

THE ROLE OF FISH-MARKETS IN THE ICELANDIC VALUE CHAIN OF COD

Ögmundur Knútsson, University of Akureyri, ogmundur@unak.is
Ólafur Klemensson, Central Bank of Iceland, olafur.klemensson@sedlabanki.is
Helgi Gestsson, University of Akureyri, helgig@unak.is

ABSTRACT

The two main pillars of the Icelandic fishing industry are the large vertically integrated fishing companies and the SMEs, specialised in fishing, producing or marketing. In order to understand how they are able to function side by side and at the same time secure a relatively high value added for the domestic part of the Icelandic value chain of cod, a closer look at the functions and operations of the Icelandic fish markets is needed. In the authors' recent studies on structural changes in the fisheries value chain in Iceland from 1990 to 2007, six dissimilar main operational strategies were identified. Common to all of those was the need for an efficient use of the Icelandic fish markets. Three distinctive effects of fish markets were identified: firstly, specialisation, where large and small fisheries companies use the fish markets to swap or sell all other species than needed in their specialised production (usually to SMEs producers specializing in those species); secondly, to gain stability in sourcing, where companies source raw material from the fish markets and top-up when there is lack of certain species (or sizes) from the companies' own boats and; thirdly, the market driven function or effect (market orientated value creation). To study this facilitating and supporting effect of fish markets on the progress of the Icelandic fisheries sector further, the focus is now the importance of fish markets from the time of their establishment in Iceland in 1987. The research is based on semi-structured and in-depth interviews with managers of a number of Icelandic fishing and processing companies and is a part of an ongoing research on the value chain structure and on organisational- and productivity changes in the Icelandic fisheries sector.

Keywords: Icelandic fish industry, value chain, fish markets, auction and structure

Introduction

Fish markets were first established in Iceland in 1987. T.Trondsen (2001) has pointed out that fish markets can be thriving and a useful source of wet-fish for processing in unregulated fisheries. But only with a developed fisheries management scheme, where economic considerations are inbuilt such as in the ITQ system, this will motivate the fishermen towards maximising their income through market orientated value adding behaviour. In such a market focused and regulated system, the fishermen are induced to manage their quota holdings in a efficient revenue maximising way and thereby supporting value adding strategy along the value chain. This will be achieved by adhering to the market signals coming from the most attractive consumer markets. This is what T. Trondsen calls MOVA or market orientated value adding behaviour (T.Trondsen, 2001, Fisheries management and Market-Orientated Value adding (MOVA), Marine Resource Economics, 16. 1737). The important challenge is to introduce the value adding policy to all instances in the value chain, upstream and downstream. Harvesting and sourcing of fish is the first step in this process and well functioning and efficient fish markets or fish auction are crucial part of this mechanism. In this sense the fish markets have a specific dual role in the value chain, to gather the market signals coming from the downstream and to react to these signals (downstream) by offering the right quantity, the right species, in the right quality and qualitative attributes at the right time. According to Trondsen this is a necessary part in an efficient fishery management system, in most cases a fully developed ITQ system.

Fish markets in Iceland are operated in mixed environment of vertical integrated companies (VICs) in fisheries and processing and independent companies in processing (without their own fishing vessels) or in fishing. Until 1986 the price of wet fish was officially regulated through the *Price Commission of the*

Fisheries, where representatives from the vessels' owners, the fishermen's unions, from the processors' organizations and from the State decided the prices for all major fish species (ex-vessel prices). With a special legislation from the Parliament in 1986, establishment of fish markets was made possible. The first fish market was then established end of 1986 and two more followed in 1987. Until the establishment of the fish markets fish was sold in direct contracts between fishing vessels and processors or fish was sourced from own vessels in the integrated fisheries companies. In previous studies of the authors it came out that the fish markets have played important role in the development of value creation in the Icelandic fish industry (Knútsson Ö., Klemensson O. and Gestsson H. 2009 a and b). This study aims to explore the role of the fish markets in the domestic value chain in Iceland to understand better the role of the fish markets in its development.

Methodology

This study is a part of an ongoing study on the structure, organisation and productivity changes in the Icelandic fisheries sector and is a follow-up of the authors' study on structural changes in the fisheries value chain in Iceland during the period from 1990 to 2007. First hand data has been collected through semi-structured interviews with managers of over forty managers of companies in the Icelandic fish industry. Interviewees came from a broad spectrum of companies in the Icelandic demersal fish industry value chain. The aim of the interviews was to explore the different business models of the companies regarding their global value chain governance, in-sourcing/out-sourcing decisions, structure of integration and type and degree of coordination along the value chain. For this part of the research additional interviews were taken in the form of semi-structured questionnaire were carried out in the weeks 24-26 2010. First a list of 10 questions was sent to 13 out of the 20 largest buyers of cod at the fish markets in 2009. Answers were taken in telephone interviews and backed up with e-mails when necessary. Together, these 13 companies bought 20.000 tons or over 50% of all cod sold at the fish markets that year. All of these 13 companies did participate in the survey. Of these 13 companies, five are independent processors (without own fishing vessels) and the rest or eight companies are operating fishing vessels. Among these eight companies, there are four companies which are in the group of the largest vertically integrated companies with a large share of the total fishing quotas in Iceland. Second hand data were collect through the *Association of Icelandic Fish Markets, Bureau of Ex-vessel Fish Prices (Verðlagsstofa skiptaverðs), Statistics Iceland and Federation of Fish Processing Plants*. Access to data prior to 1992 is difficult and time-consuming and some data for the period 1990-2000 was not available at the time of writing. This shortage of data will be rectified later on.

Fish markets development

In Iceland the exchange of wet fish is dominated by three modes of exchange, auction sales at the established fish markets, direct contracts between fishing vessels and processors and fish sourced from own vessels in integrated fisheries companies. In that case, *The Bureau of Ex-vessel Fish Prices* decides the fish price used to calculate the fishermen's remuneration. The auction system constitute the point of exchange where a number of bidders (sellers and buyers) gather together to carry out exchange of goods. This is a transparent and efficient way to organize the exchange mechanism, where economies of scale can be applied. With the use of information and communication technology (ITC) through computer and internet connection, it is possible to link together vast number of fishing vessels, a number of harbors with landing facilities and all possible buyers together at one virtual marketplace in spite of the disperse virtual location of the bidders. In that sense an artificial physical proximity is constituted, linking together possible bidders on a nationwide scale and thus increasing hugely the volume of exchange and the scope of supply in terms of species, sizes and other attributes.

This system enables also the buyers to choose from different landing places, which contributes to increased efficiency of the allocation. Another important allocating function of fish markets is the transforming of otherwise heterogeneous landings (many species of all sizes with different level of freshness) into homogenous batches of fish according to the buyers' wishes through the allocation mechanism at the fish auctions. It is also noted that the fish markets are a very important and effective

source of fish for independent processors (i.e. processors that are not linked with fishing vessels). The processors can therefore focus on what they do best in processing and exporting and let the independent fishermen focus on the fishing activities which demands special expertise and large amount of capital. The fish markets enables in this way the delinking the ownership of vessels and processing facilities. But the fish markets are not solely important for independent fishermen and processors. The fish markets also play an important role in facilitating specialization for the vertically integrated fisheries companies by changing heterogeneous landings into homogenous batches suited for their specialized processing. This is done by indirect swapping by selling on the fish markets the species and sizes not suited for their specialized processing and buying the species and sizes, which fit into their processing mode. Similar applies when the VICs use the fish markets to indirectly change the composition (in fish species) of their quota holdings into the composition in species and sizes that better reflects their production and/or marketing policy. In this way the fish auctions are used as a clearing mechanism for wet fish from VIC own vessels and for fish bought through contract agreements with independent vessel owners, which is not fit for the processing specifications. And lastly but not least, the fish markets facilitate stability in sourcing for the individual processing companies due to the magnitude of the aggregated supply of wet fish on the Icelandic fish markets.

An important stepping stone in the development of the fish markets was in 1991-2 with the creation of two separate data centrals which had the main function of operating the computerized auction and settlement systems. In 2000 the two data centrals merged in one independent company *The Fish Markets' Data Center Ltd.* (FMDC or RFS), owned by 15 independent fish markets. Now there are nearly 30 landing places around the coastline at all statically important locations. All biddings are done via the computerized auction and sales system, linking the 15 independent fish markets together. The auction mechanism is of a Dutch auction type, i.e. an auction clock system. Weekly there are six auctions during the wintertime and five in the summer time. FMDC owns and operates the computerized auction and sales system. Other functions of the FMDC are running the fish markets' website (www.rfs.is), general supervision, running the settlement system (invoicing, the buyers' bank guarantees) and collecting and publishing statistics.

It is evident from the rapid growth of the fish markets in the first four years of operation, that it was a great need for a market based exchange of fish. In the first four years, the traded volume increased from 22.000 tons to 95.000 tones and in the first five years the volume came up to 100.000 tons. In the last 20 years the volume has been on average 100.000 tons slightly falling since 2000.. The composition of species on the fish markets has seen considerable changes in recent years. Cod has been the most important specie on the markets both in volume and in value, but has in the last 10 years falling in importance from nearly half of the total volume in 2000-2002 to around one-third in 2009. The importance of haddock has in the same time increased from one-fifth to one-third of the total supply in volume terms.

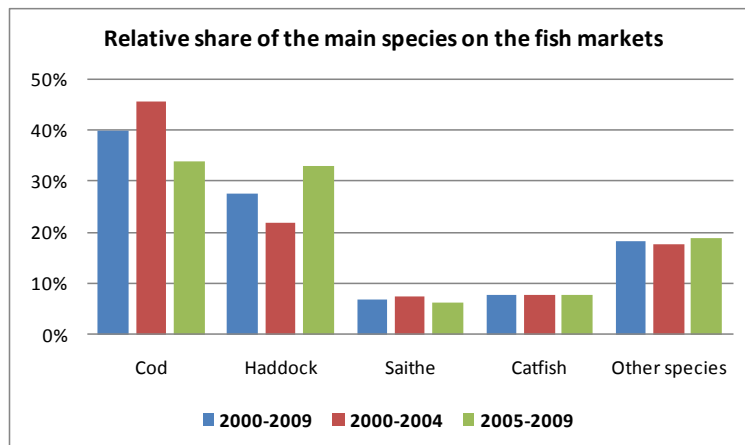


Figure 1 Relative share of the main species on the fish markets Source; Statistics Iceland

This indicates that haddock has to some extent replaced or substituted cod as the general supply of haddock has greatly increased (but has been falling in cod) in recent years due to much larger TAC in haddock. Besides that, haddock is a natural near-substitute for cod on the main consumer markets. Other species have kept their share relatively unchanged in the last 10 years.

Cod as other ground fish is allocated to processing via four main channels, 1) internally within the VICs to land based processing and to direct export in unprocessed form 2) to the fish markets mostly for land based processing 3) through direct sales to independent processors 4) to the freezer trawlers for processing at sea.

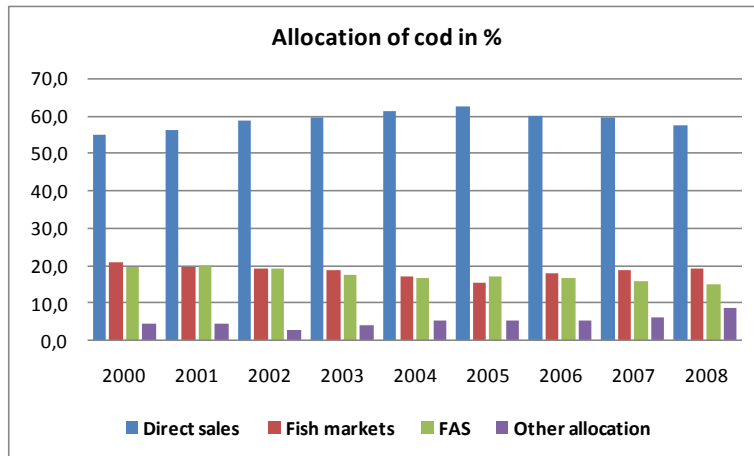


Figure 2 Allocation of Cod Source; Statistics Iceland

The focus of this study is cod for land processing and therefore only the domestic land based processing will be examined. In the period 2000-2008 around 60% of all cod was allocated via direct contracts (to vertically integrated companies' own processing or exported unprocessed), 17% and 18% went to freezer trawlers (FAS) and fish markets respectively and the rest or 5% to other allocations mainly direct contract between vessels and processors. This shows that the total allocation has changed but not significantly in recent years, although a rising part is allocated through direct contracts (4% in 2000 up to 9% in 2008), which is consistent with anecdotal evidence.

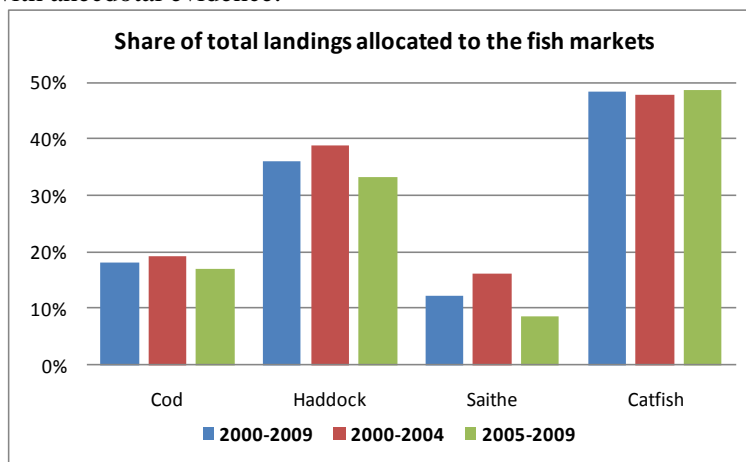


Figure 3 Share of total landings allocated to the fish markets Source; Statistics Iceland

Allocation of some other important species has changed more. The share of haddock sold on the fish markets went down from 45% in 2000 to one-third in 2009 and saithe has fallen from 20% to 10% in the same period. Only catfish on the fish markets is unchanged with a share of 50% of all landings.

In Fig. 4 the allocation of cod to different processing modes it is evident that the land frozen processing and salting have lost their shares to the fresh processing. The frozen at sea has kept its share of the cod catch at around 20%.

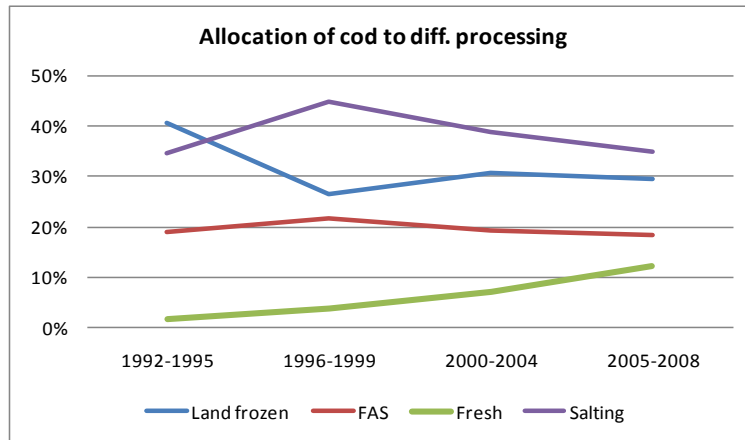


Figure 4 Share of total landings allocated to different processing modes

Source; Statistics Iceland

Market price vs. price in direct sales

From the beginning of the fish markets in Iceland there has been a significant price difference between the fish market prices and the price of fish in direct sales (internal sales). This should not come as a surprise as the price formation is fundamentally different between these two allocations. On one hand is basically an internal pricing, regulated by the semi-official *Bureau of Ex-vessel Fish Prices*, where the set-price is changed according to changes in the market price sometimes with a considerable delay. This price is not used in any transactions other than calculating the vessel crews' wages (based on a share system). It is to assume that important cost factors are not included such as direct or indirect costs of quota (leasing or buying). Other cost factors like handling, grading, logistics and other services are included in the fish market price but not in the direct sales price. It is also to assume that buyers on the fish markets are ready to pay higher price for fish in the right quantity and quality according to their stringiest demand. To what extent these differences can explain the price difference is hard to say but in general it is evident that it is not straight forward to compare these prices as they are decided in a fundamentally different way.

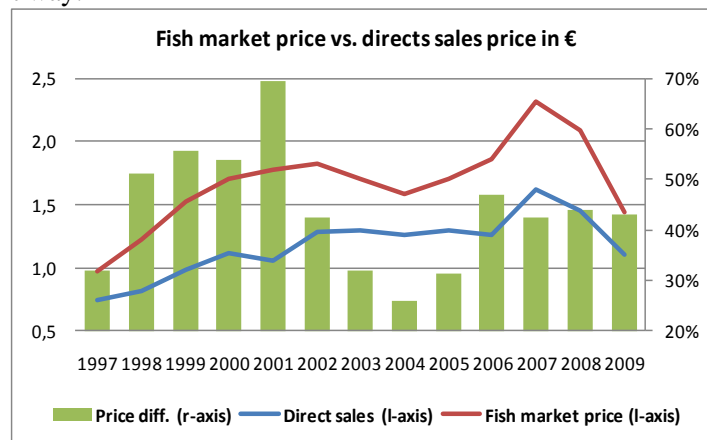


Figure 5 Fish market price vs. direct sales price Source; Statistics Iceland and authors' calculations

It can be argued on ground of economic theory that the auction as a method of exchange does affect the relative power of the buyers and sellers. In the case of the auction mechanism, it is obvious the number of buyers is much greater than in other mechanism of exchange and this will tilt the price setting to the favor of the sellers (overview see Trondsen, 2001). In other words, the auction price will generally tend to be higher than a contractual price or the internal price used by the VICs (sale and purchasing of landings within the same organization).

In this context it is tempting to explore what is driving the fish market prices and the direct sales prices (calculated in Euros).

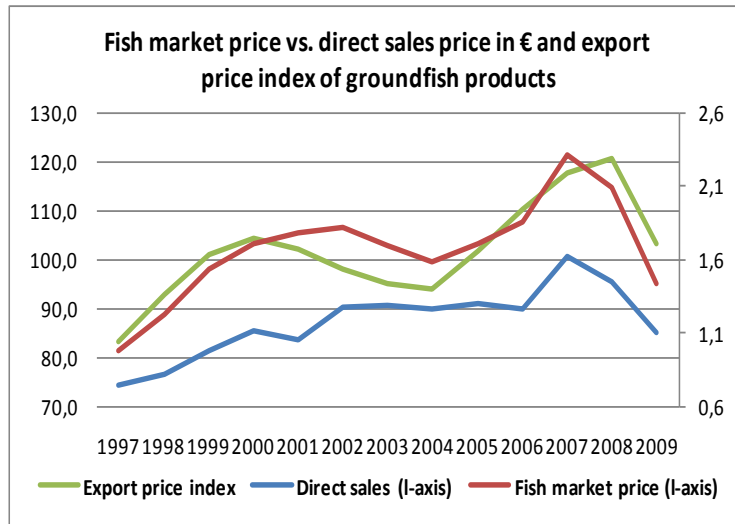


Figure 6 Prices of cod vs. export price index,

Source; Statistics Iceland and authors' calculations

It is to assume that the export prices (in foreign currency) play an important role in deciding these pieces. Supply and demand conditions must also have a great influence as well as the anticipated gross margin or value added. Although there can be detected some linkage between the direct sales price and the export price the correlation is very weak (0.13). On the other hand the correlation between the market price and export is significantly positive (0.48). This indicates that the fish market prices are linked to the export prices of ground fish products. It can therefore be argued that the auction system of exchange has increased the level and amount of market information to the fishermen and vessel owners. This additional access to vital market information (the export price of fish products) will presumably influence the strategic behavior of the fishermen. They will react to the market signals by focusing on the species, sizes, quality attributes and time of landings (freshness) in accordance with the demand impulses coming down the value and supply chain. This increased market orientation through the fish markets will arguably enhance and facilitate additional value adding activities both upstream and downstream the value chain.

Consolidation at the fish markets

The mode of transaction has impact on the allocation of bargaining power of the buyers and sellers. In system of fish auctions, the number of buyers will increase and this will tend to generate higher prices. The auction system is in this sense fundamentally different from other forms of frequently used transaction systems (like in Norway); to mention direct contract sales or the former system of bilateral contract system with officially decided minimum prices. (Trondsen, 2001). Market signals stemming from changes in the customers perception and values will be channeled to the auction markets. Special intrinsic attributes, demand for alternative products will also be signaled into the fish markets and generating demand for these attributes and products which otherwise would most likely not been supplied (no demand, no price, no supply). Greater reliability in supply and in quality will enable the fish producers and exporters to engage in entering the high quality-high price market segments like the market for high quality line-caught fresh fillets. This will mean e.g. to take advantage of the growing demand for natural fresh products by supplying fresher material (see Olsen S.O. in Fresh versus Frozen Seafood as Distinct Product Categories, IIFET, Tromsø, 1995; Chilled vs. Frozen Research, Report prepared for Seafish Insight, January 2010; Fresh versus Frozen, Industry Report, Intrafish 2007 and The Nielsen Company/Seafish, Context Report, May 19 2010).

There are a great number of buyers on the fish markets in Iceland. In 2000 the number of buyers was over 200 but gradually this number came down to 150 in 2008-9 (Fisheries Directorate and FMDC). This development is much in line with the falling number of fish processing companies in recent 10 years. This development is more outstanding when focusing on the fish market trade in cod. Number of buyers came down from 170 in 2000 to 80 in 2008. At the same time ever fewer buyers were buying the bulk of the total volume. In 2000 there were 41 companies buying 75% of the total volume but in 2008, the number of buyers with 75% share of total was down to only 18. This is yet another sign of the prevailing trend in the Icelandic fishery sector of consolidation and fewer and larger companies with significant size and scale of operation. Another interesting aspect is that the vertically integrated companies (fishery companies with fishing vessels and processing) are getting more active on the fish markets as buyers. In the last 10 years the share of cod that was sold to the VIC has increased from 33% in 2000 to 42% in 2008 which is significantly higher than the average of all species. This development is noticeably strong in cod and can be explained by the increasing focus of some of the larger VIC companies to process chilled cod fillets. Same applies to saithe as over 50% of saithe sold on the fish markets goes to two large VICs.

Table 1 Buyers of cod on the fish markets

	2000	2005	2008
Number of buyers	171	125	80
Buyers with >75%	41	28	18
Buyers with >50%	18	11	8
VICs	33%	25%	42%

Source: Fisheries Directorate

When analyzing the list of main buyers in each of the major species on the fish markets it is evident that the processing companies are not only using the fish markets to source fish for processing but also as a way to specialize in terms of fish species. From the 10 largest buyers of cod (2009) only three are among the 10 largest buyers of haddock. This specialization is evidently stronger when it comes to saithe, catfish and redfish. Few large processors take the major bulk of these species sold on the fish markets. It stands to reason that in most cases on commodity markets (as the fish markets are) that the sellers on one hand and the buyers on the other are not the same. On the Icelandic fish markets this is although the case to some extent. This applies only to the VICs as they are simultaneously sellers and buyers on the fish markets. Most frequently the VICs are selling species and fish sizes they are not specialized in and are buying the species they need for their specialized processing.

Development in the Icelandic value chain

Until late in the 1990s, the prevailing structure of the fishing industry was characterized by the powerful position of the three producers’ sales organizations and the close links between main producers (mostly vertically integrated) and these sales organizations. Very limited scope was left to independent processors and exporters or as in Knútsson 2001 *”Until 1997 the value chain can be described as product driven with the three major Icelandic marketing sales organizations in the strategic position as a central firm that controls the physical flow of products and the flow of knowledge and information in the whole value chain”*. The production was mostly focused on standardized commodity products and/or low value added products. The innovation and new activity in the value chain was severely limited although signals of changes in the customers’ demand were evident. But all the same, a major change in processing and export gradually emerged in that time. Slowly, the export of fresh cod fillets gained ground from a very low volume in early 1990s, quintupled in 2000 to 5.000 tons and reached to 13.000 tons in 2009.

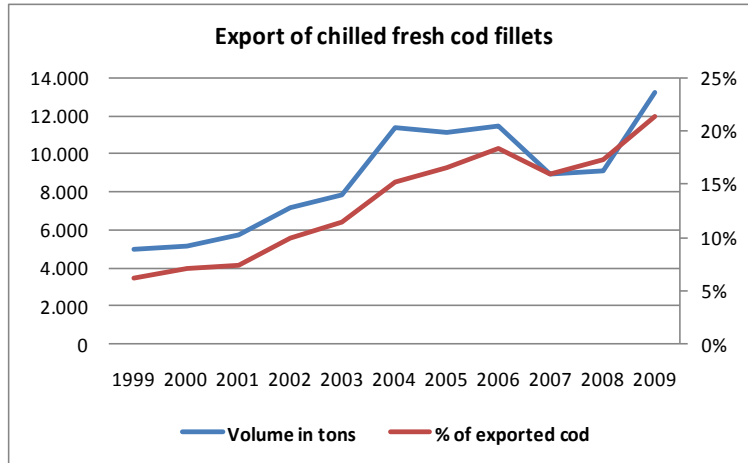


Figure 7 Export of chilled fresh fillets, Source; Statistics Iceland

Fresh and chilled cod fillets was in 2009 the second most important category in the cod export, roughly in the same as land frozen cod products but still lower than salted cod products. This change in the composition of cod export was naturally only possible while quality fish was available and could be allocated to fresh processing. On average 12% of landed cod has been allocated to fresh processing in the last four years but generating around one-fifth of the export value of cod. To a large extent this allocation has been through the fish markets as 27% of landed cod has been channeled to the fish markets and sold there in 2005-2008.

The demand for fresh cod products as well as other fresh seafood products increased rapidly in the late 1990s. Subsequently the price of fresh products increased relatively more than price of traditional frozen products. Independent processors in Iceland (mostly non-vertically integrated companies) did read these market signals correctly and started or increased their production of fresh cod products. These processors had two options to source cod for processing, on the fish markets or through direct contracts with fishing vessels. But to make this processing viable, the yield in terms of export value out of each unit of wet cod sourced at the fish markets had to be high and preferably increasing. This was the case as the yield more than doubled 1999 and 2008. Not only the yield out of each unit of wet fish had to be high but, the value adding in processing fresh cod fillets had to be the same or higher than in other methods of processing. Between 1999 and 2008 the price of fresh cod rose by 58% (calculated in GBP) when the general price level of all ground fish products (frozen, salted and fresh) increased by one-fifth.

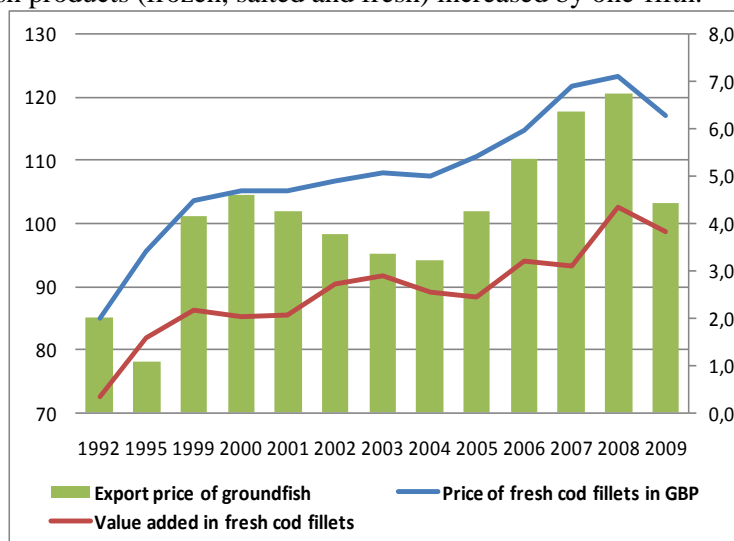


Figure 8 Price of fresh cod fillets in £, value added and export price of all ground fish products Source; Statistics Iceland and authors' calculations

No other products could generate so high export and end-market prices and that level of value adding except some high quality salted products. It must be noted in this context that the market price of cod has been considerably higher than the internal price or direct sales price that the vertically integrated companies were paying for their fish input for processing. The independent processors who were depending on wet from the fish markets had simply to generate higher yield and higher margin of value added than VICs to be competitive. This was accomplished by adhering to market signals, not only the processors but also other parts of the domestic value chain, the exporters and the fishermen. This would not have been possible if not for the easy and ready access to high quality cod at the fish markets.

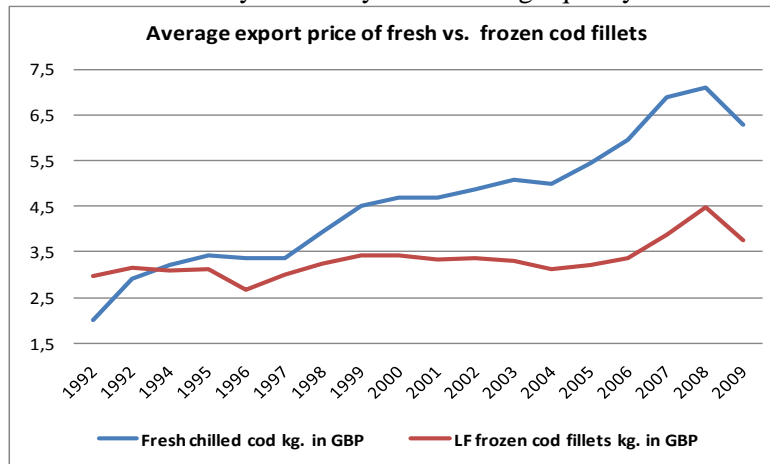


Figure 9 Comparison on prices of fresh vs. frozen cod

Source; Statistics Iceland and authors' calculations

Declining or stagnant fish stocks, especially in cod, have led to reduced supply of fish and to higher ex-vessel prices of fish. As a consequence the actors in the value chain have had to increase their value from each unit of input of raw material to keep their margin unchanged or higher. Another economic constraint in the Icelandic fish processing sector has also been playing a significant role in moving towards higher value adding, was the appreciation of the Icelandic Krona from 2004-2008. This induced the processors to undertake strategic steps in value adding through product development, higher level of production, logistic and transport efficiency. In other words, the processors have been forced from both sides, from the up-stream links or higher input prices and from the down-stream or the exporting side through lower end-price of products in IKR (lower total revenues in IKR), to increase the value out of each unit of input. This strategy of value adding includes changes in sourcing, in processing techniques and methods, in logistic and transport but also in realignment in structure, trading partners and trade flows.

Out of the 25 largest buyers of cod on the fish markets in 2009, only 9 buyers were on the top 20 list in the year 2000. Of the rest, there are 10 new processing companies and the rest are processors that have moved from being relatively small players on the fish markets to become bigger buyers. Smaller processors in 2000 have gained strength and moved upwards in size and have reached the level of becoming typical SMEs. This is a telling story about the dynamism in the processing sector and the ongoing changes in this business. Three of the largest VICs are among the 10 largest buyers in 2009 and have moved upwards in this ranking in recent years. This inroad of the largest fisheries companies (which are also the largest owners of fish quota) into the fish markets is relatively new and is not limited to the cod market but also the saithe market where one of the largest fisheries companies is buying nearly half of all saithe sold on the fish markets. The reason for these large companies to move into the fish markets is twofold; there have been cut-downs in the TAC of cod in the recent years and consequently in the cod quotas of the fisheries companies. At the same time there has been change in production strategy of these companies by putting more emphasis on producing fresh fillets instead of land/sea frozen products. Evidently the large VICs are now taking larger share of the fish supply from the fish markets. Some of their competitors, esp. among the SMEs, have argued that the large companies are using their strengths in

terms of large quota holdings (access to fish from their own vessels at a lower price than at the fish markets) and financial strength, unduly to squeeze the smaller ones out of the fish markets. The main reason is though likely to be the product specialisation of the large fisheries companies, where some of the cod, haddock or saithe for their highly specialised fresh fish processing must be sourced from the fish markets. As has been mentioned before, the vessels of the large vertically integrated companies are landing a mix of different species in different sizes and different quality (in terms of number of days at sea). In other words, these landings constitute heterogeneous batches of fish but the processing part of these companies need homogenous batches of fish (in terms of species, sizes and freshness) for their specialised production lines. The most efficient way to change these heterogeneous batches into suitable batches for the specialised products is to go through the fish markets, sell the fish not wanted for processing and buying the species needed in their production plants.

Fish markets impact on the value chain

From the interviews with the managers in the fisheries sector a general consensus emerges, that the fish markets play a crucial role in the operations of the companies. There is though a slight difference between the independent processors on one hand and the VICs (companies with own fishing vessels) on her other hand. The independent processors stress that access to fish from the fish markets is pivotal for their businesses and the corner stone in their operations. The processors with own sourcing of fish deem the importance of the fish markets be slightly less as could be anticipated beforehand. The independent processors are to a large extent solely dependent on the supply from the fish markets although all are also sourcing fish through direct contracts with vessel owners. The vertically integrated companies and processors with own fishing vessels use the fish markets to top-up their own supply, use the fish markets to stabilize the their total supply. But simultaneously these processors and VICs are using the fish markets to indirectly swap one species of fish for another.. This function is not less important than the original function of fish exchange.

All the companies in the survey see sourcing fish from the markets as having very positive and facilitating effect on production specialization. The fish markets change heterogeneous landings into homogeneous batches of fish (in terms of species, sizes, quality, freshness and other attributes). All the processors in the survey are operating product specialization, nine of the companies are specialized in fresh fish fillets and four companies in salted cod products (of these 13 companies, three companies are the largest vertically integrated companies with an extensive horizontal product diversification). The possibility to buy homogeneous batches of fish from the fish markets, which fits into the product specialization without any further sorting or handling will greatly facilitate the operation process. Sourcing the exact size and type of fish for processing lines has a very positive and contributing effect on the specialization, which is a very important factor for increased production efficiency and higher productivity in terms of manpower and equipment. And consequently this has a positive effect on the operating margin. The vertically integrated companies use the fish markets to increase their input and the stabilization of input. This is extremely important, especially for the large processors, to increase the utilization level of their production capacity which otherwise would be underutilized. High level of capacity utilization, high productivity and strategic value creation are the determinants for competitiveness and high operating margin for these companies.

Greater part of interviewees are the opinion that the fish markets have had a positive effect on product development as the availability of the “right” fish from the markets have facilitated the production of new product types, according to the wishes of their customers and clients. This is especially evident in the fresh fillet production but one of the producers of salted products also stressed this issue. The companies in the survey are more ambiguous when it comes to the question of yield. Some stress that sourcing fish from the fish markets have directly or indirectly contributed to a better yield from input. This has to do with the degree of freshness of fish from the fish markets which makes it easier to produce, in some cases, valuable by-products (roes, cheeks and other cut-offs). High level of quality and freshness has also a positive effect on the net yield in the filleting process and in the cutting of fillets. All processors strive towards the highest yield out of each unit of whole fish. Waste and discarding is kept very low and every part of the fish is used in some kind of processing. Another aspect but related is the gradual development

over the last 5-10 years to use all harvested fish. Not only are underutilized species and by-catch increasingly traded on the markets but also has the relative price of these species increased. Processors and exporters have found good markets and market niches for products from fish that was deemed unsuitable for processing due to low or no market price previously. The following table gives an indication of this.

Table 2

	2004	2009
Monk fish	600 tones	2,200 tones
Lemon sole	400 “	800 “
Ling	1,500 “	2,200 “
Price of undersized cod relative to the price of full size cod	51%	65%
Price of undersized haddock	30%	60%

Source: Fish Markets Data Center

Stability in sourcing is a very important issue for all the processors. Nearly all the processors without own fishing vessels say that other options in sourcing besides the fish markets are becoming more and more pressing. Lower volumes of the most important species, cod and haddock, traded on the fish markets, higher fish markets prices and increasing competition on the fish markets for the limited supply makes it increasingly urgent and desirable to source fish from elsewhere. Otherwise they are not able to meet the buyers’ demand, i.e. for long term supply contracts and for product specifications.

The interviewees were asked to rate and rank eight issues/attributes or functions of the fish markets according to perceived importance. The rating was on the scale of 1-8 (1= most important, 8=least important). Of the 13 companies in the survey, eight companies did send in their points of ranking.

Table 3

	Score of points	Rank
Freshness	20	1.-2.
Accessibility/stability in supply	20	1.-2.
Selection of species	33	3.-5.
Selection of sizes	30	3.-5.
Selection according to fishing gear	29	3.-5.
Fishing vessel/fishing company	40	6.-7.
Fishing ground	38	6.-7.
Swapping of species	na.	na.

The outcome is that the interviewees assessed freshness and the ability to source fish at any time as the most important issues. In the second place came selection of sizes and species. In the third place came the selection of fishing vessels. The vertically integrated companies also pointed out the importance of swapping species at the fish markets. The outcome is quite definite; on one hand is the crucial importance to be able to source fish for processing and the high level of freshness at the fish markets and on the other hand is the scope of selection at the fish markets (sizes, species, fishing gear, vessels, fishing area). In short, these two main functions stand out; firstly, the accessibility and availability in supply (the volume issue) and secondly the possibility of selection (the qualitative issue). Both of these functions have a fundamental importance for the development of efficient market orientated production and marketing activities.

Conclusion

Despite relatively low share of landed fish in Iceland is traded on the fish markets (on average one-fifth) they have had a very important role in the value chain and increased the value creation in the Icelandic fish industry. The fish markets in Iceland are the main source of wet fish for independent producers but are also very important for the

fisheries companies with own fishing vessels. In the 1990s the main fisheries companies were adherently slow to react to impulses coming from the consumer markets, demanding new and fresh products. The independent processors on the other hand which were wholly depending on the fish markets, reacted to these market impulses and specialised in fresh fish fillets. They were able to react swiftly and promptly to changes in demand with positive results to value creation and operating margin. The consumer markets were demanding fresh high quality products, these market signals were funnelled through the value chain from the consumers to the processors and to the fishermen via the fish markets. The integrated companies were less flexible downstream and upstream than the independent producers and exporters in the 1990s but have reorganised and changed their production and marketing strategy in the last 10 years.

The fish markets have facilitated the development and processing of fresh high quality fillets and they have contributed to more stability for the producers to supply products to the market. The fish markets have also supported the processing industry to be more flexible and adaptable to different business models and situations. Without the fish markets it would be difficult to foresee the existence of the fresh fish products and specialised salt fish production, at least in the same mode and at the same scale as now. Sourcing high quality fresh fish at the fish markets is one of the key factors behind the market strength of the Icelandic producers at the European fresh seafood markets. And the fish markets have been significant contributors to the product development which have been taken place in the last 10-15 years. The main function of the fish market is to be the trading place of wet fish but other functions are also of high importance. A very important function is the market swapping of species and sizes, i.e. to change multi-species landings into a single species batches of fish fit for the specialised processing modes. This function of the fish markets has been used to good measure both by the vertically integrated companies as well as the fishing vessels with contractual sales agreement with fish processors. This has facilitated the specialisation process which is the backbone of the present production strategy of Icelandic fish processing companies.

Openness through the fish markets for new entrepreneurs is of great advantage as access to fish in the ITQ system has a restricting impact on successful entry for producers without quota. The emerging of the fish markets in the late 1980s and early 1990s, made it possible for new processors to gain ground and build up the operation independent of ownership of ships or quota. The fish markets has opened a possibility and a new option for such companies to source fish from the markets and to built up their processing and marketing capabilities. This has been an important step towards specialisation and to follow the markets signals of changes in demand and transparency in the price formation has increased throughout the value chain.

Another and often disregarded aspect of the Icelandic fish markets is that every kind of fish has its price in accordance to market demand. Registered catch of underutilised species, such as some flatfish species, monkfish, ling, spotted catfish and whiting has increased substantially in the last 10 years and this fish is sold at a good price on the fish markets. Similar applies for undersized cod and haddock. As there has been a good market for small fresh fillets, the price of small size fish has increased and is now app. 2/3 of the price of average sized fish. In general, increased demand for underutilised species and undersized fish has generated higher price at the fish markets. This has resulted in a much lower tendency to discard such fish and consequently the average rate of discard has been falling in recent years (Marine Research Institute, Quantitative Assessment of Discard, 2009).

Some other positive aspects have also been detected and analysed. Higher price for wet fish at the fish markets has made it necessary for the companies sourcing wet fish from the markets to squeeze as high an utilisation yield as possible and maximising values added in processing and marketing to compensate for the higher input price of fish for processing. Consolidation among buyers (processors) and sellers (fishing vessels) is evident and the larger buyers and sellers are getting stronger and bigger; but this is line with the general trend in the Icelandic fisheries sector. Although, the number of bidders has gone down, there is still ample number of bidders at the fish markets.

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