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# The effects of fisheries management on the Icelandic demersal fish value chain

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#### ABSTRACT

Iceland's fishing industry has outperformed fishing industries in neighboring countries in recent years. This paper identifies key factors in market structure in recent decades that contribute to long run profitability of the Icelandic fishing (and fish processing) industry using semi-structured interviews with industry participants, and compares those with similar results from Norway. Further, the development of profitability in the Icelandic and Norwegian demersal fishing industries is used to assess the long run effects of different management systems on quality, product focus and profitability. The results indicate that three key changes in Icelandic regulation during the 1980s were important to the development of long run profitability within the fishing industry: the abolition of export barriers, the introduction of an individual transferable quota (ITO) system and the establishment of fish auctions. A large and growing literature supports the role of ITQs in ensuring long run profitability. The importance of market structure for profitability has only recently been identified, affecting the ability of value chains to become market oriented and supply homogenous product flow from heterogeneous raw material. Comparison with Norway indicates that while individual transferable quota management does improve profitability in fishing to a certain extent, management systems must facilitate a strong market connection from consumers, through the stages of retail and processing, to fishers for the full realization of profit potential in the fishing industry.

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#### 1. Introduction

Both theoretical work (e.g. [1,2]), as well as the experience from quota systems around the world [3–6], support the notion that a positive relationship exists between profitability and fisheries management through quota systems. Fishing quotas end the race to fish and provide fishers with the ability to respond to market incentives and control the supplied quantity and attributes of fish. The attributes of fish, whether it is the quality and freshness, the size or the time of delivery, are key value determining factors from the customer's perspective [7–9]. Quota management systems help shift fishers' focus from quantity to profitability [1]. This does not mean that all catch will be of the highest possible quality, as increased quality entails additional costs; only that the fishing companies strive to produce products that create maximum profit [2]. Supplying the right

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http://dx.doi.org/10.1016/j.marpol.2015.03.015 0308-597X/© 2015 Elsevier Ltd. All rights reserved. product with the right attributes to the right customer at the right time requires highly coordinated effort in the entire value chain, which is very difficult when faced with a heterogeneous and seasonal primary supply. Achieving such coordination requires an effective flow of information from consumers to producers, either directly through the market or through vertically integrated firms in fishing and processing [10–12]. Many questions remain unanswered. Is such coordination possible? How does it affect long run profitability? What effect does it have on the fishing industry?

This paper focuses on answering those questions by studying the market structure and how it facilitates long run profitability of the fishing and fish processing industries. In order to accomplish this, we analyze the success of the Icelandic industries in recent decades, compare profitability between Iceland and Norway, and highlight the main structural differences between the cod industry in the two countries. Semi-structured interviews with industry participants in Norway and Iceland were conducted to provide the views of industry. A comparative study of the development in the Icelandic and Norwegian fishing industries was used to assess the long run effects of the differences in those two systems on product quality, product focus and profitability.

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The paper proceeds as follows. Section 2 traces changes in Iceland's fishing and fish processing sectors since the mid-1980s, noting the increasing consolidation, the impact of fish auctions on the value chain and changes in marketing arrangements. Section 3 notes the structural differences between cod fisheries in Iceland and Norway, Section 4 sets out the methodological approach for a comparison between the industries, drawing on results from semi-structured interviews. Results are presented in Section 5, categorized into marketing, value creation and management, and ratings of effectiveness. Section 6 presents conclusions.

# 2. Changes in Icelandic fishing and fish-processing industries since the 1980s

Rapid consolidation, the impact of fish auctions on the value chain and changes in marketing arrangements in the Icelandic fishing and fish-processing industries have been demonstrated in the literature to have a major impact on their development [13].

#### 2.1. Consolidation

Significant changes occurred in the Icelandic fishing industry in the mid-1980s following the quota regulation of important fisheries and the liberalization of primary fish trade and fish exports. These changes, together with the introduction of free quota trades in 1991, led to comprehensive changes. Rapid consolidation occurred in both the fishing and processing sectors. The number of trawlers decreased by 46% between 1992 and 2011. The massive concentration that took place within the fishing sector is clearly demonstrated by the percentage of the total quota held by the five biggest quota-holding fishing companies, which increased from 17% in 1995 to 35.2% in 2011 [13].

A similar trend can be seen in fish processing. The number of processing licenses has fallen sharply since 1992, from 402 to 275 in 2007. It is very likely that the consolidation in fish processing has been even greater than these numbers indicate since it is not uncommon for the same company to have more than one license. The change has been slightly different for different product forms. The number of single licenses for salted fish production has fallen by 97, for freezing by 46 and for freezing at sea by 58 but there has been an increase of 27 licenses for the processing of fresh fish [14].

The value chains of the Icelandic fishing industry have also changed following this consolidation; companies have become bigger and have increasingly diversified to cover all stages in the value chain, i.e. fishing, processing and marketing. The abolition of export licenses in the 1980s along with the fishing companies' growth led to companies managing the sale of their own products rather than selling through large seafood export organizations. For example, the ten largest seafood companies in 2011 (controlling 55.42% of the total quota) were fully vertically integrated, i.e. they covered all stages of the cod value chain, from fishing to marketing (see Fig. 1).

Knutsson, Klemensson and Gestsson's 2008 [14] study of vertically integrated fishing companies in Iceland found that there is no standard model that can explain the operational structure of all companies. However, all companies were characterized by close cooperation in the production chain and efficient exchange of information, both of which were deemed essential for success in overseas markets. Emphasis was placed on product quality, secure delivery and access to the market. The de-regulation of primary markets and exports allowed companies the flexibility to choose the structure that best fit their operations in order to maximize value creation.

#### 2.2. Fish auctions and their impact on the value chain

Fish auctions, which emerged after the de-regulation of primary markets, have proven influential in the development of the industry despite the relatively small amount of fish being sold through them (about 20-30% of demersal catches). Firstly, the auctions provide a stable flow of raw material to many small processors, creating a low entry barrier for entrepreneurs in fish processing. Secondly, they provide larger companies with opportunities to even out short run catch variations, for example in species and size grades. Finally, the auction system allows companies to specialize, which ensures production guality and best utilization of assets. By serving as a channel for by-catch species and undersized fish, the auction system allows small quantities of fish from many suppliers to be bought by a few 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 [15].

#### 2.3. Marketing

Until 1990, the export of Icelandic fish was mostly controlled by three large marketing and sales organizations (MSOs). Two of these organizations specialized in the export of frozen seafood and the third in the export of salted fish. Export licenses were controlled by the state and in 1982 the three MSOs held about 71.5% of the market share of fish exported. In addition, the MSOs all conducted secondary processing abroad. This caused a conflict of interest in the value chain as the value creations of the MSOs and the producers were not congruent. Producers emphasized on quantity rather than quality. For instance 40% of frozen fish were block products that yielded only about 30% of the total export value [16].

The role and power of the producers' organizations decreased gradually in the late 1990s due to the abolition of export licensing and the establishment of new large fishing companies. To counter these changes the producers' organizations were changed to limited liability companies. After 2000, large integrated fisheries gradually began incorporating export and marketing activities into their value chain, as did a number of seafood companies producing frozen and chilled products [17].

In the wake of declining catches in the 1990s, changes to the system were made that aimed at increasing export value. Collaboration between fishers, fish processors and exporters increased and better information about actual preferences of foreign customers was circulated along the value chain. This led to a gradual increase in export value. In 1990 a number of important changes were made to the legal framework of the fisheries. The export permit system was abolished and fish markets established. The importance of the MSOs declined, and many small businesses were established in their wake.

#### 3. Structural differences of cod fisheries in Iceland and Norway

A profitable fishing industry must coordinate its fishing and processing to achieve the most profitable product mix [1,2]. This requires securing fishing rights, such as quotas, and good information flow in the value chain. It is very difficult to separate the contributions of different aspects of the fisheries management system to profitability. All factors are inherently intertwined. However, it is possible to increase our understanding regarding the importance of different factors by comparing the outcomes of management systems that are similar in all but a few respects. A notable example is the fisheries management systems in Iceland and Norway. Both countries catch a similar composition of species

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