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REVENUE DISTRIBUTION THROUGH THE SEAFOOD VALUE CHAIN

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PREPARATION OF THIS DOCUMENT

This document was prepared as part of the programme of the Fish Utilization and Marketing Service of the FAO Fisheries Department to generate more information on the fish trade of developing countries and to start to generate a better understanding of the disposition of income from fisheries in developed and developing markets. The four case studies presented here represent the first attempt to make a comparison between the value chains for fishery products in these two markets.

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ABSTRACT

This Circular defines the value chain as the range of services required to bring a product from conception to the final consumer. For seafood products this includes capture (or culture), processing, distribution and marketing. A theoretical basis of value chain analysis, as the value added at each step of the chain, is explained and a methodology developed. The application is demonstrated in four case studies of different fisheries, two in developing countries and two in developed. Two different types of product are covered: white fish fillets (cod from Iceland and Nile perch from the United Republic of Tanzania) and small pelagic fish (herring from Denmark and anchovy from Morocco). Despite the difficulties of obtaining data, the case studies demonstrate some common trends between the two sets of products. However, in the case of white fish fillets the retail sector absorbs 61 percent of the value chain in the United Republic of Tanzania but only 37 percent in Iceland: that is more value accrues to the producers in Iceland. For small pelagics the retail sector for Danish herring adds 38 percent of the value while for Moroccan anchovy the figure is 75 percent.

It is acknowledged that these four case studies, based on imperfect data, are only a starting point and that more value chain analysis should be undertaken to confirm and expand these results. Researchers in developing countries are encouraged to apply the methodology developed here to their fisheries in order to generate a larger body of information.

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1. INTRODUCTION

Seafood products are among the most important internationally traded food commodities. In 2000 the value of international fish trade was about US$61 billion, while the total value of all agricultural trade was US$431 billion (Anderson, 2003). The welfare effect for society from free trade is well known and several authors have shown that this also applies to trade in natural resources. However, the results are often specific to the resource itself and the structure of the economy (Hannesson, 2000). The rapid increase in seafood trade over the past decades and the fact that most of the trade is exports from developing countries to the more developed countries has led to increasing concerns over the effects of trade on sustainability of fisheries and the distribution of benefits from these trade activities to the primary sectors.[1]

Though the theoretical background of international trade is well known the research conducted so far has offered limited insights into how seafood value (or price) is actually distributed over the chain of production, processing and marketing of seafood products.[2] This report takes the first steps to analyse seafood value chains, with the initial objective of evaluating the value added processes at each level. For this purpose four different fisheries in four different countries have been examined.

Analysis of value chains requires micro level data, which proved difficult to obtain since most of the data consistently collected by government and international agencies is collected at aggregated levels. It proved to be especially difficult at the retail level since most retail data is collected and commercialized by private companies. Despite difficulties in acquiring the retail data the analysis gives valuable insights into seafood value-chains. Value chains for pelagic fisheries were shown to have similar characteristics to value chains for highly processed agricultural products while demersal species were more in line with value chains for other protein sources, i.e. beef, pork and poultry. However, there were substantial differences with demersal fish when compared with value chains for meat, emphasizing that despite these products often being regarded as substitutes for one-another there are different economic forces behind their supply. An important point that emerged was that producers in developed countries seemed to have control over a bigger portion of the value chain, possibly giving them a better competitive advantage in international seafood markets.

A lesson from this analysis is that the focus should not be on the relative value which each segment receives but rather on the operating margins in the overall value chains and the level of transparency and information flow between market levels.

The report is organized into five sections. Section 2 gives an overview of seafood trade (and the theory of international trade with respect to fisheries). It also considers the relevance of international trade to management of fishery resources and emphasizes its importance in today's seafood business. Section 3 gives an overview of the methodology used in this report. Section 4 includes the case studies for the four different fisheries, where each fishery is analysed with regard to cost items within each segment of the value chain. Section 5 focuses on cross-comparison between the different fisheries and section 6 contains discussion and concluding remarks.

Several individuals have provided research assistance and written sections in this report. The authors thank Max Nielsen for his contribution to the Danish case, Geofrey F. Nanyaro for his contribution to this project with regard to the Tanzanian case study, Lahsen Ababouch and Ahmed Chaïbi for their contribution with regard to the Moroccan anchovy case study. They also thank staff members of FAO, specifically Grimur Valdimarsson, Lahsen Ababouch and Helga Josupeit for their valuable input and comments, and not least patience.

[1] For an overview of these issues see Roheim, 2005.
[2] Examples on research on seafood value chains can be found in KPMG (2004)

2. THE INTERNATIONAL TRADE IN SEAFOOD PRODUCTS

Fish has been a major commodity in trade for more than a thousand years and seafood trade has influenced living conditions and policy decisions for just as long. An important characteristic for all food products that are traded is that they must be transportable and conservable for at least the transportation time.[3] The traditional fish trade has therefore depended on dried or dried and salted products since these were the best traditional preservation methods, and also because they reduce the weight of the fish substantially. However, even though there has been a substantial trade with fish for a long time, in most places local fishermen were the most important providers of fish particularly to the most valuable market – the local market for fresh fish. Hence, historically even for the same species, separate local and regional markets have existed, and where prices have been determined by local supply and demand. Abundance of fish and low prices in one market was not reflected in prices on other markets. This has made the seafood market highly segmented, so that it is more relevant to speak about the seafood market as a group of markets rather than a single market.[4]

During the last decades this picture has changed substantially. Increased fishing efficiency and productivity development in aquaculture has led to increased supply. Total seafood production is currently well above 100 million tonnes. Furthermore, changes in the institutional framework, and particularly the introduction of the 200 mile Exclusive Economic Zones (EEZs), have given coastal nations control over most fish stocks.[5] However, improvements in conservation and transportation methods have been most important for increased trade. In many cases this has created an integrated world market where there used to be many independent regional and local ones. Hence the seafood market is less segmented today than it was 50 years ago. This has led to new opportunities and challenges for fishermen and the seafood industry all over the world.

The economic theory of international trade shows that in general any country that engages in trade will be better off. However, during the last decades it has become apparent that there are also losers, and that policy decisions can influence how the gains are distributed. This has lead to a substantial increase in trade regulating measures in relation to seafood such as anti-dumping cases, even though, or maybe because, formal trade barriers have been reduced via the GATT negotiations, managed by the World Trade Organization (WTO). Focus has also been increasing on issues like the environment which has led to the use of eco-labels and other "green" labels to segment the market (Roheim, 2005).

The issues of equity and sustainability with regard to seafood trade have therefore become a central point in the debate on free trade. It is therefore necessary to review the importance of seafood trade for developed vs. developing countries and to look at the theoretical background of the impact of free trade on fishing communities. The next two sections deal with these two issues.

2.1 Overview of trade in seafood products

Total world catch of fish and other seafood, including aquaculture production, is shown in Table 1. The catch, or production, is still increasing, but in the 1990s this was mostly due to aquaculture. Most fish stocks are now fully utilized or overexploited, so it is unlikely that landings will increase in the future. There may still be some increase in total seafood production as aquaculture is likely to grow (Anderson and Fong, 1997; Asche, 1997).

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[3] See e.g. Kurlansky (1997) for a very entertaining account of the cod trade, which was the major seafood commodity traded during the middle ages.

[4] See Anderson (2003) for a review on the origins and development of seafood trade.

[5] Munro (1996) gives a brief account of the development of fisheries regulations and the law of the sea.

TABLE 1: World catch of fish and trade (million tonnes)

Year	Total	Human consumption	Other	Trades	Trade as percentage of total catch
1984	84	58	26	27	33
1985	86	60	26	31	36
1986	93	64	29	33	35
1987	95	66	28	34	36
1988	99	69	30	35	35
1989	101	70	30	38	38
1990	98	70	28	36	37
1991	98	69	29	38	38
1992	100	72	28	38	38
1993	103	74	29	42	40
1994	113	78	35	46	41
1995	117	85	32	45	39
1996	120	88	32	45	37
1997	123	92	31	47	38
1998	118	93	25	39	33
1999	127	95	32	44	35
2000	131	97	34	50	38
2001	130	100	31	50	39
2002	133	101	32	49	37
2003	133	104	28	49	37

Source: FAO (2006) FAO Fisheries Statistics - Commodities

TABLE 2: Dissemination of total catch by share of consumption form

	Human consumption (%)				Other (%)	
Year	Fresh	Frozen	Cured	Canned	Reduction	Miscellaneous
1984	19.2	24.6	11.6	13.6	29.3	1.6
1985	19.8	24.4	11.8	13.3	29.4	1.4
1986	21.1	24.1	11.0	12.4	29.6	1.7
1987	22.8	23.9	10.7	12.3	27.6	1.6
1988	23.1	23.7	10.2	12.1	27.8	1.6
1989	24.0	23.5	10.4	12.4	28.2	1.6
1990	23.0	24.8	11.0	13.1	26.7	1.5
1991	22.3	24.4	11.1	13.3	27.4	1.6
1992	25.6	24.2	10.0	12.3	26.0	1.8
1993	25.5	24.3	9.9	12.2	26.1	1.7
1994	31.5	20.9	7.8	9.4	26.8	3.6
1995	34.7	20.7	8.2	9.1	23.4	3.8
1996	36.2	20.4	8.1	8.8	22.8	3.6
1997	38.1	20.4	7.2	8.9	21.1	4.2
1998	41.0	21.0	8.2	9.0	16.6	4.2
1999	39.3	19.5	7.6	8.5	20.2	4.8
2000	38.8	19.3	7.4	8.4	21.1	5.0
2001	40.0	20.1	7.6	8.5	18.4	5.4
2002	39.5	20.3	7.3	8.6	19.0	5.3
2003	41.0	21.2	7.4	9.1	16.1	5.2

Source: FAO (2006) FAO Fisheries Statistics: Commodities

Table 1 shows that the quantity of fish used for reduction (which makes up 99 percent of the "Other" category) is rather constant, between 25 and 35 million metric tons (tonnes), so increases in production have mostly been used for human consumption. It is also evident from Table 1 that a major share of the total supply of fish is traded. In 1994, 41 percent of total catches entered trade and since then the share has ranged from 33 to 39 percent annually. Trade in seafood products has increased over the past two decades from an average of 35 percent between 1984 and 1994 to an annual average of 37 percent of world catch between 1995 and 2003.

Table 2 shows the development in the use of the catches by product form. It is clear that the share that is sold fresh has increased substantially over the period, from 19 percent in 1984 to 41 percent

in 2003. Fresh fish is the only product form that has substantially increased its share of the catch. The share of catch that is sold as frozen and cured has remained rather constant, while the share of canned fish and reduction has declined. This is to a large extent to be expected, both because of aquaculture's increasing share of total production and because of better transportation and conservation methods, since fresh fish tends to be the most valuable product form.

TABLE 3: World seafood imports

		US$ million		Shares	
Year	Total	Industrialized	Developing	Industrialized	Developing
1984	18 089	14 875	3 214	82 %	18 %
1985	19 491	16 287	3 204	84 %	16 %
1986	25 388	21 368	4 021	84 %	16 %
1987	31 610	27 043	4 567	86 %	14 %
1988	36 645	30 888	5 757	84 %	16 %
1989	37 127	31 110	6 016	84 %	16 %
1990	39 991	34 773	5 218	87 %	13 %
1991	43 983	37 762	6 221	86 %	14 %
1992	45 875	39 015	6 861	85 %	15 %
1993	45 228	38 376	6 852	85 %	15 %
1994	52 120	44 109	8 011	85 %	15 %
1995	57 070	48 232	8 837	85 %	15 %
1996	58 095	48 370	9 724	83 %	17 %
1997	57 573	47 562	10 012	83 %	17 %
1998	56 108	47 752	8 356	85 %	15 %
1999	58 575	49 578	8 996	85 %	15 %
2000	60 996	50 635	10 360	83 %	17 %
2001	60 559	49 653	10 906	82 %	18 %
2002	62 500	50 866	11 635	81 %	19 %
2003	68 262	55 885	12 376	82 %	18 %

Source: FAO (2006) FAO Fisheries Statistics: Commodities (*FAO FISHSTAT Plus database)

The development in total import value from industrialized and developing countries is demonstrated by Table 3. The first thing that is evident is that trade has increased substantially in value, or more than tripled between 1984 and 2003 when measured in nominal terms, while at the same time the share of developing countries has remained more or less the same. Export figures reveal that more than half of all exports come from developing countries. Hence the majority of the increase is moving into the high price markets in the developed countries. This is to be expected since an increased share of the catch is consumed as fresh, the most valuable product form.

In summary it is clear that trade in fish and seafood has increased since the mid 1980s. This is due to faster and cheaper methods for transportation and conservation, increased aquaculture, 200 mile EEZs and lower barriers to trade. To a large extent the trade is either between industrialized countries or from developing countries to industrialized countries. Trade is therefore a driving factor behind seafood production today.

Before examining the value chain for specific seafood products it is necessary to review the theoretical and methodological background for this study. The next section will explain how different management systems for fisheries and different infrastructures can influence the distribution of benefits through the chain of production, processing and marketing.

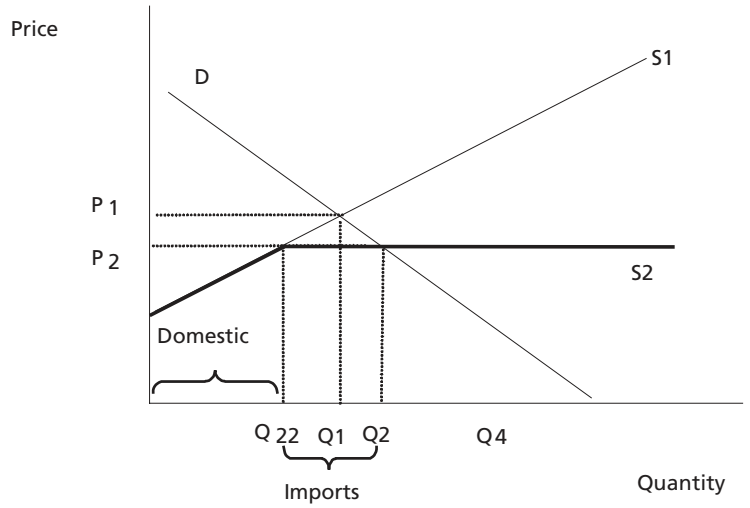
2.2 The effect of free trade on fisheries: theoretical approach

The situation for fishermen facing export competition and fishermen that are potential exporters are described here using simple economic models in a graphic presentation. It is assumed that the products are identical, independently of whether they are consumed locally, exported or imported. For the species where the degree of integration has been well investigated, whitefish and salmon, it can be concluded that there is a world market.[6] Therefore the descriptions below always assume that the potential competitor, or the potential new market, is the world market. As most local markets will be relatively small compared to the world markets, it is also assumed that the agents in these markets take the world market price as given[7] and that the fisheries in question are initially well managed.

[6] See DeVoretz and Salvanes (1993), Gordon, Salvanes and Atkins (1993), Gordon and Hannesson (1996), Asche and Sebulonsen (1998) and Asche, Bremnes and Wessells (1999).

[7] This is basically the same as assuming that the local agents do not have market power on the world market if they coordinate their actions.

FIGURE 1
Foreign trade in a basic demand/supply model



The case of a country that is a potential importer of fish, i.e. an industrialized country is shown in Figure 1. Here, the demand schedule D gives local demand. It is downward sloping since consumers will only buy more fish (or any other commodity) if the price is reduced. The supply schedule S1 gives the local supply and is upward sloping, since it will be profitable for producers to increase production only if the price increases.[8] If this is a truly local market, with no demand or supply from other sources, the transaction price and quantity is then determined by the intersection of the two curves and gives the market price P_1 and the quantity Q_1.

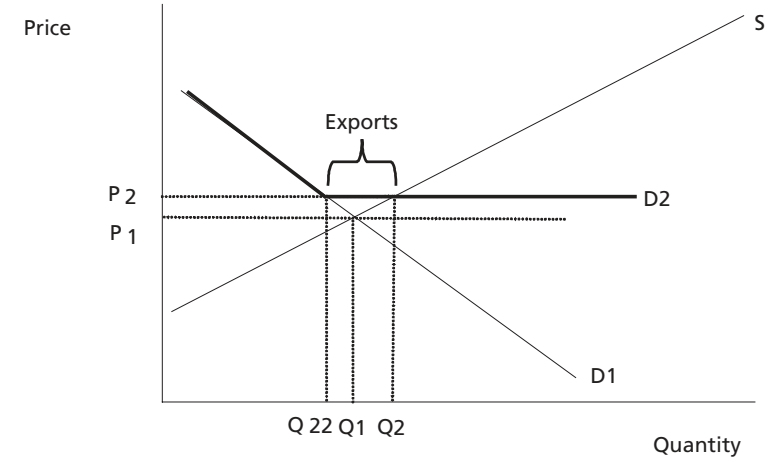
Now assume that there is a reduction in transportation costs. The world market price, including transportation costs, is reduced to P_2 from P_1 in the initial equilibrium. Up to this price, the relevant supply schedule is still S1, or the supply by local fishermen. However, at price P_2 the individual can buy as much fish as he wants at the world market price, so local fishermen will therefore not be able to sell any fish at a higher price. The supply schedule therefore becomes flat at this price, as the supply schedule S2 is in figure 1 above. In the scenario in figure 1, at the price P_2, total quantity sold will be Q_2. The quantity supplied by local fishermen is Q_{22}, and the imported quantity is Q_2-Q_{22}. Since the quantity Q_{22} is less than Q_1, imports lead both to a reduction in the quantity supplied by local fishermen and a reduction in the price they receive for their catch, which results in lower incomes. If the world market price decreases to lower levels, the kink will be at lower price levels, and the share of imports in the consumption will increase. Consumers in this country will gain from lower prices while producers will lose. However, society as a whole will be better off. This is to a large extent the situation in industrialized countries today.

A closer look at a country that is a potential exporter of fish, in most cases a developing country, is shown in Figure 2. Here, the supply schedule S gives the supply by local fishermen, and the demand schedule D1 gives local demand. If this is a truly local market, there is no demand or supply from other sources. The transaction price and quantity are then again determined by the intersection of the two schedules to give the market price P_1 and the quantity Q_1.

A situation where there is no demand from the world market implies that transportation costs makes the price at which local fishermen find it profitable to supply this market so low that no one is interested in exporting fish.

[8] The supply schedule needs not be upward sloping if there is increasing returns to scale. However, it is highly unlikely at the production levels where most fisheries operate.

FIGURE 2
High world market prices reduces quantity sold domestically but increases exports



Assume that there is a reduction in transportation costs so that the world market price for local fishermen is increased to P_2. Down to this price, the relevant demand schedule is still D1, or the local demand. However, at this price individual fisherman can sell as much fish as they want at the world market price, so local fishermen will therefore not be willing to sell at the local market for a lower price. The demand schedule therefore becomes flat at this price, as the demand schedule D2 has in the figure. In the scenario drawn in Figure 2, at the price P_2, total quantity sold will be Q_2. The quantity sold locally is Q_{22} and the exported quantity is Q_2-Q_{22}. Since the quantity Q_{22} is less than Q_1 the exports lead to a reduction in the quantity supplied to the local market and an increase in the price that fishermen receive for their catch. Fishermen's income will therefore increase. If the world market price increases to higher levels, the bend in the demand curve will be at higher price levels, and a larger share of the catch will be exported. In this case the producers (i.e. the fishermen and processors) gain from the trade but the local consumer looses. Overall society is better off and it becomes a welfare issue for society how gains from trade are distributed.

The scenarios in Figures 1 and 2 are basically mirrors of each other when considering either a truly regional market (that is not linked to the world market because the price that local fishermen receive is too high compared to what they can get on the world market) or a local market where consumers will not pay world market prices. As the wedge that transportation costs drive between local and global markets becomes smaller, the local market might become a part of the global market. When this happens, it is also possible that all locally produced fish will be exported or that all consumption is imports.

Moreover, when imports start flowing in to a formerly local market, local fishermen will see that the quantity they sell will decrease, as will the price they receive. Hence, their income will fall, and employment in the fishing sector of the importing country falls. Consumers will gain, as they can consume a higher quantity at lower prices. In the exporting market, fishermen will see their prices increasing, and will respond by increasing landings, thus increasing revenues. Prices of fish on the local market will increase relative to other goods, and consumers will find that their real income has decreased.

Most introductory texts in international economics will show that on the balance trade improves social welfare, since the gainers from trade are always able, at least in principle, to compensate the losers so that their utility is not diminished.[9] This postulates that in countries where fish imports

[9] See e.g. Krugman and Obstfelder (1994). With well managed fisheries this is also shown more rigorously by Hannesson (1978).

FIGURE 3
Standard trade model with a backward bending supply curve

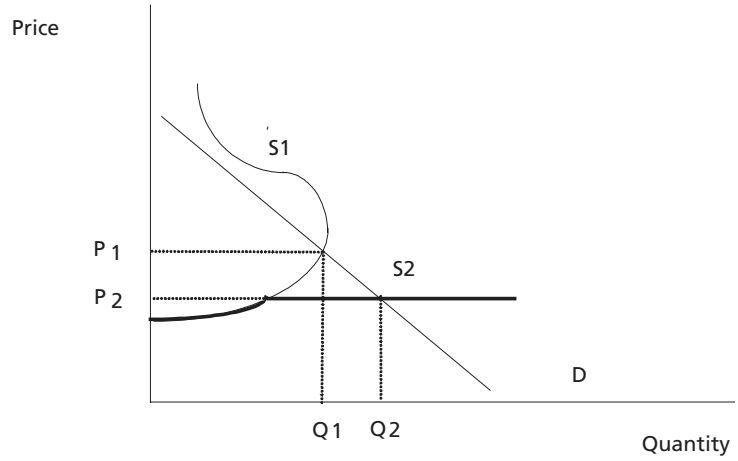
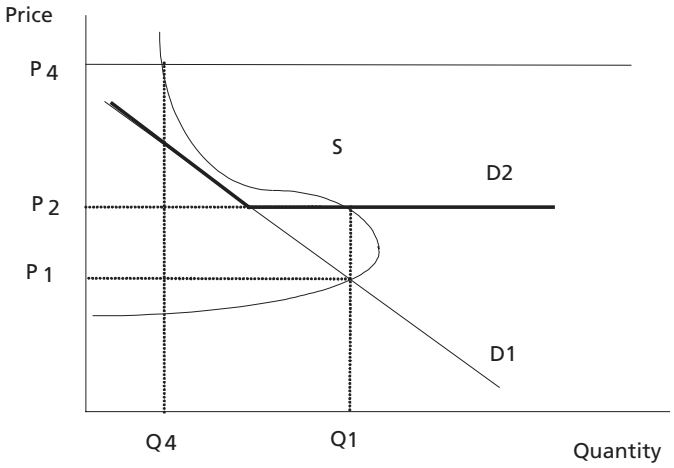


FIGURE 4
High world market prices and backward bending supply curve in a local market



increase due to trade, the society is better of, but the number of people employed in the fishery is reduced. In exporting countries society is again better of, as the fishermen increase their income, but everybody else is worse off since their real income is reduced. Hence, despite trade increasing welfare for the society as a whole, some groups will lose.

The assumption of well managed fisheries might warrant some comment, since this is obviously not true in many cases (Munro and Scott, 1985; Christy, 1996). Problems result when the fishing technology used is powerful enough to fish the stock down below the level that gives Maximum Sustainable Yield (MSY). This is because the supply schedule will be backward bending. This means that harvested quantities can only increase up to a certain level and will then start to decrease again even though the numbers of boats and crew members are increased.[10] This situation is shown in Figures 3 and 4 as supply schedule S1 and S respectively.

Figure 3 shows the situation for a potential importer of fish where fishing pressures are relatively low. The supply schedule for local fishermen is S1, while the supply schedule when local fishermen

[10] See Copes (1970) for detailed analysis of backward bending supply curves.

compete with imported fish is S2. The price is reduced when imports are coming in and landings from local fishermen are also reduced. The results are not affected by the introduction of the backward bending supply schedule. Note that if the original local price is higher, this will not affect the conclusion. Hence, an importer of fish will always benefit by increased trade.

The same scenario is shown in Figure 4 for a potential exporter of fish with limited or no fisheries management system in place. Here the picture is somewhat different. The supply schedule S, is backward bending, and local demand is given by the demand schedule D1. When there is no trade, the transaction price and quantity is determined by the intersection of the two schedules and gives the market price P_1 and the quantity Q_1. At this point the fish stocks are in good shape. Introducing a world demand at the price P_2, gives a new demand schedule D2. At this higher price, the landed quantity is still Q_1 because of the backward bending supply schedule.[11] At price levels above P_1 but below P_2 the supply will be higher. If the price is increased above P_2 landings will start to fall. For instance, at the much higher price P_4, landings are reduced to Q_4. In this case, trade will not increase fishermen's income except in the short term while they are fishing the stock down to lower levels. It is therefore possible that trade in this case will reduce social welfare since total income can be reduced and less fish is available at higher prices. Hence, efficient and effective management of a fishery is necessary when that fishery is exposed to higher prices.

Simple economic analysis indicates that if the fisheries are well managed, all parties will gain by trade, although there are groups both in importing and exporting countries that will loose. In particular, fishermen in the importing countries will loose. However, not very many fisheries in the world can be said to be well managed. In poorly managed fisheries, the importer will still gain by trade. Exporters that manage their fisheries poorly can both gain and lose by trade. What will be the outcome is an empirical issue. However, as trade value is increasing much faster than quantity for the world as a whole, there is no doubt that the exporters gain by the trade. Moreover, as world demand seems to be highly elastic and as transportation and conservation methods are likely to continue to become better and cheaper, trade is likely to increase further in the future.

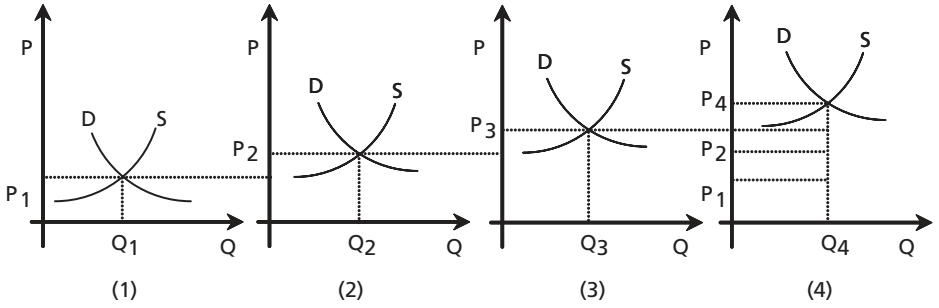
The models above show how important good management practices are for fisheries and that trade will benefit both producers and consumers, given the right institutional structure and infrastructure.

In most cases there are several market levels between the consumer and the producer of the primary product and value is added at each level through processing, distribution or marketing. The same methodology as before can be used to describe the value addition between market levels. Figure 5 shows four different stages typical for seafood products.

At the first level there is a market for fresh fish supplied by fishermen and bought by processors (1). The supply function (S in Figure 5) is assumed to be upward sloping, where the individual fishermen will supply specific markets depending on price. If the supply function was backward bending it would only affect graph number (1) in Figure 5. The other graphs would look the same except in the case of overexploitation where the quantity on each market would decrease with lower landings. If price increases, fishermen will supply more fish and vice versa for a price decrease. The processor will buy more fish if the fish becomes available for a lower price and vice versa for a price increase (D in the graph). The market will be in equilibrium at any given time where the price will be P_1 and the quantity Q_1 as shown in the graph furthest to the left in the above figure. The equilibrium price P_1 becomes the minimum price at which the processor can sell his product to the next market level, processing. The processor adds value by curing, freezing or filleting using labour and machinery (or capital). The processor might also add ingredients, such

[11] This is just a result of the way that the curves are drawn, although one such point will always exist.

FIGURE 5
Four market levels for a typical seafood value chain



as water, oil or breading. The wholesaler is the customer at the processing level, in graph (3) on Figure 5. Again, the wholesaler adds value either through distribution or marketing and sometimes acts as a buffer for the market, i.e. the wholesaler might store the products until the retail market is willing to buy a specific product. In the final graph in Figure 5 we have the retail market where the demand is Q_4 at the price P_4. The retail market adds its own value through distribution and marketing but the price P_4 is based on the value addition process throughout the whole value chain, from landing ex-vessel to the retail market. Graph 4 in the figure above shows the share which each market segment holds in the final market clearing price at the retail level for this particular case.

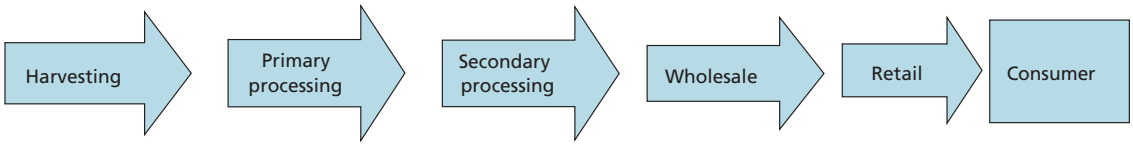
If markets are free and fulfill the assumptions of perfect market conditions each market level will receive the price needed to clear the market. However, location, infrastructure, lack of information and market power of individual companies at each market level can all affect how the final product's value is distributed through the seafood value chain. As an example one can think of small scale fishermen located in a remote location. They have only one possible harbour facility to land the catch and there is only one company which buys the seafood. The fishermen do not have access to information from the final consumer and hence might not realize what the potential price for their product is. If those same fishermen had access to computerized auction markets where numerous buyers and sellers participate in the auction the price would move closer to the market clearing price, the right price from the economic standpoint. However, local structure, agreements between processors and fishermen and the structure of the economy all affect the final price paid to the fisherman. The right economic price might therefore be higher or lower than the current price the fisherman receives. Information flow and transparency between market levels are therefore crucial conditions for an efficient distribution of seafood value throughout the seafood value chain.

The discussion in this section has shown the possible impact of increased trade on the welfare and income of fishermen, consumers and societies as a whole. It has also shown how important it is for efficient distribution of seafood prices that a transparent marketing system with strong infrastructure exists to facilitate trade. The next step is to set forth methodology in order to examine how individual markets work and how seafood value is distributed throughout different value chains.

2.3 Analysing seafood value chains

There are several means and ways of measuring the distribution of benefits to different groups; however, the objective is always the same: trying to put an objective measure on something which is not stated explicitly, or is not directly measurable. In this case the methodology needs to be robust, yet simple and easily accessible. It must also be easily comparable to studies from sectors other than fisheries.

FIGURE 6
Schematic presentation for a typical seafood value chain



The methodology used in this research is based on the concept of value chains, as defined in the business literature and production/marketing margins, as defined by the agricultural economics literature.

The value chain can be described as the range of activities required to bring a product or service from conception, through the intermediary phases of production to delivery to final consumers (Kaplinsky, 2000). A typical seafood value chain consists of harvesting (either through fishing or aquaculture, or a combination of both), primary processing, secondary processing, distribution and marketing and finally consumption. Figure 6 shows a schematic presentation for typical seafood value chain.

As in other industries there are few, if any, companies which control the whole value chain although concentration within individual segments, or sometimes between levels, has been increasing over the years.

In Figure 6 there are six steps. In reality there could be fewer or more but each step serves as a function which is vital for the entire value chain, i.e. each step adds value to the final product. In traditional business analysis of value chains the focus is on margins or real value added at each level.[12]

Each step in the value chain is analysed in terms of cost items and profit margin. This allows for calculation of the relative weight of each cost item in the overall consumer value.

Figure 7 shows an example of the cost items used in the analysis for the harvesting segment and for secondary processing. In order to make the comparison simpler the number of cost items has been kept to a minimum.

Each segment can then be evaluated as a share of the total consumer value. At this step the analysis is similar to analysis which the Economic Research Service of the US Department of Agriculture has conducted for several decades. This allows direct comparison between domestically produced agricultural products and internationally traded seafood products. The comparison is interesting because one would expect significantly different outcomes since the value chain for international trade is considerably longer than for products traded domestically. Vertical integration has also been a major issue in the production and marketing of agricultural products in the US, something which is increasingly seen in the seafood industry. Hence, one could expect that the seafood value chain might develop in similar ways as the US agricultural value chain has over the past two decades.

2.4 Marketing margins and value chains in US agriculture.

Over the past 30 years there have been substantial changes in the value chains for agricultural products in the United States of America. Figure 8 shows expenditure on food items split between

[12] For detailed explanations see Shank and Govindarajan (1993) and Porter (1985)

FIGURE 7
Value chain analysis for a seafood product – schematic presentation

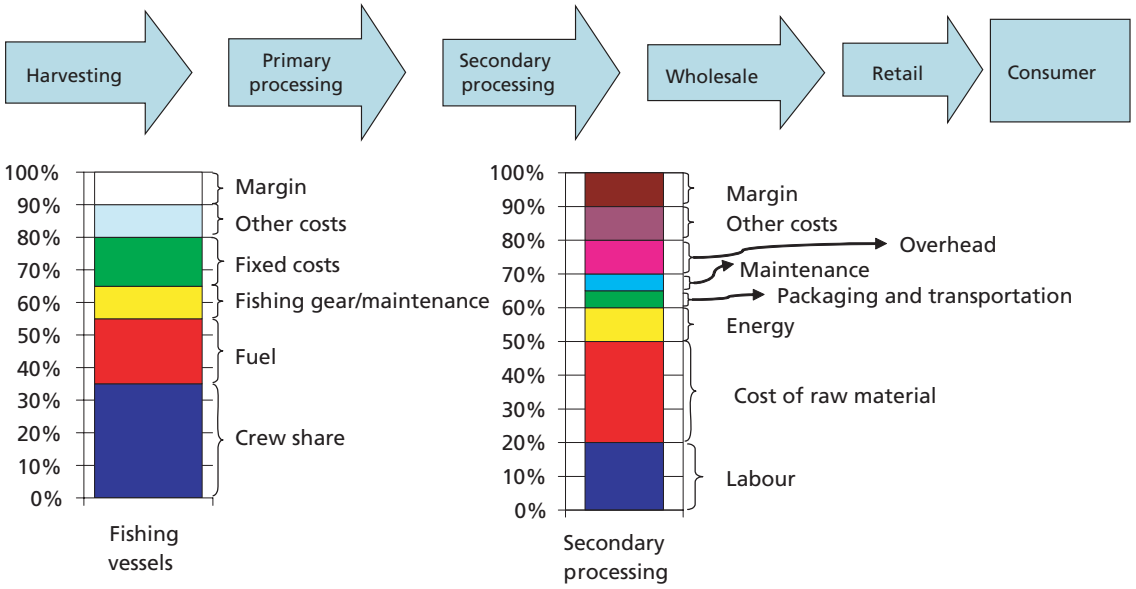
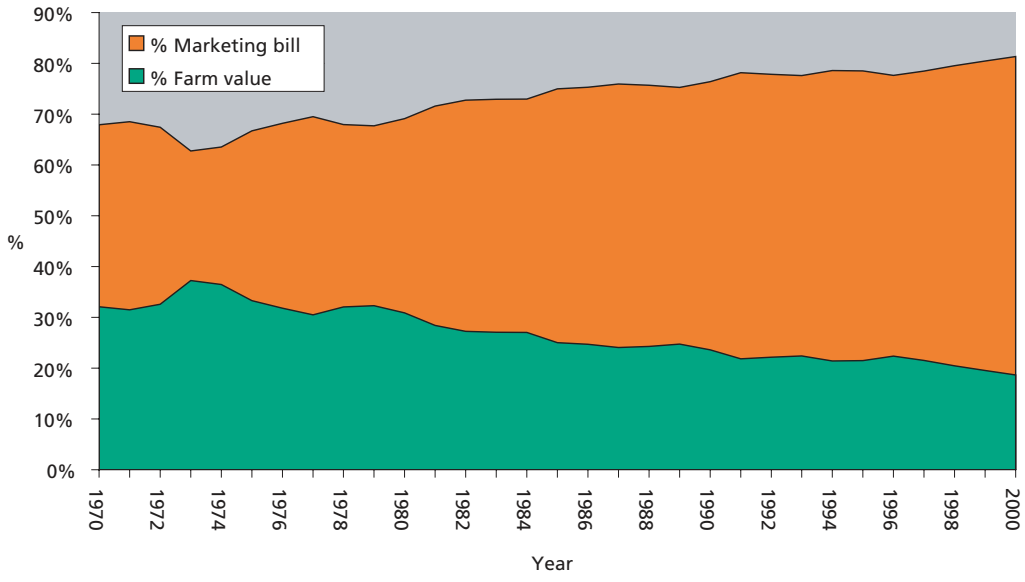


FIGURE 8
Farm value and marketing bill as a share of consumer expenditure, 1970–2000



Source: USDA – Economic Research Unit

farm value and the marketing bill, measured in constant US dollars. The marketing bill refers to all costs associated with getting the product from the primary producer (in this case the farmer) to final consumption by the customer.

The figure shows that the marketing bill has increased its share from 68 percent of consumer expenditure to 82 percent in 2000. There are several reasons for this increase, most notably higher expenditures on away-from-home food items. Consumers in the United States are buying more food that is prepared away from home, or prepared and consumed away from home. Hence, more

non-food resources are needed to provide these services, including labour for services and premises for restaurants. This trend seems to be continuing and as a result the farm value will decrease as a share of consumer expenditure in the near future.

The marketing bill is a combination of various activities but the USDA measures the activities by use of inputs rather than as a value chain of activities. In 2000 non-farm labour was the single largest input with 39 percent of the consumer dollar in the US, next was packaging with 8 percent and transportation with 4 percent. Other items include energy, insurance, advertising, interests and profits.

Farm value as a share of retail value varies substantially between food items. Table 4 shows the farm value as a percentage share of the retail value for several common food items.

TABLE 4: US farm value share of retail price in 2000

Product	%
Beef, choice, 1 lb.	49
Chicken, broiler, 1 lb.	48
Pork, 1 lb.	31
Peas, 303 can (17 oz.) – canned	22
Potatoes, 10 lbs. – fresh	17
Chicken dinner, fried,	14
Green beans, cut, 1 lb. – frozen	5
Tomatoes, whole, 303 can – canned	7
Raisins, 15-oz. box	16
Flour, wheat, 5 lbs.	19
Rice, long grain, 1 lb.	14
Potatoes, French fried, frozen, 1 lb.	10
Bread, 1 lb.	5
Corn flakes, 18-oz. box	4
Corn syrup, 16-oz. bottle	3

Source: USDA

The table shows that the farmer's share ranges from 3 percent for corn syrup to 50 percent for beef. At this point it must be emphasized that the share of farm value in the retail price does not say anything about how well individual farmers are doing financially. The economic performance of individual farmers depends on farm related costs, given the revenues for the crop or livestock. Hence a farmer who receives 3 percent of the retail price might do better financially than a farmer who receives 50 percent of the retail price. The table above reveals some additional facts when examined closely. All fresh products receive a higher share of the retail price compared to frozen and canned products. The farmer receives 17 percent of the retail price for fresh potatoes in contrast to 10 percent of the retail value for French fried potatoes. The lower share for the French fries reflects the value added activities in cutting and frying the potatoes for the consumer.

The methodology in this report represents only a snapshot of the distribution of revenues through value chains in order to estimate the share of each market level in the chain. In order to utilize this information to the fullest extent it would be necessary to collect information over a period of time, or at selected points in time, to estimate the changes in the share of each market level when price changes at the consumer level. That type of analysis might yield information about market efficiency and transparency of information between market levels.

An issue that has not been addressed so far is the increasing degree of concentration in the retail sector, particularly in developed economies. In many European countries as well as North America, large supermarket chains have developed rapidly during the last decades and now control as much as 80 percent of retail sales in many markets. This has led to concerns that these outlets are exploiting buyer power (Cooper, 2003). A similar development has also taken place in many processing industries as the efficient scale of operations increase. The same trend has also been seen in the seafood industry. For instance, Murray and Fofana (2002) show that in the UK, the supermarket chains share of seafood sales increased from about 20 percent in the 1980s to over 80 percent in 2000. Little empirical research has been conducted on these issues. However, it is clear that concentration is not necessarily bad. If concentration is due to a technical development where increased scale of operation allows retailing and processing costs to be reduced, making products less expensive for consumers, it improves welfare. Morrison (2001) indicates that this is the case for the concentration in the US meat packing sector. As long as the retail price for the product is reduced, some exercise of market power may also improve welfare. However, excessive market power will reduce value added at other levels in the value chain. The methodology used here does not allow detection of market power, but accumulation of a large share of the retail

value of a product at a specific level in the chain compared to similar chains may be an indication of market power being exploited.

Taking these caveats into account four different fisheries in four different countries are examined in order to obtain a snapshot of each market level in the respective fisheries. The fisheries are the Icelandic cod fishery, Tanzanian Nile perch fishery, the Moroccan anchovy fishery and the Danish herring fishery. The Icelandic and Tanzanian fisheries produce fresh and frozen white fish fillets sold in the US and Europe, while the Moroccan and Danish fisheries produce canned and pickled (cured) products from small pelagic species, which are also sold in the US and Europe. The diversity in product form and species makes direct comparison difficult but it gives a broad picture of the complex seafood trade in the world.

3. CASE STUDIES

This chapter contains case studies on four different fisheries in four different countries. Two of these countries are in Europe and two are in Africa. These case studies are based on the methodology presented in previous chapters and are all systematically described in the same manner. The first step is to describe the marketing chain (product form) for the selected species. Most marketing chains have several different value chains, servicing different consumer markets. The criteria for selecting each value chain are based on the relative share of the product in the total production of each species, data availability and relevance to other case studies for comparison of results. Once the value chain has been selected individual components are identified and value added activities at each level are calculated. Finally the value chain is constructed from the value added activities at each level of the chain.

Data used in these case studies are mostly secondary data collected from official documents and Web resources. In some cases this data is supplemented by primary data collected at source in each country.

3.1 Iceland

The Icelandic cod fishery is a highly capitalized fishery with multiple fleet segments and a wide variety of seafood products. The cod fishery is also the single most important fishery in Iceland in terms of export value. Catch is harvested year round by vessels of three main categories: the in-shore fleet using hook and line, the long lining and gillnet fleet, and the trawler fleet. Over the past decade the total annual catch has ranged between 200 000 and 260 000 tonnes. This catch is sold fresh, frozen, salted and dried. The utilization of the catch depends on factors like the size and texture of the fish. Large cod is preferred as an input in the processing of salted cod while medium sized cod is preferred for processing frozen cod fillets. Figure 9 shows an example of the catch and its disposition to various markets.

The figure shows that there are several underlying value chains in the production of Icelandic cod products. These value chains have different levels or stages from the very short ones with whole fish sold at foreign fish markets to the longer value added products with two or more processing stages selling their products to catering and restaurants. Cod products are mainly sold to three markets; Europe, US and Asia, with the bulk of the catch going to Europe and the US. The US market focuses primarily on the restaurant/catering business while the European market is more mixed between restaurants and retail.

Fish is exported by ships or airfreight. Over the past years efficient airfreight systems have developed allowing fresh fish from Icelandic waters to be in retail stores within 48 hours in Europe and 72 hours in the United States. Exporting by ship takes at least five days. Rapid changes in the shipping and airfreight industries in Iceland, along with computerized and centralized fish auction has been the main driving force behind this development.

FIGURE 9
Value chains for the Icelandic cod fishery

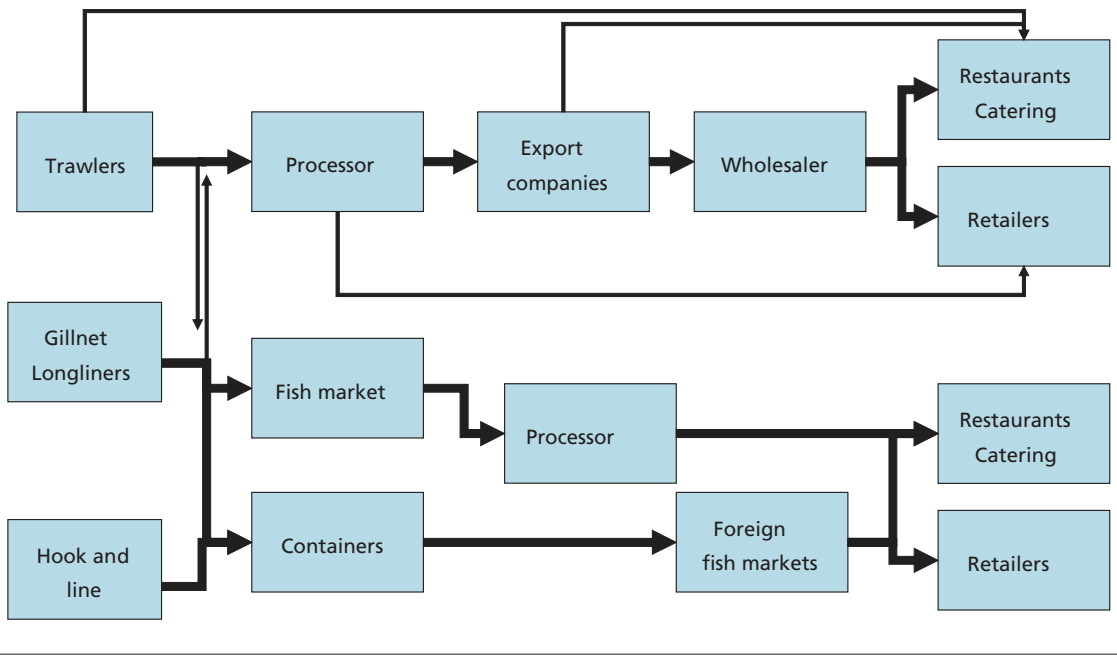
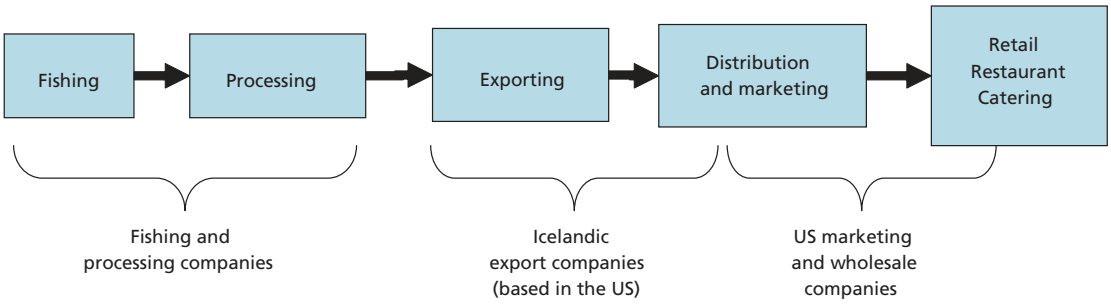


FIGURE 10
The value chain for Icelandic cod fillets exported to the United States



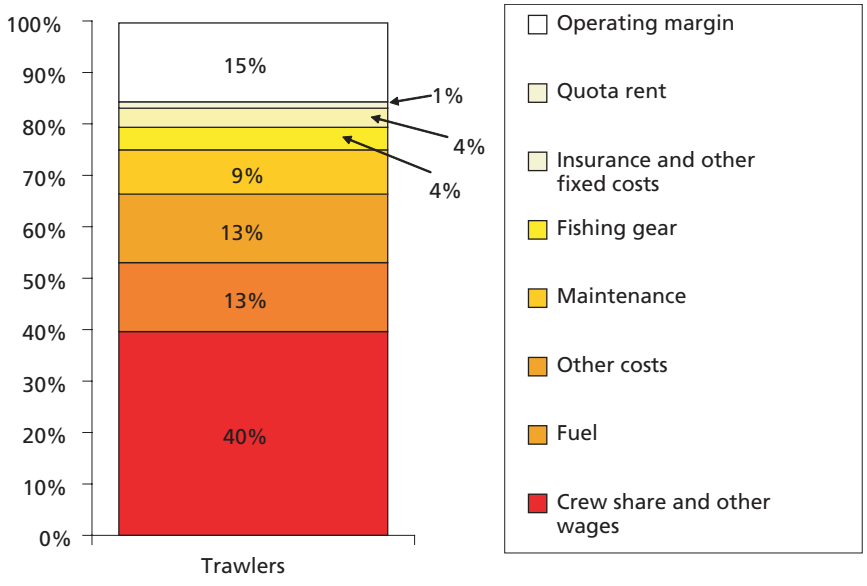
Even though the European market is the largest, with more than 75 percent of all seafood exports going to the European Economic Area (EEA), it is also the most segmented with many country specific sub-markets within the EU and EEA. In contrast on the US market Icelandic companies offer a more homogenous range of products over all states. The US cod market is also the single most important market for cod with more than 12 percent of the total export value in cod for 2003. Hence, for the purpose of this study it was determined that the value chain for cod fillets on the US market would best demonstrate the distribution of revenues through the value chain.

The value chain

The value chain for cod fillets sold on the US market has five segments; Fishing, processing, exporting, marketing/distribution and finally retailing or food service, such as restaurants or catering. Figure 10 shows a schematic representation for frozen cod fillets from Iceland sold in the US.

Most of the cod exported to the US is harvested by trawlers owned by the large processing firms. The processing firms do both primary and secondary processing with the final product being

FIGURE 11
Cost items as a share of total revenue for the Icelandic trawler fleet in 2001



Source: Statistics Iceland

individually quick frozen cod fillets and portions of fillets. The final products are sold through two export companies in the US,[13] both are owned by two of the largest export companies in Iceland, the SIF group and the Icelandic group. Both SIF and Icelandic use a network of brokers and US owned distribution/marketing companies to sell their products throughout the United States. Hence, Icelanders control the entire value chain from fishing, through primary and secondary processing and exporting, as well as a part of the distribution network.

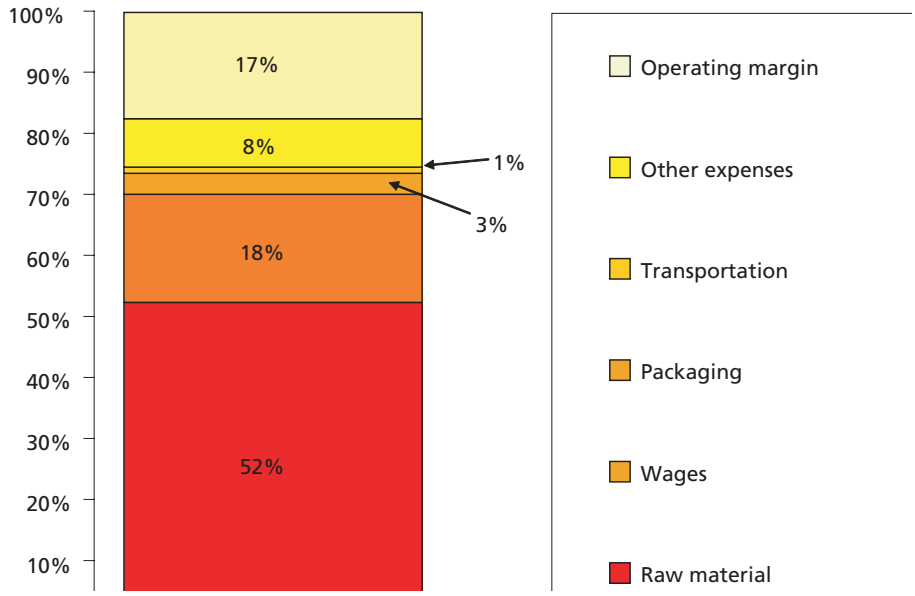
Value chain analysis for Icelandic cod products

The trawler fleet in Iceland caught approximately 80 000 tonnes in 2001, or 33 percent of the total cod catch of 240 000 metric tons. The trawler catch was valued at 33 billion Icelandic krónur at 2001 price level (or US$318 million valued at 2001 exchange rates). Operating costs (excluding depreciation and other capital costs) are estimated at 23 billion Icelandic krónur which gives an operating margin of 8.2 billion Icelandic krónur for the entire trawler fleet. Financial charges and depreciation amounted to 8 billion kronur, giving a net profit of 0.2 billion krónur for the trawler fleet (wetfish and freezing trawlers). Individual costs items are shown in Figure 11.

Figure 11 shows crew share and other wages are the largest cost items for harvesting of cod. This item accounts for 40 percent of the total revenue for the fleet. Fuel and maintenance are the other large cost categories with 13 percent and 9 percent respectively. Fishing gear accounts for 4 percent of total revenue and other categories account for less. It is interesting to note that quota rentals have a very low share in the total revenue of the trawler fleet, while other fleet categories have a substantially higher percentage for this category (up to 8 percent for medium sized boats). This reflects the nature of the operations where trawler companies tend to be large multi-vessel firms which hold their own quota. The operating margin is 15 percent of total revenue. The operating margins pay all other expenses including depreciation, capital expenses and taxes. In 2001 the net

[13] As of May 2005 these two companies have merged into one. Hence there is one dominant company on the US market today selling Icelandic cod products. There are also several smaller companies that export to the US as well.

FIGURE 12
Share of each cost item in processing of cod fillets in Iceland



Source: Statistics Iceland and own survey data

profit was estimated by Statistics Iceland to be 2.7 percent of gross revenues assuming a 6 percent cost of capital to the user.

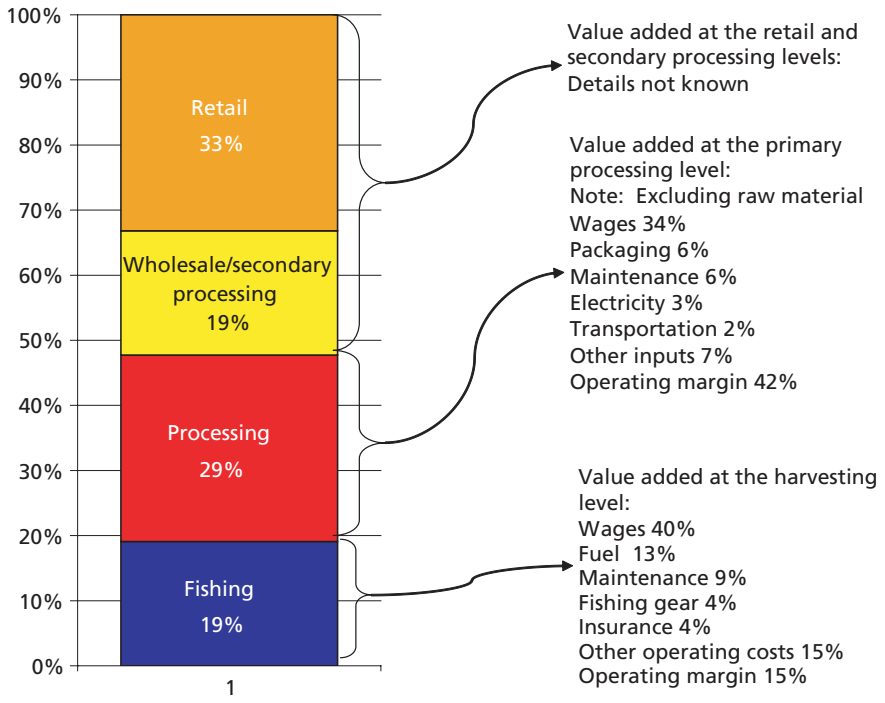
The 240 000-tonne annual catch resulted in 116 000 tonnes of exported seafood products, with 46 000 tonnes used for freezing of whole fish, fillets and fillet portions. Of the 46 000 tonnes of cod products, 14 000 tonnes were exported to the United States. The total **(FOB)** value of frozen cod products exported to the US was 7.5 billion Icelandic krónur in 2001. These products are processed in the same processing plants as cod products sold to other markets and therefore it is difficult to assign costs to specific product forms. An attempt was made to estimate these costs by doing a survey with several main processing companies. A phone survey was conducted with 7 Icelandic processing companies asking them about production costs of IQF fillets. That survey indicated a relatively higher raw material cost than in the official statistics on production costs by Statistics Iceland. Other cost items from the survey were similar to the official survey. An attempt was then made to combine the survey data with the overall industry wide data collected by Statistics Iceland. The result is believed to give a consistent estimate of individual cost items in processing frozen fillets and fillet portions. The share of individual cost categories is shown in Figure 12.

The operating margin is similar to the fishing fleet. However, capital expenses, including deprecation were much lower, relatively speaking, for the processing industry than the fishing industry. As a result profitability in the processing sector was good in 2001, with net profits of 5 billion Icelandic krónur (18 percent of total earnings in the freezing sector as a whole) as estimated by Statistics Iceland using a fixed cost of capital of 6 percent.

Unfortunately information is not available on the individual cost items for distribution and marketing of cod fillets in the United States for reasons of commercial confidentiality, since there are two competing Icelandic companies that sell cod fillets in the US market.[14] However, the cost items consist of transportation costs, tariffs, insurance, storage, marketing, distribution, capital costs and other costs. The products are mostly sold to foodservice establishment (restaurants, catering).

[14] From May 2005 these two US based companies merged into one company under the ownership of Icelandic Group.

FIGURE 13
Distribution of retail value for Icelandic cod fillets sold in restaurants in the US



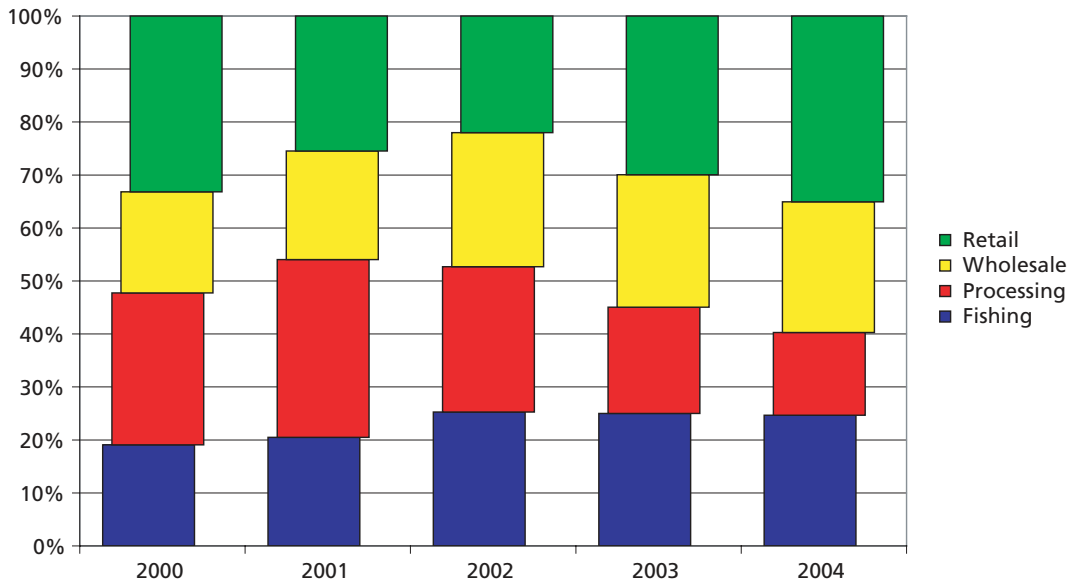
With the information above we can construct the entire value chain for Icelandic cod products exported to the US foodservice market by calculating the value added at each stage, where value added represents the services used to get the product from one stage to the next. This is illustrated by reference to one kilogram of final product sold in the US market for which prices have to be established at each level of the value chain.

First and most difficult is the retail price. No consistent and centralized data collection exists for retail seafood prices in the United States and all official information is published at highly aggregated levels. Hence information was collected by looking at samples of prices for different products. An additional difficulty is that most of these products are sold to restaurants and other food service establishments with further added value and other ingredients before selling it to the final customer. A rule of thumb within the industry is that the main item of any meal served in a restaurant should not cost more than 30 percent of the menu price for that dish. Typical prices for battered cod in US restaurants range between US$8 and US$14 per serving. Further assuming that the average portion is 8 oz. it is possible to deduce[15] a retail price for the fish fillet in the range of US$12 to US$20 per kilogram of fillet, or US$6 to US$10 per pound. The median price for Icelandic cod fillet at the wholesale level (Brown, 2001) was US$3.6 per pound, or US$7.9 per kilogram, which is the value that retailers/restaurants paid on the average in 2001. Hence it is safe to assume US$14 as a reasonable estimate for the retail price of Icelandic cod fillet sold on the US retail market in 2001. This US$14 dissipated through the value chain both in terms of segments and individual cost categories. Figure 13 shows the percentage share of each segment in the value addition through the cod fillet value chain.

The retail level contributes about 33 percent of the value added to the product. This value addition includes everything that is needed to provide the customer with the product, such as facilities and

[15] The price per kilo is found by multiplying the price for battered fish by 0.333 to obtain the price of the fish on the main menu. That price is then divided by the fish weight in grams (8 ounces = 227).

FIGURE 14
Value added at each level in the value chain from 2000–2004



services. The next level is wholesale and/or secondary processing. The products imported from Iceland as IQF fillets are most often further processed as breaded or battered fillets. This level also provides a sales network and distribution of the products to the retail level. The wholesale level has about 19 percent of the total value added in the value chain. The third level is processing. This processing is conducted within Iceland and is in the form of cutting the fillet from whole fish, and cleaning, skinning, cutting and freezing the fillet. This primary processing contributes about 29 percent of the total value added in this value chain. In most cases the processing facilities also operate the fishing vessels, harvesting the cod for the land based factories, but these fishing activities contribute about 19 percent to the total value. Overall then it can be concluded that activities within Iceland contribute about 48 percent of the total value and activities in the United States about 52 percent. Icelandic companies own companies that provide a further 19 percent of the total value and hence Icelandic companies control about 70 percent of the total value chain for Icelandic cod fillets sold in US restaurants and catering establishments. The primary activity of fishing derives 19 percent while getting the product into consumable form and getting it to the market receives 81 percent. The 81 percent is a similar share for the marketing bill as the share for the US marketing bill (see Figure 8).

The year 2001 was an unusually profitable year for the Icelandic fishing industry since the Icelandic króna depreciated in value, resulting in very high prices measured in krónur. It is therefore interesting to examine how these values have changed over time. Figure 14 provides an overview of the development at each segment of the value chain from 2000 through 2004.

This figure shows the impact of the depreciation and then appreciation of the Icelandic króna. As prices in Icelandic krónur became higher the fishing companies and processing companies received a higher share in the total value chain assuming the retail and wholesale levels could not increase their price in US dollars and hence they received a smaller share of the total value, measured in Icelandic krónur. As the Icelandic krónur appreciated in 2004 the retail and wholesale firms received a higher portion of the value chain. It should be emphasized here that this does not reflect how profitable each level was at the same time but rather shows how the same activities can vary in importance between years when there are external changes such as exchange fluctuations. This also shows the importance of using time series when monitoring the distribution of seafood value throughout the value chain.

Overall it can then be concluded that there has been relative stability in the cod fillet value chain on the US market with a 50/50 split between the primary (fishing and filleting) and secondary (distribution and marketing) sectors.

Analysing the Icelandic seafood value chain for frozen cod exported to the United States has yielded several interesting facts. The harvesting sector receives about 19 percent of the wholesale value in the US. The largest single cost item in the harvesting sector is wages, at 40 percent of total revenues. Fuel and fishing gear are the second largest with 10 percent each. In the processing sector raw material is the single largest cost item with 44 percent of total revenues going towards purchase of raw material. Wages account for 19 percent of the total and other items are less than 10 percent. An interesting fact here is that the operating margin is 23 percent for the Icelandic processing industry. The operating margin is calculated before interest, taxes and profits and given that the Icelandic processing industry is capital intensive, as a result of general use of computerized manufacturing technology, it is not surprising that capital costs could be substantial within this sector. Another explanation is that 2001 was an exceptionally good year for Icelandic fisheries since the Icelandic krónur was valued at record low levels throughout the year, benefiting Icelandic export companies.

It was not possible to yield specific cost items from the wholesale/distribution sector but this sector receives about half of the overall wholesale value. This is not surprising since marketing of food products has become the single largest cost item associated with food production, as was seen in the case of US agriculture (see section 2.4).

In the past five years Icelandic fishing companies have been consolidating and have also invested in fishing and seafood companies overseas. This is seen as a response to developments in the retail sector where there is a high level of concentration in the food retail and catering business. Hence these companies are trying to become bigger players in the value chain in order to be better prepared to meet the demands of a highly competitive market.

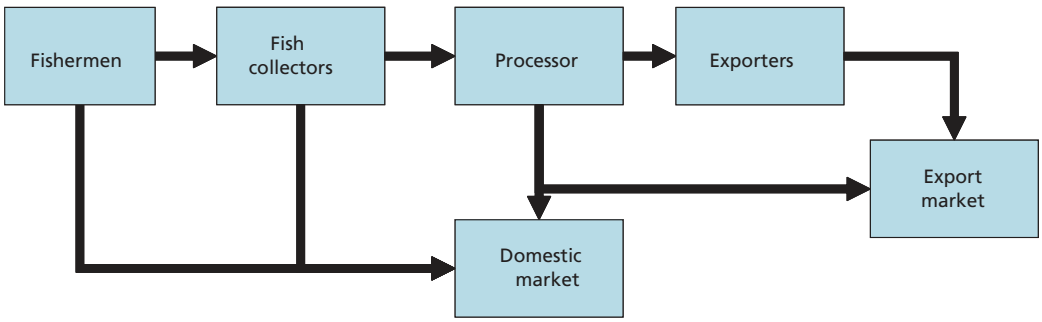
The situation for the Icelandic cod fishery is much like the one described in figure 1 in section two, where there is a well managed fishery which is a net exporter of seafood products. Historically Icelanders have exported all their cod while consuming the closely related, but lower valued haddock. Hence, high international market prices lead to almost no domestic consumption of cod. The market system from retail level to fish markets also seems to be efficient both in physical transportation and price formation. Figure 14 showed that the share each sector acquires in the value chain changes quite rapidly with changes in exchange rates and other external factors. Good fisheries management systems along with strong infrastructure and efficient marketing systems result in a strong seafood sector which, in the case of cod exported to the US, leads to a high degree of control by Icelandic companies over a large share of the seafood value chain.

3.2 United Republic of Tanzania[16]

Lake Victoria is the second largest lake in the world after Lake Superior in North America. It is shared by three East African countries: United Republic of Tanzania (51 percent), Uganda (43 percent) and Kenya (6 percent). It is estimated that the lake has a cachement area of about 194 200 km^2. The lake provides all the basic resources for the population in the area such as food and water as well as means for trade and transport linking the three riparian states. It forms a natural, social, geographical and political bridge linking the three countries.

[16] Mr Geofrey F. Nanyaro provided data and descriptive analysis for this case study. Geofrey F. Nanyaro, Fisheries Division, PO Box 2462, Dar es Salaam, Tanzania. Fax: 255222110352. E-mail: gfnanyaro@yahoo.com

FIGURE 15
The marketing chain for Nile perch in the United Republic of Tanzania



The lake supports the most important fisheries in East Africa owing to its diversity, nutritional and economic values. It is the most productive inland fishery in the world; an introduced species, Nile perch (*Lates niloticus*), holding the leadership in abundance and socio-economic value. Other fish in order of importance are the native, sardine-like dagaa (*Rastrineobola argentea*); and the Nile tilapia (*Oreochromis niloticus*), which was also introduced to the lake's ecosystem.

During the late 1970s Nile perch contributed only 2 percent of the lake's fisheries, while *Haplochromis* contributed about 80 percent and the remainder was other mixed species. The Nile perch population exploded and became the dominant population in the lake by mid-1980, followed by a rapid decrease or disappearance of other native species (Witte *et. al*., 1992). As Nile perch increased it consumed a good proportion of the indigenous fish species, which then formed a relatively good source of income and cheap protein for the local population. Being an exotic fish species, Nile perch was not well accepted initially by the local consumers and this triggered an outcry by the local population that Nile perch was a menace, which should be eliminated from the lake. However, this was no longer a feasible approach since elimination of Nile perch at this stage would have had a further adverse impact on the whole ecosystem.

In the early 1990s investment began for the exploitation of the Nile perch stock on the Tanzanian side of the lake, resulting in the establishment of a number of Nile perch processing plants. Its abundance has led to the development of several important export-oriented Nile perch fish processing establishments in the riparian regions of Kagera, Mara and Mwanza; as well as the processing of by-products for local and regional markets. The main products are frozen and fresh/chilled fillets as well as headed and gutted fish and more recently skins, which are exported to various overseas markets. Trimmings and carcasses are processed locally for local consumers and the regional markets of Zaire, Rwanda and Burundi. In general, the Nile perch industry provides direct and indirect benefits to more than 2 000 000 individuals (i.e. fishers/processors/traders and service providers).

The structure of the marketing chain for Nile perch in the Tanzanian economy is shown in Figure 15.

Harvesting is primarily based on artisanal fisheries from canoes, using either sails or outboard motors. Fishermen own their own boat or operate boats owned by a processing plant or a fish collector. Often the fishermen are obliged to land at a specific processing plant or a fish collector due to loan contracts. These contracts are on a barter level, i.e. a fisherman is provided with an outboard motor or net but a certain percentage of the future catch is retained as a payment for the motor or net.

Nile perch fish processors are of two categories; artisanal and industrial processors. The artisanal fish processors aim exclusively at the internal and regional market while the industrial processors are geared for the export markets, the main markets being the European Union, Japan, United

States, Israel and Australia. What is rejected by the processing plants for export is sold to the domestic/regional market in various product forms, including fresh, smoked and salted.

The processing plants primarily produce fresh and frozen fillets. These fillets are exported directly, or through export brokers, to foreign markets. Nile perch exports account for about 15 percent by value of Tanzania exports and the European Union market absorbs about 60 percent of Nile perch fillets exports. Since the European market is the most important for Tanzania it was decided to make a detailed examination of the value chain for Nile Perch fillets exported to the European Union.

The value chain

The value chain for the Tanzanian Lake Victoria Nile perch fishery, exported to the European Union, is split into five different segments; fishing, fish buyers/collectors (on shore collectors), processors, exporters and the EU retail market, as shown in Figure 16.

Mechanized industrial fishing was prohibited in 1994. Fishers with little capital use canoes (planked and/or dug-out) that are propelled by paddles and sails and only a few relatively rich fishers utilize outboard engines. Use of outboard engines has made it possible for poor fishers to reach distant fishing grounds as their fishing boats are towed by a mother fishing boat under a special arrangement where by the engine owner is paid a fee for towing a fleet of canoes to and from the fishing grounds. Gillnets and long lines are the major fishing gears for catching Nile perch for export purposes.

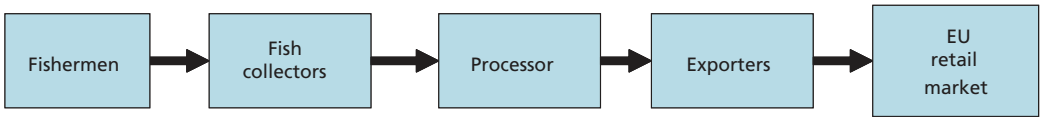
The second group of fishers is that with all modern facilities for commercial small scale fishing. Such fishers have boats with hygienic fish holds and are powered by engines. On average such boats can carry up to five (5) tonnes.

The standard practice for processing Nile perch is to land the fish at one of many landing stations dotted along the lake's shoreline and on the numerous islands in the lake. It is also collected directly from fishers by collector boats at the fishing grounds and ferried directly to the fish processing plants without passing through the landing sites.

The fish processing establishment forms the third segment in the flow diagram. This segment receives all fish (raw material) collected from segments 1 and 2. The segment is also important as it is the main source for raw materials used in preparing products intended for local and regional markets. The raw materials for these two segments come from the fish rejected by the exporter as being of poor quality, byproducts or illegally caught fish seized by the authorities and latter sold as low grade fish.

The final market segment is the export market. Usually, fish is sold in bulk to European Union importers. They in turn sell the fish to wholesalers, supermarkets, processors, etc. The fillets are also re-exported straight away (with the same or different identity). There are companies or consignors based in the European Union that are major importers of Nile perch fillets and trade the same product to other destinations such as USA, Australia and South America. Fillets are also sold to factories for further processing.

FIGURE 16
The value chain for Lake Victoria Nile perch from the United Republic of Tanzania



Value chain analysis for Tanzanian Lake Victoria Nile perch

The annual average ex-vessel price for Nile perch from 1994 to year 2003 is shown in Figure 17. Prices are per kilogram and are quoted in US$.

In almost all cases, respondents informed interviewers that the price for Nile perch at the landing station or at beach level is not determined by fishers but by collectors who are directly influenced by the processing plants. Factors such as transportation costs, availability of transportation vessel or vehicles at the time of landing will automatically influence the prices at this level. Independent fishers can have their day when there is a shortage of fish while "contract" fishers work at the prices agreed. The growth of an individual fishers operation is constrained by the fact that they have no preservation facilities and therefore delay in sale would result in low quality fish, which means lower prices.

Figure 17 shows a progressive increase in Nile perch prices at the landing sites, except for 1999 when the European Union imposed a ban on imports of Nile perch products from the Lake Victoria region due to a cholera outbreak. The ban resulted in significant economic losses to the population of the three riparian countries of Lake Victoria.

In the last three years prices have abruptly gone up because of a decline in landed quantities of Nile perch. This might be due to over exploitation of the resource leading to shortage of supply of raw materials. A fisher is now forced by circumstances to invest more in terms of fishing effort and has to fish in distant places compared to the end of the 1990s. The national fishers survey for 2002 shows a substantial increase in the fishing effort, but at the end of a day a fisher comes back home with less Nile perch than before. That means that Nile perch harvesting costs are higher compared to past years. This represents a situation as described in Figure 4 in chapter 2 where it is shown that increased prices due to an excessive demand from foreign markets can have an adverse effect on the resource if there is no proper fisheries management system in place.

The average prices in US$ paid to fisherman by collectors, and to collectors by processing plants is shown in Figure 18. The shaded areas show the net price for each market segment. Increased demand from the EU has obviously resulted in increased prices at these levels though the price increase has not been symmetrical.

FIGURE 17
Average landing values for Tanzanian Nile perch

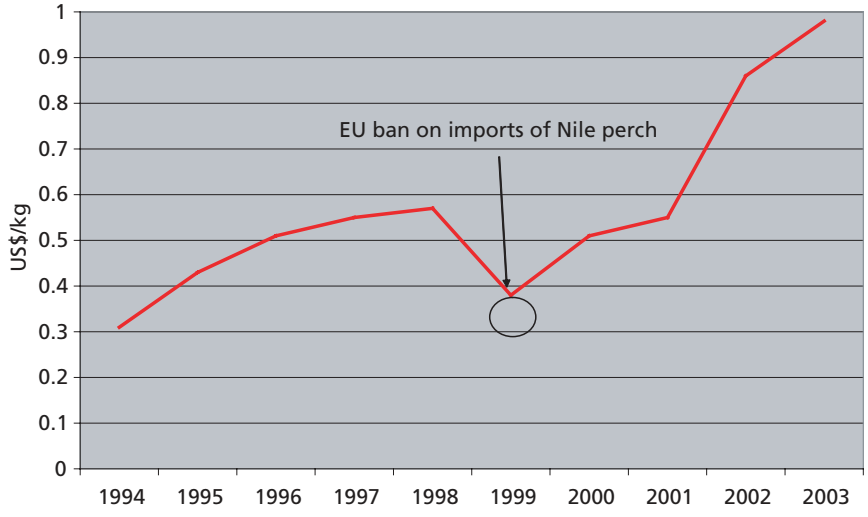
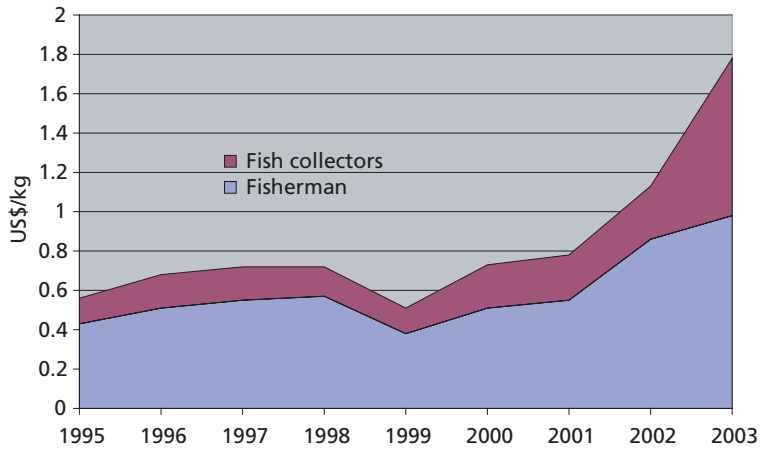


FIGURE 18
Prices paid at ex-vessel level and the factory gate



Source: Information collected at the source

Other factors such as, raw materials, cost of packaging materials, salaries and other running costs (electricity, taxes etc.) are not shown on the graph; hence it only shows net revenues but not cost of harvesting, transporting and handling.

The export market will determine the type of product traded and this reflects the final price to the consumer. Higher orders of fresh chilled Nile perch fillets by a buyer from the European Union market will drive an exporter to increase his bid price in acquiring raw materials so that the order is filled in the shortest possible time. Such instances result in intense competition resulting in price increase which benefits the collecting agent but not necessarily the fisher. Figure 18 shows this situation towards the end of 2003. Prices increase both at the fishing and fish collecting levels, but the increase at the fish collecting level is relatively higher than at the fishers' level.

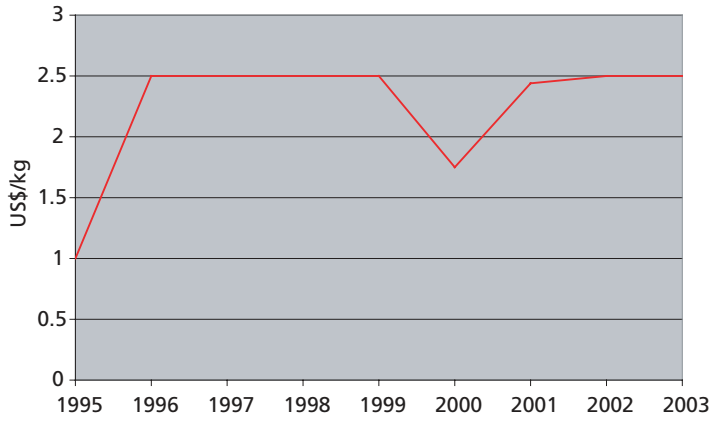
In 1996 the government imposed a minimum export price to be reported for all exports. This was due to systematic under-reporting of prices by the fish processors and other exporters of Nile perch from the United Republic of Tanzania. This minimum export price was lowered in 2000 after the market collapse because of the cholera scare in 1999. Fish collectors have increased their share in the past few years but fishers still get a higher share than the collectors. From the fishers revenues one must subtract cost of harvesting, including nets, capital costs for investments, wages, etc. Unfortunately this information was not available. However, it has been noted that increased pressure on the Nile perch fish stocks has lead to increased effort/kg of harvest. This simply means that fishermen must work harder for each kilogram of fish harvested.

Prices at the processing level are shown in Figure 19 (i.e. prices which the processing plants receive for their product).

The price reflects the minimum export price implemented by the government in order to collect export tax or levies. Due to the structure of the export market the above graph does not give any meaningful information for this analysis. It is more relevant to examine import prices to the EU, shown in Figure 20.

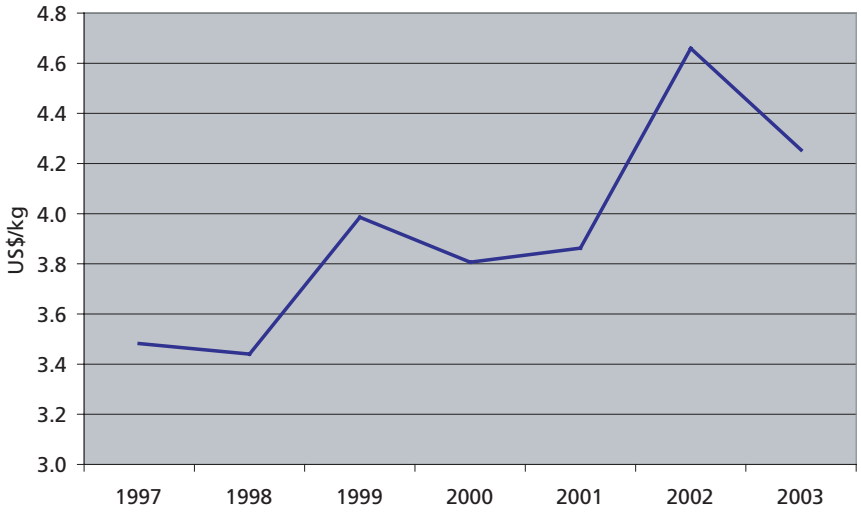
The figure shows average values for fresh and frozen fillets imported by the European Union. Import prices have risen over the past seven years, reflecting increased demand for, and less supply, of Nile perch in the European Union. Though this price increase has not been reflected in the export prices from the United Republic of Tanzania it has obviously been reflected in the increase

FIGURE 19
Prices at the processing level



Source: Information collected at the source

FIGURE 20
Import value (US$/kg)



Source: Eurostat

in prices to fish collectors and fishers, as shown in Figure 18. The price increase is therefore transferred through the entire value chain.

In order to look at the distribution of value through the value chain the year 2001 was selected. The biggest challenge was to establish a retail price for Nile perch. Retail values are difficult to obtain but Bambona (2002) estimated retail value between US$11 and US$12 per kilogram of fillet in 2002. Hence in this study a retail value of US$10 was selected as the price for a kilogram of fresh fillet sold at the retail level in EU in 2001. It is emphasized that this is a rough estimate of the true retail value.

When the retail price has been established one simply subtracts the import value to find the value added at the retail level, and then subtracts the export value from the United Republic of Tanzania from the import value in order to find the value added at the import level. The value added at the processing level is shown with the value added at the import level due to problems with reporting of export prices in the country, as mentioned earlier. Value added at the collector level is the fish

purchased by the processors minus the cost of raw material. The raw material is the harvest by the fisherman. In order to make one kilogram of fillets one needs 2.8 kilograms of raw material, assuming a yield ratio of 35 percent. Since only 35 percent of the fish is used to make the fillet 65 percent is left as byproducts. In the United Republic of Tanzania most of these byproducts are sold on local and regional markets. Hence, the price of the raw material should be split proportionally between the main product (fillets) and the byproducts (offcuts, skeleton, head, etc.). This is however rather problematic and complicates the analysis considerably. One can also argue that the cost of raw material for the byproducts is almost zero, since the processor would simply throw the byproducts away if there was no market for them. If there is no market for the fillet it would simply mean that there is no market for the fish at all. Hence in this analysis the price of the whole fish is considered to be the cost of the raw material for producing fish fillets from Nile perch.

In order to make one kilogram of fillet the processor needs to buy 2.8 kilograms of fish. The revenue received by the collectors and fisherman is therefore the value of 2.8 kilograms rather than price/kg as is usually reported.

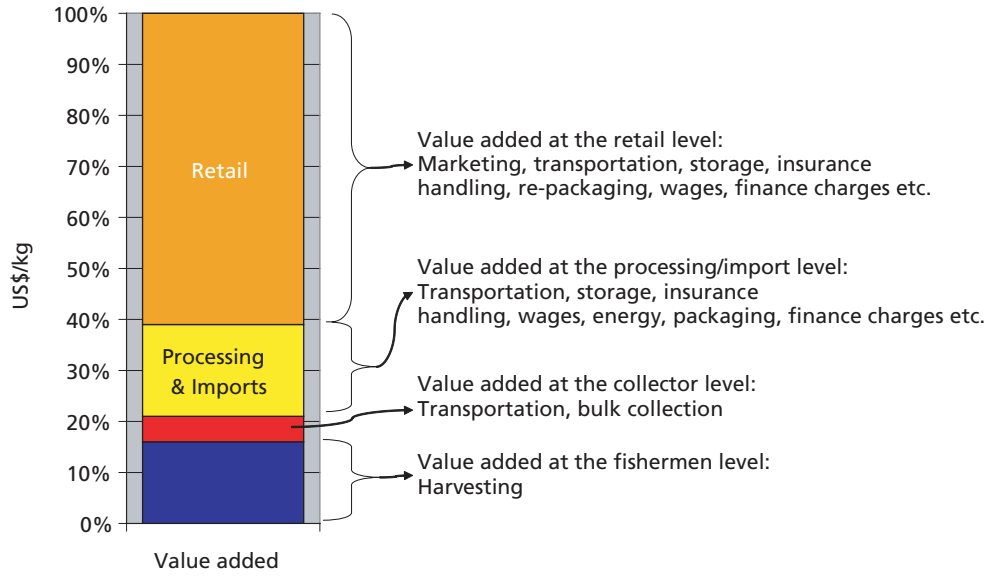
Unfortunately individual cost categories are not available for each segment of the value added chain, but the major categories are known. Hence Figure 21 shows the percentage of value addition at each segment in the value chain, with references to the major cost categories at each level.

The figure shows that fishers obtain about 15 percent of the value of the retail price for Nile perch while fish collectors obtain about 5 percent of the retail value. The processing and export sector in the United Republic of Tanzania obtain between 10 and 15 percent of the retail value and the processor and EU importers (which might be the Tanzanian exporter) receive a combined about 20 percent of the retail value. The retailer receives about 60 percent of the retail value. The 15 percent received by the fishermen is similar to the average 19 percent received by the US farmer for his products, and is also similar to the percentage share the Icelandic fisherman receives for a cod fillet.

Data collected at collector and factory level in Tanzania indicate that several changes have occurred in the cost of producing Nile perch fillet in the United Republic of Tanzania. Notably labour costs have increased over the years but transportation costs have declined due to better roads and

FIGURE 21

Value added for one kilogram of Nile perch fillet in the Tanzanian Nile perch fishery



other infrastructure. Transportation costs are though still a big part of the domestic and export value added. Transportation cost pr. kg. of fillet is as high as US$1.50 from the United Republic of Tanzania to the EU, and higher to the United States and Asian markets. Domestic transportation costs might be as high as 20 to 25 percent of the value added at the collector and processing levels.

The above analysis has shown that the value chain for Nile perch fillets from the United Republic of Tanzania to the EU has a similar structure to other value chains for fisheries and agricultural products. Fishermen are receiving higher prices due to increased demand, but the price increase is not perfectly symmetric between market segments, indicating that price formation could be improved through better distribution of information. Higher prices should mean higher revenues for Tanzanian fishers and hence they should be better off. However, as shown in Figure 4 in section 2.3 this does not have to be the case and reports of decreased landings and increased effort on behalf of the fishers is an indicator that higher prices are starting to have adverse effects on the Nile perch fish stock in Lake Victoria. In order for the Tanzanians to enjoy the benefit of higher prices it is necessary to implement a sustainable fisheries management system. Tanzanian fishers can not expect to obtain a much higher percentage in the value chain compared to other value chains. The marketing system of Nile perch seems to be fairly efficient in distributing the products from the United Republic of Tanzania to the marketplace. However, high transportation costs due to lack of infrastructure make the system relatively expensive. The system also seems to be very ad-hoc as short term fluctuations in demand and supply can cause considerable (and often local) price fluctuations. This increases uncertainty and makes it more difficult for businesses to engage in long term arrangements with wholesalers and retailers. Regulated minimum export prices also make it difficult to estimate the share which Tanzania receives in the entire value chain, but it seems that Tanzanian fishing industries control a smaller part of the value chain than for example Icelandic companies. This makes it more difficult for the United Republic of Tanzania to compete on the globalized world market for white fish fillets. The analysis above also shows that there is considerable room for improving efficiency and profitability in the Tanzanian fisheries by improving infrastructure, establishing a fisheries management system (which controls total allowable catch) and by assisting Tanzanian fish traders to gain control over a bigger portion of the value chain, through collective efforts and improved business strategies.

3.3 Morocco[17]

The Kingdom of Morocco has a 3500 km coastline extending along the Mediterranean from the north to the Canary Islands on the Atlantic coast in the south. This corresponds to an EEZ of 1.1 million km². Morocco is the top fish producer in Africa and ranked as the 21st largest producer in the world in 2000 (FAO, 2006). According to official information the exploitable aquatic resources of Morocco can be estimated as between 1.5 and 2.5 million tonnes annually, with a value US$1 billion (Eurofish 2005).

Fishing in Morocco can be categorized into three major fisheries; coastal, artisanal and industrial (Malvarosa, 2002). In total more than 21 000 vessels participate in these three fisheries of which the artisanal fleet has the greatest in number of vessels (18 000) but the industrial fleet is largest in GRT (146 000 GRT). The coastal and artisanal vessels fish in the coastal areas but the industrial vessels fish in deep sea waters within the Moroccan EEZ.

The artisanal fleet consists of 18 000 vessels scattered along the entire coast, though the biggest concentrations are on the south part of the Atlantic coast. They have outboard engines and usually a crew of two to three. These are day-fishers that land their catch fresh.

[17] Information for this chapter was collected by: Chaibi Ahmed, Institut agronomique et vétérinaire Hassan II, Département des industries agricoles et alimentaires, BP 6202, Rabat, Morocco, with assistance from Lahsen Ababouch, Fish Utilization and Marketing Service, Fisheries Department, FAO, Rome, Italy.

There are four different types of boats used in the coastal fleet; purse seiners, bottom trawlers, longliners and mixed gear boats. In 1999 there were 2523 vessels with a total 76,761 GRT (an average size of 30 GRT) (Malvarosa, 2002). However, these vessels differ greatly in numbers, length and GRT. In 1998 this fleet segment consisted of 428 trawlers, 397 purse seiners, 971 long-liners, 587 multipurpose vessels and 103 other fishing vessels. The majority of these boats makes 150 to 250 fishing trips per year and contributes about 70 percent of total catches. In 2002 the coastal fleet landed 770 000 metric tons, valued at 208 million Euros, with pelagic species (mostly sardines and anchovies) being the mainstay of the catch. Most purse seiners harvest both anchovies and sardines.

The industrial fleet had 454 vessels in 1998, totaling 146 000 GRT (an average size of 321 GRT). In some cases these vessels have freezing capacity and can stay out fishing for several days or weeks. This fishery harvests the most valuable species, including several mollusc species, whitefish and shrimp. In 2002 the industrial fleet caught 134 000 tonnes, valued at US$460 million, by far the most important category measured in terms of value.

In terms of volume the sardine is the most important species accounting for 60 to 75 percent of the annual catch between 1997 and 2002. Anchovies are the second most important species for the coastal fleet, with a total of 40 220 tonnes in 1999, valued at 79.39 millions of MDH, or US$7.7 million.

Fish caught on the Moroccan coasts is sold at the central fish market, fish landing sites or through the certifying counter for fish destined for further processing into canned fish or by-products (fishmeal or fish oil). This counter is called “Comptoir d’agréage du poisson industriel” or CAPI. Wholesalers and retailers are the main agents involved in fresh fish distribution and trade.

This study is mostly concerned with value added products from Morocco. Semi-processed anchovies are the most important of these and this product also has the major part of the total market share of similar products in the United States and several European countries. Though there is no specific anchovy fishing fleet, the majority of the anchovies are caught by the coastal fishing fleet (purse seiners) and the artisanal fleet targeting sardine. Hence, information for the purse seiners and information about anchovy processing will be used for this study.

Anchovy is a small pelagic fish which can be marketed fresh, frozen, dried, smoked, salted and/or canned and is destined for human consumption. It can also be processed as fishmeal and fish oil for animal feed.

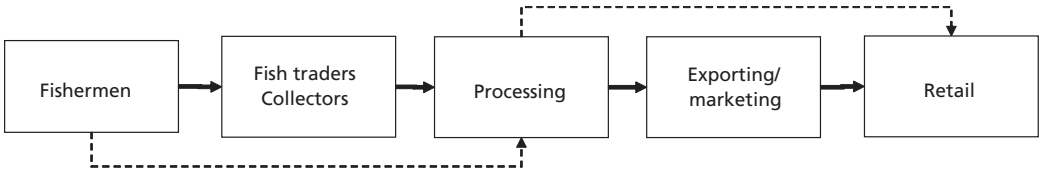
Similar to other small pelagic fish, anchovy is handled and transported in fish boxes with or without ice both for processing and marketing for human consumption. More recently, some fishing boats have introduced tanks using refrigerated sea water or chilled sea water to preserve the fish until landing.

The most common way of processing anchovies is by packing the salted fillets in oil, mainly olive oil. The traditional three-piece can has been replaced by new easy open cans of 48 g to 800 g. The other popular packaging medium for salted anchovies is glass containers.

The value chain

There are several value chains for anchovy products, based on product form and the final market for consumption. In terms of country of destination: 35 percent of anchovy exports go to France, 24 percent to Italy and 16 percent to the United States. The market share of Moroccan anchovies in the US semi-processed anchovy market is close to 50 percent (based on trade statistics from 2000) and hence the US market is an important market for Moroccan producers. Due to ease of data collection from US trade statistics and the fact that the US market is a major market for Moroccan

FIGURE 22
The value chain for exports of Moroccan anchovy



anchovy processors the value chain for semi-processed anchovies produced for that market was selected as the objective of this study. The value chain for this market is shown in Figure 22.

The fishermen land their catch either directly at the processing plants, through CAPI offices or to a fish trader who buys on behalf of the processing companies. The processing companies for semi-processed anchovies are concentrated in the middle part of the country with 10 out of 25 factories situated in Agadir. Some of the processing firms produce and export under their own label while others produce for specific marketing companies.

Value chain analysis for Moroccan anchovies

In Morocco both the coastal fleet and the artisanal fleet harvest anchovies which are used for salted products subsequently exported to the EU, Japan and the United States. The bulk of the catch comes from the coastal fleet: up to 85 percent of the pelagic catch (Baddyr and Guénette, 2001). The focus here is therefore on purse seine vessels in the coastal fleet. In order to estimate operating costs for these vessels a survey of 15 vessels in this category was conducted. Table 5 shows the descriptive statistics for the sample.

TABLE 5: Average vessel characteristics for a sample of Moroccan purse seiners

Descriptive statistics	
Length (m)	15.59
Age (years)	11.27
Engine (horsepower)	241.8
Number of fishing days	145.27

The vessels have a crew of 24 to 35 fishermen, depending on size and technology used on board.

Looking at the expense side of the operation Figure 23 shows that crew share and other wage related costs (wage taxes, social security, etc.) account for 39 percent of total revenue of this fleet. Fuel accounts for 9 percent and fishing gear and maintenance account for 6 percent. Fixed costs and other non-categorized costs make up 24 percent of total revenue, a figure that includes insurance costs, taxes (other than income tax) and fees, various rental charges, auction charges etc. The operating margin comes to 22 percent of total revenue. The operating margin is used to pay for depreciation of equipment, capital costs, income tax and dividend to owners.

In 2000 Moroccan fishermen harvested close to 40 000 tonnes of anchovy which 25 factories used to make about 12 000 tonnes of semi-preserved anchovies in various product forms. The two main product forms are salted and cured in olive oil. Both processing methods take several months and require substantial manual labour and know-how. In Morocco this know-how has evolved over the past 80 years, making many of the Moroccan anchovy products well known, with big market shares for this specific product, both in the United States and in Europe. In order to estimate the production cost for semi-preserved products figures were obtained from the annual operating costs of a medium sized processing facility using 1 500 tonnes of anchovies per year. Given that this is a representative company rather than information based on the average values for several firms the numbers below must be seen as a crude approximation of overall production costs in the anchovy industry.

FIGURE 23
Share of individual cost items for Moroccan purse seine fishery

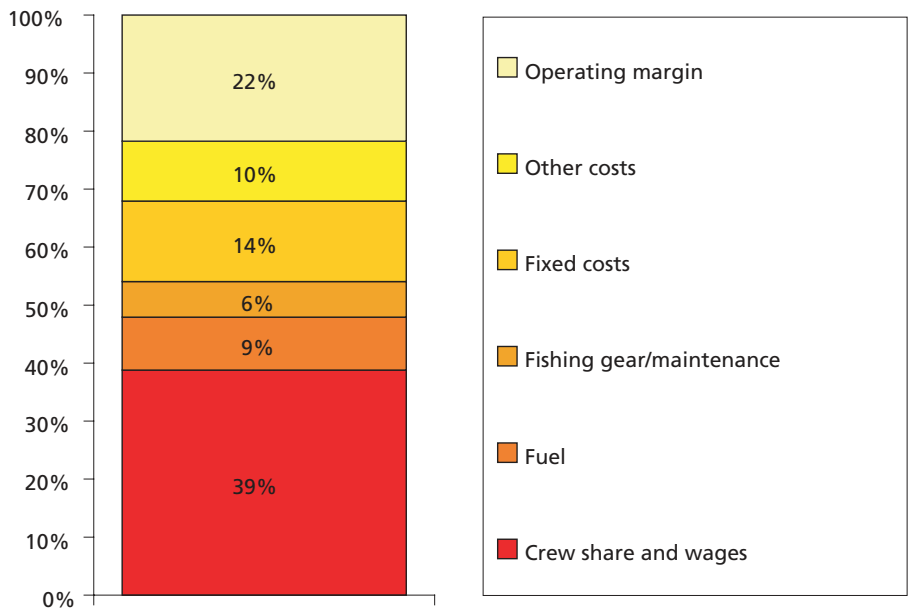
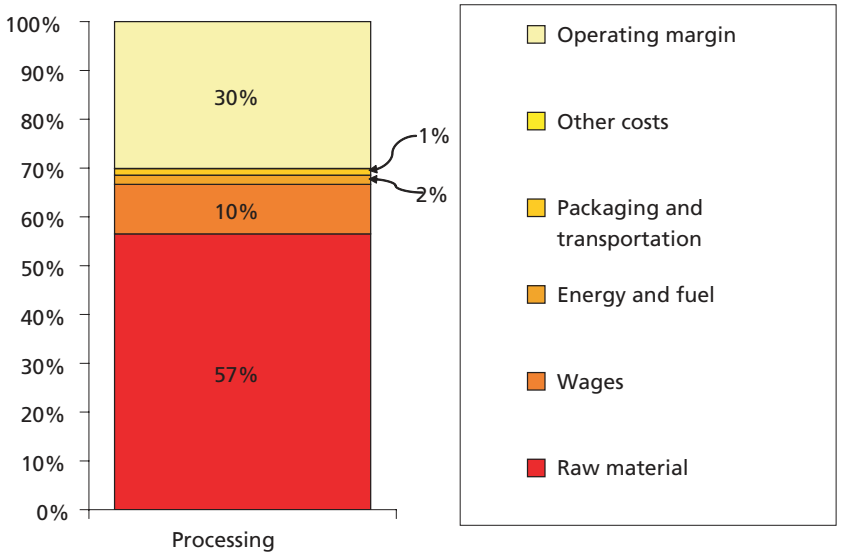
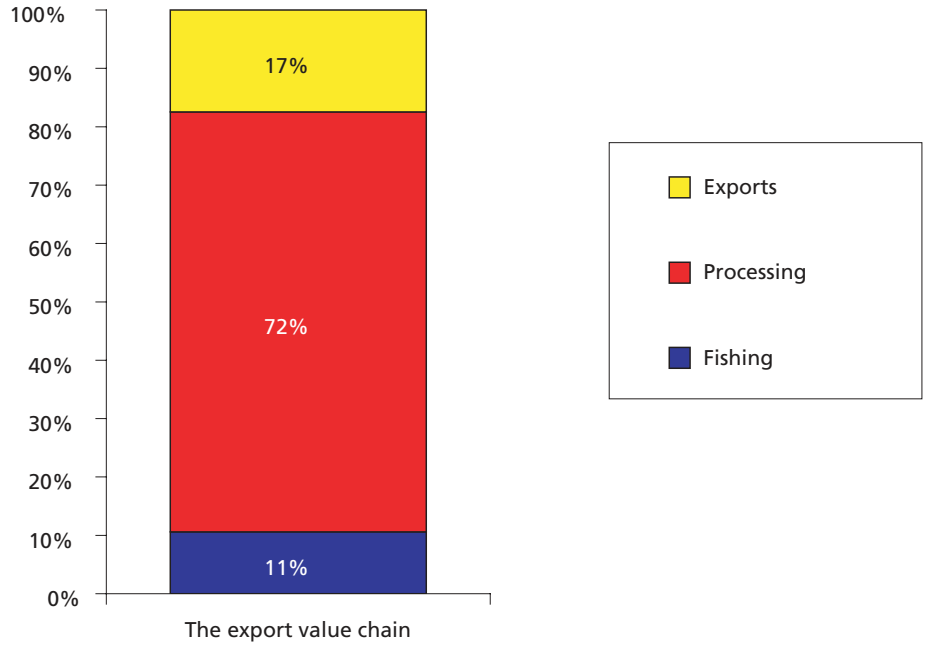


FIGURE 24
Relative processing costs for Moroccan anchovy



The cost of raw material represents more than 57 percent of total revenues while wages take only 10 percent. The raw materials are anchovies and other fish used in the process, oil and salt. Energy, packaging and transportation and other costs account for 3 percent of the total costs. The operating margin of 30 percent is quite high but there may be two explanations for that. First in the data collected no fixed costs were included and hence the fixed costs must be a part of the operating margin. Also the processing method takes several months which means that it ties up operating capital. Capital costs might therefore be high for this industry. Unfortunately it was not possible to verify these hypotheses due to lack of data. It is interesting to note that despite substantial price decreases in

FIGURE 25
The export value chain for Moroccan anchovies exported to the United States in 2000



landed value of anchovies they still account for as much as 40 percent of the total production costs, while oil and salt account for 19 percent combined. The average wholesale value at the factory gates for processed anchovy was 52.2 DHM/kg or equivalent to US$4.91 in the year 2000.

It proved difficult to obtain a reliable estimate of anchovy prices at the retail level in the United States. Estimates ranged from US$10 to US$39/kg. Since average retail prices and volumes were not known it was decided to use only the import values to estimate the value chain for Moroccan anchovies imported to the United States. In 2000 the average import value for whole anchovy fillets cured in olive oil was US$5.95/kg, and had decreased by 21 percent from its high of US$7.46 in 1998.

Figure 25 shows only a part of the value chain: that part which represents the export value chain from fishing to importing the product into the United States. This indicates that the value chain for Moroccan anchovies follows a similar pattern to other highly processed food products, such as canned tomatoes, corn flakes and corn syrup (see Table 1). This is not surprising since the processing is complicated and requires several ingredients and time before it matures as semi-preserved anchovy fillets.

This is however only part of the value chain because in order to complete the picture information on retail prices is needed. A website advertised Moroccan anchovy fillets in oil for US$39/kg in 2004 but in April 2004 a similar product sold for US$11/kg in Rome, Italy and a household consumption survey done in 2001 in Italy calculated average prices paid for anchovies as US$19/kg. Assuming that prices have not changed considerably since 2000, and assuming that there have not been substantial changes in the cost categories over the same time period it would be possible to construct the value chain for Moroccan anchovies exported to Italy. Though these calculations are based on strong assumptions the value chain for Moroccan anchovies sold in Italy is shown in the next figure. This is done to show how it could look, but it is emphasized that the Moroccan data needs to be updated in order to make this more realistic.

FIGURE 26
The value chain for Moroccan anchovies sold in Italy

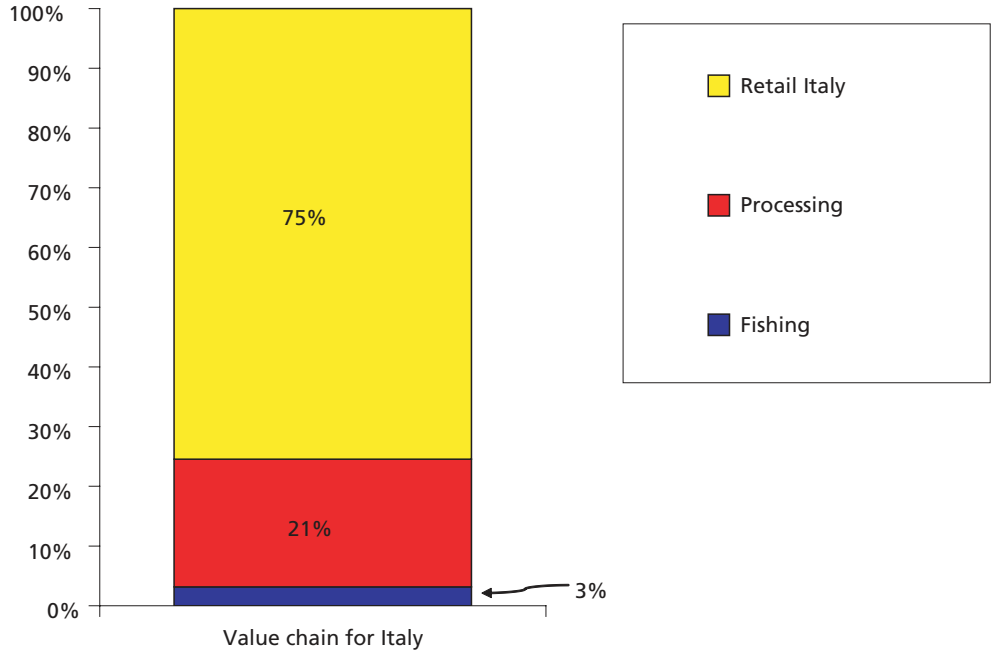


Figure 26 shows that 75 percent of the added value occurs within the retail sector, 21 percent within the processing sector and 3 percent within the fishing sector, reflecting a value chain for a highly processed product.

The analysis shows that the situation for the Moroccan anchovy fishery is similar to the case study presented in Figure 1 in chapter two. The fish stocks are stable providing a relatively stable supply of anchovy for the processing firms. The processing level is fairly sophisticated and the market for raw material seems to be relatively transparent, since processors start to import raw material if local prices rise. The CAPI system should also be able to provide accurate information on prices and quantities available at any given time. The strong traditions and development of private labels by Moroccan processors have resulted in Moroccans apparently controlling a fairly high portion of the value chain. Hence the proportion of the retail price retained by the retail sector is surprising. Given the inaccuracy of the data those results should not be extrapolated to all Moroccan anchovy products but it shows that the Moroccan value chain warrants much more detailed study in order to estimate each segment in the value chain.

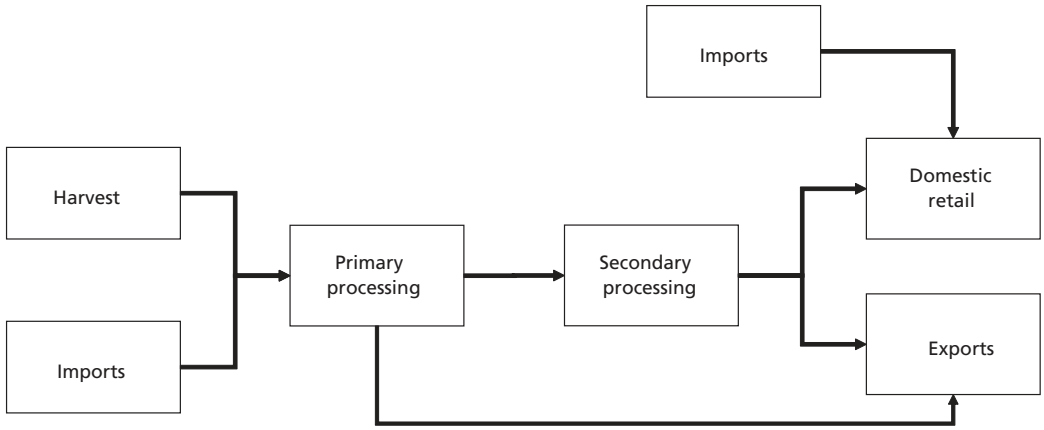
3.4 Denmark[18]

The international market for herring is characterized by the presence of three strong market areas: Northern Europe, Japan and West Africa. They are supplied by a limited number of fish stocks from the North Atlantic and North Pacific Oceans.

The North European market, covering the area to the north of the longitude going through Paris and Moscow, demands a variety of herring products, with sweet pickled herring preferred in Western Europe and frozen herring preferred in Eastern Europe countries. The Japanese market prefers herring with roe and the West African market demands large quantities of frozen whole herring.

[18] Dr Max Nielsen co-authored this section.

FIGURE 27
The Danish marketing chain for pickled herring



Denmark geographically placed between the North Atlantic stocks and the three markets is the world's largest processor of herring, based on domestic raw materials as well as on imports from Norway and other countries. Figure 27 shows a schematic graph of the marketing chain for herring processed in Denmark.

Raw material comes from harvesting activities and imports. Raw material is mainly imported from other Nordic countries, such as Norway and Iceland. Domestic harvesting is done by two fleet segments, industrialized vessels and small vessels. They both harvest several species including herring, mackerel and other fish for reduction. The industrialized segment includes 38 larger vessels (pelagic trawlers and purse seines) which together account for 90 percent of total Danish landings of herring and with 50 percent of their turnover originating from landings of herring.

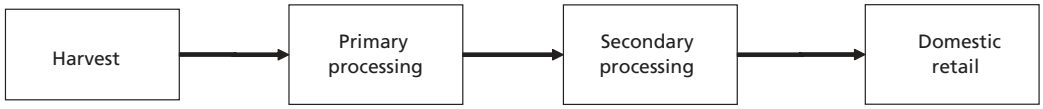
Denmark produces two processed herring products: salted herring in bulk containers and pickled herring in glass. Salted herring is a semi-processed product and is the most important item. It is used either to process pickled herring in glass for final consumption or is exported directly for further processing in the importing country which is mainly Germany. In Germany salted herring is used for fish salads but also for the production of pickled herring in glass. Both products are sold for final consumption in Germany. Besides the export of salted herring some quantities of fresh herring and flaps of herring (gutted herring products without head and bones leaving only fillets and skin) are also exported. This analysis focuses on the value chain for pickled herring produced and consumed in Denmark.

The value chain

The value chain for the Danish production of pickled herring in glass containers consists of four segments; Harvesting and salting (primary processing), pickled herring in glass (secondary processing), and the retail market (domestic consumption) as shown in Figure 28.

The total catch in 1998 in the North Atlantic Ocean was 2.4 million tonnes. Catches in the Northeast Atlantic make up 90 percent of this with the Atlanto-Scandian herring being the most important. Norway is by far the largest supplier, with catches of over 830 000 tonnes, followed by Iceland, Sweden, Denmark, the Russian Federation and the United Kingdom, all with catches less than 300 000 tonnes. Catches in the North Pacific Ocean have been of increasing importance in recent years.

FIGURE 28
The value chain for domestically produced pickled herring in Denmark



Processing of herring in Denmark is limited to six–eight companies that process salted herring while only six further companies are known to process pickled herring in glass. The industry employs approximately 400 people.

Analysing the value chain

Based on the above data the price spreads and supplies of herring products, designated for human consumption along the domestic value chain in Denmark are shown in Figure 29.

From Figure 29 it appears that the shares of fishers and processors of salted herring remained relatively stable over the period as did the retail price, implying that only the distribution of price spread between retailers and processors of pickled herring in glass changes. Even then the change is not substantial.

Distribution of value added

Based on the data and the method described above, the distribution of value added is estimated in Table 6, where the share of each cost component of total turnover in each company segment is shown. The fisheries segment, one processing segment including producers of salted herring and pickled herring in glass, a retailer segment including only fishmongers and a wholesale segment are shown.

FIGURE 29
Quarterly price spreads from 1998 through 2000

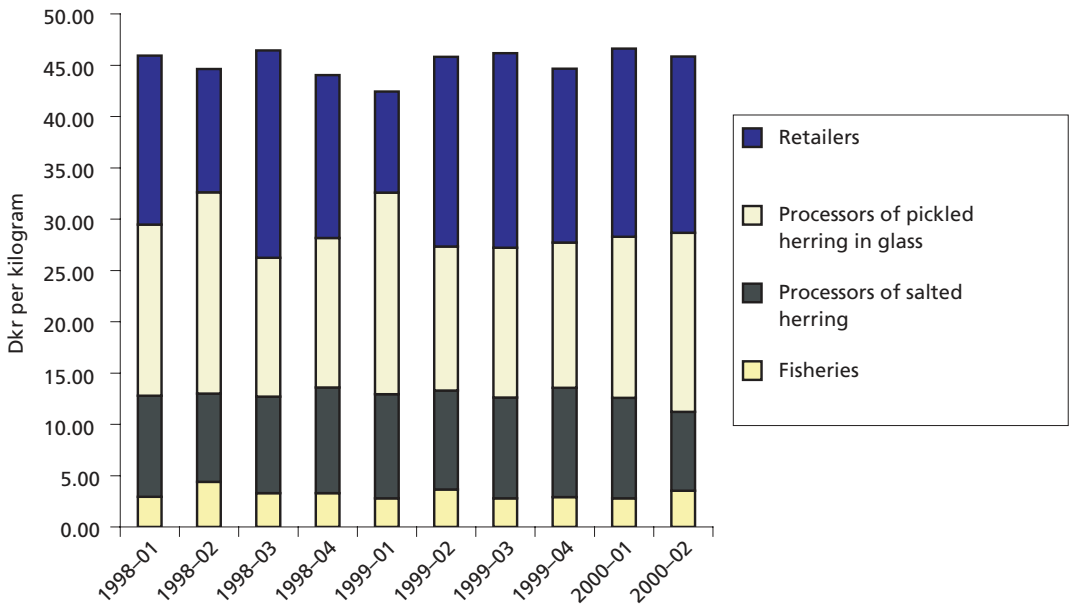


TABLE 6: Accounts statistics, percentage of turnover, average 1998-2000

	Company segment			
	Fisheries	**Processing**	**Wholesalers**	**Fishmongers**
Turnover	100	100	100	100
Costs				
Costs of purchased goods	.	71.7	90.2	62.7
Fuel	11.7	.	.	.
Landings and sales costs	6.3	.	.	.
Maintenance	16.0	.	.	.
Wage, pension etc.	28.9	14.4	3.7	14.9
Depreciations	17.8	2.5	0.7	1.7
Other ordinary expenses	9.9	8.8	3.7	10.7
Profit on ordinary activities	**9.4**	**2.6**	**1.8**	**9.8**
Financial expenditures (net)	10.9	0.7	0.1	1.4
Extraordinary expenses	.	0.1	-0.3	0.0
Corporation tax	.	0.6	0.5	0.2
Net profit	**-1.5**	**1.2**	**1.4**	**8.3**

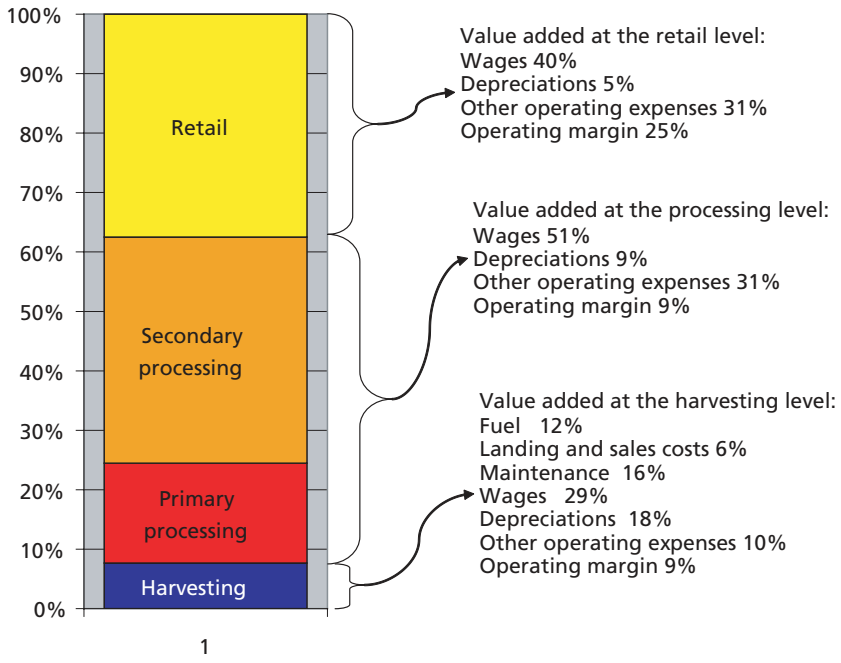
Account statistics for the industry are shown in Table 6 with all numbers in relation to turnover in the segment. For the herring fisheries segment, wages are the largest cost item, but costs related to maintaining the capital stock, such as financial expenditures, depreciation and maintenance are also substantial. Raw material costs only include fuel. The negative net profit reveals that in 2000 the activities of the fleet were limited by fisheries management decisions, implying that it might not have been possible to utilize the capital stock fully.

For the three other segments costs of purchased goods is by far the largest element, as the companies need to purchase goods in order to maintain their activities. For processors and fishmongers, wage and other ordinary expenses are also large, while depreciation and financial expenditure are on a lower level than in the fisheries segment. For wholesalers, wage and other ordinary expenses are also on a certain level, although the costs of purchased goods are more than 90 percent of turnover. Net profit is positive in all the three segments, although close to zero in the processing and wholesale segment. This shows that net profit, as a percentage of turnover, increases along the value chain. One explanation of this situation might be that there is more flexibility at the top of the value chain. It is easier and less costly for fishmongers and wholesalers to change activity, than it is for fishing companies and processors, due to the presence of a large and relatively unified capital stock (vessels and plants).

Figure 30 shows the relative value added for all segments of the value chain and the relative share of each cost item in the value adding process itself. Note that raw material does not appear in the list of individual cost items since this is net value addition at each level (i.e. revenues minus cost of raw material from the previous segment). Capital costs and profits are not included either in order to make this figure more comparable to similar figures in the three other case studies. Herring in the retail market is a highly processed product, going through at lease two processing stages. The herring fishery is a large scale industrial fishery, with high catch volume per boat. This is well reflected in the cost structure of the harvesting sector. Capital expenses, such as maintenance, depreciation, capital costs and operating margin combined constitute a little over 40 percent of total revenues. Though the harvesting sector receives a relatively small share of the value chain individual fishermen receive relatively high wages on a national and global level.

This outcome is based on the assumption that the total cost structure of all fish processing companies is representative for both the salted herring processors and for the processors of pickled herring in glass. It also assumes that the cost structure of fishmongers is representative also for supermarkets and that wholesale activities related to herring are not different from other wholesale activities. In particular the cost share of purchased goods by processors seems too high for the processors of salted herring and processors of pickled herring in glass, as herring is a low valued

FIGURE 30
Relative value added at each segment and cost share by each item



fish species. Provided that this is the case, processors costs of purchased goods are overestimated and other costs components underestimated.

4. COMPARING VALUE CHAINS BETWEEN COUNTRIES

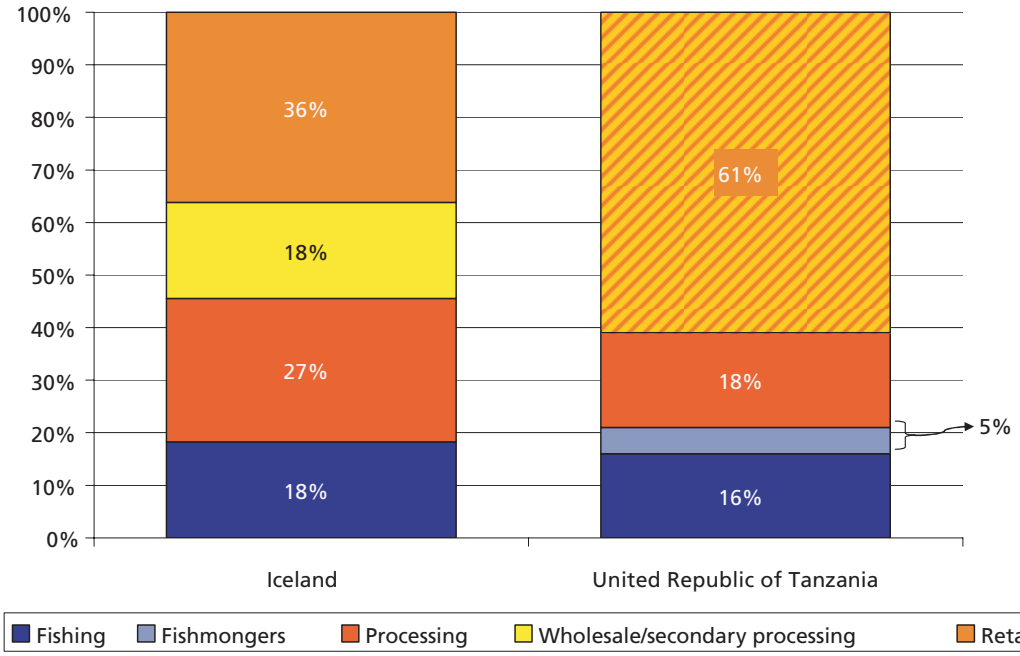
The biggest lesson learned from the four case studies is that there is a severe lack of consistent data at the retail level for seafood products. Obtaining reliable retail data proved very difficult in all cases. Hence, some critical assumptions had to be made about retail prices and their development over the past five years.

This caveat is taken into account when comparing the results between individual case studies. The most relevant comparisons are between Iceland and the United Republic of Tanzania, on the one hand, and Morocco and Denmark on the other. This is because the fisheries and the final products in these two pairs of countries are similar in nature.

In Iceland and the United Republic of Tanzania both fisheries provide a highly developed market with white fleshed fillets distributed and processed through several stages before final consumption. When comparing the value chains directly the most striking difference is in the value represented by the retail sector in each case. Figure 31 shows the two value chains for Icelandic cod fillet on the United States market and Nile perch fillets on the European market.

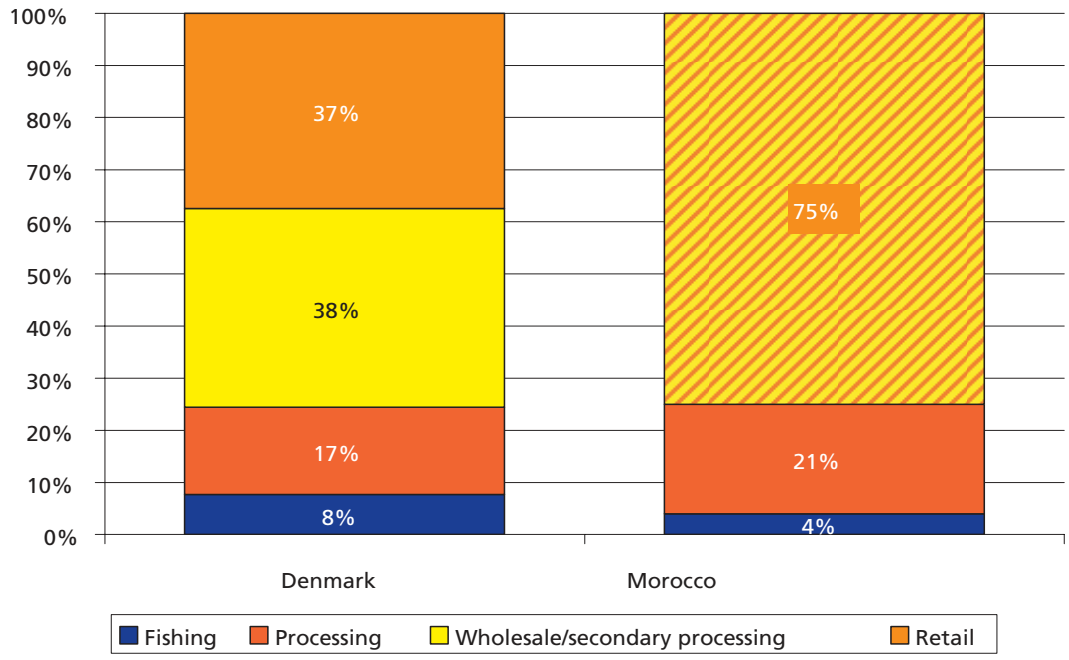
In the Tanzanian case the retailer absorbs about 60 percent of the overall value in the value chain while in the Icelandic case the retail level represents about 36 percent. This reflects the different structure of the two value chains. Icelandic companies control a bigger share of the value chain than the Tanzanian companies. Icelandic cod is exported to the US as fillets and is often further processed in factories owned by Icelandic export companies. The Tanzanian Nile perch fillet is exported directly from the United Republic of Tanzania to the EU where it is usually sold fresh. Any further value addition is then done by European companies and the distribution is in the

FIGURE 31
Comparing the value chains for Icelandic cod and Tanzanian Nile perch



hands of European companies. In the case of Icelandic cod the distribution is outsourced to large food distribution companies but the fish is sold through agents that the export companies deal with directly. The Tanzanian processing sector adds about 18 percent of the overall retail value while the Icelandic processing sector adds 28 percent. Unfortunately it was not possible to directly compare individual cost items at this level, due to shortage of data from Tanzania, but different cost structures, such as lower wages in Tanzania might be a plausible reason for this difference. Tanzanian fish traders are also a part of a fish collecting system for the processing factories taking up about 5 percent of the total retail value. In Iceland fish markets and fish processors themselves are the channel for distribution of raw material from dockside to the processors. Hence, some of the value which fish traders receive in Tanzania might be included in the value added at processing and fishing levels in Iceland. The Tanzanian fishermen receive about 15 percent of the retail value versus the 19 percent which the Icelandic fishing companies receive. It is important to make a distinction between these two since in the Tanzanian case most of the fishing is done with low capital highly labour intensive canoes, resulting in low labour productivity, while the Icelandic fishermen receive about 40 percent of the 19 percent (or 7.6 percent of retail value) that the fishing company receives. On the other hand the Icelandic fisherman works in a highly capitalized industry, resulting in high labour productivity and high wages as a result of large quantities of fish per fisherman. Thus the lower share which the Icelandic fisherman receives actually yields higher annual wages for each fisherman. This demonstrates how important it is in value chain analysis not to focus on the absolute percentage each sector receives but rather to compare efficiency and productivity of capital and labour. A comparison between relative costs in the other countries, for instance, reveals that higher prices at the retail level have led to increased fishing pressure threatening the sustainability of the Tanzanian fisheries due to lack of fisheries management. The same situation is described in chapter two Figure 4. Decreased sustainability will result in lower fishers' incomes and increased poverty. Higher prices in the Icelandic fisheries in 2001 and 2002 resulted in higher wages for the fishers through the crew share system. Due to effective fisheries management the catch only changed according to biological parameters and increased prices did

FIGURE 32
Comparing value chains for Danish herring and Moroccan anchovy



not increase the fishing pressure, at least not in such a way that it threatened the sustainability of the Icelandic cod stock.

The comparison of the value chains for Icelandic cod and Tanzanian Nile perch has shown the importance for fishing communities to participate in the ever increasing globalization of the export seafood trade to provide both income and foreign currency. However, in order to give Tanzanian fishing communities more influence in the overall value chain they must work together to create strong export structures in order to market their products directly to the large super-market chains which control consumer markets. The immediate danger is that although international trade has benefited local fishers and fishing communities the lack of effective fisheries management and poor infrastructure threatens the sustainability of the fishery. These results also largely confirm a similar analysis of the Ugandan Lake Victoria Nile perch fishery (Ikwaput-Nyeko, 2004).

There are several common factors between the Danish herring fishery and the Moroccan anchovy fishery. Both are pelagic species, high in fat and caught by purse seine. Both need considerable processing before they are put on the market. The Danish herring fishery is larger in volume but fished with fewer and larger boats than in the Moroccan fishery. The Moroccan fishery is based on both small and medium sized vessels. Figure 32 shows the value chains for the Moroccan anchovy fishery and the Danish herring fishery. When comparing these it must be kept in mind that the data for the Moroccan fishery was of considerably lower quality than that for the Danish fishery. Therefore higher variability should be expected in the actual numbers for the Moroccan fishery. The comparison is presented here as an example rather than an accurate comparison of the two fisheries.

The Danish harvesting sector receives about 8 percent of the retail value while the Moroccan fishery receives about 4 percent. When comparing individual cost items for the fishing sectors it comes as a surprise that the share of wages in the total costs for the Danish fleet is lower than the Moroccan fisheries. The Moroccan fleet paid 39 percent of total revenues as wages while the

Danish fleet paid 29 percent. There is no apparent reason for this but a plausible explanation might be that the Danish fleet is more capitalized than the Moroccan fleet. A more capitalized fishery should have a higher operating margin in order to pay for the extra capital expenses but in this case it is not explained by differences in operating margins which are approximately the same for both fisheries. Fishing gear and maintenance is considerably higher in the Danish case, or 16 percent of total revenues, compared to only 6 percent for Morocco. Since all other costs are similar the higher maintenance costs are the only indication of differences in the two fisheries. This is also interesting because the Danish fleet operated at a loss over the period while the Moroccan fleet was still profitable after deduction of interests, taxes and other capital expenses. This warrants further investigation in the future, including comparison of wages of the fisherman and more detailed study of each cost category.

The Danish and Moroccan primary processing sectors receive 17 and 21 percent respectively. Comparing individual cost categories for processing sectors in each country reveals that the Danish industry pays just over 70 percent of their total revenues for raw material, i.e. herring at the dockside or imported, compared to 57 percent in Morocco. Wages and other costs are similar but the main difference is in the operating margins where the margin for the Danish industry is about 5 percent while it is about 30 percent for the Moroccan industry. This difference might reflect the fact that Moroccan processing takes more time and requires more specialized facilities, while the Danish herring processing is fairly standardized, requiring a relatively shorter processing period. To fully understand this difference a more detailed analysis is needed, especially in the Moroccan case where the information is based on a representative firm rather than a collection of firms as for Denmark

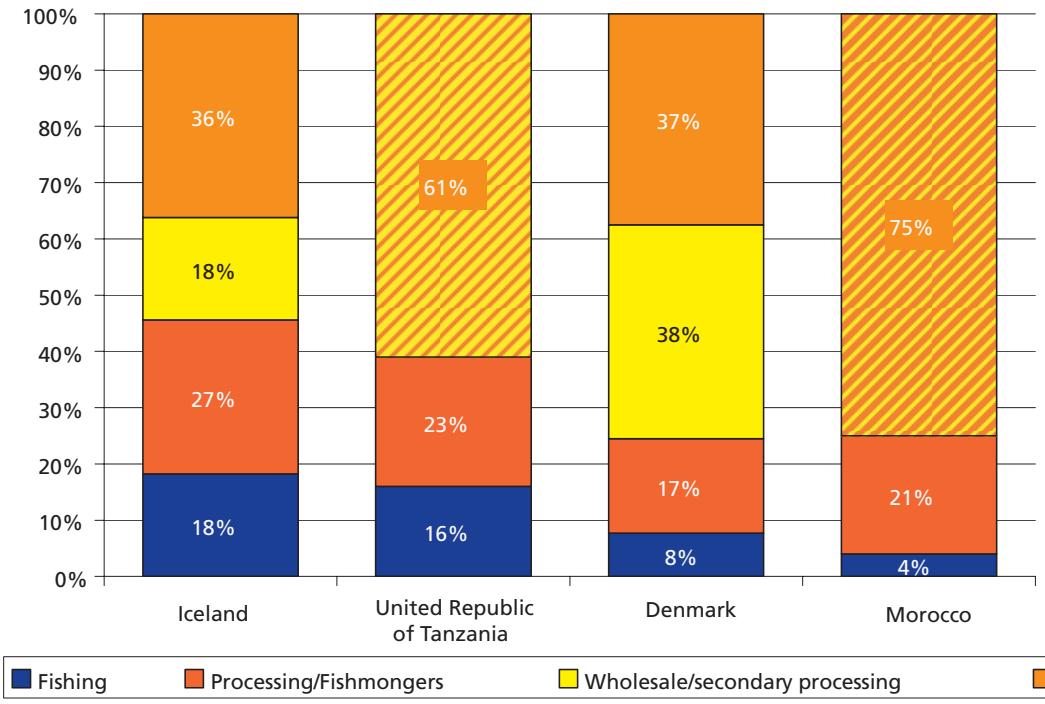
When comparing the secondary processing and retail levels for each country an interesting fact is revealed. In Denmark the retail level adds 38 percent and the secondary processing adds 37 percent of total value to the overall value chain, while in Morocco the retail value adds up to 75 percent of the total value chain. Hence, the Danish processing sector receives a considerably higher portion of the value chain. It was not possible to confirm that no additional repackaging or storage is done at the retail level in Italy and hence the Italian retail sector is left with yellow and orange stripes in the graph, indicating that some secondary processing occurs at this stage. There could be many explanations for this difference in the structure of the two value chains, including differences in import duties (Denmark is within the common European market while import duties must be paid for the Moroccan products imported to the common market), greater competition among suppliers of anchovies or lack of competition among retail stores in Italy. None of this can be confirmed without a detailed study of the retail markets for each product.

The comparison between the Danish value chain for herring and the Moroccan value chain for anchovies have yielded some interesting differences. Though in principal the products have common features their value chains are quite different. Throughout the entire value chain the operating margins are higher for the Moroccan products and yet they receive a lower share of the entire value chain. In order to explain these differences one would have to go into a detailed description of each industry with emphasis on explaining institutional organizations, such as industry and market structure.

Figure 33 shows all four value chains on one graph with two striking differences. First, the Danish and Moroccan harvesting sectors (pelagic fisheries) receive a lower share of the value chain than the Icelandic and the Tanzanian fisheries (demersal fisheries).

The value chains for pelagic fisheries show similar characteristics to value chains for highly processed agricultural products on the US market. In Table 4 it was shown that for highly processed products such as canned tomatoes or corn flakes the farmer received between 4 and 7 percent. At the same

FIGURE 33
Comparing value chains for the four case studies



time pork, poultry and beef products (often seen as substitutes for fish proteins from whitefish such as cod or Nile perch) returned between 30 and 50 percent of the retail value to the farmers. This difference between fish proteins and animal proteins is interesting and is discussed further in the chapter on the Icelandic value chain for cod. The second interesting comparison is that despite the low quality of some of the data from Morocco and Tanzania the pelagic and demersal industries show similar characteristics in the value chain structure. For pelagic fisheries the retail and secondary processing sectors combined receive about 75 percent of the retail value while in demersal fisheries this combination represents 55–60 percent of the total retail value.

Comparing the four value chains highlights some important facts for seafood value chains, including similar trends to those for agricultural products. This means that the share of farmers/fishers becomes relatively lower as the product becomes more processed. It also shows that the share in the value chain does not reflect the profitability of firms or well being of fishermen. An example is in Iceland where fishers receive higher wages than the national average but a lower share of the total retail value than their Tanzanian counterparts. In the Danish fishery the fishermen receive good wages but the fishing companies are run at a low operating margin, resulting in net loss after capital expenses. However, the Moroccan industry pays a higher share of revenue as wages, and yet operates at a higher operating margin than its Danish counterparts.

There are also lessons on the usefulness of analysing value chains and the potential pitfalls. Value chain analysis only becomes meaningful to compare the net value added at each level, however, as this research has shown, obtaining information on that is very difficult. Another difficulty is comparing profits between countries where tax codes are different and accounting for capital costs is done in different ways. This would require detailed studies of company level data that would be very costly. These difficulties make it clear that value chain analysis should be interpreted carefully and not taken out of the context of its environment.

5. DISCUSSION AND CONCLUSIONS

The objective of this study was to demonstrate how the revenues from seafood trade are distributed over the entire seafood value chain. The value chains were shown to have similar characteristics to value chains for agricultural products where the primary sectors receive a relatively lower share of the retail value of highly processed products and a higher share in less processed and fresh products.

The study also revealed that the developing countries seemed to control a relatively lower share of the overall value chain than developed countries. An example is the Icelandic case where Icelandic owned companies control as much as 70 percent of the entire value-chain while Tanzanian and Moroccan companies controlled less than 50 percent.

This is perhaps the most important lesson to be learned. The Icelandic and Tanzanian fisheries produce very similar products, going into the same markets, or market segments, in Europe and the United States. The Icelandic export sector has been developing over the past 60 years and started with state monopolies on exports (or monopolized export licences), ending with completely free trade of seafood products in the early 1990s. This has been a long process for the Icelandic companies but it created strong export companies which strategically marketed their products under their own brand names.

The Danish companies in this study seemed to control a larger share of the value chain than their Moroccan counterparts, but this did not ensure profitability of the harvesting sector. The European Union has been struggling with its fisheries policy for decades. Overfishing caused by too large fishing fleets has forced cuts in quotas, making it difficult for fishing companies to survive financially. Control of the seafood value chain does not necessarily guarantee good livelihoods for fishermen or fishing companies. In this paper it has been shown that good fisheries management is a necessity in order to allow fishermen to reap the benefits from higher export prices. Without proper management in place increased prices can lead to increased fishing pressures and hence threaten the sustainability of the resource and profitability of the fishing companies. This was also shown in the Icelandic and Moroccan fisheries where in both cases good management practices are in place, limiting the total catch to sustainable levels. Price changes then do not threaten the resource but simply have a direct impact on the income fishermen receive. In Morocco increased prices force the processors to import anchovies from other countries but when prices drop they buy only from domestic sources. This shows how international trade can actually help in relieving the pressure on fishing grounds when prices become very high due to increased demand or if catches decline through natural fluctuations. Fishing is based on a natural resource which can fluctuate dramatically between years. International trade helps seafood companies in diversifying these risks by opening up access to different sources of raw material. This again helps stabilize markets and increased stability helps in operating seafood businesses.

However, in order to reap benefits from international trade it is necessary to have the proper institutions in place and to have social capital which can use the opportunities found in global businesses. The government in each country must ensure that the proper infrastructure is available for fast and effective communication with its trading partners. The governments must also build social capital through education and training.

More in-depth analysis of the factors driving each segment in the value chains in this study are needed in order to be able to better assess how changing conditions on global markets affect local fishing communities. To achieve this consistent data collection at all levels or segments is needed over a long period of time. Such information would reveal the structure of each market and whether any one segment is able to exercise monopoly powers directly or indirectly. It would also help in comparing value chains between countries and allow more advanced studies of market

integration, price formation and changes in profitability at various market levels. These studies would help to identify where there was a need for improved infrastructure in order to facilitate fair trade and distribution of retail value throughout the seafood value chain.

The studies reported here are among the first to attempt to analyse value chains for fisheries in developing countries. As such they should be regarded as a first step. The publication contains the theoretical background underpinning the work and lays out the methodology that can also be applied to other fisheries in other countries. Although the four studies point up some interesting correlations and trends they cannot be said to be representative of all fisheries and as pointed out more in-depth investigation and analysis is needed. It is hoped that this publication will be a starting point for further investigations, using the same methodology, particularly in developing countries.

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