

STRUCTURAL CHANGES IN THE ICELANDIC FISHERIES SECTOR - A VALUE CHAIN ANALYSIS

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ABSTRACT

This pilot study maps the structural changes in the Icelandic fisheries sector from 1990 to present, from the general to the specific. The background is the radical and substantial changes in the structure of harvesting, production and processing; in the export activities and marketing in Icelandic fisheries. The main characteristics of the fisheries sector have changed from being a centralised, regulated and an alliance based structure to a deregulated, diversified and a vertical integrated structure. The pilot study focuses on the changes in the structure of the value chain in the Icelandic fisheries analyzing the main forces of these changes. The study addresses the impact of macro-environmental changes on the seafood value chain and the seafood sectors reaction to these changes. The methodology is built on the analysis of organisational theory and on statistical analysis and micro-economic assessment. The value chains are described and analysed for selected major types of products according to the relative share of each of these products in the total production of seafood. The focus will be on the individual segments (levels) in the value chain.

Keywords: Icelandic fish industry, structural changes, value-chain analysis, macro-environmental changes strategic group mapping

INTRODUCTION

The 1990's in Iceland was characterised by general deregulation and liberalisation of the economy and the upholding of the export licensing system was a part of the deregulation policy. In 1991, a relatively mature but not perfect ITQ fisheries management system (FMS) was introduced including most of the major species and for most of the fishing fleet. This was after a preliminary period from 1983 when a hybrid system of quota regulation and an effort system was used. The European Economic Area (EEA) agreement was signed in 1993 and fully implemented in 1994 in which trade in fish products within the European area (The EU countries plus Iceland and Norway) was fully liberalised and import duty and import quotas on fish products and seafood was abolished. Company stock was first registered in the Icelandic stock exchange in 1990 when 2 companies registered, in 1995 they were 27 and 75 in the year 2000.

In 1990 the yearly inflation rate was 14.8% fluctuating down to only 1.7% in 1995 but had risen to 5% in the year 2000. For the same years the GDP per capita rose from EUR (in current PPS) 18,655 to 20,788 and to 26,489 respectively. The average gross national income growth rate was only 0.3% for the period 1990 to 1995 but 4.9% for the period 1995 to 2000. Though the importance of the service sector rose slowly from 59% of Iceland's GDP in 1990 to 61% in 1995, fishing and fish processing held its GDP ratio at 14.3% and 14.2% respectively. At the end of the decade the service sector had risen to 64.7% and then the fishing and fish processing had gone down to 10%. The importance of fishing and fish processing in Iceland's exports was immense though diminishing from 75.5% of the country's total export value in 1990 to 71.9% in 1995, and down to 63.3% in the year 2000.

Cod, the most important species of fish for the Icelandic economy, returned an importance ratio of 42.5 % of total fish export value in 1990. This was down to only 26.5 % in 1995 and up again to 43.6 % in the year 2000. These last years since the turn of the century have also been characterized by rapid growth and changes in the Icelandic economy and the fishing and fish processing sectors, tapering off in the last year or so.

This paper is a pilot study on the structural changes in the Icelandic fisheries sector from 1990 to present and the importance of cod and haddock for the Icelandic fishing industry. Through the use of a focus group of chosen managers from the Icelandic fisheries industry the authors hope to lay the groundwork for a wider research on the value chain of the Icelandic cod, centring on the influences of the structural changes in the Icelandic fisheries sector from 1990 to present on both the domestic and foreign part of the value chain for Icelandic cod and haddock.

METHODOLOGY

Value chain analyses have gained lot of attention after influence writings of Michael Porters. Porter [1] defines the role of the value chain as a template, which allows managers to examine in a systematic way all the activities a firm, performs and how they interact, which is necessary for analyzing the source of competitive advantage. According to Kaplansky "the value chain describes full range of activities which are required to bring a product or service from

conception, through the intermediary phase of production, delivery to final consumers, and final disposal after use” [2]. Porter put great emphasis on the strategic position of companies in what he calls the value system, which is the embedded value chain from suppliers to buyers. Furthermore he claims that strategy is about coping with competition and that companies’ competitive strength depends on five major forces: threat of new entrants, threat of substitute products or service, bargaining power of suppliers, bargaining power of buyers and rivalry among existing competitors [3].

In this research first hand data was collected through questionnaires sent in March and April 2008 to a number of key producers and exporters in the Icelandic fishing industry. These companies were requested to describe their value chain, their sourcing of wet fish for processing, asked about the role of the fish markets, about transaction prices within the value chain, where the value adding is generated, about strengths and weaknesses and what processing format is generating the highest value adding. A focus group of five key managers from the industry was also formed, with participants both from vertically integrated companies with a broad spectrum of products (demersal, pelagics, frozen, fresh, and chilled, meal and oil) and from specialised producers in chilled products.

Secondary hard data was gathered from Statistics Iceland [4] and the Icelandic Price Settlement Committee [5]. The former research of Guðmundsson et al. [6] and Sandberg et al. [7] on the value chain of cod was analyzed for comparison. The main categories of the Fisheries Competitiveness Index 2004-2005 for Iceland and Norway taken from a paper from The Icelandic Price Settlement Committee and Norges Fiskerihøgskole in Tromsø, Norway [8] were used to structure this paper.

MACROECONOMIC MANAGEMENT & GOVERNMENT

In many ways 1990 was a turning point in the Icelandic economy mainly due to a wage contract, which was made in that year. A very broad settlement was made between all major players in the labour market, government, farmers and the banks, to lower inflation and to balance the economy, which had been rather unstable [9].

The economy has moved from government interference to a much more open and market-driven economy with a financial sector and stock market as in most western countries. During the period after the 90’s, governments have emphasised privatisation of the economy and sold most state enterprises to the private sector [10]. In addition to a more stable economy there have been many important structural changes implemented in the financial sector in the 90’s. Among these are “interest rate liberalisation, elimination of automatic access to the Central Bank facility by commercial banks, liberation of foreign exchange regulations and establishment of foreign exchange market, establishment of securities exchange and leasing operations, and the development of secondary markets for public and private bonds” [10]. The Icelandic government has also adapted the Icelandic financial system to foreign financial markets within the framework of a Nordic Economic Programme 1989-92 and the implementation of the EEA agreement in January 1994. This followed the abolishment of export licences that had dominated export of fish products from Iceland. In 1987 the duopoly of export to US was abolished and in 1993 monopoly of export of salted fish products to the Mediterranean countries was uplifted [11].

Although the economy has gradually becoming more open and market driven and the direct interference of politicians is getting weaker, there is still a tendency to build up barriers around the economy. These barriers are for example to protect Icelandic agriculture by putting up technical barriers against importing of foreign agricultural goods. Another barrier is hindering foreign investment in the Icelandic fish industry; foreigners are not allowed to directly invest in the fishery or fish processing sectors in Iceland. However, at the same time, Icelandic companies in the fish sector have invested in foreign companies in countries like Germany, UK, Chile, Mexico, Namibia and SE-Asia.

INFRASTRUCTURE & ENVIRONMENT

The fisheries sector has now to compete in a global food market. The effects of globalisation began to have effect on the fisheries and fish marketing sector in the 1990’s [7]. This changed the sourcing, markets, products and the marketing activities. Increasing globalisation in communication, in distribution and in options and opportunities of supply, all has reshaped the fisheries and processing activities [13]. The marketing activities have changed as these activities can be transferred across countries and former marketing boundaries. International demand has become more global which has led to cost savings for global operators due to for example abolishment of import duties and barriers [12]. One of the effects of the globalisation was that customers’ requirements and preferences began to converge on the one hand but became more diversified on the other hand. Consumers and other end-users of seafood and other types of food constantly look for new products and varieties [14].

In all major seafood markets, fundamental changes in the social structure have taken place in the last two-three decades. Families are becoming smaller, number of one- or two- person households are increasing, the labour market participation is increasing and working hours are getting longer. The market trends can be identified as an increased

supply of convenience products, increase in the supply of fresh products, longer shelf life of products, increased portion packed products, rising attention is now paid to quality and increasing concern for health and fitness [7][14]. Income level, in general, is continuously getting higher. But as the average number of family members is smaller, more can be spend on food items such as value added food items. Only a short time ago this was deemed to be outside the means of the average family. Through travelling, the ever increasing knowledge of foreign cultures and through the media influences and promotions, the demand for product differentiation has increased rapidly, especially regional and ethnic food. Demand for fresh products, both domestic and imported is rising. Higher awareness of ecological, health and safety issues has also has also changed the demand pattern of food. Sustainability and traceability of food is now seen as an important issue in the supply and sourcing of food commodities and food items and integral factor in sourcing, processing and promoting. Lesser time for preparing meals and purchasing food has led to rising demand for convenient food, prepared food and to one-stop shopping in hyper-and supermarkets with wide range of food items. This has also contributed to the rising trend of consuming food prepared outside home, in restaurants or from other food services [14]. Competition has moved from being primarily a price-led competition to be a product or diversity- led, where quality attributes such as taste, freshness, naturalness and easier preparation through higher degree of processing [15]. These changes in demand have been crystallised in increased size of specialised market segments such as for prepared fresh and frozen seafood products and ethnic food. Seafood producers have responded to these changes in demand by focusing on differentiated market segments with specialised products with high added value.

Technological innovations have greatly influenced and changed the processes and activities of the fisheries sector. Among other, the introduction of intelligence technology and communication (ITC) and electronic data interchange (EDI), and sophisticated fish processing equipments (in conjunction with ITC technology and custom made soft ware) has had a highly significant impact on efficiency and productivity of harvesting and processing. This has among other things greatly facilitated processing at sea through on-board innovations in processing techniques [16]. In transportation and in logistics, new techniques and processes have been introduced in the last 20 years [7]. The most important have been the widespread use of temperature controlled containers, better storage and handling methods and readily available refrigerated warehouses. The availability of air cargo capacity has increased greatly which has been one of the major conditions for the huge rise in export of chilled fish products.

With the emergence of an effective stock market in Iceland in the late 1990s^a, an increasing number of the larger fisheries companies decided to be listed on the stock market to capitalise their tangible and intangible (quota rights) assets. Altogether, 24 fisheries and fish processing companies, most of them vertically integrated, listed their stocks on the Icelandic Stock Exchange, usually through initial public offerings (IPOs). This listing and resulting capitalisation facilitated greatly external growth of these companies through mergers and acquisitions (M&A) within the fisheries sector and was a major contributing impulse for the consolidation and reconfiguration in the fisheries sector and concentration of quota holdings. But gradually all these companies were delisted from 2002 to 2008, initially through M&A by other fisheries companies and later through management or leveraged buy-outs. It was assumed that public listing of these companies were disappointing and did not serve the interests of the major stockholders in these companies. The turnover ratio of stocks in these companies was most of the time relatively low and the price formation ineffective. When the book value of assets were re-estimated in accordance with the market value of quota holdings, the Market to Book Value was well under unity (=1). The assets were therefore valued below replacement cost and the companies were in a danger of becoming a victim of take-over from other companies, major shareholders in the company or other investors [17]. Although, the stocks of the listed fisheries companies did not attract much interest of the mainstream investors, the capitalisation through going public, made the raising of necessary capital for investments in equipment, quotas and ships and M&A much easier. In that sense, the listing of the largest fisheries companies, 1996-2002, was instrumental in changing and reconfiguring of the fisheries companies and the structure of the fisheries sector.

These macro-environmental influences (The PESTEL framework of influences)^b have changed and affected, in different modes, the structure and organisation of the fisheries sector in Iceland. These influences are not only affecting the structure of the industry as a whole, but is also simultaneously affecting the strategic steps the individual companies are taking and how the companies seek to handle aspects and changes of their environment. Some of the above-mentioned macro-environmental influences are more important than other but together, as they are mostly interrelated, stand as the key drivers of change.

FISHERIES MANAGEMENT AND STRUCTURAL CHANGES

The ITQ fisheries management system (FMS) that was introduced in 1991 covered most of the major species and included most of the fishing fleet. The FMS was in no sense a flawless system at the very beginning. Only the most

important demersal species were included and only the larger vessels were subject to the system. Large part of the small boat fleet was virtually outside the FMS as they were made subject to an effort system, albeit under technical restrictions (length and size of boats, restrictions on fishing gear, time limits etc.). This loophole did later cause severe overfishing especially in cod and general non-compliance to the official fisheries management policy. This was remedied in 2003 when all vessels were included into the FMS, although the small boats are held separately [18]. In evaluating the quota system it is necessary to look at the high degree of vertical integration that has taken place between the processing and the fishing sectors. Without this vertical integration between these two sectors it can be suggested that the quota system, and especially the fact that the quota is bound to the fishing vessels, could seriously affect the power balance in the industry. Quotas that are bound to the fishing vessels put the owner of the vessels in a very powerful position in bargaining against the processing sector about prices and other matters concerning business dealings between the sectors. It can be claimed that the high degree of vertical integration has minimised this proposed negative effect of the quota system and is one of the prime reasons for the success of the quota system in Iceland [11].

Due to poor recruitment of some of the most important demersals and previous overfishing, it was deemed on biological grounds to cut the total allowable catches (TAC) of cod from 265 thousand tonnes in 1991/92 to 155 thousand tonnes in 1995/96. TAC of haddock was also cut by half from 1995/96 to 2000/01, saithe by two-third from 1992/03 to 2000/01 and red fish by nearly half in the same period. Inevitably, these severe cuts of TACs of the most important demersals was bound to have a huge impact on the structure and financial performance of the fishing fleet and ultimately on the processing sector. In this context, it must be mentioned that the fishing of shrimp and capelin increased rapidly in these years of decreasing TACs of demersals. Consequently, the technological, product development and fish processing innovations emphasised shifted from the traditional white fish to pelagics and shrimp in the latter half of the 1990s.

A great enabler of the structural changes was the establishment of fish markets in Iceland. The first fish markets started in 1987 when the official price regulation on wet fish was partially uplifted. The turnover in volume increased rapidly from 22 thousand tonnes at the beginning up to the maximum of 115 thousand tonnes in 1996. In the last 8 years or from year 2000 the yearly average turnover has been around 100 thousand tonnes or about one-fifth of the demersal catch every year. Cod and haddock has always been the most prominent species at the auction markets, in 2001 cod was 44% (18% of total landed cod) of the auctioned volume and haddock 14% (35% of landed haddock). The composition of species has changed in recent years as the availability of cod has gone down due to lower TAC and risen in haddock. In 2007 the volume of cod had fallen to 28% (16% of total catch of cod) of the total of traded volume but haddock was up to 29% (26% of the catch) [19]. The emergence of fish markets in Iceland has had a profound impact on availability of fish for the non-vertically integrated fish processors. Fish markets have also strengthened the market power of the fishermen as market based price formation has resulted in higher prices for them [18].

FISHING COMPANIES

Of the 40 large and medium sized fisheries companies in the early 1990s, only around half have survived today. The effect of the consolidation on the size and on the number of fishing vessels was great as can be seen in figure 1. The number of large trawlers sank by 44% and the number of vessels with 96% of the catch decreased by 2/3 between 1992 and 2007. But it is worth noting that the number of small vessels has risen in that period by one-third. This reduction of the fleet resulted in a 33% reduction in manpower employed at sea. This is in spite the fact that ever increasing part of the catch is processed at sea.

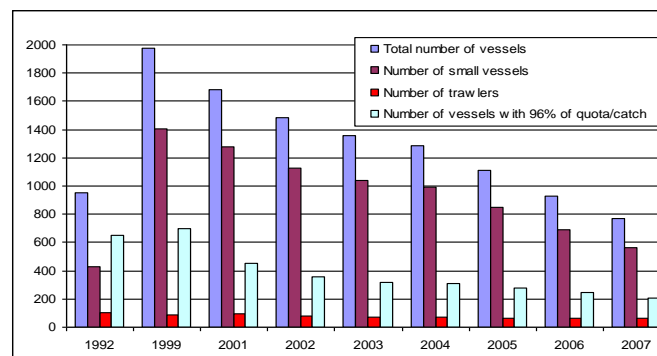


Figure 1. Changes in the Icelandic fleet from 1992 to 2007 [4].

Simultaneously, as an integral part of the consolidation, a large scale concentration of quota holdings took place. In 2007, the 50 largest quota owners had 82% of the total quota in all species but 60% in 1995. The quota concentration is most pronounced in the class of 5 and 10 largest quota owners as the 5 largest have 34% of the quota in 2007 but 17% in 1995. The same development of concentration can be seen among the 10 largest as they had 51% of the quota in 2007 but only 26% in 1995 [4]. These consolidation and rationalisation measures have resulted in eliminating the largest part of the overcapacity of the fleet although it is to be assumed that overcapacity is still prevailing in the fleet of small vessels.

The large scale consolidation of the fisheries companies in the last 8-10 years is probably the most important effect of the changes in the macro-environment of the fisheries sector. Undoubtedly, the implementation of the ITQ system contributed largely and facilitated this consolidation. But other influences had their impacts, mainly the surge of the larger fisheries to be publicly listed companies, mainly in the years 1997-2002, which aided greatly the necessary financing of M&A. For a long time, the size of the fishing fleet had been considerably over the optimal capacity. To decrease the overcapacity became increasingly urgent as the TACs of the most important demersal species were reduced. This was even more important as the financial performance of the demersal fleet was totally unacceptable. Of the 20 publicly listed fisheries companies (all but three were vertically integrated companies) in 1999, only nine have survived. The rest were merged with other companies [18].

The COVA theoretical framework can be used to describe and analyse how this organisational quota system tends to motivate cost orientated value adding instead of market orientated value adding strategy or MOVA. The latter approach is generally assessed to be a more optimal strategy in the fisheries. But even though different preferences of the fisherman will dictate values for quota attributes the constraints on the possibilities to combine quota attributes amongst vessels favours COVA activities instead of increasing the attributes that best fit the fishers' strategies and the market preferences and MOVA [13]. The Icelandic ITQ system has helped increase competition among fishers and to motivated increased operational margins between costs and market values. "Quota transfer has allowed fishing companies to restructure their operations by exchanging or combining quotas thus increasing the profitability of the industry. More than 90% of all quotas have changed hands since the quota system was established" [20].

FISH PROCESSING COMPANIES

The consolidation within the fisheries sector did not only affect the size of the fleet and concentration of the quota ownership, but also had the same effect on the processing sector. The most illustrious way is to look at the development of the official processing licences^c. In the beginning of '90s there were slightly over 400 licences active but in 2007 the total number of processing licences had gone down by 32% [21]. The largest decrease in processing licences is in freezing at sea (FAS) due to a much lower number of operators and the large increase in processing capacity on each vessel. The exemption from the general trend of decreasing number of processors is the growing number of producers of chilled fish products.

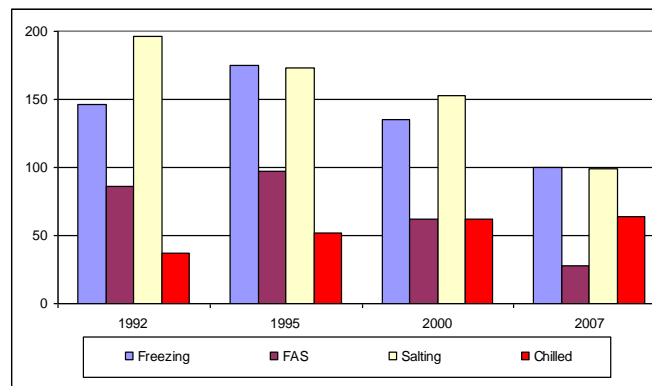


Figure 2. The Number of processing companies [18].

A steadily declining number of people employed in the fish processing goes hand in hand with the falling trend in the number of processing licences. Between 2000 and 2007 the size of the workforce in fish processing declined by 58% [4].

Technological innovation in processing equipment and the widespread use of ITC based solutions and automation has given rise to a highly significant increase in efficiency and productivity in the processing sector. According to Federation of Icelandic Fish Processing Plants, the labour productivity has increased by nearly 30% since 2000 [20]. This development has been aided by the general strategy of product specialisation and focused differentiation in the

processing activities. Larger processing units and specialisation have made way for economy of scale and in many instances for economy of scope. Other rationalisation steps have been taken such as in better utilisation of by-products and waste mainly cut-offs in filleting, heads, roes and liver. This is a significant proportion of landed volume and was until recently categorised as waste and used in meal and oil reduction or used in low grade products. This has changed and all available by-product, waste or off-falls are used in processing of value added products. In the last five years the processed amount of by-products account for 8-10% of landed volume of cod, haddock and saithe. This has contributed heavily to higher productivity of input and higher average product margin [16].

Traditionally nearly all demersal wet fish was allocated to freezing, salting or iced whole for export. This changed with the emergence of freezing trawlers in the 1980s. Since mid 1990s, around one-third of wet fish has been frozen at sea but land based freezing fell from 45% in 1990 to about 30% on average [22]. These changes in processing of demersal fish in Iceland occur in the allocation to salting that was increased temporarily to 25% in 1996-2000 but has fallen to 16% in the recent years. The only significant change since mid 1990s has been the rapid and parallel increase in allocation to chilled products to 12% in 2007. Since 2005, around quarter of wet fish has been allocated to chilled and iced fish products. Chilled products are now the second most important category of processed demersals in Iceland or 26% in value in 2007 [4].

MARKETING COMPANIES

The exporting of fish products were since the 1930's regulated by an official export licensing system. The three large producers organisations (Icelandic Freezing Plants (IFPC), Iceland Seafood (IS) and Union of Icelandic Fish Producers (UIFP)), which were producers co-operatives held a quasi monopoly of exporting of frozen and salted products as they had virtually an unlimited export licenses from the authorities. These MSOs had the great majority of processors as members of their organisations and by contractual agreements; they were obliged to sell all their products through these organisations. In effect, these three exporting organisations, two in frozen products and one in salted products, exerted a huge power over the harvesting and processing sectors in their heydays. The export licensing system was gradually uplifted from 1987 and the last remains were uplifted in 1993 [22].

In the 1990s, the predominance of the three large exporting and production companies was still prevailing. Their market power and market share diminished gradually during the 1990s. Dr. Arnar Bjarnason found out in his Ph.D. study that in 1982 IFPC, IS and UIFP exported 71,5% of the total marine export from Iceland but in 1992 only 57% [23]. Although the producers' organisations did not hold their former quasi-monopoly in exporting activities, their role and function as the main exporting organisations continued into the 1990's.

Ögmundur Knútsson has shown that before 1997 there was clear lack of communication between the markets and the producers where the MSOs tailored all information for the producers. In addition to this the three MSOs operated secondary processing abroad. That caused conflicts of interest in the value chain were the value creation within the MSOs and the producers did not harmony [11]. Another aspect of this product and volume driven system was the high volume of products of relatively low value. In the early 1990's, well over 40% of the volume of frozen products (cod, haddock, saithe and red fish) was block products which generated only 30% of the value. Still more surprising was that 35-40% of the high value cod was processed as block products at a 25% lower export price than ordinary interleaved frozen cod fillets. The block products, usually low grade industrial commodity, were only used for secondary processing in the MSOs' own foreign plants in the US and the UK. It is also safe to assume that the value adding of these block products did only partially trickle down to the domestic processing companies [22].

The decreased fish stock after the 90's meant that producers often had difficulties in increasing their value creation by just increasing fishing as they often did before. In Ögmundur Knútssons research almost all interlocutors that stood outside IFPC claimed that conflict of interests had been blocking further development in this field in Iceland. This increasingly put pressure on the MSOs to create the type of relationship where producers have the opportunity to get access to information and knowledge in the network that can support further value creation in their own companies. This is in accordance with the emphasis in the literature about networks and cooperation, where the value creation is the central issue. Hence, the central issue becomes one of how the participants' companies work together to co-produce value, rather than of how any one company can locate itself in the right position in the network, or of the bargaining power of each actor in the network[11]. In many cases the IFPC network has built on being in the right position in the value chain, in the spirit of Porters model [1]. It can be claimed that a similar situation was in the UIFP and IS networks. This led to a lack of trust between the participants in the network.

The role and power of the producers' organisation dwindled gradually in the later years of the 1990s' due to the abolishment of export licensing and the establishment of new large fisheries companies. Soon after that the largest vertically integrated fisheries company (Samherji) started exporting their products as well as a number of new marketing and exporting companies sprang up when larger independent producers (i.e. producers sourcing wet fish

from fish markets or through direct supplying contracts with vessel owners) did the same. To counter these changes the nature of the producer’s organisations was changed to limited liability companies where the members got shares in accordance to their part in the equity reserves. This tied the producers business to these exporting companies until the three companies were listed on the Icelandic Stock Exchange in 1997 and the shareholders could capitalise their share value on the stock market. Gradually after 2000, the large integrated fisheries companies took over most of their exporting and marketing activities and so did a number of seafood producing companies of frozen and chilled products [24]. In recent years, a three-tier structure characterises the exporting and marketing activities in Iceland;

1. The two large exporting and marketing companies, Icelandic and Iceland Seafood International^d (ISI), holding a market share of 35-40% in frozen and salted products
2. The fish processing companies’ own marketing divisions
3. Independent marketing companies often in close ties or affiliated with fish processing plants.

This three-tier structure of marketing and exporting activities is an open and flexible system which allows ample space to find the most profitable market options. It must be noted that although there were severe drawbacks in the market predominance of the large MSOs, they supplied a wide range of services to their members or business partners. There were also benefits and strengths (economy of scale) stemming from the market size of the MSOs and from the wide range of products (economy of scope) they could supply. In many cases the MSOs acted like cartels both at home and on foreign markets.

In the seafood business today the main goal is to maximise market value of different attributes. Specialisation and diversification is the key factor in a successful product management and in a sound strategy of product development. To make the product management effective the consumer’s requirements must be communicated through the supply chain, from the end user to the producer and to the fishermen. By targeting the right species of fish, in the right quantity and size and with efficient quality control and good handling quality, all in accordance with consumers’ requirements is the optimal way to maximise sales value. The communicative relationship upstream and downstream in the supply chain is therefore imperative if high value adding is to be realised. Thus the processing companies moved from a product driven system to a market driven one.

VALUE ADDED ON RAW MATERIAL COST IN THE VALUE CHAIN

For this pilot study the value adding accrued to the Icelandic producers in the domestic value chain is measured as a value added on raw material cost (subtracting cost of wet fish but not labour or other variable costs). This value added (VA) is calculated from the fob-export prices taken from Statistics Iceland [4]. Fish market prices are used as a proxy for the cost of wet fish material [18] but using the price notation from The Icelandic Price Settlement Committee from 2003 on [8] and commonly used utilisation ratios (yield) of wet fish to fillets [16]. The VA has been calculated for cod and haddock which are by far the most important demersal species for the Icelandic fishing industry [4]. This approach should reflect quite well the value adding in processing and exporting, although value adding in secondary processing, in the distribution and at the end-users side is only partially reflected in this approach.

On average for the periods shown in Table I the highest value added is in cod and haddock has been generated in the production of chilled haddock fillets, 114%, and in salted cod, 90%, followed by chilled cod fillets, 78%. Whole chilled cod has been generating on average 58% and land frozen haddock 66%. In contrast, both land frozen and frozen at sea (FAS) cod has only been gaining 43% and haddock FAS 35%.

Table I: Value Added on Raw Material Cost

Cod	1992-95	1996-2000	2000-2005	Trend
Chilled whole	66%	60%	49%	-
Chilled fillets	52%	82%	101%	+
Land frozen	47%	37%	44%	++
FAS	37%	41%	52%	+
Salted	94%	86%	89%	++
Weighted aver.	63%	64%	74%	+
Haddock				
Chilled whole	28%	26%	36%	++
Chilled fillets	91%	101%	149%	+
Land frozen	51%	53%	95%	+
FAS	25%	28%	51%	+
Weighted aver.	50%	55%	89%	+

Source: Statistics Iceland [4], Price Settlement Committee [8] and own calculations

It is interesting to point out the positive trend in the VA of chilled fillets of cod and haddock possibly tied in with a negative trend in the VA for whole cod and variations in the VA of whole haddock.

These results must be taken with some caution and circumspect. Firstly, the material cost as indicated in the fish auction prices could on average be too high. Only one-fifth of all demersals are traded on the fish markets and the rest is either used within the vertically integrated companies or sold through contractual direct sales to processors. Nearly all fish exported as chilled whole is coming directly from the fishing vessels, not through the fish markets. It is impossible to calculate the price of wet fish in the vertically integrated companies due to the nature of transfer pricing. It can also be stated that the internal price of fish in the vertically integrated companies is lower than the fish market price [16]. In direct sales from the vessels to independent fish processing, it is also safe to assume that the price is lower than the auction price. The unit material cost in FAS processing is always lower than in land based processing due to lower handling cost, no logistics costs and higher level of freshness. Consequently, FAS processing needs a lower value added on raw material cost than land based processing.

Secondly, the utilisation ratio of material has been rising in the last 5-10 years due to better production management and better processing technology. Handling, quality control, shorter duration of fishing trips and improvements in logistics, all have improved the quality of wet fish. The result is an increase in production efficiency through higher utilisation of material and lower unit material cost. This has a vital effect on the degree of the contribution margin and the value adding in processing [16].

Thirdly, the fish market price has risen more than the price of the products and hence the value added on raw material cost is lower. Since 2000 the market price of cod has doubled (in ISK) but the average price of land frozen product has increased by 50% [19]. This is to be compared with price from the Price Settlement Committee which is a calculated price based on the fish market price and price of fish sold directly to processors [8]. Between 2002 and 2007 this price rose only by 25%. Since the implementation of the ITQ system in 1991, the fish quota is the most valuable asset of the fishery firm. This has changed and moved the market power from the processors to the vessels owners. The reduction in the TAC of cod has also contributed to this outcome. Though, higher market price of wet fish has not lowered the total value adding but only moved a part of it from processing to the vessel owners or the fishermen.

Last but not least, better use of by-products and waste as the export of by-products, which earlier had been of low or no value, has increased rapidly in recent years. Between 2003 and 2007 the increase in export of these by-products has been over 50% [4].

THE VALUE CHAIN OF VERTICALLY INTEGRATED COMPANIES

For this pilot study a questionnaire was sent in March and April 2008 to a number of key producers and exporters in Iceland. These companies were asked to describe their value chain, inquired about sourcing of wet fish for processing, about the role of the fish markets, transaction prices within the value chain, where the value adding is generated, about strengths and weaknesses and what processing format is generating the highest value adding. The producers which responded to the questionnaire are of two types, vertically integrated companies with a broad spectrum of products (demersal, pelagics, frozen, fresh, and chilled, meal and oil) and specialised producers in chilled products. The following data is mainly built on the answers from the questionnaire and discussions in the focus group [16].

The main features of the values chain is the downstream integration and coordination from harvesting to exporting and the marketing activities. The products are sold and exported directly to distributors or to secondary processors and in some cases to the end-user (retailers). The distributors are seen as a necessary link in the value chain as they facilitate supply to the multiples (supermarket chains) and food service in Continental Europe and in the UK. The distributors (often closely coordinated or affiliated with the supermarket chains) are supplying the supermarket chains with a wide range of seafood products and have the necessary logistics to do so. The supermarket chains are requiring and demanding a wide range of products and products categories. Specialised fisheries and processing companies are only able to supply a limited number of fish products. Same applies to the food service sector where a large number of relatively small outlets are demanding small volume of variety of products. Most Icelandic producers assess that own distribution is not financially feasible to serve these customers directly but do it through distributors who are in most cases vertically coordinated and are important players in the marketing network of the Icelandic producers. Samherji, one of the largest companies, has a slightly different marketing setup as they have their own importing and distributing company in the UK, which means that they are one step nearer the end-user. It is a growing tendency towards doing business "at source", i.e. directly with the producers although distributors in the proximity of the markets can be facilitating these activities. But in all cases these business relationships between producers and distributors or secondary processors are very close [16].

All possible options and ways are used in the marketing network to serve the markets best but proximity to the markets and well functioning and effective vertical coordination between all levels of the values chain is the most

important strategy features in the marketing network (this could also mean strategic alliance). Different approaches or models in the marketing networking must be used, depending on characteristics of each individual segment of the markets and in accordance to different cultures, structures and organisation between countries. There is no single marketing model that suits all products and all markets. The strategy is to be as close as possible to the end-user. Market capabilities in products, quality, and predictability of supply and market access are most important and valuable attributes. The lack of wide spectrum of products which the multiple supermarkets are requiring can be a drawback. The marketing network rests on long standing business relationships and mutual trust in the UK but on a long term contractual basis in Germany. In both countries these relationships and vertical coordination is the backbone of the marketing activity but the agreed price at any time reflects the general market price of the products [16].

CASE STUDY - VALUE ADDING OF FROZEN AND CHILLED COD PRODUCTS

For this pilot study the value chain for frozen cod and haddock fillets and chilled cod fillets sold to a UK retail chain is studied. These value chains are similar to the generic value chain of Icelandic cod fishery shown in figure 4.

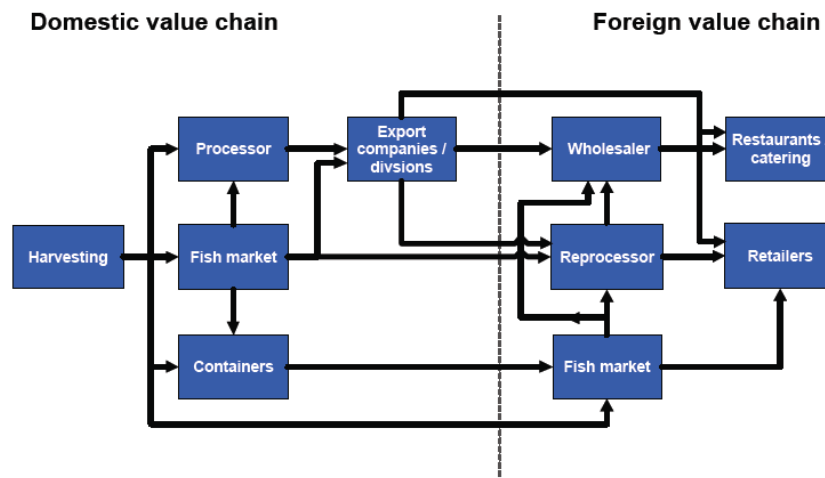


Figure 3. Value chain for the Icelandic Cod Fishery.

Data on prices and yield ratios from the fisheries companies from the focus group were gathered in April and May this year [16]. The wet fish prices were had in May from the Icelandic Price Settlement Committee [5] as well as the fob prices that were taken from Statistics Iceland [4]. The retail prices were listed from Sainsbury's UK, also in May this year [25]. These three products studied are the main products in the categories of frozen and fresh fish products from Iceland. In the following calculations shown in table II, a yield ratio of 45% is used from wet fish to fillets, 8% for insurance, sea freight and handling, 12% for insurance, air freight and handling and 15% to cover the wholesalers' commission and repacking.

Analyzing the frozen cod fillets, the relative value adding (relative to the retail end price) is 41% for the raw materials. The value adding of the processor is 47% capturing 19% of the value chain. The domestic value adding (from raw material cost to exporting Fob) is therefore 60% of the total value chain and the foreign part 40%. In the foreign part of the value chain insurance, freight and handling make up 5%, wholesalers and repacking 10% and the retailer gets 25%.

Analyzing the frozen haddock fillets, the relative value adding is 22% for the raw materials and 18% for the processor. The domestic value adding is therefore only 40% of the total value chain and the foreign part 60%. In the foreign part of the value chain insurance, freight and handling make up 3%, wholesalers and repacking 6% and the retailer gets 51%.

Analyzing the chilled cod fillets, the relative value adding is 31% for the raw materials and 27% for the processor. The domestic value adding is therefore 58% of the total value chain and the foreign part 42%. In the foreign part of the value chain insurance, freight and handling make up 6%, wholesalers and repacking 10% partly due to more costly air freight and the retailer gets 26%.

Table II: Value adding for three typical fish products

UK market	Material cost	Export price Fob	Export price Cif	Distribution & reprocessing	Retail price
Frozen cod fillets					
Euro	€ 5,50	€ 8,06	€ 8,71	€ 10,00	€ 13,34
Value added Euro		€ 2,56	€ 0,64	€ 1,29	€ 3,34
Value added in %		47%	8%	15%	33%
Relative value adding %	41%	19%	5%	10%	25%
Wet price pr. kg.	€ 2,47				
Frozen haddock fillets					
Euro	€ 2,91	€ 5,25	€ 5,67	€ 6,52	€ 13,34
Value added Euro		€ 2,34	€ 0,42	€ 0,85	€ 6,81
Value added in %		80%	8%	15%	104%
Relative value adding %	22%	18%	3%	6%	51%
Wet price pr. kg.	€ 1,31				
Chilled fresh cod fillets					
Euro	€ 6,33	€ 11,85	€ 13,22	€ 15,21	€ 20,65
Value added Euro		€ 5,52	€ 1,37	€ 1,98	€ 5,45
Value added in %		87%	12%	15%	36%
Relative value adding %	31%	27%	6%	10%	26%
Wet price pr. kg.	€ 2,85				

Source: The Icelandic Price Settlement Committee [5], Statistics Iceland [4], Sainsbury's, UK [25] and a focus group from Icelandic fish companies [16]. Data was gathered in April and May 2008.

The domestic value adding in processing of chilled fish products is considerably higher than in frozen products, gaining 87% value added and €5.52 from raw material cost to exporting (Fob) for one kilo of chilled cod fillets exported by air freight. This is the one of the reason for the great increase in processing and exporting of chilled products which has risen by 55% in volume since 2000.

Sandeberg et al. in their KPGM/Sea-Fish report from 2004 [7], found that for imported fresh cod fillet from Iceland (skin- on, pin bone out), sold as chilled natural fillets in a UK supermarket, 33% of the value adding in the foreign value chain went to the UK producers and 67% to the retailer. The value adding contribution to the total value chain for the (re)processor is therefore 23% and the retailers 32%. The foreign value chain thus makes up 55% of the total value chain and the Icelandic part 45%. This is inconsistent with the findings in Table II where only 42% of the chilled cod fillets value chain is foreign.

In their paper on revenue distribution through the seafood chain, Guðmundsson et al.(2006) found that distribution of retail value for frozen cod fillets sold in restaurants in the US in 2001 contributed 19% of the value to fishing, and 29% for processing or round 48% to the domestic part of the fillets value chain. Outside Iceland, 19% went to secondary processing and 33% to the retail part, or 52% to the foreign part of the cod fillets value chain [6]. Comparing this conclusion with this pilot study in not possible but can be viewed as additional information on the value chain of cod from Iceland.

Conclusion

The value chain from 1990 to 1997 can be described as a product driven network with the three major Icelandic marketing sales organizations (MSOs) 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. In the years after 1997 the bigger companies in the Icelandic fish industry took more or less over responsibility of the marketing activities from the MSOs. These changed the power structure in the value chain by limiting the power of the MSOs and bring more responsibility and power to the producers. Hence, the strategy of the producers moved to be more marketing focused than it had been.

During the late '90s and after 2000, the industry's environment was not very favourable with decreasing quotas and currency development that were more or less negative for the industry. Despite of this the profitability of the industry increased after the year 2000. In the period from 1993 to 2000 the profitability for the industry as a whole had fallen from its highest point of the decade in 1995 when it was up at 4.4% to being negative by 1.4% in 1997. In 2001 the profitability margin rose to its highest or to 18.1% but fluctuated and was lowest in 2004 or 5.1% rising steadily after that [4]. It is interesting to see that at the same time that the fish industry in Iceland is getting more profitable and competitive, but the old MOSs, have been facing increased difficulties as they did not seem to have found their place in the new value chain.

This indicates that the industry competitive status is strong and its ability to face the changes in the business environment is high. This can be traced to the high degree of vertical integration of the industry were for example all the 10 largest quota holders (they held 51.7% of the total quota for the quota year 2007/08) are vertical integrated companies taking care of all the activities in the value chain from fishing to marketing. This allows the companies to coordinate the fishing, production and marketing in the way they can meet the demands of their marketing commitments. In the same time increased use of technology has been making the industry much less dependent on manpower, making the industry better fit to meet economic and environmental changes. Better control of the value chain and the use of better technology make it possible for the companies to increase the value creation in the production.

Fish markets also support this increased flexibility of the fishing industry as their operations have made producers able to specialise by buying species that they need for production and selling off species that they can not make use of. The fish markets have also supported the companies increased emphasis on the production of fresh fish fillets by ensuring the supply of quality fresh fish for their production.

The value chain in the Icelandic fish industry has changed a lot from 1990 to 2007, the main changes being that the vertical integrated companies are controlling more levels in the value chain than before by overtaking part of the marketing activities. The concentration of the fish industry indicates that ever fewer actors are controlling still more of the value creation than before. There are clear signs as well that the value chain is more market driven than it was before 1997, this being a turning point for the industry.

The value chains of frozen and chilled cod and haddock fillets analyzed in this paper show that the domestic part of the value chain is returning around 60% of the total value adding in the chain. The domestic value added on raw material cost is much higher for the chilled fillets, being 101% on the average for the period 2000 to 2005.

As was expected this pilot research shows that a further research is needed to get a clearer picture of the value creation in the value chain of the Icelandic fish industry, especially in the part of the value creation abroad. It would also be of interest to study further and compare the structure of the Icelandic industry's value chain to similar value chains in other countries. Amongst other aspect worth studying is the effect of the concentration in the fish industry on the traditional fishery communities in Iceland.

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ENDNOTES

^a Ágúst Einarsson, then a professor of economics at the University of Iceland, wrote an article on the development of the exchange of companies' stock in Iceland in the period of 1991 to 2003. The number of registered companies in the Icelandic Exchange rose from 2 in 1991 to 52 in 2003, being 75 in the years 1999 and 2000 [26].

^b The PESTEL framework categories macro-environmental influences into six main types, political, economic, social, technological, environmental and legal [27]

^c Processing licences are issued by The Icelandic Food Research and The Fisheries Directorate to processing companies. Diversified companies need separate licence for each category of processing. Therefore the number of processing companies is much lower than the total number of processing licences

^d In 1999, IIFP and Iceland Seafood merged as UIFP and in 2005 the name was changed to Iceland Seafood International (ISI)