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Ph.D. Ogmundur Knutsson, director

and

Helgi Gestsson, university lector



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# The Icelandic Fishing Industry: A comprehensive overview until the end of 2001

Ph.D. Ogmundur Knutsson, director  
Helgi Gestsson, university lector

Faculty of Business Administration

University of Akureyri, Iceland

Nordurslød, IS-600 Akureyri

E-mail: [ogmundur@unak.is](mailto:ogmundur@unak.is)

E-mail: [helgi@unak.is](mailto:helgi@unak.is)

## Abstract

*This paper gives a short but comprehensive overview of the Icelandic fish industry, its history, development and structure until the end of the year 2001. The definition of a fish industry will focus on catching (the fishing sector and fish farming), processing and export.*

*The paper reveals a revolutionary development in the Icelandic fish industry from a supplement to farming in the Middle Ages to a modern high-tech industry. The fish industry in Iceland is at present one of the central industries in the country, and has a leading position in the world. The authors argue that these developments have been brought about by structural transformations, such as the introduction of a quota system, technical development, deregulation and privatisation, mergers and increased concentration, as well as changes in export and marketing.*

JEL classification: O3, Q22

Keywords: Fishing industry, Iceland, catching, processing, export

## **Introduction**

The aim of this paper is to give a short but comprehensive overview in English of the Icelandic fishing industry, its history, development and structure until the year 2001. This paper is useful for those that are looking for a brief introduction in order to improve their understanding of the background of the Icelandic fish industry at the dawn of a new millennium. For foreign business persons or students this paper offers an easy insight into one of the important - if not the most significant - industries of the Icelandic economy. Students of the United Nations University Fisheries Programme have used this paper as background to an Icelandic Case in Strategy.

The definitions of “fish” and “fishing industry” vary and can range from activities that are directly related to catching and processing fish to technical- or machinery-related operations. Here the definition of a fish industry will mainly focus on catching and farming, processing and exporting.

### **The Icelandic fishing industry**

In his book, *Íslenskur Sjávarútvegur (The Icelandic Fishing Industry)*, Sigfus Jonsson (1984) put forward a model of the Icelandic fish industry which divides it into three main sectors: catching (the fishing sector), processing and exporting. Those three sectors are influenced by official administration and research. To understand the Icelandic fish industry and the demands that face it, it is necessary to look at all these areas and to understand their impact on the industry. In many cases, these are not what could be called economic factors; they are more often ad hoc emotional and political, often invisible, factors that follow tacit principles.

Periods of fast development, rather than steady growth, have characterised the fish industry. Innovation and development have usually started in the catching sector and then moved into land processing and other related industries and services (Magnusson, 1993). In the next chapter, developments in each sector of the fish industry will be looked at briefly to give a more holistic picture of the factors that may influence the industry today.

### **From fishing to an industry**

From the earliest settlements, the fish and the sea have been important issues for Iceland. It would have been difficult for people to live in Iceland had it not been for the food supplies that came from the sea (Kristjánsson, 1980). Up until the 19<sup>th</sup> century, fishing was mainly a supplement to farming and was practised in rowing boats owned by farmers and mainly operated seasonally according to farming conditions. This form of fishing started as “home fishing” operated from the farms. Later came the establishment of fishing stations closer to the best fishing grounds. In the fishing season, people (mainly farm workers) moved from their farm to the fishing station and stayed there over the season which lasted from the end of January to the beginning of May. This continued until the latter part of the 19<sup>th</sup> century. Other fishing seasons were the spring season from the middle of May to the end of June and the autumn season from the end of September to the end of December (Kristjánsson, 1986). During the 17<sup>th</sup> and 18<sup>th</sup> centuries, Icelanders had to watch fishermen from other countries fish in Icelandic waters in large decked sailing vessels while they themselves were fishing in small open rowing

boats only a short distance from the coast. They went out in the morning and returned to shore the same day.

It is surprising how late the Icelandic fish industry started to develop and that the development began because of pressure and influence from foreigners (Snævarr, 1993). The development of the Icelandic fishing industry commenced in 1783 when the Danish King supported experiments in the operation of decked boats in Iceland. However, these experiments met with resistance from conservative Icelanders, mainly farmers, leading to their cessation in 1787. It was not until the beginning of the 19<sup>th</sup> century that Icelanders started to operate their own decked boats and in the middle of that century there were 31 such boats in Iceland. From that point on it is possible to talk about an independent fishing industry, operating on a full year basis in Iceland.

### **Fishery Sectors**

Sigfus Jonsson (1984) also split the development of the fishing industry into five periods: 1) rowing boats, 2) sail boats, 3) motorboats and trawlers, 4) innovation trawlers and Swedish boats, and finally 5) the stern trawlers. In this chapter, these periods will be used to briefly describe developments in the fishing sector. One period is added, processing trawlers, which have been developing over the past decade or so. It is interesting to see that until the beginning of the 20<sup>th</sup> century the majority of improvements and innovations in the Icelandic fishing sector occurred through activities of foreign companies or individuals. It was not until the third decade of the 20<sup>th</sup> century that Icelanders took the fish industry into their own hands (Snævarr, 1993).

#### ***Rowing boats 1750-1850***

The first period started around the middle of the 18<sup>th</sup> century when fishing was mainly operated in open rowing boats and on a seasonal basis. Up until the year 1800, fishing was almost only operated in rowing boats (Jonsson, 1984) which were widely used until the beginning of the 20<sup>th</sup> century when engines were first put into such boats. Subsequently, the use of rowing boats went into a rapid decline.

### *Sailboats 1850-1905*

The second period lasted from the middle of the 19<sup>th</sup> century until 1905, when decked sailboats became increasingly important in the fishing sector. At the turn of the 20<sup>th</sup> century the number of decked boats was 150.

### *Motor boats and trawlers 1905 - 1945*

The third period started in 1902 when the first engine was put into a boat and in 1905 when the first trawler came to Iceland. From this point on, the fishing sector developed fast, and the catching of demersal species, which had been the most important in Iceland, more than doubled from 1905 to the beginning of the First World War, or from 40,000 tons to 100,000 tons. In the 1920s, the catch went up to 340,000 tons when Icelanders started to catch saithe, which up to that point had not been utilised. Employment in the fishing and processing sectors reached its peak in 1930 when 23% of the total work force was working in both these sectors, with over 15% of the total work force employed in the fishing sector. A problem period appeared due to a sharp decline in sales during the depression and in the 1930s with a fall in the catch of demersal species, especially cod and haddock, relative to a simultaneous increase in the catching of herring. During the Second World War, the circumstances of the fish industry changed because the traditional markets for products closed or were difficult to supply. As a result of this, the export of fresh fish to Britain increased and prices went up. During the Second World War the fishery sector was very profitable and able to put money in funds to prepare for replacements of fishing vessels that were becoming old and obsolete (Jonsson, 1984).

### *Innovation trawlers and Swedish boats 1945 - 1970*

At the beginning of this period, the Icelandic government made a contract to build new trawlers to renew the ageing fleet. These trawlers received the name innovation trawlers to refer to the impact they were supposed to have on the industry. In the same way the government made a contract to build boats in Sweden to renew the boat fleet. Between 1945 and 1952 the fleet increased, but during the latter part of the period, i.e. post-1955, catches of demersal species decreased. In the years 1960–1966 the operation of trawlers became difficult and their numbers declined from 47 to 22 (Jonsson, 1984). An increased

herring catch partly made up the decline in demersal species, but this mainly applied to boats rather than trawlers. The herring catch remained abundant during 1960-1967, resulting in the near-disappearance of herring from the fishing grounds due to over-fishing.

### ***Stern trawlers 1970 - 1985***

From around 1970 onwards, the trawler fleet was renewed and stern trawlers were bought which were so well received that their numbers increased very rapidly and the government supported this development by offering good funding. The government used this as a regional development policy, to enable companies in small villages to buy stern trawlers, which would increase the stability of fishing operations, increase employment and reduce the drain of people from the rural provincial. This meant that, in addition to an increase in the catch, the number of trawlers grew from 22 in 1970 to 54 in 1974 and to 103 in 1983. After the collapse of the herring in 1967 the boat fleet started to concentrate more on other species, such as capelin, shrimp, Greenland halibut, ocean redfish as well as catching demersal species like cod. In 1982 and 1991 the capelin fishery collapsed; although very important for the boat fleet, the catch of this species has always fluctuated. After 1982 the total catch fell because of over-fishing and declining fish stocks. This decline has continued in all major species until 1997, when some evidence indicated an increase in fish stocks and quotas.

### ***Processing trawlers 1983 - 2001***

In 1983 processing at sea started to a real extent when mainly trawlers and bigger boats began to be adapted. This processing mainly includes freezing the fish whole, headed or filleted, trimming and freezing in blocks. The output of the sea processing vessels was 24 thousand tons in 1983 going up to 155 thousand tons in 1994 but has fallen a little since then, mainly because of a decline in fish stocks. In the period 1990 to 1997, new trawlers and big boats with processing facilities were bought and have enabled the fleet to fish in international fishing grounds which in some cases are without quotas and control. During the period from 1983 onwards these percentages have fluctuated from 80-90% for demersal fish and 10-20% for shrimp. In 1995, demersal species made up 81% of sea



frozen products, and shrimp 19%. This has changed in 2001 when demersal species made up 73% of total sea frozen products and shrimp accounted only for 1.1% of the total. Furthermore, pelagic species are now to a certain extent frozen at sea and stand for 15.9% of the total sea frozen products in 2001 (Statistics Iceland, 2002).

### **Fish farming**

Fish farming started to some extent in Iceland in the 1970s, mainly with salmon. Export of fresh-farmed salmon started around 1980. The production of farmed fish has gone from 3 tons in 1983 to around 3,000 tons in 1993 and was still around that in 1997 (Helgason, 1997). Around 1980 the Icelandic government offered support and favourable loans to encourage fish farming which they thought would be very positive for the Icelandic economy and would support more economic diversity. When farmed salmon from Iceland was put on the market the price was falling due to increased production in countries like Norway and Scotland. In addition to this, countries that had been farming much longer offered lower prices, as they had managed to lower the production costs. Conditions for fish farming are in many cases more difficult in Iceland than in other countries due to the cold sea. The optimism concerning fish farming thus ended with disappointment and difficulties for pioneering companies. This experience has in many ways been a barrier to further development of fish farming in Iceland, where favourable conditions, such as the geothermal water, could be utilised to a greater extent. The early 1980s saw renewed optimism and as a result fish farming, such as that of river trout, has increased. In addition, three companies have operated as experimental companies in fish farming, one in farming halibut, another in European sea bass and the third in abalone. Table 1 shows the production of harvested fish from the year 1992 to 2001 according to information from the Icelandic Aquaculture Association (2005).

**Table 1. Production of fish farming 1992 – 2001. Tons of ungutted fish.**

	1992	1995	1996	1997	1998	1999	2000	2001
	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes	tonnes
Salmon (from all farming methods)	2,585	2,880	2,990	2,580	2,742	2,990	3,370	2,645
Trout (all species)	399	860	844	1,210	1,103	920	1,459	1,425
Other species			37	6	23	36	76	209
Total	2,984	3,740	3,871	3,796	3,868	3,946	4,905	4,279

Table 1 shows that there has been an increase of over 100% in trout farming from 1992 to 1995 and a slow growth in salmon farming at the same time. In the years after 1995 the main growth in fish farming has been in trout and other species, as for example cod and halibut. Grainger (1997) states that although fish farming does not play a major part in the Icelandic fish industry, it represented around 22% of global fisheries production in the world in 1996 and increases its share every year (was 8% in 1984). In 2001 total fish farming in Iceland was 4,279 tons ungutted fish. Hence, Icelandic fish is in increased competition with farmed fish from other nations.

### **Fisheries control and management**

Fishing management and control can be divided into three important periods: (1) when the Icelandic government increased the Icelandic fisheries' limits during the period 1952-1975, (2) in 1983 when quotas were placed on the catches of the most important species and (3) in 1990, when quotas were put on all species and boats and individual transferable quotas were introduced on all species.

#### ***The Icelandic exclusive economic zone***

An extension of the fisheries' jurisdiction started in 1952 when the limits were extended from 3 to 4 miles and from 4 to 12 miles in 1958. In 1972 the Icelandic government decided, unilaterally, to extend the jurisdiction from 12 to 50 miles and again in 1975 from 50 to 200 miles. These extensions were made because of fast a decline in fish stocks and over-fishing in the fishing grounds around Iceland. Between 1950 and 1974 foreign fishing vessels caught an average of 360,000 tons of demersal species in the sea around Iceland, which is similar to the total demersal catch of the Icelandic fleet

(Jonsson, 1984). This foreign fleet was mainly from Britain (about 60%) and West Germany (30%) (Bjarnason, 1996). After each of the four extensions, Britain imposed a landing ban on Icelandic ships; West Germany imposed this after the last two extensions. The third conflict in 1972 also had an effect on the Icelandic fish industry; Protocol 6 in the EEC agreement meant that, without reaching a satisfactory agreement with EEC countries, Iceland would not enjoy specific reductions on import duties on fish to EEC countries. This sanction lasted from 1972 to 1976 when Iceland reached an agreement with regard to the 200 mile limit. Since 1976 fishing by foreign ships in Icelandic waters has been very limited and does not play an important role in the total catch.

### *The quota system*

The next aspect of fishing control that is worth mentioning is the quota system. It was introduced in 1983, with quotas on important species, either in the form of quantities or limitations regarding the number of days that ships could fish each year. Before 1983 a quota system had been introduced in the herring fisheries in 1975 and in 1980 this was extended to the fishing of capelin. The main pressure for introducing the quota system was declining fish stocks; first the collapse of the herring stock and later on the foreseeable collapse of the capelin stock unless preventive measures were adopted. The same can be said about the demersal species before 1983 when the stock had been declining due to over-fishing. Hannesson (1994) has pointed out that the ownership of quotas involves the right to catch the fish but does not entail ownership of the fish stock. Thus, it is claimed that the quota does not mean the ownership of the fish but rather the right to catch the fish.

From the beginning of the quota system, the quota has been bound to the fishing vessels. In the first years, two main systems were active. First there were quantity quotas where the fishing vessels were assigned certain quantities that they could catch. Then there was the fishing effort system that allowed the vessels to fish for a certain number of days during the year. Later the fishing effort system was abolished for all vessels except for boats under 10 tons that could choose between the two systems. In 1995 the Fisheries Management Act was slightly modified so it would also cover boats under 10 tons, which before had been exempt from the quantity quota (Fishery Association of Iceland, 1996).

Still, boats less than 10 tons can be included in the fishing effort system which allows them to fish for a limited number of days per year (around 23 days per year in the year 2000).

### *Individual transferable quota (ITQ)*

The law in relation to fishing was amended in 1990 in order to make the quota system more effective rather than responding to declining fish stocks or over-fishing as almost all law concerning the quota had previously attempted. According to Fisheries Management Act No 38/1990 no one can catch fish inside the Icelandic economic zone without permission from the Ministry of Fisheries, and licences are allocated for one year at a time. Due to this law, all major fisheries inside the Icelandic economic zone operate according to a uniform system with transferable quotas in all species and fisheries. Hence, nearly all fishing vessels have individual transferable quotas (ITQ), allowing ship owners to buy or sell quotas between ships. As has been pointed out earlier, the ITQ grants the right to catch the fish but not the ownership of the fish stock. In that way, the ITQ permits the owners of the fishing vessel to sell the right to catch the fish. However, there are limitations to the transferability of the ITQ that could affect the structure of the fisheries sectors. Firstly it is exclusively owners of fishing vessels with a valid fishing licence that can hold quotas. Secondly, the holders of quotas must catch at least 50 percent of their quotas every second year to maintain the quota share. The third restriction is the geographical restriction to the ITQ system where the local authorities and respective fisheries unions in local geographical regions can block the transfer of annual quotas between regions. On the other hand, annual vessel quotas are freely transferable between fishing vessels within the same region. Runolfsson and Arnason (1996) point out that it is rare in practice, that transfers of quotas between geographical regions are blocked.

Decreasing the total allocation of quotas causes pressure in the fishing sector to increase concentration by merger or acquisition. It serves as an example that in 1992 the twenty biggest quota holders had a 36% share of the total quota but in March 2001 the share had increased to 59% of the total quota (Haraldsson, 2001). This demonstrates that there has been concentration in the fisheries sector with companies getting bigger. This

concentration needs to be looked at in the light of the high proportion of vertical integration between the processing and fisheries sectors where vertical integration is almost a norm in the industry. Hence, the consolidation in the fisheries sector also applies to processing.

In the beginning, the annual quota was issued by the Ministry of Fisheries free of charge. In 1990 this changed in such a way that now the Ministry collects fees for the annual quota to cover the cost of monitoring and enforcing the ITQ system (Runolfsson and Arnason, 1996). The fee only covers a very small amount compared to the price of the quotas on the market.

The current situation is that in 2001 all boats have quantity quotas (except for boats under 10 tons that remain within the fishing effort quota system) for all species, and permission to fish for one year, the “fishing year” which starts on the 1<sup>st</sup> of September and ends on the 31<sup>st</sup> of August.

### **Fishing fleet and catch**

In 2001 the catch of the Icelandic fishing fleet totalled 1,980,715 tonnes and was 2.14% of the world catch. The Icelandic catch was the 12<sup>th</sup> largest national catch in the world. To obtain a better overview of the fisheries sector, it is helpful to look at the following factors. Table 2 shows the size and structure of the Icelandic fleet in 2001; Table 3 shows the fishing gear used on different types of ships for the main species caught and Table 4 shows the catch, and its value in 2001 (Statistics Iceland, 2002).

The GRT of the boats from 0 to 500 GRT has declined by about 28% from 1975 to 1997. At the same time, boats over 500 GRT have increased in GRT by about 7%. Trawler size has increased in GRT by about 21% and trawlers over 500 GRT have increased in GRT by about 18%. This means that the number of ships in the fleet is declining and the ships are getting larger. This development has been rapid since 1985, especially for big trawlers and boats with processing facilities. After 1997, the number of small seasonal boats has increased from 313 in 1997 to 1057 in 2001 although the total GRT has only increased from 1.9% to 2.5% (Fishery Association of Iceland, 1998; Statistics Iceland, 2002).



**Table 2. The fishing fleet, number and size in 2001 in Gross Registered Tonnage (GRT).**

Type of fishing Vessels	Size in GRT	Number of ships	GRT	% of total GRT
Seasonal boats	0-10	1,057	4,864	<b>2.5%</b>
Multipurpose vessels	<100	654	11,061	<b>5.8%</b>
Multipurpose vessels	100-499	173	44,748	<b>23.4%</b>
Multip and specialised	500-999	26	17,629	<b>9.2%</b>
Purse-seiner vessels	1000-1499	14	17,092	<b>8.9%</b>
Purse-seiner vessels	1500-4999	8	16,630	<b>8.7%</b>
Trawlers	0-1000	48	31,855	<b>16.6%</b>
Trawlers	>1001	32	47,558	<b>24.8%</b>
<b>Total</b>		<b>2,012</b>	<b>191,437</b>	<b>100.0%</b>

Table 3 presents the main species and fishing gear of each of the categories of the fishing fleet (Fishery Association of Iceland, 1996).

**Table 3. The fleet, main species and fishing gear.**

Type of fishing vessels	Size in GRT	Main species	Main fishing gear
Seasonal boats	0-12	Demersal	Handline,
Multipurpose vessels	13-50	Demersal	Longline, Gillnet
Multipurpose vessels	51-110	Demersal, Herring,	Longline, Gillnet
Multipurpose vessels	110-200	Shellfish	Purse-seine, trawl
Multip and specialised	201-500	Demersal, Herring.	Trawl
Purse-seiner vessels	501-800	Shellfish, Capelin	Purse-seine
Purse-seiner vessels	>800	Shellfish, Capelin	Purse-seine
Trawlers	0-500	Demersal, Shrimp	Trawl both
Trawlers	>500	Demersal, Shrimp	bottom and pelagic

Demersal species are the most important fish species in the fisheries sector with over 69.9% of the total value of landed fish in 2001. On the other hand pelagic species,

mainly capelin, represent around 74% of the quantity of landed fish (see table 4). The capelin fishing relies on quantity since a large part goes into fishmeal production, in spite of an increasing proportion being frozen. Trawlers bring ashore the highest percentage of total value, while the multipurpose boats bring the most volume, mainly due to the capelin catch, the majority of which is reduced into fish meal.

**Table 4. Total fish catch in 2001.**

	<b>Value in 000 ISK.</b>	<b>% total value</b>	<b>Quantity in 000 tonnes</b>	<b>% total quantity</b>
Demersal species	48,093,367	69.9	431,363	22.2
Flatfish	5,659,236	8.2	32,528	1.7
Pelagic fish	11,540,133	16.8	1,435,701	73.9
Molluscs and Crustaceans	3,533,747	5.1	41,756	2.2
Other	15,432	0.0	421	0.0
Total	68,841,914	100.0	1,941,768	100.0

To get a clearer picture of individual species within each group, the ten most important species according to value in 2001 are presented in table 5. In 1997 cod was less than half of the quantity in 1981 when it was at its maximum. From 1997 to 2001 there has been an increase in the quantity of cod and its importance. Cod has increased in value from 27.6% in 1997 to 42.4% in 2001, making this species still the most important in the Icelandic fisheries industry. In the 9<sup>th</sup> decade shrimp became the second most important species and sea frozen product. As an example of fluctuations in the Icelandic fish industry, shrimp was around 41% of the value of fish landed in 1995 but dropped to around 17% in 1997 and further to 4.0 % in 2001 (Fishery Association of Iceland, 1998; Statistics Iceland, 2002). Most of the volume goes to meal production, where capelin is the main species, as well as herring.

**Table 5. Ten most important species in the fish catch of 1997 and 2001. Value in each year's ISK.**

Species	1997				2001			
	Value in 000 ISK	%	Quantity in tonnes 000	%	Value in 000 ISK	%	Quantity in tonnes 000	%
Cod	15,579,987	27.6	208,622	9.5	29,157,726	42.4	234,085	12.1
Redfish	7,644,557	13.5	109,583	5.0	7,912,561	11.5	92,489	4.8
Haddock	3,539,598	6.3	43,248	2.0	6,033,207	8.8	39,042	2.0
Capelin	7,669,095	13.6	1,313,624	59.7	5,011,534	7.3	918,417	47.3
Herring	2,219,987	3.9	291,117	13.2	3,756,049	5.5	178,950	9.2
Greenl. Halibut	3,376,939	6.0	18,630	0.9	3,553,384	5.2	16,590	0.9
Shrimp	9,341,083	16.5	82,627	3.8	2,751,995	4.0	25,725	1.3
Blue whiting					2,614,075	3.8	332,305	17.1
Saithe	1,728,654	3.1	36,546	1.7	1,886,567	2.7	31,873	1.6
Catfish	792,785	1.4	11,666	0.5	1,605,143	2.3	17,950	0.9
Plaice	1,143,309	2.0	10,544	0.5				
<b>Total</b>	<b>53,035,994</b>	<b>93.9</b>	<b>2,126,207</b>	<b>96.8</b>	<b>64,282,241</b>	<b>93.5</b>	<b>1,887,426</b>	<b>97.2</b>

Although most of the volume (48%) goes to meal production, fish meal represented only about 16.4% of the total export value of fish products in 1997 and 13.8% in 2001. The most valuable method is freezing; in 1997 it was 23.6% of the total catch (land freezing was 15% of the catch and sea freezing 8.6%) representing around 55% of the export value of fish from Iceland. In 2001 it was 23.9% of the total catch (land freezing 14.6 % and sea freezing 9.3%) but made up only 50% of the export value of fish from Iceland in 2001 (Fishery Association of Iceland, 1998; Statistics Iceland, 2002).

### The processing sector

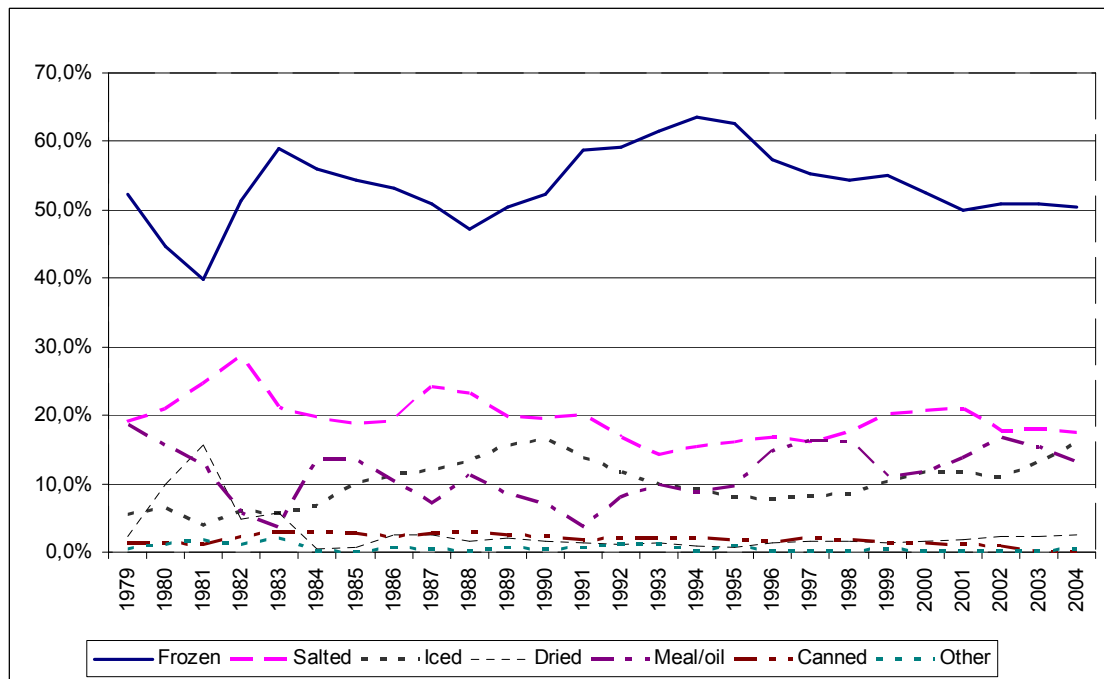
In the past, the main aim of most processing methods was to expand the lifetime of the fish so it could be kept under the primitive conditions of that time. Developments in fish processing have principally followed the development of the fishing sector. Fish processing was connected with the boat owners, usually farmers, who processed their own catch. With the emergence of bigger boats and independent boat owners (who were

not farmers), operation on a whole year basis started around the middle of the 19th century. From this time on it is possible to talk about a significant fishing industry in Iceland, both in terms of fishing and production. However, it was not until around 1930 that individual processing companies appeared that were not bound to the operation of fishing vessels (Jonsson, 1984). From that time onwards we see an independent fish processing industry, although the link between fishing and processing is obvious. Today, most of the processing companies operate their own fishing vessels to secure supplies for their production.

The oldest fish processing method in Iceland was to dry the fish to make the so-called stockfish, which is the oldest exported fish product from Iceland. In the middle of the 19th century salting took over as the main processing method, until the closing of the main market in Spain during the Civil War in the mid 1930s. After that, selling of fresh unprocessed fish increased considerably, and between 1930 and 1950 freezing took over as the main processing method in the industry, and has kept that position ever since.

### *Production methods*

Production methods for fish in Iceland can in the simplest terms be split into six main groups: 1) frozen, 2) salted, 3) fresh (iced), 4) dried, 5) meal and oil and 6) canned. In export reports unprocessed fish exported on ice is counted as fresh although it undergoes no treatment or processing in Iceland.



**Figure 1 Export of fish products 1979-2001. Yearly percentage of total production value.**

As may be gathered from Figure 1 (Statistics Iceland, 2002) which shows the yearly percentage of total production value for each production method during the years 1979-2001, there is a fluctuation for each production method. Many factors influence the choice of production methods, for example market conditions, exchange rate, quantity and quality of the catch and production capability. Another factor influencing the choice is the flexibility of the production companies; the majority of the bigger companies are capable of switching between processing methods when, for example, market conditions are favourable or the quantity of catch is too much for only one processing method. The next sub-section provides a short description of each of these processing methods and its development in Iceland, starting with the freezing of fish.

### *Freezing*

Freezing can be separated into two parts, traditional land freezing and freezing at sea, which has been increasing over the past two decades. Freezing of fish started in Iceland in the 1930s and increased dramatically in the period 1940-1950 and again in the 1960s



when Great Britain imposed a landing ban on Icelandic fishing vessels due to a fishing dispute which put pressure on companies to increase their processing capacity. Freezing uses higher technology and much more capital than both drying and salting, so the companies tend to be larger and have freezing as their core processing method, although many companies also have the option of using some other processing methods like salting. Freezing has accounted for about 50% of the total value of fish production for the past two decades, or from 38.9% in 1981, when a large proportion of the catch went into stockfish production, up to 63.6 % in 1994 and down to 50% in 2001. Onshore freezing has, for the past decade or so, faced increased difficulties in operation and competition from processing trawlers which process the fish on board. In sea freezing the fish is frozen very fresh or usually within 24 hours of catching and the processing trawlers operate 24 hours per day in 20 to 30 day cruises. This means that their output on capital is much higher than for land freezing and the fish is fresher. If the pelagic species are excluded, around 36.9% of the total catch was frozen at sea in 2001, 38.8% of demersal species and 50.7% of flatfish species and in 1997 50.3% of the total catch of shrimp was frozen at sea, although in 2001 no shrimp were frozen at sea. On the other hand, there has been increase in freezing of herring at sea and in 2001 14.4% of the total herring catch was sea-frozen (Statistics Iceland, 2002). Rarely do the processing trawlers have the facilities to utilise the cuttings and bones from the fish, nor do they have the facilities to cut or trim the fish as is possible in land processing. This means that processing at sea is considerably simpler than land processing and does not offer as much opportunity for value adding through more work. This leads to the product frozen at sea being much closer to a raw material for further processing, which is usually done abroad.

### *Salting*

Salting of fish was not common until the beginning of the 19th century, although sources report that fish was salted in Iceland from around 1624-1630. In 1820-1840 salting became increasingly important in the southern part of Iceland, although until 1870 most of the fish in the north and east of the country was processed into stockfish (Jonsson, 1984). After this, at the end of the 19th century, almost all the catch was salted due to increased knowledge of the processing method, good access to salt and favourable market

conditions. The main markets for salted fish (Spanish: bacalao) have traditionally been in southern Mediterranean countries like Italy, Spain, Portugal and Greece. During the Civil War in Spain and the Second World War, an increase in freezing meant that salting lost its place as one of the main production methods for fish in Iceland in 1930-1940. However, salted fish has always been an important fish product. From 1975 to 2001 it has fluctuated between 14.3% and 28.4% of the total value of exported fish compared to 17.5% in 2001. Salted fish production from demersal species demands neither sophisticated equipment nor technology so, even today, boat owners often process their own catch with their families. Thus, companies using salting are mainly small, with 1-5 employees, although there are bigger companies that have brought significantly more advanced technology to the production in the past decade. Salt fish production is also often a by-product or second product for companies. The main species for salting are demersal, mainly cod and herring, which are salted into barrels into which other species are often added.

### *Fresh fish (Iced)*

The export or sailing with fresh iced fish did not start until the First World War, although foreign fishing vessels had been fishing in Icelandic waters and sailing back home with their catch for a much longer time (Snævarr, 1993). Sailing with fresh fish has fluctuated greatly since then, depending on catch and market conditions. With improvements in transportation, the export of fresh fish in containers became increasingly common in the 1980s. Export of fresh fish in containers opened a new option for smaller boats that could not sail themselves with the fish to foreign auction markets; they could share containers and send it to the market that way. In 2001 around 11.8% of the total catch was exported in containers (Statistics Iceland, 2002).

### *Drying (Stockfish)*

The history of stockfish production can be traced back to the year 1200 and the first written source about export to the year 1340 (Kristjánsson, 1986). Stockfish production was the most common processing method for fish in Iceland until the middle of the 19<sup>th</sup> century. The method was almost non-existent at the beginning of the 20<sup>th</sup> century, but

regained importance around 1950 it as the catch of demersal species increased and a market for stockfish opened in Africa. Stockfish production in the 20<sup>th</sup> century reached its peak in 1981 when it amounted to around 16% of the total value of fish production from Iceland. The main export market at that time was Nigeria. However, the Nigerian market collapsed the year after due to one of many revolutions in the country. Since then, the market in Nigeria has mainly absorbed cheap by-products like dried cod heads and fish bone. Over the past decade, stockfish production has fluctuated from 0.7% to 2.7% of the total value of the fish production, with the main market for quality stockfish being Italy, and, for the cheaper products, Nigeria. Traditional stockfish production is usually a by-product for companies and neither demands much technology, equipment nor capital. Very few companies have stockfish production as their main activity except for a number of businesses located near geothermal heat sources that have used this natural resource for drying cod heads, bones and fish cuttings.

### ***Meal and oil***

The production of fishmeal and oil depends heavily on the catch of capelin and herring, which are the most important species for fishmeal as well as oil. About 96.4% of the capelin catch and around 40.2% of the herring catch in 2001 went into fishmeal and oil production. Due to an increased herring fishery in the summer time, the percentage of the catch that goes into meal production rose from nearly 56% in 1991 to around 81.3% in 1997. In 2001 this percentage had gone down to 40.2% due to increased freezing at sea and on land (Fishery Association of Iceland, 1992; 1998; Statistics Iceland, 2002). Another aspect of the fishmeal and oil production industry is the utilisation of fish bones and cuttings from the processing companies, but with an increase in sea processing this production has declined in recent years. Still another sector of this industry is the utilisation of fish products such as fish liver yielding liver oil for human consumption, both for the domestic market and for export.

Companies in the fishmeal and oil sector are in most cases separated from other processing companies or the fishing sector. It is common, however, for other fishing companies to own a share in fishmeal companies near their processing plants or have small melting facilities attached to their production.

Production in this sector fluctuates greatly, mainly due to wide swings in the catch of capelin and herring in Iceland as well as in competing countries like Canada and Norway. Fishmeal and oil production has shifted from a low of around 3% of the total export value of fish product from Iceland to a high of 25% (Snævarr, 1993).

### *Canning and pickling*

Canning has a long history in Iceland, but pickling is much more recent and only began around 1955. Herring and shrimp are the most important species but this sector also utilises lumpfish, cod-roe and cod-liver. Most of the production in this sector is exported in packaging ready for sale and consumption. At a glance, the canning and pickling sector is much closer to the consumption market than most of the rest of the fish production industry in Iceland. In 2001 production from this sector was 1.1% of the export value of fish products in Iceland (Statistics Iceland, 2002).

### **The Export Sector**

After the monopoly of the Danish merchants ended in 1787, export licences from Iceland were restricted to Danish citizens until 1855 when export was given free. Fish export from Iceland was therefore carried on with minimum government interference, with the exception of World War One, until 1930 (Jonsson, 1984). From 1900 to 1930 the most important export of fish products from Iceland consisted of cod, either salted or whole on ice, and fish liver oil. Most of the export of salted fish during this period went through individual fish merchants who bought the fish from small producers and sold to markets in Mediterranean countries, mainly Spain and Italy (Bjarnason, 1996). After 1930 a period of government interference and oligopoly in export matters took over, until around 1980 when exports increased, along with competition in exporting activities. This led to liberation of exports in the late 1980s and early 1990s.

The markets for Icelandic fish products have changed considerably during the past two decades. Europe has become the most important market area and the Japanese market has increased its share considerably. Long-term traditional markets, like the US and the former Soviet Union have declined for the past decade. It is not only changes in market areas that affect the fishing industry but also changes within the markets. The main

developments in Europe and the US relate to the increased popularity of supermarkets. An example of their growing role is the high share of the big four supermarkets in the UK where Tesco, Sainsbury's, Asda and Safeway account for about 45 percent of total UK grocery sales. Thereof Tesco has a third, around 16 percent of the total grocery sales. In addition, there is a growing interest on the UK market in own-label products that account for around 45 percent of the total supermarket sales in the UK (Fearne and Dedman, 2000). This emphasis on own-label goods is, however, not as high on other European markets, for example in France. This consolidation in the UK has also been noted in the US where consolidation has increased significantly since 1995. In the US, the process has been most prominent within the four biggest supermarkets, their share having risen in 1998 from 9 percent to 29 percent of total grocery sales in the US (Kaufman, 1999).

It has been pointed out that the increased power of the supermarkets and growing competition between supply chains (value chains) creates more pressure on supermarkets to improve the relationships within the supply chain to make it more competitive and effective. Dedman and Fearne (2000) phrase this as the "Paradox of Power" where, with the increased power of the supermarkets, emphasising own-label products, they are becoming progressively more dependent on fewer and larger suppliers. Hence, supermarkets must concentrate on cooperation with suppliers with long-term partnerships in mind (Cook, 1999; Fearne and Dedman, 2000; Wysocky, 2000). In the same way it has been pointed out that it is becoming harder for a go-it-alone strategy and small companies to be competitive in the market (Wysocky, 2000). It is clear that developments on the food markets, e.g. increased concentration, already have and will in the future affect the structure of the Icelandic fish industry. This depends on how deep into the markets producers are selling. This also indicates a stronger need to join a competitive supply chain rather than pursuing a go-it-alone strategy.

Consolidation in the retailing sector can also easily affect the Icelandic fish industry. In the UK markets, for example, the products of the secondary processing plants of Icelandic Freezing Plants (IFPC) are aimed at the supermarkets. This status of the supermarkets and their strategy of private labels makes it difficult for other producers to pursue their own labelling strategies. As a result of those changes, furthermore it could be difficult for small producers to gain direct access to the supermarkets. Rather, they



would need to sell to some intermediary that would then have access to the supermarkets. Generally the Icelandic fish products are not marketed directly to supermarkets, but rather into secondary processing, to restaurants or to other companies that distribute or sell them deeper into the markets. This, for example, is the case in the Japanese market where products from Iceland are more or less industrial products for further processing or go on to an auction market. The same can be said of the salted fish that is mainly sold to the Mediterranean area which is very much a traditional market with small shops and distribution companies selling to these small shops.

The years 1997 –2001 have brought significant changes to the export sector in the Icelandic fishing industry. The Icelandic Herring Board was changed into Íslandssild hf. in July 1998 and merged with the Union of Icelandic Fish producers (UIFP) on 1<sup>st</sup> of January 1999 making it the third biggest marketing company for fish in Iceland. Icelandic Seafood, then Iceland's second biggest marketing company merged in 1999 with UIFP, making the new UIFP the biggest marketing company for fish products in Iceland. Icelandic Freezing Plants (IFPC), formerly the biggest marketing company in Iceland, showed unacceptable performance in 1998 and 1999, forcing them to change their operation, mainly by focusing more on their core activity, the sale of frozen fish. Hence, IFPC has withdrawn from related businesses such as transportation, and sold its share in other companies. After 1999 only two of the four Primary Marketing Companies are still in operation. To further meet the changes in the global industrial environment, UIFP has significantly extended its operation and diversified from merely being a marketing company for salted fish into becoming an international marketing company focusing on chilled and frozen fish. At the same time, IFPC has focused its operation on being an international marketing company for frozen fish.

### **Profitability and Development of Companies**

As can be seen from Table 6, the profitability of the fishing industry has varied quite a lot since 1980. From 1980 to 1994 the fishing industry has only turned an operating profit (EBITA – depreciation) in two years, 1986 and 1990. The processing sector has performed better, turning an operating profit in 9 years out of the 15. Due to the vertical integration of processing into the fishing sector and vice versa, it is rather unrealistic to

look at the sectors separately. It is more realistic to consider the results from the industry as a whole. The overall profitability for this period has been rather unsatisfactory; the industry has only turned an operating profit for 6 out of 15 years. As can be seen in Table 6, operating profit as a percentage of revenues for fishing and processing has varied from - 9.4 % in 1982 up to a record 15 % in 2001 (Statistics Iceland, 2005). The table also shows the operating profit of the two marketing companies, IFPC and UIFP, as a percentage of revenues for the years 1985 – 2001 (UIFP, 1981-2002; IFPC, 1986 -2002). The numbers for IFPC are not available before the year 1985 and UIFP used different methods in presenting their statements, making access to their figures difficult.

**Table 6. Profit from regular operations as a percentage of revenues 1980-2001.**

Year	Fishing	Processing	Fishing and processing	Marketing companies:	
				IFPC	UIFP
1980	- 3.9	8.3	4.0	N/A	N/A
1981	- 1.0	6.6	4.0	N/A	N/A
1982	-39.9	5.8	- 9.4	N/A	N/A
1983	-13.0	0.5	- 4.4	N/A	N/A
1984	-18.9	- 1.4	- 8.0	N/A	N/A
1985	- 1.8	- 2.8	- 2.4	0.9	1.4
1986	6.2	3.7	4.7	0.6	1.9
1987	0.0	1.3	0.7	- 0.2	3.7
1988	- 7.7	- 9.2	- 8.5	- 1.7	2.4
1989	- 4.4	- 3.0	- 3.6	0.4	2.1
1990	7.7	2.1	4.9	1.7	4.4
1991	- 2.2	- 3.1	- 2.7	1.0	1.3
1992	- 6.6	- 0.7	- 3.5	1.9	- 1.4
1993	-11.9	1.1	- 5.1	2.7	1.8
1994	- 2.3	5.3	1.9	2.7	3.6
1995	4.2	1.9	3.0	1.2	1.8
1996	2.7	- 0.9	0.8	2.7	1.1

1997	3.5	3.3	3.4	1.0	1.3
1998	4.4	5.3	4.9	1.8	2.7
1999	3.3	0.3	1.7	- 0.5	0.1
2000	4.9	1.9	3.3	0.4	- 1.9
2001	13.0	16.6	15.0	1.2	0.7

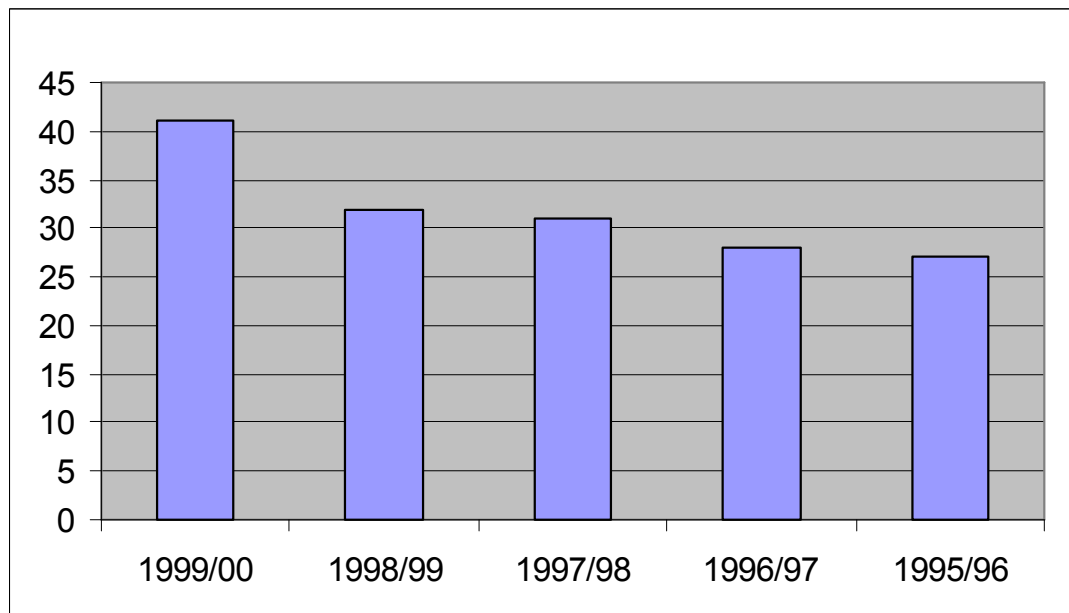
During the period 1985-2001 IFPC turned an operating profit all the years except 1987, 1988 and 1999. UIFP turned an operating profit for all the years except for 1992 the last year before the ownership change and again for 2000. Comparing the fishing and processing sector to the marketing companies it is clear that the profitability of the marketing companies has been far more stable than the fishing and the processing sector. It has to be considered that the marketing companies were formerly operated as non-profit enterprises, UIFP until 1993 and IFPC until 1997. Due to this, the marketing companies returned most of the profits to their producers at the end of the year.

Another aspect of the profitability and financial status of companies in the fish industry is the equity that the companies have built up. According to Runolfsson (1998) the equity ratio in 1988 was 5.3% for the whole industry. In 1990 this ratio was 15% and in 1996 it had gone up to 26%. This is of course an average figure for the whole industry. This development of the equity of companies in the fish industry clearly demonstrates the changes over the past decade, where increased freedom in the economic environment and more established financial markets have brought new demands on the companies in the industry to return profit and dividends to the owners. This is a radical change from the previous economic environment, mainly due to the then hand controlled economy, where the government manipulated the rate of exchange of the Icelandic krona in accordance with a zero profit policy where the aim was to keep the profit of the fish industry at zero. In this environment, profit in the fisheries sector was almost unacceptable to the politicians.

The main characteristic of this development over the past decade is concentration where companies have merged and become bigger. This applies to companies in all the sectors of the fish industry, in fishing, processing and exporting. To grasp the trend of this concentration it is helpful to look at the share of the ten largest companies in the

assigned quota of each year. Figure 2 shows the concentration of quota holdings of the 10 biggest holders of quota (companies) in the fishing years 1995/1996 – 1999/2000. In the fishing year 1995/96 the ten largest companies had a 26.5% share of the total quota which had grown steadily to 32.2 in 1998/99 and jumped to 41% in 1999/00 (Central Bank of Iceland, 2005). It is interesting to note that these ten companies are all involved in both fishing and processing; that is, vertically integrated companies.

**Figure 2. Quota of the ten biggest companies as a percentage of assigned quotas each year.**



Most of the changes in the concentration of the holding of quota by the companies demonstrated in Figure 2 can be traced to mergers between companies in the fish industry, resulting in increased company quotas. There is no sign that this development will stop in years to come. Thus, everything points towards increased concentration in the fish industry.

## Conclusion

This paper has given a short but comprehensive overview of the Icelandic fish industry, its history, development and structure until the end of 2001. The definition of a fish

industry has focused on catching (fishing sector and fish farming), processing and exporting.

The paper has revealed a revolutionary development in the Icelandic fishing industry from a supplement to farming in the Middle Ages to a modern high-tech industry. The fish industry in Iceland is at present one of the central industries in the country, and has a leading position in the world. It has been argued that these developments have been brought about by structural transformations, such as the introduction of a quota system, technical development, deregulation and privatisation, mergers and increased concentration, as well as changes in export and marketing.

Moreover, the Icelandic fish industry has gone through radical changes during the past 20 years, reflecting the economic and political environment in Iceland during this period. The main characteristic of these changes is concentration where the companies are getting fewer but bigger. The industry is gaining stability and profitability has been improving, especially after 1994. Having larger companies means that the companies have enhanced their ability to take on more complicated issues than just producing raw material. This is reflected in increased emphasis on issues such as the development of new products and marketing. From this paper on the Icelandic fish industry, four factors can be identified as the main influence on the development of the industry in the last 10-15 years, i.e. the implementation of the quota system, growing deregulation in the export of fish from Iceland, expanding privatisation and market mechanisms in Iceland and, finally, the increased entrance of companies in the fish industry to the public stock market.

This has meant that the Icelandic fish industry has had to rely much more on its own ability and development to be able to turn a profit, rather than putting pressure on the government for deflation or other governmental interference to secure the operational basis of the companies. This has created a much healthier business environment for the companies in the industry. Despite the positive effect of this development there is a negative impact as well, especially for small villages along the coast where bigger companies have bought up the locally owned quotas for fishing and processing elsewhere. Despite this criticism, it is clear that the fish industry is operating in a much healthier business environment than it did 10 years ago with increased economic freedom

as the key factor. This has caused great changes in the industry with all indications pointing to even more concentration. Furthermore, production companies will increase their value creation to an even greater extent through product development instead of selling raw material for further processing abroad.

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