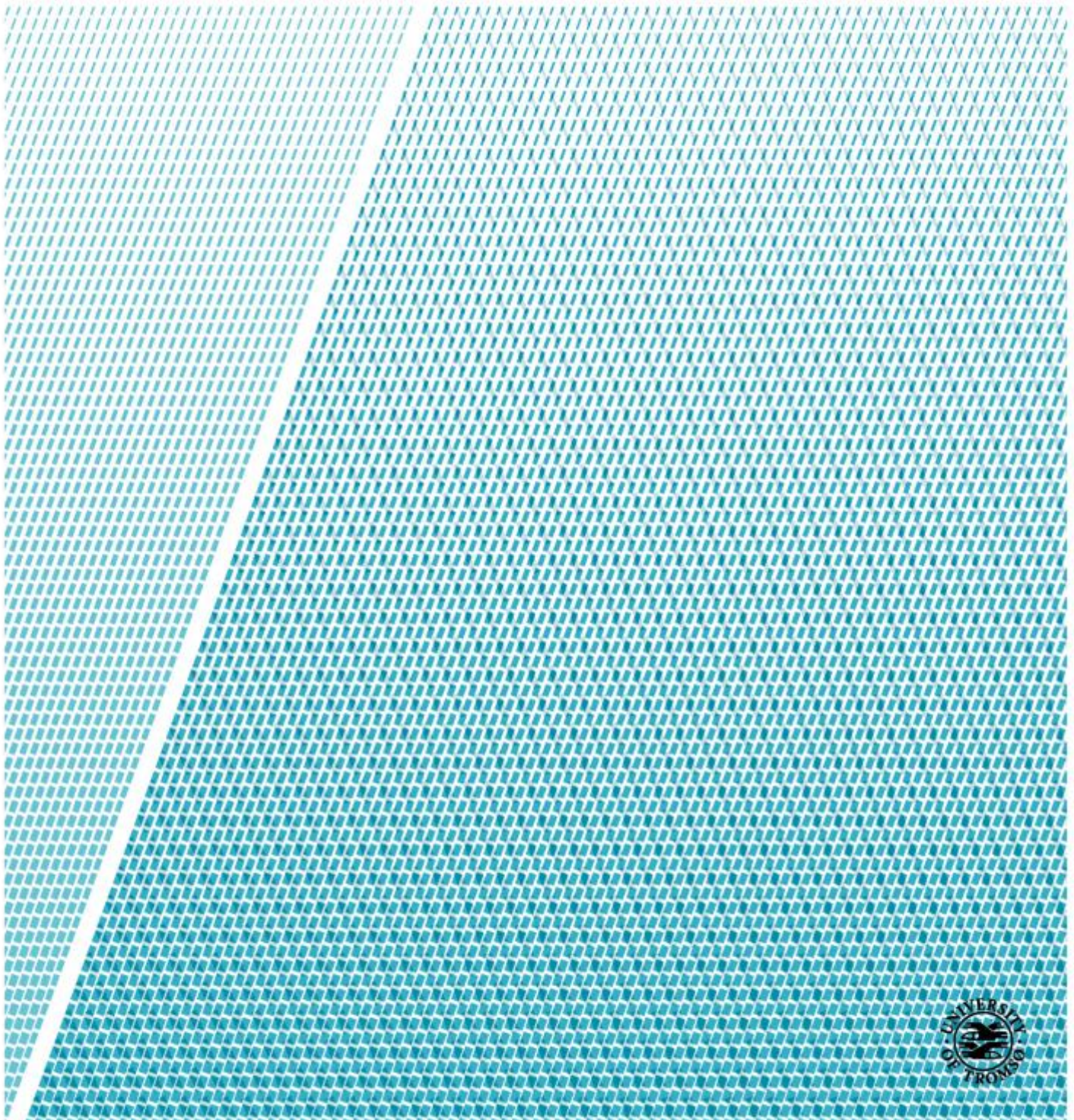


Comparison of Individual Transferable Quota in New Zealand and Individual Vessel Quota in Norway

—

Elizaveta Mikhnyuk

Master's thesis in International Fisheries Management (30 ECTS) – November 2016



Acknowledgement

First of all, I would like to thank my supervisor Bjørn Hersoug, for all the help provided during the process of writing this work. Without his patience and advice, the process of building this thesis from an idea to a reality would have not been possible.

I would also like to thank all academic staff and administration of the Faculty of Biosciences, Fisheries and Economics that have helped me during this program.

Thanks to my family for their support in the distance, love and encouragement.

Thanks to my friends and classmates for all the good moments that we have spent together. And last but not least, thanks to my dear Daria and Galyna for their support.

And thank you, my dear friend who preferred to remain nameless for valuable advice.

Tromsø, Norway

November 15, 2016

Abstract

Since the introduction of licenses and quotas as important management instruments, Norway has established a system of non-transferable IVQs. The “cod-crisis” was a reason for the Norwegian Parliament to reject an ITQ system with a high degree of transactions. However, since the late 80s the IVQ regime have forced towards a market-oriented regime for the expansion of the transferability.

The overall aim of this work is to analyze the Norwegian IVQ and the New Zealand ITQ systems and discuss whether the effects of the IVQ system are in accordance with the original ITQ model or not. The thesis will focus on the following questions:

1. What are the similarities and the differences between the New Zealand ITQ regime and the Norwegian IVQ system?
2. How can the different systems be compared regarding results (biology, economy, and social aspects)?
3. Is the Norwegian IVQ system just a stage before a fully implemented ITQ system or is it a system in its own right?

Keywords: ITQs, IVQs, Norway, New Zealand, property rights, indigenous people, self-governance organization, inshore, offshore.

Table of Contents

Acknowledgement	i
Abstract.....	iii
List of tables	vii
List of figures.....	viii
List of abbreviations	ix
Chapter 1. Introduction.....	1
1.1 Background.....	3
1.2 Research questions.....	5
1.3 Methodology and structure of thesis	5
Chapter 2. Theory and methodology	7
2.1 Individual Transferable Quota	7
2.2 Definition of ITQs property rights	9
2.3 The initial allocation of rights	12
2.4 A critical assessment of ITQs	13
2.5 Research methodology	15
Chapter 3. The ITQ system in New Zealand.....	17
3.1 Introduction.....	17
3.2 History of the system and context	17
3.3 The Core of the system.....	20
3.4 Indigenous people (Māori fishing rights)	21
3.5 Self-governance organization	22
3.6 Offshore and inshore fishing regulations	25
3.7 Marine biodiversity and aquaculture.....	27
3.8 Economic efficiency / market	28
3.9 The future of the system.....	29
Chapter 4. The IVQ system in Norway.....	32
4.1 Introduction.....	32
4.2 History of the system and context	33
4.3 The Core of the system.....	35
4.4 Indigenous people (Saami fishing rights)	36
4.5 Self-governance organization	37
4.6 Offshore and inshore fishing regulations	38

4.7 Marine biodiversity and aquaculture	40
4.8 Economic efficiency / market	40
4.9 The future of the system.....	43
Chapter 5. Discussion	45
Chapter 6. Conclusions.....	54
Bibliography	56

List of tables

Table 1. Changes in New Zealand fishing industry from 1986 to 2015	20
Table 2. Allocation of quota between inshore and offshore sectors.	35
Table 4. Registered powered fishing vessels, by length of vessel and percentage change in numbers of fishing vessels in the period 1995-2014.....	39

List of figures

Figure 1. The Norwegian EEZ and the New Zealand's EEZ (Sources: http://www.unesco-ioc-marinesp.be/ , http://www.mfe.govt.nz/).....	3
Figure 2. Characteristics of efficient property rights (Sources: Scott (1988), Harte and Bass (2000)).....	10
Figure 3. Registered fishing vessels in numbers of fishing vessels in the period 1998-2014 (Source: OECD Statistics).....	25
Figure 4. Total seafood export value in New Zealand, 2000-2015, unit - \$ billion NZ, valued free on board at New Zealand ports (Sources: Ministry for Primary Industries, Statistics New Zealand)	28
Figure 5. Total seafood export from New Zealand in 2000-2015 in 1000 tons (Sources: Ministry for Primary Industries, Statistics New Zealand).....	29
Figure 6. The New Zealand fisheries sector in 2030 (Source: New Zealand Ministry of Fisheries, 2009)	31
Figure 7. Total stock biomass of herring (Norwegian spring spawning) in Norway during 1950-2014, unit – 1000 tons (Source: Statistics Norway, 2015)	33
Figure 8. Total quantity of catch in Norway, 2000-2015, unit – million tons (Source: Statistics Norway).....	41
Figure 9. Total seafood export value in Norway, 2000-2015, unit - billion NOK (Source: Statistics Norway)	42
Figure 10. Total seafood export from Norway, 2000-2015, unit – million tons (Source: Statistics Norway)	42
Figure 11. Development of the number of fishermen in the Norwegian fishing industry during 1945-2015 (Source: Statistics Norway)	43
Figure 12. Characteristics of the New Zealand ITQ system and the Norwegian IVQ system (Sources: OECD, 2006, Gallic, 2004).....	49
Figure 13. Total growth in the seafood sector, unit – billion NOK (Source: Statistics Norway)	51
Figure 14. Total Norwegian growth in value generation, in the fisheries/aquaculture sector and the industrial sector in general, 1970-2008 (Source: Reve and Sasson, 2012)	52
Figure 15. Total growth in the seafood sector, unit - \$ million NZ (Source: OECD, 2015) ...	52
Figure 16. The value creation (contribution to GDP) and proportion of the marine economy, 2007-2013 (Source: Statistics New Zealand).....	53

List of abbreviations

ACE	Annual Catch Entitlement
BSAI	The Bering Sea and Aleutian Island
Challenger	Challenger Scallop Enhancement Company
EEZ	Exclusive Economic Zone
EU	European Union
FHL	Norwegian Seafood Federation (<i>Fiskeri- og Havbruksnæringens Landsforening</i>)
FishServe	Commercial Fisheries Service
FSO	Fishermen's Sales Organization
GDP	Gross Domestic Product
IPQ	Individual Processing Quota
ITQ	Individual Transferable Quota
IVQ	Individual Vessel Quota
MSY	Maximum Sustainable Yield
NCFA	Norwegian Coastal Fishermen's Association (<i>Norges Kystfiskarlag</i>)
NFA	Norwegian Fishermen's Association (<i>Norges Fiskarlag</i>)
NHO	Confederation of Norwegian Business and Industry (<i>Næringslivets Hovedorganisasjon</i>)
NOK	Norwegian kroner (currency unit)
NZ\$	New Zealand dollar (currency unit)
NZFCF	New Zealand Federation of Commercial Fisherman
OA	Open Access
OECD	Organization for Economic Co-operation and Development
QES	Quota Exchange System
QMA	Quota Management Area
QMS	Quota Management System
QOA	Quota Owner Association
SQS	Structural Quota System
TAC	Total Allowable Catch
TACC	Total Allowable Commercial Catch
TANC	Total Allowable Non-Commercial Catch
UQS	Unit Quota System

Chapter 1. Introduction

New Zealand and Norway. Two completely different countries. They are located on opposite sides of the planet, have widely different history, culture, traditions, nature, mentalities. But there is one thing that makes these countries close to each other and famous all over the world. It is successful fisheries management.

For many coastal societies, the fisheries have always been important and guaranteed their survival by giving employment and economic value. Now, with an advance in marine technologies, we fish longer, deeper, and harder than earlier. The catastrophe of many marine fisheries have been criticized for ineffective management of the common resource. Over the last three decades, countries from all over the world have been looking for management programs to limit their use of fishing resource.

We differentiate two systems among the fishing industry that helps to understand the whole ideology and complexity of its structure. On the one hand, in the fisheries finds its place open access (OA). The terminology came from “The tragedy of the Commons”. OA presents “the race for fish” (Gordon, 1954) scheme, when fishermen try to catch as much fish as possible, as quickly as possible (if they would not do it, their competitor will). In OA, fishermen have goal to maximize the yield every year, suppose that problems will fall to their future generations. In prospect, open access brings to lower harvest, economic overinvestment by fishermen, and shortcut fishing seasons, as a result the perspectives of biological and economic catastrophe. On the other hand, the most famous and successful system in the fisheries management - Individual Transferable Quota (ITQ). ITQs give fishermen a long-term property rights, usually in a percentage of the total allowable catch (TAC), that reduces competition between fishers.

ITQs can solve many problems in the industry, can stop “the race for fish”, improve economic and biological parameters of the fishery. ITQs encourage fishermen to fish safely and slowly, reduce the possibility for over-capitalization, and bring to the market a high-quality product. Though ITQs are not always perfective in their results and solutions, they do have problems. First of all, bycatch can rise through high grading and non-target species bycatch,

because time for fishing is increased, also it can lead to environmental destruction (like, the effect of trawling). Second, additional costs connected with the continued fishing seasons and implementation of ITQs. Third, competition between small scale fishermen and industrial fishermen. It is high probability that industrial fishermen will win quotas at open auction and the small scale fishermen will lose. Also, ITQ cannot always interpret to an increased stock biomass. This applies mostly to highly migratory species or extremely overfished stocks at the start of the introduction of the system.

Can limitations be a reason not to use the ITQ systems? Definitely not. Problems can be solved with different strategies and methods combined with an ITQ-based system. Currently, over 30 countries are operating under ITQ management frameworks. New Zealand was one of the first countries to accept ITQs as the best decision of managing its fishing industry. While not the pioneer, New Zealand was involved in the system of ITQs more completely than other countries. New Zealand became a great example to follow in the fishing industry for many countries. New Zealand did not have an old tradition of fishery before the ITQ. The system is adapted by the particular parameters of New Zealand and its fisheries. The good statistics, the lack of overfishing, stock status, management plans to protect marine mammals and seabirds, the development of full risk assessments and a lot of other positive outcomes make this system one of the most successful quota systems in the fishing industry. On the other side of the world, the Norwegian Quota System, cannot be characterized as an ordinary ITQ regime. Norway is famous for the great success in the fishing industry, this country is excellent example of a proper management in fishery. Norway decided to reject classical ITQ system in favor of a less flexible individual vessel quota (IVQ) system. However, in addition to its own structure of fishing industry Norway still has some explicit characteristics of ITQ system.

The unique combination of culture, nature and management gives New Zealand's and Norwegian seafood leading positions in terms of sustainability and quality. There have been many books and papers published about the management system in New Zealand and Norway. But the question about the unique of the quota system in Norway is still open. I found interesting to compare the systems of the fisheries management in New Zealand and Norway and discuss important aspects between the concepts of the IVQ regime and ITQ regime like an alternative management system.

1.1 Background

Before the growth of Exclusive Economic Zones (EEZ) during the 1970s, many countries had maritime territories up to 12 nautical miles. After the introduction of EEZs many nations started to develop their own national fishing on a maritime territory up to 200 nautical miles.

New Zealand and Norway were not exceptions and established the 200 nautical miles EEZ in 1978 and 1977. New Zealand became one of the largest EEZ in the world. In fact Norway established three zones of 200 nautical miles: an EEZ around the Norwegian mainland, a fishery zone around Jan Mayen (established in 1980) and a fishery protection zone around Svalbard (established in 1977).

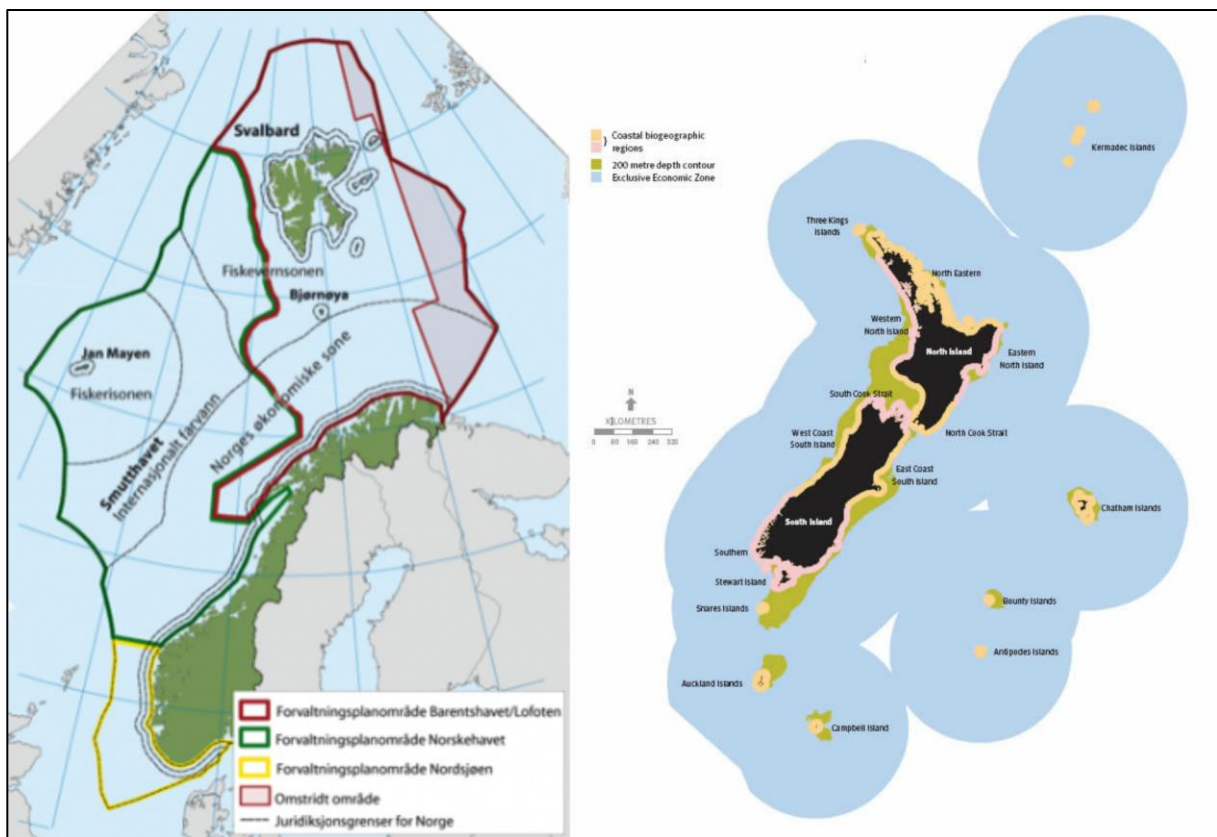


Figure 1. The Norwegian EEZ and the New Zealand's EEZ (Sources: <http://www.unesco-ioc-marinesp.be/>, <http://www.mfe.govt.nz/>)

New Zealand is a world leader in the use of ITQ to manage fisheries. Eco-systems of the New Zealand have been never overfished (almost 83% of fish stock in New Zealand are at a healthy status) and are effectively managed for ecological sustainability. About 90% of sea-

bed in New Zealand is undamaged by trawlers. In April 2007, the Government closed 17 areas in the New Zealand's EEZ to bottom trawling. The area is equal to around 30% of the EEZ. New Zealand produced around 440,000 tons of sustainable seafood annually. In seafood export, New Zealand earns NZ\$ 1.57 bill each year or 5% of total export value.

The fishing industry is still new and does not have strong historical roots. The New Zealand's Quota Management System (QMS) is characterized as a miracle. Hannesson (2013) used the right expression: "Given the availability of such a marvelous system as the ITQs, why have not all fishing nations implemented it?" According to him the New Zealand system contains the solution to the most of management problems.

The Norwegian Quota System is rather different from the New Zealand's QMS. Norway manages one of the most productive marine environments in the world. In terms of value, Norway is the world's second exporter of fish and fish products, making up 8% (around NOK 74,5 billion in 2015) of the total export of Norway, the biggest share is represented by gas and oil (about 40% of the total value of Norway's export in 2015, Norwegian Petroleum Directorate, 2016). The main capture species are cod, herring, mackerel, capelin, saithe, haddock, and blue whiting. The additional species with high commercial value are Greenland halibut, prawns and ling.

The sheltered and long coastline of Norway, with a lot of islands and fjords, and warm Atlantic Ocean current, has afforded great opportunities for fish farming. The aquaculture in Norway has developed into a main industry in coastal regions from the early 1970s. The Norwegian aquaculture sector provides a high priority for fish health, environmental considerations and welfare. The Atlantic salmon is the most valuable species in farming (about 90% of the total Norwegian aquaculture production). On the second place of the most produced species in Norwegian aquaculture is Rainbow trout. Then follows several shellfish species (oysters and blue mussels) while marine finfish (halibut, cod) are in the process of growing into commercial volumes. Of total export value in 2015 of US\$ 5,450 million, input of the Atlantic salmon reached 3,400 million \$ (Directorate of Fisheries, Statistics 2015).

The main market for the export of Norwegian fish production is the European Union (EU), however salmon products are exported all over the world. Farmed salmon gives stability to the Norwegian economy and it is still potential for this species for future growth. The major task for the industry is to develop a sustainable and effective aquaculture industry grounded in other species apart from salmon.

The Norwegian seafood industry has progressed from free fishing to an organized industry with licenses and quotas. It has decided to reject ITQ system in favor of a less flexible

individual vessel quota system. ‘During the 1990s fisheries authorities actively denied that the IVQ system introduced in the coastal fleet had anything to do with ITQs’ (Hersoug, 2005: p 119). IVQ has insisted to avoid market-based transaction of quotas and vessels, and to secure diversity regarding the fleet structure and decentralized ownership.

1.2 Research questions

The thesis present two different management systems based on the following research questions:

1. What are the similarities and the differences between the New Zealand ITQ regime and the Norwegian IVQ system?
2. How can the different systems be compared, regarding results (biology, economy, and social aspects)?
3. Is the Norwegian IVQ system just a stage before a fully implemented ITQ system or is it a system in its own right?

1.3 Methodology and structure of thesis

The research method for this thesis is qualitative analysis, that is generally based on secondary data, mainly the document analysis. Information was obtained from scientific papers, reports and books, newspaper articles, and official reports from the national fisheries authorities in New Zealand and Norway (such as Statistics New Zealand, Ministry of Primary Industries, Norwegian Ministry of Fisheries and Coastal Affairs, and others).

To answer the research questions, I used the following thesis structure. The basic background is introduced in Chapter 1. Chapter 2 includes the theoretical part of the work, and gives us a brief introduction in the Individual Quota System in the whole world, history, main ideas, and criticism. Chapter 3 and Chapter 4 present the New Zealand and the Norwegian experience of individual transferable quotas. The main focus will be on the explanation about the core of the systems, the description of social and economic aspects, analysis of regulations in the offshore and inshore fishing, and the future of the systems. In Chapter 5 the research will compare two quota systems by answering to the research questions. In the discussion part I will analyze and broaden up the differences and the similarities between the Norwegian and the New Zealand quota systems, and the role of self-governance organizations in

the systems. Chapter 6 is the concluding chapter that summarizes the work and presents the final results of the research.

Chapter 2. Theory and methodology

2.1 Individual Transferable Quota

Initially, fisheries management creates a balance between conflicting economic, biological and social objectives. To find a fisheries system with an ideal rate of all components: stable economic rents, compensated harvested stocks, and equality of participants (and former participants), is impossible. Generally, there are stories about losses: the elimination of coastal ecosystem by reason of long-time overfishing, damage of bottom ecosystems because of trawling, reduction in large predatory fish, reckless discarding, and these are just few examples. The easiest way to solve the hidden problem is based on an open-access fishery, which has no limitations on fishing effort and no barrier to entry. The serious problem of the common property nature of fishery resources were mentioned by Hardin (1968) in his famous article: “Tragedy of the commons”.

Lack of property rights has inspired fishermen to compete with each other for the fish. This competition usually brings to industry overexploitation and overcapitalization of fishery resources. Catches are limited and restricted nowadays in many ways, including closed areas and seasons, a cap on the TAC, limited entry, limited mesh and boat size, and gear restriction. These rules have been created to reduce catches so that the stock will recover at a level of socially acceptable optimum yield. But maintaining a biologically optimal level of a fishery would degrade economic performance by restrictive regulations and extreme effort.

Introduction of the ITQs in an industry supposed to advance economically rational fisheries exploitation (Deweese, 1998). ITQs are one of the most important institutional innovation of the 20th century. The exclusive fisheries or economic zones are the common resources of the ocean within 200 nautical miles of land; ITQs mean the opportunity of further privatization, to the level of individuals or firms. The goal of ITQs is to decrease excess fishing effort and fishery overcapitalization. ITQs symbolize a structure of “right-based management”, whereby governments participate in the fishery by controlling shares (size of the quota, quantity of gear or other inputs which fishers can use or harvest). The main key to suc-

cess in ITQs management is transferability. Markets can operate and take over from management agencies the best part of the role of allocating narrow resources (because of transferability and exclusive rights) (Grafton, 1996). The whole idea of ITQs is developed from the theory that a multitude of competing users would be much worse than an individual proprietor to make an efficient solution on behalf of economic and natural resources. The entry in the fishing industry should be controlled in some way and the open access is a barrier to efficient and successful fisheries management (McCay, 1995). ITQs involve the allocation of a share of TAC to the fishermen. The structure of ITQ systems depends on the fishery, political realities, economic goals, and industry history and organization. The main elements of ITQ management include aggregation limits, initial quota allocation methods, resource rentals or cost rentals, adjusting and setting TAC, and degree of transferability (Deweese, 1998).

The main limitations of ITQs are about the initial allocation of quotas, the socio-economic outcomes for members, and the concentration of quota. The initial quota allocation parts are usually based on boats characteristics and historical landings. This may be a reason for fishermen to falsify their catch history in order to gain more quota. The concentration of quota to fewer members as overcapitalization is decreased, can lead to a social inequality among fishermen, between native and local fishermen, seasoned and new fishermen, crew and captain, and between generations, which lead to weak socio-economic outcomes for the fishermen (Chu, 2009).

ITQs provide fishermen with a long-term interest in the resource and can raise the net return from fishery and change fisher behavior. ITQs support the fishermen to minimize their expenses because their gross revenue is more or less permanent (under the condition that fishermen harvest only their own quota). Also, this can decrease overcapitalization (Grafton, 1996). ITQ systems give fishermen, producers or/and boats dedicated access rights to land a fixed quantity of TAC. It is a sector of a management, whereby the TAC is reserved by a regulatory agency and further on is shared on units that can be sold, leased or bought among members in the fishery. Most ITQs are fee-based with payments as for scientific research, funding enforcement and management (Chu, 2009).

With the help of the ITQ, fisheries management may reduce the necessity for specific input control and other regulations. Cancellation of the limited fishing season can be a good example with no need of an input control (regulating days at sea, fleet capacity, etc.) because such controls pointedly cause inefficiency in the economic. Full year of harvesting may enable fishermen to land a higher-quality product and rise safety at sea. The transferability of the harvesting rights can provide fishermen with a more profitable yield and greater share of the

TAC. Such transfers may change the structure of the fishing industry because of the fact that the less profitable fishermen would leave the industry through the leasing or selling of their quota.

The additional interest in the resource for fisheries is one of the striking trait of ITQs. The cost of the quota owned by individuals may promote more involvement in management by fishermen. Cooperation among fishermen and owners of the resource should both reduce the costs of control and improve the management of the industry (Branch, 2009).

Realization of ITQ systems in marine fisheries has developed since 1986. The programs differ with respect to their size of the industry, number of members, conditions for transferability and various other characteristics. The first countries to introduce the ITQ regime were Netherlands, Canada and Iceland in the late 1970s. The first country to adopt the ITQ as a national policy was New Zealand in 1986.

2.2 Definition of ITQs property rights

According to Barzel (1997) there are two basic disciplines in the property rights – law and economics. Economic rights are what people look for, and law fulfils supporting role, what can help to achieve economic rights. From a legal view, property right is a social convention supported by social institutions as the courts and legislative regulations. Property is a package of interests or rights in an asset to operate and use it. These property rights have a long history in traditional law as for land (as leasehold, freehold estate, usufruct, etc.), however, there is a little traditional law development in point of fisheries in the western institution in relation to rules introduced both by the Romans and thereafter in the Magna Carta that established an open access (OA). Property rights can be acknowledged and supported locally without governmental consent, only to be admitted in the courts.

On the part of an economist's view, the property rights are about protecting economic interests. Many economists do not accept that property rights can be used to protect "non-economic" values, rights are used to dispose their value-added use to groups or individuals, excluding others. The economic view of property rights is more correct, because it does not consider problems admitted at law (Connor, 2000).

The economic view of property rights studies the influences of the dimensions of property rights on outcomes and economic motivation. Based on descriptions by Scott (1988,

2000) and Harte and Bess (2000) the dimensions consist of transferability, exclusivity, duration, security (or quality of title), divisibility and flexibility (Figure 2).

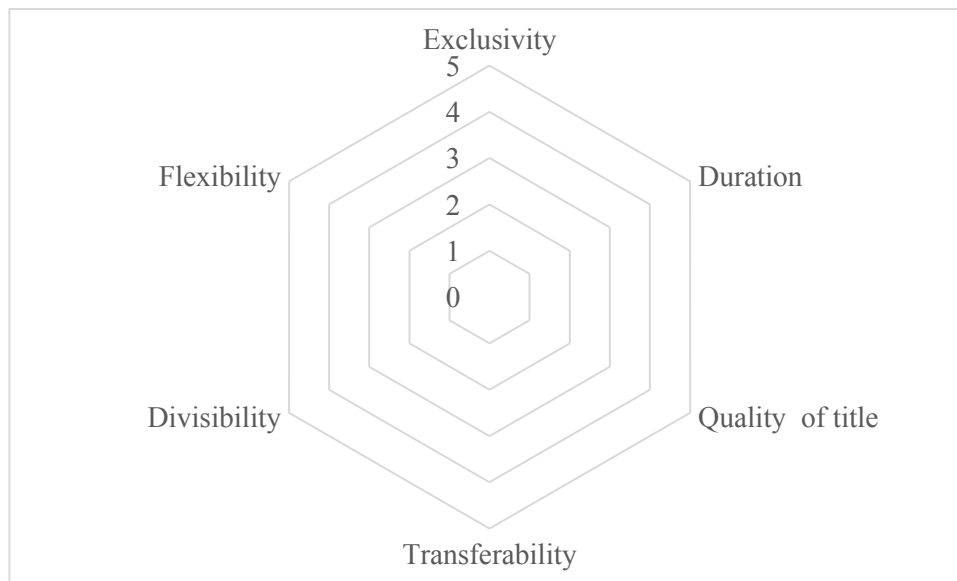


Figure 2. Characteristics of efficient property rights (Sources: Scott (1988), Harte and Bass (2000))

- *Duration* means all quotas have a time span of more than 1 season. Some seem to be perpetual (“ownership” presents the property right in life annuity or till owner wants), and all can be revived.
- *Security, or quality of title* refers to the ability of the owner to resist challenges from other individuals, institutes or the government and protect his right. Measure of 1 supposes that the holder will keep his right with perfect safety, and otherwise (when a security measures of 0) it means the holder will necessarily lose his right.
- *Transferability* explains the ability of the owner to transfer the property right to others. This characteristic helps the optimal resources allocation. An essential component of transferability is divisibility, the faculty to divide the property right into several parts for the goal of transfer. *Exclusivity* refers the chance for the owner to manage and use the resource without external interferences. An ITQ owner has a right to a definite volume of yield from a given stock over a concrete period of time. An ITQ right gives less than 100% exclusivity to the fish stock and its marine environment, because of the interference from others with this ability or other fishermen that can raise difficulties to each other to harvest quota to the full extent (Arnason, 1999).

- *Divisibility* explains the possibility of property rights to divide more narrowly (by geographic, season, stocks, age, ground etc.), to move some quota to others, and to split the amount of quota into smaller amounts.
- *Flexibility* gives the holders ability to “freely” system operations to gain their objects. This characteristic allows holders to change their production function or use their quotas in most productive way (Gallic, 2004).

Security and Duration characteristics gave the holders in the ITQ one of the power of ownership – management. For short-time management, it provides the power of selecting where and when to land fish, and for which market. For long-time management, the composition and size of earlier yields belong to quota owner. There is a high correlation between what a quota-holder captures today, and what he will take from the stock in future years. For this reason, each quota-owner has a limited ownership power over management which is divided between the owners according to the quota shares.

Initially, in New Zealand and Iceland, the quota license was not transferable and permanent. But after a few years, the fishermen achieved these rights, and permanence gave them the chance to act more like “a farmer”. The quota-holder can obtain equipment and boats to landing for smaller numbers over long term, without any cut-throat competition. The owners can build markets for fish landed of an exact quality and at a certain time. If the fisherman has other opportunities, it gives him the right to rent or sell his quota permanently or for a definite period (Scott, 2000)

Property rights send to a bundle of entitlements determining the owner’s rights, limitations and benefits for use of the resource. Property rights have an influence on owners, they know that their actions will affect their current and future benefit and by inference they will use resources more effectively. In the fishing industry, because fish is a renewable resource, the property rights provide improvement for both utilization and conservation outcomes. In addition, this regulation would prevent destruction of the resource. The possibility of long-term planning will give more sustainable use. Fishermen will invest their profit in the natural capital stock without the risk of having the profit stolen by others. Industry with a property rights has a better market development and research, investment in management system, scientific research, more sustainable gear and lower harvesting rates in the short time (in the long time, the harvesting rates will increase with the expansion of the stock) (Stokes, 2000).

2.3 The initial allocation of rights

Almost always ITQs are presented for free of charge to boat owners, because they bore the risk of investing in the fishing industry and should be compensated. Whereas other members were granted to vessel owners for their work. Regularly, allocations consist from vessels characteristics, catch history and similar shares. For example, in Alaska the allocation established on catch history, the vessels owners could choose the best five out of six years of catches for sablefish and five out of seven for halibut. When in the Tasmanian rock lobster fishery, the allocation mostly founded on an equal per-pot share and less on a catch history (Hartley and Fina, 2001).

Many of the scientific works consider that the auction is the most economically efficient process of distributing the TAC. The auction helps to share a profitable resource between many groups of people involved in the industry (not just to a particular group) (Clark and Munro, 2002). Auctions are not popular among the members of the fishing industry, but can be attractive to the public. The auction has the benefit that it brings new entrants to the industry. If the efficient are dynamic, they will decrease their costs. As a consequence of the low-cost, the more efficient fishermen will have the advantage on the others to pay a bigger price for the license. The income from the auctions (the resource rents) may be used by the government for different goals, either for general public purposes, or in particular related to the fishing industry.

The allocation of quotas based on past landing and capital investments was used during the initial allocation of ITQ in New Zealand (in 1985) The holders of a license were provided a share following the results of the best two of their past three years' registered landings (Clark, 1993). This allocation did not solve the problem of overcapacity, where the TAC was reduced for management goals. The New Zealand government realized a two-step buy-back scheme, with a view to handle overcapacity. At the beginning, there was held a tender procedure where individual fisherman suggested their prices for leaving the industry to the government. It allowed the government to fix a price for the ITQs and reduced the capacity. The next step, was an offer from the governing body to buy further quotas, based on the first-step prices. It was enough to reduce the total ITQs to the desired TAC's level.

One of the lack of the allocation based on historic catch, is an implication of the fish stock. The fishermen may decide to raise their landings (because of the increased effort) to get a bigger share of the TAC. Also, the allocation of quotas based on past landing can exclude

some new entrants. The cost of buying the quota may persuade potential fishers from entering, that would imply a non-efficient allocation of resources. But, according to the theory of competitive markets, if quotas are transferable, mutual exchange will push the less efficient operators out in favor of more efficient ones.

In some countries, there exists the mix of two allocation methods, which simplify the entrance for the new members. For example, in Estonia 90% of the TAC is allocated in proportion to past landing, other 10% is auctioned. Allocating ITQs to broader groups of interest means that fishing communities and crew members should be included in the division of income. The good example is the Bering Sea and Aleutian Island (BSAI) crab fisheries, where ITQs are allocated to harvesters, and

Individual Processing Quotas (IPQs) are allocated to processors (“two-pie” system, in January 2005¹). Harvesters must grant 90% of their yield to IPQ owners, the remaining portion can be passed to any processors. If a local processor votes to interrupt operations, the fishing communities are given priorities to get IPQs. Like an added incentive, the 3 % of the TAC can be granted by those who are actively fishing.

In Norway, the allocation method of the Norwegian cod fishery invites to invest in environmental friendly technology. The trawlers of the cod fishery utilize more CO² per kg fish caught than the coastal fleet (6 times more). The allocation method here rewards environmentally friendly fishermen with more quotas (Røed, 2013).

2.4 A critical assessment of ITQs

The criticism of ITQ is addressed to the ethical implications and the framework of ITQ models. For example, the problem in multi-species fisheries – the level of effort which is the best for one species may not be the best for another species. Furthermore, ITQ would be an unacceptable management tool where there are many challenges that belong to determination of the optimal level of the TAC at the start of the season. This is related to unstable stocks or flash fisheries, when the fish must be caught in a certain time interval and in a particular condition, like when roe is a priority and not the fish itself.

¹ The “one-pie” and “two-pie” systems have been proposed to undercut the influence of ITQs on processors. Under the “one-pie” system, part of the ITQs are automatically designated to the processors. In the “two-pie” system, processors are allocated IPQs based on processing history, and harvesters are designated quotas as before (Matulich and Sever, 1999).

One of the major issues is a breach of the law, or quota busting. The most spectacular example is an experiment in the Bay of Fundy herring fishery with individual boat quotas that shows failure the system. The fishermen have lost motivation to stay bondable, when they knew that colleagues were cheating on their quotas without being caught. The industry needs monitoring to detect any breach and penalize.

Influence of the fish size on a price per kg motivates the agents to fill the quota with only high quality fish, and exclude the low quality fish. Illegal discarding is not usually documented, and leads to overfishing, wrong information and decrease the net revenue derivable from the industry. The high grading and quota busting points at the priority of enforcement and monitoring in the ITQ regimes (Copes, 1986).

The ITQ systems make changes in the social structure of the community, such as the structure of the fleet, working relationships on a boat, balance of power between buyers and harvesters, changes in function and structure of the management system, in fishing-dependent society, in policy and science. For example, if the owner of a boat and the quota-owner is a one person, it would affect the working relationship, with a distancing of the holder from the crew in the future. Many coastal communities depend on the owner-operator fishing. The introduction of ITQs has made splits in the small coastal communities, between families that were involved with the initial allocation and others. These splits can be dangerous in many respects, it can influence the politics of school boards, churches and city hall. Also, the coastal communities are affected by the position of processing factory, and geographic shifts in fish landings (McCay, 2000).

The quota system is affected by the concentration of wealth. The earnings from selling quotas belong to the quota-holder. Profitable rights to fish block entrance in the industry, and just the first generation gets the privileges for free benefit (Copes, 1986). New Zealand is an exception, with average 90 new entrants per year. The big concentration of rights in the Icelandic fishing industry was one of the destructive fallout from the financial crisis in 2007-2008. The ITQs were used for speculation and mortgage-secured. In 2007, the substandard mortgage market went broke, the TAC dropped and the ITQs has played its role in the crisis (Røed, 2013).

The meaning of a “common property” is vanished after the introduction of ITQs system which is the regime of property rights. According to Røed (2013), the future of a marine resources in Norway is uncertain. The ministry of fisheries, when Helga Pedersen was the minister (2005-2009), decided that the fish belonged to the Norwegian people and property

rights could not be endless. But the case ended up in the Supreme Court due to the trawl owners which were not satisfied with the ministry's decision. The state won. In other industries, the members have to pay taxes or an extra charge for the handling of common property resources, but people in Norway got no compensation for the resource they no more had access to.

A technological development necessitated to limit an entrance to the fishing industry, for the purpose of the acquisition of income. Some quota-holders got property rights for free, they encroached the common resource. Access limitation would create user's value, decrease a number of members and vessels. Other members were forced to change work and invest the capital in other industry (Hannesson, 2002). Now, many of the members in the industry behave like they are or should be the only owners of the common property.

2.5 Research methodology

This thesis is theoretical research found on secondary databases. There have been many books and articles provided to get an inside of the development of the ITQs system. The information was received through books, articles, reports, official documents and statistics. Most of the information was found in the Internet with use of web search engines scholar.google.com, Oria and Wiley online libraries, and professional network ResearchGate. In this thesis there was collected information from such fields as governance, Food and Agriculture Organization of the United Nations, Eurofish, market, indigenous people in Norway and New Zealand, No-fima, The Organization for Economic Co-operation and Development (OECD), legal framework in Norway and New Zealand, the Treaty of Waitangi.

The thesis is inspired by works of Hersoug: "Closing the Commons. Norwegian fisheries from open access to private property" (2005) and "Unfinished business. New Zealand's experience with rights-based fisheries management" (2003).

Theoretical framework is mostly based on Scott (1988, 2000), Grafton (1996), Annala (1996), Connor (2001). Theoretical part of the thesis found on "The Tragedy of Commons" by Hardin (1968) and "The Economic Theory of a Common-Property Resource: The Fishery" by Gordon (1954).

During the selection of data and operating with the web search engines there were used the following keywords: Individual Transferable Quota, New Zealand, Individual Vessel

Quota, Norway, property rights, Māori, Saami, offshore and inshore fishing. The method of selection data for the Norwegian and New Zealand's systems is performed with use of key characteristics, such as the historical background, the enforcement system, co-management organization, indigenous people, and economic efficiency.

The method I used was to collect relevant secondary statistics on the Internet. I systematized the different statistical data for the current sectors aimed to help comparisons across two different systems and countries. I show statistics on development on national level (in Norway and New Zealand) over the last 1-2 decades, finished the most "nearby" year with complete data (2014 or 2015). For analysis of the management systems I used the standard categories in the statistics.

Statistics on stock biomass, seafood export, quantity of catch, total growth in the fishing industries can be found in Statistics Norway (under the topic "Agriculture, forestry, hunting and fishing", sections "Aquaculture", and "Fishing and catches"), and in Statistics New Zealand, also in data-bases of the Directorate of Fisheries (Norway), Ministry for Primary Industries (New Zealand), the OECD, New Zealand Ministry of Fisheries (dissolved in 2012). The number of fishermen in the Norwegian fishing industry are available from 1945 until today, and the total stock biomass of herring (Norwegian spring spawning) in Norway from 1950. Economic dates were found in the organizations that are responsible for official statistics in Norway and New Zealand (Statistics Norway, Statistics New Zealand). The thesis is based on only recent figures to show the actual situation.

The structure of this work is partly inspired by the three master students' theses: Amakali (2011), Islam (2008), and Hotvedt (2010).

There are few limitations connected to data collection for this thesis. Firstly, the geographical and financial frames were among the main restrictions in this work. Secondly, the core of the thesis is a comparison study of two management systems which are geographically located at opposite ends of the planet. Thirdly, there was no opportunity to travel all the way to New Zealand for data collection. In addition, I highlight out the human factor as the key limitation of this work. And last, but not least, the research would be much more informative and valuable if I would have been better at self-organizing.

Chapter 3. The ITQ system in New Zealand

3.1 Introduction

The fishing industry in New Zealand does not have a long tradition. The seeds of the future ITQ regime can be found in theoretical models developed by economists Pearce and Moloney in 1979 (Deweese, 2006). The QMS is formed by the specific characteristics of New Zealand fisheries. The country does not have shared resources with neighboring countries, so the government can make decisions regarding fisheries management without a lot of external influence (Aranda and Christense, 2009).

Since the 1970s, New Zealand's fisheries have changed greatly. For less than 10 years, New Zealand had a pure ITQ regime (from 1986 to 1999), but after 1999 the ITQ system was corrected to stimulate commercial stakeholder organizations take upon specific management responsibilities. With those changes, the system after 1999 is well-known as a co-management regime based on ITQs, instead of a classic ITQ system (Yandle and Dewees, 2008).

3.2 History of the system and context

Before the ITQ system was introduced, fisheries in New Zealand were small and limited to an inshore domestic industry. From 1938, management in the fishing industry was disorganized, the industry was under tight controls with a bounding license system and deregulated almost until 1980. By 1980, after the introduction of the EEZ in 1978, it was understood that along with biological objectives, the economic ones were an important component for a productive management system. The quota-based deep-water trawl policy was announced in 1983. The TAC were introduced under this system, and quotas became the main element in the system (Clark, 1993).

Before, New Zealand had a low yielding fishery and overexploitation moved the inshore fishery into a crisis. Licensed foreign fleets mostly controlled the offshore fishery within the EEZ (generally the fleets were from Japan, the Soviet Union, and Korea). Foreign

vessels were responsible for approximately 90% of the total demersal catch of 475,600 tons before implementing the EEZ (Sharp, 1997).

The establishment of the EEZ made New Zealand a seafaring country, responsible for a marine area twenty times the size of New Zealand's territory. The area was not very productive (around 75% of the area is deeper than 1000 meters), but it stimulated development of the national offshore fishery, partly based on new deep-water species (such as orange roughy).

During the expansion, New Zealand had neither special skills, nor the fleet capacity needed for the offshore fishing. Just a few of the larger companies could productively move their capacity offshore from the inshore fisheries. The inshore zone continued to be highly over-capitalized because of the great majority of the new vessels were too small to be used in the deep-water fisheries.

In the early 1980s, the New Zealand's government presented many changes since economic crisis called for drastic measures. The government offered three options for the weak industry: traditional business with a steady decline due to economic attrition; the TAC system with "Olympic fisheries" (restricted number of the days at sea); and an alternative implication ITQ, where the TAC in all main fishery was to be cut in individual parts based on past catch history (Hersoug, 2002).

The ITQ-system was created to reduce pressure on the industry when a crisis took place in the inshore fishery. The "status quo" was not an option for the inshore fishery and the extent of overcapitalization and overfishing was documented. The ITQ system was the least disruptive to the current members, the best option of a bad lot. A pro argument for the ITQ system for the inshore fishery was based on the collapse in the present methods that depended on boat and gear controls. The ITQ were not presented like something radically new from the current management methods, and "the greatest promise of efficiency and stability" was made by the government and companies.

Most fishermen didn't understand what the new system was like, how much it would change the industry and how it would affect them personally. The New Zealand Federation of Commercial Fishermen (NZFCF) supported introduction of the ITQ for the inshore fishery, and they could see that it was the only one right way to protect the stocks and allow restructuring of the industry, without damaging the existing fishermen (Sinner and Fenemor, 2005).

The ITQ was introduced into New Zealand's inshore and offshore fisheries on 1 October 1986. The seeds of the New Zealand's ITQ model can be found in a theoretical model de-

veloped by Canadian economists Pearce and Moloney in 1979 (Deweese, 2006). The initial allocation for those choosing to stay in the fisheries was based on average harvesting performance taken in any two out of three fishing years (1982-1984).

According to Luxton (1997), the core objectives of the QMS were to:

1. Increase the recreational fishery,
2. Reconstruct inshore fisheries,
3. Limit catches to level that could be stable over the long time,
4. Make sure that catches bring maximum benefit to country and to the industry,
5. Integrate management of offshore and inshore fisheries,
6. Create a management system suitable on both regional- and national-bases,
7. Give permits for catch based on individual permit (Harte and Bess, 2000).

The key element of the ITQ is transferring of property right to harvest a limited quantity of fish, including the right to lease. ITQs were prescribed in perpetuity. In the beginning, there were 25 species (or species groupings) in the QMS. The fishery for every single group is classified into the fish stocks (a number of different fishery management units). The QMS consists from 10 different quota management areas (QMAs) and each Fishstocks belongs to one or more QMAs (Annala, 1996). The QMS represents shares of Total Allowable Commercial Catches (TACCs), which mostly compensate the TACs and also include accounts of customary and recreational fisheries, and other fishing mortality (Mace, 2014).

State Court of New Zealand asked the Minister to fix a TAC that moves a stock in the direction of its Maximum Sustainable Yield (MSY). In offshore fisheries is no recreational interest to admit (like in the orange roughy fisheries), and the TACC is aligned to the TAC. On the other hand, the Minister is obligated to create allowances for non-commercial catches (TANC) in shared fisheries, like rock lobster. Non-commercial fishermen are controlled by daily catch limits, and commercial harvesters share of the TACC. In order to reach sustainable TAC levels, the government suggested to buy back the amount of quota.

The measure of punishment inside the industry was strong and backstopped the process (for example, the fine for quota busting was rough, with immediate confiscation of the vessel and all gears). In due course, other troubles were solved. For instance, to improve monitoring of fishing activities in fishing areas, New Zealand launched the Vessels Monitoring System (the first satellite fishing tracking system in the world) in 1994.

The data on changes in New Zealand fishing industry from 1986 to 2015 are presented in Table 1. Many factors have put pressure on the huge changes in the system. One of them is

a long-time general direction to “New Zealandization” of the fishery with more processing and harvesting inside the country. There are 130 commercial species in New Zealand, and the QMS control 100 species in 638 stock regions (Seafood New Zealand, 2015). Seafood exports have doubled after the introduction of the ITQ.

Table 1. Changes in New Zealand fishing industry from 1986 to 2015

Characteristics	1986-1987	2015
Fishing industry employment (no. individuals)	7 900	20 000
Quota owners nationally (no.)	1 356	1 500
Fishing vessels (no.)	2 331	1 400
Seafood exports (in \$ NZ)	657 000 000	1 513 000 000
Species groups under QMS (no.)	25	17

Sources: Annala (1996), Dewees (1998), FAO (2014), and New Zealand Ministry of Fisheries

Bess and Harte (2000) mentioned that during the first ten years of the ITQ in New Zealand the positive results in the industry included a rise of the profitability, improved biodiversity because of progress in recovery strategies and high level of investment. At start there were many difficulties: limited knowledge about stock distribution and abundance; lack of the criteria on how to share rights among stakeholders; as well as regulating and looking for activities like black marketing and quota busting.

3.3 The Core of the system

The enforcement system in New Zealand is based on a complex reporting process to prevent overfishing (the quota-holders must not catch more fish than they are empowered to catch), penalties for inflicors, and “reverse onus” bill². At the beginning, the hard work on formal documentation and reporting procedures helped to develop systems to test, analyze and classify the information (Macgillivray, 1990).

The present active fisheries regulation in New Zealand (including the high-sea regulation) is the Fisheries Act 1996. The main goal of the law is the sustainable utilization of fish-

² Reverse onus obligates a violator to prove his guiltlessness rather than usage of the crown confirming guilt.

eries resources. The Act announces that a person can hold only one fishing permit. The fishing license identifies the stocks to which it belongs and it has to be subject to different conditions, such as conditions about quantities, methods, regions, types and numbers of fishing gear, and the specific boat that can be used.

In New Zealand, the judicial system and an effective MCS structure are the foundation of the QMS. The infrastructure of the Ministry of Fisheries includes patrols, a vessel tracking system supported by a qualified crew and satellite, together with military forces. Considerable crimes in New Zealand fishing industry include misreporting, faking of records, illegal fishing and sea dumping, declaration of harvests from other regions (different from place where vessels are admitted to fish). The Act brings detailed penalties and sanctions for abusing the law, including confiscation of boats and gear, cancelation of quotas and licenses, penal damages and the minimum acceptable requirement is the prison confinement. The MSC system manages the documentation and pursuance of the technical measures (size limits, mesh size, area limitation), but technical measures are not a big question in the management of New Zealand fisheries (Aranda and Christensen, 2009).

3.4 Indigenous people (Māori fishing rights)

From ancient times, the fishery resource took up a great space for the Māori society, it was more than just a food source. A special complex of rituals made the connection between Māori and ocean “products” more specific. The deep respect for the ocean and its “products” underlines of the concern for fisheries. According to Firth (1959), the Māori had a clearly defined property rights system in respect of fishing grounds and land. Each family owned their own fishing area with clear boundaries and the territory was handed down across the generations.

The fishing was split by season, with climatic and geographic differences. The Māori were excellent fishermen, they knew where and when to fish (Sandrey, 1986). On 6th February 1840, the Māori signed the Treaty of Waitangi³, which became the main reason for the New Zealand’s government to try to find a harmony between traditional Māori rights and the current capitalistic management system. The agreement stipulates the protection of both a

³ The Treaty of Waitangi (or Tiriti o Waitangi) is a treaty between many the English Crown and the many of the Māori Chiefs of New Zealand. The Treaty recognized the moral and legal claim for Māori property of the land, forest and fishing resources in the New Zealand (Sandrey, 1986).

right to fish and the place of fishing. The Tribunal declared that the English Crown must take all the needed steps to support Māori in their fishing, and give them an active protection in the use of their waters and lands. “The full, exclusive and undisturbed possession of their fisheries for as long as they wished to keep them” (Waitangi Tribunal 1988: 220). The Tribunal confirmed the Māori right to specify their own internal economic, social and political rights, and to maintain their own customary law and institutions. The Treaty acknowledged the Māori’s rights to their cultural and natural resources (including fishing resources) (Hersoug, 2002).

In 1957, the United Nations ratified Convention No. 107 which took under its protection indigenous and tribal populations in independent countries. Since then, indigenous peoples have started getting back resources and rights lost during and after colonization and they have raised the political influence of their countries.

At the beginning of the QMS inception, the social aspects were not taken into consideration. The proper management and reorganization of the fleet were the main questions for the QMS. In 1983, part time fishermen (many of them were Māori) were not authorized for the initial distribution of quotas. For that period, the quota had been issued for 29 species (over the 80% of the commercial fisheries) (Aranda and Christensen, 2009).

Now, the Māori controls more than 50% of the quota rights, while they make up about 15% of the population. The Māori fishing industry controls about 28% of ITQ, on the condition that a 50% economic interest in the quota is under control of Sealord (half of this company owned by the Māori people). The asset value of the commercial fish resource under QMS in New Zealand in 2009 was \$4,0 billion, and around \$ 1,12 billion (28%) was owned by the Māori people (Statistics New Zealand, 2010).

3.5 Self-governance organization

There is a lot of literature and research papers about operation of the self-governance in New Zealand. Hersoug (2002) conducted research of New Zealand fisheries co-management and gives a good mark of the QMS in terms of developing commercial utilization, but the system runs into difficulties with a multi-stakeholder situation.

The initiation of the ITQ in New Zealand was included as a compound of a market-oriented reform of economic institutions. The reforms should make fisheries management

more effective by using private provision of services. The Ministry of Fisheries lost the research functions in favor of a Crown research institute in 1992 (the National Institute for Water and Atmosphere Research Limited).

Commercial Fisheries Service (or “FishServe”) is the only private management agency in the world, that was given unique administrative functions by the government. Since 2001, FishServe has operated to the comfort of both industry and government. FishServe, like an industry-owned service department, began to give total records management services for annual catch entitlement transactions (ACE), constant quota-share transactions, licensing, catches against ACE, and constructive value fee for catches that go beyond ACE. The ACE regime reduces barriers and gives the fishermen the possibility of obtaining a within-season right to catch a fixed number of fish, without the obligation to hold the quota. The ACE regime has increased participation of the industry (Stewart and Callagher, 2011).

FishServe pay to the budget of the government any payments related to government under these dealings. The relationship between FishServe and the Ministry of Fisheries is based on a combination of contracted assignation of some services and devolved assignation of others. The transfer of the administration functions from the Ministry took about 5 years and required big investments from the industry and government.

The Challenger Scallop Enhancement Company (or “Challenger”) is a one of the well-developed self-governance organization in New Zealand fisheries, it was introduced in 1994. The main destination of Challenger is a long time sustainability of the scallop fishery. This organization carries out research and stock assessments, fixes an annual quota corrected to a nominal maximum quota provided by the government, observes seafood safety and bio-toxins, seeds juvenile scallops, and closes freshly seeded regions to guarantee growth. Challenger has made arrangements with dredge boats and recreational harvesters to administer monitoring of use. This management behavior finances by the self-imposed expenses on catches (from 17% to 20%).

At the beginning, there were a number of others self-management groups, but calling them co-management groups would be more correct. For example, the Bluff Oyster Management Company was an autonomic organization addressing conditions of the stocks, which were susceptible to disease. To prevent overexploitation of sub-stocks, the Orange Roughy Company started a self-driving program to distribute fishing to sub-regions in quota control regions. The main goal of the company was to improve research and cooperation with the New Zealand government for maximizing the profit of New Zealand’s EEZ. The Crayfish

Management Advisory Committees are the basis of the New-Zealand rock lobster co-management. The Chatham Islands Quota Holdings Limited was incorporated in 1994, where the owners of the company are the inhabitants of the Islands. The main goals of the company are buying of the quotas to protect future activities on the Chatham Islands, leasing out of rights to the local fishermen, and lobbying the Government to achieve the most favorable regulations.

Benefits from being in a corporate quota-owner grouping in New Zealand fishery are:

1. Support from stake-holders, fishermen,
2. An expertly operated quota-owner group or company,
3. Extra accountability,
4. Competence to self-control their “own” rules,
5. Competence to finance and conduct their own research,
6. Competence to realize own regulatory regime, for example rotational harvesting,
7. Competence to negotiate with other consumers of the marine resources, like tourism or recreational based,
8. Closer attention on sustainable management,
9. Confidence in future business operations with less government intervention, and
10. Enhanced responsibility for environmental issues, for example activities to decrease environmental impacts, improvement of water quality in the regions of the scallop fishery, and dumping of liquid and solid effluents at coast.

The Ministry of Fisheries supports the Quota Owner Associations (QOAs) and their improvement in many ways. New Zealand government conceives that QOAs are a minimum expense policy tool, which promotes sustainable management and completes current property rights approaches in the industry. The benefits for the self-government stakeholder organizations are good motivation to reduce costs and to create the best results for shareowners, and direct obligations to the government and to shareowners.

There are some problems connected to functioning of the system. Not all members take part in the decision-making procedure, such a recreational and environmental groups, which are not quota-holders and as a result not a part of the company. However, it is important for the company to consult interest of all groups, in a reverse situation these groups may be instrumental in the annual TAC setting exercise implemented by the Ministry of Fisheries.

Sometimes, the company has a narrow view of environmental concerns, because it pursued economic objectives. It proved true by the limitation of the shareowner group targets.

Challenger is an exception from the rule and this organization is active at all point of environmental protection measures. On the other hand, dredging of scallops is on the record of devastating consequences for the environment, and the question of the process improvement has financial limits (Hughey, 2000).

Hersoug (2002) finished his analysis of co-management with the conclusion that:

“...New Zealand’s experiments with QOAs should be followed closely. Maybe they can give some indications to solutions for other nations, where administrative innovations have been conspicuously lacking for years.”

3.6 Offshore and inshore fishing regulations

The number of registered fishing vessels in 2014 was 1 334 vessels, a reduction of 37% since 1998 (2 126 vessels) (Figure 3).

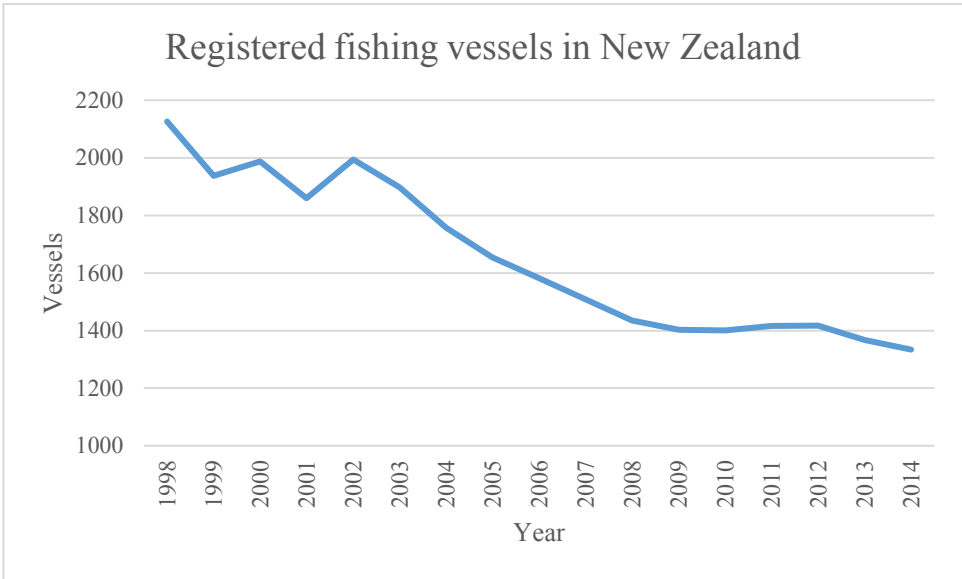


Figure 3. Registered fishing vessels in numbers of fishing vessels in the period 1998-2014 (Source: OECD Statistics)

The industry in New Zealand consists of two very different sectors. The offshore industry targets such species as squid, hake, orange roughy, and hoki, and this industry is controlled by a small number of huge vertically integrated processing and harvesting companies. The inshore sector targets species such as rock lobster, gurnard, and snapper. The inshore industry consists of boats that belong to the vertically integrated companies with hired teams,

and independent small-scale fishermen who mainly sell their harvest to the vertically integrated companies. The offshore industry was created only in 1983, when New Zealand introduced the QMS. The government wanted to assist the growing domestic industry to force the foreign boats out of 200-mile limit. Between 1988 and 1989, most of the industry experienced growth. During that time, the regional fleet was short on offshore capability, so local companies started to invest heavily in offshore capability and sea farming. The introduction of the ITQ in the New Zealand fishing industry gave rise to a fleet development.

The governmental fishing regulations of the inshore sector has a long history (more than 100 years). What is notable, there is a gap in a community-based inshore fishing regulations. But for indigenous Māori people, fishing was an integral piece of the traditional lifestyle. The inshore sector had different challenges, the New Zealand's government realized a set of input-based management controls, after (in 1983) they cut out all partial time fishermen from commercial fishing (Yandel and Dewees, 2008).

The inshore fleet (includes \square 12 and 12-24 m) underwent serious restructuring during the introduction of the system that resulted in a change in ownership, boats replacement, changed targeting, and new gear set. The sector of the small vessels (\square 12 m) had a big reduction of 70% (change in a benefit for larger boats). The 24 – 33 m sector has grown from several vessels in the 1970s to a big segment of the offshore fleet. During the introduction of the new system, the gains in productivity were found outside the harvesting segment; e.g. cooperation between the offshore and inshore operations, large and new companies, and returns to scale in the export and processing segment (Connor, 2001).

The main factors that led to the acceptance of the ITQ-system in the inshore fishery in New Zealand were:

1. Successful realization of a forerunner to ITQs in the offshore fishery,
2. A good consultation service that gave a chance for fishermen's worries and questions to be heard,
3. Support from key members and cooperation between industry and government representatives from the beginning of ITQ,
4. Protection of existing members, including compensations for harvest reductions from the government,
5. A crisis that needed a changeover in current management and lack of any other option to meet the crisis,
6. And tough stance of the Labour Government towards a reform based on ITQ (Sinner and Fenemor, 2005).

3.7 Marine biodiversity and aquaculture

Since New Zealand is geographically separated, most of its international trade (above 90% of the total volume) relies on seaborne shipping. Many of New Zealand's species cannot be found anywhere else on the planet. This includes marine biodiversity, e.g. about 90% of New Zealand's molluscs are located only in New Zealand. About 120-million-year geographic isolation from other terrestrial parts of the globe makes biodiversity in New Zealand very exclusive.

About 8,000 marine species have been discovered in New Zealand, including 964 fish (where 108 species are unique) 41 marine mammals, 61 seabirds, 2,000 molluscs, 400 echinoderms, 350 sponges, 700 species of micro-algae and 900 species of seaweeds.

Between 1965 and 1985, many coastal fish stocks were damaged. After the introduction of the ITQ system, most of the stocks are at sustainable levels in terms of productivity and biomass.

Since 1978, there has been a ban on hunting of marine mammals (Marine Mammals Protection Act). Most of the dolphin, whale, sea lion and fur seal species are reviving. Fisheries by-catch continues to be an issue for some species, like New Zealand sea lion, Hector's dolphin, and albatross. Some marine invertebrates are vulnerable to habitat degradation and to overharvesting, due to pollution, transfer of sediments from rivers, and climate changes (Hewitt, 2004).

Aquaculture in New Zealand developed apace, from a hobby to a multimillion-dollar industry. It is mostly based on three main species: salmon, oysters and mussels (99% of total aquaculture production), and the largest part from it is the endemic GreenshellTM mussel.

The salmon aquaculture industry was originally introduced to New Zealand as part of recreational fisheries. New Zealand is in charge of almost half of the global farmed production of Chinook salmon and only Chile is producing sizable quantities of this fish (other than New Zealand) (Hersoug, 2002). Exports of aquaculture products amounted to around 300 \$ million NZ in 2011 (Aquaculture New Zealand, 2011).

The industry operates worldwide in high seas fisheries for species such as Patagonian toothfish, orange roughy, and migratory tuna species.

3.8 Economic efficiency / market

In 2013, the aquaculture and fisheries gave input 896 \$ million NZ to gross domestic product (0,4% of the national economy) (Statistics New Zealand, 2016). The seafood industry harvests around 750,000 tons from aquaculture and fisheries every year. The profit of this catch ranges from 1,2 to 1,5 \$ billion NZ per year, of which the aquaculture to 200 \$ million NZ per year. Seafood exports ranks as fourth or fifth biggest export item in the country (OECD, 2013). In 2015, the TACC for all QMS stocks amounted to 599,126 tons, and the weight of actual commercial stocks caught in 2015 was 68% of TACC (409,449 tons).

The total seafood export value in 2015 was at its highest value since 2000 (see Figure 4), and amounted to 1,62 \$ billion NZ. The main seafood export partners are China, Australia and the United States.



Figure 4. Total seafood export value in New Zealand, 2000-2015, unit - \$ billion NZ, valued free on board at New Zealand ports (Sources: Ministry for Primary Industries, Statistics New Zealand)

From the total seafood export in 2015 (Figure 5), finfish species amounted to 82% of total volume of export (or 236,715 tons) with shellfish about 16% (or 50,690 tons). The main export species for New Zealand are rock lobster, mussels and hoki.



Figure 5. Total seafood export from New Zealand in 2000-2015 in 1000 tons (Sources: Ministry for Primary Industries, Statistics New Zealand)

The fishing industry is an important primary industry for New Zealand, contributing at the mean over \$1,3 billion NZ every year in export incomes to the economy (\$1,45 billion NZ in 2015). In 2013, 47,430 jobs were in New Zealand were in the fishing industry and aquaculture, with a total income before taxes about 657 \$ million NZ (Statistics New Zealand, 2016).

3.9 The future of the system

Recently, the government has begun creating Fisheries Plans with clear fisheries management objectives. This plan would create close correlation between fisheries management and fisheries research, improve management activities in the industry. Steps that will prevent overfishing in the future are:

1. Smaller-scale report system to simplify solutions to spatial conflicts;
2. An electronic monitoring to calculate the amount of discharge of fish in the in-shore fisheries;
3. Strengthening of control of ecosystem subjects, especially requirements for eco-certification of products;
4. Strengthening of use of a management strategy evaluation;

5. Realization of updated national program of action for sharks and seabirds, plan for an endangered species (like Maui's and Hector's dolphins);
6. Monitoring of the activities of foreign bottoms fishing in New Zealand waters;
7. Strengthening of use of ecological risk analysis to advise management actions and research priorities (Mace, 2014).

The Fisheries 2030 Strategy was created by the Hon. Phil Heatley, the Minister of Fisheries in 2009 (New Zealand Ministry of Fisheries, 2009). The main goal is to maximize New Zealand benefits from the utilization of marine resources within environmental limits. How the New Zealand fisheries sector might look in 2030 is showed in Figure 6.

There are two outcome statements to achieve the goal – use outcome and environmental outcome. For supporting use outcome, the Ministry intends to: increase development and research funding; strategy for shared fisheries, create alternative management goals for sustainability of stocks; support actions that allow beneficial use of marine water areas; reconsider fisheries law and regulation for the purpose of improving effectiveness and lowering compliance costs; and create shared government and industry aquaculture development strategy.

The actions aimed at supporting environment outcome are: to develop fisheries harvest strategy standards; to promote the development of the Resource Management Act⁴ statements, environmental standards, as well as freshwater and coastal plans, and to develop aquatic biosecurity policy to manage risk.

In improving the governance conditions, the Ministry aims at: strengthening collective management actions (include Māori), developing the long-time research plans for improving knowledge of the environmental impacts and fish stock, improving communication inside the sector and the level of voluntary observation of fisheries laws and standards, discouraging illegal activity, and cooperating with Pacific countries to create stable management regimes (New Zealand Ministry of Fisheries, 2009).

⁴ The Resource Management Act is the main piece of New Zealand's legislation that describes how society should manage environment. It was signed in 1991.

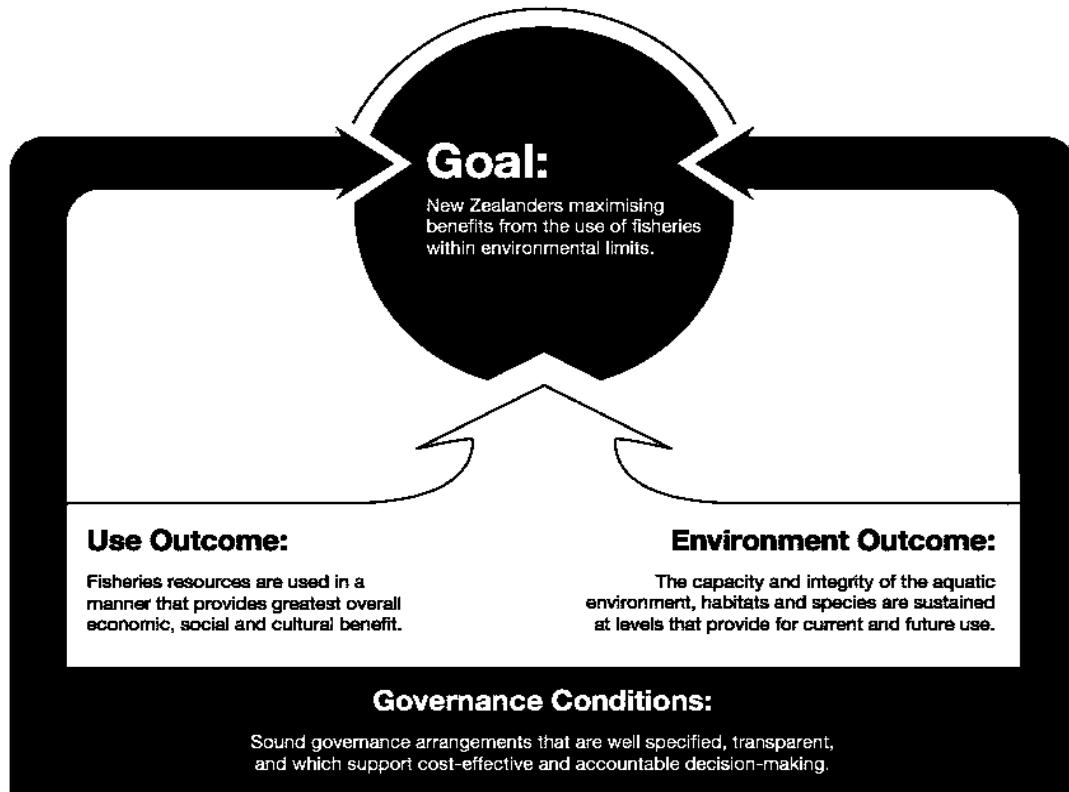


Figure 6. The New Zealand fisheries sector in 2030 (Source: New Zealand Ministry of Fisheries, 2009)

As reported by Hersoug (2002), the QMS are expected to exist for many years ahead, specifically for two reasons. The first reason is the system has been successful in the context of economical and biological indicators. The second one is high investments in the system where a complete change would lead to the huge political and economic costs.

Chapter 4. The IVQ system in Norway

4.1 Introduction

For ages, the fish resources constitute the major source of income and employment in coastal societies in Norway. When the reconstruction of country began after the Second World War, the development of the fishing industry laid the foundation for the development of the coastal regions. The Norwegian fishing industry played a great role in the government's general policy to keep the settlement system of the coastal societies (Williams and Hammer, 1999). Norwegian fisheries management has developed over decades. The structure of the management system is complex and includes the setting of TACs and limitations for other fishermen on access. (Årland and Bjørndal, 2002).

Is the Norwegian IVQ system just a stage before a fully implemented ITQ system or is it a system in its own right? The answer on this question is still unclear. It is complicated to say categorically no, but there are marked differences between the Norwegian vessel quota system and a "pure" ITQ regime. There is no "pure" model in the world, all systems were conformed to the local political and historical conditions. The Norwegian IVQ differs from the theoretical standard in tenure and transferability of quotas. Assignment of quotas can be bought only with a vessel to which they are part of, quota can be moved to another vessel on condition that the vessel is permanently taken out from the industry. The elements of classical ITQs regime are transferability (center piece) and limitations on transfers. In the same way as for ITQs system, transferability of quotas has been created to decrease overcapacity and increase profitability in the fishing fleet. In Norway, quotas have become highly concentrated on fewer vessels, that has helped to increase profitability for some fleet segments and achieve its reorganization (Hannesson, 2013).

4.2 History of the system and context

In Norwegian fisheries, appearance of a proper management structure dates from the late 1960s, the collapse of the Atlanto-Scandian herring stock. Theretofore, there were three basic types of the intervention by government in the Norwegian fishery. The first type is the “Regional Fisheries Act” (1897), with “operational rules” to avoid conflicts generated by the adaptation of new harvesting technology and keep order among fishermen. The second form is the “Raw Fish Act” (1938), targeted on controlling the sales of raw fish. The last type of intervention is aimed at limiting of the entry through the use of license into particular fisheries, such as the “Trawler Act” (1951), the “Limited Entry Act” (1972), and the “Salt Water Fishing Act” (1955). The last mentioned legislation gave the Ministry of Fisheries a general authority to assume measures fall outside the scope of “operational rules”. These actions varied from limitation on the design of gear and size to the setting of TACs for specific stocks (Jen-toft and McCay, 2007).

From the end of the Second World War and to the mid-1950s in Norway was a tremendous increase in the landing of herring. After that period of time there was a sharp drop, succeeded by a growth again in the 1960s. The Atlanto-Scandian herring stock fallen in the late 1960s, a few years after the North Sea stock met a similar fate (Figure 7).

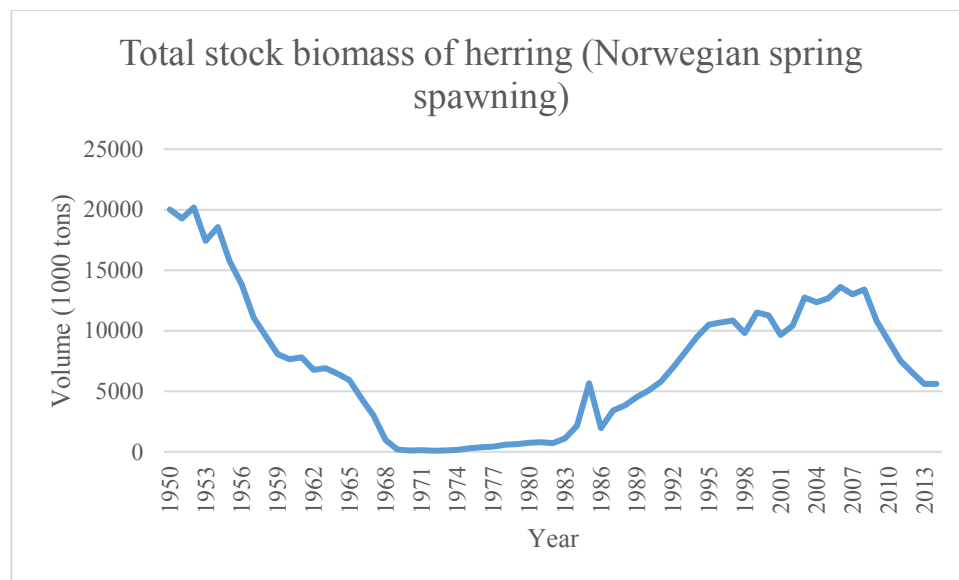


Figure 7. Total stock biomass of herring (Norwegian spring spawning) in Norway during 1950-2014, unit – 1000 tons (Source: Statistics Norway, 2015)

The reason of a crisis in a herring catches was a technological breakthrough, such as the construction of asdic and power block used for pulling the purse-seine. These modernizations increased the power of the fleet for a short time and sparked off a collapse of the herring stocks. The fishery was frozen in the 1970s to prevent herring stocks from the extinction. After the situation in 1970s the “tragedy of the commons” became admitted by everyone in the fisheries, and the fisheries biologists came to understand their “watchdog’s” role in the avoidance of overexploitation (Lorentzen and Hannesson, 2004).

The idea of limited entry in Norwegian fisheries was introduced by Klaus Sunnanå, the Director of Fisheries, presenting it at the annual meeting of the Norwegian Fishermen’s Association in 1967. The argument he proposed was the necessity to adjust the effort and investment to both markets and stocks, later it became the “Limited Entry Act”. The first changes were addressed to the offshore fishery, quotas enforced in the capelin, shrimp, herring and partially in the cod fisheries, but only for trawlers (Jentoft and McCay, 2007). A quota-transfer system in Norway was introduced in 1984 in the cod trawler fleet. Also there were limitations on the building of new offshore boats until 1985. The main argument has been to prevent market oriented transactions of vessels and quotas as means to avoid overcapacity and set a stability relative to a varied fleet structure and decentralized control of critical cod resources (Standal and Aarset, 2008).

The crucial moment for the inshore fishery started from 1989 with a dramatic decrease of the TAC in the cod. The reason of the “cod-crisis” was a tough competition between inshore fishermen for “their” part of the declining general quota. The measures that followed after the crisis led to a crisis point in Norwegian fisheries management and broadening of management by individual quotas to practically all boats and fisheries. The history of Norwegian fisheries management as well as for New Zealand based on incremental changes and ad-hoc modifications rather than grand strategies and long-lived planning (Jentoft and McCay, 2007).

The lowest level of TAC and “cod-crisis” led to the introduction of the “quota ladder” in the early 1990s. The quota ladder defines the relevant shares of the inshore and offshore sectors under different TACs (the ladder is showed in Table 2). For example, when the TAC is less than 100,000 tons, the offshore fleet will get a smaller share (only 20%) than the inshore fleet. Originally, the ladder was created specifically for the cod stocks, but currently it includes other stocks as well, the system has been made more complete. The main goal for the development of longtime allocation rules has been to find balance and predict future of

the industry, especially for fulltime fishermen (Jentoft, 2013). However, the merging of quotas for vessels under the 11 meters has not been allowed yet.

Table 2. Allocation of quota between inshore and offshore sectors.

Norwegian quota (1000 tons)	Inshore (%)	Offshore (%)
0-100	80	20
100-150	75	25
150-200	72	28
200-300	69	31
300 and over	65	35

Source: Directorate of Fisheries

More than 90% of the total catch takes place from shared resources with Russia, the EU, Iceland, the Faroe Islands or Greenland. The shared resources create difficulties to be successful and prosper in resource management for one country if other participants do not proceed in a similar manner. Not only the sharing formula for fish stocks should be mutual, but management policy and control measures have to get in line.

By the Joint Norwegian-Russian Fishing Committee, the total quotas of haddock and cod are shared on 50/50 between those two countries. The EU, Iceland, the Faroe Islands, and Greenland are allocated 10% of the TAC. In Norway, the TAC quota for haddock and cod is split between the trawlers and coastal boats which fish with passive gears like long line, gill net, hand line, and Danish seine. The TAC quotas are disposed in line with an allocation key. If the Norwegian TAC is less than 100,000 tons, the trawlers get 20%, but the share would increase to 35% when the TAC surpasses 300,000 tons (Standal and Aarset, 2008).

4.3 The Core of the system

According to McCay and Jentoft (2007), a system of a ministerial control for the industry is possibly characterized as one of “centralized consultation” system. The TACs are based on the suggestions from the International Council for the Exploration of the Sea (scientific advice) and according to the bilateral negotiations about shared stocks with other countries (“Mixed Norwegian-Russian Fisheries Commission”, for common stocks in the Barents Sea,

and the North Sea stocks between Norway and the EU). Before 2002, all the negotiations and preparatory documents were under considerable secrecy, even parliament was absent from the policymaking procedure. The consultative process at the state level is coming after these negotiations. The Regulatory Meeting is a consultative committee to the Ministry of Fisheries in charge of the Director of Fisheries. The Director makes proposal for the management of different fisheries and stocks and presents it on the meeting. The Director has some decision-making power over the work of the meeting. The main and final management decisions backbone in the Norwegian fisheries in the Ministry that creates the management plan based on the advice of the meeting.

At the sea, when the fish is harvested, the Coast Guard makes inspection of fishing boats and verifies their yield against their logbooks. All boats in the Norwegian waters are subject to controls. Boats over 24 meters are obliged to have satellite transponders for the possibility to monitor their activity all the year.

4.4 Indigenous people (Saami fishing rights)

For a long time, the Sami population has been under pressure of the Norwegian government. From the mid 19th century, program towards the minorities in the north of Norway (the Kven and the Sami) can be characterized as step-by-step assimilation, or “Norwegianization” (Hersoug, 2005).

In 1990, the Sami’s issue was placed on the table for the negotiation in fisheries management, starting a process for the first time with which we have still to see the end.

1990 was a year of crisis for the traditional cod fishery, never before the TAC had been fixed so low. “Never April 18th again!” The year before, the TAC had been harvested by mid April, far from scheduled date (September 1). As a result, the cod fishery was stopped for the rest of 1989. The fishers with small-scale vessels in the northern fjords suffered badly by this crisis because for them the cod fishery season had not even started. The decision of the Fisheries Director was the introduction of the vessel quota system in 1990.

The Norwegian fisheries legislation has an implication that a fisherman is a fisher, no matter which ethnic origin he is. Therefore, the Norwegian government was surprised by the claim from the newly established Sami Parliament that the quota system disregarded Sami interests and contravened the international law on minorities and indigenous people rights.

There was no mentioning in the Norwegian fisheries law about indigenous people rights and interests. The Sami Parliament asked for not only marginal corrections in the system, but also Sami claimed a full clearing of legal rights in the industry. The government agreed on some of the recommendation shortly (according to NOU 2008: 5 Kystfiskeutvalgets for Finnmark). For example, the Sami Parliament got a seat in the Fisheries Regulatory Council, but most important issues were not clarified (Davis and Jentoft, 2001)

The story of the Sami is far from being comparable with stories of the success of indigenous people in New Zealand or Canada. There is no original treaty, which could be used in court to show the rights of the native people for natural resources. The Saami population is less than 1% of the Norwegian population, compared to 15% Māori in New Zealand. Therefore, the political support of the Sami at home is weak (Hersoug, 2005).

There was a long and complicated process of recognition of Saami rights. Only in 2005, the Norwegian Parliament recognized the title to the territory in the north of Norway, Finnmark Country, which is a main region of Sami residence (Søreng, 2008)⁵.

4.5 Self-governance organization

For years, the most important organization in the Norwegian fisheries was the Norwegian Fishermen's Association (Norges Fiskarlag, or NFA), created in 1926. The good position was established as a result of being the agent of all industry in the negotiations with government. The NFA is an impressive organization regarding the amount of all types of fishermen (owners and crew, small and large, those who use passive or active gear). Also, NFA plays role of the parent organization for other more specific associations, like the Norwegian Trawler-Owners Associations, and the Fishing Vessel Owners Association, which regulates work of around 300 of the biggest boat owners in the Norwegian offshore fleet. For years, the authorities needed to keep contact with only one organization, which acted for all fishermen. But this organization structure has sparked internal tensions, especially when NFA addressed to resource allocation as its principal activity. The entrenched bureaucracy of NFA has realized the progressive reduction of fishermen. The Norwegian Coastal Fisher's Association (NCFA)

⁵ "Finnmark Act" came into force on 1 July 2006 and consolidated the Sami's right to be involve in the management of Finnmark, the core region for Sami people.

was introduced largely because of discontentment with the influence of the bigger boat owners within NFA. NCFA includes generally small-scale range of fishermen mostly from the northern part of Norway. It took a long time for NFCA to become recognized by political authorities.

The Fishermen's Sales Organizations (FSOs) regulate the economic contacts. The FSOs were the cause of great challenges in the 1930s, when fishermen got a legal protection for the initiation of fisher-owned sales organization to control the ex-vessel sales of all fish. The Raw Fish Act laid the foundation of FSOs. The Norwegian Herring Sales Association (all pelagic species) and The Norwegian Raw Fish Association (whitefish) are the two main FSOs in Norway. The FSOs control all sales to processors and can set minimum prices, if agreement for pieces is not achieved. They also help fisheries authorities in monitoring all catches and providing them with statistics.

The Norwegian Seafood Federation (FHL) is affiliated with the Confederation of Norwegian Business and Industry (NHO). The FHL composes of four offices: FHL aquaculture, FHL industry and exports, FHL fish feed and FHL fish meal. The FHL represents the interests of about 500 member companies. The NHO is the important delegate body for Norwegian employers with more than 20,000 companies starting from small family business to transnational companies (Hersoug, 2005).

The major modification nowadays is that the Raw Fish Act was improved and replaced by the new Fish Sales Union Act in 2013. The new act has to reduce influence of the sales unions on the prices. The Act put a mediator into action, in case if the sales unions and the fish buyers are not able to come to agreement in the minimum price negotiations. However, the mediator plays only the role of an adviser (Hersoug, 2015).

The most important for the development of the Norwegian fisheries is that the organizations traditionally have taken part in policy decisions. However, about half the number of all fishermen are disorganized, making problems of freeriding for the companies and problems of representation for the authorities (Hersoug, 2005).

4.6 Offshore and inshore fishing regulations

The IVQ system consisted of different standardized instruments to control overcapacity in the inshore and offshore fleet. A Unit Quota System (UQS) was created to give opportunity for

owners of deep-sea trawlers, deep-sea long liners and deep sea purse seiners to move quotas from scrapped boats to a new boat.

Two different systems were established in the inshore fleet – a decommissioning scheme and a Structural Quota System (SQS). The SQS was made to control all vessels under 28 meters. The main rule of the SQS is that 80% of scrapped boat quota may be moved to different boats with the same length group and the same geographical location, and last 20% of the quota is divided among the rest of the boats in the same group. However, the boat owners from the Finnmark and the northern part of Troms are granted a permission to buy boats with quotas from all over Norway which are added to an SQS list.

There is a special quota portfolio for the structured boat in different length groups. For example, owners of the vessels over 15 meters may decide between having a quota portfolio of two IVQs in herring fisheries with quotas in the capelin and mackerel fishermen and four IVQs in the cod fisheries (haddock, saithe and cod), or four quotas in the herring fisheries and two IVQ's in the cod fisheries (Henriksen, 2014).

Since 1960, there have been many schemes for the decommissioning of boats. Originally the purpose was innovation and decrease of the fleet capacity, but now schemes are working on a capacity reduction. These arrangements have led to a reduction in total vessel numbers as shown in Table 4.

Table 3. Registered powered fishing vessels, by length of vessel and percentage change in numbers of fishing vessels in the period 1995-2014.

Length group	1995	2015	Change
Vessels under 10 meters	10 872	3 166	-70,9%
Vessels 10 – 14,99 meters	2 169	2 206	+1,7%
Vessels 15 – 20,99 meters	591	149	-74,8%
Vessels 21 – 27,99 meters	183	121	-33,9%
Vessels 28 meter and over	372	245	-34,1%
Total	14 187	5 887	-58,5%

Source: Statistics Norway, Directorate of fisheries

The reason for the quantity reduction in total boats number is disposal of nonworking coastal boats from the list and the scrapping program. The main factors for the big reduction in the number of smaller coastal boats in the Register of Norwegian Fishing Vessels are the establishment of an annual fee on boats for being in registration, disposal of non-working boats

from the register and removal from operation the small coastal vessels keeping annual permits. The SQS is a reason of the reduction in numbers of the larger coastal vessels and larger ocean-going vessels (Directorate of fisheries, 2015).

4.7 Marine biodiversity and aquaculture

Sea regions in Norway are much bigger than its land territory (about six times larger), and include a huge species diversity. Marine habitats vary from cold waters and fjords in the north and used for Arctic species, to warm landlocked regions in the south, which were supported oyster farming from olden times. The territory stretches from shallow coastal waters all the way to deep-sea areas with a depth of up to 4 000 – 5 000 meters, and from the temperate waters of the North Sea to the Arctic Oceans. More than 12,000 species have been discovered in the Northeast Atlantic. Every year, the special sea bottom-mapping program MAREANO registers new species, generally in target regions of northeastern shelf of the Norwegian sea and the Barents Sea.

The Norwegian commercial fisheries are based on a few core species. The central regions for the Norwegian fisheries are the Norwegian Sea, the Barents Sea, the North Sea and long coastal line. These regions have simple ecosystems regarding the number of species detected. In spite of the fleet is aimed at more than 70 species, 90% of the yield is covered by ten species, seven pelagic and three demersal. The fisheries of the bottom inhabitants of the sea are founded on saithe, cod, haddock, with halibut, redfish, turbot, ling, wolf fish, plaice and tusk which amounts minor fisheries of economic value. In pelagic fisheries, herring, capelin, mackerel, blue whiting prevail over sprat, sardines and Danish eel catches. In the crustacean shrimp dominates over lobster and crab. The Norwegian fisheries are overly dependent on few key species, which cannot be easily substituted for other species (like when larger herring stocks delay the growth of capelin stocks) (Hersoug, 2005). In 2014, fisheries made up 31% (or 18,7 billion NOK) of total exports.

4.8 Economic efficiency / market

Fisheries play a small role in routine politics in Norway. At the same time, in the coastal regions, the fishery is very significant when it comes to employment and economic effects. On the export side, the fish makes the third most important export product for Norway next to oil

and gas. Also there are few related industries that were built on Norwegian fishing industry, like gear production, ship-building yards, and a huge service sector specializing in everything starting from administrative services and to genetic improvement of aquaculture stocks (Hersoug, 2005).

In 2015, almost 2.3 million tons of fish, molluscs and shellfish were harvested in Norway, which was about the same level as in the previous year (Figure 8). Cod dominated in quantity (almost 18%) and was the most valued species (NOK 5,4 billion) (Norwegian Seafood Council, 2015).

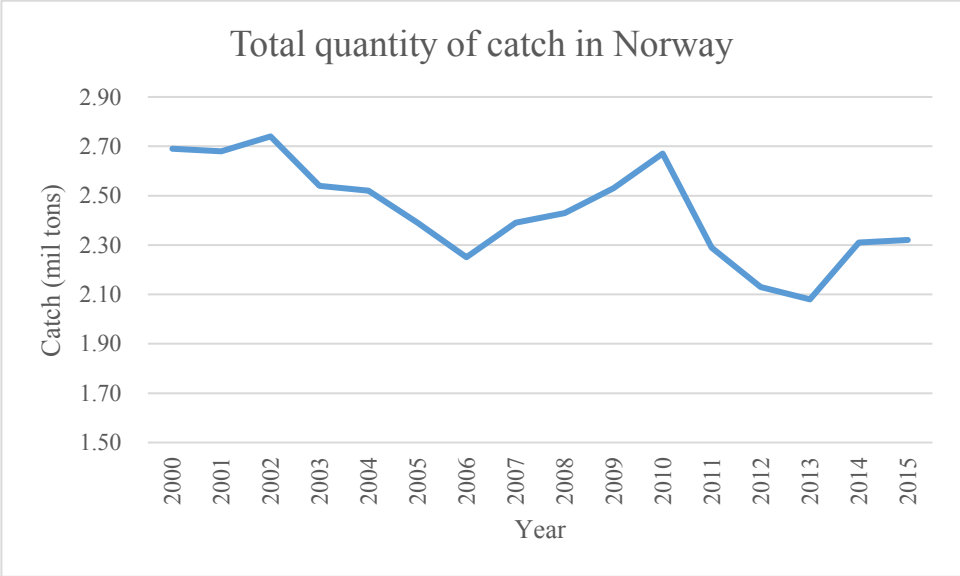


Figure 8. Total quantity of catch in Norway, 2000-2015, unit – million tons (Source: Statistics Norway)

Norway is a second biggest seafood exporter in the world (after China). In 2015, Norway exported seafood to 143 countries, 2/3 of which were exported to the EU. In last 10 years, the Norwegian seafood exports were more than doubled (NOK 74,5 billion in 2015), 70% of the total seafood export belongs to aquaculture (NOK 50 billion in 2015) (Figure 9) (Norwegian Seafood Council, 2015).

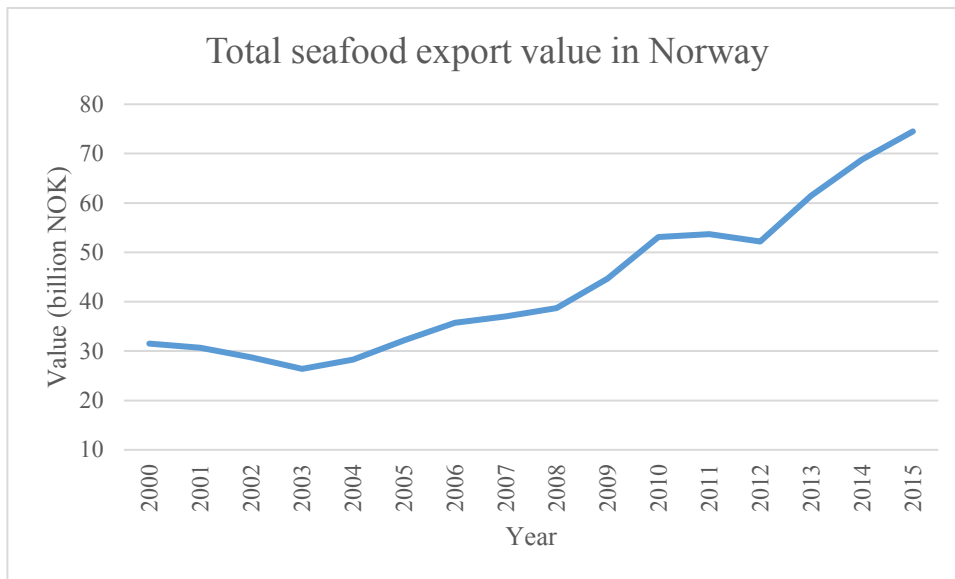


Figure 9. Total seafood export value in Norway, 2000-2015, unit - billion NOK (Source: Statistics Norway)

Salmon and trout combined to 41% of total volume of export (or 1,07 mil tons), with cod about 15% (or 0,4 mil tons). In 2014, Norway exported trout and salmon for NOK 46,2 billion, while the codfish export was worth NOK 12 billion (Figure 10).

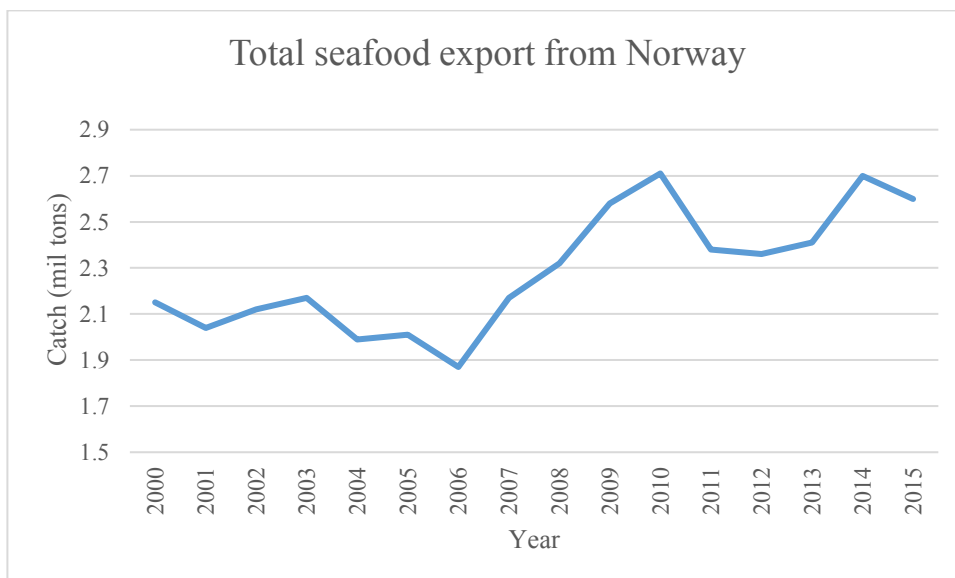


Figure 10. Total seafood export from Norway, 2000-2015, unit – million tons (Source: Statistics Norway)

The Norwegian fishing industry has always been a main factor to rural development. For the last 50 years the industry has been exploited by the Norwegian government in order to keep

population along the coast. The total number of fishermen in 2015 was 11,146. As before, the regions with the highest number of registered fishermen are Finnmark, Troms, Nordland in the north of Norway and Møre og Romsdal, Sogn og Fjordane, and Hordaland in the west of Norway.

The reduction in numbers of boats and fishermen has encouraged growth of profitability and productivity for present members of the fishery (Table 5, Figure 11). These changes have diminished influence of the fishing industry on employment and settlement in coastal society. The positive aspects of these reductions were that they happened during a period with low unemployment rates and different alternative employment possibilities (Gullestad, 2013).

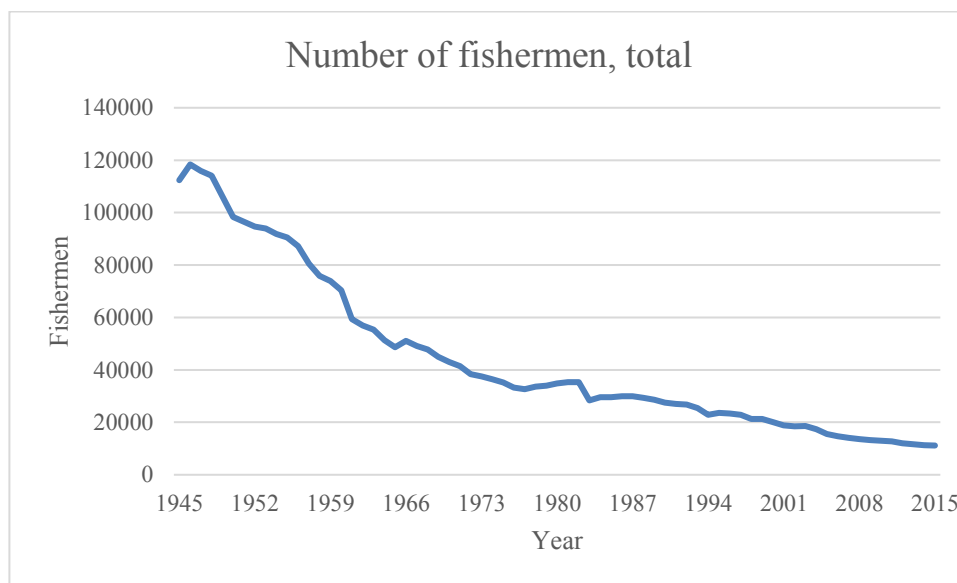


Figure 11. Development of the number of fishermen in the Norwegian fishing industry during 1945-2015 (Source: Statistics Norway)

The income from the oil industry and the size of the population of Norway (only 5 million) made the reduction of the number of fishermen possible and easy. The high petrol tax (78%) to the government is largely used to achieve social targets like redistribution of income.

4.9 The future of the system

Currently, the big issue in the Norwegian fishing industry is the Eidessens’ “Committee”. The Norwegian government has appointed an expert committee headed by Arild Eidesen to decide

the future of the quota system. The recommendations would include improvements of the license system, realization of the resource rent and adaptation of the fleet to the resource base. An important argument for a resource rent tax is that only few players now have the rights to exploit the common fish resources and value created by the exploitation of the common fish resources should be supplied to the Norwegian society. The Commission should as well set a time limit for the introduction of the new system. This will ensure that the industry have an opportunity to adapt its capacity to the resource base and keep pace with productivity growth in the society, so the industry will continue to work as before the changes in the system (Ministry of Trade, Industry and Fisheries, 2015).

The main impacts on the ecosystem towards 2025 are petroleum activity, increase of the fisheries, ocean acidification and climate change. The criteria for selecting the regions under the area based management plans were regions with high concentration of stocks and high production and a large part of endangered habitats, and when it is a critical area for nationally or internationally important populations (Quillfeldt, 2009). The development of the fishing industry in Norway looks toward the improvement of productivity and healthy conditions of the ocean and the efficient use of marine resources.

Chapter 5. Discussion

The institutional theory supposes that there is always tales of the past in the present practices and regulations. New Zealand does not have a long history of the fishing industry, but it has Māori fisheries. As a coastal society, Māori people have been dependent on fish like a premier source of food⁶. They were connected to the use of marine resources a long time ago (about 800 years ago). In the 18th century, the Māori had different fishing techniques, engineered to catch selected fish stocks, and developed social organization. They collected seafood not only for domestic consumption but for barter with distant societies as well. When the European colonists arrived, the Māori already had a well-developed fisheries management based on property rights. It took less than 150 years for colonists to ruin this system (Hersoug, 2002).

Before the declaration of New Zealand's EEZ (1978), the country was more oriented on other primary industries like forestry and farming. "This has probably retarded the rate of the development of the industry" (Slack, 1969). The fishing industry was small, and focused on a national inshore industry, there was no offshore fishing. When New Zealand implemented the EEZ in 1978, nobody knew about the weight of future fisheries. Suddenly New Zealand had one of the biggest EEZs in the world (Hersoug, 2002). Even though New Zealand's QMS is one of the oldest quota systems in the world, the fishing industry on its own is relatively new, but since the beginning it has centered around the licenses. Because of it, the QMS in New Zealand is almost a pure model of ITQ system. QMS has changed in some ways, but the core principles of the ITQ have remained constant (Yandle and Dewees, 2000). On the other side, the Norwegian fishing industry that has been traditionally an important part of the economy and development in the country, and laid the foundation for the coastal societies of northern and western Norway. The modern history of the fishing industry in Norway started in 1900s, the institutional transformation of the industry begun in the 1930s. In that year, seafood amounted to 15% of the total value of Norwegian exports, it was 90% of all Norwegian fish products. Even at that moment, when the industry just appeared, a process of

⁶ For many years, New Zealand's land did not have large mammals to feed population. Only in 1769, Captain Cook brought with him the first mammals (pigs, sheep, and goats) (Hersoug, 2002).

organizational and technical change made the system more effective but less flexible. The first two sales organizations in the fishing industry were approved by the Norwegian government in 1929, those who monopolies have been authorized in the herring fishery. Meanwhile, the fishermen started to understand that acting individually in the market would not bring good prices on herring (Holm, 1995). To deal with the matter, there was formed The Ministry of Fisheries (nowadays the Ministry of Trade and Fisheries) in 1946. In addition, the Norwegian College of Fisheries Science was created in 1972 as part of the University of Tromsø (Hersoug, 2005). The long process of establishment of the fishing industry in Norway and strong traditions had an impact on the choice of the modern fisheries management. It must be mentioned that during all changes, details of the “old” industry has been kept alive. Norway rejected the pure ITQ regime, and the main reason for this was a fear of privatization of the commons. It was clear that it was needed to have TACs, closed access, and that the exclusive right to fish is divided between the restricted number of fishermen, based on tradition. The Norwegian government made a decision in favor of the IVQ regime in 1989 on the recommendation of the Advisory Board for Fisheries Regulations⁷ (OECD, 2011). In comparison with a long decision making process in Norway, the ITQ regime in New Zealand offshore fishery was established quite fast just after a short discussion with industry. Norway is a parliamentary constitutional monarchy. Executive power in Norway is operated by the cabinet, led by the Prime Minister, and the King (Harald V, since 17 January 1991) has only nominal power. New Zealand’s system of government is parliamentary democracy and the country is also a member of the Commonwealth of Nations. Queen Elizabeth II is the chief of New Zealand, but “the Queen Elizabeth II reigns, but the government leads”. The countries have multi-party systems.

In Norway, fishermen have been a strong political force at all the times. In Norway, the fishermen have for hundred years been a well-organized group. This interrupted any fundamental change, since co-management always included consultations with the NFA. Since 1926, the organization of fishermen has been an important political factor. The Norwegian fishing industry played a critical role behind the negotiations of entry into the European Community in 1972. Still it is a main issue in the debate with regard to joining the EU. Close relations between industry organizations and the government has not been problematic. The political system in Norway has escaped disturbances due to corruption scandals, which indicates the high-

⁷ The Advisory Board for Fisheries Regulations was the main policy arena for discussion the IVQ regime. It was created in 1983 as the meeting place between the fisheries leaders and the industry representatives (OECD, 2011).

level of political trust and the public acceptance of strong links between fisheries and the Norwegian government. There has always been a conflict between the Norwegian Parliament and the Sami Parliament regarding the Sami fishing rights. Though, the “Finnmark Act” is a great victory for the Sami people and the official document created the Finnmark property, which is the new administration organ that will manage the region, but the fishing rights are still not clarified (Søreng, 2007). New Zealand and Norway started significant changes in the management of their fisheries industries due to crises. In modern history of the Norwegian fishing industry there has been two resources crisis: the crisis in the herring fisheries in the late 1960s and the “cod-crisis” in the 1990s. At the time of the first crisis, the Norwegian fisheries accepted “limited entry” as solution (Act on the Regulation and Participation in Fisheries was introduced in 1972). The crisis in the 1990s included on the agenda the issue of overcapacity, the “cod-crisis” touched mostly the inshore fleet (OECD, 2011). Although, the “cod-crisis” was a biological crisis, it was clear that the marine biologists popularized the impression of a great crisis, which led to the creation of a new management system and introduction of limited entry to the industry. In practice, the IVQ had been established already by using maximum quotas (Hersoug, 2005). In New Zealand the crisis happened in the inshore fisheries in the 1980s. At that time, the inshore industry was overcrowded and overcapitalized. In the early 1980s, sector of economy was created with high level of protection, which brought about a lack of competition and inefficiency. At that time, New Zealand’s economy was characterized by high level of inflation, low economic growth and the trade was decreasing. Those characteristics moved New Zealand from a highly regulated country to one of the most deregulated economy in the west (OECD, 2011).

In 1984, the Government’s Inshore Fisheries Management Discussion Paper was offering three options for the destroyed inshore industry, and one of them was the introduction of the ITQ system. But in the same way as for the Norwegian fisheries, the idea was not a total breakthrough from 1982, a similar regime had been recommended and partly implemented in the offshore fisheries (Hersoug, 2002).

The initial allocation of quotas in both cases was based on the “historical rights”. In New Zealand’s ITQ system, TACs for the commercial fishery were allocated according to vessel catch history, the average of the two best years for the period 1981-1984. Quotas were allocated between fishermen for free, but the requisitions for initial allocation were very strict. (Aranda and Christensen, 2009).

Because of the cod-crisis in Norway, the priority was given to the cod fisheries. The “historical rights” in the cod catches, which state that the fishermen who had fished cod before should be favored, later were fixed according to the qualifying period (1987-1989) by the Ministry of Fisheries in cooperation with NFA. The quota was allocated to the vessel on the basis of the average harvest records inside the size group to which it belonged. Therefore, all vessels in one size group would receive the same quota (Hersoug, 2005). Rights were allocated for free.

According to the Fisheries Act 1996, the general maximum holding limit in New Zealand fisheries allowed up to 35%. The fishermen could keep up to 45% of the quota for stocks presented in the Fifth Schedule; this meant the high level of needed investments to participate in these fisheries. Also there were few species exceptions to the maximum aggregation of the quota: maximum 20% of paua quota in a specific QMA, maximum 20% of the total bluenose quota, and up to 10% of spiny rock lobster quota in any one QMA (The Fisheries Act, 1996). In Norway, the maximum aggregation for each vessel allocated due to quota factors (QFs), were based on the fixed shares of the TACs. For example, the small purse seine equipped boats may use 1,82 QFs the North Sea and 0,5 QFs in Skagerrak. Maximum quota for boats equipped with purse license may use 2,49 QFs in the North Sea and 0,5 QFs in Skagerrak. Maximum aggregate quota for boats with pelagic trawl permit may use 0,79 QFs in the North Sea (Regulation No. 11 on quota factor when fishing for herring in the North Sea and Skagerrak in 2015). Also, in Norway, the allocation of TAC between inshore and offshore fleet is based on the “quota-ladder” (the ladder illustrated in Table 3).

In New Zealand, rights are held in perpetuity. In Norway, rights have time limitations, which is 20 years’ duration on structural quotas for the offshore and inshore fleets, if it was reintroduced and for 25 years’ duration, if it would have been already allocated (OECD, 2013). In relation to who can own quotas, ITQ holders in New Zealand must be citizens, residents or companies characterized as New Zealand companies (at least 75% of New Zealand ownership) (Shotton, 2000). The foreign controlled organizations may not be holders of fish quotas in New Zealand. Right to acquire a fishing vessel in Norway can be given to Norwegian citizens or joint-stock companies located in Norway (60% of Norwegian ownership), where all members of the board are shareowners and Norwegian citizens with residence in Norway.

Figure 12 summarizes the main characteristics and the effects of New Zealand ITQ system and Norwegian IVQ system.

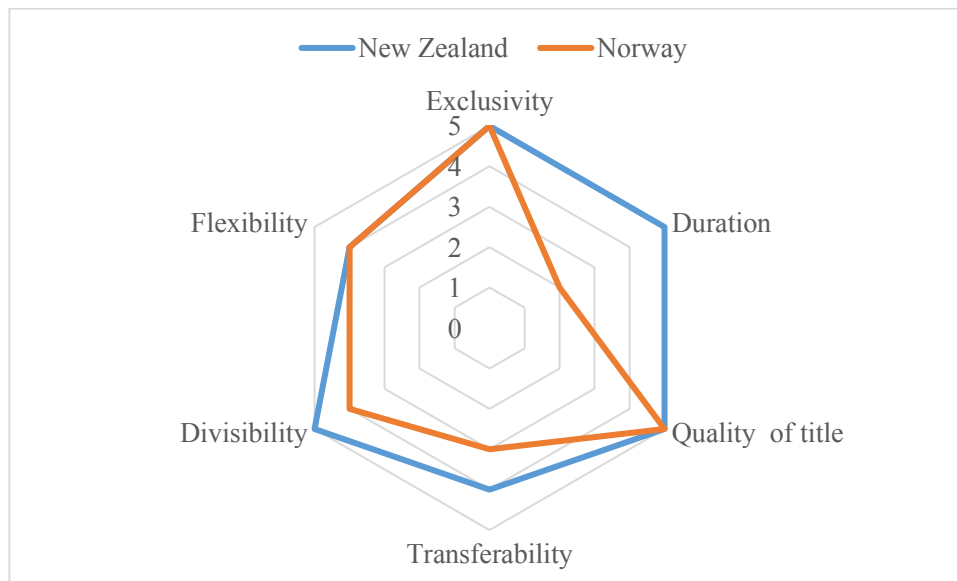


Figure 12. Characteristics of the New Zealand ITQ system and the Norwegian IVQ system (Sources: OECD, 2006, Gallic, 2004)

As with ITQs, IVQs give holders of the right with a high level of *exclusivity* (ranked 5 out of 5 on the scale). The holder knows that the others would not damage his quota by exceeding of their own quotas. The right holder knows what his production will be independently of the others.

The quality of title (or security) in New Zealand ITQs regime is on the same high level as with Norwegian IVQs (ranked 5 out of 5 on the scale). The right to access the resource in Norway and New Zealand is secure.

The choice on how to harvest the quota is almost flexible in Norway and New Zealand. The *flexibility* of the right may be admitted as high but limited (ranked 4 out of 5 on the scale). In Norway, IVQs are allocated every year, that explains the *duration* like limited and low value characteristics (ranked 2 out of 5 on the scale). The difference between New Zealand's ITQs and Norwegian IVQs is that ITQs can be allocated on a permanent basis. The level of the duration in ITQs is high (ranked 5 out of 5 on the scale).

Transferability is a key characteristic in the New Zealand system. Though, full transferability is not necessary, New Zealand keep foreign agents out of the industry (ranked 4 out of 5 on the scale) (OECD, 2006). The pure model of the individual vessel quotas is not transferable (ranked 0 out of 5 on the scale). Although, in Norway, the variant systems of the traditional IVQ system allow some forms of long-term transferability. The UQS for deep-water boats allows the owner of two boats to move the quota from one boat to another (ranked 3 out

of 5 on the scale). The SQS for coastal boats (15-28 m) permits the owner of two boats to move quota from one boat to another subject to one boat is scrapped (ranked 2 out of 5 on the scale). And the Quota Exchange System (QES) for coastal boats less than 28 m allows cooperation of two boat owners inside one group for fishing both quotas on one boat for three out of five years (ranked 3 out of 5 on the scale) (Gallic, 2004). The average level of the transferability for the Norwegian quota is ranked 3 out of 5 on the scale.

New Zealand ITQs can be easily aggregated or divided, any share may be moved. The level of *divisibility* is high (ranked 5 out of 5 on the scale). Because the connection between the divisibility and transferability is high, in case with the pure IVQ regimes it becomes difficult to divide quota (ranked 0 out of 5 on the scale). Due to the modified systems of the traditional IVQ regime (UQS, SQS and QES), the level of the divisibility is relatively high, but limited (ranked 4 out of 5 on the scale).

Compared to Norwegian IVQs, ITQs in New Zealand are described by higher level for all key factors. That means the ITQs can permit both the long-term investment and short-run utilization of fish capacity. However, the development of innovative variants of IVQs in Norway offers additional flexibility to the regime (OECD, 2006).

The Harvest Strategy Standard that complies with the Fisheries Act 1996, indicates four measures which used to classify the status of fisheries and stocks in New Zealand. The first one is the “soft limit”, the stock is almost depleted or overfished and needs to be intensively rebuilt. The next is the “hard limit”, it describes that the stock is close to be collapsed and fishing should be cautious with a view to fix the stock as fast as that possible. The third measure is the “overfishing threshold”, this limit should not be surpassed, as it will lead to the depletion of the stock biomass below biomass limits and/or management targets (if this has not happened yet). The last one is the “management target” which is illustrative of the biomass level, but sometimes given as a fishing mortality standard.

By the end of 2015, the biggest part of the fisheries in New Zealand performed well. According to the Status of New Zealand’s Fisheries by the end of 2015, regarding the number of fish stock of known status: 82,8% of fish species exceeded their “soft limits”, 94,0% exceeded the “hard limit”, 85,1% of fish stocks were below the “overfishing threshold”, and 72,5% of stocks exceeded the “management target”. Regarding the volume of landings of species of known status: 96,8% of stocks above their “soft limits”, 99,6% exceeded the “hard limit”, 94,6% of the landings was below the “overfishing threshold”, and 93,5% exceeded the “management targets”. The key conclusion from these numbers is that almost all of the New Zealand’s fisheries are effective (Ministry for Primary Industries, 2016).

According to the report of the Northern Research Institute (2016), in Norwegian fisheries, the traditionally harvested stocks are almost fully exploited, but the aquaculture sector has possibility to quintuple their production. Because the biggest part of the wild stocks biomass harvested from species shared with other countries (Russia, Iceland, EU, the Faroes Islands, Greenland), the biomass accessible for Norwegian fisheries is varied according to the stock size, the stock size of species that are not shared, and the volume of the TAC allocated Norwegian vessels. So, the condition of the Norwegian stocks is determined from the international negotiations and biological factors. In Norwegian fisheries, the utilization of the traditional fish species is mostly well balanced with the unstable resource base. The future alternative for increase of the fisheries is through use of other fish and marine species, like seaweed and plankton (Falk-Anderson, Forbord and Vennesland, 2016).

The economic sustainability of the Norwegian seafood industry can be determined by profit. Based on data from Statistics Norway, the contribution the fishing industry and aquaculture was NOK 63,8 billion, up to 8% from 2014 (NOK 58,3 billion) (Figure 13). In Norway, the increase of the economical sustainability is noticed.

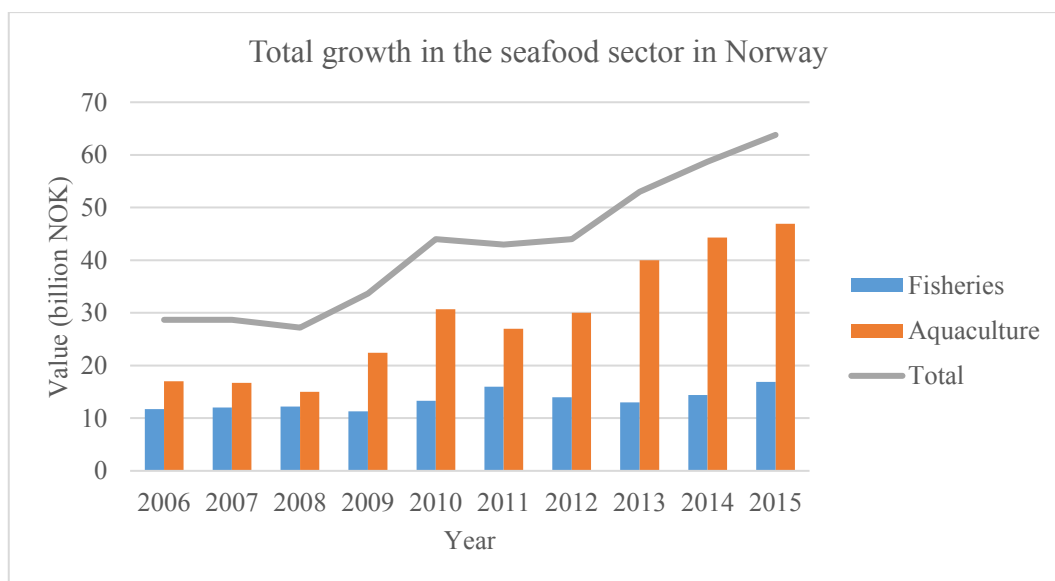


Figure 13. Total growth in the seafood sector, unit – billion NOK (Source: Statistics Norway)

According to the Statistics Norway, the annual growth in Gross Domestic Product (GDP) is 1,9% (in 2012), the seafood sector grew by 5,5% per year, and the others of the industrial sector by 1,5% (Figure 14).

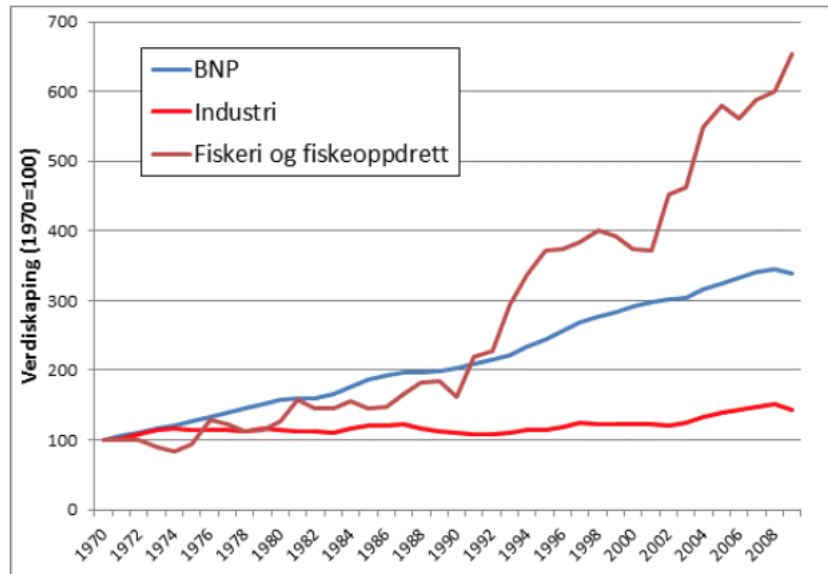


Figure 14. Total Norwegian growth in value generation, in the fisheries/aquaculture sector and the industrial sector in general, 1970-2008 (Source: Reve and Sasson, 2012)

The economic effects of the seafood industry in New Zealand can be measured regarding the total profit from the fisheries and aquaculture. (Figure 15).

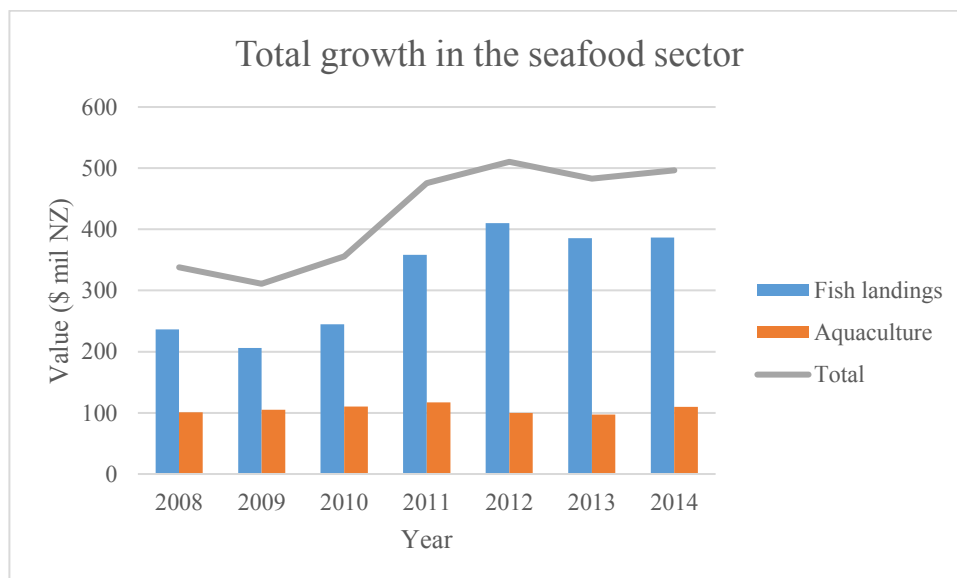


Figure 15. Total growth in the seafood sector, unit - \$ million NZ (Source: OECD, 2015)

In 2013, the seafood industry in New Zealand contributed 896 \$ million NZ to GDP, which amounts 0,4% of the national economy and 22% of the marine economy (Figure 16).

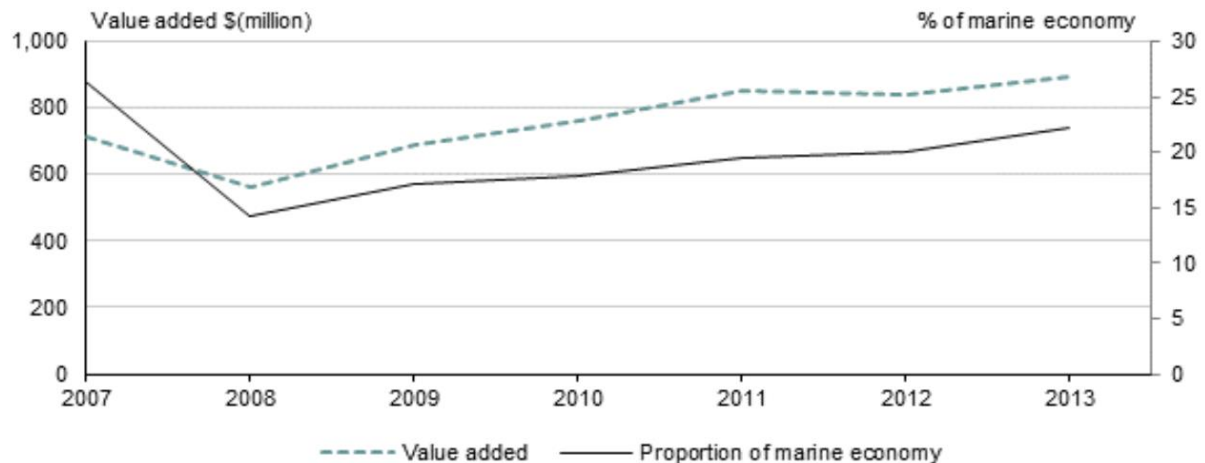


Figure 16. The value creation (contribution to GDP) and proportion of the marine economy, 2007-2013 (Source: Statistics New Zealand)

The fisheries policy in New Zealand plays an important role regarding the Māori, who have established rights to the fishery. The Māori rights have been fundamental for their traditions, doctrine of land title, and the Treaty. On the other side, the Sami fishing rights, include rights as part of their traditions, international agreements, and local legislation. The Lapp Codicil, article 12 (1751)⁸ can be defined this way, but the codicil does not give the same rights as the Treaty. As opposed to Norway, New Zealand has a common law structure with an unwritten constitution. In the case of the Sami people, the development of legal precedent and legislation in New Zealand relative to Māori rights could make a foundation for the recognition of the Sami fishing rights (Toki, 2010).

Today, the difference between observance of Māori fishing rights in New Zealand and Sami fishing rights in Norway is large. For example, now Māori control over one-third of the commercial fisheries in New Zealand and Sami have just an extra Sami quota on cod in the north of Norway (an extra 3,000 tons).

⁸ The Lapp Codicil from 1751 is an agreement that established the Norwegian-Swedish border. This codicil formalized the rights of the Saami (or the Lapps) to prosecute with their historic migratory reindeer on the newly confirmed border between the Sweden and Norway. The citizenship, taxes and other things had also appeared.

Chapter 6. Conclusions

The Norwegian IVQ system combines aspects of both strong public governance and market mechanism. The IVQ system was created to specifically avoid market transactions of related vessels and quotas, to provide diversity of the fleet structure, and to decentralized ownership of cod quotas in business ineffective regions (the “cod-crisis” in the 1990s). For that reasons, the ITQ system with a strong concentration of quotas and full transferability has never been a right alternative. However, time moves along and the original IVQ has been forced to move from a nonflexible system, towards a market-oriented regime to increase transferability of the vessels and quotas. During the “cod-crisis”, the ITQ system was rejected to avoid concentration of the cod quotas on the “privileged few”, but the opposition didn’t take the potential for changes in ownership and vessel’s weak economy into account. As a result, the big corporate investors took over the “lion’s share” of the trawler fleet in the north of Norway (Standal and Aarset, 2007).

The ITQ market in New Zealand is a highly segmented, divided into different geographical regions, that gives a large number of segmented quota markets. The ITQ system does not provide a full transferability; the selling and buying of quotas go on without restrictions. Compared to the New Zealand model, the IVQ system has the limitations based on transferability because of governmental approval (Hersoug, 2005).

Biological and economic factors of the Norwegian IVQ system and the New Zealand ITQ system are both on a good level. Norway is better in economic sustainability due to the size and the importance of the industry. On the other hand, the stock biomass in New Zealand is not under the outside pressure. Because of the co-operation between Norway, Russia, Iceland, Greenland, the EU and the Faro Islands, scientists are worried about the condition of many stocks. Countries cannot agree on lower catches, especially in the pelagic fisheries and today the total catch is exceeded by far the recommended annual tonnage according to scientists.

From an ethnical point of view, the Norwegian government has encroached on the Sami people’s legitimate rights for a long time. The point of view of the Norwegian authorities is that traditional use is not an appropriate basis to constitute a right. It may happen, that

in the future, the Norway will accept the consultation process with the Sami people to administer and distribute their assets, in the similar way as the process undertaken by Māori people in New Zealand.

Over the time the Norwegian government have acknowledged that the ITQ system is an effective instrument to reduce overcapacity. The limitations on quota trade have gradually been reduced.

The quota has been distributed to more and more vessel groups. The IVQ system is still subject to continuous development, but even though there are still vessels outside the system, the core of the system is under transferable quotas now (around 75-80% of landings) (Hannesson, 2012). The IVQ system unavoidably leads to the same fleet structure and concentration of quotas as the experience from the New Zealand's ITQ system. The IVQ model was originally created to decentralize the distribution of the vessels and quotas and make small companies stronger. However, today the IVQ system in Norway seems to be best suited for the strongest stakeholders and not for the weak and small actors in rural fisheries dependent regions (Standal and Aarset, 2007).

The Norwegian fishing industry is a complex structure with the long history. The development of the IVQ system makes it similar to the ITQ system. But as for now it is complicated to predict the future of the fisheries management and the way it would look in a few decades. No matter what would happen, the Norwegian "final" product will always be uniquely Norwegian.

Bibliography

Annala, John H. 1996: "New Zealand's ITQ system: have the first eight years been a success or a failure?" *Reviews in Fish Biology and Fisheries* 6: 43-62.

Aranda, Martin and Anne-Sofie Christensen. 2009: "The New Zealand's Quota Management System (QMS) and its Complementary Mechanisms." *Comparative Evaluations of Innovative Fisheries Management*: 19-41.

Årland, Kristin and Bjørndal Trond. 2002: "Fisheries management in Norway – an overview". *Marine Policy* 26 (2002): 307-313.

Arnason, Ragnar. 2000: "Property Rights as a means of economic organization." *Use of property rights in fisheries management. FAO Fisheries Technical Paper* 404/1: 14-25.

Barzel, Yoram. 1997: "Economic Analysis of Property Rights. Political Economy of Institutions and Decisions." *Cambridge University Press*.

Branch, Trevor A. 2009: "How do Individual Transferable Quota affect marine ecosystems?" *Fish and Fisheries* 10: 39-57.

Chu, Cindy. 2009: "Thirty years later: the global growth of ITQs and their influence on stock status in marine fisheries." *Fish and Fisheries* 10: 217-230.

Clark, C.W. and C.R. Munro. 2002: "The problem of overcapacity." *Bulletin of Marine Science* 70, no. 2: 473-483.

Clark, Ian. 1993: "Individual transferable quotas: The New Zealand experience." *Marine Policy* 17: 340-342.

Connor, Robin. 2000: "Are ITQs Property Rights? Definition, Discipline and Discourse." *Use of property rights in fisheries management. FAO Fisheries Technical Paper* 404/2: 29-38.

Connor, Robin. 2001: "Changes in Fleet Capacity and Ownership of Harvesting Rights in New Zealand Fisheries." *Case Studies on the Effects of Transferable Fishing Rights on Fleet Capacity and Concentration of Quota Ownership. FAO Fisheries Technical Papers* 412.

- Copes, P. 1986: "A critical review of the Individual quotas as a device in fisheries management." *Land Econ* 62, no. 3: 278-291.
- Davis, Anthony and Svein Jentoft. 2001: "The challenge and the promise of indigenous peoples' fishing rights – from dependency to agency." *Marine Policy* 25: 223-237.
- Deweese, Christopher M. 1998: "Effects of Individual Quota Systems on New Zealand and British Columbia fisheries." *Ecological Applications* 8, no. 1: 133-138.
- Deweese, Christopher M. 2006: "Historical observations of New Zealand's Quota Management System." University of California Davis, New Zealand fisheries study tour. <http://nzfishtour.ucdavis.edu/tour2006.cfm?displaysection=5> (accessed June 11, 2016).
- Falk-Andersson, Jannike, Forbord, Magnar, and Vennesland, Birger. 2016: "Mapping the bio-economy: biological resources and production in forestry, agriculture, fisheries and aquaculture across Norway." *NORUT*.
- FAO. 2012: "The State of World Fisheries and Aquaculture 2012. World review of fisheries and aquaculture. Part 1." *FAO*.
- FAO. 2014: "Yearbook of Fishery and Aquaculture Statistics." *FAO*.
- Fiskeridirektoratet. 2016: "Fiskefartøy og fiskarar, konsesjonar og årlege deltakaradgangar 2015/ Norwegian fishing vessels, fishermen and licenses 2015." *Fiskeridirektoratet*.
- Gallic, Le Bertrand. 2004: "The use of market-like instruments in OECD countries: key insights from an organizational framework." *IIFET 2004 Japan Proceedings*.
- Gordon, Scott H. 1954: "The Economic Theory of a Common-Property Resource: The Fishery." *The Journal of Political Economy* 62, no. 2: 124-142.
- Grafton, Quentin R. 1996: "Individual Transferable Quotas: theory and practice." *Reviews in Fish Biology and Fisheries* 6: 5-20.
- Gullestad, Peter, Asgeir Aglen, Åsmund Bjordal, Geir Blom, Sverre Johansen, Jørn Krog, Ole Arve Misund, and Ingolf Røttingen. 2013: "Changing attitudes 1970–2012: evolution of the Norwegian management framework to prevent overfishing and to secure long-term sustainability." *ICES Journal of Marine Science*.

Hannesson, Rögnvaldur. 2013: "Norway's experience with ITQs." *Marine Policy* 37: 264-269.

Hannesson, Rögnvaldur. 2002: "The Economics of marine reserves." *Natural resource modelling* 15, no. 3: 273-289.

Hardin, Garrett. 1968: "The Tragedy of the Commons." *Science* 162: 1243-1248.

Harte, M., and R. Bess. 2000: "The role of property rights in the development of New Zealand's marine farming industry." *Use of property rights in fisheries management. FAO Fisheries Technical Paper* 404/2: 331-338.

Hartley, M. and M. Fina. 2001: "Allocation of individual vessel quota in the Alaskan Pacific halibut and sablefish fisheries." *Case studies on the allocation of transferable quota rights in fisheries. FAO Fisheries Technical Paper* 411.

Henriksen, Edgar. 2014: "Norwegian coastal fisheries. An overview of the coastal fishing fleet of less than 21 meters." *Nofima*. Report 14.

Hersoug, Bjørn, Bjørn-Petter Finstad, and Pål Christensen. 2015: "The system of Norwegian fish sales unions – An anachronism or a successful adaptation to modern fisheries?" *Acta Borealia* 32, no. 2: 190-204.

Hersoug, Bjørn, Petter Holm, and Stein Arne Rånes. 2000: "The missing T. Path dependency within an individual vessel quota system - the case of Norwegian cod fisheries." *Marine Policy* 24: 319-330.

Hersoug, Bjørn. 2005: "Closing the Commons. Norwegian fisheries from open access to private property." *Eburon*.

Hersoug, Bjørn. 2002: "Unfinished Business. New Zealand's experience with rights-based fisheries management." *Eburon, Delft*.

Hewitt, Chad L., Jane Willing, Allan Bauckham, A. Maria Cassidy, Camilla M.S. Cox, Liz Jones, and Debra M. Wotton. 2004: "New Zealand marine biosecurity: Delivering outcomes in a fluid environment." *New Zealand Journal of Marine and Freshwater Research* 38: 429-438.

- Holm, Peter. 1995: "The Dynamics of Institutionalization: Transformation Processes in Norwegian Fisheries." *Administrative Science Quarterly* 40, no. 3: 398-422.
- Hughey, Kenneth F.D., Ross Cullen, and Geoffrey N. Kerr. 2000: "Stakeholder groups in fisheries management." *Marine Policy* 24: 119-127.
- Jentoft, Svein and Bonnie McCay. 1995: "User participation in fisheries management. Lessons drawn from international experiences." *Marine Policy* 19, no. 3: 227-246.
- Jentoft, Svein. 2013: "Social Justice in the Context of Fisheries – A governability Challenge." *Governability of Fisheries and Aquaculture: Theory and Applications. Mare publication 7*: 45-66.
- Lorentzen, Torbjørn and Rögnvaldur Hannesson. 2004: "The Collapse of the Norwegian Herring Fisheries in the Late 1950s and 60s. Crisis, Adaptation, and Recovery." *Centre for Fisheries Economics*. Discussion paper no. 2.
- Mace, Pamela M., Kevin J. Sullivan, and Martin Cryer. 2014: "The evolution of New Zealand's fisheries science and management systems under ITQs." *ICES Journal of Marine Science* 71, no. 2: 204-215.
- Macgillivray, Paul B. 1990: "Assessment of New Zealand's individual transferable quota fisheries management." *Economic and Commercial Analysis* no. 75.
- Matulich, S. C. and S. Sever. 1999: Reconsidering the initial allocation of ITQs: the search for a Pareto-safe allocation between fishing and processing sectors. *Land Economics* 75: 203-219.
- McCay, Bonnie J. 1995: "Social and ecological implications of ITQs: an overview." *Ocean and Coastal Management* 28: 3-22.
- Ministry for Primary Industries. 2015: "Harvest Strategy Standard for New Zealand Fisheries. The Status of New Zealand's Fisheries 2015." *Ministry for Primary Industries* (2015).
- Ministry of Trade, Industry and Fisheries. June 19, 2015: "Mandat - utvalg for å gjennomgå kvotesystemet i fiskeflåten.", <https://www.regjeringen.no/no/aktuelt/dep/nfd/pressemeldinger/2015/utvalg-skal-se-pa-regler-for-fiskekvoter/mandat---utvalg-for-a-gjennomga-kvotesystemet-i-fiskeflaten/id2423961/> (accessed: November 2, 2016).

Norwegian Ministry of Climate and Environment. 2014: "Norway's Fifth National Report to the Convention on Biological Diversity." *Norwegian Ministry of Climate and Environment*.

Norwegian Ministry of Fisheries and Coastal Affairs. 2014: "Facts about Fisheries and Aquaculture 2013." *Norwegian Ministry of Fisheries and Coastal Affairs*.

OECD. 2011: "Fisheries Policy Reform: National Experiences." *OECD Publishing*.

OECD. 2015: "OECD Review of Fisheries: Country Statistics 2015." *OECD Publishing*.

OECD. 2013: "OECD Review of Fisheries: Policies and Summary Statistics 2013." *OECD Publishing*.

OECD. 2006: "Using Market Mechanisms to Manage Fisheries. Smoothing the path." *OECD Publishing*.

Reve, T. and A. Sasson. 2012: "Et kunnskapsbasert Norge (A knowledge-based Norway)." *Universitetsforlaget*.

Røed, Henning. 2013: "Fiskehistorier. Hvem skal eie havet?" *Manifest*.

Sandrey, R.A. 1986: "Māori fishing rights in New Zealand: an economic perspective." *Agriculture Economics Research Unit* no. 101.

Scott, Antony. 1988: "Development of Property in the Fishery." *Marine Resource Economics* 5: 289-311.

Scott, Antony. 2000: "Introducing property in fisheries management." *Use of property rights in fisheries management. FAO Fisheries Technical Paper* 404/1: 1-13.

Sharp, M.H. Basil. 1997: "From regulated access to transferable harvesting rights: policy insights from New Zealand." *Marine Policy* 21, no. 6: 501-517.

Shotton, R. 2000: "Current Property Rights Systems in Fisheries Management." *Use of property rights in fisheries management. FAO Fisheries Technical Paper* 404/1 (2000): 45-50.

Sinner, Jim and Andrew Fenemor. 2005: "The Adoption of ITQ for New Zealand's Inshore Fisheries." *Ecologic Research Report* no. 4.

Slack, E.B. 1969: "The Fishing Industry in New Zealand." *Fisheries and New Zealand*.

Søreng, Siri Ulfsdatter. 2007: "Fishing rights struggles in Norway: political or legal strategies?" *Journal of Legal Pluralism* 55: 187-210.

Standal, Dag and Bernt Aarset. 2008: "The IVQ regime in Norway: A stable alternative to an ITQ regime?" *Marine Policy* 32: 663-668.

Statistics New Zealand. 2010: "Fish monetary stock account 1996-2009." *Statistics New Zealand*.

Stewart, James and Peter Callagher. 2011: "Quota concentration in the New Zealand fishery: Annual catch entitlement and the small fisher." *Marine Policy* 35: 631-646.

Stokes, A. 2000: "Property rights on the high seas: issues for high seas fisheries." *Use of property rights in fisheries management. FAO Fisheries Technical Paper* 404/2: 107-117.

Toki, Valmaine. 2010: "Indigenous Peoples' Fisheries Rights – A comparative perspective between Māori and the Sami." *Arctic Review on Law and Politics* 1: 54-81.

Von Quillfeldt, C.H., Olsen E., Dommasnes A., and Vongraven D. 2009: "Integrated ecosystem-based management of the Barents Sea - Lofoten areas." *Tapir academic press*: 545-562.

Williams, J.H. and S. Hammer. 1999: "The Norwegian fisheries: an unregulated common property resource in transition by the introduction of quotas, closed access and the industry's user-right perception." *Royal Norwegian Ministry of Fisheries. Institutional Arrangements*: 192-197.

Yandle, Tracy and Christopher M. Dewees. 2008: "Consolidation in an Individual Transferable Quota Regime: Lessons from New Zealand, 1986-1999." *Environmental Management*: 915-928.