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

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**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 2012, 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 forms of fish-markets use were identified; firstly, specialisation, where companies use fish-markets to sell off all other species usually to SME producers specializing in those species, secondly, assurance, where companies ensure raw material and fill in when there is lack of cod from the company's own boats and, thirdly, market driven, where companies completely rely on fish-markets for the supply of cod. To further studying this facilitator of industrial success, the focus is on 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 companies and is a part

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of an ongoing research on the value chain structure and organisational- and productivity changes in the Icelandic fisheries sector

Key words: Icelandic fish industry, value chain, fish markets, auction and structure

Jel Codes

## **1 Introduction**

Fish markets in Iceland are operated in mixed environment of vertical integrated companies (VICs), operating both fisheries and processing and sometimes in marketing as well and independent companies in fisheries or in processing. Until 1986 the price of wet fish was officially regulated through the Price Commission of the Fisheries where representatives from the vessels owners, from the fishermen unions, from the possessors organizations and from the State came together to decide 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 owners and processors or fish was sourced from own vessels in integrated fisheries companies. In previous studies of the authors it has come evident that the establishment of the fish markets have played important role in the development of value creation in the Icelandic fish industry (Knútsson, Klemensson and Gestsson 2009; a , b). This study aims to explore the role and importance of the fish markets to the value chain in the Icelandic fisheries companies to be able to understand better the role of the fish markets in the creation of the value chain in the fisheries and in processing..

## **2 Theory**

Trondsen (2001) has pointed out that fish markets can be a useful source of wet-fish for processing in unregulated fisheries. But only with a developed management scheme where economic considerations are inbuilt, such in the ITQ system, will motivate the fishermen towards maximising their income through market orientated value adding behaviour. In such a market focused regulated system, the fishermen are induced to manage their quota holdings in an efficient revenue-maximising way by 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 Trondsen (2001) calls MOVA or market orientated value adding behaviour. The important challenge is to introduce the value adding policy to all instances of 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 by offering the right quantity, the right species, in the right quality and qualitative attributes at the right time. According to Trondsen (2001) a prerequisite for that is an efficient fishery management system, in most cases a fully developed ITQ system.

The mode of transaction in the value chain of fish 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 (Arnarson and Trondsen, 1998; Trondsen, 2001). Market signals stemming from changes in the customers perception and values will be channelled to the auction markets. Special intrinsic attributes, demand for alternative products will also be signalled 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. taking advantage of the growing demand for natural fresh products by supplying fresher material (Olsen, 1995; Seafish, 2010; Intrafish, 2007 and Nielsen, 2010).

### **3 Methodology**

This study is a part of an ongoing study on the structure, organisational- 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 2014. First hand data has been collected through semi-structured interviews with managers of over fifty companies in the Icelandic fish industry. Interviewees have come from a broad spectrum of companies in the Icelandic demersal fish industry value chain. The aim of the interviews has been to explore the different business models of the companies regarding their global value chain governance, insourcing/outsourcing decisions, structure of integration and type of degree of coordination along the value chain and to understand the development in the value chain. The interviews have been collected though the period of 1997 to 2014.

For this part of the research additional interviews were conducted in the form of semi-structured questionnaires in week 24-26 2010. First a list of 10 questions was sent to 13 out of the 20 largest buyers of cod at the local fish markets in 2010. Answers were then gathered from telephone interviews and backed up with e-mails when necessary. These 13 companies bought 20,000 tons or over 50% of all cod sold at the local fish markets that year. All of these 13 companies did take part in the survey. Of these 13 companies, five are independent processors (without their own fishing vessels) and the rest or eight companies are processors operating their own fishing vessels. Among these eight companies are four companies which are categorized as some of the largest VICs with a large share of the total fishing quotas in Iceland. Similar survey was conducted in 2014. A list of 9 questions was sent to 15 processing companies that were the largest buyers of cod on the local fish markets these two years. The

interviewees in these special surveys were asked to rate and rank nine issues/attributes or functions of the fish markets according to perceived importance.

Secondary data was collected through the Association of Icelandic Fish Markets, Fisheries' Pricing Bureau, Statistics Iceland and Federation of Fish Processing Plants. Access to specific relevant data prior to 1992 is difficult and time-consuming to acquire and some data for the period 1990-2000 was simply not available.

#### **4 Local Fish Markets' Development**

In Iceland the exchange of wet fish is dominated by three modes of exchange, auction sales at the established local fish markets, direct contracts between fishing vessels and processors and fish sourced from own vessels in vertically integrated fisheries companies. In that case, the Fisheries Price Bureau 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. With the use of information and communication technology (ICY) through computer and internet connection, it is possible to link together vast number of fishing vessels, a number of harbours with landing facilities and all interested buyers together in one virtual marketplace in spite of the disperse real position or 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 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 (type of fish, sizes, freshness, fishing gears etc.) 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). These processors can therefore focus on what they do best-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 of the ownership of vessels and of processing facilities.

The fish markets also play an important role as a facilitator of specialization for the vertically integrated fisheries companies by changing heterogeneous landings into homogenous batches suited for their specialised 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 (according to the consumers' tastes). In this way the fish auctions are used as a clearing mechanism for wet fish from VICs own vessels and for fish bought through contract agreements, which is not suitable for these companies' 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 at any given time.

An important stepping stone in the development of the fish markets came in 1991-2 with the creation of two separate data centres, which had the main function of operating the computerised auction and settlement systems. In 2000 the two data centrals merged in one independent company The Fish Markets' Data Centre Ltd. (FMDC), owned by 15 independent fish markets. Now there are nearly 30 landing places around the coastline at all strategic important locations. All biddings are done via the computerised auction and sales system linking the 15 independent fish markets. The auction mechanism is of the 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 computerised auction and sales system. Other functions of the FMDC are running the fish markets' website, general supervision, running the settlement system (invoicing, the buyers' bank guarantees etc.) and collecting and publishing statistics.

It is evident from the rapid growth of the fish markets in the first four years of operation, that there 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 tons and in fifth year up to 100,000 tons. In the last 25 years the volume has been between 85,000 to 100,000 tons and since 2000 the average turnover has been 89,000 tons, slightly falling in the recent years. The composition of species on the fish markets has seen changes in recent years. As can be seen from figure 1, cod has been the most important specie on the markets, both in volume and in value, but has in the last 10 years been falling in importance from nearly half of all fish (of the total supply in volume terms) in 2000-2002 to 40% on average in 2010-13. In the same time the importance of haddock increased from around 20% in 2000-2004 to around 33% from 2005-2009 and down to 23% in the last three years 2010-2013.



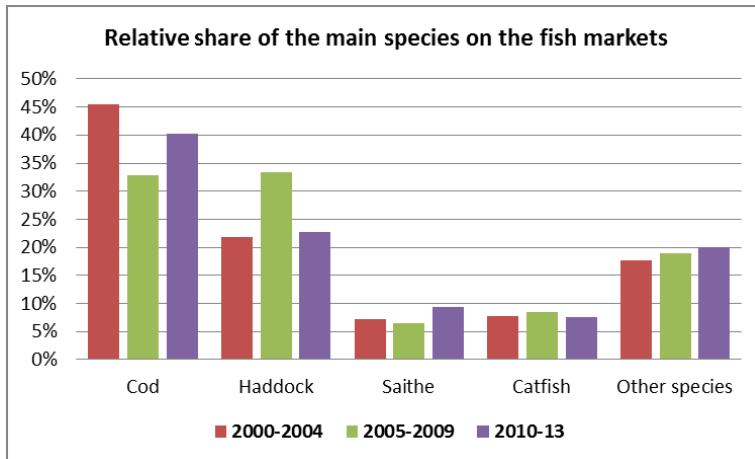


Figure 1 Relative share in volume of the main species on the fish markets; *Source: Statistics Iceland*

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) in the freezer trawlers for processing at sea. As figure 2 represents around 60% (on average) of all cod was allocated via direct contracts (to VICs' own processing or exported unprocessed) in the period 2000-2012 but in recent years this has risen up to around 67% of total landings. The share of cod allocated to the fish markets has been more or less constant since 2000, around 20% of total landings. A declining proportion between 3-5% since 2000 goes into frozen at sea and the same applies to other allocations or (mainly direct sales contract between vessels and independent processors).

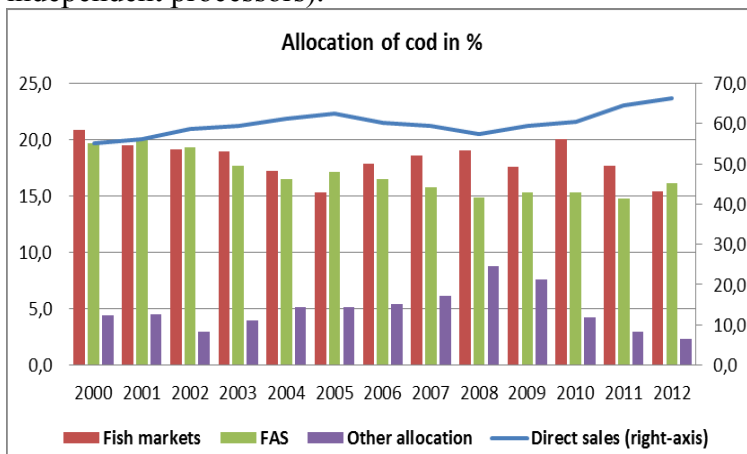


Figure 2 Share of total landings allocated to the fish markets *Source: Statistics Iceland*

Figure 3 shows that the allocation of some other important species in the fish markets has changed more than cod. The share of haddock out of total landings sold on the fish markets has been fairly stable around 33% since the year 2000, Saithe sold on fish markets has increased in recent years and the same applies to redfish.

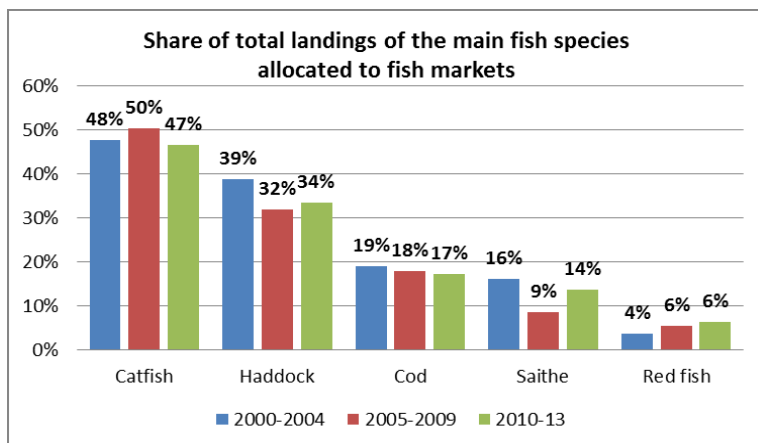


Figure 3 Share of total landings allocated to the fish markets *Source; Statistics Iceland*

The market share of catfish has been stable since 2000. Around half of all landed catfish is allocated to the fish markets. It is to note in this context that saithe, redfish and catfish are lower valued species compared to cod and haddock but through specialised processing (mainly fresh fillets) it has been possible to increase value added in the processing process.

#### 4.1 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 through direct sales (internal sales) as can be seen in figure 4. 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 set 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 set 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 different set-ups can explain the price difference (around one-third) 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.

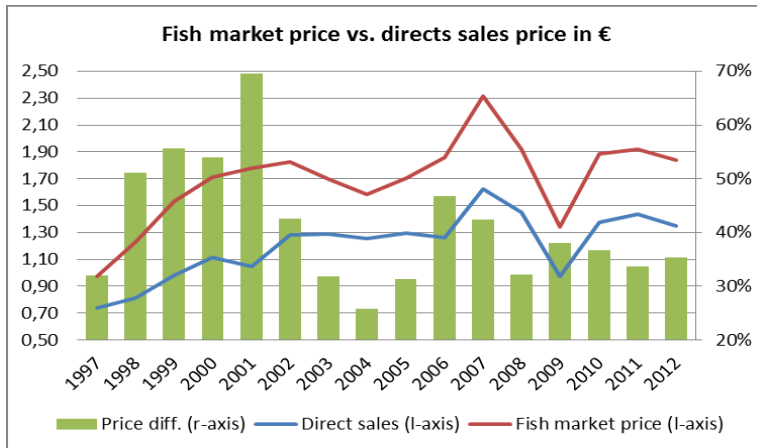


Figure 4 Fish market price vs. direct sales price in € Source; Statistics Iceland and authors' calculations

In this context it is tempting to explore what is driving the fish market prices and the direct sales prices (calculated in Euros) presentment in figure 5.

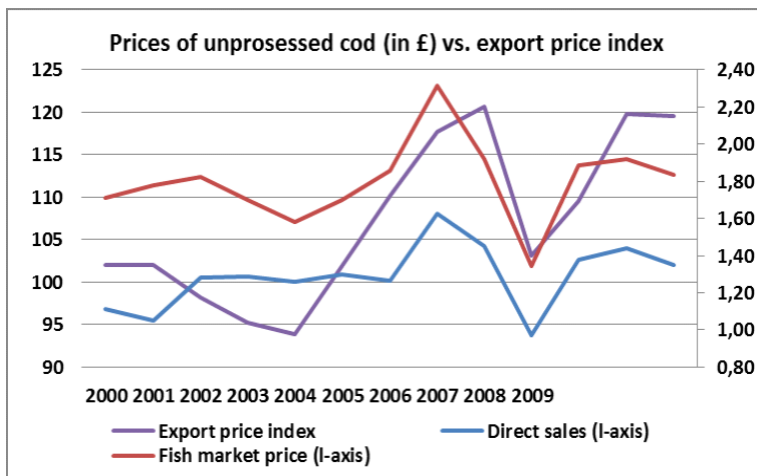


Figure 5 Prices of cod vs. export price index, Source; Statistics Iceland and authors' calculations

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 association 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 to a certain degree influenced by 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 behaviour of the fishermen. They will react to the market signals by focusing on the species, sizes, quality attributes and time of landings in accordance with the demand impulses coming down the value and supply chain. Furthermore, this increased market orientation through the fish market will arguably enhance and facilitate additional value adding activities both upstream and downstream in the value chain.

#### 4.2 Consolidation at the Fish Markets

Table 1 shows that the number of buyers of all species in 2000 was over 200 but gradually this number is down to 140 in 2012 (buyers with more than 50 tons each). This development is in line with the falling number of Icelandic fish processing companies in recent 10-15 years. This development is more significant when focusing on the fish market trade in cod. Number of buyers came down from 170 in 2000 down to 56 in 2012. At the same time ever fewer buyers are buying the bulk of the total volume. In 2000 there were 41 companies buying 75% of the total volume of cod in the market but in 2012, this number was down to only 16. This is yet another sign of the prevailing trend of consolidation in the Icelandic fishery sector where fewer and larger companies with significant economies of size and scale have become the major players. Another interesting aspect is the VICs are becoming more active on the fish markets both as buyers and sellers. This specially applies to the market trade in saithe and redfish as over 50% of saithe and around 33% of redfish sold on the fish markets goes to two and seven large VICs respectively.

**Table 1 Buyers of cod on the fish markets, Source: Fisheries Directorate**

	2000	2005	2008	2012
Number of buyers	171	125	80	56
Buyers with >75%	41	28	18	16
Buyers with > 50%	18	11	8	8
VICs	33%	25%	42%	25%

When analysing the list of main buyers on the fish markets in each of the major species it is evident that the processing companies are not only using the fish markets to source fish for processing but also as way to specialize in terms of fish species. This specialization is more evident 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 are the fish markets), the sellers on one hand and the buyers on the other are not one and the same. On the Icelandic fish markets this is the case to some extent. This applies only to the VICs as they are simultaneously sellers and buyers on the fish markets (albeit in different species). 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.

## 5 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 (with semi-monopoly of exporting rights) 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 Knútsson in 2001 states;” *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 products and/or low value added products. The innovation and new activity in the value chain were severely limited (although signals of changes in the customers’ demand were all too evident). But in spite of this a significant change in processing and export strategy emerged in the same 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 nearly 17.000 tons in 2012 as can be seen in figure 6.

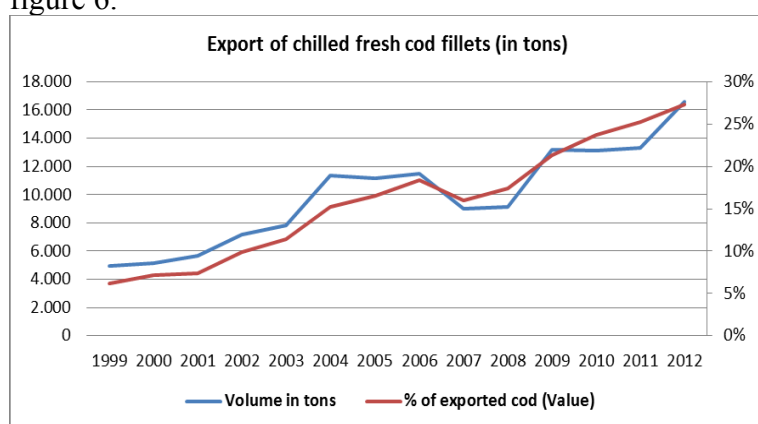


Figure 6 Export of chilled fresh fillets Source; Statistics Iceland

Fresh chilled cod fillets constituted the largest share of export of cod products in 2012, but in 2009 fresh cod fillets were only in the 3rd. place surpassed by land frozen products and salted cod. This change in the composition of cod export has obviously only been possible as the right quality fish has been available and could be easily sourced for fresh processing from the fish markets. On average 14% of the total catch of cod has been allocated to fresh processing in the last four years, generating around 25% of the export value of all cod products.

The demand for fresh cod products as well as other 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 for sourcing 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 2000 and 2012. 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. Figure 7 shows that between 2000 and 2012 the price of fresh cod fillets rose by 60% (calculated

in GBP) when the average price level of all ground fish products (frozen, salted and fresh) increased by 40%

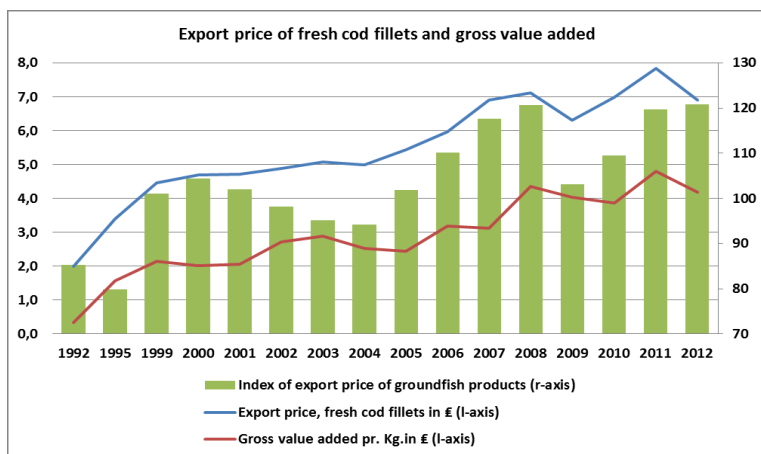


Figure 7 Price of fresh cod fillets in £, value added and export price of all ground fish products Source; Statistics Iceland and authors' calculations

No other cod product can generate such high prices and that level of gross value added 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 VICs are paying for their fish input for processing (figure 8). The independent processors who were relying on wet fish 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 efficient access to high quality cod at the fish markets.

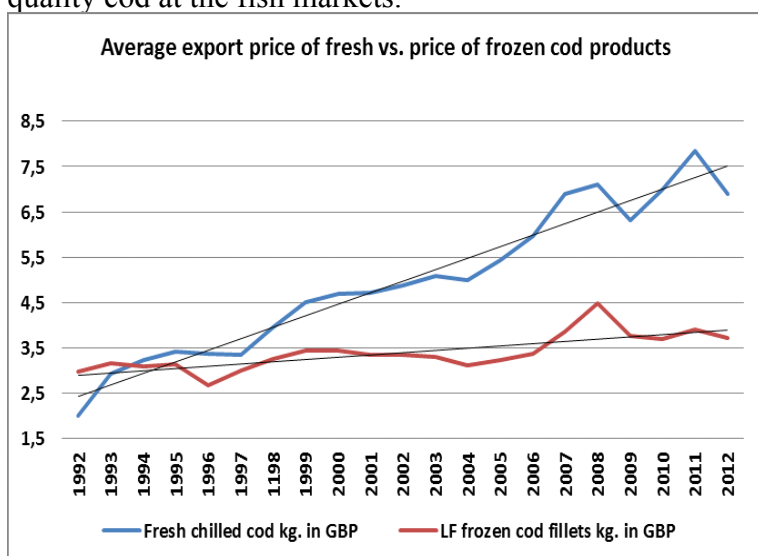


Figure 8 Comparison on prices of fresh vs. frozen cod Source; Statistics Iceland and authors' calculations

Declining or stagnant fish stocks, especially in cod, have led to reduced supply of fish and 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 that has also been playing a significant role in moving towards higher value adding, was the appreciation of the IKR from 2004-2008. This induced the processors to undertake strategic steps in value added policy. In other words, the processors have been forced simultaneously from the up-stream links and from the down-stream linkages to increase the value out of each unit of input. This strategy of value adding includes changes in sourcing, in processing techniques and methods, higher yield in processing, in logistic and transport but also in realignment in organisation and structure and new policy towards the trading partners and in 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 established processors that have moved from being relatively small players on the fish markets to become bigger buyers. Some of the smaller processors 10-15 years ago have grown stronger and are still getting bigger. These fish processors are typical SMEs, which are leaders in product development, technical innovation and in marketing. 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 and sellers on the fish markets and have moved upwards in this ranking in recent years. The entry 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 and redfish market. The reason for the large companies to move into the fish markets is twofold; there have been cut-downs in the TACs of cod and other species in the recent years and 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. As mentioned, the large VICs are now taking larger share of the fish supply from the fish markets. Some of their competitors, especially 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. But the main reason for the entry of the large companies on the fish markets is the policy of product specialisation. These companies were compelled to source some of the cod, haddock or saithe for their highly specialised fresh fish processing from the fish markets. The vessels of the large VICs are landing a mix of different species in different sizes and different quality (depending of number of days at sea). In other words, these landings constitute heterogeneous batches of fish but the processing part of these companies need a homogenous input of wet fish for their production (in terms of species, sizes and freshness).

### *5.1 Fish Markets Impact on the Value Chain*

From the interviews with the managers in the fisheries sector it is clear that there is a general consensus, that the fish markets play a crucial role in the operations of the companies. There is a slight difference though between the independent processors on one hand and the VICs on the 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 to 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 VICs and processors with own fishing vessels use the fish markets to top-up their own supply, use the fish markets to stabilize their total supply. But simultaneously these processors and VICs are using the fish markets to indirectly swap one species/sizes of fish for another. They use the markets to sell the species and sizes not suitable of their specialized processing and buy instead the fish they need in their production lines. This function is not less important than the original function of fish exchange, i.e. to source fish for processing.

The special survey carried out in 2010 and again in 2014 along with the list of 9 questions sent to 15 processing companies which were the largest buyers of cod on the fish markets in these two years found that all the companies both in 2010 and 2014 surveys, see sourcing fish from the markets as having very positive and facilitating effect on specialization in production. 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 2014 survey are operating according to product specialization, seven of the companies are specialized in fresh fish fillets (and customised frozen products) and two companies in salted cod products. 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 had a positive effect on the operating margin. This is extremely important to increase the utilization level of their production capacity which otherwise would be underutilized especially for the large processors. High level of capacity utilization, high productivity and the policy value creation are the main determinants for competitiveness and high operating margin for these companies.

Majority of interviewees are of the opinion that the fish markets have had a positive effect on product development as the availability of the “right” fish from the markets has 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 and 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 or utilised in some kind of processing. 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.

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. Falling volumes traded on the fish markets of the most important species, cod and haddock, rising 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 going to be able to meet the buyers' strong demand, i.e. for long term supply contracts and for certain product specifications.

The interviewees in the special surveys were asked to rate and rank nine issues/attributes or functions of the fish markets according to perceived importance. The rating was on the scale of 1-9 (1= most important, 9=least important). Of the 15 companies in the survey, nine companies, (seven of them are among the largest buyers of cod on the fish markets) did send in their points of ranking as can be seen in table 2.

**Table 2, Attributes of the fish markets**

	2010/Rank	2013/Rank
Freshness	1-2	1
Access to wet fish	1-2	2
Selection of species	5	3
Selection of size	4	4
Swapping of species/sizes	Na.	5
Fishing vessel/fishing company	7	6
Stability in supply over the year	Na.	7
Fishing ground	6	8
Selection according to fishing gears	3	9

The outcome is that the interviewees assessed freshness as the most important issue; second most important was assumed to be the proven easy access to raw material from the fish markets. In the third and fourth place came selection of species and sizes. The fifth most important issue was the ability to swap species and different sizes of fish on 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 and on the other hand is the scope or possibilities of selection at the fish markets (sizes, species, fishing gear, vessels, fishing area). In short, these two main functions or issues stand out, firstly, the accessibility and availability in supply (the volume issues) and secondly the possibility of selection according to species, sizes and other qualitative attributes (the qualitative issues). Both of these functional factors have a fundamental importance for the development of efficient market orientated production, marketing and exporting activities.

## **6 Conclusion**

Despite relatively low share of landed fish in Iceland is traded on the fish markets they have had a very important role in the value chain in 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 both downstream and upstream in the value chain than the independent producers and exporters in the 1990s but have 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. Without the fish markets it would be difficult to foresee the existence of the fresh fish and specialised salt fish production, at least in the same mode 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 mode. This function of the fish markets has been used to good measure both by the VICs as well as the fishing vessels with contractual sales agreement with fish processors. This has facilitated the specialisation process greatly which is the backbone of the present production strategy of Icelandic fish processing companies.

Opening for new entrepreneurs through the fish markets 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. This was an important step towards specialisation and to follow the markets signals of changes in demand. The fish markets have created a possibility and a new option for such companies to source fish from the markets and to build up their processing and marketing capabilities. This has created a lower entree barrier for entrepreneurs into the fish processing business.

Another and often disregarded aspect of the Icelandic fish markets is contained in the market mechanism of an efficient trading place of goods. 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 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, 2009).

It can be stated here that the auction system have enabled companies to specialize, which in turn has ensured production quality and called for enhanced utilization of each species. The auction market thus serves as a channel for by-catch species, allowing small quantities of fish from many suppliers to be bought by a handful of specialized processors. The fish auctions support the processing industry, allowing it to be more flexible and adaptable to different business models and situations. All of this has contributed to higher value added and the specialization of production in the Icelandic value chain of fish as well as it has been one of the factors leading to more marketing driven value chain instead of the harvesting and product driven value chain that dominated in the Icelandic fish industry before 1997.

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