", one of the major export items has, for example, to be officially inspected before consignment abroad. (25)

Thus, instead of relying on large numbers of private buyers to ensure a good price for fish, and also to guarantee the quality of the fish under the usual economic sanctions for failure to supply the market with what it requires, the Norwegians rely on (1) organized price negotiations, (2) considerable governmental concern with the quality of the fish sold, and (3) government-supported monopolies of sales by co-operatives representing the fishermen's interests.

In Holland all selling of fish at major ports is done through employees of a state-controlled Port Organization. Wholesalers are licensed by the State,

(25) Of the 171 th.m. tons of cod taken in 1951 in Norway 12% was sold fresh and frozen, 51% was salted and 37% dried. Op.cit. p.189.

and have to satisfy conditions as to their premises and qualifications to trade. Sale is by "Dutch Auction", and attempts to sell by "the clock" have had to be abandoned because wholesalers find it difficult to remember the exact quality of fish in the lots offered for sale. The electric clock system is, however, operated in the sale of salted herrings.

In Denmark, the Esbjerg market handles prime North Sea fish caught by a large fleet of small seiners. There are legal restrictions on the manner in which the fish may be displayed, and the arrangement followed is said to be better than in most ports (single boxes laid out, after the fish has been sorted, on tables, into the boxes, and use of an auction hall). All fish exported is strictly controlled by a form of sample inspection, and a government fishery controller on the spot enforces rules as to cleanliness and hygiene throughout the whole saling processes of filleting, freezing and so on.

2.2. In France, the Report of the Dourdin office (17) remarks on the striking contrast between the technical efficiency, concentration of interests, and modern equipment of the French fishing fleet and the insufficiency, lack of technical knowledge, and feeble organization of the distributive trade.

There is an untidy competitiveness between the methods of wholesaling through port wholesalers, retail wholesalers, sellers on commission, and by direct channels to large consumers. The market has a distinctly speculative character. It is wide open to fluctuations due to seasonal or annual changes, or to sudden increases or decreases in imports. There is a crowd of intermediary middlemen. In consequence of this confusion, prices are unstable. Although the Ministry of Merchant Marine licenses the wholesalers permitted to buy direct from the catchers, on conditions intended to secure that they are genuine wholesalers and men of substance, these conditions are ill observed. Minimum physical conditions for the handling of fish by wholesalers are laid down by the State in France, and cover many points from air circulation to water supply that might affect hygiene.

One of the main troubles is that the existence of inland wholesalers stands in the way of the development of the trade, or of improvement in quality. The wholesaling trade generally, in its pivotal position, encourages a large number of retailers to rely on them for fish, which has therefore to be kept in stock to some extent. The habit grows of bringing the oldest fish out for sale. Competitive wholesaling results in an oversupply of retailers.

However accurate the Dourdin Report's account of France may or may not be, it raises criticisms that, with slight changes, might well be valid in many other countries; it suggests both the difficulties of regulation, the inadequacy from a welfare point of view of so-called "competition", and the gravity of the consequence of neglecting technical education and development. For France, with its modernized fleet, its high quality fish and extensive coast-line, consumes relatively little fish, and the taste for it in France is not rapidly increasing.

2.3. The port markets in Great Britain are organized quite differently. There the striking background feature of the fish trade in the last thirty-five years has been the rise of the distant water trawler section of the industry,

which has made Hull and Grimsby the two largest fishing ports in the western world, each port individually landing more fish than any one port in the United States, Norway or France. But the total landings of fish in the United Kingdom have not noticeably increased, the average weight landed from 1910-12 in the old days of sail and a few steam and motor-boats, exceeding the total average weight landed in each three-year period since 1946. Thus the large ports have risen while the smaller ports have declined. Hull, Grimsby and Fleetwood together now land some 65 per cent of the total British landings. (26)

The port markets in these large ports are served by very large numbers of wholesale merchants, varying in average size, however, from port to port. For example, there were in 1927 some 550 port merchants in Grimsby, 230 in Hull and over 200 in Aberdeen. The average weight of fish handled per merchant varied between the different ports sometimes by a factor of 100 per cent from 16,000 lbs. per merchant in Hull to 8,000 in Aberdeen.

Some part of the reason for these differences must be found in a historical theory, in the sense that there are lags in the adjustment of institutions to the size of the catch to be handled, as can easily be seen in a declining port like Cardiff or Milford Haven. There the existence of over 100 port merchants in 1956 is clearly due not to the trade handled in the preceding five years, but to the volume of trade in the 1930's and in the years immediately after 1946. Another major part of the explanation is that the character of the trade varies from port to port. For example, if the number of merchants operating in Grimsby at any time in the last thirty years is contrasted with that in Hull, the explanation commonly given is that Hull specializes in distant water trawling while Grimsby has a big share of its fish from middle water and inshore fishermen. Grimsby, in other words, deals in a greater variety, and a higher average quality, of fish.

The typical small port wholesaler claims to be providing very economically (he has a very small staff, and not much capital outlay), and competitively, a specialized service to the retailer which a large firm could not so economically provide. He may, again, specialize in a particular type, or types, of fish with specialized destinations, such as dogfish for the South London trade, or fresh haddock for the West Riding.

But the reasons for the existence of many small port merchants must include the methods of sale in operation in the ports. The basic economic function of those sales, in the larger fishing ports, it must be recalled, is to move large quantities of fish rapidly from vessel to inland distributing point. The methods of sale in the large British ports, confused and in some senses illogical as they must appear to economists trained in theories of perfect competition, at least serve this basic purpose. The sorting of fish into the appropriate grades for different specialized markets is also alleged to be one of the functions performed.

Emphasis has been placed upon the large numbers of port merchants operating in the large British ports. Those numbers appear to be declining in the 1950's. Every year since 1950 far more have gone out of business than have

(26) Figures based on weight of demersal fish landed in 1955

entered the trade. Moreover, while comprehensive statistics are lacking, it is well known that a very high proportion of the total trade is in the hands of a few large-scale merchants; in Hull, for example, it is estimated that 6 per cent of the merchants carried on in 1955 some 50 per cent of the trade, and 21 per cent of the merchants (sixty-two firms) carried on 75 per cent of the total trade. It would also be true of Grimsby and Fleetwood that a dozen to twenty large firms, each with ten or more buyers on the dock, dominate the trade.

2.4. Few generalizations can be made on the economic consequences of the auctioning system commonly followed, with local variations, in the British port markets where fish is sold on a large scale, because the exact sequence of bids, their value and meaning in the light of ever-changing demand and supply situations would need lengthy study to support any definitive conclusions.

The auctions begin at a fixed time each morning, when the fish has been landed, and proceed from boat to boat until all the catch has been sold, or withdrawn unsold for disposal to the fishmeal works. The auctioneer sells one by one each group of "kits" (a kit contains approximately 140 lbs. of fish), perhaps twenty-four, forty-eight, or 100 kits, as the case may be. These contain fish from the same part of any one boat, of the same variety, having been sorted into varieties. Sometimes the quality of the fish may vary considerably even within one "lot" or "square" (group of kits) offered for sale; nearly always the quality varies as between the different lots landed from the same boat, the fish caught early in a long voyage being several days staler than the fish caught late. Hence, even if conditions of perfect competition prevailed, there might well be different prices reached for different lots, or even for different parts of lots. The prospective buyers crowd round the lot being sold, many balancing themselves on the edges of the wooden or aluminium boxes containing the fish. (27) Their bids are conveyed to the auctioneer by secret conventional signs, which with fairly consistent success disguise the origin of the bid from the other merchants taking part in the sale. This allows salesmen to put in their own bids, or to prevent a particular buyer from being successful.

Since the method of sale is so simply organized, the different auctioneers taking up their stands by successive lots, with no rostrum, and in all the confusion of a fish dock, only a limited number of buyers are taking an effective part in any one sale - perhaps thirty or forty, or more in times of shortage, but nothing like the total of merchants on the dock. The winning bid entitles the buyer to a lot. But two peculiarities of the sale here deserve mentioning; firstly, the winning bidder may say "I'll take two", or ten, or whatever figure he chooses to name, and he points to the kits that he has chosen, and puts his labels on them. The auctioneer then re-opens the sale for the kits that the buyer rejects. Secondly, the buyer, if favoured by the auctioneer for some reason, agrees with him to pay not the price called, but some lower figure, a practice regarded as perhaps unusual but as neither illegal nor unethical. (28)

The first of these peculiarities alone guarantees that the auctions, as actually practised, do not fulfil the theoretical condition of a perfect market as laid down in the economic text-books.

(27) This practice seems to be quite general at fish auctions and is obviously unhygienic.

(28) Disgruntled merchants allege that fish "not sold to anyone" leaves the markets.

For, even when the fish in one lot is all indistinguishable in quality (by expert buyers and sellers), the price at which it is sold at one auction sale may vary considerably. The condition of "one price in the market" is unfulfilled.

For example, twenty-four kits may be knocked down at £9.10.0., but the buyer may choose to take only two of these kits; the auction re-opens, and two more go for £9.5.0., and so on until the last two are cleared at £8. This might suggest that the opening buyer had misjudged the market, and that he would have been well advised to hold off and pick up his fish cheaper. But he has not necessarily acted foolishly, or even with misjudgment. It has to be remembered that both he, as well as the successive buyers, have on each occasion of a successful bid obtained not only (say) two kits of a given quality of fish, but an option; had the first buyer held off, the whole of that lot of fish might have been taken up by another buyer, and supposing that the first buyer really badly wanted his two kits to satisfy an old customer he might then have had to pay more than £9.10.0. to obtain his two kits, or he might have been unable to obtain any of the fish at all.

After the original auctions are concluded, the large merchants, who have bought well, unload small quantities of fish as required to smaller merchants, so making a straight speculative gain before the fish has left the docks. Transactions the other way can of course occur, if a large merchant is short of some speciality shrewdly bought by a small man. Again, there may be the usual sharing of the product between merchants who have entered some understanding not to bid up prices against each other. (Merchants contend, on this point, that such arrangements are short-lived, and not unduly sinister in the conditions of large Western European fish markets.)

Thus, somewhat complex cross-transactions and final arrangements undoubtedly take place, and must almost inevitably take place, so long as the present auctioning system is followed, with a highly perishable commodity of very variable quality to be distributed to many thousands of outlets within a short space of time. An equilibrium price of a kind is reached, since the market is, generally, cleared of fish. Even a sketch of the procedure perhaps suffices to bring out the point that commercial success or survival demands a craftsman's skill in buying as well as in judging the quality of fish. The wholesale auction precedes the sale of fish to inland wholesalers and to retailers, apart from the relatively few instances of standing orders placed with port merchants; the latter have therefore to make their price on the dock ahead of telephoning their customers inland with offers of fish.

All successful port wholesalers must therefore have a detailed knowledge of their customers' preferences and demands. Naturally, they do not always assess sudden changes in the level of demand accurately, especially as these changes depend on extraneous, and not always well understood, factors, such as plentifulness of substitute commodities.

Some versions of the auctions are considerably more complicated than that described; bids are kept wholly secret, and conveyed to the auctioneer by whispering or secret communication. The fishermen have to be told, subsequently

to the sales, what the total return of their voyage has been, but this information is not generally available in detail for individual lots at the actual moment of sale.

The variability of quality of fish, as sold in the large markets, can hardly be too highly stressed for its economic effects. It provides a ready answer if variable prices are obtained for the same type of fish sold on the same day. It causes quick, rough assessments to be made and to be quickly acted upon. A merchant stands to lose heavily if he makes a false judgment on quality - thin fish fillets badly, and an extra 15 per cent of waste in filleting (or even less) can turn a profit into a loss. Wide genuine variability in the product precludes any observer from discovering the degree of departure from perfect competition, if any, that is operating in any particular sale.

When, on the other hand, the quality of the fish is high, and known to be high, as in some of the smaller inshore fishing ports, good organization of sellers can, and sometimes does, ensure that something demonstrably near to the full competitive price is reached before the fish is sold. This occurs where a co-operative, or single seller, disposes of such quality fish on the national market to the highest bidder. (29) Few small inshore ports are successfully organized on these lines; on the contrary, some of them are dominated by small rings of local wholesale buyers.

Where the number of bidders is small, as in some small or even medium-sized ports, there is always a danger, from the catchers' point of view, that a ring price will be set, the merchants agreeing among themselves to restrict bidding against each other, and sharing out the catch between themselves. Such rings may not be very rigidly maintained, but even if they are intermittent, they have the effect of increasing the profits of merchants at the expense of the catchers. It is almost inconceivable, however, that such a ring should be nation-wide, and difficult for it to be worked even in two ports. Thus, an economic sanction against this abuse consists in the possibility of the catchers selling in different markets.

There are two other limitations to any tendency towards monopoly practices in a port market: the counter-organization of the market by the catchers, whether owner or crew, and the reluctance of the merchants themselves to kill the goose - that is, to drive the catchers out of business. Detailed examples of counter-organization of the market may be studied in White's book (14) on the New England fishing industry; the rules agreed by the unions in Boston, for example, for the New England Fish Exchange (court-approved since 1919) are designed to ensure competitive prices. Disputes have arisen over the interpretation of the rules from time to time. The point is that the State has, in this case, intervened to reduce monopoly (or duopoly) practices in the port, and the unions have supported this intervention. Other types of counter-organization may be found elsewhere, such as the entry of trawler owners into the wholesale distributive trade which has occurred in the large British ports.

The other limitation to any tendency of merchants to form rings will

(29) The "competition" is between the seller of one port and those from other ports in this instance; in relation to the particular port, the seller is a monopolist.

obviously operate most successfully if there are alternative uses to which capital and labour in the fishing industry may be put. Prices paid to catchers in small ports may be expected to harden a little if local factory or service trade employment opportunities suddenly become more attractive.

It must not be thought, then, that, so far as can be observed, degree of exploitation and fewness of buyers are uniquely correlated, since various economic and social restraints are often imposed upon potential monopolists. Some ports with very few buyers offer relatively good conditions to the catchers.

Auction markets are sometimes on the normal (upward) bid basis, and sometimes on the Dutch auction (downward) principle; nearly always, in the small ports, the sale is for the boat-load of fish, by type of fish, but in the case of large distant-water vessels the sale is by "lots" or "squares" of kits, because of the size of the catch. (30) The vessel landing first has its catch sold first, and so on throughout the hours of trading. (There may be some overlaps, but in principle the sale is normally by vessels seriatim.) In the large British ports there is a minimum price agreed between the trawler owners, who withdraw their fish from sale and dispose of it to fishmeal works or otherwise, if the price drops to this level. This practice is not followed in the smaller British ports.

The auctioning of the fish is usually done by selling companies, acting as agents for the catchers, or by their direct employees.

Auction is not the only method of sale of fish at the ports. Some fish is sold on contract, the trawler owner undertaking to provide a given quantity of fish of certain quality at a pre-arranged price. Salted fish has sometimes been contracted for in advance in Britain; but Norway and the United States provide better examples of this procedure.

In small ports the auctioneering firms may tend to become the capitalists of the industry, arranging loans to owners (skipper-owners mostly in these cases), and managing the accounts for the boats. This puts the selling firms in a strong position to secure repayment of interest and capital, since all gross receipts pass through their hands.

The other great source of capital to the industry has been either through the merchant turned vessel owner, or through the skipper turned vessel owner, who have expanded their fishing businesses, and incidentally either maintained, or expanded, their activities as merchants. Merchants as such have not built up heavy accumulations of capital at all comparable with the capital in the fishing side of the industry, although some large, well capitalized, modern firms have become specialist merchants. This suggests that whatever temporary and limited monopsony power they may attain, they do not successfully maintain rings and secure monopolistic profits, at any rate in the larger ports, although

(30) This suggests the important possibility that, the more efficient the catching (i.e., the lower the cost of catching per cwt. of fish landed) the more difficult the wholesaling problem, if the fish is marketed fresh. Efficient catching is usually carried out by relatively large vessels, which inevitably tend to land both a larger quantity, and a greater variety of quality within type, of fish than one buyer will want for his trade, or even a consortium of buyers. The case is different only when the end-use of the product is some bulk process, such as oil extraction and fishmeal production.

in the smaller (and very small) ports rings are relatively easier to maintain, and monopoly profits, on a small scale, to protect.

One important aspect of the auction system must never be forgotten, namely its link with the system of settling payments to the skippers and crews of the fishing vessels. Since these men are so frequently paid on the "share" (or "lay") system they have to be informed immediately on conclusion of a voyage (or a day or so afterwards) of the financial results of the venture. Hence a price for the fish at the ports must be set. It has to be a price which is not, in the sharers' view, obviously rigged against them. Thus, even in those ports where trawler owners are increasingly entering into wholesaling, they have a strong motive for maintaining an auction, instead of "selling the fish to themselves", and adjusting the bookkeeping on some other principle than that of a daily sale.

Wholesale merchants who buy fish at the ports constitute the typical first stage in the channel of distribution from vessel to consumer, but there are other channels, such as direct sales to wholesale-retailers, to representatives of intermediary consumers (catering firms, hotels and institutions), and to factories for processing or manufacture.

2.5. The physical methods of unloading, displaying, selling, removing, and processing fish in the large port markets leave very much to be desired from the point of view of cleanliness and hygiene. This is a matter of economics, private as well as public, since fish is an easily damaged commodity, as is recognized by the merchants in their various abortive campaigns to get the use of hooks or pitchforks abandoned by the lumpers. Failure to improve handling methods in unloading led, in the period 1946-53, in some ports, such as Hull, to a deterioration in the quality of the fish landed, according to some merchants. (31)

Persistent deterioration of the quality of fish despatched inland could have serious consequences for the trade in any country, as could increasing public awareness of the unhygienic conditions in which fish is handled at the docks. (32) The reaction of the commercial world to the demand for improved hygiene has so far taken two main forms; the development of the frozen fish trade (33) and improvement in the sorting and packing of limited classes of prime fish.

There is a persistent dilemma for the trade, which raises many as yet unsolved normative economic problems. As now organized, the older ports exhibit striking features of overcrowding and physical disadvantages for handling the large quantities of fish that they in fact handle with anything approaching a minimum deterioration of quality. The length of time that the fish actually stands on the dock is not very long, but may be up to fourteen hours, for example, during which time the temperature of the fish may rise considerably in hot weather. There is absolutely no mechanization of handling in some ports, and very little in others; kits are spilt, and shovelled back without enough care. The approaches

(31) See 21, p.19.

(32) For example, the dragging of halibut across the floor of the market, or smoking and spitting at sales. In some countries practices of this kind are more or less successfully prohibited by law.

(33) This is nowadays based on first-class raw material, as inferior fish is not worth an expensive method of handling; but of course individual buyers cannot change inferior port handling facilities where these exist.

to the dock are, even by British transport standards, ludicrously inadequate, and result in avoidable delay in getting fish away by road to the processing plants; there is lack of time or facilities to cleanse transport vehicles, and other problems.

3. SUPPLY, COST AND DEMAND CONDITIONS AFFECTING PORT MARKETS

3.1. Fish, the last major source of nutriment still secured by the primitive method of hunting, has to be caught, and to be caught it must be found, and it is not always to be found in the places where it has been caught before. Many factors, some fully understood (such as those which govern season fluctuation), others still being investigated, contribute to the movements and abundance of fish; the economic consequences of those fluctuations in supply are serious.

Firstly, there are the long-term changes, lasting over many years, and sometimes believed to be cyclical. Whatever their causes - and these undoubtedly vary, violent and unexpected changes in availability of fish have occurred over decades, with the result that whole fishing industries, based on particular ports, have risen to a peak, and then declined, or actually disappeared, when the particular source of fish for that port market has ceased to be available at an economic cost. Examples of absolute cessation of major fishing activities from particular ports can be drawn from several countries. (34)

Even short of the dramatic spectacle of a close-down, the variously caused long cycles in fish supply may cause a mal-distribution of investment in fish markets, as well as in fishing equipment. The market may sometimes, in consequence, operate for decades or at least years in a chronic state of overcapacity, with too many merchants and high overhead costs.

The second type of fluctuation, annual changes in supply, may again be caused by unexpected changes in the supply of fish, or may originate from the demand side (as may cyclical changes too). Annual fluctuations lead sometimes to losses by merchants, or to abnormal profits if the shortage is general and not specific to the port. These fluctuations may be quite severe, whatever their cause, and the possible loss of a "bad season" has to be hedged against by the merchant in good years, so far as he is able.

Then there are the more strictly seasonal fluctuations, which are usually roughly anticipated. A highly seasonal trade, like that of the herring, may lead to special forms of marketing; for example, the herring fleet from Scotland putting into the English ports may not only bring its own salesmen with it, but may attract to the ports merchants not otherwise doing business there. Seasonal fluctuations cannot be exactly forecast, leading again to possible overcapacity in wholesaling resources. (35)

(34) Cardiff, Wales, recently closed down, as did Monterey in California in the 1940's.

(35) The Herring Industry Board has remarked: "The shore-based sections of the industry are, in a restricted sense, and to a limited extent, peripatetic. By the very nature of things, however, their mobility cannot compare with that of the catchers...in present industrial circumstances....it is impossible for any shore-based section of the industry to keep standing by, against the chance that landings may occur." See, 5, pp. 26–27.

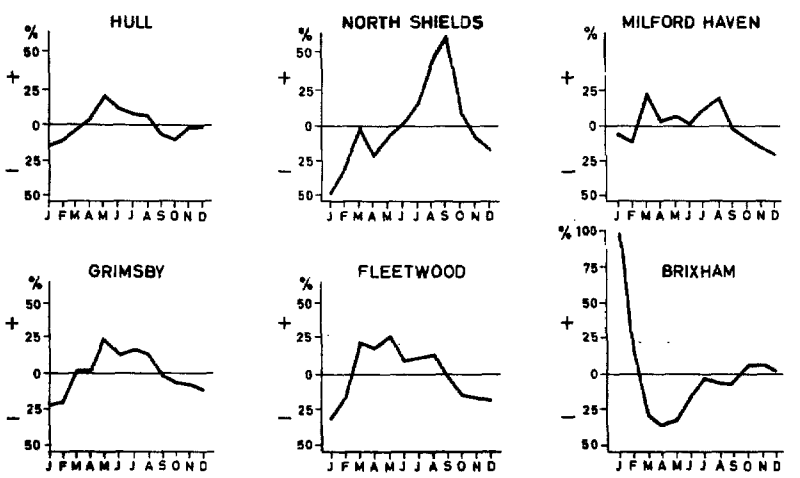
TABLE VII. 5.

Mean Percentage Deviations of Landings and Prices by Days from their respective Overall Means

Day	Landings %	Prices %
Monday	+ 31	+ 1.2
Tuesday	- 9	0.0
Wednesday	+ 7	+ 0.4
Thursday	+ 11	+ 1.2
Friday	- 14	- 2.5
Saturday	- 27	- 3.7

Source: Ministry of Agriculture & Fisheries statistics for landings at Hull, Aug. 1954 to July 1955. Table prepared by Dr. R.A. Taylor.

Monthly fluctuations in the supply of fish are, again, roughly anticipated, but may be upset by unexpected meteorological or ecological conditions. The port market has to be capable of handling the highest monthly peaks of supply with reasonable speed. A problem arises how to employ resources in the less active months. Diagram VII.2. which gives monthly fluctuations in six British ports (average percentages for a seven-year period), illustrates the position. (36)



Source: Ministry of Agriculture data

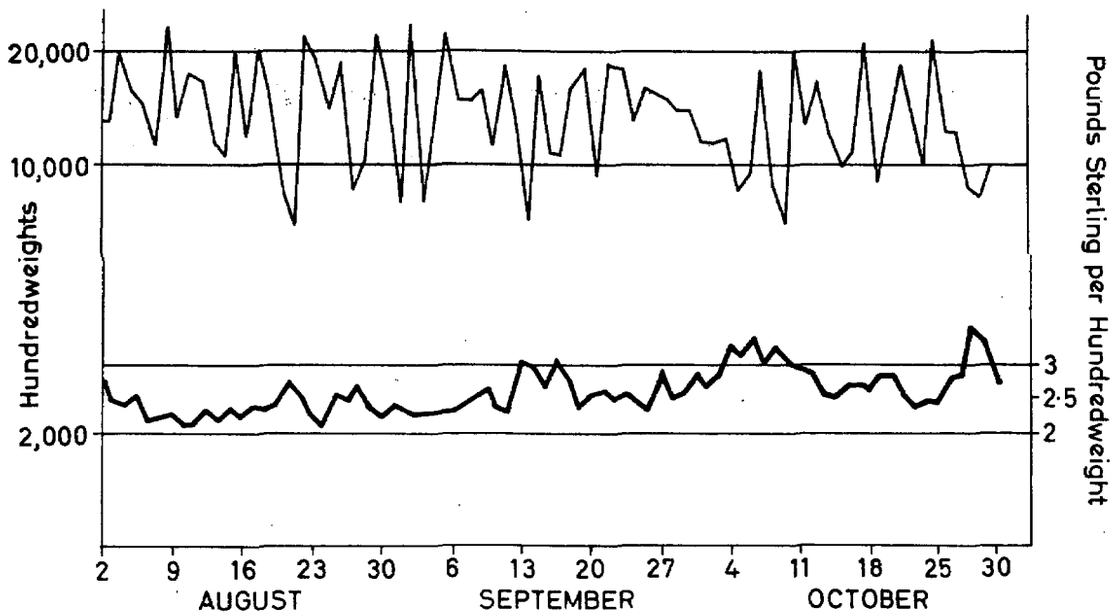
Diagram VII.2.
Fluctuations in Wet Fish Landings
(Percentages of monthly averages for the seven years 1949-55)

(36) In the case of North Shields, herring landings have been excluded from the calculations.

Finally, there are the weekly and daily fluctuations in supply, some part of them intentional and designed to anticipate the rhythm of demand, the rest accidental.

For example, in some ports there is a peak of landings on Mondays and Thursdays, the first to meet the post-weekend demand, and the second to meet the habit of eating fish on Fridays. If the catchers brought in a sufficiently large quantity to meet the rise in demand that occurs each week, (37) prices would tend to stability. Plotted over a year, however, the daily prices and quantities of fish in a major port tend to move up and down together rather than inversely. This seems to be due to daily changes in the whole demand schedule, not met by sufficient changes in supply to keep prices constant. This may be due either wholly or partly to deliberate policy (38), or to a bottleneck, for example in landing facilities, contributing to inelasticity in short-term supply.

The daily fluctuations in prices, and also in quantities to be handled, partly due to the daily shifts in demand (and to absence of full Saturday and Sunday working of the market), undoubtedly give rise to additional costs to the wholesalers. They accentuate the speculative character of the operations.



NOTE: Prices relate only to fish sold for human consumption

Diagram VII.3.
Daily Landings of Edible Fresh Fish at Hull
and Average Prices Realised
2/8/54 – 30/10/54

(37) Of course not necessarily the same amount each week, a well-known special case being Easter. See also Table VII, 5.

(38) No allegation is here made that deliberate policy is at work; an involved question is how far catchers, if they were aiming at maximum returns, should attempt to keep prices stable by a full quantity adjustment, or how far they would gain by stopping short of stability. Undoubtedly landing facilities in most ports are a major reason of supply inelasticity.

TABLE VII. 7.

Landings of demersal fish, 1955

	Weight (000 met. tons)	Value (mill. £)	Approx. No. of whole-salers.	Weight per merchant (metric tons)	Approx. average gross turnover per merchant	£ per metric ton
Hull	271.9	12.0	300	906.3	40.0	44.1
Grimsby	232.9	12.8	500	465.9	25.6	54.9
Fleetwood	63.8	4.0	180	354.6	22.2	62.6
Milford Haven	18.6	1.4	100	185.9	13.8	74.6
Lowestoft	13.2	1.2	60	220.1	20.0	90.7
North Shields	11.9	0.7	60	198.1	11.1	55.9
All other (E. & W.)	67.3	5.7				
England and Wales	679.6	37.8				
Aberdeen	85.5	4.3				
All other (Scotland)	108.6	5.0				
Scotland	194.1	9.3				
U.K.	878.5	47.2				

Source: White Fish Authority and Department of Economics, Hull University.

The percentage mark-up on prices for coastal wholesalers was thus shown in 1927 to be 22.5 per cent, while another sample of 60 wholesalers in 1950, 51 and 52 showed an average mark-up of from 21 to 23 per cent. At an intermediate date between these two enquiries, the port wholesalers' mark-up was shown as 23 per cent. (40) The White Fish Authority obtained the figures shown in Table VII.8., for the three years 1950-52 inclusive, on a voluntary basis, and its reports on the figures collected emphasized that they were not "representative of the coastal wholesaling trade generally". (41) This must have been true of the earlier results as well. Nevertheless, partly because these are some of the few data available, the figures deserve scrutiny; they throw some light on wholesaling distributive activity.

(40) See 22, p.54.
(41) Op.cit. for 1954, para. 103, p.29.

Firstly, the net profit, considered as a percentage added to gross sales receipts, was not only low but fluctuating. In the most recent sample, it rose from a negative value (loss) in 1950, to 1.22 per cent profit in 1951, falling again to less than half of one per cent in 1952.

Where data are available from other countries, they seem to confirm the view suggested by these figures, that the net profit of port wholesaling firms is apt to fluctuate violently.

Net profit of £90,000 for 60 firms in the "good" year of 1951 could hardly be regarded as "excessive", if thought of as an average of £1,500 a firm. However, it has to be noted that depreciation and proprietors' and directors' fees have already been charged. No figures are available of the capital employed in these businesses.

Secondly, the items of gain may be worth considering, namely receipts from the sale of fish and those from the sale of offal. The weight of fish sold may have been, very approximately, equal to the weight of offal sold (42), or not more than 12-15 per cent greater; it cannot have been much greater than this, in relation to the offal weight. Yet the value received for the (presumably mainly filleted) fish was thirty or forty times that received for offal. Offal receipts amounted to from 1/37th to 1/27th of receipts for fish.

If the tonnage of fish handled by the merchants was not far out of line with the proportion of their total trade by value, the tonnage handled by them can be estimated. This is not a firm estimate, but gives a result good enough for the present purpose, which is to estimate that offal was fetching between £8 and £10 a ton in the years in question. About 4 1/3rd tons of offal are needed for a ton of fishmeal, and fishmeal delivered to farmers fetched some £68 to £70 a ton in the years in question.

Without an analysis of the processing and distributing costs of fishmeal, it is not possible to say how the difference between the cost of raw material and the price of the finished and delivered product was made up; if the costs of delivering fishmeal are comparable to similar transport charges for meals and flours etc., and if processing was not a hopelessly expensive operation, it is evident that the fishmeal production industry was likely to be expanding. External evidence confirms that this was so.

It becomes a very interesting point for further investigation how far the existing prices and costs structure of the port wholesaling industry (particularly in Britain) is sustained, and made tolerable, by the present trends in the demand and supply of fishmeal.

It has to be remembered that in many parts of the world, integration of the industry has taken the form of port merchants and trawler owners combining to build and operate fishmeal works. Similar queries arise in respect of the fish oil industries.

(42) Since filleting takes 50–55 per cent of the weight and between 75 per cent and 100 per cent of fish is filleted at the ports.

Thirdly, to return to the accounts, it is clear that the business of the merchants, as merchants, was made more directly dependent upon a given proportionate change in fish prices than in offal prices. A 2 per cent rise in the price of fish sold in 1952 would have given the firms in the sample an extra £152 millions for the same quantity of fish, equal to a 65 per cent rise in receipts from offal.

TABLE VII. 8.

Samples of Coastal Wholesalers, Great Britain (£000's)

	1950	1951	1952
A. Sales (i) Fish	4,849	7,184	7,615
(ii) Offal	106	191	234
	4,955	7,375	7,849
B. Purchases	3,954	5,857	6,285
C. Gross margin (A - B)	1,002	1,518	1,564
D. Direct expenses			
(i) Boxes	110	160	164
(ii) Carriage	300	528	524
(iii) Other	55	47	57
	465	735	745
E. Trading profit (C - D)	536	783	819
F. Indirect expenses			
(i) Salaries and wages	288	392	481
(ii) Telephone and postage	45	58	63
(iii) Other (incl. depreciation)	115	147	163
	448	597	708
G. Profit before charging Proprietors' or Directors' remuneration and fees (E - F)	89	186	111
H. Proprietors' and Directors' remuneration and fees	90	96	80
I. Final net profit (G - H)	-1	90	31
I as % of gross sales A	(-.024)	1.22	.40

Source: White Fish Authority Reports for years to March 31, 1953 and 1954, pp.22 and 30 respectively, H.M.S.O., London.

TABLE VII. 9.

Sample of Coastal Wholesalers: Great Britain (Percentages)

Item	Use of Table VII.8 data	1950	1951	1952
Percentage profit	I as % of A	-0.024	1.22	0.40
Offal sales as % of fish sales	A sub-heads	2.19	2.66	3.07
Wholesalers' % on purchase price (incl. offal receipts)	100 (A - B) - 100	25	26	25
Percentage on fish alone	100 (Aii - B) - 100	23	23	21
Expenses as % of purchase price:				
Boxes	(Di - B) x 100	2.78	2.73	2.61
Carriage	(Dii - B) x 100	7.59	9.00	8.35
Other	(Diii - B) x 100	1.39	0.80	0.91
Salaries and Wages		7.29	6.68	7.65
Telephone and postage		1.14	0.99	1.00

Source: Statistics derived from Table VII.8.

Fourthly, since the value of sales of fish was kept a fairly steady 23 per cent above the value of purchases (43), it follows that fluctuations in any group of expenses directly affected profits, or one of the items met out of profits. For example, the bill for salaries and wages had risen from 6.7 per cent on purchases of fish to 7.7 per cent between 1951 and 1952, not a big rise in relation to turnover. But one point out of a total mark-up of twenty-three is important. Looked at in terms of another ratio, the wholesaler was getting £18.3 of fish sold for every £1 spent on salaries and wages in 1951, but only £15.8 in 1952. True, he aggravated (presumably because he had to do so) the position by cutting his gross mark-up during that year. The point is that the relative rise in wages had an important consequence for the net profit margin. Similarly of other items of expenditure, rises in which, it appears, could not, for whatever reasons, be passed on in increased prices. The explanation would seem to lie in the competitive character of the trade as sellers.

There are many ways in which these costs deserve analysis; but more nearly comprehensive returns would be necessary to diagnose the economic structure of the industry. These British figures illustrate the point that wholesalers

(43) Dropping to 21 per cent in 1952.

at the port work on small margins on a large turnover; other evidence collected at British ports shows that entry into the industry does not require a large capital; developments in methods of handling to improve quality (freezing, hygienic conditions of sorting and filleting, and handling) are all of a character, however, where substantial investments are required. If current market trends in the direction of improved quality persist, therefore, the scale of firms is likely to increase on average, and ability to command finance will play an increasingly important part in the drive towards integration.

More detailed analysis of British marketing costs will be possible when the 1955 sample figures collected by the White Fish Authority are published. (44)

4. FUTURE PROSPECTS

4.1. Future prospects can only be deduced from past trends and present opportunities. Scientific writers and technicians have frequently warned the world of the importance of maintaining protein supplies for human consumption, and have pointed out the apparent economic "waste" of using fish for fishmeal instead of for human consumption. This argument is sometimes dangerously over-simplified; what has to be considered is not only the relative costs in man-hours of producing different forms of protein but also the net advantages to the consumer of taking his protein via one route rather than another.

(44) Some of these figures have been analysed since this paper was presented at Rome, in a 1956 report of the White Fish Authority. A summary of the conclusion reached by the W.F.A. statisticians is reproduced below.

	Duncan Report	Present A	Enquiry B
Port wholesaler's buying price	100	100	100
Port & Inland wholesalers'	44	43	44
Fishmonger's buying price	144	143	144
Fishmonger's gross margin	52	40	46
Fishmonger's selling price	196	183	190

Source: White Fish Authority, Report on Enquiry into the Costs of Distributing White Fish, 1956, p.32.

Column A is based on average gross margins calculated for port and inland wholesalers, and fishmongers, on the basis of their sample returns, while B is based on the same figures adjusted to exclude other items than white fish, and to add back into "purchases" costs of transport, boxes and ice where these had been included by traders in "expenses".

4.2. The question may well be asked whether governments, which have been concerned and are likely in the future to be concerned, with the future of their nation's fishing industries, do not need to re-think their approach to fishing problems. They seem often to be biassed in favour of maintaining a way of life for producers, rather than directing attention to solving a complex problem in which all members of the nation are individually involved.

One fundamental issue in which governments are directly involved themselves is that of the size and shape of national investment. They can hardly, at least in Europe, avoid concern with the amount of the national savings that is invested each year in ships and docks. Usually they are, directly or indirectly, investors in the equipment themselves, and hence the investment at one remove may be financed by the ultimate lenders in international governmental transactions.

In making decisions on these investments, must not governments be concerned with the efficiency of handling the produce?

Then again, there are the wide responsibilities of government from the health aspects of food distribution.

Finally, there are the agricultural policies of the different governments; from the United States to Greece and Turkey, all Western governments are deeply committed to agricultural support and development in one way or another. But fishing is directly both in competition with, and complementary to, modern agriculture. Governments can hardly avoid having a fish policy.

4.3. It would seem likely that the organization of fish dock markets is likely to change as much over the next thirty years as it has done over the last thirty. Is not the question, now, how to begin a study of all forms of distribution of fish, so that the policy framework within which these changes take place, is at least founded upon a sound economic analysis?

(1) Herring Industry Board, Sixteenth Annual Report, year to March 31, 1951, (Cmd. 8322), London, H.M.S.O., 1951.

(2) Herring Industry Board, Seventeenth Annual Report, 1st April to December 31st, 1951, (Cmd. 9765), London, H.M.S.O., 1952.

(3) Herring Industry Board, Eighteenth Annual Report, year to December 31st, 1952, (Cmd. 8840), London, H.M.S.O., 1953.

(4) Herring Industry Board, Nineteenth Annual Report, year to December 31st, 1953, (Cmd. 9149), London, H.M.S.O., 1954.

(5) Herring Industry Board, Twentieth Annual Report, year to December 31st, 1954, (Cmd. 9492), London, H.M.S.O., 1955.

(6) White Fish Authority, First Annual Report and Accounts, year ending 31st March, 1952, London, H.M.S.O., 1952.

(7) White Fish Authority, Second Annual Report and Accounts, year ending 31st March, 1953, London, H.M.S.O., 1953.

(8) White Fish Authority, Third Annual Report and Accounts, year ending 31st March, 1954, London, H.M.S.O., 1954.

(9) White Fish Authority, Fourth Annual Report and Accounts, year ending 31st March, 1955, London, H.M.S.O., 1955.

(10) Yearbook of Fishery Statistics, 1952–53, Vol. IV, Part 1. F.A.O., Rome, 1955.

(11) Yearbook of Fishery Statistics, 1952–53, Vol. IV, Part 2. F.A.O., Rome, 1955.

(12) Robert Morgan, World Sea Fisheries, Methuen, London, 1956.

(13) J.F. Rees, The Story of Milford, University of Wales, Cardiff, 1954.

(14) Donald J. White, The New England Fishing Industry, Harvard University Press, Cambridge, Massachusetts, 1954.

(15) Report of the British Fishing Industry, Distant Water Trawlers, British Trawlers' Federation, 1955.
(16) Technology of Herring Utilization, Report of the F.A.O. Meeting, 1950, Bergen, 1953.
(17) J. Saint-Germain, Le Marché du Poisson, Office Dourdin, Boulogne, 1952.
(18) Fish Marketing in O.E.E.C. Countries, O.E.E.C., Paris, 1951.
(19) Report of the Imperial Economic Committee on Fish, 1927, (Cmd. 2934), London, H.M.S.O, 1927.
(20) Birger Rasmussen, "The Fisheries", in Industries of Norway (ed.) Olge J. Adamson, Dreyer, Oslo, 1952.
(21) "Trade of Hull and the Humber Ports", Hull Daily Mail Annual, 1954.
(22) Committee on the Fishing Industry Report, 1932, (Cmd. 4012), London, H.M.S.O., 1932.

DISCUSSION

The paper was introduced by MACKENZIE, who described its contents by sections and made comments on each. The first section, he said, dealt with the function of a port market, considered as "an institution for the realization of certain external economies". These economies MACKENZIE took to be economies from the viewpoint of the secondary fishing industry, though BOWEN did point out the advantages of large-scale outlets to primary fishing enterprises.

BOWEN's paper began by setting out the basic function of a port market, and by pointing to and giving reasons for the wide diversity of arrangements that existed to carry out that function. In this section, MACKENZIE was struck by the fact that processing tended to be treated as a residual activity. In this respect the paper reflected European conditions. In North America, in contrast, the bulk of the catch was processed in one way or another and the fish dock facilities described by BOWEN were normally located on the premises of private processing firms. BOWEN discussed the significance of the development of the modern fish-processing industry. Freezing and filleting directly affected marketing at wholesale and retail levels, but the expansion of the processing industry, on the basis of these techniques, had had a profound effect on marketing at the primary level also. The optimum scale of operations in fish processing could be realized in relatively modest plants, but the stability consequently required in raw material supply called for large-scale concentration of fishing fleets. BOWEN's suggestion that freezing "also helped to solve the problem of the small ports" seemed to be in contradiction of this, unless he meant that it would lead to their disappearance.

BOWEN had also said that filleting was a striking example of the tendency for more processing to be done at the port and less near the point of consumption. It was, of course, well known that fish processing was a raw-material oriented and highly localised industry. But recently in North America the development of pre-cooking had given rise to an opposite tendency. There were, for example, instances of frozen blocks of fillets being transported to potato-growing areas for final preparation as packaged fish-and-chips.

The second section of the paper was concerned with selling methods and market structure. BOWEN here described the position in several European countries, then gave a detailed account of the situation in the U.K. He explained the concentration of landings in U.K. in a few large ports, and showed that while the number of buyers or port merchants appeared to be large, it was in fact declining and the trade was dominated by a few large firms. MACKENZIE said that a similar situation was to be found in Canada.

The paper went on to discuss the auction, by which the bulk of the fish landed in the U.K. was sold. BOWEN said that generalisations about fish auctions were difficult; they were not perfect markets but there was some kind of "equilibrium" price, the market was cleared of fish. He emphasised the need for skill and judgment on the part of buyers; MACKENZIE thought that this was probably a requirement in all such primary markets, for example the market for tobacco.

BOWEN's paper drew attention to the tendency for fishing companies

(trawler owners) to take on processing and wholesaling functions. The auctions persisted nevertheless, since fishermen remunerated on the share basis insisted on at least the semblance of competition among buyers of the catch. MACKENZIE found this of especial interest because there had been an opposite movement in Canada: processing companies had acquired fishing fleets. Here also the "fiction" of a free sale from the catching to the processing division of the enterprise was maintained.

At this point, MACKENZIE said that he wished to ask a question he thought pertinent: why was the fish auction so widespread an institution in Europe and so little known in America, and particularly in Canada? In Canada, about two-thirds (in value terms) of the total catch was sold at relatively fixed seasonal prices. These prices were set at the beginning of each season, either by negotiation or through the leadership of the larger firms. The Canadian fishermen seemed to have a strong interest in eliminating in this way one of the uncertainties in a business subject to a high degree of uncertainty. In other fisheries, notably those for lobster and freshwater fish, prices for the catch were determined by the export markets (chiefly New York and Chicago) and were subject to considerable fluctuation. Only a part of the catch of one single fishery (Pacific halibut at Prince Rupert), was sold by auction, and the fishermen there had been pressing for some time for a change to a fixed price negotiated each season.

BOWEN's reference in the paper to losses in the quality of fish due to bad handling was probably familiar to many of the group. In Canada, MACKENZIE associated the persistence of conditions conducive to bad handling with the ability of the industry to sell low-quality fish profitably. The mass markets were far inland and consumers there were unfamiliar with fish as it ought to taste. But the U.K. situation could not be explained in that way.

In the third section of the paper, BOWEN discussed the cost structure, of the U.K. wholesale trade in fish products, referring in the first instance to the wide and unpredictable variations in raw material supply (both short- and long-term) and the effect this had on overhead costs. MACKENZIE said that he himself knew of instances in Canada of processing operations "breaking even" at less than 50 per cent of annual plant capacity. BOWEN also said that at major ports the volume handled and the average price realized by the auction tended to move together. This indicated inelasticity of short-term supply - though BOWEN's graph did not seem to bear this out.

The wholesale trade in U.K. was not highly capitalised and appeared to MACKENZIE to operate with very small margins on a large turnover. The net mark-up on the raw fish price was about 20-25 per cent, on the basis of available data, and net profit on sales seemed to fluctuate around 1 per cent. In the Canadian filleting and freezing industry, in contrast, only a little more than half the price of the product f.o.b. plant represented the cost of raw material, and profit rates of 10 per cent and more on sales would not, MACKENZIE thought, be unusual. BOWEN explained the narrow British margins by the competitive character of the trade. His conclusion that the smaller and weaker firms would be likely to be shaken out as investment requirements grew was supported, in MACKENZIE's view, by American experience.

TURVEY suggested that the discussion began with auctioning, and HILDEBRANDT offered some comments on BOWEN's view that few generalisations could be made about the consequences of auctions and on MACKENZIE's question as to why there were so many.

Eighty years ago there were no auctions, said HILDEBRANDT. Fishermen sold to middlemen, and they then felt themselves to be in the position that the fishermen in poorer countries were in today. The auction was a concentration of the influences of supply and demand, and the fisherman could be sure of the best price possible in such circumstances since he would be selling in conditions of perfect competition. But BOWEN thought that there were difficulties with auctions, and the same had been said elsewhere. Was the auction in fact the best way for the fisherman to ensure a high price in present conditions? Freezing provided him with an alternative means of disposal in the case of distant water fishing. But what of the other (near and middle water) fishermen? In several European countries, the auction had been replaced by integration and control over prices. In diagram VII.4., which gave a growth curve, beyond L_1 the fisherman met an expanding market and then the auction gave him an optimal yield. Beyond L_2, however, he met a nearly saturated market, which meant lower prices as landings expanded. The same situation occurred in agriculture: farmers did not gain from good crops or expanding agriculture; this was the origin of agricultural co-operatives. The same sort of thing was happening in fishing: vertical integration and price regulation. Germany provided an example. In consequence, in the absence of such measures the fisherman would not get the optimal yield T at price M (diagram VII.5.) but a lower yield.

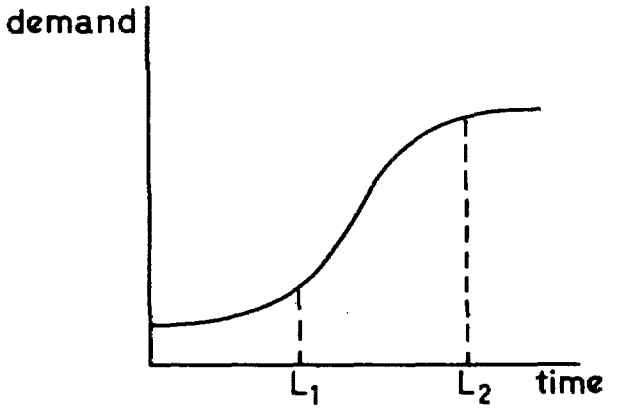


Diagram VII.4.

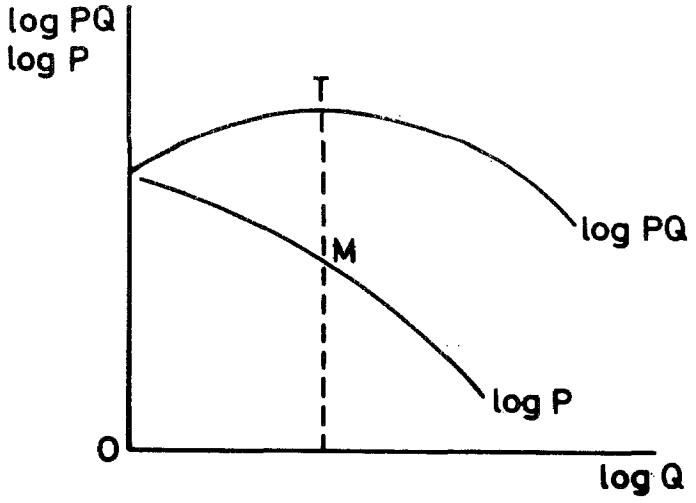


Diagram VII.5.

TURVEY commented that this meant that when landings were expanding fast, auctions began and were satisfactory as long as profits were super-normal. Afterwards auctions were replaced either by integration or by co-operatives. This raised the point, continued TURVEY, that restriction could possibly improve fishermen's incomes. This seemed to be the essence of HILDEBRANDT's support for a price of M. Only three alternatives to a fisherman's monopoly existed:

(1) A state organisation;
(2) Auctions;
(3) Fixed contract prices.

Their problem of explaining auctions was confined to cases where there was no State organisation and no co-operatives or vertical integration, as auctions were not feasible when these circumstances were present. The question of interest was: when did auctions develop, and when contracts? The Canadian example given by MACKENZIE was a case in point. Clearly, the auction system could not work where there were too few purchasers. Was this the situation in Canada? MACKENZIE said that it was. Then, continued TURVEY, the problem was to explain the persistence of auctions where the market was shrinking and oligopsony growing. The existence of the share system and of trade unions were possible reasons; were there others?

CRUTCHFIELD offered some suggestions. Some auctions persisted in the United States although they were known to be unsatisfactory because the concentration of buyers was such that they were able to influence market prices. There were several reasons for this. The most efficient size of fishing unit was often too small itself to create marketing firms as such. Or there might be substantive barriers to entry, such as the non-availability of dockage. The anti-trust laws had also made it difficult for the fishermen to intervene successfully in the marketing process by such means as forming co-operatives. Where such organisations could be formed, their success depended upon the possibility of bringing in enough groups to provide an orderly assortment of fish adequate for

the purposes of the co-operative. Racial and other social differences could make this very difficult. In halibut fishing, and also in other types of fishery, dealers were not themselves interested in fishing activity. They left this kind of risk to others, and restricted themselves to buying on non-competitive terms. The situation described by MACKENZIE might reflect the importance of canning, of dispersion, and of the isolation of buyers on the Pacific Coast. There had been similar developments (non-competitive buying) in Alaska until these were stopped by anti-trust action. An unofficial understanding was still in being, however, so anti-trust action against dealers was not really effective.

CRUTCHFIELD also drew attention to the practice of open-ticket pricing; a price was posted by the buyer and remained valid for 24 hours. He believed that the differences in the methods adopted were explicable in simple economic terms, though he had been surprised at the range of methods used. The markets described by BOWEN had more in common with U.S.A. produce markets than with the fish markets in that country.

HILDEBRANDT was invited to reply to the earlier criticism of his position. He said that United States fish consumption was very low - 5-6 kilogrammes per head per annum - but the market was expanding. The industry was nearly beyond point L_1 on his curve in diagram VII.4. In other countries, especially in Western Europe, fishing was protected like agriculture, and it was necessary to ask how fishermen could be assured of an optimum yield through the auction system in a saturated market and with an inelastic demand.

CRUTCHFIELD was puzzled about the propositions about expanding and stable markets. He was familiar with salmon and halibut fisheries using auctions in which landings had been declining or only stable. There was in these cases an incentive for fishermen to avoid competition wherever possible. But no immediate method of doing so was apparent, and the dealers on their side had no incentive to change.

VAN DYK said that an auction was like an exchange. All would agree on the desirability of a stock exchange, and auctions were equally useful; they were a means of obtaining a price indicator. He thought that one reason why auctions were more common in Europe than in America was that the centres of consumption were farther away in America and the direct influence of the consumer possibly less. In the Netherlands, for example, there was constant telephone communication between the auctions and the Belgian markets. These were neighbourhood markets; it was understandable that the organisation in America or in a country like Norway should be different. Also, in Western European fisheries it was not possible to assume an expanding market for each type of fish, though there might be an expanding market for all fish. At some time a particular species might be in strong demand. A week later the market could have declined.

This was the kind of situation, continued VAN DYK, that led to minimum prices. There was nothing like the defined Norwegian cod season in the case of Netherlands fish such as plaice or sole. This, together with the fluctuating demand problem just explained, meant that price fixing in Norway could be at a much higher level than in countries like Germany, Britain and the Netherlands. The aim of minimum prices in these latter countries was not to increase the price

level but to cut off the rock bottom in order to provide market stability for both fisherman and consumer; rock bottom prices were no good to either party. In the circumstances, the minimum price schemes used in the Netherlands and in Norway were not comparable.

SCOTT thought that the group should be asking what the auction did that no other system could do. If it was compared with contracts or price control, the auction was found to differ in that there could be several prices in a day and not just one. Why was this desirable? SCOTT made two suggestions:

(1) It was significant that the auction occurred where the fresh fish catch was important. The time of day, week and year were of importance, and a fluctuating price was wanted to allocate a fluctuating demand over time.

(2) Some species might vary in quality; BOWEN had described how this led to the sale of batches after auction at the Hull auctions. Contract selling by grade could overcome this difficulty if buyers and sellers were willing and able to trust the grader and to give him time. Otherwise, the auction system would be better.

POPPER said in elaboration of SCOTT that the effectiveness of the auction was a function of price elasticity of demand. Where buying was for processing and the price elasticity of demand was much lower, errors in pricing might be much less important than in other cases.

GERHARDSEN commented on the discussion in the light of Norwegian conditions. One reason why auctions were not used was the wide dispersion of ports and the difficulties of getting between them. It was also of interest that (as in Canada) the main demand was for processing. In the Winter-herring fishery identical herring was being sold to the meal, oil, salting and fresh herring trades. All offered different prices for their raw material. Then the buyers began to organise themselves. The price offered for fresh fish exports tended to be lowered to the expected meal and oil price. Selling organisations countered by trying to allocate catches so as to maximise the returns from all markets together. In such circumstances auctions would have been difficult even if the ports had been concentrated. GERHARDSEN agreed about the disadvantages of the present system of price-fixing, which (for the reasons given by VAN DYK) made it very difficult to get prices down. The Norwegian fishermen based their activities on the minimum price, and this could have unfortunate results in relation to exports. On HILDEBRANDT's argument, GERHARDSEN recalled that he had earlier pointed out the disadvantages of fishermen thinking in terms of prices rather than of income and profit. He did not think that the optimum revenue concept was given enough attention in fixing Norwegian prices; political considerations, notions of "social welfare" and so on were taken into account.

Turning to auctions, GERHARDSEN asked how far they provided a guide for production. Did falls in auction prices affect landings? In Portugal, maximum retail prices were fixed for popular species. The auction buyers were retailers. This took much time, and he saw no relation between price trends and quantities landed. The retailing and the auctioning were both regulated by the government; the auction consequently had too little flexibility to fulfil its purpose.

CRUTCHFIELD said he had one substantial point on auction selling. SCOTT and POPPER were right about the flexibility of the auction method. He could wish that their own auctions worked like those described by BOWEN. Auctions needed enough buyers and potential buyers to ensure a price-sensitivity, but they persisted when this was not so, because of the difficulties, already discussed, of alternative methods of selling. The development of modern freezing and other preservation techniques was likely to alter the situation because negotiated prices could probably be adjusted with sufficient flexibility for the new conditions. In the case of canning and perhaps fillets, contracts had great advantages for buyers as a means of keeping overheads (filleting, transporting, etc. apparatus and process labour) fully utilised.

CRUTCHFIELD also pointed out that the different prices for different uses discussed by GERHARDSEN need not be wrong if marginal revenues were equated. TURVEY said that what worried him about this was that a lower price appeared sometimes to be paid for fish for canning; it could be inferred from this that the elasticity of demand for canning was higher than for fresh sale. CRUTCHFIELD replied that it depended on the individual instance; no generalisation was possible. GERHARDSEN gave an illustration: in the 1930's the Norwegian price for fish for oil and fishmeal was lower than the price for other uses. That situation had now been reversed as a result of technical improvement.

TURVEY turned to the question of whether there were too many retailers, asking SCOTT to comment on BOWEN's position. SCOTT referred to CRUTCHFIELD's mention of potential buyers. If wholesalers were competing to sell to retailers, there could be continuous potential competition. The situation was different if it was known that the same people must do the buying. BOWEN intervened to ask what the "potential" buyers who did not actually buy lived on? SCOTT thought they lived on very little. CRUTCHFIELD said that if there were only a few buyers they could use such devices as equal bids and share catches among themselves. In such ways, what might seem like a socially useful device for stable marketing became a source of harmful control.

BOWEN said that he had valued the comments on the ways in which the marketing organisations in other countries differed from those described in his paper. But he had found the discussion disconcerting because for some time different universes seemed to have been under consideration. SCOTT's formulation encouraged his own belief that there were characteristics specific to auctions and general points to be made about them. He would instance the tremendous size of the markets concerned and the fact that they were mainly concerned with fresh fish. He had described in his paper a very large mass market - much larger than the market to be found in any other port. BOWEN was sceptical of the possibility of freezing taking 100 per cent or even as much as 50 per cent of the total catch in areas with large populations living within 100 miles of the coast as in Great Britain. It was therefore of interest, he considered, to know whether the auction method must persist despite its disadvantages.

BOWEN thought that the point about quality raised by SCOTT was important. Other systems could work if grading were possible, but there were not just simple graduations in quality; the catch could show variations even within each boat's catch. This was the trade defence of the system. He was not saying

that a grading system could not be worked out, but it had not happened so far. Had any other large market done it? The first reaction of the visitor to a port market was horror at the muddle and confusion. But the system worked, and, given the nature of the market set-up, it was governed by one simple economic motive. BOWEN asked the group to consider the position of a trawler owner who had a load of fish arrive at 2 a.m. What was he to do? There was only one answer, to get rid of it quickly. This was happening every morning.

Trawler owners were not worried about disposing of their good fish: this could always be sold, although the price might vary, and in any case it comprised only 5-10 per cent of the total catch. The problem was the disposal of the marginal fish, and it was here that one found the economic incentive that produced a dirty filthy market in which barrow boys could pick up cheap poor quality fish. The problem would not disappear with an alternative marketing organisation. BOWEN also drew attention to the fact that the bigger markets were still growing in size, despite the apparent muddle. Trucks were used to transport fish from Scotland for sale in Grimsby. No doubt this was not entirely technically efficient. But how was the growth to be explained?

In respect of minimum prices, BOWEN said that he was not sure about the results, but so far as he could judge the price was fixed at the average cost of landing fish over the year, which was what the trawler owners claimed. This referred to cod; it was difficult to explain the higher minimum prices of plaice and sole except on the basis that the scheme was used to protect differentials as well. But there was certainly no attempt to obtain a monopoly price for cod.

CASSADY asked if the costs of landing each type of fish could be assumed to be the same. Could there not be differences due to numbers found, variations in handling costs, etc.? BOWEN replied that no real differences of this kind could arise where the fish were all landed from the same boat. Plaice and other fish had to be regarded as a by-product; the data he had referred to related to the average costs of middle-water fisheries.

HILDEBRANDT said that in the Netherlands price was not based more or less on costs, as in the case discussed by BOWEN, but was determined by the inflexion point of the demand curve. This gave optimal yield and optimal consumption. TURVEY asked for care in distinguishing what was said and what was done, and BEEVER (FAO) said that there was much misinterpretation of the meaning of a minimum price; the minimum price discussed by BOWEN was one below which trawler owners refused to sell. If unable to get it, they disposed of the catch for fishmeal at less than half the minimum price.

CRUTCHFIELD asked for an explanation of the Dutch minimum prices; was there a support price at which the government bought? VAN DYK said there was not. The support had been supposed to be at a level covering out-of-pocket expenses, but had then been raised. The buyer must pay the support price. CRUTCHFIELD asked the speaker what happened if not all the fish was bought, and was told that it went to the fishmeal manufacturers. BEEVER asked if there was not a price-equalisation scheme to take care of this? VAN DYK agreed; a self-supporting fund paid the difference between the support price and the fishmeal price.

CRUTCHFIELD said that BOWEN had suggested that the handling methods that he described were economically rational. Did this mean that the more valuable fish got better treatment? BOWEN replied that in fact high quality halibut were badly handled before sale because the facilities were oriented for the handling of cod. One great problem of the mass market was that the low-quality fish determined the character of the trade; this was clearly brought out by a comparison of the mass cod market organised for the fish and chip trade and the nearby port markets organised for handling high quality fish. These small ports complained of their inability to get a differential for special handling because this was not recognised. They had no protection against the "bias" of large ports competing "on the side" in the quality fish markets. The problem had so far proved insoluble; the "high quality" ports had needed grant and loan schemes to keep going.

TURVEY suggested that there was an incentive to good handling only if those concerned stood to gain from good conditions. The merchant had such an incentive, but if the handlers were paid by the hour they did not. This was the reason for bad handling and poor condition. In relation to BOWEN's description of the position of the small ports, was it not a waste of resources to treat the fish better if the consumer was not prepared to pay?

BOWEN explained that it was a question of knowledge at the point of sale. If the buyer had the necessary knowledge, he might discriminate. But how to find out? And how to discover a retailer to sell the good fish? Retailers tended to "buy down" because they got their fish so much cheaper that way. This might work well in the short run but was harmful to the trade in the longer run as it encouraged a long-term decline in consumption.

CASSADY asked if rough handling might not improve quality if it increased speed. Did damage to the flesh which affected appearance arise from early handling?

BOWEN said that bruised fish went off more quickly, and CRUTCHFIELD cited the case of salmon caught in trawls for the fresh market. This catch was very carefully handled; an expert buyer could still spot fish caught by gill-net. CRUTCHFIELD thought, however, that TURVEY's point about consumer demand was a sound one. Countries differed in their demand characteristics and it was these that determined and justified different types of handling.

SCOTT GORDON argued that not only high but also a more certain quality of fish was important. The low consumption of fish in America was in part due to the inability of consumers to rely on quality.

Quality did carry a differential in the Netherlands, said VAN DYK; the first quality might be twice the price of the second. It was wrong to say that consumers were unwilling to pay. Their willingness depended on the nature of the market; Great Britain was a closed market, unlike those in other West-European countries where there could be a very quick response to quality differences.

VAN DYK also commented on the number of wholesalers. BOWEN's paper

made it clear that there were too many. This was because the functions of some wholesalers no longer existed. They had ceased to be true wholesalers and became executives, for example packers.

BOWEN had discussed some of the consequences to be expected as a result of the development of deep freezing. VAN DYK said that the development would also increase wholesalers' investment because refrigerated vans would be required for transport. On the other hand, costs could be decreased because there could be more selling points than for fresh fish; the frozen product could be handled by people like greengrocers. This also meant that total consumption could be expected to rise both because of the convenience of frozen fish and because of the additional selling points. Overall, freezing would probably reduce the distribution costs of wholesalers.

VAN DYK turned to BOWEN's argument that annual fluctuations might have serious effects on the position of wholesalers. He (VAN DYK) disagreed. There might be effects on retailers or fishermen, but the wholesaler did not need to stock fresh fish and so need not lose.

Finally, in relation to the disposal of offal, VAN DYK's own studies had led him to conclude that the price obtainable for offal in Holland was just equal to the cost of filleting fish.

BOWEN asked if Holland could be thought of as one market for fish. VAN DYK said there were many markets. BOWEN explained that he had mobility in mind; in Great Britain, if a merchant in Milford Haven was doing badly he would not move to Grimsby. VAN DYK agreed that there might be considerable mobility of this type in Holland.

MACKENZIE asked if VAN DYK's filleting cost was the whole processing cost, and was told that it was the labour cost of cutting. BOWEN asked what the relevance of the information was. Was it to say that the price of offal in Holland was higher than in Great Britain? If so, it must be realised that the British fishmeal factories were jointly owned by processors and trawler owners. What was paid for offal was not important, as the fishmeal price could be adjusted. CRUTCHFIELD added that offal prices were also a function of the degree of concentration. Salmon factories did not use offal because they were too dispersed. Similarly, in Pacific ports the offal was given away free to collecting firms in order to save disposal costs.

VIII. THE MARKETING OF FISHERY PRODUCTS IN THE UNITED STATES

by Ralph Cassady Jr.

1. INTRODUCTION

This paper attempts to provide an overview of the marketing of fish and fishery products in the United States of America. In preparing the study, the author has tried to present an over-all picture of the way fish and fishery products move from producer to consumer and to show the changes that have been taking place in the marketing of fish in this country during recent years. As part of the marketing picture an attempt has been made to arrive at some appraisal of the present and future markets for fish in the United States. In short, the paper is a case study of marketing and consumption behaviour in one country with possible applications to other areas.

2. CHARACTERISTICS OF THE PRODUCT AND THE MARKET

As this author has stated elsewhere, considerable light can be thrown on the nature of the competitive structure of an industry merely by studying the characteristics of the product under consideration. (1) That is, the characteristics of the product have an important bearing on the number and types and locations of distributive outlets, the attitude of consumer-buyers toward various offerings, as well as other equally important factors such as the amount and type of regulatory and fiscal legislation which is required from the standpoint of social welfare.

Fish is defined in Webster's (2) as "Any of numerous cold-blooded, strictly aquatic, water-breathing, craniate vertebrates having the limbs (when present) developed as fins, and typically a long somewhat tapering body covered with scales and ending in a broad vertical caudal, or tail, fin." Fish are found in numerous varieties in various parts of the world. The flesh of fish, like meat, cheese, poultry and eggs is a high-protein, tissue-building food product which has been used as a main item in the diet of human animals since time out of mind. Basically fish is just as good a food as the other principal high-protein products (3) (perhaps better in certain respects) (4) although food values vary among species.

Fish is a generic term which includes many different varieties of water-breathing vertebrates. The various species may be classified on a basis of use - edible, and to a lesser extent, industrial. From the standpoint of their use as a food, one might classify various species as fresh water and salt water fish

(1) Ralph Cassady, Jr. and Wylie L. Jones, The Nature of Competition in Gasoline Distribution at the Retail Level, Berkeley, University of California Press, 1951.

(2) Webster's New International Dictionary, 2nd edition, Unabridged.

(3) Generally speaking, fish contains significant amounts of protein, fats, minerals (calcium, phosphorus, iron, copper, iodine and sulphur) and essential vitamins (A, and B Complex).

(4) For one thing, it is a superior source of minerals, particularly calcium and iodine. Also, while high in protein, fish is relatively low in calories. (Lenna F. Cooper, et al., Nutrition in Health and Disease, 12th edition, Philadelphia, J.B. Lippincott Company, 1953, p.526). See footnote 80 below.

or as groundfish and surface-dwelling fish, or as finfish and shellfish. Each major category contains many different varieties. There is, of course, basic homogeneity among the several types of fish but substantial differences in flavour and texture which affect taste preferences. These differences in consumer preference, combined with varying supply conditions, affect the value of the product. Some varieties of fish bring a very high price (salmon) and others can be sold only at a low price (ocean perch).

This product is derived from a resource which is freely exploitable without payment for its use. This does not necessarily mean that harvesting costs are low. The gathering of the product requires highly specialized and often costly production facilities. Moreover, like mining, the resource is not limitless. It seems well established that the continued fishing has an effect on the supply of fish. (5) The international aspect of the fishing operation complicates the regulatory task because no one country's efforts are likely to be effective without the co-operation of the others.

World supplies of fish are concentrated mainly in the North Temperate Zone, principally on continental shelves and banks or shoals where feed is abundant (e.g. North-West coast of America, Grand Banks, North Sea, North-East coast of Asia, etc.). The main source of supply of fish in the United States is limited to a number of major grounds. These sources supply the contiguous markets and distant deficit areas as well. It would appear that the supply of fish is inelastic in the short run but possibly expansible in the longer run. except, of course, to the extent that inflexible quotas are in effect. Considering the many varieties and preferences for fish no one production area is entirely self-sufficient, hence shipments are made from one supply area to another, particularly at certain seasons of the year. The product is a commodity of high enough value in relation to bulk to justify long-distance transportation, especially for certain varieties and at certain times.

Fish is a highly perishable product, but one whose quality can be preserved (at least partially) by proper handling and care. (6) However, unless proper precautions are taken, the product starts deteriorating immediately upon withdrawal from the water. (7) To the extent that any deterioration has taken place, quality can never be restored. Even that portion of the catch which is to be canned, frozen, or cured must be carefully handled and protected before processing if quality is to be maintained. This need for protection against deterioration, combined with the fact that fish are caught in distant places and must be transported by rapid means to the point of consumption, adds substantially to the cost of distribution of the fresh product. Moreover, because of the danger of deterioration, the product is subject to governmental regulation in the

(5) H. Scott Gordon, "The Economic Theory of a Common-Property Resource: The Fishery", Journal of Political Economy, April 1954, p. 126. However, over-fishing will not result in extinction of a species because long before the fish disappear entirely fishing operations will become uneconomic, and hence will be discontinued.

(6) Regardless of the care given to the commodity, the quality of fresh fish can be maintained only for about twelve days. If the fish are frozen instead of being merely chilled, spoilage can be arrested. but only at a risk of injuring cells, thus impairing the quality of the product in the process.

(7) Fatty fish are particularly susceptible to rapid deterioration.

form of inspection and confiscation of spoiled goods. (8)

Unlike some products (e.g. gasoline) fish is not a single-use commodity. While its use as a food is of great (perhaps paramount) importance, the product is used also as a source of oil and in the manufacture of meal for animal feeding, (9) as well as for the materials which compose the basic products used in other manufactures (e.g. paint). Fish may be thought of as multi-purpose in another sense as the product is sold fresh and for canning, curing and packaging. Thus, even when used as a food the product may be classified as an industrial good at an early stage in the marketing process.

Because of variations in supply, fish prices fluctuate greatly at the wholesale level. (10) Fish lends itself very well to quick freezing, (11) with resulting preservation of quality and tendency toward greater price stability. (12) Fish is a transitory good which, as in the case of other foodstuffs, is consumed in use, and may be classified as a repeat-purchase item. The product differs from some other transitory goods (e.g. cigarettes) in that it has many substitutes and hence may not be purchased often or at all by some individuals and even peoples because the basic want is satisfied by the use of another food. Indeed this high-protein food product, while superior in some ways to other such products (e.g. meat, cheese, or poultry), is in some localities at a disadvantage as compared with other high-protein foods, in terms of consumer taste preferences. As

(8) This consumer-protective function in the United States is divided among federal, state, municipal, and county agencies, although each has a certain area of responsibility and works co-operatively with the others.

(9) While some of the non-food manufacturing is a by-product activity, some varieties of fish (e.g. menhaden) are utilized almost exclusively for non-food uses (e.g. meal and oil).

(10) Interestingly enough, however, fresh fish prices remain quite stable at the retail level. This is made possible, according to one competent observer, by a generous mark-up which allows for the absorption of price fluctuations.

(11) "Quick freezing" is a process instituted first in Europe and developed in the United States after its introduction in 1918. The time consumed in this process may vary from an almost instantaneous result to one hour or more, depending on the method used and size and composition of the commodity involved. It is accomplished by one or a combination of the following techniques: (1) direct immersion in a refrigerating medium, for example, through brine freezing; (2) indirect contact with a refrigerant, as by conduction through metal plates; (3) convection in a blast of cold air.

During the 12 to 14 hours ordinarily required for slow freezing of fishery products, most of the water content of the commodity separates into large ice crystals. When thawed, much drip or leakage occurs, often resulting in denaturation or the loss of soluble proteins and other nutrients and flavourous components, leaving the fish dry and flavourless.

The rapidity of quick freezing, in contrast, preserves a high degree of fresh flavour because it prevents the rupture of the food cells by the ice crystals which, in this process, are very small and which are reabsorbed at the time of thawing, thus retaining the texture and flavour of the fish. In addition, decomposition is arrested earlier where the products are quickly cooled below the temperature at which bacterial, mould and yeast growth occur.

While the quality of quick-frozen foods is higher than that of slow-frozen commodities immediately following freezing, deterioration takes place during the storage period. The result is that quick- and slow-frozen samples approach each other in quality as the storage time increases and eventually (perhaps in 9 months) no difference between them can be detected.

(12) Frozen products lend themselves to use as "buffer stocks", thus facilitating a more even flow of supplies onto the market and hence a greater stability of prices than if foods could not be held over.

a complication to the marketing of this product, in some areas the demand for fish varies during the week and even during the year because of certain deep-rooted religious beliefs and practices. (13)

Unlike meat, (14) the product is one for which few if any standards of quality prevail. (15) This is true of fresh fish (16) as well as of frozen fish products. (17) Fish is a product that must be prepared before it can be consumed, and hence some knowledge of methods of preparation may condition demand.

Marketing functionaries handling fish are highly specialized at the processing and wholesale levels. At one time much of the fish sold in the United States was sold through retail outlets specializing in the sale of fish and related products. The product is, to some extent at least, an impulse item which is purchased on the spur of the moment as a result of some promotional stimulus or suggestion at the point of sale.

We do not know much about the precise shape of the demand curve for fish. We know, of course, that unlike the demand for durable-consumption commodities the demand for this product does not tend to be dissipated as the result of con-

(13) According to White (Donald J. White, The New England Fishing Industry, Cambridge, Harvard University Press, 1954, p.116): "Between 1939 and October of 1951, the one-day-a-week characteristic of fish demand diminished considerably in importance, though it did not cease to operate as a factor in fish marketing. Using the questionnaire method, Fish and Wildlife officials found that nationally only about 34 per cent of those interviewed served fish particularly on Friday; about 58 per cent of the housewives indicated that they do not have any particular day on which fish is served. The change in consumption pattern was substantially less, however, in the high-consumption northeastern United States region. In October 1951 in that area about 50 per cent of those interviewed chose to serve fish particularly on Friday".
It is interesting to contemplate the over-all effect on the consumption of fish of a one-day-a-week religious restriction of meat. It may increase consumption (because the use of other products is restricted and fish will be substituted) or decrease consumption (because consumption of fish is largely confined to the one-day pattern rather than eaten throughout the week). It is interesting, too, that the latter point of view is not without support by students of the fishing industry.

(14) In the United States meat is sold on a basis of five grades: Prime, Choice, Good, Commercial and Canner and Cutter.

(15) This is true at least in the United States. Hence, one might find goods sold as fresh when actually they they have first been frozen and then thawed just before being offered for sale in retail stores.

(16) This is not to say that the fish are not graded at all. Certain varieties of fish (e.g. halibut and lingcod) are graded at the time of the initial sale, but only on a basis of size.

(17) One large retail vendor reports that he was offered a supply of breaded shrimp whose sample revealed that the product was 69 per cent cereal. Selling bread worth 17¢ per lb. as shrimp worth 80¢ per lb. should be a very profitable business.
According to trade paper reports, there has been some move recently toward the establishment of governmental standards for certain fishery products. See "What Pacific Packers Wanted to Know About Fish Sticks Standards," Pacific Fisherman, May 1956, p.17. One large American chain food concern, with which the author is acquainted, has established its own quality standards and purchases its own fishery products on a basis of the specifications for each item they buy. These specifications include the species or type of raw material to be used, the flavour, odour and colour, the degree of temperature used in freezing the product, etc..

sumer purchases. (18) We know, moreover, that the demand for fish unlike that for automobile tyres, for example, is direct rather than derived. The latter point is particularly important because it means that the market tends to be more responsive to price adjustments than if the demand were derived and that the demand for fish is subject to manipulation by direct promotional effort aimed at increased use of the generic product as well as of particular brands.

Our knowledge of the degree of price elasticity of demand for fish is sketchy also. We believe that the demand for fish possesses a considerable degree of elasticity because of the competition between fish and other high-protein foods, especially meat. (19) However, as will be pointed out later, we think that the demand curve for fish in the United States as it relates to that for meat may possess certain peculiarities because of the existence of a strong preference for meat among American consumers. (20) We suspect, moreover, that this tendency toward a high degree of elasticity of demand for fish may be affected, to some extent at least, by the existence of religious restrictions which limit shifts to substitute products, (i.e. that some fish may be purchased despite relatively high prices because of an injunction by the church against the use of meat at certain times).

It is an interesting fact that the demand for fresh fish has been considerably greater in and around the primary market areas than in more distant areas, although this is probably less true at present than it was formerly. Consumer-buyers of fish are, of course, joint purchasers of other food products. The product is purchased largely by the housewife at the time other foods are bought. Moreover, the product is typically purchased on a hand-to-mouth basis, although it can be purchased in larger quantities and stored in deep-freeze cabinets for later use. Although consumers are likely to be well informed about the comparative prices of various high-protein foods, they may be inadequately informed about the advantages possessed by fish in the dietary programme. The latter point suggests that the demand for this product may be expansible if the use of the product is intelligently promoted by functionaries having some interest in consumer welfare as well as in individual gains.

3. MARKETING CHANNELS FOR FISH AND FISHERY PRODUCTS

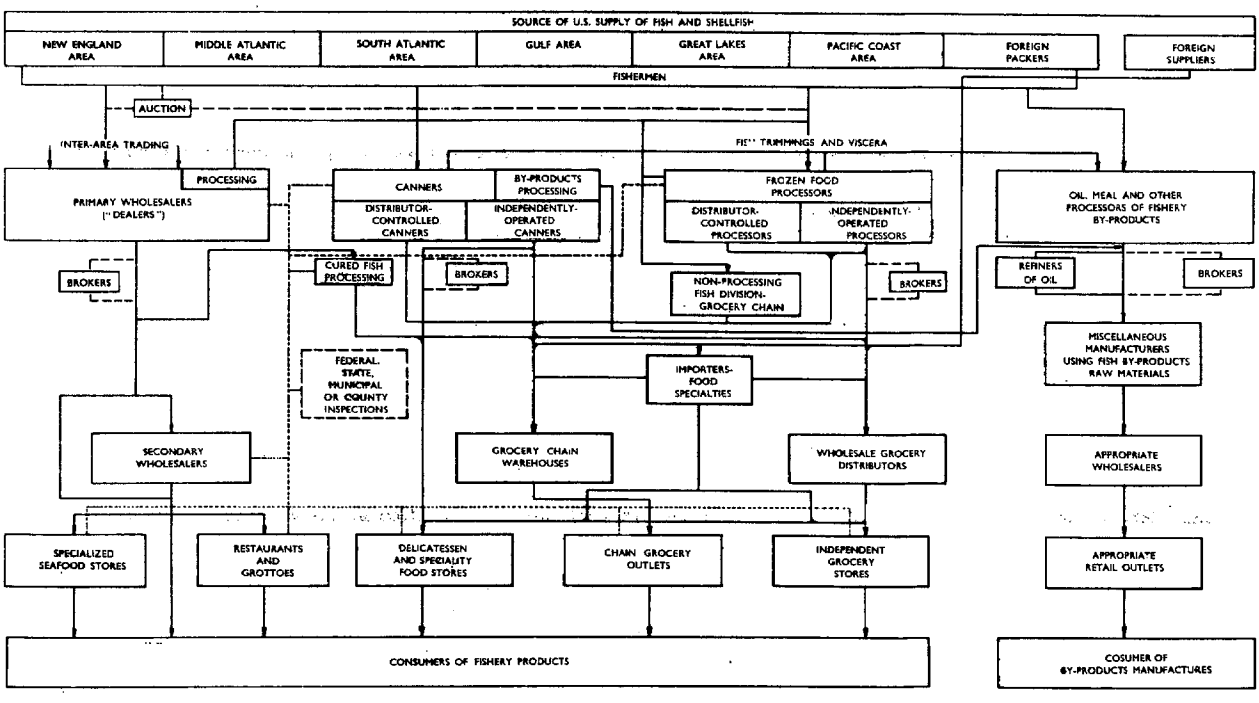
To a very considerable extent fish is caught at great distances from the places of consumption. Since goods cannot be consumed unless they are

(18) See, for example, O. Morgenstern, "Demand Theory Reconsidered", The Quarterly Journal of Economics, February, 1948, pp. 170–171.

(19) It would appear a priori that there is a substantial degree of cross-elasticity between fish and substitute foods, and indeed among different varieties of fish as well. In its simplest sense cross-elasticity means the elasticity of demand of one product (or brand of product) in terms of the price of another. This apparently simple concept becomes very complex when we consider that in realistic marketing situations the impact of a price change often is not confined to one rival but may extend to several and so there are differing cross-elasticities between one product and its several rival commodities, or even between the product of one seller and those of rival sellers. It is interesting, therefore, that the product of one seller may possess a high degree of elasticity while the degree of cross-elasticity between his product and that of any one rival may be low.

(20) This idea is expanded in Section 5 below.

available for use at the time and place needed, certain marketing functions of acquiring possession, transportation, storage, etc. must be performed before the product is rendered usable. It follows, then, that these marketing services are essential to the fulfilment of the production (i.e. utility-creation) function.



Source: First hand market investigation by author supplimented by miscellaneous bibliographical materials.

Diagram VIII.1.

Marketing Channels for Fishery Products in the United States-1956

Diagram VIII.1. is an attempt to depict the marketing channels for fishery products in the United States of America. The various types of functionaries are depicted as rectangular boxes: each represents hundreds of concerns in widely scattered markets. The product moves from fishermen through the various distribution levels to the final acquisition by the consumer. Solid lines between the boxes indicate physical movement or change of title, usually both. In preparing the diagram the author has expanded the usual concept of channel charting by including the activities of those who arrange change of title as well as those engaged in the physical movement of goods. This former activity (usually carried on by brokers) is indicated by broken instead of solid lines.

It should be clear from the presentation in diagram VIII.1. that there are several principal primary sources of fish in the United States. Thus the largest volume of fish for human consumption and by-product use comes from New

England, (21) the South (22) and Middle Atlantic Coast (23) (including Chesapeake Bay), (24) the Gulf ports, (25) the Great Lakes area (26) and the Pacific Coast (27) (including Alaska). In addition, considerable quantities of fish are imported into the United States from foreign countries. (28)

Fish is often initially sold in the United States (as in many other countries) through auctions located on landing markets during which buyers bid for particular lots (29) of the commodity. (30) Generally speaking, fish is initially purchased either by primary wholesalers (dealers so-called) or by processors of various types (particularly canners and frozen fish packers). Those purchasing fish directly from fishermen perform the essential marketing functions of assembling quantities of the product, accepting title, storing and protecting the commodity until needed (hence assuming risk) and subsequently distributing these supplies in smaller lots to other functionaries who ultimately transfer them to consumer buyers. It should be noted that, in the distribution of fresh fish, wagon jobbers (who sell to retail stores) and peddlers (who sell to consumers) sometimes short-circuit orthodox functionaries. (31) It should be noted

(21) New England key species: groundfish (cod, haddock, hake, pollock, and cusk), rosefish, flounder, sardines (Atlantic sea herring), whiting, clams, lobsters and scallops.

(22) South Atlantic Coast key species: bluefish, bullheads, catfish, mullet, spot, Spanish mackerel, crabs, oysters, and shrimp, and for industrial purposes, menhaden.

(23) Middle Atlantic Coastkey species: butterfish, flounder, haddock, mackerel, scup (porgy), shad, sea trout, whiting, clams, and oysters.

(24) Chesapeake Bay area key species: croaker, scup, shad, sea trout, striped bass, crabs, and oysters.

(25) Gulf Coast key species: red snapper, crabs, oysters, and shrimp.

(26) Great Lakes key species: carp, chubs, cisco, lake herring, lake trout, sheepshead, sucker mullet, whitefish, yellow perch, and yellow pike.

(27) Pacific Coast key species: salmon, sardines (pilchards), mackerel, tuna, rockfish, flounder, halibut, lingcod, sablefish, smelt, crabs, and oysters.

(28) This is especially true since the general price level increased reducing the effectiveness of the specific rate on fish. In 1951 imports of groundfish fillets into the United States reportedly amounted to about one-third of the total U.S. market for this type of product (White, op.cit., p.6) and by 1954 these imports had increased to about 40 per cent of the market (U.S. Fish and Wildlife Service C.F.S. No. 1129), Packaged Fish-1954, Washington D.C.)

(29) In some countries, the auction system differs considerably from that found in the United States. For example, in Portugal, reportedly, the descending system is utilized, that is, the bidding descends downward rather than upward. (Fish Marketing in OEEC Countries, Paris, Organisation for European Economic Co-operation, 1952, p. 153). In Trieste, to take another example, wholesale prices are arrived at by secret auction, that is, prices are whispered in the ear of the auctioneer. (Ibid., p. 172).

(30) Some of the exchanges in which fish are sold at auction have been indicted by the United States Government for alleged restraint of trade and price-rigging activities under the Sherman Antitrust law. For example, see U.S. v. New England Fish Exchange, 258 Fed. 732 (1919); motion to modify decree denied 292 Fed. 511, Jan. 1923. See also U.S. v. San Pedro Fish Exchange, Civil 1772-B, complaint filed under Section I of the Sherman Act Sept. 15, 1941; Consent Decree issued Sept. 15, 1941. See in addition U.S. v. Seattle Fish Exchange, Inc., Civil 612, complaint filed under Section I of Sherman Act, Nov. 10, 1942; Consent Decree issued Nov. 10, 1942.

(31) Thus, it will be noted that channel lines at times not only indicate movement of goods through certain functionaries but also show circumvention of such functionaries and sale to a buyer one step closer to the consumer. This merely means that while the functionary next in line is usually employed, some vendors sell direct at least part of the time.

also that the primary wholesaler may conduct certain processing operations (such as mild curing, filleting and quick freezing) in addition to his marketing activities.

As can be seen from the diagram, there are five principal forms of fish and fishery products moving into the distribution channels - fresh fish, canned fish, frozen fish, cured fish, and fishery by-products. Thus, the product moves either as fresh (or frozen whole) fish through primary wholesalers, then through secondary wholesalers, and to retail outlets and restaurants; or as processed fish through wholesale distributors, and then to retail outlets and the ultimate consumer. The product of each primary functionary (marketer as well as processor) may be differentiated either by brand promotion, or by a reputation for a superior product or service. As can be seen from the diagram, the raw material for by-product processing comes from canners, (32) frozen fish packers, etc. and the resulting products move with or without the use of brokers through appropriate wholesale distributors and retailers to the ultimate consumer.

Primary wholesalers, as the term suggests, are the initial purchasers of the commodity, and because different varieties of fish originate in different areas, a considerable amount of inter-market trading takes place among primary wholesalers. (33) This is depicted in the diagram by arrows indicating the flow of product among "dealers". One inadequacy in the portrayal of diagram VIII.1. is that it does not clearly depict the relationships among primary wholesalers located in various surplus areas and the relationships between primary wholesalers and secondary wholesalers located in surplus and deficit areas respectively. (34) Another inadequacy is the absence of any attempt to depict the varying activities of many hundreds or even thousands of firms with differing policies and practices in connection with integration, procuring supplies, seeking markets, etc.

As was mentioned earlier, the harvesting and the consumption of fish often occur at widely separated points. Moreover, fresh fish is a highly perishable commodity and from the very moment it is caught it must be protected against deterioration. In this segment of the industry, the solid lines connecting the various functionaries represent high-speed transportation facilities. It should be obvious that it is fundamentally costly to store, transport and market merchandise of this character in its fresh state. This is particularly true where the market is thin (i.e. where the demand is not intensive) or where the goods transported contain a large portion of waste or low-quality material (trimmings and viscera).

The combination of rapid-transit shipment of a product over long distances in small quantities, the protection against deterioration, and the burden

(32) Some canners conduct their own by-products operations and thus have no raw material to sell.

(33) Economically this trading makes possible the consumption of particular varieties of fish in areas which do not produce such varieties, and the regular consumption of varieties unobtainable in a particular area at certain times of the year. Again, marketing makes possible the consumption of a commodity by making the goods available at the time and place they are needed.

(34) Actually, a single-plane presentation cannot adequately depict spatial differentials while showing movement from one distribution level to another.

of expense of paying for shipment of waste material makes for high marketing costs. (35) The expense involved in the distribution of fresh fish undoubtedly causes some vendors to seek lower-cost methods of protecting the goods from deterioration - freezing, then thawing out the frozen commodity before sale is finally made. This prevents spoilage but in the process seriously impairs the flavour of the product.

A large proportion of fish marketed in the United States is sold in the form of tinned goods. As can be seen on the diagram, canning concerns purchase fish direct from fishermen and then process it. Some of the canners (perhaps most) are unaffiliated with any retail concern, but some conduct either integrated or semi-integrated operations. (36) Tinned merchandise, of course, has no quality-protection problems after the commodity is placed in cans. Thus the product simply becomes another of the hundreds of grocery products moving through orthodox channels towards the retail outlets and thence to the consumer-buyer. Cured fish (now a relatively unimportant product in the United States) is sold either direct to retail stores (largely delicatessens) or to specialty distributors, who in turn sell to retail outlets. The cured-fish operation is placed below the level of the primary purchasers on the chart because raw-material supplies are acquired from wholesale dealers rather than directly from fishermen.

Frozen-fish processors differ greatly in type. Some are filleters and packers of ready-to-cook products. Some are processors of frozen ready-to-heat products. Moreover, some are independent of any retail operation and others are integrated with chain concerns. As the diagram suggests, the frozen fish processors (depending to some extent on the type) may buy their requirements from fishermen or from dealers or both. Some companies (e.g. The Great Atlantic and Pacific Tea Company) buy direct in some areas but not in others. It should be noted that a non-processing fishery products division of a chain store operation (such as that conducted by Safeway Stores, Inc.) may purchase certain products (e.g. fillets) from primary wholesalers and others (e.g. fish sticks) from processors. (37)

As can be seen from the diagram, there is a secondary level of marketing functionaries through which the several forms of product flow. These include secondary wholesalers of fresh products, wholesale grocery distributors and chain warehouses for the canned and frozen products, etc. These functionaries are widely deployed and strategically located to adequately serve the tens of thousands of retail outlets in the various communities throughout the country. The main functions of these distributors are searching for and acquiring supplies of product, storing them until the time they are needed, protecting them from deterioration, seeking out buyers, transporting products to the points where buyers

(35) According to White (White, op. cit., p.5) "...the distribution system for fish has tended to absorb a high percentage of the retail price. New England interests have stated that wholesale mark-ups of 30 to 40 per cent and retail margins of 50 to 100 per cent have not been unusual."

(36) They are, in other words, owned by food chains or are contractually obligated to such firms to provide merchandise on a specification basis.

(37) These products are sold under the distributor's own (private) lable. The typical arrangement is for the chain concern to purchase the commodity on a basis of specification, the buyer furnishing the overwrap labels to be attached to the distributor's own packaged product.

are located and to some extent at least financing the operation.

One of the most striking aspects of the marketing of fish in the United States is the heavy reliance placed on brokers of various types in the several distribution channels. While the use of brokers is not universal, heavy responsibility is placed on brokers in the food field in the United States because the many thousands of supply sources and purchasers are scattered throughout a wide geographical area and specialists are required to bring them into touch with one another. (38) The broker (whose relationship to the marketing channel is indicated by a broken line in the diagram) is not a merchant who takes title to the goods but is rather a functional middleman who brings buyer and seller together and arranges transfers of title. (39)

As in other fields where they are employed, brokers in the fish industry may stress buying or selling or both. More specifically:

(a) They may seek out supplies for marketers (i.e. they are buying brokers).

(b) They may seek out buyers for supplies (i.e. they are selling brokers).

(c) They may combine both functions, acting in one capacity in the handling of one transaction and the other in another.

The stress on buying or selling by brokers is determined largely by the conditions of the market. When supplies are short (as in war time), brokers usually emphasize seeking out supplies. When supplies are plentiful, brokers stress finding buyers. Getting buyers and sellers together obviously is an extremely important function, because without it goods, otherwise ready for use, would not be available for consumption.

There have been many new developments within the past quarter century which have caused a revolution in the distribution of fish in the United States. These include quick freezing, filleting, the use of fast refrigerator trucks, and the development of ready-to-cook and even pre-cooked products. (40) These changes have been accompanied by the offering of the product in packaged form under a manufacturer's or distributor's brand name rather than unbranded as was common earlier. Consequently more and more in the United States sale of fish at retail is shifting to general food stores. This type of food, therefore, is offered jointly at the retail level with other foods, and different varieties of fish are offered under different suppliers' brand names in each retail institu-

(38) This is not to suggest that brokers are utilized in all transactions and by all firms but merely that in this field such functionaries are available and that at times heavy reliance is placed on them in obtaining supplies or finding markets.

(39) However, some "brokers" in this field may actually take title to goods. To the extent that "brokers" accept title to goods they become merchants, and, technically, the lines from and to other functionaries should be solid instead of broken. This particular phase of their operations is not illustrated on the diagram.

(40) One must conclude a priori that firms specializing in the fresh fish field have to a considerable extent hedged the impact of this change by undertaking additional marketing (e.g., storage) or processing functions (e.g., filleting).

tion. (41)

It should be clear even to the casual observer of the American scene that the sale of quick-frozen fish in packaged form is now one of the principal methods of distributing this product in that country. The accompanying diagram does not adequately depict the tremendous shift in consumer demand away from fresh fish and toward packaged quick-frozen fish in certain areas in the United States during the past two decades of market development. (42) While this shift is not universal or even uniform in intensity, there are in the United States fewer and fewer fresh-fish outlets available to consumers (43) and higher-cost fresh-fish distribution (44) is giving way to the basically lower-cost methods of marketing the product. (45)

This trend toward the sale of packaged frozen fish in the United States has had at least two important economic results which might be mentioned in this connection:

(a) Competition among vendors of packaged frozen fish who are attempting to get their products into the retail stores is inherently very intensive because of the limitation of costly space in retail food store freezer cabinets. (46) This limitation in space is a result of the tremendous increase in the number of frozen fish products which have been introduced into the American market since World War II (47) combined with an increase in other frozen food products. (48) This

(41) But see statement at end of para. (a) below.

(42) Market development of packaged frozen fish undoubtedly would have been more difficult without the accompanying promotion of other frozen foods and the resulting consumer acceptance of frozen foods per se, which in turn made possible the economical use of freezer cabinets for display purposes.

(43) This shift has not been as drastic in the important fish-eating areas as in those in which fish is a less important consumption item. For example as of April 1956 one large national food chain offered fresh fish in only about 20 per cent of its stores, the large bulk of which were located in the Pacific North-West and the New England regions, still substantial consuming areas for fresh fish.

(44) While data are not available to prove the point, it would seem at first glance that the cost of filleting and quick-freezing (especially when accomplished by factory methods) would be more than offset by heavier transportation, quality protection and retail handling costs of the product "in the round".

(45) Census of Business figures (Statistical Abstract of the United States–1955, p. 856) indicate that the number of sea-food markets in the United States declined by over 20 per cent from 1939 to 1948, while the number of grocery stores (with meat) increased about 20 per cent. It is interesting, too, that the number of meat markets in the United States declined by about 30 per cent during the same ten-year period. This latter figure reflects the shift in patronage from specialized outlets to supermarkets.

(46) Costly not only because of the expense of the equipment utilized but because of the valuable floor space which it occupies.

(47) Over 80 frozen fishery products are available in various localities of the American market. Those recently observed in the Los Angeles market include swordfish steaks, dressed whiting, rainbow trout, skinless sole, sea bass fillets, salmon fillets, breaded ocean perch fillets, haddock fillets, halibut fillets, breaded cod fillets, breaded oysters (ready to fry), breaded shrimp, split lobster (ready to heat), fresh frozen shrimp, lobster tails, fried shrimp dinners, fish sticks (golden fried), sea scallops (golden fried), complete fish dinners, etc.

(48) These include complete heat-and-eat dinners, French fried potatoes, frozen fruits, frozen vegetables of all varieties, fruit and vegetable juices, fruit pies, poultry, ready-to-bake biscuits, meat pies, soups, ready-to-heat waffles, etc.

limitation of space along with the absence of strong brand preference in frozen fish distribution causes some private-brand distributors to stock only their own brands of packaged frozen fish.

(b) The most significant result of this shift from fresh to frozen fish distribution is the increase in the number of retail outlets handling the product. Whereas a few years ago consumers in each community had to rely on a relatively few fresh-fish stores plus some butcher shops which carried the product as an accommodation for consumers (sometimes only on Thursdays and Fridays), to-day fish is almost universally available (in the freezer cabinets of the large majority of supermarkets throughout the United States). This change may be greatly significant from the standpoint of the potential market for fish in the United States, because the product is now more generally available and need only be selected (not sought out) by those experiencing a desire for this item. (49) While most of the fish sold in the United States is sold through stores (grocery, delicatessen, and seafood establishments) for use at home, a considerable amount is sold as integral parts of meals in restaurants.

Two final points:

(a) As can be seen from the diagram, a part of the by-products processing is carried on by canners as an integrated operation, but some of it is completely separated from other processing except for the procuring of raw materials. The principal commodities of by-products processing are mea,
which are sold for use in manufacturing or, in the case of oil, for furthe refining. The main end-products of the fishery by-product industry are animal feed and paint, although there are many other products which are made in part at least from fish by-products raw materials. (50) While still shown on the diagram for the sake of completeness, the use of certain types of oil for vitamin manufacture (cod and shark liver, for example) has been for the most part replaced by synthetics.

(b) The product under study is particularly subject to quality regulation because of its tendency to deteriorate quickly. Examination of the diagram reveals the existence of a box whose border lines are broken and whose connecting lines with various functionaries are dotted rather than solid or broken. This signifies a governmental (rather than a commercial) activity. It shows in this instance the relationship of governmental inspection at various jurisdictional

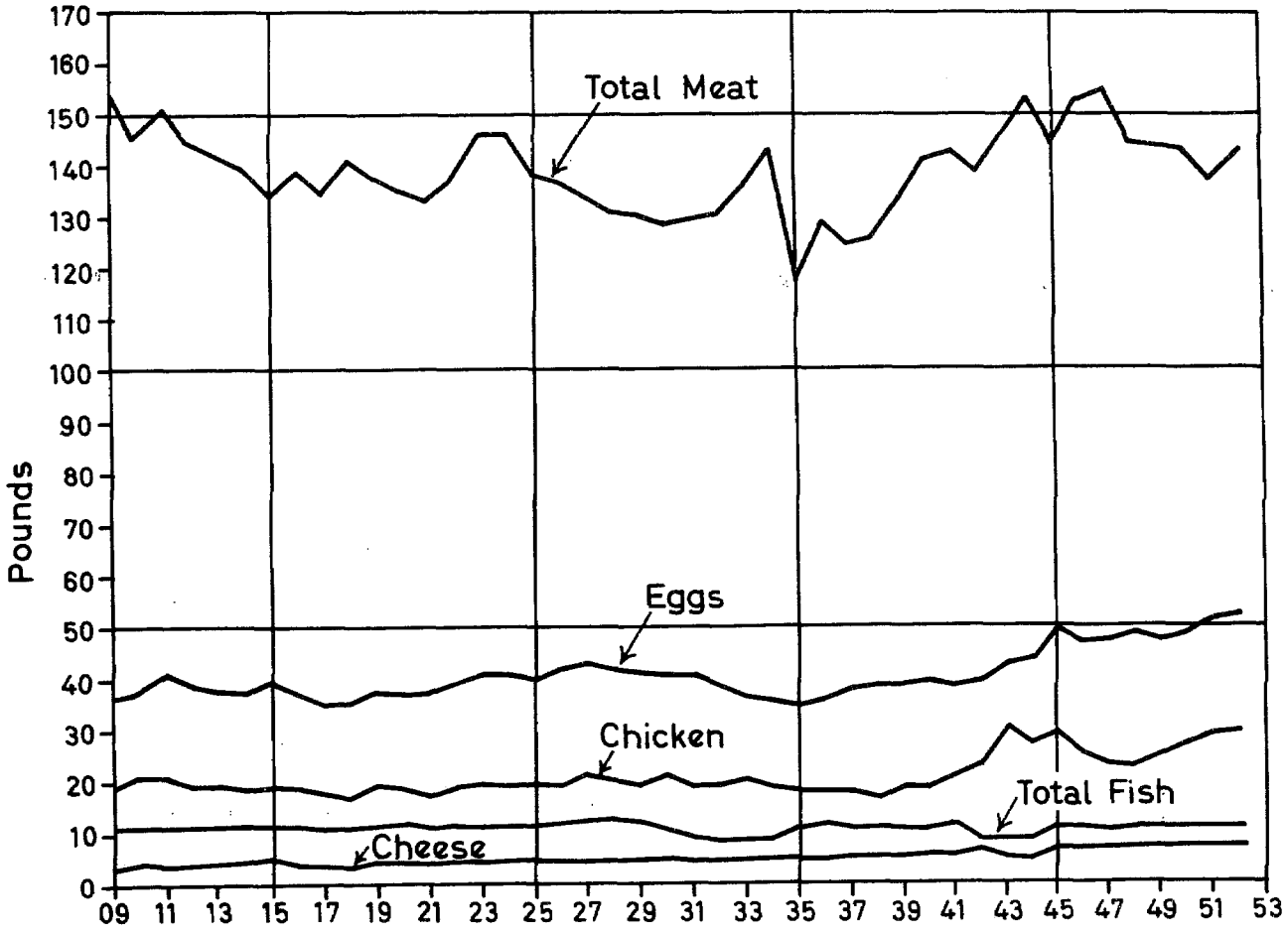
(49) It may be significant that the head of the fish division of a large national food chain in the United States told the author that fish, to a large extent, is an impulse item and that attractive display, itself, may have a great influence on the amount purchased by consumer-buyers.

(50) According to one source (Morris B. Jacobs, ed. The Chemistry and Technology of Food and Food Products, Vol. II, 2nd edition 1, New York, Inter-science Publishers, Inc., 1951, p. 968): "Various by-products are produced from waste from the fisheries. These include fish oils used both for feeding purposes and industrially (e.g., for manufacture of paint, varnish, soap, linoleum, printing ink, etc.); fish meals used primarily for animal feeding, leather, novelties, gelatin, and glue prepared from fish skins; pearl essence, jewelry and novelties, foam producing compound for fire extinguishers, and animal charcoal from fish scales; isinglass, clarifiers for filtration, and adhesives from fish sounds; protamine for preparation of protamine insulin from milt; sports fish bait from roe; and from the flesh (usually trimmings) numerous amino acids such as histodine, lysine, tryptophan, etc."

levels to the marketing of the product. In the United States, inspection may take place at the federal level, at the state level, at the county level, or at the local level depending upon the type of transaction involved. (51) Thus, the federal, state, county, and municipal governments attempt to protect public health by preventing the sale of fish which is unfit for human consumption.

4. CONSUMPTION PATTERNS FOR FISHERY PRODUCTS IN THE UNITED STATES

It should be of interest at this point to turn from channels of distribution for fish to an analysis of the market for fish in the United States. In doing this we will shift from a consideration of the way the product moves to market to a consideration of the extent of the market towards which the product moves. We shall first look at the consumption of fish in the past, then consider current patterns.



Source: United States Fish and Wild Life Service and United States Bureau of Agricultural Economics.

Diagram VIII. 2.
Estimated U.S. per capita Consumption of Meat, Eggs, Chicken, Fish and Cheese, 1909 – 1952

(51) It should be noted that for budgetary reasons governmental inspectors cannot cover the activities of all handlers of fish at all levels of processing and distribution, but must rely on spot checks and complaints by competitors of consumers.

Consumption Patterns in the Past. Diagram VIII.2. based on U.S. Fish and Wildlife Service data, is designed to depict consumption patterns for fish and other high-protein products over a period of some forty years in the United States. The other high-protein foods, especially meat, should serve as a standard of comparison for fish consumption. The figures for fish are on an edible-weight basis, while those for meat are on a carcass-weight basis which includes bones and trimmings. Even allowing for a 30 per cent conversion factor, (52) one must infer from an examination of diagram VIII.2. that fish is of secondary importance as a high-protein food in the United States and that this has been true in the past as well as at present. (53) Of the five high-protein foods considered, meat consumption is by far the largest in the United States. This is followed by eggs, chicken, fish and cheese in that order. Of these, only cheese reveals a lower per capita consumption figure than fish.

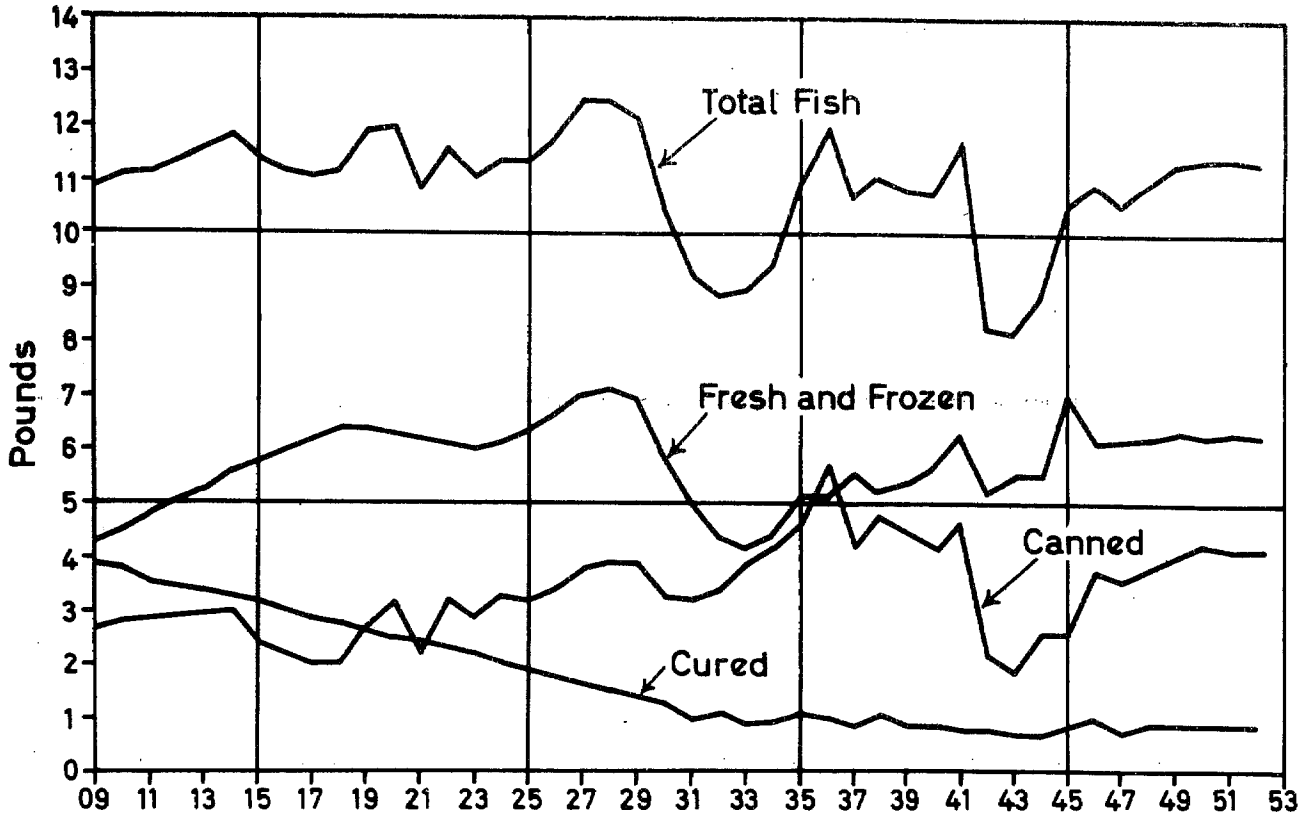
Taking a more detailed look at the diagram: while the United States per capita consumption of meat fluctuates around 140 pounds, the per capita consumption of eggs fluctuates around 40 pounds, the per capita consumption of chickens around 20 pounds, the per capita consumption of fish around 10 pounds (13.0 pounds marketed weight) and the per capita consumption of cheese around 5 pounds. Generally speaking, the per capita consumption of meat is close to twice the per capita consumption of all four other high-protein foods combined. It should be clear from this that the United States of America is a meat-consuming country. (54)

This high per capita meat consumption is nothing new in the United States. The diagram shows, however, that there was a slight downward trend in U.S. meat consumption in the 43 years 1909-1952. It should be pointed out, moreover, that per capita meat consumption which increased tremendously from the mid-thirties throughout the World War II period, declined substantially after the peak year of 1947. It is interesting to note that during World War II the per capita consumption of eggs and, to a lesser extent, cheese, also increased substantially but that gains by these latter commodities have been largely retained. It is interesting also that per capita fish consumption declined during the earlier days of the war but recovered substantially beginning about 1945. Generally speaking, eggs, chickens and fish appear to have made modest gains at the expense of meat following World War II.

(52) A.W. Anderson, W.H. Stolting and Associates, Survey of the Domestic Tuna Industry, U.S. Fish and Wildlife Service Special Scientific Report: Fisheries no. 104, Washington, D.C.: 1953, p. 40.

(53) According to White (White, op.cit., p. 114): "...United States (is) an intermediate fish-consumption nation. We stood far below such industrial nations as Belgium, Germany, and the United Kingdom, which ranked as high consumption areas with per capita consumption ranging from 22 to 43.8 pounds". Other areas which appear to be large per capita consumers of fish ("Computing Human Consumption of Fish", F.A.O. Fisheries Bulletin, March-April 1949, pp. 31-34) included West Indian countries, Philippine Islands, Japan, the Scandinavian countries, Portugal.

(54) Indeed, the United States of America is a pork and beef consuming country. Of the total of 142 pounds of meat consumed per capita in 1952, pork and beef together amounted to over 130 pounds while the balance of less than 10 pounds was represented by veal, lamb and mutton. See U.S. Fish and Wildlife Service Fisheries no. 104, op.cit., p. 41.



Source: United States Fish and Wild Life Service and United States Bureau of Agricultural Economics.

Diagram VIII.3.
Estimated U.S. per capita Consumption of Fish (Edible Weight) 1909-1953

Diagram VIII.3. provides a more detailed picture of per capita fish consumption in the United States during the years 1909-1952. (55) It can be seen from this diagram that while consumption of fish in the United States typically fluctuates around 10-11 pounds per capita per annum, there have been sharp changes in total consumption at certain times. For example, in 1929 (at the beginning of the Great Depression) until 1932 the per capita consumption of fish declined by about 25 per cent, from around 12 pounds to around 9 pounds per capita. Interestingly enough, per capita consumption of fish increased sharply beginning in 1933 and by 1936 it had recovered most of the loss sustained during the earlier days of the depression. This loss in the early 'thirties was largely in the consumption of fresh and frozen fish although canned fish, too, declined to some extent for a brief period. Then while fresh and frozen fish were still declining,

(55) It is difficult to say just what varieties of fish are most popular in the United States. On a basis of landings (Statistical Abstract, ibid., p. 724) menhaden has the largest tonnage, but this is primarily an industrial-use fish rather than an edible variety. Shrimp, tuna and salmon are next but these are to a large extent (especially tuna) canning species. The most important fish marketed as fresh or frozen products appear to be ocean perch, herring and haddock.

canned fish started recovering, and within a few short years (by 1936) it was at the peak of consumption. A re-examination of diagram VIII.2. will indicate that the losses sustained in fish consumption in these years were gained by meat. We can only surmise that the price of meat was so favourable at that time as to cause consumers to switch to meat consumption.

In the late 'thirties, fish consumption was high in the United States, around 11 pounds per capita. Then in 1941, a sharp decline was experienced in the per capita consumption of this product when the figure went from 11.8 to 8.2 in 1943. However, per capita consumption began to increase again almost immediately and by the end of World War II the per capita figure was back at 11 pounds.

Even more interesting is the long-term trend for fish in various forms - fresh and frozen, canned and cured. According to the U.S. Fish and Wildlife data in diagram VIII.3. the trend of per capita fresh and frozen fish consumption was slightly upward over the years for which data exist. This gain was particularly marked from 1933 to 1952. As was indicated elsewhere, it appears that per capita consumption of frozen fish and particularly packaged frozen fillets has gained acceptance at the expense of fresh (and ostensibly fresh) fish.

It is equally interesting that the trend for per capita canned fish consumption is slightly upward over the years 1909-1952. But again, some varieties have gained (e.g. tuna) while others have declined (e.g. salmon).(56) Perhaps the clearest-cut conclusion one can draw from the per capita consumption figures for various forms of fish over the years is that the cured product which at one time enjoyed a substantial demand in the United States (4 pounds per capita) is no longer in favour with American consumers. Recent consumption figures indicate that only one pound per capita is now being consumed.

Current Consumption Patterns. The U.S. Fish and Wildlife figures suggest that, as compared with meat, fishery products are served relatively infrequently by householders in the United States. However, this conclusion is on the basis of averages only, and consumption patterns for fishery products are far from uniform throughout the country.

Statistics indicate (see Table VIII.1) that a large percentage of householders in the United States are consumers of certain types of fishery products, while only a small percentage are users of other types. For example, 70 per cent of the respondents for the country as a whole served fresh fish within the immediately preceding year. The figure for canned fish was even higher (77.7 per cent). The percentage for frozen fish was somewhat less (52.2 per cent), but still substantial. But the percentages for cured fish (20.3 per cent), fresh shellfish (26.2 per cent), frozen shellfish (19.4 per cent) and canned shellfish (20.4 per cent) were very small. These latter products evidently possess very thin markets indeed.

(56) According to the Statistical Abstract (ibid., p. 729), the production of canned salmon declined from 362,600,000 pounds to 187,700,000 pounds from 1937 to 1953. It is interesting, however, that the value of the salmon went from $50,934,000 in 1937 to $82,240,000 in 1953, despite the decline in volume, because of a substantial increase in the price of the product. However, during the same period the quantity of tuna packed increased from 69,500,000 to 188,700,000 pounds and the value of the tuna packed increased from $18,996,000 to $126,258,000.

TABLE VIII. 1.

The Percentage of Householders Serving and not Serving Various Fishery Products During the Immediately Preceding Year 1951

Product	Served Within Year	Did Not Serve Within Year	Do not know	No Reply
fresh fish	70.0	29.4	0.3	0.3
frozen fish	52.2	47.4	0.3	0.1
canned fish	77.7	21.0	0.4	0.9
cured fish	20.3	74.0	0.6	5.1
fresh shellfish	26.2	73.2	0.3	0.3
frozen shellfish	19.4	80.0	0.4	0.2
canned shellfish	20.4	77.6	0.5	1.5

Source: W.H. Stolting, M.J. Garfield, and D.R. Alexander, Fish and Shellfish Preferences of Household Consumers, U.S. Fish and Wildlife Service Research Report 41, Washington, D.C., 1955, pp. 16-49.

The Fish and Wildlife Service divides the country into four areas for the survey purposes, (i.e. North-East, North Central, South and West). (57) The evidence suggests that certain United States markets are relatively heavy consumption areas for fish and others are not. (58) Using frequency of serving as a criterion, for example, 76.4 per cent of those questioned in the North-East area served fresh fish within the year preceding a recent survey, while only 62.7 per cent of those in the North Central area served this item during that period. Moreover, 68.4 per cent of those North-East householders who had served the

(57) The states included in the regions are as follows: West-Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming; North Central—Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin; South—Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia; North-East—Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont. It should be pointed out that the regions are too large to serve as a basis for sharp conclusions concerning variations in consumption patterns.

(58) The sub-area universe figures are not apt to be precise because of the fact that they are based on a very small sub-sample.

product during the year served it at least once during the preceding month, while only 40.1 per cent of those in the North Central area serving it within the year served it that recently. Thus, one might conclude that a larger proportion of New Englanders eat fresh fish than do people in other states, and those New Englanders consuming this item eat it more often. As might be expected, orthodox channels of distribution have not given way to newer forms of distributing the product in the coastal areas to the extent that they have in inland areas.

The acceptance of frozen fish also has been far from uniform in all parts of the United States. The popularity of the product in this form (as measured by the percentage of householders serving frozen fish during the immediately preceding year) appears to be greater in relatively low fish-consumption areas than in high-consumption areas. In view of this, it is not surprising that the frozen product has not received the acceptance in the North-East area that it has in other regions. It is interesting, according to the U.S. Fish and Wildlife Service figures, that while a larger percentage of households in the North Central area had served frozen fish during the twelve months preceding the survey than in the North-East (62.2 as against 51.8 per cent), (59) the percentage of those (that is, of those serving the item within the year) who served frozen fish at least once per month was substantially higher in the North-East than in the North Central area (68.4 as against 40.1 per cent). There is every reason to believe that the North-East area would lead, moreover, in the number of times per month fish was served. This strongly suggests an atypical fish-consumption pattern in the North-East area as compared with the country as a whole. However, if separate figures were available for the Pacific North-West, they would very likely manifest a consumption pattern closely comparable to that found in the North-East area.

There are other indications of variations in consumption patterns for fishery products in the United States. According to a report of the U.S. Fish and Wildlife Service, (60) the species of fish and shellfish consumed in greatest quantities in areas close to important producing waters are those caught in those waters. Thus cod, haddock and mackerel predominate in the north and middle Atlantic markets; croaker, mullet, red snapper, sea trout and shrimp are popular items in the south Atlantic and Gulf Coast communities. Similarly, halibut, salmon, lingcod, crabs and oysters are leading consumption items in the Pacific Coast area; and catfish, lake herring, lake trout, pike perch, and white fish are among the most important species of Middle-Western communities.

The general rule in the United States and elsewhere is that fresh fish consumption is higher in coastal areas where fish is cheap and of better quality than in the inland communities. Because of the availability at low prices and the traditional acceptance of the product, consumption is much higher in areas of large production where the custom of eating fish existed long before efficient methods of transportation developed, than in distant regions. A report of the

(59) W.H. Stolting, M.J. Garfield, and D.R. Alexander, Fish and Shellfish Preferences of Household Consumers, U.S. Fish and Wildlife Service Research Report 41, Washington, D.C., 1955, p. 32.

(60) R.A. Kahn and W.H. Stolting, Sales Patterns for Fresh and Frozen Fish and Shellfish, 1936 and 1946, U.S. Fish and Wildlife Service Fishery Leaflet 365, Washington, D.C., December 1949, p. 2.

Fish and Wildlife Service several years ago (61) indicated that the per capita consumption in the coastal cities of New York and Jacksonville, Florida, was 32 and 18 pounds, respectively, while in the inland cities of St. Louis, Missouri, and Louisville, Kentucky, the figures were 9 and 6 pounds, respectively.

While it is generally true that local species of fish predominate in markets contiguous to producing waters in the United States, at least two exceptions should be mentioned.

(a) Over the years, certain species of seafoods have become known and desired in areas far from their source and are even consumed in preference to local species. Outstanding examples of this are halibut and salmon, which are produced largely in Pacific North-West waters but marketed in distant communities as well; haddock, originating in the north Atlantic waters but distributed in other markets in addition; and shrimp, from the south Atlantic and Gulf Coast but sold throughout the United States. (62)

(b) Fillets of fish are now found to be the number-one consumption item, according to volume, in many markets which formerly featured some regional variety. Fillets of north Atlantic species particularly have made inroads on local varieties in distant markets. Thus, in many inland cities, local and regional species have been replaced as top-ranking consumption items by varieties of north Atlantic ground fish. (63) Some of this change in popularity is undoubtedly due to filleting per se, as indicated by the fact that in some eastern seaboard markets fillets of local fish have supplanted local varieties of whole ("round") fish. (64)

While quick-frozen fillets have made great gains in many U.S. markets over the years, the latest sensational development in U.S. markets has taken place in frozen ready-to-heat products (65) such as breaded shrimp and fish sticks. Breaded shrimp production, which started in a modest way in the United States following World War II, increased rapidly until 1954 when 17 million pounds (66) were sold in American markets. Fish stick production increased even more sensationally from 7.5 million pounds in 1953 to approximately 50 million pounds in 1954, (67) and an estimated 60 million pounds in 1955. (68) This phenomenal increase in sales of these products is undoubtedly due, in part at least, to the ease in preparation of the items, combined with the high regard American housewives have for time-saving methods.

(61) Fred F. Johnson, Per Capita Consumption of Fish..., U.S. Fish and Wildlife Service Fishery Leaflet 287, Washington, D.C., May 1948, p. 2.

(62) U.S. Fish and Wildlife Service Fishery Leaflet 365, op.cit., p.2.

(63) Ibid. – Examples: Atlanta, Georgia; Butte, Montana; Cincinnati, Ohio; Cleveland, Ohio; Indianapolis, Indiana; Little Rock, Arkansas; Pittsburgh, Pennsylvania; Scranton, Pennsylvania; and Washington, D.C.

(64) Ibid. – Examples: Fall River, Massachusetts; New York City, and Providence, Rhode Island.

(65) Foods which are cooked and frozen and need only to be heated. These are sometimes called "heat-and-eat" products.

(66) R.A. Kahn and W.H. Stolting, Household Consumer Preferences for Breaded Shrimp and Breaded Fish Sticks, Part I, U.S. Fish and Wildlife Service Fishery Leaflet 424, Washington, D.C., July 1955, p.2.

(67) Ibid.

(68) This estimate is based on U.S. Fish and Wildlife Service figures for January through September 1955 with extrapolations for the remaining months of the year. (Fish Stick Report, C.F.S. No. 1223, July-September 1955, p.2).

5. THE FUTURE MARKET FOR FISH IN THE UNITED STATES

In the United States certain changes are taking place in human food-consumption habits, particularly as a result of the competition of various types of products for a place in the American diet. Table VIII.2. shows specific changes in the consumption of selected food items in this country between 1930 and 1940, 1940 and 1950, and 1930 and 1950: (69)

TABLE VIII. 2.

Changes in the Consumption of Selected Food Items in the United States, 1930-1950-

Item	1930	1940	% Increase or Decrease 1940 over 1930	1950	% Increase or Decrease 1950 over 1940	Total % Increase or Decrease 1950 over 1930
1. Meat (carcass weight) lbs.	128.3	141.7	+ 10.4	143.7	+ 1.4	+ 12
2. Chicken (dressed) lbs.	21.5	18.7	- 13.0	26.9	+ 43.8	+ 25
3. Eggs lbs.	39.9	37.7	- 5.5	49.3	+ 30.7	+ 24
4. Butter lbs.	17.2	16.9	- 1.7	10.8	- 36.1	- 37
5. Fresh Fruit lbs.	122.6	140.7	+ 14.8	108.7	- 22.7	- 11
6. Canned Fruit and Vegs. lbs.	39.9	51.6	+ 29.3	62.3	+ 20.1	+ 56
7. Wheat Flour lbs.	164.0	142.0	- 13.4	133.0	- 6.5	- 19
8. Fishery Products (retail marketed weight) lbs.	13.5	13.9	+ 2.9	14.7	+ 5.7	+ 9

Source: Richard A. Kahn from "Some Aspects of Future Consumption", National Fisheries Yearbook, 1953, p.1.

As can be seen from the 1930-to-1950 per capita consumption and percentage-change figures given in the table, some foods have decreased in relation to the population and possibly even in absolute terms (butter, wheat flour and

(69) The writer recognizes that percentage changes from one year to another may be misleading because of the variations that might occur simply by choosing different base years. The reader is warned, therefore, not to lean too heavily on such percentage-change figures, but to utilize them only for general background information.

fresh fruit) while others have increased more than proportionately to the population (chickens, eggs, and canned fruits and vegetables particularly). The data show that fish should be included with those products that increased over the years, but that the increase has been modest.

The question is what is apt to happen to fish consumption in future years, assuming the existence of adequate supplies. (70) This is not a problem in simple extrapolation because, for one thing, consumption is likely to be conditioned by factors whose behaviour is not predictable. The problem then becomes one of making predictions on a basis of certain assumptions. One might start off by assuming (a) that conditions will remain essentially the same as now (except for a continuing increase in population) and then (b) that certain changes will occur which will condition consumption.

(a) If prices and promotional activity were to continue very much as at present the consumption of fish in the United States would very likely continue as now or increase only slightly. (71) Such a slight increase might result from an enhancement of purchasing developing out of the impact on consumer-buyers of the greatly increased number of retail outlets handling fish (72) and the undoubted impulse nature of the item. This latter means that much consumer purchasing is unplanned and, to some extent at least, fish is purchased on the spur of the moment, often as a result of a stimulus developing from a display of the product at the point of sale. (73) One might conclude then that given a continuation of present market conditions, a modest trend upward might be expected in per capita consumption of fish.

(b) But significant changes in market conditions may develop. Changes in conditions might be in the form of (i) changes in prices or (ii) changes in the amount of promotional effort expended on behalf of the consumption of fish.

(70) Actually, key species (e.g., salmon and halibut) are becoming more difficult to procure. This may be due to a disruption of spawning grounds by dam building (as in the case of salmon) or overfishing and imposition of quotas (as in the case of halibut). Whatever the reason, when one comes to the limit of supply of popular species any increase in consumption must come from the sale of other (often less popular) species.
The recent increase in consumer acceptance of rosefish (ocean perch) might serve as an example of this. However, it was pointed out to the author by an ichthyologist who has given some thought to the matter that this species is an unfortunate choice for intensive promotional efforts because it matures somewhat slowly and successful attainment of the objective (i.e., popular acceptance) would inevitably result in a shortage of the product.

(71) Technically, stable consumption means that (1) the demand schedule for fish remains unchanged, (2) latent low-priced markets are not tapped and (3) sales are not expanded at the expense of overvalued substitute products.

(72) Easy availability of frozen fish is not universal in the United States. However, according to the U.S. Fish and Wildlife Service (Research Report 41, op.cit., p.13): "More people indicated that they can get frozen fish where they do most of their food shopping than cannot. Availability of the desired kind of frozen fish seems to be especially good in communities having more than 2500 inhabitants."

(73) However, not every consumer-buyer will necessarily respond to an attractive display of fish. Those who have purchased fish before and liked it are, of course, apt to respond more readily than those who have not. This suggests that different varieties and forms of fish may compete with one another for the patronage of that segment of the market which is accustomed to buying fish.

(i) The problem of predicting consumption on a basis of price changes is a very difficult one. To begin with, we have no way of prognosticating the movement of prices (e.g. when and in what direction they will move). But even if we knew that prices were going to change in a certain direction, the results would still be obscure because we do not know how consumers would respond to such price changes. While we believe a priori that there is a substantial degree of cross-elasticity of demand between meat and fish, we are not advanced enough in our knowledge of consumer behaviour to predict precise consumption patterns.

Let us look at some of the difficulties inherent in an analysis of this problem: past experience would indicate that a drop in U.S. meat prices in relation to those for fish will have an adverse effect on the purchase of the latter product by consumers. However, this tendency is due in part at least to the fact that meat is more highly regarded by consumers than is fish. This suggests that consumers would move toward the highly-regarded product, meat, when the prices of that product declined or when the prices of the less highly-regarded product went up. (74) This is not to say that such consumer response would necessarily be prompt. Time is an important element in actual (as opposed to theoretical) demand-elasticity situations, and indeed responsiveness depends to some extent at least on consumer well-being at a particular moment. (75)

But even assuming we know what would happen if prices favoured meat, the question is what would be the effect of prices moving the other way (i.e. of fish prices declining in relation to meat prices)? In the absence of adequate data, one can only venture the guess that the preference for meat as compared with fish in the United States would be so strong that consumers would not readily respond to a price reduction and that it might take a substantial change in the price of fish, as compared with meat, to cause consumers to shift to the purchase of fish. If this is true, the elasticity of demand for fish is greater above the existing price than it is below that price, assuming substitute product prices remain the same. That is, there would be a "kink" in the demand curve for fish caused by this preference for meat over fish (76) by consumers in the United States. (77)

We are in a position, then, of hypothesizing that if prices changed in the United States to favour meat as compared with fish (i.e. meat prices dropped in relation to fish prices) there would be a strong tendency toward increased meat consumption at the expense of fish, other things being equal. However, assuming our hypothesis is correct, the tendency would not be nearly as strong if price changes favoured fish as compared with meat (i.e. fish prices dropped in relation to meat prices). It is possible, however, that educational effort

(74) Even this is somewhat hypothetical and would require testing for confirmation. Testing this hypothesis would require intensive analysis of consumption/price relationships among substitute products which would necessitate time and resources which are not available at present.

(75) That the elasticity differs in different phases of the business cycle has been pointed out by R.F. Harrod in The Trade Cycle, London, Oxford University Press, 1936, p.21. For a refinement of this concept see Ralph Cassady, Jr., "The Time Element and Demand Analysis", Reavis Cox and Wroe Alderson, eds., Theory in Marketing, Chicago, Richard D. Irwin, 1950, pp. 204–206.

(76) Simply stated, if the price were raised (meat remaining the same) the amount taken would fall off drastically. On the other hand, if the price dropped little would be gained in terms of amounts taken.

(77) This suggests that applications of economic principles are not necessarily universal but may vary in accordance with the deep-seated habits of consumers in various areas, especially in demand analysis.

would have the effect of changing consumer attitudes and that one result of a promotional programme might be to straighten out the demand curve for fish and thus enhance the impact of favourable price changes on the consumption of fish. (78)

(ii) Turning now to opportunities for demand manipulation in this field: it would seem to this author that great opportunity exists for the use of promotional effort in the sale of fish in the United States. Some activities have been promulgated in this direction already. For example, the Fish and Wildlife Service (part of the United States Department of the Interior) has attempted to promote the idea of a second fish-eating day in addition to Friday (Tuesday, reportedly). This type of propaganda is likely to be fruitless, however. One cannot expect consumers to accept an idea unless they can be shown that acceptance would be advantageous.

There is little question that fish is a first-class food nutritionally (even though it is regarded by many American consumers as a second-class food) and hence the first requisite of a successful promotional effort - a sound product - is fulfilled. There is also little question that the numerous varieties of seafood conveniently available to shoppers, the various ways of preparing them and the several uses of the product (as a main dish, as a salad, etc.) strengthen the potential market for this product. (79) It also has the advantage of being a relatively low-calorie food, which should appeal to girth-conscious Americans. (80)

A successful promotional campaign for fish in the United States might take one or both of two directions:

1. Educate the housewife - through women's magazines, domestic science and home economics courses (81) and advertising (82) - in the advantages and the

(78) One question asked by the U.S. Fish and Wildlife Service in its surveys (Research Report 41, op.cit., p.56) was: "Generally speaking, do you think people serve fish more often when meats go up in price or not?" The replies for the U.S. as a whole indicate that 52.4 per cent feel they do and 13.2 per cent feel they do not, while the balance either did not know or did not reply.

(79) According to White (op.cit., p.147): "The available evidence indicates that consumer ignorance of the variety of fishery products, the nutritional qualities of fish, and the varied methods of preparing fish blankets a huge slumbering demand".

(80) Data provided by Bowes and Church (Anna de Planter Bowes and Charles F. Church, Food Values of Portions Commonly Used, 7th edition, Philadelphia, College Offset Press, Inc., 1954, pp.63–84), indicate that although there are substantial variations among varieties and cuts, fish is a relatively low-calorie food. Examination of a sample of 20 one-pound portions of high-protein foods reveals that poultry ranged from 815 calories (for turkey) to 880 (for stewing chickens) meat from 748 calories (for veal cutlets) to 2044 (for pork sausage), and fish from 121 calories (for flounder and sole) to 922 (for King salmon). The median figure for fish was 369 calories, as compared with meat at 892 calories. This compares with median figures for protein content of 67.2 and 71.0 gms. respectively. It is interesting that the same study showed that the calorie count for eggs was 655 and for Swiss cheese 1680.

(81) According to a recent article in The New York Times ("Nutrition Aides Roam Far Afield", Sunday, March 11, 1956, pagination not available): "In Chile, for example, home economists have contributed materially to the rise in the amount of fish eaten in many areas, inland as well as coastal. Their efforts to popularize this cheap and accessible source of protein concentrated on school children with amusing jingles and songs about fish, and on adults through mobile kitchens in which they demonstrated fish dishes and recipes."

(82) The U.S. Fish and Wildlife Service (Fishery Leaflet 424, op.cit., p.3) states that: "A high percentage of all home makers trying either cooked or uncooked breaded shrimp become satisfied customers. The survey suggests (therefore) that store demonstrations would be effective in market promotion".

several uses of the product. She must know the types of fish and fishery products available and the various possible uses of the product in the planning and preparation of meals. She must know, also, how to prepare the foods and she must, in addition, have confidence that she knows how when she shops.

This educational programme probably should be a co-operative responsibility of the entire industry rather than a task for any one company in the industry. Companies may supplement this task, however, and in so doing may be able to promote the product or service of the individual firm.

2. Make the use of fish easier by preparing the product for consumption with a minimum of effort on the part of the housewife (83) and by providing the purchaser with easy-to-understand instructions regarding preparation and cooking. (84) This is especially important in the United States where housewives choose to engage in numerous activities outside the home which leave them with little time to spend in the kitchen. (85) Thus fish and fishery products must be ready to cook or even pre-cooked ("heat-and-eat") items if a maximum consumption potential is to be attained. (86) It is a significant fact that fish and fishery products - particularly those which are frozen - lend themselves to easy-to-prepare form. (87)

It takes little more than a superficial analysis to realize that there are favourable and unfavourable factors which may condition the future market for fish in the United States. There is, on the one hand, the bias in favour of meat which strongly tends to limit the consumption of fish. However, the nutritional quality of the commodity, the variety of the product in use and the possibility of providing consumers with an item practically ready to eat are offsetting factors. The question is: will the commercial propagandists be able to break down the barrier of bias and realize, in part at least, the potential in the consumption of this product?

It must be recognised that other food industries are constantly striving

(83) In reply to questions posed by the U.S. Fish and Wildlife Service as to what consumers especially liked about fresh fish and frozen fish, respectively, about 65 per cent said they liked the flavour of fresh fish, while 67.1 per cent said they liked the convenience of storage, preparation and consumption of frozen fish. (U.S. Fish and Wildlife Service Research Report 41, op.cit., pp. 53–54).

(84) One of the large chain food concerns in the United States put out a recipe book devoted exclusively to the preparation of fish and fishery products.

(85) Many of the housewives work and must find easy ways to prepare meals. Some do not work but are "gadding about" doing what they consider to be more important things and therefore find easy-to-prepare foods attractive.

(86) On the basis of observations made in the Los Angeles market the following heat-and-eat dinners are available to consumer buyers: beef pot roast dinner, roast half chicken dinner, enchillada dinner, ham steak dinner, turkey dinner, Mexican dinners. Other ready-to-heat frozen foods: chop suey, cream chicken, beef stew, sirloin tips, mushrooms, macaroni and cheese, cheeseburgers, and barbecued ham sandwiches.

(87) Packaged fish has become a very important item in the United States in recent years. Total U.S. production of packaged fish in 1954 (largely fillets and steaks) amounted to 171.7 million pounds (the product of 547 million pounds of "round" fish). Of this total, 70 per cent was frozen and the balance was fresh. Ocean perch (rosefish) and haddock were by far the most important varieties produced (amounting to 60 per cent of the total), while flounder and cod accounted for another 20 per cent. Imports of fillets amounted to approximately 135 million pounds in 1954. See U.S. Fish and Wildlife Service C.S.F. No. 1129, op.cit.

to obtain a share (possibly an increasing share) of the market, (88) and that new lines are being introduced from time to time (spaghetti and meat balls, meat pies, etc.) (89) Despite this, it is the writer's opinion that given favourable market conditions an increase in per capita sales is attainable if a sales promotion campaign on behalf of fish and fishery products were intelligently carried out. There is little question that even if total consumption does not increase, certain companies, alert to the business opportunities in this field, will strive to realize their potentials and make substantial gains in the marketing of this product. (90)

6. CONCLUSIONS

The distribution of fish has been revolutionized in the United States during the past two decades. This product which once was sold largely fresh (ostensibly at least) is now largely sold frozen and packaged. This introduction of quick freezing and packaging has had a very important impact on distribution methods and channels. Goods which were once sold to consumers through special fish markets and butcher shops are now sold largely through grocery outlets.

The fact that distribution channels are open in numerous markets throughout the week (91) means that fish has a greater demand potential than ever before. However, there are in the United States certain prejudices and biases in favour of other high-protein foods which must be overcome if potentials are to be realized. This is indeed a challenge to the commercial propagandist who may be assigned to the problem of increasing the per capita consumption of fishery products in the United States.

Generally speaking, the trend will undoubtedly continue toward more ready-to-cook frozen fish and less strictly fresh fish sold "in the round", a concession to convenience and ease of preparation. Thus, fish has become, in part, and will continue more and more to become a packaged grocery item, to be purchased in supermarkets instead of in specialized outlets and departments such as seafood stores and meat counters. (92) This trend is apt to prevail regard-

(88) The trade paper Quick Frozen Foods (Feb. 1956, pp. 249–252) lists 798 frozen foods available in U.S. markets. These are classified as follows: 56 vegetables, 53 fruits, 66 meats, 25 poultry and game, 81 fish and seafoods, 79 juice and concentrates, and 438 cooked and prepared foods. (The latter are broken down into 48 meats; 48 fruits and vegetables; 41 poultry; 98 fish and seafoods; 54 soups and and broths; 48 sauces, pastes and toppings; 17 batters and doughs; 29 bakery products-desserts; 13 dinners and 42 other items.)

(89) According to The Wall Street Journal (Pacific Coast Edition, March 15, 1956, p.1) the sales of frozen meat pies (including chicken and turkey) increased in the United States from one million in 1950 to 325 million in 1955. This fast-growing infant industry is now the largest user of fowl in the country and the impact on competing industries, including fish, must be substantial.

(90) Any change which may occur in the per capita consumption of fish in the United States is apt to differ considerably among areas. That is, changes are likely to be different in the North-East and Pacific North-West areas which are heavier-than-average fish consumption areas from the North Central area where consumption is not as great. But whether an increase in consumption would be greater in heavy fish-consumption areas than elsewhere (because the people are more susceptible to consumption propaganda) or whether such an increase would be less in such areas (because consumption is already high) is impossible to predict.

(91) In contrast to the limited number of distribution outlets selling the product only on certain days of the week, as in yesteryear.

(92) The sales of fishery products of one large American national food chain amount to about 2 per cent or less of total sales, compared with almost 25 per cent for meat and meat products.

less of any increase in consumption. (93)

Certain changes may occur in marketing channels, however, as a result of consolidation and integration of operations. One change that may be expected is the gradual expansion of the processing function of primary wholesale dealers and the contraction of fresh-fish distribution. It may be at the same time that such functionaries would introduce and promote their own brands of packaged fish in addition to providing supplies of the product for private-label buyers. If so, it would not be unreasonable to expect that secondary wholesalers (or some of them at least) would gradually devote less of their energies and facilities to fresh-fish marketing and to assume part of the responsibility of moving the packaged frozen product from producer to consumer.

As in any new type of operation, many new vendors have come into the field. It is inevitable that some of these will be eliminated or combined with others. Some concerns will undoubtedly find that forward integration (from processing to distribution) will be advantageous if only because of the intensification of competition and the need for being in a more advantageous position for effective sales promotional effort. At the same time, chain grocery private-brand promoters may integrate backward (from distribution to processing) in order to acquire supplies at lowest cost. (94) It appears, therefore, that in days to come there will be a continuing shift from traditional channels to the use of grocery outlets in the United States, but that goods will be moved through fewer hands in the journey from the producer to the consumer.

The result of this revolution in terms of consumer satisfaction is not entirely clear. It would be easier to evaluate if consumers always had obtained fresh fish when they purchased the product previously. Actually, many times they were undoubtedly provided with frozen fish thawed before sale rather than strictly fresh fish. The result is that those who once were able to obtain ocean-fresh fish may be dissatisfied by the change, but other consumers in purchasing the frozen packaged products now obtain a better commodity than they received before. There is little question that quick-freezing and cooking frozen fish without thawing retains the juices and flavour and that these are seriously impaired when the product is slow-frozen and thawed before cooking. In fact, some frozen-fish enthusiasts argue that only experts can detect the difference between fresh and quick-frozen fish which is properly prepared, especially for certain varieties. The combination of a sound product, effective distribution channels and skilful publicity makes for a bright future for fish consumption in the United States, assuming the existence of adequate supplies of product.

(93) It is likely, too, that the constant availability of the quick-frozen product to consumer-buyers will tend to eliminate the one-day-a-week nature of fish consumption.

(94) Because of the shift to frozen products by retail outlets, some freshfish wholesalers have even feared that they might have to integrate forward and open retail stores in order to move their product into the hands of consumers ("Seafood Marketing," Southern Fisherman, August 1953, p. 128).

DISCUSSION

The paper was introduced by SCOTT, who said that he had found it very interesting and thought provoking. CASSADY had defined his purpose as the presentation of "an overall picture of the way fish move from producer to consumer, ... and the way the process has changed". There were several reasons why such a study of the United States was useful, said SCOTT. Firstly, the technical changes there gave an indication of the prospects for the rest of the world. Secondly, such processes as freezing, with consequential changes in integration etc. were already developed or developing in countries like the United Kingdom. In short, the situation in U.S.A. was useful for purposes of comparison.

SCOTT thought that the idea of studying the physical and demand characteristics of fish in comparison with other products, in order to discover the common and divergent characteristics, was a very promising one. Nevertheless, section 2 of the paper (which did this) was a disappointment. This was not CASSADY's fault, but that of the information at his disposal.

Section 3 gave an encyclopaedic diagram of marketing channels. This was a useful first step, but it did not provide information about the relative importance of different channels. Even so, the difference between the marketing system for fresh fish and for other (e.g. quick frozen) types came out very clearly. In the latter, there had been a change to grocery store and chain distribution, with an interesting new type of competition, for space in freezing cabinets, developing in consequence.

The discussion of consumption patterns (section 4) showed beyond question that fish was a relatively minor protein product in the United States, as compared with meat and eggs. There was an interesting cyclical pattern in meat and fish consumption, which was mentioned briefly and which SCOTT thought worth presenting diagrammatically in a rough way in diagram VIII.4.

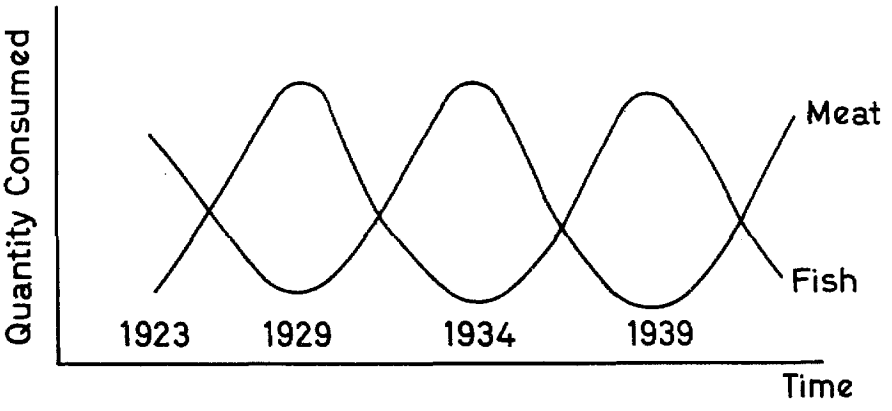


Diagram VIII.4.

CASSADY's paper suggested in explanation that cross-elasticity of demand was important but that consumers treated meat as the "desirable" item of diet and fish as a not very satisfactory substitute.

In sections 4 and 5, CASSADY (who thought it misleading to treat fish as homogeneous and had tried to give independent consideration to species as well as types) gave information on consumption patterns, changes in them over time, and future possibilities. The interesting questions to SCOTT here were concerned with price, income etc. elasticities; he would not comment on this further as it would be raised in subsequent discussion.

SCOTT next made some comments on the general problems discussed in the paper. He had two questions:-

(1) What was the market supposed to do? How well did it do it? That is, what kinds of things occurred in the process of fish distribution that economists might object to?

(2) What were the implications of the recent changes that CASSADY described?

In relation to (1) SCOTT said that the functions were to collect, store, break bulk, transport and to bear some risks on the supply and also on the demand side. All these things were done in one way or another and at a price. CASSADY gave wholesale mark-ups at 25-40 per cent and retail margins of 50-100 per cent; this agreed with White's writing on the subject. In Canada, the net profit to sales ratio in processing was around 15 per cent; this was not a mark-up but profit after expenses. A part of the price paid, in SCOTT's view, was the poor standards of freshness of fish on arrival at some markets referred to by CASSADY. It was also of interest that consumers were forced to deal with specialist shops, like fish markets, but were insulated from the possibility of low prices when fish were plentiful. Why was there this price stability? Was there resale price maintenance? Or was it the result of aversion to risk or a fear of "spoiling the market"? Who in fact maintained the price? Was there competition?

On (2) (the "quick frozen revolution") SCOTT said that the developments described by CASSADY raised total margins between the port and the consumer, both because of the cost of freezing and because of the cost of holding frozen stocks: from this point of view there was a tendency towards higher prices and higher quality fish products. Against this, the new methods could utilise the facilities and talents of the grocery industry in distribution, and this might make for a reduction in margins. As CASSADY said, the opportunities for competition were increased; fish entered the maelstrom of the general large-scale food industry and grocery competition, with competition between chains and between the chains and the independents. Fish would also enter into closer competition with the other proteins, as a newly included participant in the stores' battle for a share of the consumer budget. The competitive effects, however, were likely to be very mixed:

(a) The new developments encouraged existing tendencies towards vertical integration because of the need for capital, brand names, etc.

(b) It was almost certain that the hand of the dealer (or whoever dealt with fishermen in auctions or on contracts) would be strengthened.

(c) Contracts were likely to displace auctions, as grade would become rather less important and timing of landings less important than the assurance of steady supplies.

(d) Between regions, certain ports and fisheries were likely to be strengthened relative to others, because of the changed marketing pattern, and inter-regional competition was likely to be intensified.

SCOTT suggested that these possibilities should be discussed by the group. Vertical integration was a specially interesting issue; it might offset the increased possibilities of competition by encouraging the "building back" of fixed consumption patterns, or might bring advantages by increasing flexibility.

SCOTT also speculated about the consequences of radiation on board ship, which had begun to develop. This might produce a different situation again. When the fish arrived at port, there would be need only to break bulk and move it to the consumer, and the number of processing stages could consequently be reduced.

In conclusion, SCOTT said that CASSADY's paper made the best use of the available information. In doing so, it illuminated the major difficulty of research; statisticians had not been collecting the right statistics or asking the right questions. This was an interesting contrast with agriculture: the American authorities on butter could provide data on each stage in its production. In one way, freezing made the available information even less satisfactory, as fish facts became lost in general statistics about food and the grocery business in general. There was need for further information about the stages of distribution for each species, the distribution of consumption between types of product (fresh, frozen, etc.), the size and nature at each stage in the distribution process of profit margins, investment and employment, the competitive situation at each stage, and the size of firms and extent of vertical and horizontal integration.

HILDEBRANDT then gave a formula which had been evolved in connection with the fixing of prices in the Netherlands, and which he thought had relevance to the discussion of elasticity of demand by Cassady and SCOTT:

$C = f(P_F, Y, P_M)$ where

C = consumption of demersal (fresh sea) fish per head,

Y = income per head

P_F = price of fish per kg.

P_M = price of meat per kg., and

C, Y, P_F and P_M are each calculated as deviations and expressed as per cents of the arithmetic mean of the range concerned.

For the Netherlands, the values for the period 1921-1939 were:

$$C = -0.6\ P_F + 1.9\ Y = 0.5\ P_M$$

As a result of the method of calculation followed and as there were only small deviations from the above-mentioned arithmetic means, the regression-co-efficients could be read as elasticity-co-efficients. That meant: if the price of fish rose 1 per cent (all other factors remaining equal), consumption of fish would decrease by 0.6 per cent; at a change in income of 1 per cent (all other factors remaining equal) the consumption of fish would change in the same direction by 1.9 per cent; a change in the price of meat of 1 per cent (all other factors remaining equal) would cause a change in the consumption of fish of 0.5 per cent, also in the same direction.

The consumption of fish in Holland was thus very dependent on income. This would appear to be also true of the fluctuations shown in CASSADY and SCOTT's diagrams; high income elasticity of demand for fish, and not just cross elasticity, affected the demand for fish over time. It was very difficult to increase the consumption of fish because it was treated as a luxury; sales varied with income but were not much affected by price reductions because price elasticity was low. The same phenomena had been observed on the production side over the same fifteen-year period (1924-39).

A discussion ensued as to the reliability of the values given by HILDEBRANDT for Holland. In reply to SCOTT GORDON, he said that the correlation co-efficient was 0.9 and that the intercorrelation between the independent variables was low. GERHARDSEN enquired what other factors were considered and found to be unimportant; HILDEBRANDT explained that they examined anything that might be relevant: oil, pork meat, and so on. Was it certain, SCOTT GORDON then asked, that the other potential variables could be assumed to be random? If these other variables were introduced, the picture might be changed. HILDEBRANDT believed that this problem had been taken care of. GERHARDSEN said that a formula of this type ought to take account of the composition of retail sales. Norwegian consumption of herring was half its pre-war size, but the consumption of other species had risen. He also gave some other factors that he thought relevant: religion, the freshness of the fish, ways of serving fish, etc. Could the correlation be considered satisfactory, in the light of all the omissions and statistical difficulties? TURVEY thought that the factors suggested by GERHARDSEN could mostly be ignored; they became relevant only if there was some change in them in Holland over the period examined. Inter-country comparisons were irrelevant. SCOTT GORDON said that he had asked about randomness because the other variables were important unless they were in fact random.

CASSADY questioned whether HILDEBRANDT's description would apply to the U.S.A., since fish was treated as a second-class food by most people there. He believed that if prices changed in favour of fish it would take a long time for consumption to shift in its favour. A fall in the price of meat, however, would quickly induce a fall in fish consumption. BOWEN said that income-elasticity operated in the opposite way to HILDEBRANDT's description in Britain in the 1930's; as incomes rose fish consumption fell.

POPPER pointed out that fish were not homogeneous. There was not very much sense in a price index for "fish in general" for countries like Canada and the U.S.A. The differences between species might not matter too much, but such differences as that between canned and fresh certainly did; elasticity of demand was quite different. On BOWEN's point, a study of fillet consumption in the United States suggested (no more) that fish might be an inferior good, consumption falling as ability to buy meat increased. This tallied with BOWEN's description of the British situation.

CRUTCHFIELD said that in the United States the income elasticity of demand for fish in general was generally very low. But it varied between species, and the demand conditions for the higher grades - shrimps, lobster, etc., were much nearer to those for meat. The income elasticity of demand for the processing of fish (preparation outside the home) was much higher than for the fish itself, particularly in the case of low-price fish.

GERHARDSEN commented on the nature of the period to which the formula referred. This was the period of development of distant water fishing in Europe and of filleting in ports. These changes must have affected the quality and therefore the consumption of fish. Freezing was also just beginning. Another factor which might seem remote but was probably significant was the growing scarcity of domestic help which encouraged the purchase of prepared foods.

CRUTCHFIELD shifted discussion to the questions of price policy and competition in marketing. His comments related to the United States, but he thought they might have general significance. On the minor point of the relative stability of retail prices, CRUTCHFIELD suggested that the explanation lay in the great importance of transport costs and fixed mark-ups in the case of fresh fish, and in the use of sliding percentage mark-ups for canned products. CRUTCHFIELD then offered an analysis of the price policies and competitive situation in fish marketing. In general, he said, the degree of competition and closeness to perfection at the retail end was very high. This was because of the overlapping of port regions and consuming areas, which was itself partly due to low duties on imports and the large volume of such imports that in fact arrived from Canada, Northern Europe and (in canned form) Japan. When oligopsonistic practices existed in the initial purchase of fish he thought it possible that this retail competition tended to push price reductions back on to the fisherman, to the extent that the latter was immobile. Combination between fishermen then became a requisite of survival.

The greater mobility resulting from quick freezing increased the area of competition. Integration was a general tendency of retailing organizations, to move back in the productive process. But, in fact, quick freezing was an area of rugged competition, which might become less when the development phase had worked itself out. For the present CASSADY's evidence pointed to competition at least as vigorous as in the past, and to growing pressure on immobile fishermen.

CASSADY said that it was useful to distinguish forward and backward integration. If integration forward from the primary marketer was considered,

then SCOTT's analysis of the competitive situation was more likely to hold than if integration were backward. The latter seemed in fact to be more probable, and it would bring more competition. Also, the retail chains were aggressive competitors and would not go along with established brands and fixed prices. With regard to SCOTT's comments on margins, CASSADY thought that the margins in fresh fish were bound to be higher than in frozen. It was necessary to distinguish the processing itself and the marketing of the fish. He did not know how the total processes compared, but was almost sure that the margins in fresh fish were higher. The process of keeping fish from going bad when getting it to the point of final sale in the Middle West was a very costly one without quick freezing.

CRUTCHFIELD agreed. The standards of handling fresh fish were very poor and retailers disliked handling it. Frozen fish could move with other items, be incorporated in brand-families for advertising purposes, and so on. This might well reduce costs.

BOWEN asked for further explanation of the backward and forward integration point. Forward integration, replied CASSADY, would be a Boston primary marketer extending his activities by acquiring marketing units elsewhere because he was now handling a standardized (frozen) product. Backward integration would be a retail organisation extending its activities to earlier stages, perhaps even to the ownership of fishing vessels. CRUTCHFIELD added that both backward and forward integration were often encouraged not so much by the possibilities of direct cost reductions as by the desire for quality control and supply regularity.

SCOTT said that although the questions he had raised about integration and margins had been well dealt with, he would still like some further information. The distinction between backward and forward integration was useful, and it was probably true of the United States that integration tended to be backward through the distribution chains. But this need not be the case. In Canada, there had been forward integration from the canning and packing of salmon, almost to the retailer in some cases. Even when retailers bought through a wholesaler, they would be "serviced" by the packers. Both CASSADY and CRUTCHFIELD had agreed that forward integration reduced competition but backward integration would bring more competition because the chains themselves were very competitive and were accustomed to objecting to "strong" brands that would place them at a bargaining disadvantage; they preferred to produce their own alternatives. But, asked SCOTT, was this latter situation not compatible with a lessening of competition between regions? The shifts took place inside ports or regions once the distribution "lines" had been established.

On margins, SCOTT agreed with the reasons given for expecting a lower margin on the quick frozen product. On the other hand, the advantage of this product was that it could be held in stock. Surely this holding could itself be expensive?

CASSADY said that holding stocks for the sake of holding them was one thing and holding for purposes of price stabilization was another, and that the latter might be bad from one point of view but not from another. But in general,

stocks would only be held if on balance it was thought profitable to do so. In respect of brands, the idea of backward integration was partly the establishment by firms of their own brands. He had checked on this situation a little, and found no brand consumer preferences in the field under consideration, so that distributors might as well have their own brands. The Safeway Company made constant studies of margins. When they found a high one, they made cost studies to see if they could produce the product more cheaply. They then established a price on the basis of this. Often, the product would not sell; the price had to be eased upward until it was nearer that of the national brand.

CRUTCHFIELD also commented on SCOTT's questions. The size of existing firms, he said, would help to determine which way integration would go. In the fresh market in America, there were no processing organisations large enough to go in for this kind of thing. He disagreed about the possibility of a breakdown in inter-regional competitions. In effect, the major chains tended to focus such competition by shifting fish about. In regard to stocks the suppliers supervised retail stocks and were cautious about oversupply. Also, if the flow of fish was fairly smooth stocks need be no larger than with fresh fish. He thought he should emphasise the fact that frozen fish was moving through established distribution channels for frozen foods, and this should reduce distribution costs.

VAN DYK supported the points made about relative margins. There was a 60 per cent margin on the frozen product in the Netherlands, as against 100-125 per cent for the same species fresh. Of course, the initial price of the frozen fish was higher, but it was also completely edible, free from bones etc., so that the real difference in margins was very great. It had to be borne in mind, however, that the high cost of frozen fish derived from the need to keep it in the freezing cabinets. The seasonal consumption of such fish had encouraged its stocking in combination with other frozen foods such as vegetables. Some had been of the opinion that ice cream would also be a good item to combine with fish. But the profit on ice cream was rather high, so that from May to October there was no interest in fish and the idea was abandoned. But combination with frozen fruit and frozen vegetables worked and kept down the cost of the cabinet.

As an illustration of the benefits of the idea and of quick freezing generally, VAN DYK said that a year ago there were only 2-300 cabinets in Holland. There were now 2,000. The growth had been encouraged by the good margins, advice, information and general help provided by importers, and in his view the future prospects for frozen foods in Holland were very good.

In reply to a question about the effect of the United States developments as described on price fixing at the ports, integration of fishermen with processors, and the organisation of the "primary" fishing industry generally, CRUTCHFIELD offered a tentative analysis. Firstly, there had been a tendency to abandon such practices as "open ticket" pricing in favour of regular contracts. Secondly, there was no pronounced tendency for the integration of fishing with the immediate primary processors. This characteristic might be peculiar to the United States. In regard to prices obtained, landings and fishermen's incomes, the immediate effect on the West coast had been to raise prices and incomes in

trawling areas. Subsequent developments had followed the analyses of SCOTT GORDON and SCOTT in earlier papers; more draggers had come in and incomes had fallen back. Deep trawling had developed technically, but there had also been over-expansion of the fleet.

TURVEY asked what were the advantages of integration all the way through? How were catches managed so as to keep the organisation in balance?

BOWEN, replying, said that he could not give a complete answer. The development was not new; integration from port to retailer had been in existence for thirty years. There were possible advantages of size in integration. The company would themselves argue also that the possibility of using branding enabled them to take advantage of price-elasticities much more than was possible with the unbranded product. In this connection, the general problem referred to by CASSADY, that the housewife tended to judge quality by price, was relevant. The retailers generally argued against following port prices for fresh fish because in such demand conditions there was no point in it. As to the frozen fish market, this was initially geared to orthodox outlets cabinets appeared in fishmongers' shops. This was not paying, as the fishmongers regarded the cabinets only as a last resort, so there was a tendency to shift to other outlets. This raised new problems of distributing to stores, often in areas not formerly well served. There was consequently a need to develop distribution points. This proved inconvenient, and the next development was to make use of intermediate middlemen. There was then a third development, for the middlemen themselves to shop around and begin to stock other and cheaper brands from the smaller freezers. The big people were now setting up their own distributing points again and were necessarily moving into other products as a result.

The quality problem was a difficult one. Even supposing that consumers had the last word, it was still very difficult to provide them with an even quality, although the Department of Scientific and Industrial Research had tried to define objective standards. The quality of frozen fish, particularly if frozen at sea, was undoubtedly very good - better in fact at two years old than much fish sold as fresh. But frozen fish was admitted in the trade to be less good than the best fresh fish. The difficulty to be tackled in many places (e.g. Hull) was that the worst fish was frozen, when about to go "off", and this affected the consumers' taste for frozen fish. He (BOWEN) wondered whether it was already too late to get over the quality problem. Even if it was not, freezing was never going to become the only method of fish sale.

CASSADY said that he had not wished to suggest that freezing would become the only method, but rather that it would become the preponderant method where fresh fish could not be got. That this was so was demonstrated by the way former consumers of the "fresh" product were changing over.

TURVEY asked if fish retailing in the United Kingdom (where the situation differed from that in the United States) was likely to integrate in sympathy with a growth of resale price maintenance as the frozen fish trade expanded. Price maintenance became much more possible with freezing. If price maintenance was not made illegal generally, it might begin to affect the fish trade to the disadvantage of the consumer. What were the chances of this?

CASSADY said there were two kinds of answer for the United States, both being that there was no chance of such a development. Firstly, there had never been successful price maintenance of foods in the United States. Secondly, resale price maintenance was in any case disappearing very fast in the United States, both for economic reasons and because 10 out of the 48 States had given adverse decisions on the practice on the courts.

BOWEN said that the developments by the large freezing organisations in the United Kingdom that he had described had price maintenance as an objective. But this did not mean that there would be no competition; there was no agreement about the prices to be maintained and the existence of many competing large interests made such agreement unlikely in the near future. An increasing source of worry to people like trawler companies was the unwillingness of fishmongers to adjust prices. Each shop seemed to set a price and depend upon a local clientele. The position was clearly illustrated by the contrast, in towns with port areas, between the immediate port area and the rest of the town. There must also be some kind of broad agreement between wholesalers, that they would not undersell each other on their doorsteps.

CRUTCHFIELD said that there was also a more formal limitation at the wholesale level that was relevant. There were real diseconomies of scale in that short-run managerial problems were very difficult. The problems of constantly offering an appropriate assortment of fish were hard on decision-making and militated against very large units.

CRUTCHFIELD then asked SZCZEPANIK if the paper and discussion had any relevance to the problems of distribution in poorer areas. SZCZEPANIK thought it had. They were trying to develop similar methods wherever climatic and other conditions permitted. Nothing specific had yet been done about such matters as the development of freezing facilities, because of the heavy capital outlays involved, and use of these methods was unlikely in the near future for this reason. Filleting was of special interest because of its high labour intensity, but it was no use if it had to be combined with freezing.

GERHARDSEN said that one problem was that of identification of the fish once filleted. Customers disliked a fillet with no skin on, and might indeed find themselves cheated. On the other hand, filleting helped with the ugly-looking fish, as they had discovered in Germany. It was perhaps also of interest that there was no interest in fillets in Southern Europe, where domestic labour was more plentiful and cheap.

SCOTT asked what would be the point of filleting if the fish were not going far? It could be done at home. GERHARDSEN agreed, but said that in India, for example, it was hoped to ship the fish inland. Filleting could then save on such things as transport costs. This would necessitate chilling, replied SCOTT, and SZCZEPANIK had said there were no facilities. SZCZEPANIK himself intervened to say that the saving in transport costs might be practicable and useful.

IX. FISH MARKETING IN ICELAND WITH SPECIAL REFERENCE TO FOREIGN TRADE [1]

by Olafur Björnsson

I. THE ROLE OF FISHERIES IN THE ICELANDIC ECONOMY

(a) The Geographical and Physical Background of the Icelandic Economy.

Iceland comprises an area of about 103,000 square kilometres, in latitude between $63\frac{1}{2}$ and $66\frac{1}{2}$ degrees North and in longitude between $13\frac{1}{2}$ and $24\frac{1}{2}$ West of Greenwich.

Iceland is essentially a mountainous country, only about one-seventh of its area lying below 200 metres. The inhabited areas are spread along the coast, while the whole of the interior is uninhabitable desert and mountain, some of which is covered by eternal snow.

The climate is of subarctic character. The annual mean temperature is about 5 degrees centigrade along the Southern coast, and 2-3 degrees centigrade along the Northern coast. The climate is characterized by cool summers and relatively mild winters. The summer temperatures are too low to permit the growing of any cereals except barley and oats in some few places on the South coast where climatic conditions are most favourable.

The country has no mineral resources worth mentioning. On the other hand it is well equipped with sources of energy; waterpower suitable for hydro-electric utilization is abundant, and the hot springs also offer great possibilities as a source of energy.

The most important natural resources of Iceland are the rich fishing grounds around the coast. The utilization of these resources has in the course of the last century changed the Icelandic economy from a primitive rural economy into an industrial economy comparable in productivity with the economies of the other European countries, as will be more fully explained in the following.

(b) Population and Chief Occupations.

Because of unfavourable climatic and territorial conditions, Iceland is the most thinly populated country in Europe. The population of the country amounts to only 160,000 or about 1.5 inhabitants per square kilometre.

Until the last half of the nineteenth century the Icelandic economy was overwhelmingly a rural economy. In 1850 the whole population of the country was about 60,000. With the exception of the capital, Reykjavik, which at that time had about 1,200 inhabitants, there was no town or village of more than 500 inhabitants in the country. Most of the population lived in rural districts or small coastal villages.

(1) O.E.E.C., Fish Marketing in O.E.E.C. Countries, Paris, 1952. Iceland, 1946 (A Handbook published on the Sixtieth Anniversary of Landsbanki Islands (The National Bank of Iceland).

The chief occupation was farming, based on cattle and sheep raising. The only crop was haymaking for the cattle, and it was performed with very primitive methods that had mostly remained unchanged since the colonization of the country by the Norwegians in about 900 A.D. Farm productivity was very low and so was the standard of living of the people.

Ever since the time of the colonization, fisheries have played some part in the country's economy. But until the middle of the nineteenth century the Icelandic fishing fleet consisted almost exclusively of rowing boats. Fishing could not be considered as an independent occupation, as relatively few of the inhabitants lived exclusively by it. Fishing was done by those farmers who had property adjacent to the coast, as a secondary occupation.

Although productivity in the fisheries at that time was very low, because of the primitive fishing boats and methods used, fish products have for centuries been the chief export products of the country.

In the latter half of the nineteenth century the number of decked vessels engaged in fishing began to increase rapidly, and the number of rowing boats used for that purpose declined. The change from open rowing boats to decked vessels caused a great increase in the productivity of the fisheries and also greater security for the fishermen.

In the beginning of this century, the first trawlers to be operated by Icelanders arrived in the country. At the same time the first Icelandic vessels were equipped with engines, nothing but sails having been used before. These technical changes were of great importance and their introduction meant the beginning of the industrial era in Iceland.

TABLE IX. 1.

Occupation	Number of people engaged in each occupation		Per cent of the population	
	1880	1950	1880	1950
Farming	53,044	28,695	73.2	19.9
Fisheries	8,688	15,523	12.0	10.8
Industry	1,544	46,816	2.1	32.5
Commerce and communications	2,612	25,409	3.6	17.7
Public and personal service	2,412	17,029	3.4	11.8
Unoccupied	3,097	9,499	4.3	6.6
Occupation not stated	1,048	1,004	1.4	0.7
Total	72,445	143,975	100.0	100.0

During the last century the Icelandic economy changed from being exclusively a rural economy to an industrial economy using modern technical division of labour. Table IX.1. (see previous page), showing the occupational distribution of the Icelandic population in 1880 and 1950, conveys some information about the development that has taken place.

It seems perhaps a little surprising that the percentage of the population engaged in fisheries should have declined between 1880 and 1950. The reason is the technical development in the fishing trade. Although the catch has increased enormously, both as to quantity and value, relatively fewer persons are now engaged in the catching than when more primitive methods were used. It should also be pointed out that in 1880 persons engaged in curing fish were counted as being occupied in the fisheries, while later occupational censuses counted them in industry.

(c) The Icelandic Fishing Fleet and the Quantity of the Catch.

As mentioned above, the first trawler sent out fishing by the Icelanders arrived in Iceland at the beginning of this century. From then up to the First World War the number of this type of vessel increased to 20, but during the war 10 ships, or half the fleet, were sold abroad.

As soon as peace had been restored, steps were taken to increase the trawler fleet until it numbered 47 in 1928. From 1930 until the outbreak of the Second World War the number of trawlers gradually diminished again, because the owners of the trawlers had great difficulties to contend with during that period. At the outbreak of the war there were only 37 trawlers left, which number decreased further through war casualties to 28 at the end of the war.

During the last years of the war preparations were made for the renewal of the fishing fleet. During the first five years after the war, the trawler fleet was almost completely renewed, as the Government caused about 40 trawlers to be built abroad and sold them to individuals, companies or municipalities. In 1950 the number of trawlers was 48 and has hardly changed since then; but as the new ships were bigger than the old, the Gross Registered Tonnage increased from 12,855 GRT to 28,476 GRT in 1955.

As mentioned above, the first Icelandic vessels were equipped with engines shortly after 1900. Since then the number of motor vessels sent out fishing has increased steadily, and in 1955 the number of motor vessels sent out fishing was 587, with a GRT of 24,064. In 1955 the whole fishing fleet amounted to 54,531 GRT; the gross tonnage of the fishing fleet had more than doubled since 1939.

TABLE IX. 2.

Distribution of Iceland Catch, by Weight (Selected Years)

	1901-05 (average)	1936-40 (average)	1955
	Tons	Tons	Tons
Cod and other white fish	42,099	154,452	355,359
Herring	-	160,241	53,593

The fishing is mainly of two kinds: the cod fisheries and the herring fisheries. The former were until recently of pre-eminent importance compared with the herring fisheries. But after 1930 the economic importance of the herring fisheries increased very greatly, and in the last years before the war the value of the herring fisheries was nearly as great as that of the cod fisheries. During the war the relative importance of the herring fisheries diminished again, and since the war the herring catch has failed almost every year, so that the cod fisheries are still the most important economically. Table IX.2. (see previous page), shows the quantity of the catch for the years 1901-1905, 1936-1940 and 1955.

(d) The Role of the Fisheries in Foreign Trade.

For the last 15 years 90-95 per cent of the exports from Iceland have consisted of fish or fisheries products. As the natural resources of Iceland are relatively limited, this fact explains the vital role of this industry in the country's economy. The quantity of fish consumed on the home market is quite negligible in relation to the quantity produced.

The importance of foreign trade for the country's economy can be shown by comparing imports and exports with computed gross national income. The last year for which data are available is 1954. In that year gross national income amounted to 2840 million Icelandic krona (the value of the Icelandic krona expressed in U.S. dollars now being 6.1 cents), but in the same year the value of exports was 846 million krona and that of imports 1130 million krona. The deficit on merchandise account was balanced partly by credits and other items on current account in the balance of payments, partly by loans and foreign aid. The foreign trade of the country thus makes up about a third of gross national income.

In 1955, 91 per cent of Icelandic exports consisted of products from the fisheries. The main items and their percentage of value in the 1955 exports of fisheries products were as follows:

	Per cent
Salted fish	26
Dried fish (stock fish)	8
Frozen fish	35
Fresh fish (iced)	1
Fishmeal	8
Fish oils	8
Salted herring	11
Total	97

II. THE ORGANISATION OF ICELANDIC FISH EXPORT

(a) Organizations of Producers of Salted Fish.

Production in the Icelandic fisheries is characterized by a great

number of small producers scattered in numerous fishing villages all along the coast. This led comparatively early to the forming of associations between the producers, for the purpose of taking care of the export of certain products.

The first of these associations, The Union of Icelandic Fish Producers, was established in 1932. It was formed on a voluntary basis by producers of salted fish, which at that time was by far the most important product in Icelandic exports. Almost from the beginning this organization was protected by law. The association has to apply annually to the Government for authorization to act as sole exporter of salted fish, and such authorization has always been granted, the Government being satisfied that more than two-thirds of the producers are supporting the Union. In fact more than 90 per cent of the producers support the association.

The association has from the start maintained one or several representatives of its own in each importing country in the main consuming areas, to promote the sale of salted fish. The association keeps well informed of the quantities available from each of its members, and negotiates and concludes contracts for transport and other technical matters. It is a non-profit-making organization. It pays its members a provisional sum on account of sales, amounting to 90 per cent of their value, and makes a final settlement at the end of each year, giving all firms the same price for the same products delivered during the same season. As mentioned above, the percentage of the value of salted fish in the 1955 exports of fisheries products was 26. The main consuming countries of Icelandic salted fish have for a long time been the South European countries, Spain, Italy, Portugal and Greece. During the last few years Brazil has gained increasing significance as an importer of Icelandic salted fish.

(b) Salted Herring.

This development in the salted fish trade has influenced the organization of other branches of the export trade. In 1934 a law was enacted regulating the export of salted herring. According to this law a special board, the Herring Board, was set up; it is partially elected by Parliament, together with representatives from fishermen's organizations and owners of fishing vessels. With the exception of two years, the Board was always given Government authorization to act as sole exporter of salted herring; as with other salted fish, the majority of the producers supported the organization.

The most important consuming countries of Icelandic salted herring are the Soviet Union, Finland and Sweden.

(c) Frozen Fish.

In the last pre-war years the freezing of fish in Iceland was starting on a small scale. During the war years a considerable increase took place and in 1943 a group of freezing plants, controlling about 85 per cent of the production, formed an export organization, the "Icelandic Freezing Plants Corporation". The remaining freezing plants are controlled by the co-operative societies, which maintain an export organization of their own for all sorts of products. Practically no frozen fish is exported other than by these two groups.

The Icelandic Freezing Plants Corporation has set up its own firms for sales promotion in some of the most important markets.

As mentioned above frozen fish is the most important single item in Icelandic exports. In recent years the export of frozen fish has spread to many countries, but the most important markets are the Soviet Union and U.S.A.

(d) Dried Fish (Stockfish).

The youngest of the groups of producers organized for export purposes is the Union of Stockfish Producers, which was established in 1952. Stockfish is a comparatively new item in Icelandic exports but has gained greatly in importance during the last 3-4 years. This export association controls about two-thirds of the production of stockfish. The rest is exported through several firms, the co-operatives being among the biggest. The most important markets for Icelandic stockfish are the United Kingdom and the British Colonies in Africa.

(e) Other Products.

The export of products other than those mentioned above is in the hands of individual private firms operating through regular trade channels in the importing countries. This is the case of the most important manufactured fisheries products, such as fishmeal and fish oils. Concerning herring oil, the most important item in the Icelandic export of fish oils, it may be remarked that most of the bigger factories are state-owned, so that a good deal of the export of this item is on account of the state.

(f) The Role of the State as Exporter.

Besides the above-mentioned role of the state as an exporter of herring oil, the export of certain other important products, such as frozen fish, has in recent years become increasingly dependent on markets in Eastern Europe where state trading is the rule. This has led in some cases to the Government having to act as exporter.

All exports are by law controlled by the Government. The exporters, whoever they are, have to apply for export licences. Minimum export prices are established by the Government to prevent underselling in the markets. Exporters with a sole authorization have the control in their own hands.

(g) The Tendency toward Centralization.

As may be seen from what was said above, the organization of Icelandic exports has tended to develop in the direction of increased centralization in the form of groups of the producers themselves. All the associations thus formed are on a co-operative, non-profit-making basis.

This tendency toward centralization has been further accentuated both by the growing importance of the state as an exporter, as explained above, and by the growing influence of the Government upon fish prices, financing of the fisheries and other matters of importance to fish production. The causes of the increasing

influence of governmental agencies upon the economy of the fisheries will be further explained below.

III. GOVERNMENTAL POLICY REGARDING THE FISHING TRADE

(a) An Historical Outline.

As has been explained above, the fisheries are practically the sole exporting trade in Iceland. Because of the dependence of the Icelandic economy on imports, this makes the fisheries one of the country's most vital occupations.

In spite of the vital character of the fisheries for the Icelandic economy, the occupation is inherently a very risky one. The catch, especially the herring catch, fluctuates greatly from year to year. Since the products are sold abroad the producers are dependent upon world market prices, which must be expected to fluctuate more than home market prices.

As the Icelanders are to such a degree dependent upon imports, it would mean an economic catastrophe if the fisheries should contract strongly or stop. The Government must therefore take measures to prevent such a development if it should seem imminent.

Up to the last world war the producers of fisheries products had to bear their own risks, without any significant support from governmental agencies. The Great Depression in the 'thirties caused great financial difficulties for the Icelandic fisheries, but the only governmental support to the fisheries in these years was in the form of some credit arrangements and a slight modification of income taxes. Enterprises engaged in the fishing trade were allowed to deduct losses for several years from taxable income. As income taxes at that time were very progressive, this mitigated the well-known feature of progressive taxes of falling most heavily upon occupations where income fluctuates, as in the case of fisheries.

During the Second World War exports of fisheries products from Iceland were very profitable and the tax relief granted before the war was again abolished.

The financial difficulties of the fishing trade had caused a substantial contraction of fisheries production and the fishing fleet. During the war the fishing fleet was further reduced both through war losses and the impossibility of renewing the ships under war conditions.

As mentioned above, comprehensive measures were taken after the war for the purpose of increasing and renewing the fishing fleet. The Icelandic Government had to participate in the financing of new vessels by means of loans at special low-interest rates. Moreover, the Government assumed responsibility for orders of trawlers placed with British shipyards.

The trawler fleet was almost completely renewed after the war. But the rebuilding of the fleet meant to a considerable degree a change of ownership of the vessels. Before the war nearly all the trawlers had been in private

ownership, either of individuals or of limited liability companies. Many of the new trawlers built with the aid of the Government, on the other hand, were sold to municipalities along the coast and sent out fishing by them. As mentioned above, the export of fish and fishing products was very profitable during the war as supplies of fish in the British market from other sources had nearly vanished. After the war the situation soon altered as supplies of fish increased and demand declined with the general improvement in the food situation. This inevitably led to a decline in fish prices, and as production costs in Iceland were rising, the profitability of the fishing trade was severely reduced. In 1946 the Icelandic Government decided to guarantee fish prices to the motor vessel fleet. By 1949 the subsidies had become so expensive that in March 1950 the Government was obliged to abandon the scheme, and at the same time to devalue the Icelandic krona. The devaluation, which amounted to a rise of 42.6 per cent in the foreign exchange rate, proved insufficient to make the fisheries profitable, and further measures had to be taken during the following years, as will be explained below.

(b) Economic Policy in Iceland Regarding Foreign Exchange Rates and Foreign Trade.

Since the end of the Second World War some kind of governmental support for export of fisheries products has been necessary to prevent economic collapse in the fishing trade. In order to understand this fully, some appreciation of economic policy with regard to foreign exchange rates and foreign trade is necessary.

The so-called industrial revolution can first be said to have taken place in Iceland at the beginning of the twentieth century. Since then there has been an era of big investment designed to increase productivity in the various trades of the country. This large investment has unavoidably had an inflationary effect upon the economy. Since 1939 prices have risen seven-fold.

As the policy with regard to foreign exchange rates was to keep them as stable as possible, price movements were unfavourable to the export trades. Constant foreign exchange rates with rising wages and other production costs at home necessarily resulted in increasing economic difficulties for the export trades. There has, it seems, been a chronic tendency to keep the Icelandic krona overvalued in terms of foreign currency.

The discrepancy between the internal and external value of the krona could, of course, be corrected by devaluation. Such a step was taken in 1950, as mentioned above. But as imports weigh heavily in the cost of living in Iceland, changes in the foreign rate of exchange have a great influence upon the price level. Devaluation therefore always faces great political difficulties, and has met with especially strong resistance from labour organizations. In war-time the labour organizations succeeded in making wage contracts which tied wages to the cost-of-living index, so that wages automatically rise proportionately with the rise in the index. Such wage contracts still dominate. A rise in the cost of living brings about a danger of cumulative inflation.

The relatively high level of investment together with the wage-price spiral has caused great inflationary pressure on the country's economy. The

economic policy that has been followed can be characterized as one of repressed inflation. Prices were kept down through price control, imports cut down through exchange control, but exports subsidized. These subsidies were financed with import duties. The system of subsidies will be described in more detail below.

(c) Subsidies to the Fishing Trade.

Since 1946 Icelandic fish exports have always been subsidized in one form or another except for a short time after the devaluation in 1950. This may seem unnatural as the fisheries are without question the most productive trade of the country, measured in real terms. But as mentioned above, it can be explained by the overvaluation of the Icelandic krona.

First the subsidies took the form of a state guarantee of minimum prices for white fish to the motor vessel fleet. There were no subsidies to the trawlers or the herring fisheries. The subsidies were financed out of import duties. They had the disadvantage that the interest of the producers in getting as high a price for their products as possible necessarily dwindled, as the guaranteed minimum prices soon became higher than the prices it was possible to get in the foreign markets.

In 1950 the Icelandic krona was devalued with the intention of making the subsidies unnecessary. But as the terms of trade then deteriorated very much, and import prices rose much more than export prices, the devaluation proved insufficient to make the fisheries profitable.

Early in 1951 further measures for promoting fish exports had to be taken. Some part of the foreign exchange earned by the motor vessel fleet was sold to importers at a rate 60 per cent higher than the basic foreign exchange rate. The foreign exchange that was bought at this high price could only be used for the import of special goods, but such goods could be imported without licences and were exempted from price control.

In the summer of 1954 wages and prices had risen to such a degree that support to the trawlers was necessary if the fisheries were not to come to a stop. Support was given in the form of paying a certain sum to each trawler for every day it was out fishing.

In the spring of 1955 widespread strikes broke out for the purpose of raising wages; they resulted in a general wage increase of about 10 per cent. This made new measures for supporting the fishing trade unavoidable, and in January 1956 subsidies both to trawlers and motor vessels were augmented, being financed by higher import duties and a general sales tax.

Since the devaluation in March 1950 the domestic price index in Iceland has risen by about 80 per cent. As the foreign exchange rate has remained unaltered since then, and prices have risen less in those countries with which Iceland has the closest commercial relations, the Icelandic krona has again become overvalued to a considerable extent. To prevent a collapse in the export trades as a result of these price movements, the support policy described above has been followed and has inevitably brought about the well-known difficulties of econom-

ies where repressed inflation prevails.

IV. RESEARCH AND FUTURE PROBLEMS

(a) Measures for Promoting Research.

The vital role of the fisheries for the Icelandic economy has been described above. It has also been explained how the fishing trade in Iceland has had to fight against chronic economic difficulties, the causes of which are firstly, the inherently risky character of that occupation and secondly, the economic policy which has been pursued in Iceland during the last decade. The disequilibrium in the Icelandic economy has brought about the paradoxical state of affairs that the country's most productive occupation, measured in real terms, has not been able to do without governmental support in one form or another.

The establishment of a more rational settlement of the affairs of the fishing trade is without question one of the most important problems of the Icelandic economy, but, of course, this problem is closely connected with the overall economic problems of the country.

The support policy has necessarily made Government agencies greatly interested in the economic problems of the fishing trade. But until now, very little research has been done in this field.

Such research as has been done concerning the fisheries has been in the technical field. Two institutions may be mentioned which are especially engaged in such technical research work for the benefit of the fisheries. One is the University Research Institute (Atvinnudeild Háskóla Islands) which commenced operations in 1937. It works in connection with the university but is governed by a National Research Board, formed for the purpose of directing and promoting the investigation of the natural resources of the country. One department of the institute does research work in the interest of the fisheries, that is, it investigates the sea waters, plankton, bottom feed, and useful fisheries, etc. The main stress is laid upon investigating those species that are of greatest importance for the Icelandic fisheries, such as cod, haddock and herring.

The other institution specially worth mentioning is The Fisheries Association of Iceland (Fiskifélag Islands). It was established in 1911 for the purpose of encouraging the salt water fisheries and the fish industry generally. It is an executive agency of the Government in various matters and its adviser on everything concerning the fishing trade. The Association enjoys a state grant, but otherwise it is organized on a private basis. The highest authority in matters coming within the purview of the Association is vested in the Fishers Council, consisting of 22 members, who hold meetings at least biennially. The Fishers Council elects the board of directors, five in number, for a term of 4 years. The chairman is chosen specially and he is called Director of Fishing Affairs (fiskimálastjóri).

The Association collects detailed reports on the fisheries, issues a monthly and other publications, runs a laboratory and holds courses in navigation and the working of engines. It has established a bureau which collects reports

from the owners of motor vessels sent out fishing, and issues an annual report on the results.

Although the Government must have great interest in the economic affairs of the fisheries, as these have become so heavily dependent upon governmental support, no scientific research work on the economic aspects of the fishing trade has so far been undertaken.

In 1934 the Althing passed an act under which a Fish Industry Board (Fiskimalánefnd) was created. Its activities were intended to cover a wide field, such as financing new markets, effecting trial sales of Icelandic fish where this commodity had not yet been introduced, experimenting with the use of new methods of catching fish and curing for export, and in general initiating and encouraging such measures as might seem likely to benefit the fishing trade.

In 1935 there was established a Fish Industry Fund (Fiskimálasjoour) for the purpose of financing the activities of the Board. In 1947 the Board as such was abolished but its activities were taken over by the management of the Fish Industry Fund, which is appointed by the Althing.

The above-mentioned Herring Board is intended to cover the same field of activities for the herring fisheries as was assigned to the Fish Industry Board with respect to other kinds of fish.

But none of the above-mentioned institutions have so far done any scientific economic research work.

(b) Publicity.

Since domestic fish consumption represents only a negligible outlet, the publicity problem of the Icelandic fishing trade almost exclusively concerns foreign markets. This has been a difficult problem to solve, as it often requires a considerable financial effort and, to a certain extent, the co-operation or goodwill of the importing countries. So far no co-ordinated efforts seem to have been made in this field; the various public and private agencies engaged in fish marketing have charged their representatives abroad with this task, leaving them to perform it in the manner each of them has deemed feasible.

(c) Concluding Remarks on the Outlook for the Icelandic Fishing Trade.

As the fisheries are almost the sole exporting trade of Iceland, it is obvious that the economic progress of the country depends very much upon the technical and economic efficiency of this industry.

As already observed, there has been great technical progress in the Icelandic fisheries since the beginning of this century, so that the productivity of this trade has increased enormously. So far as the economic aspect is concerned on the other hand, there have been great difficulties, which have been described above at some length.

The economic problem of the fishing industry cannot be solved unless

the overall economic policy of the country is changed. In one way or another harmony between the external and internal value of the Icelandic currency must be achieved, so that the subsidies and other forms of support policy can be abolished. However, any measures capable of bringing about equilibrium in the Icelandic economy would meet with great political difficulties, a side of the problem which will not be discussed further.

So far as the fish marketing problem in particular is concerned, the high domestic price level and exchange control have given rise to a tendency to increase trade on the basis of bilateral agreements. There has been a tendency to increase trade with the countries of Eastern Europe.

This development, together with the support policy, has increasingly made the fish marketing problem a concern of the Government. But so far, the public character of this problem has not stimulated any scientific research on the economic aspect of the problem. It would seem that such research in co-operation with scientists in this field from other countries could yield results of some value.

The problems which seem worth investigating include consumption patterns in the importing countries, demand elasticities, production costs, etc. But no research has been done so far in this field, except for the collection of crude numerical facts.

Regarding the domestic side of the research problem, some difficulties should be pointed out. The enterprises in the fishing trade are mostly privately owned and most of them very small. The collection of reliable statistical material, which must be the basis for any scientific research in the economic field, is accordingly very difficult. The support policy is bound to cause a certain tendency for the owners of fishing enterprises to try to make their economic status appear as bad as possible, and this must make the data collected from such enterprises less reliable than they should be. Lastly, economic research in this field is quite new, which means that there are all the initial difficulties to cope with, such as lack of experience, lack of trained staff, etc. In spite of this, there seems to be a growing interest in more economic research for the benefit of the fisheries, both by governmental authorities and the unions of the fishing trade.

DISCUSSION

The paper was introduced by CASSADY, who said that he intended to pick out the topics in the paper that he himself had found specially interesting. The subject-matter of the paper was unique. Iceland was heavily dependent on one commodity: fish, and the fish industry was "sick". The problems were therefore much more acute than those of other fishing industries elsewhere, and a solution was very necessary for the welfare of the Icelandic community as a whole.

A profitable discussion of the paper would need, in CASSADY's view, to attempt to isolate the cause or causes of the difficulties. He did not find particularly acceptable the idea that everything was attributable to the exchange situation. Conceptually the problems could be at a number of other points. The exchange problem was of course important: the over-valued krona made it difficult to sell exports and obtain a return that would cover costs. But this was not all; there were other possible reasons for the problems and for inability to cover costs. As suggestions:-

(1) Might not the fishing industry itself be relatively inefficient? He knew nothing about this, but it seemed possible that the input-output situation might be less favourable than elsewhere because the Icelanders did not have the proper equipment or adequate know-how; alternatively, the fish groups in Icelandic waters might not be as populous as was required for good results, so that there was a need for more intensive effort with a consequent cost-disadvantage relative to other countries. There was also the possibility that their location relative to the market was bad.

(2) There might be problems in the market itself, apart from location, e.g. Iceland might not be getting into the most favourable markets, this assuming that they had selected the "right" kind of product. He thought that earlier discussion in the Group suggested that there might be something in this. He was not now thinking in terms of exclusion from markets, but rather of whether the most favourable means of marketing had been found in relation to such things as types, form (frozen, etc.) and so on. There might not be enough exploitation of the resource. What, for example, were the long-run possibilities of product differentiation?

CASSADY said that he had illustrated the possibilities. He would have liked to be able to isolate the problems more specifically, but it was at this point of isolation that economic methodology was weak; experimentation was not available; it was necessary to lean heavily on inference.

HILDEBRANDT then said that the paper explained the position in Iceland very clearly. The basic problem, of course, was that they were trying to eat more than they had; this always caused difficulties. But he thought that some remarks on export cartels, which were important in Iceland, were called for. The Icelandic associations were protected by law and acted as exporters. The Norwegian co-operatives were similar in nature, and there were also so-called co-operatives in Sweden that acted as exporters. All these Scandinavian and Icelandic associations were not co-operatives which were voluntary bodies, but

were cartels, set up by law or protected by the Government. Cartels were necessary for profitable fishing. The reason, to put it briefly, was demand inelasticity. Declining costs meant more fish which meant declining prices. Price regulation was needed in fishing and agriculture because (in contrast with industry) the conditions of demand were such that increased production meant lower returns to producers. He had earlier used a demand-regression to show how difficult it was to increase fish consumption. Also, countries protected their fisheries, and exports met saturated markets, and the only way to make fishing and agriculture profitable was therefore by wise policies of cartelisation. Unlike those in manufacturing industry, the fishermen would not themselves realise their position or do anything about it. They had also no possibility of rapidly declining costs such as might arise, for example, from automation in industry.

CRUTCHFIELD found himself in agreement with some of HILDEBRANDT's premises but distressed by his conclusions. Firstly, he had some points of explanation as to the position of Iceland and other exporters in relation to the frozen fillet trades. The industries in some countries had expanded for war purposes and consequently now had excess capacity. At the same time, much of the market for frozen fillets must be in the developed countries with suitable storage and distribution facilities. Consequently, the elasticity of demand for internationally traded fillets was quite low.

CRUTCHFIELD then said that nationalistic cartel policies were likely to lead to highly unsatisfactory consequences, and associations of such cartels must make the consumer suffer. This was the short answer to HILDEBRANDT.

ZOETEWEIJ said that he would support CRUTCHFIELD against HILDEBRANDT. CASSADY had mentioned the possibility of Iceland having a problem of finding the right markets. Might this not be due to the protection of national markets? He believed (but would accept correction) that the liberalisation of fish trading through O.E.E.C. had been much less than for other (manufactured) products. BJÖRNSSON's paper had made him wonder whether the characteristics of the fishing industry did not make necessary some modification of the normal ideas of international division of labour and free trade. But he had been unable to find any satisfactory reasons for supporting cartels as against trade liberalisation. Could anyone give him any?

GERHARDSEN said that it was essential to understand the structure and development of the Iceland fisheries. He agreed with CASSADY that the exchange problem was of great importance. The difficulties originated in the good war-time earnings of foreign currencies, which were used to expand the fishing fleet as soon as the war was over. A freezing industry did make a beginning in war-time, but it was mostly a growth of the last ten years. Icelandic fishing, like that of Norway, could be divided into cod and herring fisheries. The herring fishing had been successful until recently, but was now a failure. Herring was being caught much further from the Icelandic shores, nearer to Norway and the Ice Barrier. This northward extension was very unfavourable, as the factories were in the south. There had also been a specialisation of trawlers in herring fishing (boats had formerly combined herring and other fishing). These bigger trawlers, delivering to British ports, might have had the same success as the

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British trawlers had they been able to continue, but they did not in fact receive a subsidy like the British ones. It might be that the trawlers had now become too big as a consequence of technical change or, if they were to be used for salt fish, that they were too small.

Various other trades had been tried by Iceland fishermen; they had even entered the stockfish trade. Frozen fish production had been intensified, and they had begun to supply Eastern Europe markets under trade agreements as a consequence of the loss of the British market.

Turning to HILDEBRANDT's comment, GERHARDSEN said in Norway it was possible for the Government to regulate exports under existing legislation. Norway was like Iceland in this respect. Such regulation was essential for trade with East Europe as it was all the Eastern Europeans would accept. GERHARDSEN did not accept BJÖRNSSON's view that there were special features justifying cartelisation in Iceland. But national organisations for export were in fact in competition with similar products from other countries; their particular produce was not essential to the consumer. (There were in fact some interesting cases, such as the Italian stockfish market, which had small but very special requirements. Once demand had been met, the earlier good prices fell drastically. Also, some customers would pay a premium to have fish of exactly the right kind. But these instances had no great significance. Spain and Portugal had been thought to have special requirements, and therefore an inelastic demand, but they had turned to their own products and to different types.)

The question remained, said GERHARDSEN: What would we do in Iceland's position?

TURVEY said that there appeared to be three sets of points before the group:

(1) Why was Iceland in a mess and what should be done?

(2) Why were export cartels set up?

(3) Questions of price policy and of the organisation of cartels.

On (1), GERHARDSEN had given an admirable account of some of the general factors. Accepting all GERHARDSEN's points on structure, then, he himself would raise some other general points.

The explanation of how Iceland got into a mess, and discussion of what to do, should be kept distinct. TURVEY would agree with CASSADY that cost-reduction was a possible solution, though this was not a factor in the list explaining how the situation had arisen. The question was one of comparative cost; the Iceland fishermen could have higher money costs than the others and still be doing the right thing. The continuous inflation in Iceland could account for her problems, irrespective of costs.

Turning to point (2) TURVEY offered some reasons for the creation of export cartels:

(a) The low demand-elasticity point, stressed by HILDEBRANDT. Clearly, a low elasticity of demand gave an incentive to create an export cartel. But the idea that it meant that there must be one was quite wrong. Many primary products had similar demand conditions, but international markets in them functioned perfectly well. He agreed that the cartels benefited producers, but not that the market could not function without them.

(b) The need for a single selling organisation in order to sell to East European countries.

(c) An export cartel would pay not only when demand elasticity was low but also when elasticity differed between markets and price discrimination was possible. There was a good illustration provided by the stockfish market, in which Norway had a virtual monopoly. Different prices were charged in the custom-bound Italian market and in the West African market which had more demand-elasticity and a lower price. GERHARDSEN objected that the market situation was much more complex; 44 distinct types of stockfish had been classified. TURVEY concurred but thought his argument and illustration stood; profit maximisation was often complicated.

VAN DYK said that in discussing cartels, the fresh fish market should be distinguished from the rest; there was no need for cartels in fresh fish outside the case of centralised buyers. There might be something to be said for them in the processed fish market in conditions where demand was decreasing. Some measures to keep prices up were necessary in such conditions, otherwise traders would lose interest. In an expanding market prices could differ without harm.

Returning to an early question asked by ZOETEWELJ, on the possibility of trade liberation in fishing, VAN DYK said that very high import duties - ranging from 15 per cent to over 50 per cent - were in force. If this situation could not be improved, it was clear (in Western Europe at least) that there could be no effective liberalisation. The duties could not be explained by differences in cost.

SCOTT GORDON said that he wished to make some general points about the trade in fishery products. Fairly rapid shifts in the pattern of world trade in fish were required from time to time, for three reasons:

(a) The fish themselves might alter their positions, making it necessary for some groups of fishermen to give up their catch to others.

(b) The economic relationships (e.g. between ports and fishing areas) might be altered as a result of technical change (e.g. the extension of the range of fishing boats).

(c) Markets changed. For example when the North American market turned to fresh frozen fillets, this should have shifted the focus of exploitation of the continental shelf from the United States towards Canada.

There were thus strong reasons for change in the economic pattern of

the industry over time. But there were also special reasons why such change was difficult. Fishing industries almost everywhere coincided with a geographical region and often coincided also with a political entity. For example, the Canadian industry was co-extensive with more than two provinces, three Cabinet Ministers, and one department of Government (this last was especially striking; the department in question was concerned with only a very small part of the national product; by contrast there was no special department for the very important pulp and paper industry). In such circumstances it was always politically difficult to say that fishermen should become something else. The Iceland case was an extreme illustration of the problem. In conclusion SCOTT GORDON suggested that the points he had made explained both why mobility was needed and why it was less than normal.

SCOTT took up the over-all formulation suggested by TURVEY. The latter had distinguished causes and possible solutions. Were there any special causes of Iceland's problems, or were they an acute case of a general situation?

Subsidies could not be used in Iceland because of the large size of the fishing industry relative to national income. The existence of a cartel was irrelevant as far as he could see because, as GERHARDSEN, VAN DYK and others had demonstrated, Iceland was concerned with outside markets in which she was a small competitor. The price was given to her by the market, and Iceland's opportunities of exploiting a monopoly position were consequently fairly limited. From GERHARDSEN's comments, it also appeared that demand conditions in different markets were such that the possibilities of price discrimination were not important. If these arguments were valid, the Iceland problem was the general problem of the fishing industry. The question requiring answer was: Why had the fishing industry got the wrong terms of trade?

CASSADY had earlier suggested productivity as a reason for Iceland's problems. Here SCOTT thought that care was needed to distinguish the situation in Iceland and in the world as a whole. It might be that the increase in productivity in general was too great. Iceland could only improve her position if her productivity rose faster than that of others. As BJÖRNSSON said in his paper, Iceland had a new fleet. But this was also true elsewhere, and the result was a fast rise in the output of fish. It was not surprising if in these conditions economies highly dependent on fishing had adverse terms of trade. This being so, it would be necessary (as TURVEY had implied) to adapt the internal situation and terms of trade in Iceland to the conditions of a relatively declining industry.

CRUTCHFIELD asked if a good deal of Iceland's difficulty was not caused simply by social pressure for a standard of living that could not be attained with the resources available. He then asked a number of specific questions:

(1) With regard to price policies, selling problems, etc., in Iceland, what degree of knowledge was there of demand elasticities for different fish, processes and so on? To what extent were policies based on quantitative evidence? Were marketing efforts in fact maximising returns in the sense of equalising marginal revenues?

(2) How did bilateral bargains between countries in fact work?

(3) Cartels had several possible objectives. For example, the Government might want to maximise earnings of particular currencies, though this was not the fishermen's aim. What were the precise objectives in Iceland?

These questions could be boiled down to one final one:-

(4) To what extent were the policies being pursued consistent with welfare in an aggregative sense?

BJÖRNSSON was asked to comment on the discussion so far. On CASSADY's introduction, he agreed that the exchange problem was most important, but that questions of efficiency and of marketing were also significant. The efficiency of the fishing fleet could no doubt be better. It was not technically backward, but there was large over-capitalisation in some sections, particularly herring. His figures showed that since 1936 the herring catch had fallen heavily, but since the Second World War there had been big investments in the herring industry. These had all been a complete failure. On the other side, there were instances of failure to exploit the most profitable markets. But this question was closely linked with the exchange problem. The trade with the "clearing" countries, especially Eastern Europe, was larger than could be justified economically; this was explained by a tendency among fishermen to over-value the currencies of "clearing" countries. In this regard, VAN DYK was right about the lack of Icelandic competition in places like the Netherlands, but this was because exporters of fish products found that East European markets offered a better price. On the other hand, what must be bought from those countries was more expensive than if bought in countries like the Netherlands or Britain. He supposed that trade with these latter countries might be better from the point of view of the terms of trade, but trawler owners and not consumers made the agreements.

BJÖRNSSON turned to the question of the right economic policy for Iceland. He believed that the economist, qua economist, must advise the Government to devalue the krona. From the point of view of economic welfare he would be right. But there were very great political difficulties, some of which he had explained in his paper. Since the beginning of World War II there had been a very strong demand for labour and there had been a rise in the cost of living. Many of the strong trade unions were dominated by communists. These unions would insist on wage increases, object to the removal of subsidies, and generally render devaluation or attempts at disinflation abortive.

ZOETEWEIJ's question about liberalisation was very interesting. Were cartels of any value? Many people in Iceland had asked that question. Could they have any monopoly power? Would it not be more reasonable to leave the export trade free? On this issue, BJÖRNSSON agreed with SCOTT's analysis: the demand for fish products as a whole was rather elastic. Iceland was very dependent upon her fisheries, and her monopoly powers were very small.

Concluding, BJÖRNSSON said that he had used his paper to give some elementary facts on the structure of the Iceland economy, as he could not expect

these facts to be well-known and they were necessary to an understanding of the problems. More general theoretical questions had been less thoroughly treated in consequence.

CRUTCHFIELD asked BJÖRNSSON if the Iceland cartels had in fact assumed the demand for their product to be highly elastic. To put it in another way, had they assumed that Government agencies elsewhere would not react to their price changes? CASSADY added a rider: was there any hope of penetrating new markets by price cuts? BJÖRNSSON replied that there might be some cases (possibly Italian and Greek markets) where price cuts were not met. But in general it had to be assumed that they would be.

GERHARDSEN returned to the question asked by CRUTCHFIELD, which he thought concerned matters of great importance and about which some information was available. In relation to co-operative organisations, these differed in nature between countries. In Norway, it could not be said that export sales were controlled by a cartel. Some sales associations were monopolies protected by law, but these sold to the actual exporters and to processors. Firms were not prevented from maximising profits. Export organisations, in co-ordination with the Government, fixed prices only on certain markets, and these were only minimum prices. Above this level the exporting firms (which were operating in competition) could do what they liked. CRUTCHFIELD had asked about knowledge. Exporters had to use rule of thumb, as they knew little about import markets. They had gained some knowledge by experience, contacts with foreign agents and similar means. The situation was exemplified by the Swiss market. Fish was a popular food, and several countries competed in the supply of similar qualities of fish. The Norwegian frozen fish association had not been entirely successful in holding its position in competition with other countries, and their prices were now much higher than the Danish. From a knowledge point of view it was of interest that although the products were almost identical, consumers had continued to buy the higher-priced Norwegian product, though GERHARDSEN did not think that this would last.

The currency problem raised by CRUTCHFIELD had been important to immediate post-war European fishery policies. In particular the need to earn dollars had been influential. E.P.U. had reduced the importance of the problem and currency shortages had much less policy significance now.

CRUTCHFIELD had asked finally if the policies being pursued were consistent with the general welfare. GERHARDSEN could hardly think so. But:

(1) In individual countries, cartel and other policies might serve a "welfare" purpose, and those in charge were often right in thinking that the consumer would not gain if they did not exist, but only intermediate agencies.

(2) If there were agreement between countries on quotas, for example, (an unrealistic proposition), this could also be called a cartel, but it might result in a reduction in prices.

CASSADY took up the description of the Swiss market by GERHARDSEN. He thought that the price differential might persist for years, as it had in the

case of Bayer aspirin and many branded foods in the United States.

POPPER remarked that it would appear that cartels did well where there were also import cartels or where prices were low and the product in inelastic demand. Experience did not suggest that cartels knew more about the market: rather the reverse.

In support of CASSADY's illustration of "irrational" differentials, POPPER cited the case of the British seller who sorted fish into three baskets irrespective of quality and sold at three different prices.

CASSADY said he would have liked to hear more about the State monopolies and particularly how far they were in fact competitors with one another. CRUTCHFIELD supported this. If a large number of nations moved towards nationalisation of fish exporting, would there not be a recognition of the dangers of competitive price cutting? Why then should such international cartelisation lead to lower prices, as GERHARDSEN suggested?

GERHARDSEN replied that he appreciated the point. He would limit his argument to Europe. There, the large consumers were also producers. There were considerable uncertainties which had to be carried somehow, and here the cartels created possibilities of saving. Also, the cartels could adjust themselves better to the market if they got together, as they would have more information. CRUTCHFIELD intervened to say that this was just what he himself feared. Continuing, GERHARDSEN said that the bodies were monopolies only in a very limited sense, as earlier discussion had brought out. Price negotiations tended to be tougher and price formation much less flexible because of cartels; he agreed with VAN DYK about this. Also, cartels made it difficult to have world movements in fish prices reflected in prices to fishermen. He himself thought that the trend was towards a break-up of cartels and the re-introduction of some degree of competition. The cartels were less flexible than individual exporters; there was always a danger of bureaucracy, particularly when government officials came to have a say in business transactions.

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