The Effects of Globalization on Artisanal Fisheries in the Magellan and Chilean Antarctic Region

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The Netherlands, 2018

Images: Personal archive.

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Date: June 23rd, 2018

UvA ID: 11254750

Word Count: 31 385 words

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Abstract

Globalization and changes in international markets have effected the local level by defining and redefining the local production schemes, excluding or including actors, transforming local cultures, and influencing the ecosystems' sustainability. While there is vast literature about local and global economic interactions and value chains of various fisheries, there are no studies on the value chain and socioeconomic issues of the southern king crab. Therefore, this research aims to understand the consequences of global fishing markets on the Magellan and Chilean Antarctic regions by studying the history and value chain of this fishery and the effects of global value chains (GVC) on the social well-being of those artisanal fishers involved in this activity.

A mixed-methods approach was applied, employing observations, semi-structured and unstructured in-depth interviews, and a survey with the fishers and key informants. This study finds a simplification in the production requirements due to the new markets' preferences oriented in less processed seafood. One of the main buyers, China, has influenced the transformations in the production process by buying whole frozen products instead of canned food. However, despite a lower added value, the prices paid for this marine resource are higher than in the past due to the increasing demand and hard competition among suppliers. This increase in price influences the social mobility and the objective well-being of the fishers and differentiates this activity from other Chilean fisheries because of the income.

The king crab's case deepens the knowledge about the complexity in fisheries' structures and highlights the social dimensions of them. By showing how globalization and globalization of fisheries have developed highly regulated and competitive artisanal fishing activity, this study shows the importance of complementing the predominantly technical and ecological analyses of fisheries with a socio-economic and well-being perspective. Hence the author argues for a more holistic approach towards the effective governance of king crab fisheries and fair allocation of benefits for all the actors involved, specifically, for the most vulnerable in the chain: the artisanal fishers.

Keywords: southern king crab, value chain, social well-being, globalization, fisheries, Chile.

Acknowledgements

Doing fieldwork about fisheries in an extreme place such as the Magellan region taught me many things about human nature--one of the most important being perseverance. Perseverance from those who have lived in this region despite the extreme weather conditions and geographical distance, but also from the artisanal fishers who are challenged every single day by the Patagonian frozen waters and the strong cold winds.

Writing a thesis is also an exercise of perseverance, especially in those days when ideas are not clear and confusion is normal. However, being surrounded by supportive people and practicing consistency is part of the recipe for a successful result. Thus, I want to say thank you to all the people who were part of this journey, especially to my supervisor, Maarten Bavinck, for sharing, with kindness and patience, his wisdom. Professor Bavinck is an example of human warmth and genuine academic commitment. I am grateful for the IDEAL Research Center, my local supervisor, Laura Nahuelhual and all the people in Valdivia and Magallanes who contributed to my research. I treasure with love the time that I spent in Chilean Patagonia--a wild place full of warm and wonderful people and surreal landscapes.

Also, I want to express my gratitude to my alma mater in Costa Rica, Universidad Nacional, and my academic unit, the International Relations School, for trust and the opportunity to complete my Master studies in The Netherlands. I am so proud to say that I am the result of a country and a university with a strong social vision and humanism.

Finally, I want to thank all my friends and family, especially to my beloved mother, Mari, and brother, Luis Carlos, who always support me despite the distance. They are my reason for continuing in this journey called life. To my mother, thank you for being such a great woman who I deeply love, admire, and respect. And, of course, to my beloved grandfather's memory; years cannot take away my love and pride for you, Papá.

Contents

1. Introduction[1]

At mid-morning or at the end of the afternoon in Barranco Amarrillo harbor, 15 minutes by car from downtown Punta Arenas, the main city of the Magellan and the Antarctic region, several mid-sized, artisanal motor boats arrive back full of live king crab in their storages. Many of these boats do not belong to the fishers, but to the middlemen. In this kind of modern harbor there are some medium-sized trucks with men, some of them probably migrants from Colombia, Haiti, or Dominican Republic, who are waiting in order to land the king crab. Meanwhile, authorities supervise the landing by measuring this big red and spiny crustacean and checking that all of them are males (catching females is not allowed by the law). If the crab meets these requirements, the men carefully put it into a blue plastic box inside the truck. Then, the king crab, still alive, is taken to a processing plant where it will be killed, cleaned, cooked, frozen, and packaged under different presentations, but the most common, as a whole frozen crab. After many days of travel, this Antarctic crustacean will probably be placed into a colorful gift box and perhaps will be a corporate gift for the New Chinese Year, served in a luxurious Asian restaurant, or as a gift as a sign of good luck among relatives in China.

Briefly and simply described, this is the value chain of the king crab caught in the Magellan region. This is one of the most important fisheries in the region, which in a period of around ten years, has experienced a remarkable price increase due to a growing demand, especially from Asian markets. This growing demand, and some political and economic national policies, has led to remarkable changes in this fishery.

Thirty or forty years ago, this complex and formalized process of catching king crab was unthinkable. This crustacean was caught by artisanal fishers close to the coast in small boats, without any mechanization or regulations. The fishers transported the king crabs by themselves and the harbor was an exchange point where even locals could buy, among others, this marine resource. However, the demand for this product and the integration of Chile into the global value chains configured an artisanal fishery with some industrial features. In this fishery, many artisanal fishers have experienced social mobility because of higher incomes, but also questionable changes related to personal expectations and relations among fishers and authorities, which completely transformed the artisanal fishing scenario in the Magellan region. By describing this chain and all its transformations, it is possible to analyze different fisheries' roles in communities and, in a broader sense, the effects of globalization and globalization of fisheries at the local level.

Globalization entails complex and multidimensional processes (Rood & Schechter, 2007) that have changed the way in which countries and markets interact through the creation of regulations, faster and cheaper communication, and transportation alternatives. These interactions imply possibilities of free movement of capital, people, and goods. But, at the same time, standards and

[1] Some sections (introduction, theoretical framework, and methodology) in this thesis are based on the research proposal "The effects of globalization on high-priced artisanal fisheries in the Magellan and Chilean Antarctic Region, Chile" prepared and presented by the researcher before going to fieldwork.

new restrictive regulations emerge creating a paradox among fragmentation/integration or inclusion/exclusion (Laforest & Brown, 1994; Shangquan, 2000; Maslow, 2009). An example of this paradox is the market integration through free trade agreements and multilateral organizations. However, with these agreements, new non-tariff regulations were established, especially by developed countries (Kiripet, 2012). Most of the time, these regulations are difficult to accomplish by producers in developing countries because of lack of infrastructure, knowledge, and resources. As a result, despite the existence of a trade agreement, the market establishes measures for excluding those who cannot compete, excluding them as well from the global value chains. This paradox illustrates how globalization implies unequal distribution of benefits (Rood & Schechter, 2007) which is also evident in fisheries.

Regarding seafood in the globalization context, it has a key economic role by being the "the most world-traded food commodity" (FAO, 2017, p. 1). Besides that, according to FAO (2018)[2], "fisheries and aquaculture provide livelihoods to around 820 million around the world." From that number, around 56.6 million people are engaged in the primary sector of capture fisheries and aquaculture (FAO, 2016), most of them located in developing countries. Thus, artisanal fishing is one of their main sources of income and energy for many people by providing well-being to millions of people as a source of income, but also as an activity in which cultural, spiritual, social, and environmental issues are involved (FAO, 2016; The World Bank, 2013).

Globalization has economic, political, cultural, environmental, and social effects on fisheries (Schmidt, 2003; OECD, 2007; Tylor et al., 2007; Thorpe & Bennet, 2001). For instance, consequences related to the new market demands change and lead to the emergence of new suppliers, new governance mechanisms, higher pressure on marine ecosystems leading to the depletion of some species (Lem & Emerson 2008; FAO, 2016). All of these effects are part of the bigger and permanent debate among economic development and the environment (The Brundtland Report, 1987; Adams, 2004; OECD, 2018). According to Rood and Schechter (2007), fisheries' globalization is also a localized activity with global consequences in which some groups benefit from the increasing productive efficiency and others suffer the consequences of resource mismanagement in order to accomplish external demands.

In the case of fisheries' globalization in Chile, this country has positioned itself as the sixth exporter and the eleventh producer of fish worldwide (FAO, 2016), taking the advantages of its long coast and its huge and biodiversity-rich marine space. Therefore, the country has a high potential in seafood production where the industrial and artisanal fishing, and more recently the aquaculture sector (salmon), are growing in relevance for national economy (Observatorio Laboral Chile, 2016; FAO, 2016; OECD, 2018). From an economic perspective, artisanal fisheries–in contrast to industrial fisheries--have been an important subsector in Chilean fisheries by providing a high number of direct and indirect jobs and contributing to national fish production. For instance, in 2015 and regarding employment, artisanal fisheries represented 43% (Palma et al., 2015, p. 24) of the total fishing sector with 94,164 people reported as artisanal fishers in the official records.

In line with the richness of marine resources and liberal economic policies, in the last 50 years this country has developed an institutional and governance framework with different tools such as

[2] "(…) worldwide, one in two seafood workers is a woman" (Monfort, 2015).

quotas, bans, minimal sizes, and management committees in order to regulate the exploitation of these resources (OECD, 2008, p. 57-71). However, the implementation of this framework, in combination with the economic power of industrial fisheries, the increasing interest in establishing protected areas and national parks, and also new trends in international markets, have affected the artisanal fishing sector and created uncertainties about its future (OECD, 2008; Moreno & Revenga, 2014). Thus, globalization of fisheries raises many questions related to the future of artisanal fishing as an occupation, resource sustainability versus fishing efficiency, food security for those communities relying on marine resources, effective governance mechanisms, resource allocation, and social inequalities in fishing communities, among others.

The main objective of this research is to analyze the effects of globalization on the artisanal fisheries of the southern king crab (*Lithodes santolla*). These effects are studied by analyzing market data and the views of different actors involved in the artisanal fish production chain, mainly, the king crab fishers. It is important to highlight that the artisanal fishing activity in the Magellan region and the rest of the country was promoted by international fishing policies created in 1960 and the creation of exclusive economic zones at sea (Mellado et al., 2017). However, the region has been historically recognized for their richness in exotic and high-value marine resources, for instance, at the beginning of the twentieth century the chase of whales and seals was popular (Chaparro, 1917). More recently, the king crab fishing became one of the most important economic activities in the regional fishing sector due to the growing Chinese demand for this crustacean.

Since most of the research on Chilean fisheries has been focused on biological issues, the importance of doing more and deeper analysis related to economic, social, and governance aspects have been recognized (Yáñez t al., 2011, p. 168). Generally speaking, there are several biological and fishery knowledge gaps due to the lack of data about stocks, effects on habitats (Armstrong & Falk-Petersen, 2008), underestimation of fishing effort (Anticamara et al., 2011), and neglecting different types of knowledge, such as fishers' knowledge (Mckinson & Nottestad, 1998; Stephenson et al., 2016). Hence, interdisciplinary approaches to fisheries beyond the biological and fisheries' perspective contribute to formulating more effective and inclusive public policies based on the particularities of ecosystems, production systems, and value chains.

By using a global value chain and social well-being approach, this research aims to contribute to understanding the effects of economic globalization at the local level by using the southern king crab fishery as a case study. This case was selected due to the growing importance of "luxury" or high-value fish species in international markets (FAO, 2016, p. 63) and the increasing capture of this marine resource in the Magellan and Chilean Antarctic region as a result of it. For the purpose of gathering original material, a four-month fieldwork was conducted in the Magellan region in which fishers, officials, key informants, and consumers were surveyed and interviewed in-depth.

The thesis is structured in seven chapters. The first chapter is a brief introduction to the fisheries' globalization and the research associated with it. The second chapter describes value chain and social well-being as the theoretical framework for the study. Then, chapter three explains the mixed-methods approach applied. After that, chapter four describes the historical background of this fishery in order to understand the current status of it. Chapters five and six contain the empirical findings related to the value chain dynamics and the effects of these dynamics on the well-being of the king crab fishers. Finally, in chapter seven, conclusions of the research are presented.

The research was conducted with the support of the Research Center Dynamics of High Latitude Marine Ecosystems (*Centro de Investigación Dinámica de Ecosistemas Marinos de Altas Latitudes* [IDEAL]). This non-profit academic organization is located in Valdivia and Punta Arenas, Chile, and has the aim of measuring and understanding "the impacts of environmental stressors caused by global change, on the productivity of the marine ecosystems in the Antarctic and Sub-Antarctic regions, and the implications for the communities that depend on them" (IDEAL, N.d.). The Center directs its efforts to three main research themes: the Antarctic and Sub-Antarctic connection, the global change and their impact on the marine environment, and the human dimension of these changes regarding livelihoods and well-being as a result of activities such fishing, aquaculture, tourism, etc. The current research is focused on the human dimension.

2. Value Chains and Social Well-Being: A Theoretical Approach

2.1. Introduction

In order to analyze the globalization of fisheries and the effects of it on the artisanal fishers, the value chain framework and the social well-being approach are used. The main objective of this chapter is to understand how global issues such as socioeconomic changes and market trends impact at different levels on local productive structures and several fields beyond the economic aspect. The chapter starts by describing globalization, globalization of agri-foods, and globalization of fisheries with emphasis on the effects of market liberalization on local fisheries. Then, main aspects of the value chain approach are explained, specifically internal (structures) and external governance mechanisms (horizontal linkages and institutions). In this section, fish chains are analyzed with more detail aiming to understand the particularities of it. Finally, the social well-being framework is introduced by taking into account the three main dimensions of this concept: objective, subjective, and relational well-being.

2.2. Globalization

2.2.1. Globalization: conceptualization.

"Globalization refers to complex and multidimensional processes" (Taylor, 2007, p. 2) in which people and places are connected in different ways and at different levels. Held et al. (1999, p. 2) define globalization as "the widening, deepening, and speeding of the worldwide interconnectedness in all aspects of contemporary social life, from cultural to the criminal, the financial to the spiritual." Globalization is a broad concept and many authors argue that, instead of thinking about "globalization," introducing plural, "globalizations," will be more useful by recognizing that there is not just "a single theory or interpretation of globalization" (Rood & Schechter, 2007: 2).

For the purpose of this research, since globalization is a broad and complex concept, it is mostly analyzed from an economic and social perspective by acknowledging its effects and manifestations beyond the economy, as will be discussed in Chapter 6. Therefore, globalization is considered as "the increasing interdependence of world economies as a result of the growing scale of cross-border trade of commodities and services, the flow of international capital, and wide and rapid spread of technologies" (Shangquan, 2000). This interdependence also implies higher market interaction regardless of distance, which also has social implications by connecting people in different places. According to Rood & Schechter (2007, p. 2), "The deepening of interregional flows and the thickening of networks also suggests that people in different places are now more important and more linked to one another than ever before."

Globalization is not a new phenomenon (Lentner, 2000; Simmons & Oudraat, 2001) and has been deeply studied from different perspectives (Appadurai, 2001; Bhagwati, 2004; Appelbaum & Robinson, 2005; Roberston, 1992; Friedman, 2000; Krugman & Venables, 1995; Beck, 2018).

However, the new aspect is the speed of changes and the increase of interactions at different levels and among different actors, especially in the latter part of the twentieth century. Improvements in communication and transportation systems, an intensive trade exchange, and homogenization of forces in different fields (culture, trade, and businesses, for example) have driven these quick changes, connecting ideas, people, services, and goods. Agri-foods are part of this last category, seafood being an important component of agri-foods. Thus, scholars point out that such products differ from other goods in multiple respects. It is for this reason that the next section pays specific attention to agri-foods.

2.2.2. Globalization of agri-foods.

"Food and agribusiness supply chains and networks–once characterized by autonomy and independence of actors–are now swiftly moving toward global interconnected systems with a large variety of complex relationships" (Ruben et al., 2006, p. 1). This connection among actors located in different parts of the world changes the way in which food is produced, processed, and delivered, and requires "continuous innovation and agency coordination" (Ruben et al., 2006, p. 1). Markets, dominated by consumers with several options, pressure producers in order to assure quality and affordable prices which, instead of being mechanisms for integration, could also lead to exclusion from production chains for those vulnerable producers unable to accomplish these requirements because of lack of market data or poor institutional support (Ruben et al., 2006). Besides this, the liberalization process has diminished tariff measures and, at the same time, especially in developed countries, has raised technical measures, making these measures an obstacle for producers in developing countries. Concerning innovation, food value chains for perishable products are longer than in the past due to new production processes and packaging alternatives increasing the efficiency and product life, and also diminishing transport and storage-related costs.

Urbanization and changing consumer patterns are two elements when analyzing globalization of agri-foods (Ruben et al., 2006). The urbanization phenomenon requests for more efficient food distribution mechanisms and entails new lifestyles for those people living in big cities and who are interested in new, healthy, or stylish food (food as an indicator of social status). Regarding changes in dietary patterns, it entails two phenomena: dietary convergence and dietary adaptation. Kennedy, Nantel, & Shetty (2004, p. 9) argue that dietary convergence is the "result of increased reliance on a narrow base of staple grains, increased consumption of meat and meat products, dairy products, edible oil, salt and sugar, and a lower intake of dietary fiber;" meanwhile, dietary adaptation "is characterized by an increased consumption of brand name processed and storage bought foods, an increased number of meals eaten outside home, and the consumer behaviors driven by the appeal of new foods available."

In this context, retailers and big supermarkets became crucial figures in the process of food globalization by transforming the institutional landscape of production and exchange systems (Ruben et al., 2006) in order to supply an increasing demand for food. They influence the organization of the food chain by requiring product homogeneity, continuous deliveries, quality upgrading and stable shelf life (Ruben et al., 2006). All these requirements design a vertically integrated chain where retailers or supermarkets acquire control forward or backward the structure, for example, buying some related enterprises in order to assure supplies. This also implies complex

and long-lasting relations among actors in order to accomplish the procurement and quality standards.

Integration of food chains entails access to cheaper and diverse food from distant places in the world. However, it also implies environmental, social, and economic effects. According to La Trobe & Acott (2000) one of the main environmental consequences is the called "food miles," which refers to longer distances that food travels to different market destinations and the energy in terms of transport (oil) that this implies, but also regarding transformation and packaging processes in order to keep the product fresh. On the other side, regarding social and economic consequences, "one of the major problems of the global food system is that cheap food imports, in many instances, undermine the farmers' activities, eventually forcing them to leave the land when they can no longer compete and are not able to make a living from farming" (La Trobe & Acott, 2000, p. 312). Besides that, food security in communities is another main concern since many local resources are export-oriented with higher prices that locals, most of the times, cannot pay.

Thus, fisheries are not excluded from these transformations and value chains have been changing due to the market integration and the increasing global demand for sea products, as described in the next section.

2.2.3. Globalization of fisheries.

Globalization in the fisheries sector is a recent field of study. Regarding this, Rood & Schechter (2007, p. 6) argue that "Globalization in fisheries' resources is indeed new in the sense of greater influence on fisheries' stock and consequently requires new governance approaches and policy solutions." A fishery is understood in this research as

> a unit determined by an authority or other entity that is engaged in raising and/or harvesting fish. Typically, the unit is defined in terms of some or all of the following aspects: people involved, species or type of fish, the area of water or seabed, method of fishing, class of boats, and purpose of the activities. (Fletcher et al., 2002)

Hence, Alder & Watson (2007, p. 60) define fisheries' globalization as "the accelerated growth in the trade of fish products resulting in economic activity that spans politically defined national and international boundaries." According to Thorpe & Bennett (2001); by studying the Latin American case, distinguish three main stages in the globalization of fisheries related to the interest of foreign fleets for regional stocks and the effects of national economic and policy management. These stages are: 1. globalization of fish production (from World War II to mid-1970s) in which distant water fleets plundered the Latin American seas unregulated by international and national laws; 2. globalization of trade (from the 1970s to the current day) boosted by the definition of Economic Exclusive Zones (EEZs) and implementation of macroeconomic policies oriented to productive nationalization, including the displacement of foreign distant fleets by national ones; and 3. the globalization of regulatory control (during the 1990s) as a result of the two previous phases, and its effects on resource depletion. All three phases illustrate how policies, both international and national, and the growing demand for seafood, have shaped fisheries in many parts of the world.

According to Rood & Schechter (2007), there are two main drivers in the process of fisheries' globalization: economic integration and technological change. As a result, the global pressure on

local fish stocks has increased and, at the same time, the technology for catching sea resources and understanding the sea has improved. Rood & Schechter (2007, p. 9) highlight that "Technology, along with the globalization of demand, is the source of both problems for fisheries' stocks and solutions to those problems." It is a problem due to the accelerated increase of the fishing effort but it also represents a solution by giving opportunities for a deeper exploration of the sea.

Following the previous arguments about drivers, Chuenpagdee et al. (2005, p. 28) identify three main drivers on this process of globalization. The first factor is the increasing consumption in the main world economies (North America, Europe, and Japan). The second driver is the diversification of demand in these regions, and the third one is the increase in the demand for resources in other regions due to economic growth which leads to higher prices and commodification of those resources previously linked to global markets (Arbo & Hersoug, 1997). These drivers configured a sort of Fordism logic[3] (Chuepangdee et al., 2005, p. 28) in fisheries with several socioeconomic, environmental, and political implications. According to Chuepangdee (2005) these effects could be: 1. threats against aquatic ecosystem health due to the intensification of fishing efforts; 2. social changes with profound implications for social justice; 3. threats against livelihoods, employment, and social relations because of the capitalization of fisheries; and 4. expansion of global fish markets and stronger links with local markets. Alder and Watson (2007, p. 65) refer to these effects by arguing that "Globalization of the fishing sector consumes marine resources, changes the nature of business with flow-on effects to employment and property rights, and also affects how resources are managed."

Regarding the consequences of this process of globalization, Chuenpagdee et al. (2005) argue that it affects fisheries in terms of ecosystems, allocation of resources, employment, and food supplies. Related to controversial effects of globalization on fisheries, some authors highlight the improvements in trawler technologies (processes such as freezing, filleting, etc.) which increase the efficiency and capture capacity to previously non-accessible areas (Taylor et al., 2007; OECD, 2008), processes which also raised the participation of different stakeholders in the value chain. These stakeholders have different scopes: local, regional, national, and global, and make the value chain more complex by creating interaction diversity between levels compared to the past (Taylor et al., 2007). In terms of communication, globalization has offered and could offer political, economic, and social incentives to protect and restore ecosystems by sharing scientific knowledge about the ecosystem dynamics, for example, the introduction of fish harvesting techniques instead of wild captures (Tylor et al., 2007; OECD, 2008; The World Bank, 2013; FAO, 2016).

On the other side, the negative effect of these global interactions is the higher vulnerability in the transmission of human, vegetal, and animal illnesses (Bright, 1999; Tylor et al., 2007; Stentiford et al., 2012). Another negative consequence is the drastic change of ecosystems due to the introduction of new species (highly demanded species in the international market) or depletion of local species by international demands with effects on the local well-being and the environment (Taylor et al., 2007, p. 23). A higher demand on marine species for commercial purposes has effects on the aquatic ecosystems, for example, the degradation in quality and quantity of water resources

[3] A model characterized by mass capture techniques and a high speed production of the industrial fishing sector (Chuenpagdee et al., 2005, p. 28).

with effects on the fish productivity and stocks (Abramovitz, 1996; Sumaila, Bellmann, & Tipping, 2014; Randhir, 2016).

Consequences of globalization on fisheries could also be analyzed from a cultural and ethical perspective in order to understand its complexity and the way in which economic issues transform different human dimensions. For instance, some authors criticize the western production model by arguing that: "traditional fishing practices were both more ecologically friendly and less stressful on cultural networks" (Rood & Schechter, 2007, p. 15) because they respected the biological cycles, and communities used to be the owners and managers of local resources. On the other side, new market demands (standards or certifications) according to changes in consumer preferences are also part of this ethical debate and its contribution to sustainability by criticizing harmful productive processes (Taylor et al., 2007, p. 40).

From a socioeconomic perspective, there is also discussion about consequences of this process of globalization regarding social inequalities (Bennett, 2005; Wamukota, 2014; Rood & Schechter 2007), for example, issues related to gender disparities in this sector (see the case study by Hapke [2009] on gender labor division in fisheries in Kerala, India) or inequalities between industrial and artisanal fisheries (DuBois & Zografos, 2012).

The effect of a growing external demand for seafood is also evident in changes in local food security systems (McClanahan, Allison, & Cinner, 2013; Asche et al., 2015), probably leading to more limited access to seafood by the locals (Golden, 2016), and the industrialization of artisanal fisheries (Fulgencio, 2009; Said, Tzanopoulus, & McMillan, 2016) disempowering fishers from their own resources due to a value chain highly controlled by top actors in the chain.

Regarding production structures, issues in international trade such as regulations and preferences can transform the value chain structure (Gibbon, 2003) by adding or changing processes and actors, for example, the increasing importance of demand-driven structures (Gereffi, 1994; Gereffi & Lee, 2012) in international trade landscape. In this kind of chain, consumers define the products that they are going to buy according to their preferences (Rood & Schechter, 2007), as will be explained in the next paragraphs about global value chains (GVC).

2.3. Global Value Chain

2.3.1. Defining value chain.

Section 2.2. noted that value chains make up part of the food systems. Van Dijk & Trienekens (2012, p. 12) define a value chain as "the full range of activities which are required to bring a product or a service from conception, through different phases of production… delivery to final consumers, and final disposal after use." This chain is composed of different economic actors, such as individuals, local associations, companies, and governments, and encompasses elements related to organization, coordination, strategies, and power relations among actors (Jacinto & Pomeroy, 2011, p. 166). The value chain approach is part of the chain's research, sharing some analytical aspects with approaches such as commodity chain (Gereffi & Korzeniewicz, 1994), supply chain (Gereffi, 1999), and, more recently, novel frameworks like networks (Lazzarini, Chaddad, & Cook,

2001). However, all of them diverge on scope and interaction, and focus on different aspects in the chain.

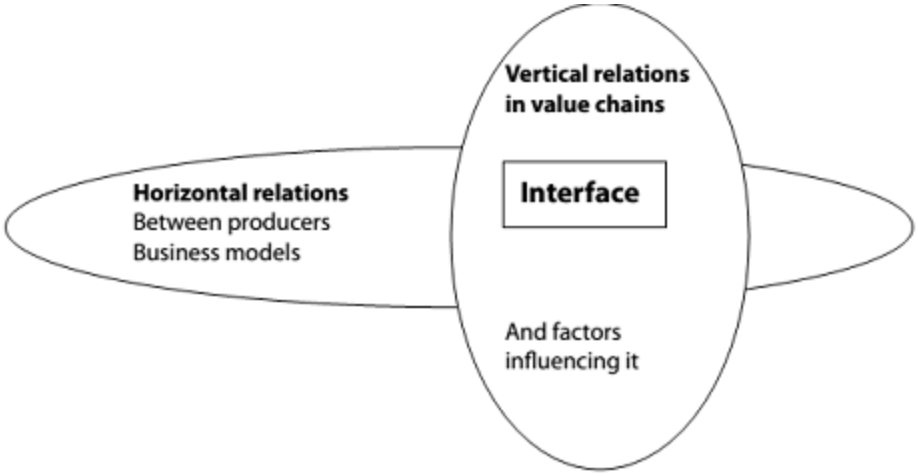
The value chain approach has its roots in the commodity framework, a body of knowledge which gained importance during the 1990s (Lee, 2010). While a value chain entails different production phases "involving a combination of physical transformations and the input of various producer services" where "production *per se* is only one of the number of value added *links"* (Kaplinsky & Morris, 2000, p. 4); a supply chain implies "a number of various entities (i.e. suppliers, manufacturers, distributors, and retailers)" working together in order to "(1) acquire raw materials, (2) convert this raw material into specified final products, and (3) deliver these final products to retailers" (Beamon, 1998, p.281). On the other side, a commodity chain "refers to a network of labor and production processes whose end result is a finished commodity" (Hopkins & Wallerstein, 1986, p. 159). Despite these three concepts sometimes being used interchangeably (Sturgeon, 2000), for the purposes of this research, the main difference among them is the added-value process that the value chain entails.

Thus, regarding GVC, Dijk & Trienekens (2012, p. 9) explain that "Global value chains are about linking producers from developing countries to international markets," which means a connection between local and global production systems. This framework, according to Gereffi & Lee (2012, p. 24) "has gained popularity as a way to analyze the international expansion and geographical fragmentation of contemporary supply chains and value creation and capture therein."

A typical value chain is a vertical structure which describes the flow of services and/or products from producers to consumers. However, several authors emphasize its complexity by adding horizontal relations among actors at local or regional levels (small producers, local traders or associations, farms, etc.) (Figure 2.3-1). Besides that, they also focus attention on their particularities such as length or type of value chain according to the good or service (Dijk & Trienekens, 2012). Horizontal relations involve several "business models" used by producers such as "organizations, clusters, or networks" (Van Dijk & Trienekens, 2012, p. 14); each of them has their own level of development and dynamics. According to Van Dijk & Trienekens (2012, p. 243), collaboration horizontally could be "considered as an important enabler of value chain upgrading."[4]

[4] According to Mitchell et al. (2009), upgrading implies using technological, institutional, and market capabilities in order to improve competitiveness and move into higher value activities.

Figure 2.3-1: Horizontal and vertical relations in the value chain



Source: Van Dijk & Trienekens (2012, p. 15).

The value chain approach has the advantage of adjusting analysis according to markets, resources, individuals, and clusters of entrepreneurs at different levels: global, macro, meso, or micro (Gereffi & Kaplinsky, 2001). As opposed to sector-based approaches, this theoretical framework acknowledges dynamism and interactions at different levels and several directions in the production process (Jacinto & Pomeroy, 2011, p. 166). Besides that, it recognizes structures and several factors that influence the value chain: global, national, regional, clusters, or city-level factors (Van Dijk & Trienekens, 2012, p. 14).

Value chains undergo two types of governance: governance that emerges from the value chain itself (internal governance) and governance that arises from the environment (external governance). The following sections examine these two types of governance.

2.3.2. Value chain structure: mechanisms of internal governance.

The GVC approach analyzes two sides of the production process: the supply and the demand. Moreover, the mode of insertion by local producers is studied, acknowledging that benefits from globalization are distributed unequally and some insertions can harm local actors (Tylor et al., 2007). Thus, related to value chain typologies, it is possible to identify two main categories: form of governance and the position of the leading firm (Taglioni & Winkler, 2016, p. 158-160; Gereffi, 2005, p. 83-84; Gereffi, 1999a; Kaplinsky & Morris, 2002). Regarding the first category, form of governance, there are five types of chain structures: market, modular[5], relational, captive, and hierarchical (see Figure 2.3-2). These chain sub-types describe the configuration of relations among actors within the structure by taking into account three factors: the complexity of shared information within the chain, the coding process of that information, and competence among suppliers (Taglioni & Winkler, 2016).

[5] It is not explained here because it is mostly related to industries such as footwear, cars, apparel, etc.

2.3.2.1. Governance structures.

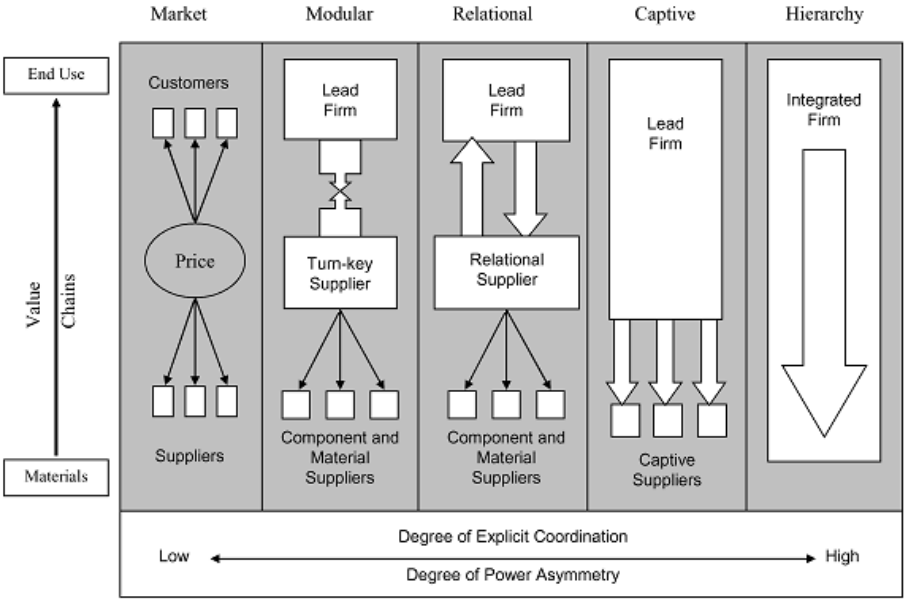
2.3.2.1.1. Market governance.

The market governance structure encompasses simple transactions led by price mechanisms. Suppliers can make products with minimal inputs from buyers because the information about specifications is easily transmitted. Cooperation between leading firms and suppliers is low, then costs associated with switching partners on both sides of the chain are low as well (Taglioni & Winkler, 2016, p.158).

2.3.2.1.2. Relational.

The relational form encompasses a structure where sharing information among actors is difficult and requires strong relations based on trust and other characteristics such as ethnicity or proximity. Also, difficulties in transmitting information along the chain require frequent interactions between the parties; therefore, the mutual dependence is high. However, "lead firms still specify what is needed and thus have the ability to exert some level of control over suppliers" (Taglioni & Winkler, 2016, p. 159). Meanwhile, producers elaborate their products based on unique characteristics such as quality or geographic region related-issues. Because of an intense, high dependence among actors, the costs of switching to a new partner are usually high (Taglioni & Winkler, 2016)

Figure 2.3-2: Value chains: Governance typologies



Source: Gereffi, Humphrey & Sturgeon (2005, p. 89).

2.3.2.1.3. Captive.

The captive structure implies few buyers with high deal power. The lead firm has a high degree of control and monitoring along the chain, which also creates a mutual dependence and higher costs in case of changing partners from both sides. In this kind of structure, upgrading is evident because "the lead firms tend to be in areas outside production, so helping the suppliers upgrading their

production capabilities" (Taglioni & Winkler, 2016, p.159) also increases the value chain efficiency.

2.3.2.1.4. Hierarchical.

This is the less common structure. A hierarchical chain represents a vertical and simple structure where the leading firm is in charge of the whole production process (in-house production) because finding suppliers is difficult due to particularities in the product.

2.3.2.2. The position of the leading firm.

The second category about the position of the leading firm and the control over the whole chain (Taglioni & Winkler, 2016, p. 160-161; Gereffi, 2005, p. 59) involves two kinds of structures: the producer-driven and the demand-driven chains. These types of chains are also related to different kinds of production systems.

2.3.2.2.1. Producer-driven.

The producer-driven chain is led by multinational corporations' focus on scale economies and the production of mid- or high-technology goods. Processes such as research, development, and the final production are under the domain of these corporations. According to Gereffi (2005, p. 32), in these chains "producers take responsibility for assisting the efficiency of both their suppliers and their costumers." The presence of foreign investment is more common in producer-driven chains.

2.3.2.2.2. Demand-driven.

According to Gereffi (1994, p. 82), in the demand-driven chain global buyers have a high control even if they do not own the product. This chain is focused on consumer products and large retailers, marketers, or traders that are in charge of design and marketing but subcontract production, mostly located in developing countries (Gereffi, 1999/2005). This chain is characterized by labor-intensive industries such as footwear or clothing (Gereffi, 2000) and also because local firms located in developing countries, instead of foreign investment, supply the developed countries' demands. According to Gereffi (2005, p. 33), "Production is generally carried out by tiered networks of third-world contractors that make finished goods for foreign buyers. The specifications are supplied by the large retailers or marketers that order the goods."

2.3.3. External governance: institutions and horizontal linkages.

Besides the scales and directions, factors such as production standards, institutions, power relations, and infrastructural issues must be taken into account in order to understand the chain dynamics (Jacinto & Pomeroy, 2011). Some of these factors could also be considered as constraints in the value chain integration process. According to Trienekens (2012, p. 57-60) market access and orientation of the value chain rely on those factors. A detailed value chain analysis identifies actors, structures, and processes by recognizing "new forms of production, technologies, logistics, labor processes, and organizational relations and networks" (Trienekens 2012, p.44), all of them introduced by producers and buyers.

By analyzing these, the dynamic's distribution of power within the chain is determined (Jacinto & Pomeroy, 2011, p. 174) and the added-value process is defined by the most powerful actors in the structure (Trienekens, 2012, p. 57). Thus, it is important to highlight the role of standards in value chain structures and behavior. They can be mechanisms with dual purpose by promoting the adding-value process or being a constraint in the integration into the value chain by those who are more vulnerable and complying with international requirements becomes a difficult task (Giovanucci & Reardon, 2001; Dijk & Trienekens, 2012).

Therefore, the institutional role is important in the value chain analysis by identifying "how local, national, and international conditions and policies shape the globalization in each stage of the value chain" (Gereffi & Fernandez-Stark, 2011, p. 11). Institutional conditions like subsidies, education and innovation policies, taxes, and labor regulation are part of the local or national conditions that determine the level of integration into the value chain by local producers.

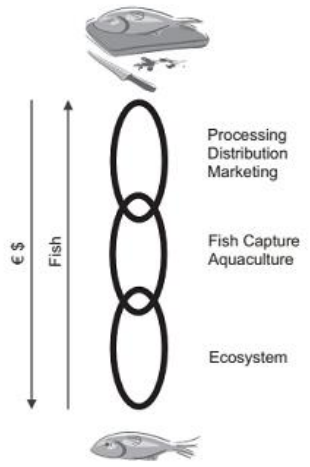
On the other side, as part of the chain dynamics, horizontal linkages imply relations among actors (enterprises or producers) at the same level, stage, or node in the chain (GTZ, N.d.; Schmitz, 1999). These linkages entail actions of coordination or collaboration among actors, sometimes gathered as local associations in order to integrate themselves into the value chain and be competitive (Shresta et al., 2015). According to Schmitz (2005, p. 36), "The small producers organize horizontally so that buyers can interact with one collective organization. Or a local entrepreneur could subcontract a group of small producers and ensure in situ that the buyer's requirements are met." Formal relations (associations) or informal interactions (network supports among actors) characterize the horizontal linkages in the value chain.

Every value chain is particular depending on the product and context (Hellin & Meijer, 2006). But it also shares common aspects with other products which are the base for the analysis, even for comparison purposes. Fish and fishery products are not excluded from these chains; on the contrary, fish, being one of the most traded commodities (FAO, 2016), have structured complex and diverse value chains for such products. This complexity and diversity have different consequences at local, regional, national, and global levels, as explained in the below section about fish value chains.

2.3.4. Fish value chains.

Fish chains have been part of human history (Zohar et al., 2001). However, explanations of these structures were developed just in recent times. Thorpe, Johnson, & Bavinck (2005, p. 41) argue that the fish chain suggests "connectedness–one link fits in with, and influences, the next sequence, as it is itself affected by the preceding link." It is a complex, very particular, and sometimes unique, dynamic, and diverse structure (Johnson et al., 2005, p. 139). Historically, these chains have been studied by using a "vertical" or linear structure (see Figure 2.3-1), which implies a useful but simplistic analysis due to the complexity of interactions between different parts of it.

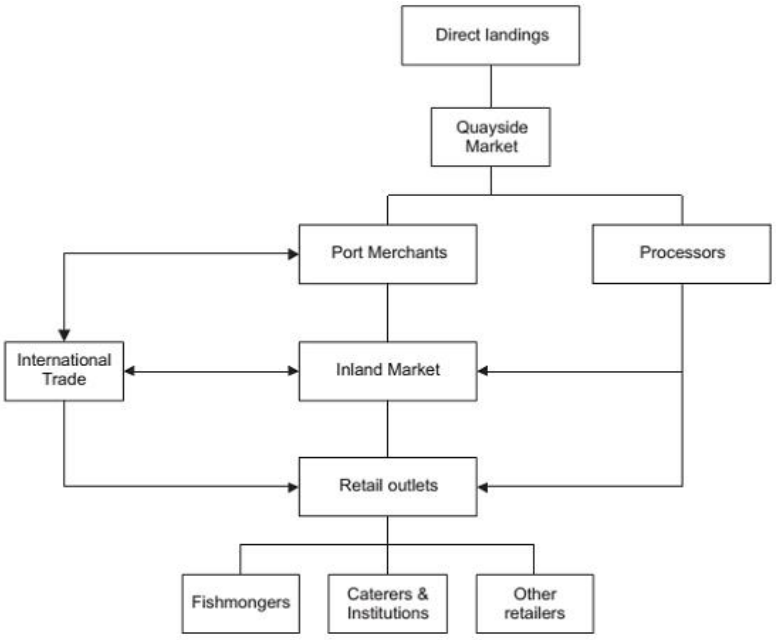
Figure 2.3-1: Vertical fish chain



Source: Kooiman, J. et al. (2005, p. 42).

In vertical chains, changes in fish value and resource transformations are followed by each link describing direct interactions (Thorpe, Johnson & Bavinck, 2005, p. 41). However, simple structures could imply the risk of skipping important interactions or identifying emerging or "hidden" connections along the chain. Thus, more complex chains (including more actors or stages) have been designed by taking into account different scales, contexts, lengths, actors, and levels in order to deeply understand interactions and processes on it (see Figure 2.3-4).

Figure 2.3-4: Example of fish supply chain



Source: Kooiman, J. et al. (2005, p. 115).

This complexity is present in the value chain length, which sometimes is not related to geographical distances but it is most concerned about processes. For example, there are short chains where fresh fish is sold in the coastal areas, but there are also longer ones where several processes (curing, smoking, pickling, salting, drying, and freezing) transform the fish, which could be sold at local or external markets (Thorpe et al., 2005, p. 109).

Technological changes have improved and lengthened the fish chain with new food conservation practices and more efficient transport (De Silva, 2011). Nevertheless, these changes could also increase the vulnerability for local actors (fishers or small enterprises) within the structure as connections with new markets are more direct and dependency on them is higher. Therefore, any important alteration on international markets (prices, standards, or conflicts), especially on the main consumers'/buyers' side, could affect remote supply regions regarding employment, food security, livelihoods, justice, etc. (Thorpe, Johnson, & Bavinck, 2005; Wilkinson, 2006; Rivera-Ferre, 2009). Related to this, Thorpe (2005, p. 131) highlights the vulnerability in fish chains by arguing that "such global fish chains are also more consumer-driven than their counterparts and consequently more vulnerable to 'top-down' pressures to restructure the chain in a particular way."

Analyzing the value chain as a whole is complex because of the diversity of processes, different involved actors and the risk of neglecting specific and important issues along the chain (for instance, informal horizontal relations) by doing a global analysis. That is a reason for an interactive analysis which means analyzing parts of the chain in the interaction with the whole chain in order to identify linkages, structures, and interactions at different levels and within them.

It is important to recognize that the basic chain structure persists (route trawler to the table). However, what happens in between has changed and accelerated with the globalization of fisheries, by including new individuals, organizations, operations, processes, and institutions (Thorpe et al., 2005).

Finally, governance mechanisms are important in value chain analysis (Gereffi, Humphrey, & Sturgeon, 2005). By identifying different governance tools in fish value chains such as tariffs, quotas, restrictions on foreign investments, prevention of restrictive practices, quality standards, etc., it is possible to find a deeper understanding of the current structures and the mode of insertion of local fisheries into the fish GVC.

In short, fish value chains have been structured by global forces like international markets and local factors such as institutions, and economic and political decisions. Besides that, relations among actors at different phases of the chain are shaped by all these drivers with positive and critical effects for different actors, among them, one of the most vulnerable in the chain: the fishers, as is described in the section below about well-being in fisheries.

2.4. Social Well-Being in Fisheries

2.4.1. Social well-being: a conceptualization.

In order to analyze the effects of globalization on fisheries from a human dimension, the social well-being approach is used as a theoretical perspective (McGregor, 2008; Johnson et al., 2018; McGregor & Summer, 2010). Within this framework, well-being is defined as "a state of being with others, where human needs are met, and one can act meaningfully to pursue one's goal and where one enjoys a satisfactory quality of life" (McGregor, 2008, p. 1). Well-being is a non-reductionist approach aiming to analyze the quantifiable phenomenon related to specific human activities without neglecting qualitative features considered as of central importance for a particular human group (Johnson, 2018). According to Agarwala (2014), the well-being approach is interested in diverse and multidimensional needs and aspirations about what it means to live well for a group of people in a specific time and place.

Frameworks such as Millennium Ecosystem Assessment (Millennium Ecosystem Assessment, 2005) and the sustainable livelihoods (Scoones, 1998) considered well-being as a human outcome. However, this conceptualization neglects the relational nature of well-being as a shaping factor of the human impact on the environment according to the ideas on living well; or by well-being as an intrinsic element which constitutes the base for individual actions according to their relations with the external world and their ideas as a result of these relations.[6]

Thus, the social well-being framework is a novel approach developed by Gough & McGregor (2007) "that attempts to synthesize lessons from the international development literature about poverty alleviation into a framework for research and application in developmental interventions." This approach considers well-being as a motivator of human actions, not only as something that is delivered by the ecosystem services. Under this relational consideration of well-being, it is possible to identify what is meaningful for humans and motivates their actions.

2.4.2. Social well-being: dimensions and relevance.

Social well-being is a multidimensional approach. It understands well-being from the material objective, subjective, and relational dimensions (Johnson, 2018). This perspective offers a systematic framework where "material aspects can be combined with emotional needs, cultural dimensions, formal and informal social relations, self-defined rights and freedoms, and how people came to understand wider political, social, and economic structures which govern them" (Weeratunge et al., 2014).

This approach encompasses material and non-material goals and is considered as useful in developmental research and policy formulation because it contributes to understanding what is important (including perceptions and values) to people, communities, and society (Weeratunge,

[6] Previous approaches such as job satisfaction in fisheries analyze if the job contributes to fulfilling a person's needs and the effects of it on physical and psychological health of the fishers (Bavinck et al., 2012). This framework takes into account subjective elements with relational consequences (how the fisher relates with their own environment and different groups of people due to their perceptions of their own job).

2014; Armitage et al., 2012; Breslow et al., 2016). Values, perceptions, and identities are important issues in well-being research in order to analyze motivations and understanding expectations. Each person, group of people, community, or society is motivated in their actions by a system of values (Johnson et al., 2018). These values are not permanent and could change through time, which means that what could be well-being for a person today might not have the same meaning for this person as it had ten years ago, or motivations for being fishers changed with the time. It is also possible that an individual fulfills all the basic material needs and he or she still thinks that they need more to experience well-being (Weeratunge, 2014; Johnson et al., 2018), which reflects the complexity and richness of the well-being analysis.

The social well-being perspective is interested in multidimensional and diverse meanings about living well for specific people at a specific time and particular place. Thus, social well-being encompasses three dimensions: 1. objective: standards of living or resources that people possess such as health, income, education, etc.; 2. subjective: regarding evaluations about how the person is doing, which it includes aspects such as fears or hopes; and 3. relational: the way that people perceive their relations with their own context, for instance, relation with authorities, networks of support, identities, etc. (McGregor, 2008, p. 4).

2.4.3. An approach to the social well-being in fisheries.

The social well-being perspective is interested in multidimensional and diverse meanings about living well. Regarding fisheries, McGregor (2008, p. 256) argues that well-being "provides not only a way to look at outcomes. Just as importantly, it is an analytical lens which can help draw policy attention to the non-material benefits of fisheries, in the course of also adding value to our understanding of social and economic dynamics in fishing communities." The table below describes these three dimensions from the fisheries' perspective.

Table 3.3-1: Values of small-scale fisheries (SSF) from a social well-being perspective

Objective or material	Subjective	Relational
• Economic contributions of SSF • Distinctive practices and technologies employed by SSF • Ecological role and impacts related to other users • Uses of space by small-scale fishers and related groups	• Value given to fishing and fishing practices (e.g. satisfaction; non-fisher admiration or disdain for SSF or ignorance to them) • Particular meanings and attachments associated with coastal ecologies and maritime space by SSF	• Consideration of importance of SSF and aspects of SSF for different groups (e.g. insiders/outsiders; men/women; owners/crew; etc.) • Considerations of variations in understanding and expression of objective and subjective dimensions for different groups • Contributions of SSF institutions to coastal and fisheries governance • The interaction between human and the natural and ecological knowledge

Source: Adapted from (Johnson et. al 2018, p. 9).

These three dimensions can be operationalized in qualitative and quantitative variables and indicators for analyzing fisheries from a social well-being perspective (Johnson et al., 2018: p. 9). For example, indicators such as employment by gender, SSF contribution to gross domestic product (GDP), SSF fish production as percentage of total national (or local) production, percentage part-time versus full-time fishers in the SSF sector (economic integration of SSF into larger economies), fisher and non-fisher perceptions of the sub-national regional and national economic, cultural, and social values of SSF, among others indicators (see appendix 1), can be used to understand fisheries' role from this perspective.

Briefly, social well-being is a novel perspective in the study of fisheries (Coulthard, 2010; McGregor 2009; Coulthard et al., 2015) which offers a multidimensional approach to reflect on tangible (socioeconomic aspects) and non-tangible (values, identity, motivations, and perceptions) issues of different human groups in specific contexts.

2.5. Concluding Remarks

This chapter presented the theoretical framework of this study, highlighting the phenomenon of globalization and its effects on agri-food chains and fisheries. It is noted that agri-food chains, and among them the fish value chains, have been defined and re-defined by global economic drivers and technological innovations with social, economic, political, cultural, and environmental effects at the local level. New markets located at longer distances with a growing number of consumers interested in buying quality products at competitive prices have defined different modes of integration into the chain. This also determined more complex value chains with vertical but also several horizontal formal and informal interactions aiming to adjust or comply with foreign market requirements. All these changes effect, in different intensities, the involved actors in the chain, the artisanal fishers being one of the most affected (in a positive or negative way) due to their high dependence on the demand structures of the chain, which also defines a logic of exclusion in the process of integration into the global markets. Thus, the well-being approach contributes to a holistic analysis of fisheries and fishers by considering tangible and intangible aspects. However, the most important contribution of this framework is acknowledging that well-being is not only an outcome for human beings, but also it is a motivator for human actions. These effects of globalization of fisheries on value chains will be discussed in Chapter five which describes the king crab value chain in the Magellan Region. The well-being changes for the fishers in this region will be analyzed in Chapter six.

3. Methodology

3.1. Introduction

This section describes the methodology applied before, during, and after the fieldwork. First, the epistemological approach is described in order to justify the research design options. After that, the mixed-methods research design is explained in order to understand the reasons for choosing specific methods for collecting and analyzing data. Finally, the chapter closes with an ethical reflection about the main goals and constraints encountered during the research process.

3.2. Epistemological Approach

Critical realism is used by the researcher as an epistemological approach in order to understand the globalization influence (domain of real or structures and causal powers) through the value chain on the well-being of artisanal fishers (domain of actual or observed/unobserved events and empirical or experienced events) (Bhaskar, 1978). Bryman describes critical realism as

> a specific form of realism whose manifesto is to recognize the reality of the natural order and the events and discourses of the social world and holds that we will only be able to understand–and so change–the social world if we identify the structures at work that generate those events and discourses. (2016, p. 25)

Sometimes, these structures are not amenable to observation, and as a result, practical and theoretical knowledge from social sciences must be used to identify and explain them. In other words, critical realism recognizes there is a reality outside the observer, but comprehension of reality is shaped by the researcher's knowledge and elaborated-upon concepts in order to understand these tangible or intangible structures and the consequences of them (Sayer, 1992; Leca & Naccache, 2006; Easton, 2010).

Related to this research, globalization and globalization of fisheries entails several structures such as international markets which define value chains and GVC for seafood exchange. These structures imply several effects (events) at the local level affecting the social well-being of artisanal fishers, such as their income, that could be an observed event; but also, more intangible aspects about actors' interactions and emerging processes. It gives a space for theorizing from a social perspective and looking for new but non-permanent concepts which make these events visible (Sayer, 1992)[7].

3.3. Research Design

This research is based on a convergent mixed-methods design (Creswell & Plano, 2014) which does not prioritize among the qualitative or the quantitative strands because one strand does not depend on the other one. Thus, both strands were handled independently during the analysis and their results were mixed during the final interpretation phase (Creswell & Plano, 2014, p. 71) in

[7] Sayer (1992) highlights that knowledge is fallible, theory-laden, and it is not immune to empirical check.

order to discuss the results and as a form of triangulation among the qualitative and quantitative findings. For example, in order to identify relations between changes in the market prices and the ideas of fishers about seasonality or presence of new industrial actors in their communities.

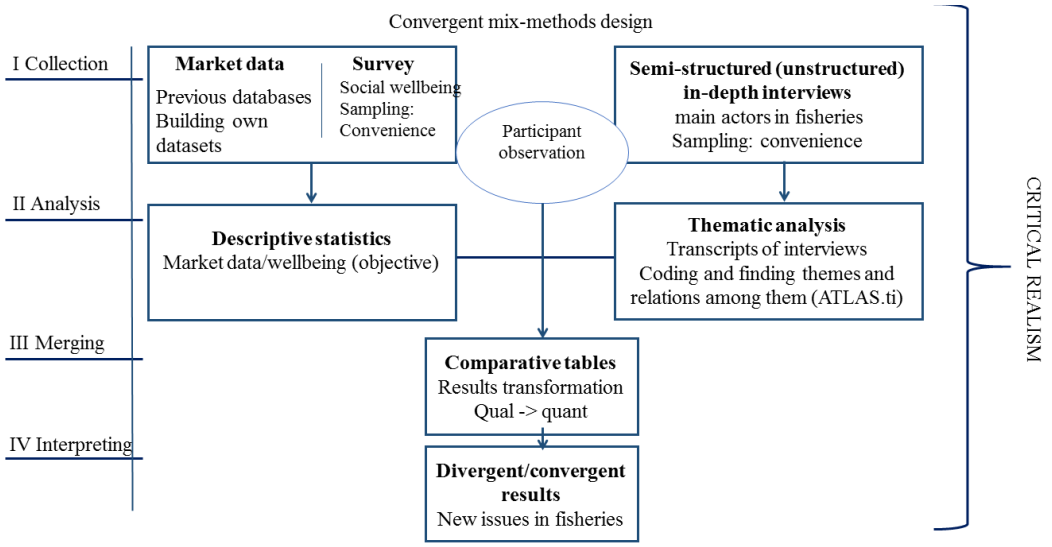
The research was developed in four main stages (see Figure 3.3-1). The first phase, where statistical data regarding prices, trade flows, quantities (landings), and markets for the most important species since 1980 were analyzed by using descriptive statistics. The period from 1980-2015/2016 was selected as a reference due to data availability and because it implies a time period which includes 1990, an important decade for Chilean fisheries since the General Fisheries Law was approved in 1992 (Marín, 2007). During this phase, the survey and the interviews were applied.

After that, during the second phase, data from the interviews were analyzed by using thematic analysis (Piercy, N.d.; Given, 2008, p. 867-868; Thomas & Harden, 2009) in order to identify common and divergent/emerging themes or frequent ideas from the participants about the effects of globalization on the king crab artisanal fishers.

Then, in the third stage, the integration, or mixing, phase took place by merging strategies such tables, discussion, transformation of results into others results, or quantification of qualitative data (Creswell & Plano, 2014, p. 67), for example, by making links between the actors' ideas from the interviews about changes in the local market and variations in quantities or prices.

Finally, in the fourth phase, the results were interpreted by using summaries of the main findings from chapters five and six, also by identifying diverging or converging elements, and/or describing permanent and new issues in the fish local market and value chain, for instance, by analyzing if the perceptions of actors regarding their jobs and income match with the market or objective well-being data (do the high prices of king crab represent better life conditions such as income for fishers?). The main purpose of this stage is to find constant or new socioeconomic interactions in fisheries in the Magellan and Chilean Antarctic Region.

Figure 3.3-1: Convergent mixed-methods design



Source: Author.

3.4. Research Questions

The research design was based on the main question: How has the incorporation of the artisanal fishers into a global value chain (GVC) affected their well-being in the Magellan and Chilean Antarctic region? This question was divided into three sub-questions: 1. How has the GVC of the king crab developed in this region? 2. How are the artisanal fisheries structured? and 3. What is the well-being of artisanal fishers? Each sub-question is developed in a separate chapter (chapters 4, 5, and 6). Then, the main question and sub-questions are answered in Chapter 7.

3.5. Applied Methods

3.5.1. Collecting data.

The fieldwork took place, most of the time, in the city of Punta Arenas, from September 1st to December 7th, 2017. The researcher spent the previous weeks, from August 14th to August 31st, 2017, in Valdivia in order to meet the local supervisor and the IDEAL research team, getting data about possible informants, and preparing the survey and the interviews. Quantitative and qualitative data were collected mainly in Punta Arenas, where one of the main harbors is located, but also because the Magellan region is quite isolated and distances between each port are big, and transportation most of the time must be by ferry or plane. Therefore, visits to the other ports in Porvenir, Puerto Natales, and Puerto Williams were carefully planned by the researcher. Moreover, it is important to mention that getting permission for doing the research was not problematic, the researcher got a student visa and, once in Chile, she registered with the national police and got an identification document for foreigners, which is a process that almost every foreign person must do. Then, the researcher got access to the harbors by contacting the union leaders who manage these places by telephone. The contacts were facilitated by the IDEAL Research Center.

Quantitative data related to prices, trade flows such as fish and king crab imports or exports, and regional king crab landings were collected from the main official databases from 1980-2015/2016. Besides that, official and academic documents were collected in order to investigate the history of this fishery since there are not many academic publications about this fishery from an interdisciplinary view, for instance, socioeconomic studies.

Besides that, observation was an important part of the research, specifically in order to understand the value chain of this resource from the catch to the industrial plant. Thus, the researcher frequently visited different harbors, or *caletas*, and some visits to the industrial plants were done. The idea of visiting different harbors allowed the researcher to be in contact with several actors (fishers, union leaders, and middlemen) but also helped her understand the particularities of the value chain because every harbor is located far from each other with geographical and some legal particularities. Also, it allowed the researcher to understand local geography, which is an important element for understanding different value chains in the region. Since the researcher could not join to the fishers in the catching process due to safety issues that will be explained in the ethical reflection, some trips to different harbors were done. The researcher visited Bahía Chilota in Porvenir (two hours by ferry from Punta Arenas crossing the Magellan Strait), Puerto Natales (three hours by bus from Punta Arenas), and Puerto Williams (thirty-two hours by ferry from Punta Arenas) (see figures below). In these places the researcher spent between one and four days walking

around the ports, talking to the fishers, and administering the survey and interviews to different actors.

Figure3.4-1 and 3.4-2: Caleta Bahía Chilota (Porvenir) and Puerto Natales

*Left, Bahía Chilota and right, Puerto Natales.
Source: Author.

Figure 3.4-3 and 3.4-4. Puerto Williams and Caleta Barranco Amarillo (Punta Arenas)

*Left, new facilities in Puerto Williams' *Caleta* and right, Barranco Amarillo.
Source: Author.

A short survey (see appendix 2) collecting data on social well-being was administered to the king crab fishers. A convenience sample of twenty-seven fishers (households) was selected. According to Cresswell & Plano (2014), a convenience sample implies selecting individuals who are available and can be studied. It is useful when "the chance presents itself to gather data from a convenience sample and it represents too good an opportunity to miss" (Bryman, 2016, p. 187). There are two main reasons for selecting a convenience sample: 1. reaching the fishers was difficult because most of them were at sea fishing at that time and those who are at the port most of the time were reluctant to cooperate because of longer working hours, and 2. this region is quite isolated and it is necessary to travel long distances (by road, the sea, or by plane) to reach the next town or harbor. As a result, the researcher strategically contacted some fishers (some contacts were

facilitated by the research center) by phone and did some appointments when traveling to places far from Punta Arenas.

In the case of those fishers interviewed at the harbor, the researcher visited the port often (almost four days per week) in order to find fishers dedicated to fishing king crab. Sometimes, the fishers asked to be interviewed in their houses, and in those visits, some of them were not available, and then their wives were interviewed. Wives have an important role in this fishery by managing the income and all the issues related to their husband's job while they are at sea. It was not a problem regarding data since the survey was about well-being issues and most of the questions were related to health, income, fisher's habits, and experience. In those cases where the wives were interviewed, some questions were adapted a bit regarding language, but the content remained the same.

From twenty-seven surveyed households, just four were women, two of them being fisher's wives, plus one intermediary and one union leader. That proportion is evidence of the classic gender segregation in the fishing sector (FAO, 2016). One important detail regarding the king crab artisanal fishers, and also highlighted in the questionnaires, is different fishers' categories in order to understand power relations and the effect of it on the well-being. Three of these categories were highlighted in the fisheries' law: owner, diver, and artisanal fisher (regarding crew). The rest of the categories used in the questionnaires (intermediary, ship skipper, and union leader) were selected and discussed with the IDEAL Research Center researchers with previous experience interviewing artisanal fishers, by recognizing that the law just uses the general category of artisanal fishers despite different roles of the people involved in the fishing activity. These categories were validated by the interviewees who recognized themselves as artisanal fishers but always acknowledged different roles on board. In short; all these categories belong to the general category of artisanal fisher defined by the Chilean law as those people involved in extractive fishing, who developed this activity in a personal, direct, and permanent way. They have to be registered in the Artisanal Fishing Register (*Registro Pesquero Artesanal*) with or without a registered boat. The boat must but less than 18 m lengths and with a storage capacity below of 80 m^3 (SERNAPESCA, N.d.).

On the other side, semi-structured or unstructured in-depth interviews were administered to main actors in the king crab value chain. In total, thirty-eight interviews were administered by selecting a sample by convenience due to the fishers' and main actors' availability, as explained in previous paragraphs. Sixteen king crab artisanal fishers, eight consumers (fish shops and restaurants), five key informants (academicians and experts in the area, like former workers, or people who have lived for a long time in the town), four officials (people working in public institutions related to fisheries such as SUBPESCA, SERNAPESCA, ProChile, IFOP), and five industrial plants (plants' CEOs) were interviewed. Despite the obstacles regarding generalization for using a convenience sample, the researcher tried to look for different actors and within different contexts (organizations) and also different geographical places in order to guarantee diversity in the sample. Regarding fishers, in order to take advantage of the fishers' availability, the survey was also applied to these fishers, which means that these sixteen fishers are included in the twenty-seven well-being surveys.

Due to the diversity of actors, three different interviews were designed (one interview was designed for artisanal fishers, one for consumers, and one for industrial plants and officials) (see

appendix 2 for fisher's interview[8]). The main objective of the interviews was to obtain data about the king crab value chain (structure, processes, and actors). For both, the interview and the survey were previously designed by taking into account previous research developed by the IDEAL Research Center. The researcher had access to previous interviews (audio files) about related studies developed by this center[9]. These audio files contributed to building the survey and questionnaire. After testing the interviews with experienced researchers in the research center, some interviews and surveys were applied in order to test it with the fishers and main actors as well. Few modifications were done after that, and then both instruments were formally applied.

Finally, some interviews became more unstructured at the end because the researcher realized that some fishers felt really uncomfortable with the semi-structured interview. As a result, the interview changed into an informal conversation by taking into account all the main aspects of the interview guide. Most of the interviews were recorded and transcribed by the researcher who is a native Spanish speaker.

3.5.2. Data analysis.

The quantitative data about landings, prices, trade flows, and objective well-being indicators (the well-being survey) were analyzed in Excel by using descriptive statistics. On the other side, the qualitative data about well-being (subjective and relational dimension) and the value chain (processes and structures) were analyzed in Atlas.ti by using thematic analysis in order to identify common themes and patterns in the interviewees' answers. A deductive and inductive coding process (Mills, Durepos, & Wiebe, 2010) was applied in order to identify themes and develop data categorization. Fieldwork notes were also included in this analysis in order to triangulate or complement some findings and ideas.

Quantitative and qualitative collected data results were triangulated with each other and with official reports and statistics. Moreover, the researcher participated in two public events during the fieldwork time in order to share preliminary ideas and progress on the research. The first event was a meeting of the regional management committee on October 5th, 2017. This committee involved several regional stakeholders in the fishing sector (fishers, industrial plants, union leaders, and officials). It was an excellent opportunity for receiving practical feedback about the research questions and design and also having contact with main actors in the sector; some of them were interviewed afterwards. Also, after this presentation, on October 19th, 2017, the researcher presented some fieldwork advances to the external scientific committee which annually assesses the IDEAL Research Center activities. International experts in biology and fisheries are part of this committee. The presentation activity included local academicians, officials, and experts and was an excellent opportunity for receiving technical feedback about the collected data and also identifying potential

[8] The interviews for consumers, officials, industrial plants, and key informants are based on the structure of the fisher's interview.

[9] The researcher has access to interviews used for writing the paper "On Super Fishers and Black Capture: Images of Illegal Fishing in Artisanal Fisheries of Southern Chile" written by IDEAL Research Center staff, which was submitted to Marine Policy and is under review. Aside from that, some interviews were used in the book *Relatos de Vida en Los Mares Australes*, Ediciones Kultrún, Valdivia, Chile written by Mellado et al. (2018), and interviews applied by Katherine Herrera (2017) as part of her undergraduate thesis called "Evolución de las Estrategias Alimentarias en Relación a la Seguridad y Soberanía Alimentaria de los Pescadores Artesanales de Puerto Natales, Región de Magallanes," Universidad Austral de Chile, Valdivia.

gaps that the researcher tried to fill during the remaining time there. These meetings also helped to validate the research design and the preliminary results by taking into account expert criteria.

3.6. Unit of Analysis

The main unit of analysis is the king crab artisanal fishers in the Magellan and Chilean Antarctic Region. The research aims to understand two main aspects of these fishers: first, their role in the value chain, and second, the effects of the value chain structure and processes on their social well-being. Secondary units of analysis were other actors in the value chain such as consumers, experts, and officials.

Most of the fishers, officials, industrial plants, and consumers were surveyed and/or interviewed in Punta Arenas because one of the main harbors (Barranco Amarillo) is located in this city. However, main harbors in Puerto Natales, Porvenir, and Puerto Williams were also visited by the researcher in order to diversify the sample.

Artisanal fishing represents, in terms of employment, 43% of the total fishing sector (Palma et al., 2015, p. 24) with 94,164 artisanal fishers officially registered in 2015. Thus, the Magellan and Chilean Antarctic region represented around 6.2% of the total of artisanal fishers with 5,959 fishers registered according to the SERNAPESCA Statistical Yearbook 2016 (SERNAPESCA, 2016). However, just 574 fishers are allowed to catch king crab (Registro Pesquero Artesanal, 2018).

3.7. Ethical Considerations

Having access to the fishing sector (fishers and middlemen, specifically) could be difficult due to the prevailing distrust in this sector regarding the government and some non-governmental organizations (NGOs') work. Hence, the researcher was clear about her intentions with the research, how the data would be used, and also the respondents' possibility of having access to the final product (thesis and paper), which contributed to establishing a trust bond among the fishers and the researcher. All the respondents did read by themselves the informant consent, and the researcher answered any doubt regarding the research purposes, mainly because data such as prices, money flows, illegal fishing, and relations with authorities were collected. As a result, some fishers were reluctant and suspicious about sharing this data. The researcher ensured that all the data is confidential, and that personal data about the respondents wouldn't be shared. All the collected data is stored in a private server and the user requires a password to access it. The only authorized people with access to the data are the researcher, her supervisor, and the local supervisor. Besides that, assumed names are used in this research (quotations), with only one encrypted document saved on the server which has the real names related to each interview.

Keeping privacy is important in order to guarantee respondents' integrity and safety. However, academic transparency is also crucial in order to provide reliable data. Therefore, any question about the integrity of this research or data request must be done by the interested person through the professor in charge (supervisor), the researcher, and the Integrity Committee according to the *Integrity Protocol of AISSR* (AISSR, 2017). The interested person, through email, has to explain in a detailed way, his or her main reason for such request.

Finally, one of the main concerns was the gender issue because this sector is male-dominant and there are few women working at the harbors and no women fishing. The researcher was invited by some fishers to fish with them; however, due to personal safety reasons (being the only woman sharing the space with two or four or more men at sea and forty hours from the coast, represented some personal safety issues for the researcher). However, discrimination was not experienced, nor any kind of harassment. Surprisingly the fishers were quite open to talking about their lives and work. Nevertheless, being a foreign woman made a difference because the fishers were more interested in the researcher's work and her experience of living in a different country. Interesting to say that, despite the researcher speaks the same language (Spanish), having a different accent made a difference since they were more interested in talking to the researcher about coming from a different country. All these components contributed in a positive way to having access to people and data, but also led the researcher to reflect about her position, constraints, and privileges in this context.

3.8. Concluding Remarks

Using quantitative and qualitative data collection techniques within the mixed-methods framework allows taking advantage of different data available in the field, especially in the artisanal fisheries in which high level of informality prevails and most of the data is not written and it is gathered by some key actors. Besides the fact of being a close sector in which gaining the trust of the fishers is difficult, and in which factors such as gender, age, and nationality can influence the openness of the fishers and the possibility of having deeper conversations. It is important to also mention that the small size of the sample used for both the interviews and the survey, implies problems regarding possibilities of generalization. Nevertheless, the idea of having different kinds of data (household data, official statistics, documents, and interviews) aims to triangulate and give validity to the findings and results as will be done in the next three chapters on context (Chapter three), value chain (Chapter 4), and social well-being (Chapter five).

4. Chile: Liberalization Process, Fisheries, and Its Incorporation into the GVC

4.1. Introduction

The incorporation into the global economy and the value chains implies political and economic decisions. However, it has effects that go further than the economic and political spheres reaching the social, cultural, and environmental arenas, for instance. Thus, this chapter describes the history of the king crab fishery in the Magellan Region as part of the Chilean incorporation into the international markets at the beginning of 1970. The purpose of the chapter is to establish a historical framework in order to understand how this incorporation has developed and the effects of it on the current structure of regional fisheries and fishers' well-being, which are issues that will be analyzed in Chapters five and six.

4.2. The incorporation of Chile into the global value chains (GVC)

The openness of the Chilean economy in the 1970s was promoted by the orthodox economic policies introduced by Augusto Pinochet's dictatorial government (1974-1990) through exports promotion, tax cuts, and the attraction of foreign investment policies. All these changes configured a growing economy (DIRECON, 2009), especially during the middle of the 1980s , transforming the national economic landscape, but also prompted severe social, political, and environmental consequences for this nation. Democracy's restoration in 1990 deepened the liberalization process by involving the country in bilateral and multilateral free trade agreements which transformed Chile into one of the most openly traded countries in Latin America and the world (DIRECON, 2009, p.7), experiencing an average economic growth of 5% per year between 1990 and 2014.

A huge part of Chilean exports is based on natural resources, specifically mining and hydrocarbons, thus 80% of the export basket was represented by these products in 1980 (DIRECON, 2009, p. 10). Nevertheless, as a result of the liberalization process, a diversification strategy was developed by introducing agro-industrial products[10] into the markets.

According to DIRECON (2009), in terms of markets, the main destination (in value) for Chilean exports in 1990 was the United States (17%), followed by Japan (16.1%), and regarding regions, Europe was the main partner at that time (39.1%). However, at the end of this decade, Latin America became one of the main regional partners for the South American economy representing 38.9% of total exported value (DIRECON, 2009, p. 12). The landscape changed a bit in 2000 with the economic boom in China, transforming this Asian country into the main export destination. For example, in 2008 China exceeded the United States representing 14% of the Chilean exports. However, there is a big difference regarding the type of exported products. Meanwhile, North America is a destination for added-value and diversified Chilean products; markets such China and Japan buy low-value (raw material) products, which also marks a difference in the value chain.

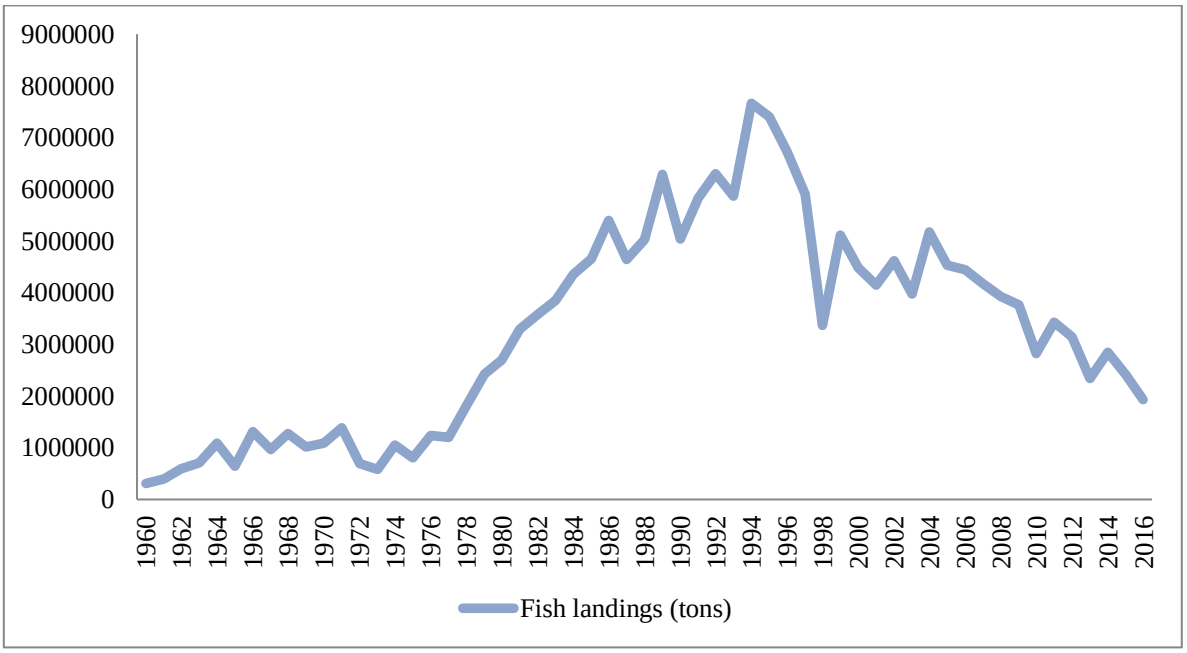
[10] The main new products were: salmon and trout, fruits, vegetables, wine, mollusks, crustaceans, and seeds, among others. And more recently, meat and dairy products (DIRECON, 2009, p. 35)

According to OECD (2015, p.10), Chile has the highest levels of GVC integration in Latin America. The trade and economic policies implemented in the last decades influenced this integration and compensated for some of the disadvantages such as the size of the economy and the distance "from the main manufacturing hubs." Despite that, the North American and European markets prevailed as important buyers for the Chilean economy. New destinations, such China, Korea, Canada, Mexico, and India "have become increasingly important in Chile's forward GVC linkages, while the previously European economies have been losing importance" (OECD, 2015 p.16). The Chilean integration into the GVC is mostly due to the copper industry, but in the last years, the export of fruits and vegetables, for example, has been gradually integrating the country into the food GVC. This integration process started with fresh fruits and vegetables in 1980 and added processed and cold storage products during the period of 1985-1990. A high centralization in transport is still evident since a low number of products are exported from ports located in the north and south of the country, and most of them are transported to the ports located in the middle of the country (OECD, 2015, p.18).

Regarding fisheries, today Chile is one of the most important fish producers in the world (FAO, 2016). The start of the incorporation process of this country into the international markets in terms of fisheries and seafood started in the 1960s during the import substitution phase. That process was oriented not only in the industrialization of the country but also in the exploitation of natural resources in rural and marine areas (Camus & Hajek, 1998). Thus, the fishing industry was focused on the production of fishmeal in the north of the country, with the Arica and Iquique regions being the two most relevant producers at that time. However, the effects of El Niño in 1965 and the overexploitation of marine resources like anchovies provoked the first environmental crisis in this sector. After that crisis, there was a recovery period in 1971, but the effects of El Niño and the overexploitation of the resources collapsed this fishery again in 1973 (Zuleta, 1990).

During the 1970s, the dictatorial governmental policies of deregulation and trade openness (DIRECON, 2009) also had effects on fisheries' stocks and management. Therefore, a production model based on "mining in the north, the fruticulture in the center of the country, the silviculture in the south, and the fishing…" (Camus and Hajek, 1998, p.17) was established. As a result, in 1993, exportations were structured (regarding value in USD) at 43.8% on mining, 13.2% on forestry products, 11.4% on fishing-related products, and 11% on fruticulture (Camus and Hajek, 1998). The anchovy fishery was replaced by the sardine and jack mackerel fisheries. Besides that, the economic incentives attracted high investments in the fishing industry. According to Camus and Hajek (1998), "The fish landings increased from 0.9 millions of tons in 1975 to 6.6 millions of tons in 1989, placing Chile among the 5 countries in importance in terms of fisheries." The opening process of Chilean fisheries was structured in two stages: the first one saw big factory ships from Japan, Korea, and Spain arrive in Chile despite the prohibition by international laws of industrial fishing close to the coast. Nevertheless, an increasing vulnerability due to the effects of El Niño led to the second stage in which the arrivals of foreign factory ships were restricted and the installation of industrial plants on land was promoted, besides the incentives to national investment on this sector by the law.

Figure 4.2-1: Chilean fish landings 1960-2016 (tons)



Source: Author based on SERNAPESCA.

Camus and Hajek (1998) argue that the policy oriented to fisheries' exploitation had an important effect in terms of sustainability, mainly in the cities where important ports have been located, such as Iquique, Antofagasta, and Talcahuano. These cities experienced important problems related to water and air pollution.

With the return of democracy in 1990, many politicians had to include environmental concerns and measures in their governmental plans. Therefore, in 1992, the General Law of Fisheries and Aquaculture was approved (Law number 18, 892). However, this law was more oriented to control the rational exploitation of marine resources instead of their protection by establishing some measures such as global capture quotas, restrictions on the size of the capture and the gear, and seasonal closures. Regarding the direct effects of this law for coastal fisheries, some critics pointed out that one of the main concerns was to allow ships with a length of 18 meters and capacity for 50 tons the possibility of fishing in the exclusive zone (five miles beyond the coast line) without considering the technological conditions of these ships regarding their extraction capacity. In the same category were the artisanal boats and those boats with technology that could overcome the artisanal fishers (Camus & Hajek, 1998).

4.3. The king crab and its market

The king crab is a name applied to different crab species: blue king crab, Hanasaki king crab, golden and scarlet king crabs, and southern king crab or Centolla in Spanish. All of these species belong to the family *Lithodidae* (see figure 4.3-1) (Stevens & Lovrich, 2014).

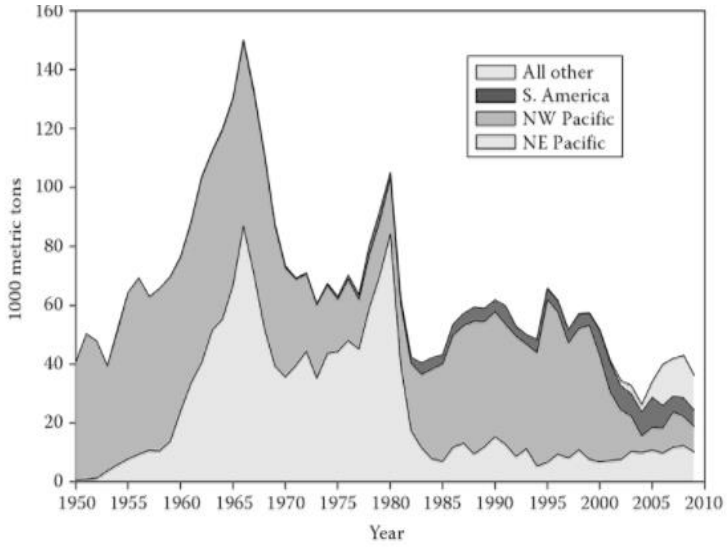
Figure 4.3-1: Southern king crab or *Centolla*

Source: SUBPESCA.

In the last century, the king crab has become one of the most valuable crabs in the marketplace (Stevens & Lovrich, 2014). This fishery started in 1890s in Japan, experiencing a fast expansion (1905-1920) with influence in the Russian region of Kamchatka and reaching the waters of the Bering Sea. After that, in 1928, Russia developed a fishing industry in order to catch king crab in the Sea of Okhotsk. Both Russia and Japan exploited this fishery in the Bering Sea during the 1950s (Stevens & Lovrich, 2014).

In North America, most of the king crab landings came from Alaska. The fishery started in this region in 1920 with few landings. However, after World War II, an increasing interest started on this crab and during the period of 1960-1970. The production increased, reaching its peak in 1980 which led to a commercial closure of the Alaskan waters starting in 1982 (Stevens & Lovrich, 2014). During that time, the southern crabs (soft shell red crabs and *centolla*) erupted in the market due to the sharp decline of the northern king crab. For example, in 1985, 27 industrial plants processed this fishery in the Magellan region, compared to 7 plants established in 1975 (Cárdenas et.al., 1987, p. 116). This increasing Chilean participation in the global market is evident in the below figure (4.3-2), in which the darker area represents the South American *lithodid* crab landings.

Figure 4.3-2: World Landings of *lithodid* crabs by regions

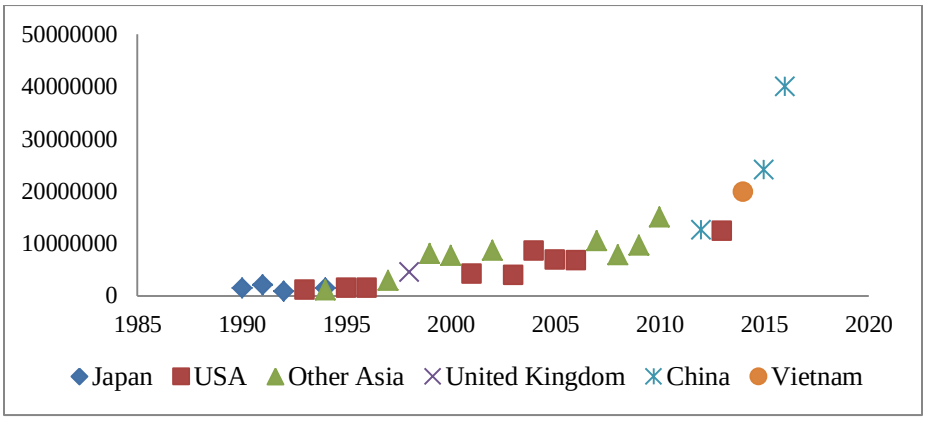


Source: Stevens & Lovrich (2014).

Most of the king crab landings come from the Northeast and Northwest Pacific (Northern Hemisphere). However, after World War II, the fishing areas diversified. According to Otto (2014), during the period of 1950-2009, almost 93.9% of *Lithodid* crabs were harvested from the Northern Pacific region. Nevertheless, after the collapse of the Alaskan fishery, different regions were introduced as harvesting places. Nowadays, the most prominent king crab suppliers are Russia, the United States, Japan, and the South Korea (Otto, 2014; ProChile, 2017).

According to ProChile (2017), in 2016, 36 Chilean enterprises exported king crab to 25 markets. China ($35.72 million USD) and Hong Kong ($3.28 million USD) are the main destinations, followed by the United States ($7.16 million USD), and Australia ($1.52 million USD) as an emerging market. Thus, China has increased its presence as a king crab importer from Chile. Its imports raised from $122 million USD in 2006 to $614 million USD in 2016 (see figure 4.4-3).

Figure 4.3-3: Market destination: Chilean crustacean exports, 1990-2016 (tons)



Source: Author based on COMTRADE.

Besides that, there are high expectations about the market in Hong Kong due to the interest of consumers on high-value and quality products. It is expected that in 2019 the king crab consumption in this economy will reach 70kg per person per year. The signed preferential agreements granted tax benefits to the Chilean products, such as free entrance tariffs for the Chilean king crab in the Chinese and Hong Kong markets.

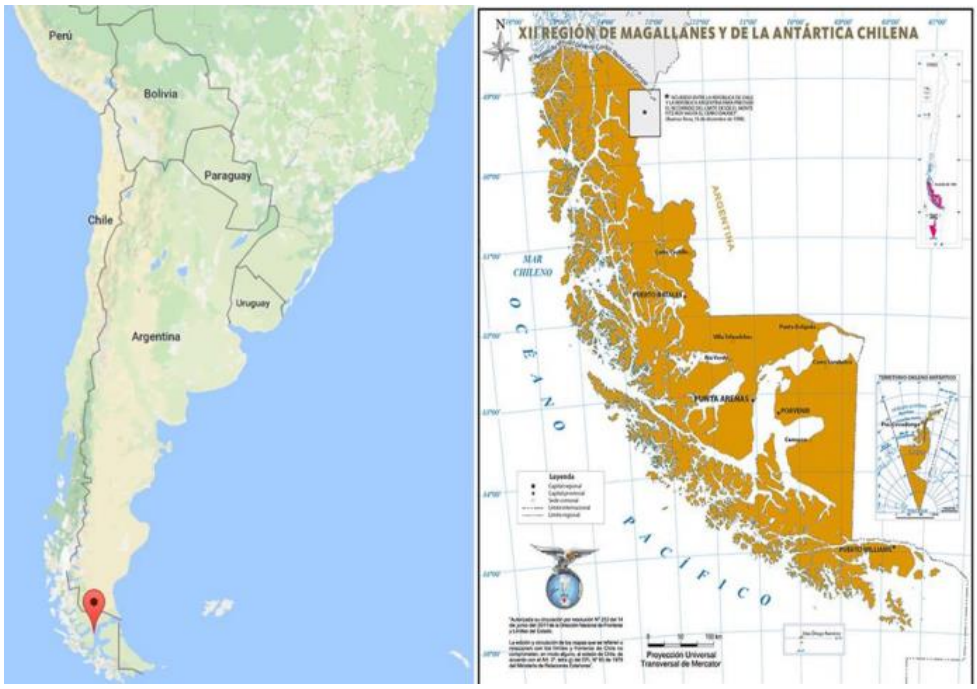
4.4. The king crab fishery in the Magellan Region

4.4.1. The Magellan Region

The Magellan Region is located in the southern extreme of Chile (see figure 4.4.1-1). The region comprises the southern part of Patagonia and the western section of Tierra del Fuego, besides the close islands in the west and south. The region has an area of 132,033 km^2, becoming one of the largest regions in Chile, representing 17.5% of its territory (Martinic, 2016).

Being an extreme region close to Antarctica implies extreme weather which also has effects on production activities and lifestyle. Due to the location and geography, this region is geographically isolated from the rest of the Chilean territory by land and only connected with Argentina by highways. However, the region has different maritime connections (on one side, the Pacific Ocean, and on the other side, the Atlantic Ocean; or sailing close to Antarctica by the Drake Passage). Besides that, the region is connected by air (daily flights) with the rest of the country.

Figure 4.4.1-1: Map of Chile and the Magellan and the Chilean Antarctica Region (XII)



Left: Physical map of Chile. The red pin shows the location of Punta Arenas. Source: Google maps. Right: Magellan and the Chilean Antarctic region. Source: Military Institute of Geography.

The name of the region honors one of the first Europeans that arrived there: Fernando de Magallanes (1480-1521). In 1519, Magallanes sailed from the Spanish port of San Lúcar de

Barrameda looking for a different trade route to the Indias by passing the recently-discovered America (Martinic, 2016, p. 23-24).

Despite being one of the largest regions in Chile, the population in Magallanes is gathered in few places. The region has a population of 164,661 inhabitants (INE, 2012). In administrative terms, it is divided into four provinces: Última Esperanza, Magallanes, Tierra del Fuego, and Chilean Antarctica. The city of Punta Arenas, which belongs to Magallanes province, is the regional capital, containing 79% of the region's population (Martinic, 2016; p. 12).

Historically speaking, the region have been attractive because of their richness in natural resources: vast lands for cattle raising (mainly sheep), hydrocarbons (coal and oil) (Martinic, 2016, p. 127), and more recently, for commercial activities such as tourism, aquaculture (salmon), and fishing (Chilean seabass, australis hake, king crab, and sea urchin). There is a tax-free zone and some regions have tax benefits (*Ley Navarino*), in order to attract more investments and people to populate these isolated places and consolidate the Chilean sovereignty (mainly in Tierra del Fuego). Nowadays, the main productive activities in the region are mining (coal), tourism, fishing and salmon culture, and transport and communications (Biblioteca Nacional del Congreso de Chile, N.d.).

4.4.2. Fisheries in Magallanes

There are 5,759 registered fishers[11] in the region according to the last National Survey (2015); 3,657 of them are registered as artisanal fishers. According to Chilean law, the fishers are classified according to the fishery or the economic activity in which they are involved: those dedicated to collect algae (*algueros*), those dedicated to extracting seafood (*mariscadores*), boat owners (*armadores*), and artisanal fishers (Mellado et al., 2017, p. 13). Moreover, between 30% and 40% of fishers work without the RPA according to the Institute for the Promotion of Fisheries (IFOP in Spanish) and the National Service of Fisheries (SERNAPESCA in Spanish).

In commercial terms, the most important marine species in the region are the king crab (*Lithodes santolla*), Chilean snow crab (*Paralomis granulosa*), sea urchin (*Loxcechinus albus*), sea asparagus (*Ensis macha huepo*), gigartina radula-type pig skin (*Gigartina skottsbergii*), and australis hake (*Merluccius australis*) (Mellado, 2017, p. 14).

It is possible to identify the origins of the economic activities related to the sea in this region with the hunting of whales, sea lions, and seals at the beginning of the twentieth century (Nicholls, 2010). After that, some historical reports describe an intense extraction in 1917 of king crab to prepare preserved food (Chaparro, 1917; p. 24). However, the artisanal fisheries in this region started their activity in 1960 with the economic reforms and the implementation of the Law of the Sea. In the case of Chile, those rights were focused on the implementation of an exclusive economic zone. Besides that, some productive figures such as Conglomerates of Fisheries and Fisheries Industries (*industrias pesqueras*) (Orrego, 1972) were created. As a result of these economic policies, in the northern part of the country some marine resources were overexploited and the fishing industry spread out through the south of the country. Therefore, the regional government of

[11] That means that those fishers are registered in the Artisanal Fishery Register (*Registro Pesquero Artesanal* or RPA in Spanish).

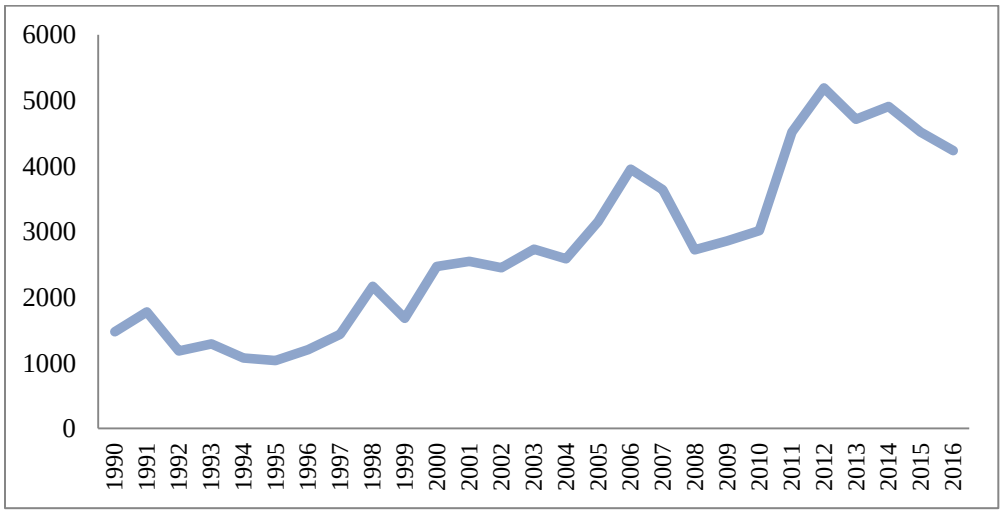
Magallanes boosted the consolidation of settlements in different strategic places within the region by applying a policy called *Operación Canales*. Thus, the fishing industry was consolidated in several places within regions such as Puerto Edén, Puerto Natales, and Puerto Williams and, as a consequence, the number of ships tripled during the period of 1964-1970 (Martinic, 2008 cited by Mellado, 2017, p. 15).

In short, from 1970 onwards, the fishing industry increased in importance. Between 1977 and 1982, the region received almost 30% more immigrants from different regions of Chile. Around 40% of them were men between 19 and 21 years of age who were looking for new economic opportunities as a result of the increasing Chilean military presence in the region[12], which also implied demand for workers in different economic activities (Mellado, 2017, p. 15).

After the dictatorial period (1973-1990), the new General Law on Fisheries and Aquaculture (*Ley General de Pesca y Acuicultura*) was enacted. One of the most important issues about this new policy was that it perceived the marine resources from the sustainability and rational perspective. Thus, according to Camus and Hajek (1998), there was more interest in creating the right conditions to exploit the resources under the governmental control than the protection of the resources itself.

Aside from the return to democracy, the changes introduced by the new Law of Fisheries[13] boosted fishing activity. During that time (1990), around 3,000 fishers were registered in the region and more than 30 industrial plants processed marine resources (Martinic, 2006) (see figure 4.4.1-2). Due to the implementation of the Law of Fisheries and the decrease of some marine stocks at regional and national levels, the 2000s were characterized by the implementation of fishing quotas and biological and extractive closures.

Figure 4.4.1-2: King crab landings (tons), Magellan Region (1990-2016)



Source: Author based on SERNAPESCA.

[12] This was due to the border conflict with Argentina (1978-1984).

[13] According to Mellado (2017,p. 16), two measures were established: an exclusive economic zone of 5 miles from the coast for artisanal fishing and Areas of Management and Exploitation of Benthic Marine Resources (AMERB in Spanish).

4.5. The geographical context

4.5.1. About Punta Arenas

Punta Arenas is the capital city of the Magellan Region. It had a population of 130,165 inhabitants (Biblioteca del Congreso Nacional de Chile, 2015) in 2015, and 68% of the 3,657 registered fishers in the region lived in this *comuna* (Mellado, 2017).

According to some sources (Mellado, 2017), one of the first industrial plants established in the region was Pesquera Camelio or COMTESA during the 1960s. However, it was in the 1980s when, due to the higher external demand, the extraction of sea urchin and king crab increased their importance in the fishing industry.

Due to the organization of the coast in the region (and the resettlement of the fishers which used to live close to the coast), the recent *caletas* (authorized artisanal fishing ports) were built. In the Magellan region, there are ten "*caletas"*, and the city of Punta Arenas has two (Sistema de Información Territorial Regional, N.d.).

The *caleta* is one key section in the king crab value chain because it is the point of transition between the artisanal fisher (boat owner) or the middleman (the shipper), most of the time, and the industrial plant. All of the legal captures have to be carefully landed by the people in charge of transporting them (all the king crabs must be alive), measured by the authorities (IFOP) in order to comply with the legal requirements of gender and size, and transported by trucks from the port to the industrial plants.

Figure 4.5.1-1: Artisanal Boats in Caleta Barranco Amarillo (Punta Arenas)

Source:Author**.**

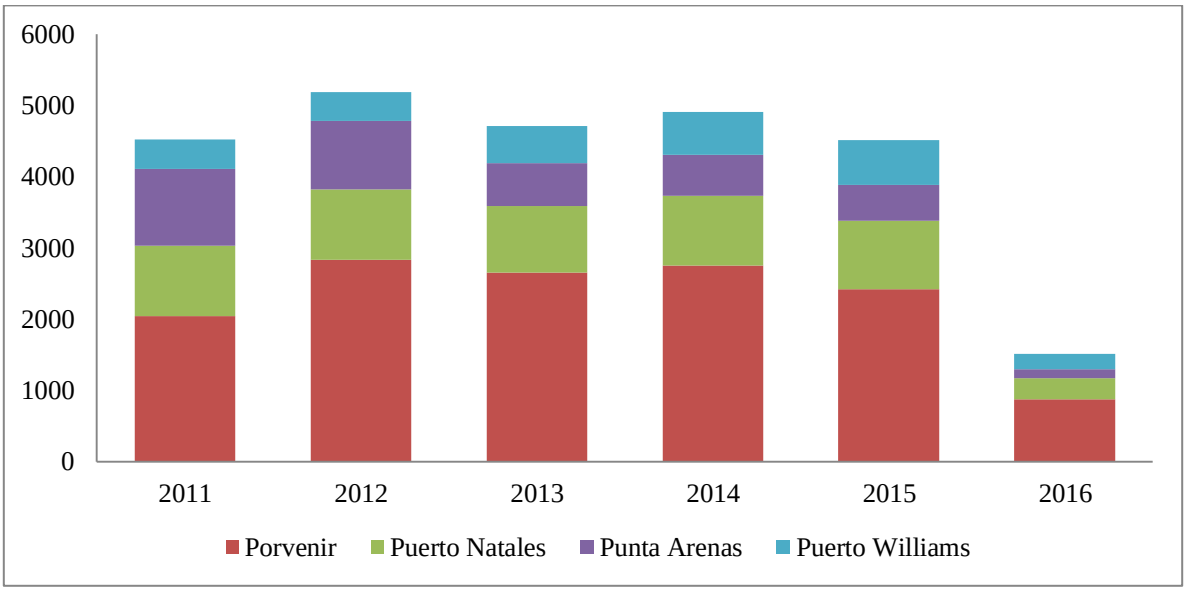
Figure 4.5.1-2: Landing zone in Puerto Williams

Source: Author.

Most of these *caletas* are modern (see above figures); many of them were built some years ago and have technological facilities and services for the fishers and boat maintenance. As part of the research, four *caletas* were visited: Barranco Amarillo in Punta Arenas, Puerto Natales, Bahía Chilota in Porvenir, and Caleta of Puerto Williams. However, due to their economic relevance and strategic position, a big part of the research (interviews and survey) took place in Punta Arenas, in Barranco Amarillo.

Despite Punta Arenas being the main city in the region, most of the landings for many fisheries are reported in Porvenir (see figure 4.5.1-3) because of the tax benefits that the island of Tierra del Fuego receives due to the Navarino Law. These benefits create a market-based system where many industrial plants located in this place can establish competitive prices for some fisheries, especially for king crab due to the high demand for this resource.

Figure 4.5.1-3: Magellan Region: King Crab Landings per Harbour 2011-2016 (tons)



Source: Author based on SERNAPESCA.

In 2016, 43 industrial plants operated in this region (SERNAPESCA, 2016); 36 are registered as frozen crustacean processors which means that they can process southern king crab. Six of them have the PAC certification[14] (SERNAPESCA, 2012). These numbers are not precise and could change since there is no available data about the number of plants processing this fishery. Besides this, some of them have license to process different fisheries at the same time.

4.5.2. On Puerto Williams, Puerto Natales, and Porvenir

The other places in which the fieldwork was developed were Puerto Natales, Porvenir, and Puerto Williams. Puerto Williams is the southernmost town in the world (Kindersley, 2013, p. 251). It is located in the Navarino Island with a population of 2,262 people. It is quite a new town, having been founded by the army in 1953 in order to establish Chilean presence on Cape Horn.

According to the official records, 264 fishers are registered here and Pesquera Productos Marinos Puerto Williams Ltda. is the only industrial plant processing king crab and Chilean snow crab. However, during the period between 1980-2000, several industrial plants dedicated to king crab, sea urchin, and australis hake had operations in Puerto Williams (Mellado et.al., 2017, p. 57), but they closed due to economic and management reasons according to some interviewed experts.

Puerto Natales is located in the northern part of the region between the Cerro Dorotea and the eastern shore of Seno Última Esperanza (Jani, 2009). This *comuna* had a population of 21,553 inhabitants in 2015 and an area of 49,924.10 km^2 (Biblioteca del Congreso Nacional de Chile, 2015). It is the capital of the province Última Esperanza. The town was founded in 1911. Coal

[14] The Quality Assurance Program (PAC in Spanish) is a voluntary certification based on HACCP (Hazard Analysis Critical Control Point). It is required by the European Union, Brazil, Argentina, China, Colombia, and Uruguay (Chileatiende, 2017).

mining was the main economic activity, and, more recently, tourism, due to the strategic position close to attractive national parks such as Torres del Paine and O'Higgins National Park (Jani, 2009, p. 488). In 2016, this region reported 37,104 tons of landed fish. Salmon, trout, and sea urchin are the main fisheries. The king crab landings for this year represented just 0.8% of total landings. However, it is important to mention that this is just the number reported at the port, but many boats from this region fish and deliver the catch in places such as Porvenir.

On the other side, located in Tierra del Fuego in front of Punta Arenas and across from the Magellan Strait is Porvenir. This village is the capital of the province Tierra del Fuego, which was founded in 1894 during the gold rush (Ilustre Municipalidad de Porvenir, 2018). It had a projected population of 7,446 inhabitants for 2015 and an extension of 9,707.4 km^2 (Biblioteca del Congreso Nacional de Chile, 2015b). The most important economic activity in Porvenir was mining (gold and oil). However, in order to promote the Chilean presence and sovereignty in this territory, in 1985, the Navarino Law was approved. This law establishes a tax-preferential regime for the XII Region (Figure 4.6-1). Therefore, the economic activities diversified, increasing the importance of fishing and manufacturing of textiles (Ilustre Municipalidad de Porvenir, 2018). Fishing landings are high in this zone due to the incentives of the industrial plants in order to pay a higher price for king crab. For example, in 2016, 871 tons of fish were landed in this harbor--an amount that is higher than the sum of the three other harbors together--even if the landed fish for 2016 was lower than the previous years as shown in figure 4.5.1-3.

4.6. The king crab in the Magellan Region

In the research *Economic, Administrative, and Social Study of the Magellan Territory*[15] (Chaparro, 1917) the king crab fishery is noted as an economic activity in this region. The author argues, "Recently the king crab fishing is successfully developed; it is a delicious crustacean which competes with the Juan Fernandez lobster, even overcoming it regarding taste (…)" (Chaparro, 1917,p. 24). However, many studies point out that this fishery started as a relevant economic activity in 1928 (Guzmán et al., 2004).

It is now a highly regulated fishery with many restrictions oriented to control the extraction of this resource. Restrictions include: traps are approved for use, but not nets, despite many interviewees and officials stating that they are highly used by some fishers, mainly at the end of the season; a seven-month closure; minimum capture size of 120 mm; not allowing the extraction of female king crab; and male captures have to be delivered alive to the industrial plants. Besides that, in this region the inscription of artisanal fishers related to this resource is closed (Guzmán et al., 2004). The king crab is a popular and highly appreciated crab related to the Magellan region. However, this fishery is also harvested in the X region (Figure 4.6-1) (SUBPESCA, N.d.).

[15] The original tittle in Spanish is "Estudio Economico – Administrativo – Social del Territorio de Magallanes."

Figure 4.6-1: X and XII region

Source: Google maps

A higher international price for this product increased the number of industries related to this fishery in 1984, and a huge increase in the regional fishing sector from 1986. For instance, according to Fabricant (2001), at the beginning of 1980, a pound of frozen crab legs cost $10 USD; the same amount in 2006 cost more than $20 USD. During the year of the closure of the Alaskan waters for fishing king crab, a pound of prime quality shelled crab meat had a price of $17 USD; in 2015 the price for this product was up to $27 USD (The New York Times, 1983; Rosen, 2015).

Therefore, in order to protect this valuable resource, in 1987, Chilean authorities implemented a biological closure during December and January, aside from the other restrictions explained above. However, in 1994, an extended closure from July 1st until November 30th was established. This closure defines the present fishing season (Canales et al., 1999, p. 36-37).

The introduction of the Chilean king crab into the international market, according to some interviewees, was a consequence of the closure of the fishery in Alaska in 1983. At that time, the Chilean king crab replaced the Alaskan supply and the prices started rising due to the competition of local industrial plants to comply with the requirements of the exporters.

Along with the history of this fishery, different levels of transformation of this product have been identified according to the international market demands, for example, as preserved food, whole frozen king crab, cooked or fresh-cooled product. This is a key issue because it defines the upgrading mechanisms and the industry requirements at different phases of the chain; not only in terms of presentation but also regarding product quality.

Thus, prior to the year 2000 and the economic rising of China, the two main markets for this product were the United States (US) and the European Union (EU). According to key informants

related to the industry, both of them demanded a different kind of product presentation. The US imported frozen, processed king crab (legs or the flesh). The EU bought it as preserved or canned food (Canales et al., 1999, p.61-63), which implied selling a value-added product. However, the economic crisis in the US and the EU led to changes in the demand (being a product considered a delicacy, it was not a priority for the American or European consumers). Nevertheless, the economic rise in Southern Asia showed a promising market niche, but with different tastes. Therefore, from preserved or frozen flesh, the whole frozen king crab was bought by the Chinese consumers, mainly for special days such as Christmas or the Chinese New Year, where is it given as a present inside of a gift box (see picture below).

Figure 4.6-2: King crab gift box

Source: http://www.jd.com/chanpin/2028381.html[16]

The East Asian market became an attractive alternative for the industrial plants due to the lower quality standards required by the buyers and compared with the American and European markets. In fact, some markets in East Asia, like China, require PAC certification, which applies some requirements to the industrial plants. However, it is a lower standard compared to the European quality requirements which have effects not only on the plants, but also on the boats, increasing the extraction and commercialization costs.

All these changes in the markets transformed the production process and industrial plant strategies. Some of them prepare different presentations of king crab (preserved or frozen). Nevertheless, most of them are focused on processing this product in order to sell it whole and frozen, which also implied a step back in terms of production upgrading. But, it is important to mention that, despite the low added value of this resource, the international market pays higher prices, due to the product scarcity.

[16] Accessed on February 21st, 2018.

4.7. Legal context: Navarino Law, incentive or distortion?

The Navarino Law (Law number 18, 392) is key to understand the economic context of this fishery. The law was enacted in 1985 and defines some tax and customs benefits for a period of 50 years for those enterprises located in the south of the Magellan Strait (regions of Porvenir, Timaukel, Primavera, and Navarino) (Servicio de Impuestos Internos, N.d.). The benefits rely on industries such as mining, tourism, transport, and fishing, and require that these industries use as input at least 25% from the region (human capital or resources). Among these benefits, there are some tax exemptions and also a bonus of 20% of the total sales (products or services) for these companies (Biblioteca del Congreso Nacional de Chile, 2014). That means that an industrial plant will receive a yearly bonus of 20% of the total sales reported. These incentives attract investment. For example, regarding fisheries, in 1980 there were just 2 industrial plants in the region and in 2016 there are 11 plants processing different sea products (SERNAP, 1980; SERNAPESCA, 2016).

However, there is a debate about the effects of this law on the artisanal fishing sector. Some interviewees, mainly those from Puerto Natales, argued concerns about this law due to the difference in prices that are paid by the industrial plants in the region benefited by the law compared to those regions outside. According to some interviewed people, this could create an "unfair competition" among fishers. On the other side, some enterprises mentioned that, without this law, the development of villages such as Porvenir or Puerto Williams would not be possible because there is no other incentive than the law and the tax benefits to attract capital and people to work and live in these isolated places.

4.8. Concluding remarks

In short the incorporation of Chile into the GVC started late in 1960 and was boosted by the economic reforms during the dictatorial period. This incorporation focused for a long time on the mining sector due to the importance of copper for the national economy. However, changes in international markets and trade policies oriented to the productive diversification introduced the fishing sector into the global markets. Therefore, Chile became one of the most important fish exporters worldwide.

Thus, some Chilean fisheries positioned themselves in developed markets such as the United States and the European Union. Nevertheless, the economic crisis and the rising of China and other Asian economies led to a production transformation in Chilean fisheries, including the southern king crab. This transformation implied technological, environmental, socioeconomic, and cultural changes in the Magellan Region; some of which will be analyzed in the next chapter about state of the fisheries in the Magellan and the Chilean Antarctic region.

5. The Value Chain of the Southern King Crab: Structure and Processes

5.1. Introduction

The king crab fishery in the Magellan region started at the beginning of the twentieth century, around 1928 (Guzmán et al., 2004, p. 5; Hernández, 1986). However, according to Chaparro (1917, 24), in 1917 this product was already sold in the international market as canned food.

Fisheries have contributed to the local economy since a long time ago. The king crab fishery is one of the most important regional fishing activities; however, other fisheries (industrial and artisanal) also contribute to local and national economies (Chilean snow crab, sea urchin, Chilean seabass, and *australis hake*, for instance). These fisheries have been successfully incorporated into the international markets as a result of long-lasting liberal economic policies and a growing external demand for seafood. In the case of Chilean snow crab, it is exported to the United States and some Asian countries (PROCHILE, 2017). The *australis hake* is bought by Spain, China, and some other European countries (COMTRADE, 2017), and the sea urchin is imported mostly by Japan (PROCHILE, 2016).

This chapter analyzes the value chain of the southern king crab by understanding the main actors and processes involved. Besides that, some governance issues of this fishery will be analyzed, and also aspects such as prices and relations among actors in order to understand the integration of this fishery into the global markets. Data collected from the interviews with fishers and key actors, the survey applied to the fishers, and also some document analyses are the main inputs for this chapter.

5.2. King Crab Value Chain: Actors, Distribution, Processes, and Relations

5.2.1. Actors.

Value chains involve several actors describing horizontal and vertical interactions. Some of the main actors in the chain (see Figure 5.2-2) are artisanal fishers, middlemen, industrial plants, and consumers (local and foreign consumers), which are going to be analyzed in the paragraphs below.

5.2.1.1. Artisanal fishers.

The General Law of Fisheries and Aquaculture (Law number 18,892) defines artisanal fishers as "those who are ship skippers or crew in an artisanal boat regardless of the retribution regime."[17] Thus, an artisanal boat is defined as a boat with a maximum length of 18 m and 80 m^3 of storage capacity. There are different kinds of boat categories according to the length; each category has a defined capacity according to the type of fishing.

Despite having just one single definition of artisanal fisher, there are many kinds of fishers according to the activity and number of boats which belong to them. The interviews and surveys identified different kinds of artisanal fishers:

[17] This law also recognizes boat owners as artisanal fishers (Article 2, section 28, subparagraph a).

- Crew: A person who works on the boat under the ship skipper's instructions. They have to have a certification for being crew (artisanal fishers).
- Owner or *armador*: This person can work on the boat as a ship skipper or not.
- Middlemen: This person was an artisanal fisher in the past, and is now retired and owns several boats, some of them for fishing and some of them for transporting king crab to the harbor. Or the person was not a fisher, but has been related to the sector for a long time.
- Extractive-independent: An artisanal fisher who owns a boat, fishes, and delivers the catch directly to the industrial plant or a specific middleman at sea. This type of fisher does not have a prior agreement to deliver catches to the middleman. Nowadays, this figure is less common due to the high costs for the fishers regarding self-funding when fishing.
- Extractive-dependent: A fisher who owns a boat, fishes, and delivers the catch to a specific middleman. This fisher has a previous agreement with the middleman because the middleman is funding him. This is the most common figure now.

According to the SERNAPESCA Statistical Yearbook (2016), there are 97,787 registered fishers in Chile, and from that number, 5,930 fishers are located in the Magellan Region (SERNAPESCA, 2016). However, only 574 fishers are allowed to catch king crab, according to the Artisanal Fishers Register (2018)[18]. Most of the fishers registered for catching this resource are located in Punta Arenas followed by Puerto Natales (see Table 5.2-1).

Table 5.2-1: Magellan Region, authorized king crab fishers (2018)

Harbor	Number of authorized fishers
Punta Arenas	379
Navarino	17
Porvenir	12
Puerto Edén	17
Puerto Natales	129
Puerto Williams	20
Total	574

Source: Author based on Artisanal Fishers Register (2018).

Also, it is important to highlight that, similar to other fisheries in Chile and worldwide, the king crab fishing is a male-dominated activity. There is no legal prohibition regarding women's participation, and the women's role in this sector is quite different; it is more focused on managing their partners' issues on land (payments, buying fishing gear, and delivering documents) than working at sea. For example, out of the total registered fishers, just 9.5% of them are women. Most of the women are registered as algae collectors, followed by the category of artisanal fisher and

[18] Fishers represent 3.6% of the regional population and king crab fishers are 9.7% of the regional registered fishers (SERNAPESCA, 2016).

diver (those dedicated to capturing Chilean oysters, for instance) as the category with more reduced participation by women, as Figure 5.2-1 shows.

Figure 5.2-1: Number of women in artisanal fisheries (XII Region)

Source: Author based on SERNAPESCA Statistical Yearbook (2016).

These numbers highlight a remarkable division of labor in this sector and also the danger of neglecting women's contribution to artisanal fishing. Concerning the king crab fishery, women's participation is even smaller. According to the Artisanal Fishers Register (2018) just four women are registered as artisanal fishers in this activity in Punta Arenas (main caleta). Besides that, just four women are also registered as authorized boat owners working with king crab (they own the boats, but do not go to sea). These four women are the same as those registered as artisanal fishers. This happens because one person could be registered under different categories in order to be allowed to work in different fisheries.

*5.2.1.2. Middlemen (***acarreadores*)*.*

The middlemen are the people that, at the beginning of the fishing season, organize (on land) groups of fishers in order to finance them and supply them with inputs (food and gear) throughout the season. The middlemen can own different boats, including shipping and extractive boats. Some of them use some boats for fishing but most of them send their boats, at least once a week, to buy or collect the catch from the fishers at sea and deliver it to the industrial plant. During the interviews, they considered themselves artisanal fishers, probably because most of them were artisanal fishers (working at sea) before becoming middlemen. There is no formal definition for this figure; therefore, the previous definition is based on the interviews.

According to one key informant, during the 1970s, the industrial plants used to have boats catching the king crab (interview industrial plant Jeison, October 31st, 2017; Punta Arenas). However, that was a complex job, therefore many of these plants decided just to be in contact with one person who organized the fishers and paid them. The agreement was simple: the middlemen

guaranteed the king crab supply and the industrial plant gave them the funding in order to organize the fishing season. It is important to mention that there are no recognized formal financing sources for this sector, for example, special banking loans for artisanal fishers.

> We organize the fishing season. What does it mean? You have a group of people, each fisher has his own boat, his own fishing codes, because the fisheries here are regulated by codes. So, the fishers gather by groups and sectors. Each fisher has three or four crew members. They gather themselves by sectors, and what does the middleman do? The middleman has a bigger boat for collecting the catch from the fisher boats. We also have our own extractive boats. What the middleman does is supply these floating cities [the groups of boats at sea] because the catching season lasts five months; five months in which the fisher stays at sea. Hence, the middlemen supply them and also collect the product and carry it to the industrial plant.
>
> Middleman, Sara, September 15th, 2017; Punta Arenas

According to the interviewees, a middleman can manage from ten to eighty boats. Average middlemen can manage twenty to twenty-five boats. Just a few of them organize eighty boats.

5.2.1.2.1. Middleman's role: funding and contact point between fishers/families and fishers/industrial plants.

The fishers deliver the catch in different ways. The first option is to deliver the product at the harbor, and then it will be transported to the industrial plant by medium or small trucks. The second alternative is to deliver at sea to the middlemen's boats. These boats collect the catch from the fishers' boats every six or eight days. In this case, the middleman has a previous arrangement with the fisher (formal or informal contract) in order to assure the catch. Those fishers that are not delivering at the port or to a specific middleman at sea sell the catch to the best buyer at sea. Some middlemen do not have any contract with the fishers, but they sail through the different catching zones at sea looking for those fishers interested in selling the product. These middlemen pay with cash, which means that high amounts of money are flowing there as well instead of the harbors, making the sea a transactional place for money. Prices may vary if the fisher decides to sell the product at the port (directly to the industrial plant) or at sea (when they do not have a previous arrangement with the industrial plants or, in some cases, they do have an arrangement but decided to sell it to the best buyer).

However, many fishers decide just to sell the product at sea because they do not have to wait for a long time to receive the payment back. Otherwise, if they decide just to sell the product directly to the industrial plants, they have to wait at least one week to get the payment back. That is a problem, especially for those small fishermen who rely on this revenue in order to buy new inputs for the catching process.

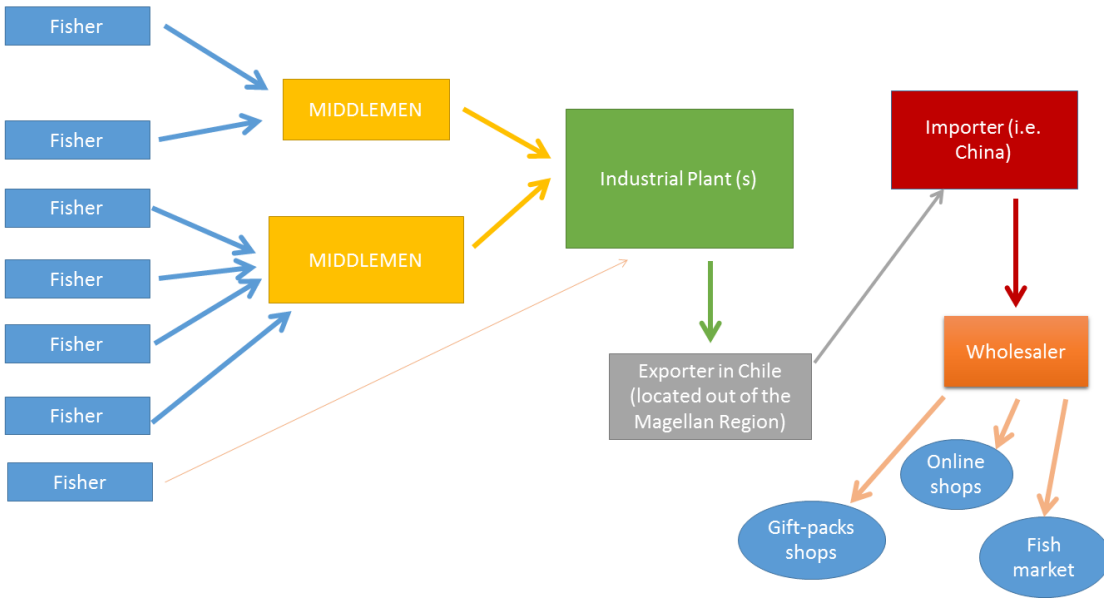
Because many fishers stay at sea during the catching season (most of them are at sea two to three months or for the whole fishing season, which means five months), the middlemen not only buy the catch from them but they also have a supplying role. They supply oil and food to the fishers' boats and are also the contact point between the family and the fishers.

When buying the product at sea, the middlemen charge from around 1,000 Chilean pesos ($1.60 USD)[19] per kilo, which means that if the price per kilo is 3,200 Chilean pesos ($5.30 USD) those fishers that sell king crab at sea will receive back around 2,200 Chilean pesos ($3.60 USD or $4.80 USD) at the beginning of the season. That "shipping and supplying fee" is constant during the fishing season.

There are two ways of financing the artisanal fishers according to the informants, or what is called *habilitación* (enabling). The first one is to enable (give money) to the crew members (around 500,000 to 1,000,000 Chilean pesos) which they will give to their families before leaving. This money is a way to attract people and assure the crew. (There are high rotations and high levels of informality in hiring crew members. For more details see Chapter six.) The second financing strategy is to give money to the boat owners (from the industrial plants or the middlemen) in order to buy all the required inputs for the season (oil, food, and gear). That requires an amount of money of 30 to 40 million Chilean pesos for the bigger boats; the smaller vessels could require between 3 to 5 million Chilean pesos.

Because of the informality of this process, it is not possible to identify the number of fishers that ask for funding from the middlemen. Most of them establish a trust-based relationship with the middlemen. This relationship, most of the time, is based just on verbal agreements. Nevertheless, according to one of the main middlemen in the region, around 80% of the fishers use this funding system (Middleman Sara, September 15th, 2017: Punta Arenas). Just a few fishers finance their activities with their own revenues.

Figure 5.2-2: King crab value chain



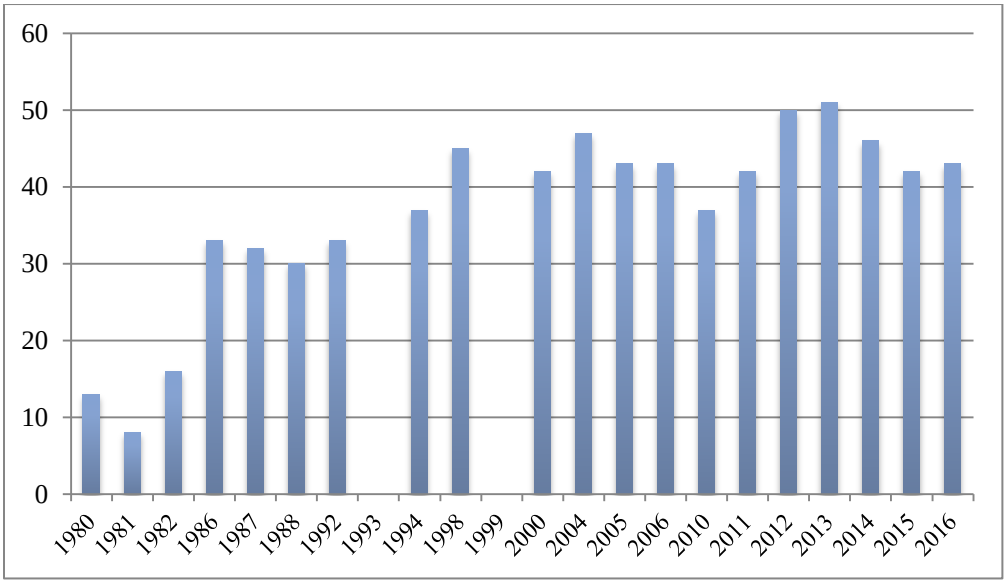
Source: Author based on interviews.

[19] $1 USD = 600 Chilean pesos, average exchange rate for the dates in which the data was collected by the researcher.

5.2.1.3. Industrial plants.

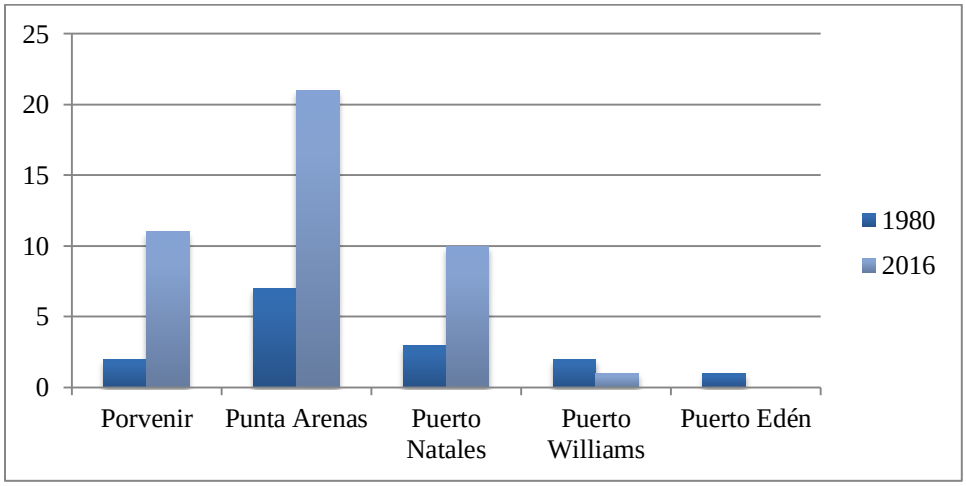
There are twelve industrial plants with PAC (*Quality Assurance Program*) certification processing frozen crustaceans (snow crab and king crab) (SERNAPESCA, 2016). Most of these plants are located in Porvenir (Tierra del Fuego) in order to benefit from the tax exemptions from the *Navarino Law*. The number and locations of the industrial plants have changed over the years. However, the interviewees agreed that an increase in the number of plants improved the prices due to the competition among them. For example, now in Porvenir, there are around eleven industrial plants compared to two in 1980 (see figures 5.2-3 and 5.2-4).

Figure 5.2-3: Total of industrial plants, XII Region (1980-2016)



*No available data in 1993 and 1999.
Source: Author based on SERNAPESCA Statistical Yearbook, several years.

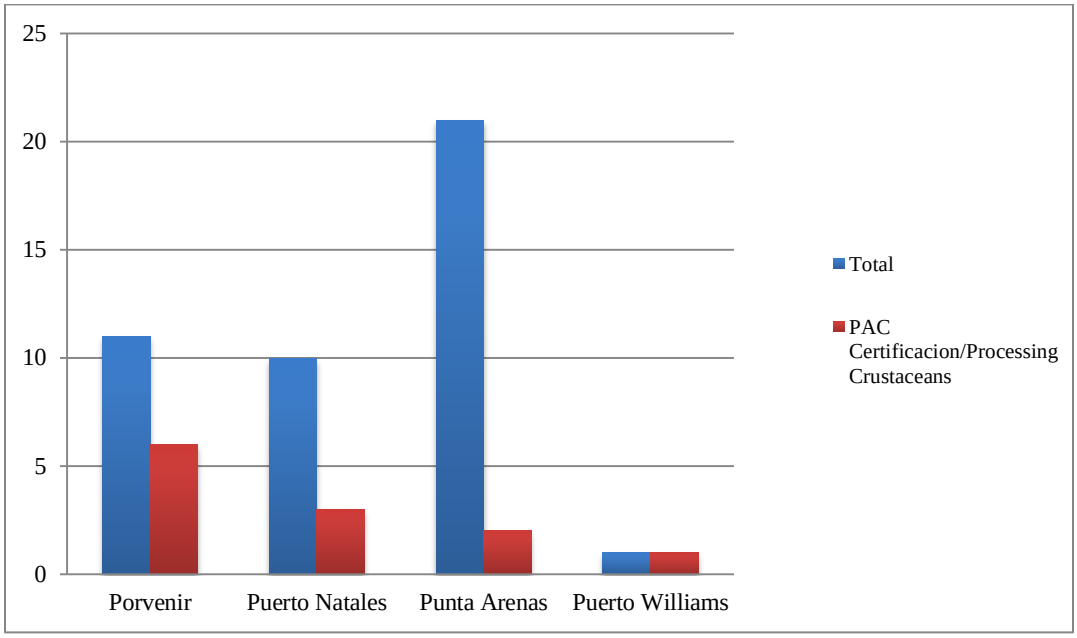
Figure 5.2-4: Distribution industrial plants. XII Region, selected years (1980 and 2016)



Source: Author based on SERNAPESCA Statistical Yearbook, several years.

Nowadays, in total, there is just one industrial plant in Puerto Williams, ten in Puerto Natales, twenty-one in Punta Arenas, and eleven in Porvenir. However, only some of them process crustaceans (including the king crab) and are certified under PAC. As is showed in the Figure 5.2-5, from the forty-three industrial plants in the region (blue bar), twelve of them are certified as PAC, which means that these plants are able to process frozen crustaceans and export them to the EU, China, Brazil, Colombia, or Uruguay (red bar). It is possible that other plants process frozen crustaceans, however, there is not available data about that specific product, just for those under PAC category.

Figure 5.2-5: Total industrial plants and industrial plants with PAC processing king crab



Source: Author based on SERNAPESCA (2016) & SERNAPESCA (N.d.)

Prices are established by the industrial plants which, according to some interviewees, define a quota every year to comply with the foreign buyers. For example, the industrial plant agrees with a foreign buyer in supplying X tons of king crab by the end of the year. Thus, prices are not static and fluctuate from the beginning of the season in July until the end of it in November or mid-December (if the season is legally extended).

According to the interviewed actors, every year the industrial plants establish an initial price per kilo of king crab. For instance, in 2017 the initial price was 3,500 Chilean pesos ($5.80 USD), and it fluctuated every week according to the market. The price increased 100 Chilean pesos ($0.20 USD approximately) every week. At the end of the season, the price reached a peak of 9,000 Chilean pesos ($15 USD) (SERNAPESCA, 2018). In the interviews, the fishers argued that during October and November, a rush for the catching starts since the plants need to meet their quotas, therefore the prices continue increasing and some fishers decide to use illegal gear, such as nets, in order to catch as much as possible (Hernández, 2016).

The middlemen deliver higher amounts of catch to the industrial plant compared to the capacity of an independent fisher. That is one of the main reasons for the plants to just receive the catch from the middlemen. In that way, they can process high amounts of king crab at a lower cost.

The industrial plant finances the middlemen (enable), or in a few cases the fishers. Boats or even fishers' houses work as a pledge to ensure that money is delivered back as catch. However, giving the money to the middlemen sometimes does not ensure being paid back with product. Many interviewed actors agreed that some fishers do not respect the contract (written or verbal) and deliver the product to other middlemen or industrial plants which are paying higher prices.

However, power relations are complex and multidirectional. For instance, according to the manager of one of the most important industrial plants in the region, he highlights that just being supplied by king crab is a difficult task because of the high competition among industrial plants in order to get as much product as possible. As a result, they pay higher prices in order to incentivize fishers to deliver the resource to them.

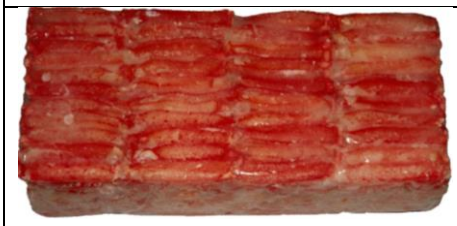
> As I told you before, here the competition [among industrial plants] is huge. It means that it is more difficult [for the industrial plant] to buy the product than it is just selling it. If you ask me who is my client, my client in this context is my supplier [most of the times the middlemen].
>
> Industrial plant, Salomón, November 14th, 2017; Punta Arenas

5.2.1.4. Consumers.

5.2.1.4.1. Foreign markets: new consumers.

According to some interviewed officials and industrial plants, almost ten years ago, the main markets for the king crab were the American market, where it was sold as a processed and frozen product (5lbs. frozen blocks) and the European market, where canned king crab with a higher price was popular. However, after the economic crisis in the United States (2008) and the EU (2010) markets, the demand for these products was lower in the Northern Hemisphere and started rising in some Asian markets, especially after 2012. Therefore, with these new consumers, the demand for the king crab under a simpler presentation (whole and frozen product) increased (see Table 5.2-2 about product presentations). That reduced production costs and, at the same time, the increasing demand raised the price paid by the buyers, and as a result, the price paid to the fishers increased as well.

Table 5.2-2: King crab, presentations and prices

Presentation	Description	Price (average)
	Frozen block, 5lbs*	$15 to $22 USD
	Canned food**	$17.95 USD per 100 g
	Whole frozen king crab***	$14 to $17 USD per kilo

*Source: https://www.flickr.com/photos/29087868@N03/5985808502
**Source: http://www.geomar.cl/producto/king-crab/
***Source: http://www.chileseafoods.com/kingcrab.html

5.2.1.4.2. Local consumption: problems supplying the local market

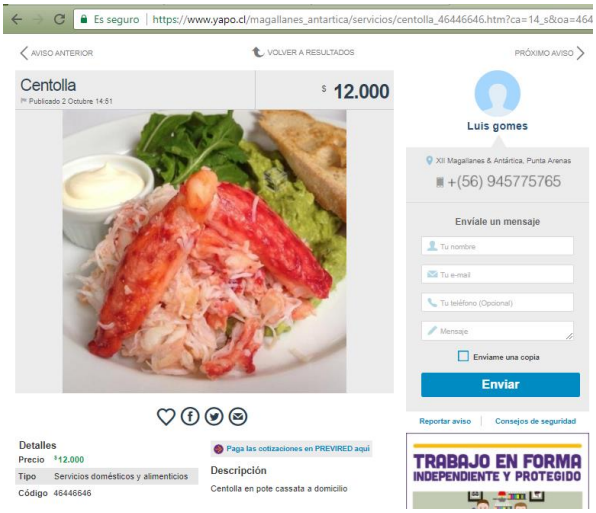
Despite being a recognized product in the region and being called the "star product," the local king crab consumption is low. Being a highly regulated and externally demanded fishery implies higher prices for the product. These prices are not affordable for many locals; as a result, an important part of the local market (which is small because sea products are not highly consumed due to cultural issues)[20] is supplied by the informal fishing sector (illegal fishing).

[20] This region is highly recognized for production of beef and lamb. Other kinds of meat, such as chicken, are quite popular due to the low prices.

According to the interviews with the fishers, consumers, and key informants, thirty to forty years ago, the king crab was a common product highly consumed by the locals. The product was sold by street vendors. More recently, due to sanitary regulations, it is not possible to buy it on the street, and even at the port there are no facilities for buying this resource and other sea products.

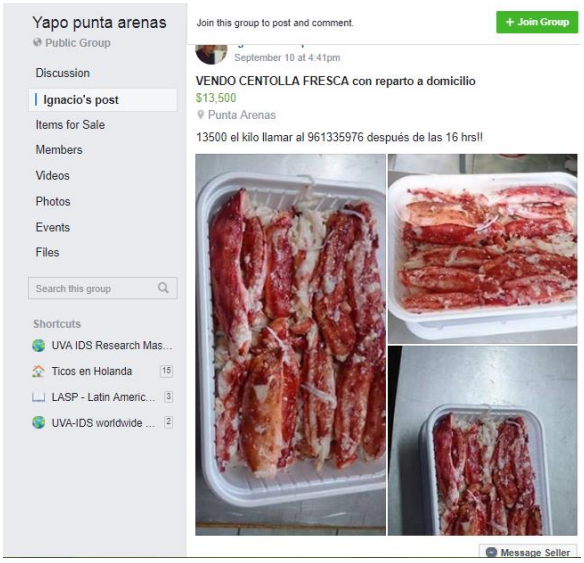
The local market is mostly supplied by the informal/illegal fishing sector. Hence, the product is processed at sea (cooked and packaged in presentations of 800 grams). Then, it is sold by the fishers or some people that buy that product from the fishers. Sometimes, the product is sold by using web platforms such as Yapo (Figure 5.2-6) or Facebook (Figure 5.2-7).

Figure 5.2-6. Ad in Yapo, king crab sold in Chile



Source: Yapo.cl

Figure 5.2-7: Ad on Facebook



*The bold words say: "I sell fresh king crab delivered at home". Source: Facebook

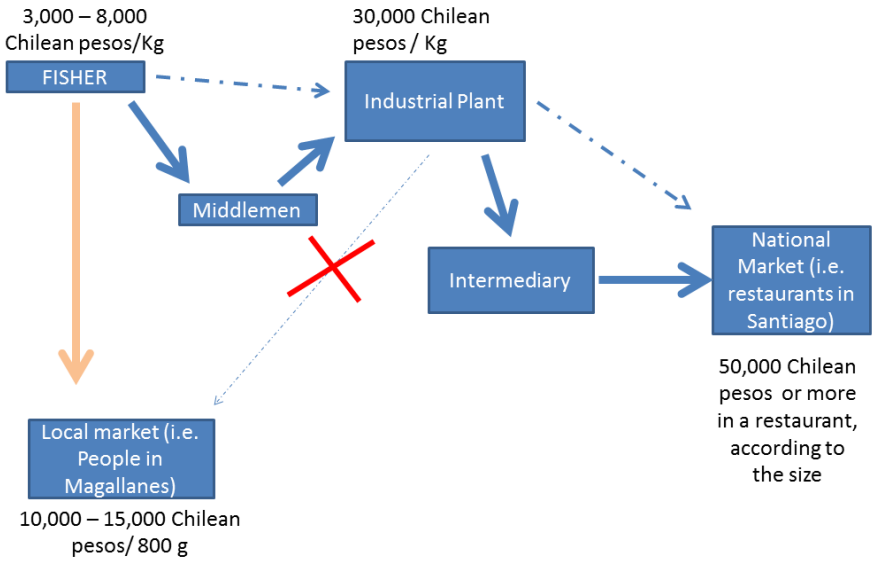
Prices vary drastically between the legal and illegal products; for example, an illegal box of 800 grams of crab called "Cassata"[21] costs around 10,000 to 15,000 Chilean pesos ($16.60 USD to $25 USD); meanwhile, a legal package of 1 kilo costs around 30,000 Chilean pesos in the municipal market.

There are no official numbers on the supply of the local market by illegal fishing. However, according to some middlemen and officials, despite the local consumption being low, around 80% to 90% of the local market is supplied by illegal fishing.

Besides that, at the national level, there is not a formal distribution chain. According to some interviewed industrial plants and key informants, the national market, especially when supplying the demand in the capital city, is very informal. The distribution is made by direct contact between buyers (especially some restaurants) and the industrial plants or some actors (intermediaries) that buy the product from the industrial plant and then sell it to their contacts in the capital city.

Figure 5.2-8: Local and national value chain

[21] It is packed in an ice cream box with a brand called "Cassata."

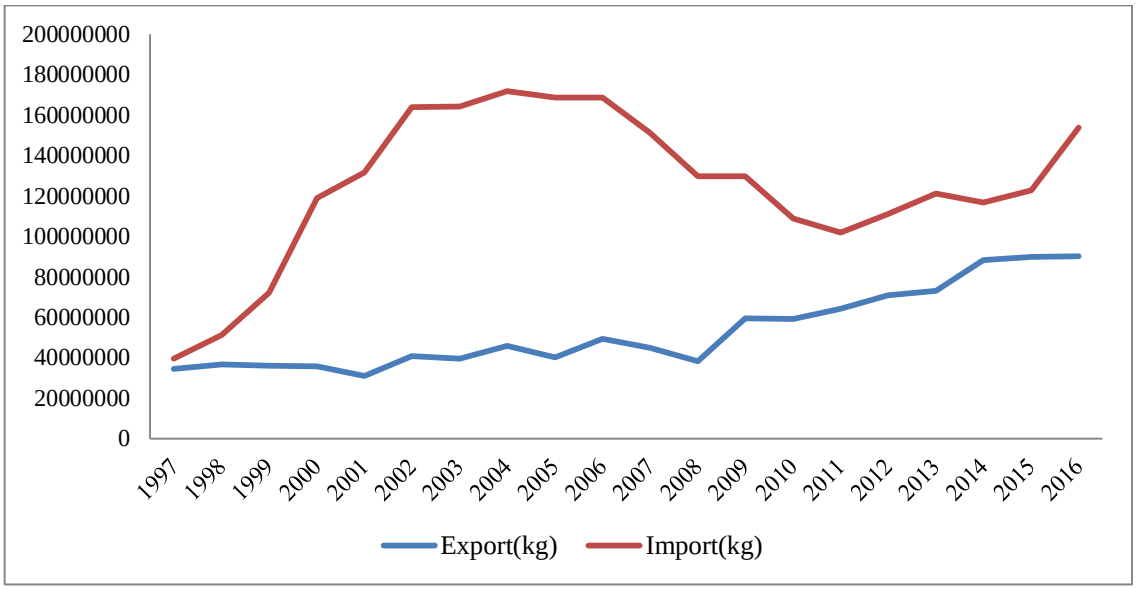


Source: Author from interviews.
Exchange rate: $1 USD = 600 Chilean pesos.

5.2.2. Prices (income, costs, and margins).

In the last ten years, an increasing international demand for different crustaceans has been experienced (The Observatory of Economic Complexity, N.d.). Emerging markets, especially Asian markets, and new consumers interested in buying fresh or frozen seafood for health and convenience issues, drive the new demand (see Figure 5.2-9. The offer of these products is overcome by the demand; as a result, prices have increased over time (Prochile, 2017).

Figure 5.2-9: International crustacean offer and demand (1997-2016) (kg)[22]

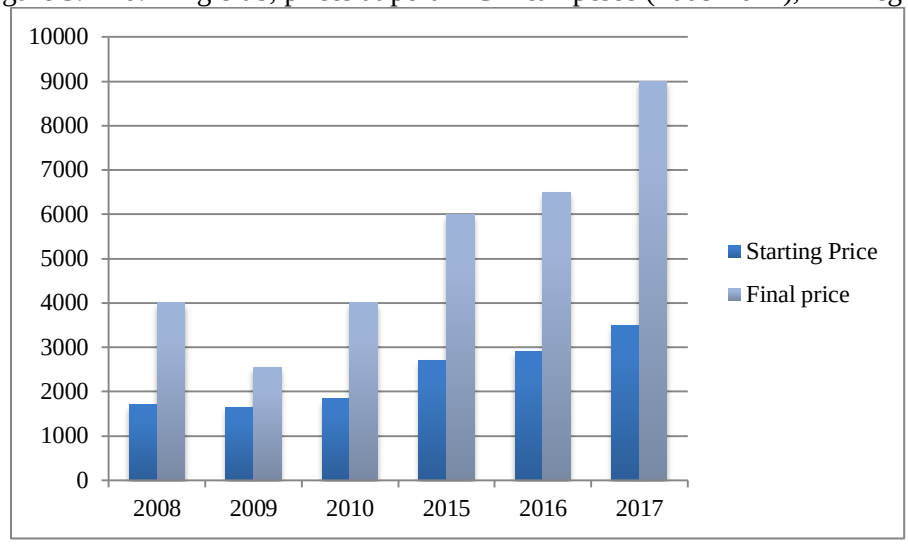


Source: Author based on COMTRADE (2018).

The local fishers agreed that prices for the king crab increased during the last five years (see Figure 5.2-10). There is an increasing trend in both prices; when the fishing season starts in July (starting price) and when it finishes in November (final price). This increase happens because of the rising Chinese demand in the international markets and also the Chinese interest in investing at the local level in order to assure king crab supply.

[22] In the harmonized system the king crab is classified as: *Crustaceans; frozen, crabs, in shell or not, smoked, cooked or not, before or during smoking; in shell, cooked by steaming or by boiling water* (number 030614). There is not such a specific category in COMTRADE database for king crab. For imports the following data was used for the main world king crab importers (FAO, 2018): United States, China, and South Korea; on the other hand, for exports, data from the main world king crab exporters was used (Russia, China, and the United States) (FAO,2018).

Figure 5.2-10: King crab, prices at port in Chilean pesos (2008-2017), XII Region



*There is no available data for prices during 2011-2014 in Punta Arenas.
Source: Author based on SERNAPESCA (2018).

During the interviews, income was a difficult aspect to measure because the fishers highlighted that fishing is an unpredictable activity; some weeks the catch could be good and others the catch is low or there is not catch at all. Thus, the income in the artisanal sector significantly varies regarding external factors such as weather and issues related to the fishers' capabilities: gear quality and capacity, boats, experience, and knowledge of the best places for catching (*caladeros*) (AQUA, 2017), which, in fishers' words, "is a matter of luck." So, establishing an average income for the artisanal fisher is a risky task, but it is possible, according to the interviews, to determine some general income categories:

- Owner (one medium-sized boat): 1 to 2 million Chilean pesos per month.
- Crew: 400,000 to 800,000 Chilean pesos per month. According to the fishers, many people working as crew in the king crab artisanal sector have an income based on 10% of the total catch per X period of time. So, if in X period the catch was 1,000 kilos and the price is 5,000 per kilo delivered at the harbor the crew member will receive 500,000 Chilean pesos. Some ship skippers argued that they pay the crew based on this 10% plus the base wage, but most of them also argued that the payment is different among boat owners and everybody has their own system and formal or informal agreements with the crew.
- Ship skipper: 13% the delivered catch, plus base wage.
- Middlemen: 10% of the total income. They charge around 1,000 Chilean pesos per caught kilo as a transport fee.
- Industrial plant: Selling, in the local market, one kilo of whole frozen king crab for 30,000 Chilean pesos ($50 USD). In international markets, one kilo of this product costs between $15 and $30 USD (ProChile, 2016) according to the presentation (frozen blocks, whole frozen, canned food, etc.)

Regarding investments, according the interviewees, the amount of money required for starting a season is high. For example, some middlemen and owners argue that just one average boat requires

an investment of 30 to 40 million Chilean pesos ($50,000 to $66,600 USD) in order to buy traps, gear, and all the related material for starting the fishing season. Besides that, the owner points out that every crew member could require an amount of 500,000 to 1,000,000 Chilean pesos ($833 to $1,600 USD) to give to their families before they leave. The bigger middlemen, those who organize groups of ten or more boats, agreed that they require around 200 to 500 million Chilean pesos ($333,000 to $833,000 USD) as an investment at the beginning of the season. They get this money from the industrial plants and they agree to pay back the money with the product and without paying any interest.

There are two kinds of prices: the price paid at sea (those fishers who sell the product to the middlemen at sea) and the price paid at the plant (the price in which the middleman or the fisher sells the product to the industrial plant). The difference is around 1,000 Chilean pesos ($1.70 USD). The price changes every single week, but the middleman keeps this amount which is his income for transporting the product from the open sea to the plant.

According to the industrial plant managers, they (industrial plants) define the initial price according to their needs and interests (agreed upon quotas with foreign buyers). According to some officials, industrial plants, and key informants, the plants decide among themselves on the initial price (collusion). The existence of a vertical relation based on financing the fishery also determines a power relation where the plant defines the price and the fishers are just price-takers. According to one interviewed union leader, former owner, and middleman:

> The plant defines the price because they are the only ones who look for markets. They are going to those markets to sell the product and they deal with those interested in buying it. Here we have an issue; the artisanal fisher has never defined the price. That is something that we always wanted to change, but we couldn't do it. That is something that needs to be changed. The industrial plant must go to the beach and buy the product there, then we [the artisanal fishers] can define our own price, not the industrial plant.
>
> Fisher (owner), David, October 30th, 2017; Punta Arenas

The initial price is established by the plants and it fluctuates according to the market demands and competition among plants and middlemen. Price speculation is quite high in this sector. The industrial plant establishes an initial price; nevertheless, the competition is among the middlemen, who also keep more information on prices, which leads to these price fluctuations. The industrial plant finances the activity, but the middlemen have an important role defining prices and fishers' buying behavior.

5.2.3. Relationships, linkages, and trust.

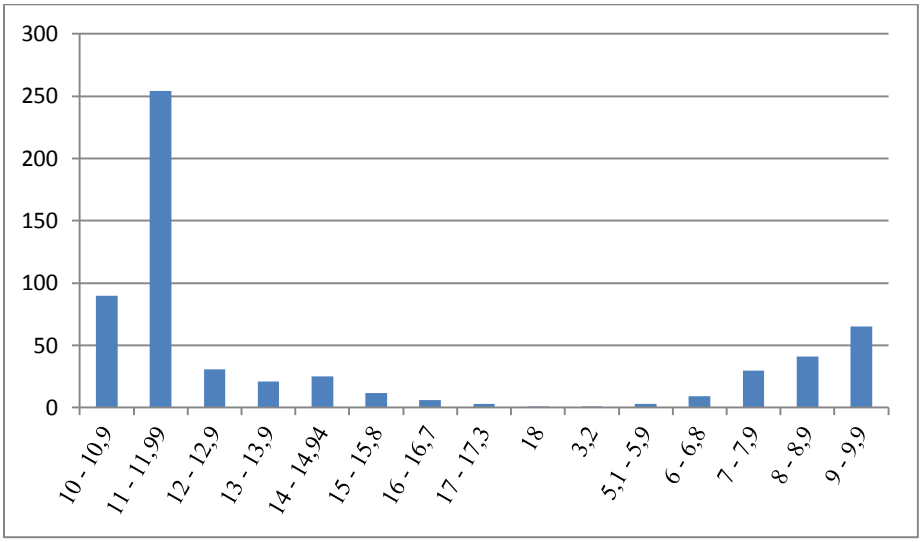
The king crab fishery still presents high levels of informality regarding contracts among the actors (AQUA, 2017). For example, many interviewed fishers declared that contracts are more common now than ten or twenty years ago, but an important sector of the fishers, especially the crew, just prefer not having a contract in order to avoid tax payments--an issue that will be discussed in Chapter six. Also, some interviewed middlemen highlighted that they do not use a contract when they ask for financing to the industrial plant or give money to the fishers at the beginning of the season. They declare that trust is still an important element in this sector, which is

also a problem regarding the high amount of money that flows through the chain and the high levels of indebtedness which also prevails and will be discussed in the next chapter.

5.3. An Artisanal Fishery with Industrial Behavior: Gear and Technological Change

Fishing in a climatic extreme zone implies having advanced gear and suitable boats in order to handle difficult weather conditions. Sizes of the artisanal boats are diverse and it is not possible to just describe one kind of boat as artisanal. Hence, it is possible to find small boats from 12 meters or even smaller that compete with bigger boats (18 meters in length) equipped with advanced technology. All of them are considered artisanal by Chilean law. According to the Artisanal Boats Register (2018), around 58% of the king crab authorized boats range from 10 to 11.99 meters in length.

Figure 5.3-1: Sizes (meters) of authorized boats for fishing king crab, XII Region



Source: Author based on SERNAPESCA, *Registro embarcaciones artensales* (2018).

This size makes a difference regarding how far a fisher can go and the amount of catch that is able to fish and keep in good conditions (alive and without any injuries) until it is sold at the harbor or to the middleman. For example, smaller boats are limited to fishing close to the coast; meanwhile, bigger boats can sail for more than forty hours and stay away for longer periods.

Figure 5.3-2: Small-medium sized extractive boat (11.5 meters in length)

Source: Author during fieldwork in Porvenir.

Figures 5.3-3 and 5.3-4: Transshipment boats

Left: Shipping boat, size 16.64 meters length
Right: Front of the shipping boat. The two blue small doors on the floor are the storage places for the king crab.
Source: Author during fieldwork in Punta Arenas

5.3.1. Changes in fishing effort and "industrialization of the activity."

In the interviews, most of the fishers agreed that they fish deeper at sea (at longer distances from the coast) quite often because it is more difficult to find places for fishing close to the harbor. Longer distances imply a longer time spent fishing and also gear sophistication in order to catch deeper, while facing complicated weather conditions like high-speed winds or frozen seawater. According to some fishers, sometimes they are fishing at an average depth of 300 to 500 meters; meanwhile, twenty years ago they were catching king crab at a depth of 30 meters.

The fishers highlighted that the fishing effort is also increasing (see Chapter six). Not only are the size of the boats becoming diverse, but also the number of traps per extractive boat. Thus, catching numbers could be imprecise because there is no control on the number of traps in the water. Regulations just apply to the ships, but the number of traps employed by the fishers is open. The caught king crabs have to comply with the regulations regarding sex and size. If the catch includes females, or males below 120 millimeters in size, they have to be returned alive back to the water. It was not possible to find official data about the number of traps; during the interviews with the fishers and middlemen, the number of traps used was asked. After interviewing twenty-one fishers (including middlemen), 22,350 traps were reported, which means an average of 1,064 traps per interviewed fisher. The fishers noted that twenty years ago, they used to fish by using 100 to 200 traps per boat.

Nevertheless, distribution of traps between owners and middlemen, for example, is diverse and unequal; while some smaller ships use between 300 and 500 traps, the bigger boats can use up to 2,000 traps (see appendix 3 about the number of traps per interviewed fisher). However, according to interviewed officials and experts, the number of traps changes a lot and sometimes smaller boats can have more traps, since many traps do not have to be on the boat and are stored on some islands close to the catching zones, then they are picked up again by the fisher when the season starts, which is also an obstacle to having accurate statistics about the fishing effort.

According to an interviewed union leader and former ship skipper, "The fishing effort has increased a lot. Every year, I can tell you that we are fishing with more than 30,000 or 40,000 traps in the water. So, to what extent is the resource going to be sustainable?"

The fishers and key informants acknowledge that the king crab fishery is lucrative compared to other fisheries. But, they also argue that the required investment for developing this activity is high. In order to illustrate this point, the fishers explained the average cost of the related gear:

- Trap: 35,000 Chilean pesos ($58.30 USD) per trap
- Pulley or winch: 3,000,000 Chilean pesos ($5,000 USD)
- Twelve meter boat: 45 to 50 million Chilean pesos ($75,000 USD to $83,300 USD)

Due to the weather and geographical conditions, artisanal fishers utilize technological gear in order to improve their activities. For instance, they use cameras under the water and echo sounder equipment to assess the fishing zones. Also, they outline their fishing zones with buoys equipped with sensors that are located by GPS (see Figure 5.3-5).

Figure 5.3-5: Wheelhouse in transshipment boat

Source: Author during fieldwork in Barranco Amarillo, Puntarenas.

Fishing modernization in this region has happened over a period of thirty years. Three decades ago, fishers completed the activity by using just their senses and strengths, without any technological help (see Figure 5.3-6). For instance, according to fishers, ten years ago, *el burrito*, a machine for taking out the traps from the sea, started being used by the fishers.

Figure 5.3-6: King crab artisanal fisher in Puerto Natales (1967)

Source: https://www.enterreno.com/moments/pescador-de-centollas-en-1967-3006

5.4. Governance in the King Crab Fishery: The Management Committee and Some Future Challenges

This fishery is highly regulated by law. The General Law on Fisheries and Aquaculture in 1989 established the regulations regarding sizes, sex, seasonality, and gear in order to catch king crab in this region. However, according to officials, illegality persists by using nets instead of traps or non-registered boats (boats without codes) or by catching females and crabs under 120 millimeters in length.

Aiming to obtain a sustainable management of this resource, in 2015 a King Crab and Snow Crab Management Committee (Comité de Manejo de Centolla y Centollón) was created by the Fisheries Undersecretariat (Subsecretaría de Pesca or SUBPESCA). This committee has an advisory role regarding the creation or implementation of a management plan for those closed-access fisheries or those recovering or in an initial exploitation phase[23]. This organization involves several actors related to king crab fishing: industrial plants, union leaders, and officials[24]. One of the main concerns of this committee is to promote the sustainable management of both resources by taking into account social, cultural, and economic aspects of these fisheries (SUBPESCA, 2017). Despite its advisory nature, some interviewed actors who are also part of the committee, consider it a good sign and management idea just to bring together different actors from the artisanal world. The idea is to discuss the future of this fishery beyond technical issues and include socioeconomic aspects of the fisheries and fishers. According to one member of the committee and industrial plant representative,

> I don't like at all the idea of establishing quotas. I am more willing to support management like the one that we want to do in the committee--management which includes people from different sectors, including environmentalists, fishing authorities, navy, artisanal fishers… all the actors involved in this activity, and trying to do something smart, trying to identify some indicators, signals about the fishery sustainability and establishing mutual boundaries, but, the most important, guarantying quality in the decision-making process.… I think this is more useful and safer for the future of fisheries than any other experiment that I have ever seen.
>
> Industrial plant, Jeison, October 31st, 2017, Punta Arenas

This committee is a complement to the scientific committee. The management plan is created by the management committee, assessed by the scientific committee, and confirmed again by the management committee in case of modifications by the scientific committee. The committee is an advisory entity, but the management plan created by them is mandatory for all the involved actors in the fishery.

Governance tools for managing this fishery are a controversial issue in the committee meetings. Despite the previous regulations, some measures such as quotas are also discussed in this organization. Establishing a quota is not a popular measure among fishers and industrial plants. Based on the *australis hake* quota experience, many actors think that this measure will end the artisanal fishing in general. One of the main reasons is due to the size of the fishery; the extracted

[23] General Law on Fisheries and Aquaculture, (1989). Article 8th.

[24] According to the Law the composition of the committee should be a minimum of two and a maximum of seven representatives of artisanal fishers, three representatives from industrial fisheries, one from an industrial plant, and one representative from SERNAPESCA. (General Law on Fisheries and Aquaculture , 198924).

volumes are high but not too big as in the industrial fishing activity. Thus, establishing a fixed amount for extracting king crab and then dividing it into the number of distributed fishing codes (that sometimes are not the same as fishers) could lead to a "market of fishing codes" and monopoly of the activity by few people. In this context, some code holders will sell their codes to a bigger fisher or middleman and they just wait for their revenues instead of going to sea and fishing.

> There are companies; the businessmen, they don't go and fish the *australis hake*. They buy the ticket [to the fishers] and stay like I am now here sitting on this sofa [refers to how they do not do anything else]. The businessmen buy the quotas and they do massive fishing and this happens in all the extractive fisheries. Regarding the king crab, I think is going to happen the same… There are fishers who do not fish and, obviously, when quotas will be defined they are going to do the same; they are waiting for the quotas. For example, I am dedicated to go fishing, and then I can buy five or ten tickets [these mean fishing codes] for being allowed to catch a determined resource. It always happened like that; in that way the resource is going to be depleted.
>
> Fisher (owner) and union leader, Jesús, September 16th, 2018

Regarding the resource sustainability, there are different opinions among experts, industrial plants, fishers' leaders, and fishers. It is recognized that it is a highly regulated fishery, but the number of traps is not regulated and increases every year. According to some experts, that aspect could configure a kind of semi-open fishery, which could lead to uncertain consequences for this marine resource, without considering the effects of illegal fishing for the ecosystems. Longer sailing hours to find new catching zones could be evidence of this. However, there are no recent studies about the stocks and this fishery is barely known in scientific terms (Campodónico, 2018).

Thus, according to Campodónico (2018), this fishery might not be certified as sustainable (MSC certification) because of the current conditions, lack of data about the stocks and illegal fishing activities, for instance. Nevertheless, the market pressure (a more responsible consumer) could lead to creating better conditions in order to have a sustainable fishery.

> There is not a scientific assessment (quantification) of the king crab stock in the Magellan region. Thus, there is not a formal characterization of its status either or any reference in order to assess its status. The problem is even more complex if it is taken into account that some studies showed possibilities of multiple stocks in the region with low or no connection among them. There are indicators of relative abundance that suits for evaluating stocks but the trends in these indicators do not allow making any inferences about the population size for this resource.
>
> Expert, Campodónico, January 26th, 2018; Amsterdam

Management committees are a novelty in Chilean fisheries (AQUA, 2015) and improvements regarding coordination of this entity with other authorities, internal management, and processes are necessary in order to guarantee the resources' sustainability. However, they could be a democratic space where different involved actors could share their views about the fishing activity and challenges beyond the traditional scientific and technical approach in fisheries.

5.5. Concluding Remarks

The king crab value chain experienced a transformation regarding processes and technology due to the higher demands from foreign markets. The chain suffered a simplification regarding presentation (from preserved and frozen fancy presentations to whole frozen products) of king crab sold in markets such as China, where less added-value implied a relative reduction in price. This reduction was compensated for competitive prices due to the scarcity of this resource and consumers looking for new gastronomic experiences. In short, less added value, reduction of production costs for industrial plants, and higher prices in order to meet the foreign demand are some of the main features of this value chain. Besides that, a technological transformation was required in order to catch deeper and stay longer in the Austral Sea with extreme weather conditions, which also defined what is called by some of the interviewees "an artisanal activity with industrial characteristics." Higher prices and the need for increasing the fishing effort implies higher investments in this fishery. Here the middleman figure has an important role by providing funding, but also in the organization of the fishing seasons, responsibilities which also imply an important power quota in the chain. All these changes have effects on fishers and coastal communities regarding well-being; for example, social mobility for the king crab fishers benefited from international rising prices and, at the same time, challenges related to access to local sea resources by the community, issues that will be further discussed in the next chapter about the effects of the value chain on fishers' social well-being.

6. The Social Well-Being of the King Crab Fishers

6.1. Introduction

The King Crab fishery is recognized for being a high-income fishery due to the market value of this product and the growing foreign demand, as was discussed in Chapter five about the value chain of this resource. That led to an increase of around 50% in prices at the beach per kilo of king crab caught and also, an increase in the artisanal fishers' income.

Every year, at the beginning of the catching season in July and during it, different villages in the Magellan region experience dynamism in their economic activity. In order to meet their quotas, the industrial plants give high amounts of money to the middlemen in order to organize the catching season and finance the artisanal fishers so they may buy food, fuel, and gear for the ship, which increases the flow of money within and among the villages. All these activities have effects beyond the economic field such as changing patterns of local seafood consumption, generation of employment, migration of fishers from other regions, and in return, gradual changes in local fishing culture, or environmental consequences related to a higher pressure on the resource and the impact of more boats or traps at sea (Jacinto, 2004; Gardner et al., 2017).

Despite king crab fishing being an important economic activity for the Magellan region and some studies have been developed around it, the socioeconomic dimension of this fishery has been scarcely explored with very little data or studies about the effects it has on the fishers' lives. Thus, the main objective of this chapter is to understand the well-being of the artisanal fishers in the Magellan region by taking into account that a high-value fishery could imply possibilities of higher income and social mobility, but also negative effects related to increasing competition for resources which could lead to uncertainty for the ecosystem sustainability and the fishers relying on them.

The chapter explores the three dimensions of social well-being described in chapter two by using data from a survey and interviews administered to the fishers and also to other actors in the value chain. Thus, the first section describes the objective well-being by discussing issues related to health, education, income, and employment, for instance. The second section explores the relational dimension by discussing formal and informal relations among fishers and different actors in the chain, and the third section goes further into the subjective dimension of well-being by discussing fishers' self-perceptions of their work. After that, some concluding remarks are developed.

6.2. The Social Well-Being of the Magellan King Crab Fishers

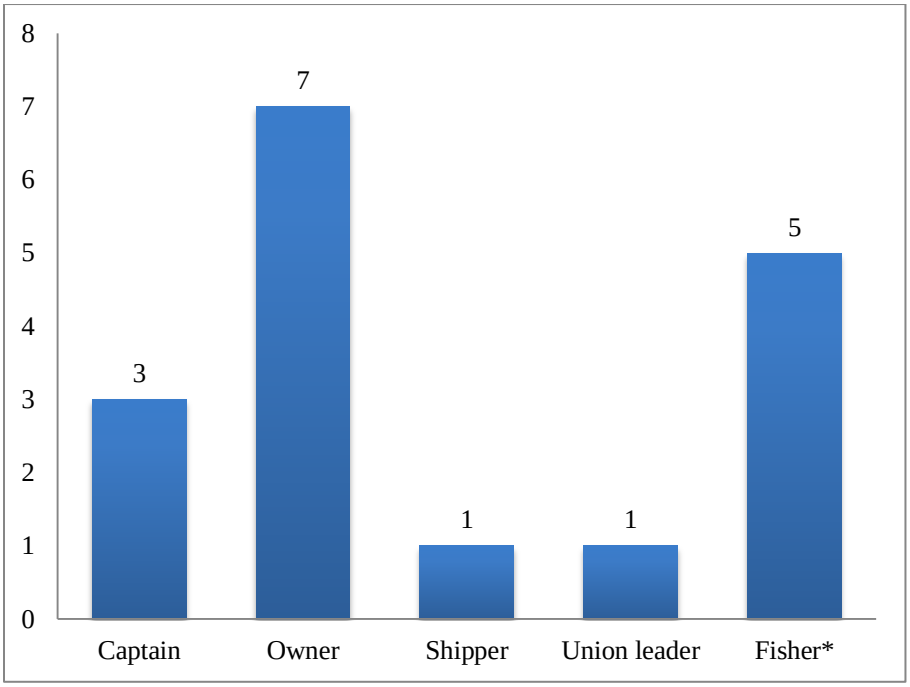
6.2.1. The fishers' sample: a socioeconomic profile.

The data in this chapter was collected from a survey and interviews given to twenty-seven fishers (two of them were fishers' wives) between September 2017 and December 2017 (see the methodological chapter). The researcher also interviewed representatives from five industrial plants,

four government officials, five key informants (scientists and consultants), and eight local buyers (restaurants and fish shops).

Twenty-one of the interviewed and surveyed fishers were extractive fishers (one dedicated to both extracting and transporting the king crab) and two shippers, plus three of which did not identify themselves as either extractive or shippers. Sixty-two percent of them are owners (see Figure 6.2-1). Almost 60% of them come from the X region (Los Lagos) and just 18.5% are originally from the XII region (Magellan and Chilean Antarctic region), which is an important factor when analyzing the objective and subjective dimension in the next section.

Figure 6.2-1: Type of surveyed fishers*



Source: Author based on the survey.
*The fishers could identify themselves in different categories. In the context of this figure, the blue bar named "fisher" means crew. The ship skipper or captain sometimes is not the owner; he is hired by the owner when the previous one does not want work on the boat anymore.

The surveyed fishers have lived an average of 22 years in the region with an average experience of 23 years in the fishing sector (inside and outside the region); 66.7% of them are over 40 years old; from that, 48.15% are located in an age range of 50 to 60 years old. The age is also an important issue explained further in the subjective dimension part. On the other hand, the gender gap is remarkable in this sector; in total, just four women were surveyed: one social leader in the fishing sector, one middleman, and two fishers' wives. Most of the fishers are married (52%) and just 11% are divorced or separated. Moreover, most of the fishers received education; 33% finished primary school and 22% successfully completed high school.

6.2.2. Objective well-being.

The objective dimension, as was explained in chapter two, refers to "assets or resources that people possess, such as health, education levels, or income" (Johnson, 2018, p. 8). This section will analyze income, health, food security, modernization in fisheries, and environmental effects as part of this material dimension.

6.2.2.1. Income.

Regarding fishing income, respondents expressed a positive perception of the income behavior through time. Almost 48% of the surveyed fishers agreed about noticing an income improvement, meanwhile, almost 30% think that the income has been constant. Income is different according to the crew position; therefore, the ship skippers have a higher income compared to the crew because of the specialization and necessary skills for fishing in this region that is required for the captains.

On the other hand, 48% of the surveyed fishers classified their income as "good." However, this fishery requires a high initial investment which could lead some people to higher levels of indebtedness with the intermediaries or plants (they request for financing, as was explained in chapter five) because of the lack of formal financing systems for fishers (interview with middleman Pedro, October 20th, 2017; Punta Arenas). This indebtedness leads to the high dependence that the fishers have on the middlemen or industrial plants. Thus, according to an interviewed fisher (owner):

> I stopped catching king crab four or five years ago because the investment for it was too high and the catch is variable. I do not want to be involved in owing money to processing plants or any other person. Then, just suppose, if I decide to catch king crab, I have to go with at least 500 traps and every trap has a cost of 35,000 Chilean pesos. As a result, I have to invest almost 20 million Chilean pesos in traps, plus gear. That means that I need around 30 or 40 million Chilean pesos for it. It is a high investment and I did not want to do it anymore.
>
> Fisher (owner), David, October 30th, 2017; Punta Arenas [25]

In order to understand life conditions regarding material aspects, the fishers were asked about their properties and access to basic services, as is described in table 6.2-1:

Table 6.2-1: Access to properties and basic services by the surveyed fishers

Properties and basic services	Access (%)
Car (at least one)	77.7
Own house	85
Basic services (water, electricity, and heating)	100
Cable TV and internet	>80

Source: Author based on survey.

[25] The author translated by herself all the quotes from Spanish into English.

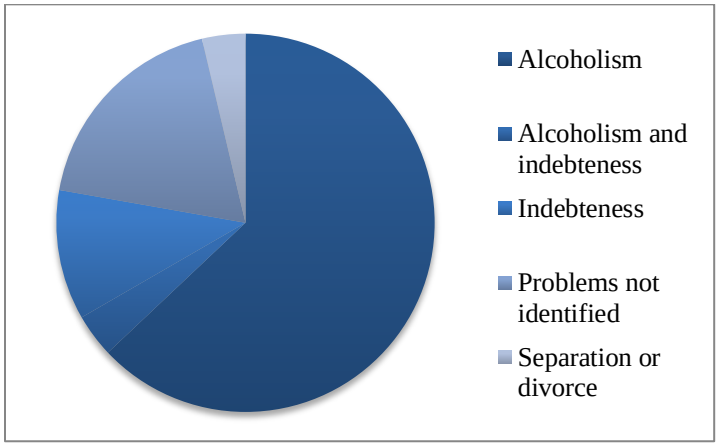
A high level of access to services and properties evidences some possible effects of the higher income on the material well-being of this sector.

6.2.2.2. Health.

Concerning health, during the interviews most of the fishers consider their health as "very good" or "good," and 48% of them said that being a fisher does not affect their health condition. However, 37% said that there are some effects of this activity on their health by arguing that after years as fishermen, pain in their joints and backs are common ailments. Besides that, a stricter regulation and higher income led to increasing levels of fishers' access to the pension and healthcare systems, for example, 81.5% of the surveyed fishers are part of the pension system and 88.9% of the healthcare system.

It is important to mention that, regarding social problems, 66.6% of the surveyed fishers identified alcoholism as the main social problem in the sector (see Figure 6.2-2) (Fundación para la Superación de la Pobreza, 1997; Fernández y Pozo, 2013).

Figure 6.2-2: Main social problems in the fishing sector



Source: Author based on the survey.

Besides that, some of them argued that, despite the high income, some fishers poorly manage their income leading to debts and impossibility for saving money and future investments on their own activities.

> Suddenly, there are fishermen who have high profits, but they do not spend them wisely. Probably you have seen this, probably they buy luxury cars of 30 million Chilean pesos, and you can see them driving that car.… However, they also have wasted their money, they asked for money from the industrial plants, and then they do not pay back to them; going on holidays, the season finishes and they are going on holidays, [and] after it they come back without money. Then, they come back to the processing plant or the intermediary and ask them for more money for the catching season.
>
> Fisher (owner), David, October 30th, 2017; Punta Arenas,

6.2.2.3. Employment.

Besides the high income, employment creation was also identified as an effect of this activity. Of the surveyed fishers, 96% agreed that the king crab fishery has created employment, but 77.7% of them argued that this employment is mostly indirect (ancillary activities such as terrestrial transport) and related to the industrial plants. Seasonality in king crab employment is common both in the fishing sector and in the processing plants. Many people just work the five months of the season or less as crew or workers in the plants and then go back to their regions. According to an owner and middleman regarding employment creation:

> Everything you showed me from the fisher until the processing plant [she refers to value chain]. Then, the fisherman hires three or four people. After that, the shipper has four more people; just think about how many people are involved! Also, there are people in charge of collecting the catch from the boat at the port and putting it into the trucks in order to take it to the processing plant (landing). In Porvenir, for instance, there are almost 28 people just involved in the landing process. After that, in the plant there are many families working there; for example, in the plant in which we deliver king crab, must be around 40 people, and the bigger ones [plants] must have almost 100 people.
> Then, you have to think that the fishers need supplies such as oil, meat, gear, and food… All these products go to the fishing zone, so the wheel [referring to the value chain] is so big. That is why the catching season in the region is very important for creating different employment options. In total, in a season, I would say around 15,000 people are involved in the region.
>
> Middleman, Sara, September 15th, 2017; Punta Arenas

Despite the employment opportunities, according to some union leaders and middlemen, there is a lack of local people interested in the fishing sector. That is the main reason for bringing fishers and people from other regions. Even people from Colombia, Haiti, or the Dominican Republic are arriving at the Magellan region in order to work, mainly, in the industrial plants, which could imply a demographic and cultural change in the fishing working sector[26].

6.2.2.4. Food security.

High competition among processing plants for king crab raises the prices and the fishing effort in order to catch as much as possible during the season. That competition is evident in higher prices paid to the fishers but also, more restrictions for the community in having access to this product because of high prices at the local market which, most of the time, are not affordable for the locals. According to the interviewees, thirty or forty years ago the king crab was sold by the fishers or merchants in different places in the villages. Some people say that even ten years ago it was easy just to go to the port and buy the fresh king crab from the fisher.

> We are still discussing that at the crustacean board [Mesa de Crustáceos]; how to analyze that because the low offer of seafood for the local consumption has been our constant problem. The lack of local marine products offered leads to smuggling, black market, and illegal fishing. That is because people in the region, in the province, they want to consume these products. However, the authorities are intransigent and laws are quite restrictive, and as a result, fishing catches must be delivered only to the plants. A local processing place could be an alternative in which artisanal

[26] There are not official numbers about nationalities and migration flows in the region (La Prensa, 2016). Those nationalities were pointed out by most of the interviewees.

> fishers can sell a small amount of their catch; the big processing plants are designed just for exportation.
>
> Fisher (owner) and union leader, Arturo, September 28th, 2017; Puerto Natales

However, in the present, due to stricter sanitary regulations and higher prices, king crab is scarcely available in the local market. It is not possible to buy fresh king crab at the harbor and there is just one local market in Punta Arenas where the king crab is sold processed and frozen at a high price (28,000 to 30,000 Chilean pesos per 800 grams, or $46.60 to $50 USD). According to the interviewees, most of the local market offers come from the informal or illegal markets. All the interviewed people agreed that the increasing foreign demand for this product raised the prices at levels in which locals cannot afford if they want to buy legal king crab.

Despite the illegal supply, local consumption levels are considered low. According to the interviewees, consumption is low due to two main reasons: the high price and cultural preferences. Meat consumption is quite popular in the region because of its cattle raising tradition and also because products such as beef and chicken are more affordable, even compared to the illegal king crab offer. King crab is available in some local restaurants in the different villages, but nevertheless, prices are high and the offer is mostly oriented to the tourists (see Figure 6.2-3):

Figure 6.2-3: Menu at a local restaurant in Puerto Natales

Source: Author
*The first option under the title "Platos de fondo" (main dishes) costs 26,000 Chilean pesos ($43.44 USD). A cluster means a couple of king crab legs sometimes accompanied with a lettuce salad.

The surveyed fishers note that they consume seafood products. However, even among them, the king crab consumption is not a priority due to food preferences, where eating beef or chicken is more popular.

6.2.2.5. Technological modernization of the king crab fishery.

Another effect of higher competition and high levels of money invested in this sector is the technological modernization of the fishing sector. In the last thirty years, rising income and stricter regulations led some fishers to buy more and/or bigger boats and advanced technological devices such as GPS, cameras, satellite telephones, and hydraulic machines for handling traps. According to one fisher:

> Fishing effort was low when I started as a fisher; it was more basic. I used to work with 100 to 159 traps. Ships were more precarious. Nowadays we have boats that could be considered as a floating house and we can manage that number of traps [regarding a higher amount]. We catch more product and we catch it deeper at sea. In the past we used to fish close to the coast… nowadays we are fishing king crab outside [far from the coast].
> Time changes. Technology has been changing the fishing techniques as well. Nowadays fishing is not so artisanal but is not industrial at all; it is more sophisticated, smarter, with a new vision about fishing as an activity. Technology in the sector advanced a lot; for instance, we add sensors to the buoys. We have everything demarcated; we use tools to see the seafloor.
>
> Middleman and union leader, former fisher, Jesús, September 16th, 2017, Punta Arenas

As a result, fishers are able to operate in deeper waters (see Chapter five) and stay longer, sometimes the whole season, at sea. All these changes, according to the interviewed fishers, improved the efficiency in the catching process. However, the interviewees also recognize some concerns regarding the sustainability of this resource, especially because it is barely known from the scientific and fisheries' perspective and the published studies are outdated or just cover a specific catching zone.

6.2.2.6. Environmental effects.

As mentioned in the previous paragraphs, the improvement in the fishing effort also raises concerns about the resource's sustainability. During the interviews, some fishers recognized that it is difficult, sometimes, to find a good place for catching and they say that the income has probably increased despite the catching numbers sometimes being lower compared to the past. According to the interviewed fishers in Porvenir and Puerto Williams:

> Sure, it is worthy it [regarding the income from the king crab catching], but this year has been bad regarding fishing. However, despite the lower amounts that we catch, the price of the product is good. Then, we are talking about some trade-offs because now one kilo of king crab costs almost 6,000 Chilean pesos, however, the catching is not constant, then one thing for the other. In the past, we used to fish a lot but prices were around 2,000 Chilean pesos per kilo, as a result, higher amounts but lower prices; now lower catch at higher prices.
>
> Fishers (owners), Ernesto, Willy, and Andrés, October 10th, 2017; Puerto Williams

> In the past, the number of boats was lower. We are talking about 20 boats [catching king crab] 20 or 25 years ago. Now, there are 580 registered boats [this is not the exact number; see chapter four for more details]. In the past, we used to fish using 200 traps. Now 1,000, 1,500, 1,800, 2,000 in bigger boats. Then, many changes happened, this sector has changed.
>
> Fisher (owner), Raúl, September 14th, 2017; Punta Arenas

In fact, although the season officially finishes every year on December 1st, last year the fishers asked the authorities for a season extension of fifteen days more after the original closure (El Pingüino, 2017; Martínez, 2017) in order to comply with the negotiated catching. It is important also to mention that weather is crucial in this region and it is a factor in the possibility of catching or not. According to some interviewed fishermen, stronger winds become an obstacle for fishing by affecting the productive time at sea.

> From five months that we have for fishing we just work three of them; the rest of the time we do not work because of the weather. What does this mean? Each week, I just work three days; I cannot work the whole week. This region is not a place where I can say I am going to work the whole month; you work fifteen or twenty days maximum when the weather allows you to do it. This is another thing that is not analyzed. Authorities give us five months for fishing but I can only work three of them, because of the region, because of the weather factor; winds are strong.
>
> Middleman and former fisher, Vinicio, October 2nd, 2017; Punta Arenas

It is also interesting to mention that all the interviewed fishers recognized some kind of climate change influence on their activities by taking some empirical facts as evidence. In their answers, they made a link between warmer waters and the difficulties in catching king crab close to the coast.

> Arturo: I have a personal theory and I think that it is also about climate change. It is an issue that has not been studied enough and we do not know what the effects of climate change on this region are.
> Interviewer: Some people say that now the king crab is deeper at sea? What do you think about it?
> Arturo: Yes, it is. As I told you before, it is climate change which changes the seawater temperature.
> Interviewer: And how does this impact the fishers?
> Arturo: A lot. Because they have to go and fish deeper at the sea, then they have to have better gear, hydraulic machines. A 7-, 9- or 11-meter length boat is not allowed to work in those places because it is an open zone where the winds are stronger.
>
> Middleman, union leader, and former fisher, Arturo, September 28th, 2017; Puerto Natales

According to one interviewed expert (key informant –scientist- Rafael, 2018), this is also interesting because it suggests local extinctions in the closer catching zones and a kind of predator behavior of the fishers who are looking for new fishing zones far from the coastline[27].

Another concern expressed by some fishers, union leaders, and officials during the interviews was the direct impact of the fishing activity on the sea. Because many boats during the catching season stay at sea longer, a big amount of trash (oil, food and human waste, and plastic) is directly disposed into the water affecting the whole ecosystem.

> For instance, I told you about "floating villages" in the region [regarding groups of boats at sea for a long time]. For example, the Ministry of Environment does not have an exclusive boat for collecting the waste, bags, and general trash. It is important to encourage a clean fishing activity, but the government does not promote that. I tell my people that even I am getting worried about… I take to sea 4,000 or 5,000 kilos of bait, even 10,000 kilos, so you think about the bags where the bait is

[27] The recognized biologist Daniel Pauly et al. (1998) refers to this phenomenon of catching deeper in the ocean as "fishing down food webs," that entails a process in which "fisheries first invariably exploit the larger fishes in an ecosystem (insofar the current gear technology allows it), then gradually moves down as the higher trophic levels are depleted." (Pauly, 2008, p. 7).

carried and what about if those empty bags do not come back to the port, they remain in the coast; some people throw them into the sea and that is dangerous for those the small animals that live there.

Middleman, union leader, and former fisher, Jesús, September 16th, 2017, Punta Arenas

Finally, the table below briefly describes the above-identified changes and trade-offs in the objective well-being of the king crab fishers.

Table 6.2-2: Objective well-being of the Magellan king crab fishers

Factor	Change	Trade-off
Income	Income improvement leading to the acquisition of goods (car, house, education, etc.)	Indebtedness and poor money administration
Health	Higher regulations and higher income implies higher levels of affiliation of fishers to the healthcare and pension systems	Despite the technological modernization, the extreme weather conditions could imply, in the long term, health problems in fishers' joints and backs
Employment	Employment opportunities (fishing sector and ancillary activities)	Perception change of fishing as a job (see a more detailed explanation in the subjective section)
Food security	Access to alternative food products	Restricted access to local marine resources because they are exported
Technological modernization and environment	Efficiency increase and advanced technology for exploring the sea	Resource sustainability (higher pressure on ecosystems) and direct consequences of boats at sea (waste disposal)

Source: Adapted from Idrobo, C., 2018, p. 75-96.

Being a high-value activity developed in a geographically isolated region also shapes the relations between fishers, between fishers and the communities, and also with the government, as explained in the next section on the relational dimension.

6.2.3. Relational.

According to Johnson (2018, p. 8), the relational dimension "refers at one level to the social relationship that a person is involved in," which means that the relationships that people have and how they are valuable for them (White & Ellison, 2007, p. 87). Regarding the research, contract relations (formality/informality), relations with the authorities, and the cohesion in the fishing sector were the main aspects identified during the interviews.

6.2.3.1. Contractual relations.

According to the respondents, informality--considered as performing outside the official systems (pension, healthcare, taxes), regulations, or laws--in the fishing sector has diminished in recent years. New regulations in fisheries, for example, require affiliation to the public healthcare system (National Healthcare Fund or *Fondo Nacional de Salud* [FONASA]) and the retirement system (Retirement Fund Managers or *Administradoras de Fondos de Pensiones* [AFP]) (see Table 6.2-3).

Table 6.2-3: Surveyed fishers' affiliation to healthcare and retirement systems

Affiliation pension system		Healthcare system	
No	4 (14.8%)	No	2 (7.4%)
Yes	22 (81.5%)	Yes	24 (88.9%)
NR	1(3.7%)	NR	1(3.7%)
Total	27 (100%)	Total	27(100%)

Source: Author from the survey.

However, informality prevails in contractual relations. Most of the interviewed fishers (owners) agreed about the lack of written contracts in the sector. Forty-eight percent of them have used or currently use temporary contracts (for five months) and 44% do not have or have not used a contract. According to them, many people in the fishing sector (crew) prefer not having a contract in order to receive the money without any compulsory deduction. Another reason is that some of them benefit from public subsidies (water, gas, etc.) and having a contract is a proof of income which could affect the access to this subsidy.

> Arturo: Just a few people have formal contracts with the crew. It is informal work.
> Interviewer: Would you say that is it mostly about informal work?
> Arturo: Yes, almost 90% is that. And that is because of some cases that I am going to explain to you. Generally speaking, I do not use contracts with my crew, but I do prepare a receipt because in that way I have evidence for tax issues.… For example, some invoices are around five million; however, if I do not have a proof for tax authorities they are going to say that my profits were five million. Actually, my income was not five million; it was just one. Sometimes people say to me, "look, I do not want a contract because I receive water and gas subsidies and if you prepare a contract they [the government] are going to cancel my subsidy; or my wife receives some governmental benefits and if I have a contract, they are going to cancel it."
>
> Fisher (owner), Arturo, September 29th, 2017, Puerto Natales

Another factor related to this informality is the high working rotation in the fishing sector. Almost 60% of the surveyed fishers consider this activity as unstable due to the seasonality and external conditions such as weather, gear, and even "luck" in finding good catching zones. Due to the uncertainty, the fishers, especially those who are crew, often move from one boat to another during the season looking for better working conditions or have left the region due to the harsh weather conditions.

Informality is not only present in labor contracts, but also in the financing system. As was discussed in chapter five, there is no formal financing system for the fishers where institutions such

as banks are involved. Few initiatives from the government give some funding to the unions as projects, according to some interviewees just a few boat owners benefit from it. Most of the boat owners need an important amount of money in order to buy gear, oil, and food and for hiring crew. This money comes from the industrial plants, and most of the time, through the middlemen. Until recently, written contracts were not requested and the financial relationship was based on an oral agreement. This informality also leads to some indebtedness problems in the sector:

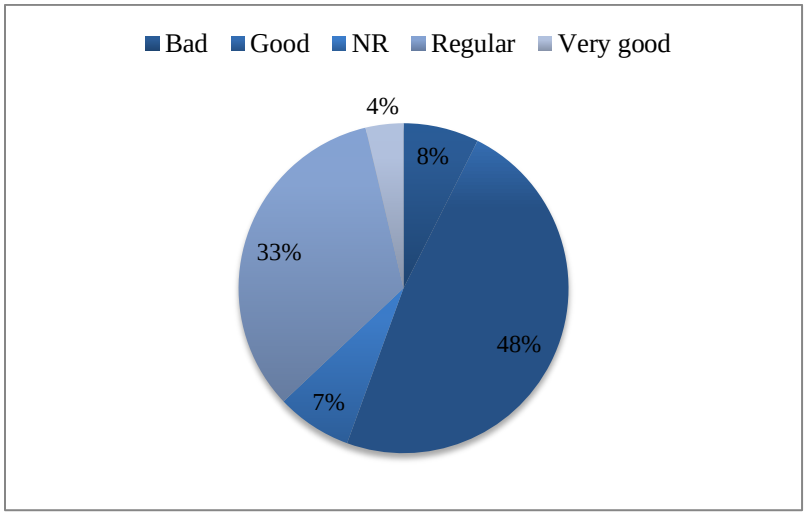
> [Middlemen] …receive 200, 300, and even 400 million Chilean pesos and they distribute them among 20, 25, 30 smaller boats without any qualification. They give the money without any contract, without any analysis and just say "go fishing and then bring the catch back to me." Then, the guy [the fisher] is more interested to just sell the catch to different people who are going to pay him with cash instead of delivering the product to the person who lends them the money and he does not pay to that person anymore. Here, there is a high informality which is based on a kind of gold rush phenomenon and the irresponsibility in which this business has been managed. All this happens because this business has allowed having some "error margin" [refers to high profits in the king crab business].
>
> Industrial plant, Jeison, October 31st, 2017, Punta Arenas

According to the surveyed fishers, the interviewed industrial plant managers, and some union leaders, written contracts and taking boats and houses as pledge are more popular now as business practices in the artisanal fishing sector.

6.2.3.2. Relationship with authorities.

The interviewed fishers mostly consider their relationship with authorities (army, navy, and local officials) as good or regular (see Figure 6.2-4) by arguing that there is no conflict between artisanal fishers and the authorities.

Figure 6.2-4: Surveyed fishers: Perception of relationship with authorities



Source: Author based on survey.

However, during the interviews, the fishermen complained about the government neglecting the artisanal fishing sector. This neglect is evident in obstructive regulations and laws that, according to the fishermen, show that the government is more focused on promoting the industrial fishing.

> Interviewer: Does artisanal fishing have a future or is it disappearing?
> Nicolás: Here in Chile they [the government] want to eliminate the artisanal fishing, with the new fisheries law, they want to eliminate the artisanal fishing.
>
> Fisher (owner), Nicolás, September 23rd; 2017; Porvenir

6.2.3.3. Cohesion.

There are 51 registered associations in the Magellan and Chilean Antarctic region (SERNAPESCA, 2017) and most of the fishers are part of them. Of the surveyed fishers, 51.9% are part of one of these organizations and 33.3% do not belong to it by arguing lack of interest in being part of a union. Despite the high number of organizations and even fishermen's participation in them, during the interviews, most of them argued that in the king crab fishing sector social cohesion is weak.

> Right! Everybody just takes care of their own things…. Here is almost like that… I think that fishers are more like "just about me" … It is not like those fishers living in places with resource scarcity; there is more support, but if you pay attention, that happens [more cohesion in the sector] because everybody is living under bad conditions. That is why they say, "we cannot live like this anymore. Let's do it." [refers to working together as sector]
> Definitively, do you remember when we went to the fifth region [talking to one of the other interviewed fishers], people there told us, "here come the rich fishers, the fishers with money." They were not trying to be mean; actually, I think that is the truth. As king crab fishers we probably have a better income than the rest of the fishers.
>
> Fishers Ernesto, Willy, and Andrés, October 10th, 2017; Puerto Williams

As it is pointed out in the quotes from the interviews, some of them have their own theories about this phenomenon by arguing that catching a high-value resource and having a higher income have created an individualistic behavior in the Magellan fishermen. For example, some of them compare their activity with some fisheries in the northern part of Chile where the lack of resource led, according to them, to a more united sector.

But also the lack of cohesion is evident in the lack of internal mechanisms of support among the fishers. In the survey, the fishermen were asked if there is any mechanism of support among them, for example, having access to funds in case of emergency; 74% answered no and just 7% said yes. According to fishers, most of the time, if something happens to one of them, at least regarding financial issues, there is just the goodwill of the other fishermen, but there is not a formal mechanism of support, even if they belong to unions. Of the surveyed fishers, 40.7 % say that this happens because fishers are individualistic.

> Interviewer: Do you think that is there union among the fishermen, for instance, if something happens to one fisher, are there support mechanisms?
> Willy: Just a few of us… [regarding being willing to help]
> Andrés: I cannot say that there is no support, but I can say that that support is low.
> Interviewer: Why do you think it is like that?
> Willy: Because nothing serious has happened to us.

> Andrés: I think, you know, in my opinion, if you think about it, those of us who are working in king crab, we have profits. Then, it is classic, like, I do not care about the others because they have their own money.
> Interviewer: Is it more individualistic?
> Andrés: That is what I think, that is why we are not a united sector…. Most of the people [fishers] are not going to understand you if it is not about a serious problem, they are not going to give you any support. If you think about Chile, in other regions fishermen with lower income are more united.
>
> Fishers (owners), Ernesto, Willy, and Andrés, October 10th, 2017; Puerto Williams

The relational fishers' behavior could also be explained by the fishers' self-perception and ideas about their own work and the world as is described in the paragraphs below on subjective well-being.

6.2.4. Subjective well-being.

The subjective dimension is related to "personal evaluation of how one is doing" (Johnson, 2018: 8). This is related to people's perspectives of their own lives, access to resources, and what they can do with them (White, 2010). Regarding the artisanal fishers, there are two main aspects identified during the interviews and are explained in the next paragraphs: the fisher identity and their ideas about the future of artisanal fisheries in the region.

6.2.4.1. Who is the fisher?

It was common to hear from the interviewed fishers that fishing in this region is different from the rest of the country because of the weather and the complex geography. Most of them agreed that not many people are used to these conditions and the middlemen complain that often people from other regions cannot handle these extreme conditions.

> Magallanes is different from the rest of the country. It is not easy to control Magallanes. It is a huge region. Most of the country is regular coast, you sail and in half an hour, you are at the open sea. Here that is different.
> That is why I told you that here not all the people are fishers. Look, I brought fishers from Chiloé; they just work ten or fifteen days. The fishing practices are different, they cannot handle the pressure of being at sea [he refers to longer periods of time]… we have to learn how to live in this context.
>
> Fisher (owner), Jesús, September 16th, 2017; Punta Arenas

Moreover, the fishers complain about the generational change in the sector and the effects of it for the future, not only for the king crab artisanal fishery, but the artisanal fisheries in general. The older interviewed fishers spoke with pride about their job by using expressions like "the fishing gave me everything." However, they also recognized that new generations have a different perspective on fishing. According to one fisherman, young fishers are "less romantic" and more focused on the possibility of income creation (utilitarian vision). Besides that, many fishers improved their living conditions and some of their daughters or sons had access to tertiary education with different professional opportunities.

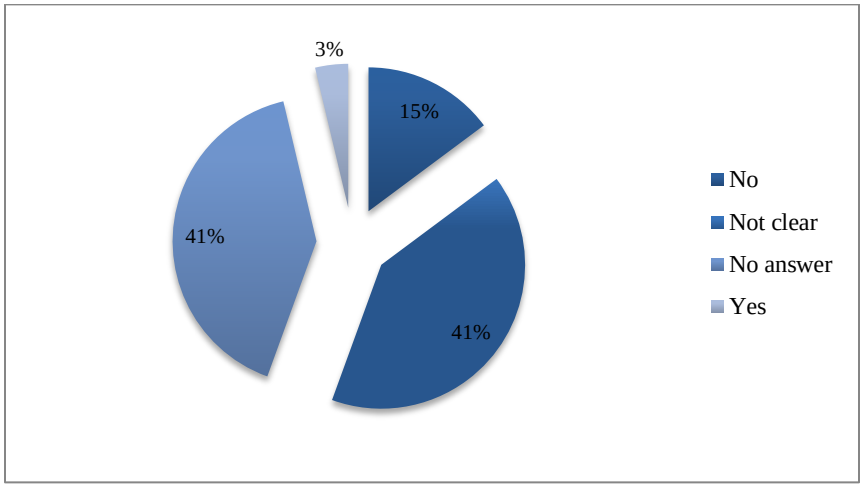
> But I have to say that there is something that makes me happy: my daughter and son's education. That is my pride, even I get excited about it every time I just remember it.… My first concern is my family and my son and daughter's education. I always demand them and they made it [finishing their studies on time]. In the artisanal fishing world, there are many beautiful and ugly stories.
>
> Fisher (owner), Ernesto, October 10th, 2017; Puerto Williams

But all of the interviewed fishermen agreed with the governmental disdain against the artisanal fishers, which is reflected in lack of support in this sector and a growing industrial fishing presence in the Chilean sea (Jarroud, 2015; Saavedra, 2015; Camus, Hidalgo, & Muñoz, 2016).

6.2.4.2. The future of the artisanal king crab fishery.

The last question in the survey administered to the fishers was if there is any future for the artisanal fisheries. Of the interviewed fishermen, 41% did not answer this question, but another 41% of them answered that the future for artisanal fisheries is not clear and just a small percentage are positive about the future for this activity (see Figure 6.2-5).

Figure 6.2-5: Is there future for artisanal fisheries?



Source: Author based on survey.

The previous figure shows high levels of uncertainty related to lack of institutional support, the increasing influence of industrial fishing, and even the spread of environmental initiatives in the region. According to the surveyed fishers:

> I think that [artisanal] fishing is dying, not because of the resources… [referring to depletion] We are in charge of creating obstacles to almost everything, for example, we already closed the permissions [*códigos de pesca*] for the king crab [fishers' registration], there are not going to be more boats for catching king crab.… Regarding divers [for catching sea urchin], they are getting older. For example, in my case, I am registered as a diver, but new actors are not appearing; that is my concern. We are going to sudden death regarding the boats. Nowadays the government does not promote fishing as a working alternative. There is not a public policy for promoting artisanal fisheries; they are interested in other things such as salmon farms and tourism, then the fishing zones are transformed for these

activities. In this region, we are full of salmon farms and I totally agree with tourism, but I think that all these activities can be developed without harming the others.

Middlemen, union leader, and former fisher, Jesús, September 16th, 2017; Punta Arenas

In short, during the interviews, five reasons related to the uncertainty in this sector were identified: 1. institutional context, related to increasing restrictions (regulations) and lack of support from the government; 2. climate change, regarding changes in weather patterns and the rise of temperature in oceanic waters; 3. resource sustainability, related to the increasing fishing effort and occasional struggles in accomplishing catching goals for every season; 4. generational change, regarding the lack of interest of young generations on artisanal fishing and high working rotation in fishing; and 5. salmon industry, growing presence, and competence for human capital from the salmon industry (divers).

6.3. Concluding Remarks

The social well-being is a multidimensional approach oriented to understand the complexity of this phenomenon by taking into account the objective, subjective, and relational dimensions as they were analyzed in the chapter. Regarding the objective dimension, an income improvement contributed to material progress for the surveyed fishers, especially related to access to basic services and housing, health care, and education for their families. Nevertheless, a higher income also led to a stronger competition for catching this resource. As a result, the increase of the fishing effort puts pressure on the ecosystems and contributes to a higher uncertainty about their sustainability due to the lack of knowledge about the king crab's biological conditions. Moreover, regarding the subjective perspective, the self-perception of the fisher in this region is being transformed by migration and local demographic changes (new Magellan generations have less interest in being artisanal fishers). This also contributes to the uncertainty about the future of artisanal fishing because of the lack of interest from authorities in this sector and problems related to fishers' cohesion. This weak union among fishers is influenced by an individualism boosted by the present economic abundance in this fishery, as was highlighted in the relational dimension.

During the interviews, a common phrase by the interviewees was that "the fishing gave me everything." Thus, despite the trade-offs mentioned in the different well-being dimensions, 96% of the fishers agreed that the king crab fishery is a tool for social mobility. However, it is interesting to mention that for most of them, social mobility is related to having a good income as a sign of well-being. Thus, the next chapter will discuss the relation among the king crab value chain and their effects on the fishers' well-being by taking into account the main findings in chapters five and six.

7. Conclusions

7.1. Introduction

In order to analyze the effects of global phenomenon at local levels, this study formulated a main research question: How has the incorporation of the artisanal fishers into a global value chain (GVC) affected their well-being in the Magellan and Chilean Antarctic region? This question was divided into three sub-questions: 1. How has the GVC of the king crab developed in this region? 2. How are the artisanal fisheries structured? and 3. What is the well-being of artisanal fishers? These questions aim to explain different relations, structures, and effects of this local/global relation and some issues in between. This chapter starts by answering the sub-questions in order to elaborate on the main question, and after that, some methodological and theoretical considerations will be discussed. Finally, some policy recommendations based on the research findings will be presented.

7.2. Answering the Sub-Questions

Regarding the first sub-question about the development of the GVC in the region, it is important to highlight that the integration of the king crab fishery into the GVC was a combination of internal and external factors. The closure of the Alaskan fishery in 1980 due to depletion of this resource and, more recently, the demand from Asian economies such as China and Vietnam are identified as the main factors. On the other side, as internal factors, a national liberal commercial policy based on trade agreements and attraction of foreign investment boosted this integration. Besides this, geopolitical interests based on promoting Chilean sovereignty in the Magellan region through tax incentives for those companies working there configured the context for fisheries and, specifically, the king crab integration into global markets.

Chapter two noted two main drivers of fisheries' globalization in which the king crab integration into the global markets is framed: economic integration and technological change. Integration is evident in numerous trade agreements and an export-oriented economy where seafood is an important component. Besides, technological change is determined by the fishing effort increase and the technological modernization of artisanal fisheries in the region, whereby the range and capacity of this fleet have improved.

The integration of king crab into the GVC is successful because it has survived the hard competition from important king crab exporters such as Japan and Russia by positioning first in the American and European markets, and more recently, in the Asian markets with a product that is highly appreciated because of its symbolism regarding the relationship between the color red and good luck in Chinese culture.

Related to the second sub-question on fisheries' structure in the region, the increase in demand and fishing effort led to an industrialization of the fisheries (including the king crab fishery) and modernization (Fulgencio, 2009; Said, Tzanopoulus & MacMillan, 2016) of this sector in order to meet foreign market demands regarding volume and quality standards. Thus, fishers require high

initial investments in order to buy the required gear and supplies to be competitive in this sector, which could lead to problems with indebtedness. Another negative effect of this industrialization is the locals' restricted access to local seafood and king crab because of the foreign demand but also due to stricter regulations in order to guarantee traceability and quality. On one side, these regulations certify catching and processing conditions for king crab, but also increases costs for locals in order to buy the product, and as a result, boosting the illegal fishing that is aiming to supply the local and national demand.

It is possible to describe a general king crab value chain according to demand, relations, and length. Thus, the high influence of consumer markets has configured what Gereffi (1994, 2005) calls a demand-driven chain. In recent years, foreign markets (buyers) changed the productive model by simplifying the production process of the king crab. A product transition happened in which a less processed whole frozen king crab gained popularity compared to the previous highly-processed product under the presentation of blocks of crab meat or as canned food. This simplification did not impact the fisher's income; on the contrary, despite the whole frozen king crab being cheaper, the higher demand for it and the difficulties in catching it increased its price in the last five years. Thus, regarding value chain upgrading (adding value), this simplification in the king crab production process is an interesting case of stepping back in the chain (removing value) according to top-down pressures (Thorpe, Johnson & Bavinck, 2005), such as external market preferences.

Related to interaction within the chain, relationships among actors are mostly based on trust and information. These assets are unequally distributed or difficult to access for some more vulnerable actors such as one category of boat owners. Information and trust are part of what is often called a relational chain (Taglioni & Winkler, 2016, p. 158-160; Gereffi, 2005, p. 83-84; Gereffi, 1999; Kaplinsky & Morris, 2002), which is also evident in an informal financing structure (enabling) based on trust and long-time relationships among fishers and middlemen, and middlemen and industrial plants. This financing system is quite vertical and also defines the distribution of power (Jacinto & Pomeroy, 2011) within the chain. In this structure the industrial plant determines prices, the middleman speculates with prices in order to meet the industrial plant's demands, and the fisher is just a price-taker. There is no prior access to information regarding prices because most of the times the exchange of king crab is not at the harbor but at sea, and access to enough information for offering to the best buyer is not possible due to the context conditions. Thus, it is important to mention that communication at sea in this region is difficult because of its complex and vast geography. Internet connections and access to the conventional telephonic network is highly limited; just satellite telephone allows communication in some parts and it is not available for all the fishers because it is expensive.

Fishers recognize that without this funding system it is not possible for most of them to work in the king crab fishery. However, being price-takers and relying on the middlemen or industrial plants increases vulnerability for them as dependence levels are high and the fishers are not autonomous in their decisions about their own work.

Concerning chain length (Thorpe, Johnson & Bavinck, 2005), there are different sizes. The chain length is long in terms of distance because the Magellan region is geographically isolated (far from the main ports of Chile and the world). However, in terms of processes, it is short due to the

simplification of the production process defining a low added-value chain (few transformations for the product). Besides that, two kinds of chains were identified: a formal chain related to the external markets where actors and processes are clearly defined; and an informal chain related to local, regional, and national markets where actors and distribution mechanisms are not defined and interactions are mostly based on trust and proximity.

Regarding the number of actors involved and the level of fishers' dependence for delivering the product, two particular chains were identified: 1. the most common, in which the fisher sells king crab to the intermediary, and 2. in which the fisher delivers directly to the industrial plant. In both chains, the fisher is a price-taker and most of the time they will rely on financing from the industrial plant, but revenues are different since the intermediaries may or may not be participating.

Power relations are also defined by benefits that some industrial plants receive due to institutional context, such as tax incentives. Despite having different harbors most of the king crab landings, as was explained in Chapter five, are registered in Porvenir because of the tax incentives due to the Navarino Law. This is a controversial issue, especially for fishers in Puerto Natales, which consider this as unfair competition since many boats catch the king crab close to the other harbors (Puerto Natales, Punta Arenas, or Puerto Williams) but transport the catch to Porvenir because of the higher prices paid by the industrial plants there, which also creates different economic dynamics regarding income, employment creation, and entrepreneurship.

Regarding the third sub-question on the well-being of king crab artisanal fishers, this integration into the chain has effects on the social well-being of the fishers (McGregor, 2008; Johnson et al., 2018; McGregor & Summer, 2010) with positive and negative consequences, as was explained in Chapter six. According to the fishers, the main positive effect regarding the objective well-being is the income improvement that has taken place over time due to higher prices. This income improvement has contributed to social mobility, considered by the interviewed fishers as having access to education, holidays, healthcare, and material things such as houses, cars, and home appliances.

However, the consequences of integration into the GVC on non-tangible issues such as relationships among fishers (relational well-being) and fisher's self-perception (subjective well-being) were strongly criticized by the interviewees. On relational well-being, one of the main concerns is a paradox pointed out by the fishers about the high institutionalization of the fishing sector with many organizations for a small-populated region, versus the low level of cohesion among fishers. This low cohesion is manifested in the lack of active participation by the fishers in these organizations. Some of the fishers mentioned during the interviews that the main reason for being part of these organizations is just to comply with formal requirements from public institutions to get access to some projects. Besides this, this low level of cohesion is evident in the lack of internal support structures in the fishing sector materialized in non-existent financial funds for covering fishers' emergencies. According to the fishers, this lack of solidarity and interest could be a consequence of being involved in a high-income fishery in which everybody solves their own problems by using their own money, perpetuating an individualistic behavior in the Magellan artisanal fishers.

On the other side, regarding the subjective well-being, the interviewed fishers were skeptical about the future of artisanal fishing by arguing that the growing presence of industrial fishing in the region and the rest of the country, the salmon culture as a growing presence threatening king crab catching zones, the climate change and modification of seawater temperatures, and the influence of international environmental movements interested in creating national parks in the region. Moreover, a generational change and interest of younger people in other professions or jobs, besides the interests of many fishers in providing education to their families, create a generational problem in the Magellan artisanal fishing sector influenced by regional and international migration to the zone. According to the fishers, these new people have different ideas about fishing and the sea, also changing the perception of the sea and the figure of the fisher in itself. This change of perception goes from the romantic vision of the sea as a second home to the utilitarian perspective of the sea as a place for creating income, which also has social and environmental effects regarding the relations among fishers and the fishers' concerns about sea sustainability.

7.3. Answering the Main Research Question

Therefore, regarding the main research question on the integration of artisanal fishers and the effects on their well-being, the research identified an artisanal fishery sector fully integrated into the GVC in terms of market access by the successful exportation of this resource. Thus, a direct effect on income was identified and fishers consider that this positive change in income contributes to social mobility, which it is represented as improvement in material life conditions such as health, education, or ownership of properties. However, the artisanal fishers are skeptical about their future because of the pressures of this integration related to the industrial fishing influence and a feeling of disdain by the Chilean authorities, who historically have underestimated the socioeconomic importance of artisanal fisheries for communities and the country as a whole.

The king crab case shows how a successful integration in the value chain of a high-value marine resource could imply important income which leads to objective well-being, while personal expectations and relationships among different actors could be eroded by top-down pressures such as international markets. The case illustrates how resilient this value chain is by overcoming critical transformations such as changing markets of destination and production processes. Thus, the chain has been successful due to the simplification process and higher demand for a product with lower added-value.

7.4. Theoretical and Methodological Considerations

In theoretical terms, this research confirms the relevance and usefulness of the value chain approach (Gereffi, 1994; Gereffi, 2005; Gereffi & Kaplisnky, 2001) by identifying actors, structures, and relationships in the king crab production process from the sea to the table. I have added to this the well-being approach, which allows us to understand these interactions regarding the artisanal fishers' material and non-material life conditions. In supplement to the regular value chain approach, the relational nature of this chain, characterized by high informality based on trust regarding personal, production, and financing relationships, demonstrates the relevance of interactions or linkages between productive actors and those who are not directly related to the chain such as the extended community of fishers, local public institutions, and environmental organizations. This justifies the application of newer approaches related to value chain such as

global production networks (Ernst & Kim, 2002; Lazzarini, Chaddad & Cook, 2001). The latter approach goes further than the linear configuration of value chains and analyzes different network structures in the production process in which the value chain is one important phase, but not the only one. Besides that, this framework encompasses relevant sets of actors and relationships in the network, not only the inter-firm transactions as value chain does (Coe et al., 2008, p. 272).

By making use of the value chain and the social well-being approaches, I identified several actors non-directly related to the chain and some formal and informal relations in the whole king crab production process previously discussed. My work also contributed to identifying some topics for further studies such as:

1. The effects of global environmental initiatives (promotion of protected zones) on artisanal fishing communities due to the increasing interest for attracting tourism and gaining international environmental recognition but excluding the artisanal fishers and threatening their access to the sea.
2. The consequences of management tools such as quotas and management/scientific committees on artisanal fisheries regarding their effectiveness. The quota system has been highly criticized by their effect of creating a sort of "quota market" in which few actors buy the quotas to the artisanal fishers limiting the number of artisanal fishers who are able to catch. Thus, figures such as management committees emerge as an inclusive institution in which several actors of the artisanal fishing world are involved and debate the scientific and technical recommendations about the fisheries management.
3. Regarding the production process, analyzing different alternatives for adding value to agri-foods in a context of a demand focused on less processed and fresher food. In this case, analyzing the importance of certifications related to sustainability and quality or product differentiation.
4. In the context of Chilean fisheries, it is important to research further about women's roles and contribution to the artisanal fisheries development, by understanding women's roles as active fishers or as coordinator actors in charge of arranging relatives' or husbands' issues on land; the current literature about this topic is scarce.

An analysis of the value chain and its effects on the well-being of fishers has justified a mixed-methods approach (Bryman, 2016) in which the quantitative strand related to prices, income allocation, costs, and production, and the qualitative strand regarding actors' perceptions and motivations, complement each other in order to analyze a complex context characterized by multiple actors, interactions, and processes. That is especially important in the artisanal fishing world, in which data is dispersed and sometimes is difficult to access because of the informality of this sector. Besides this, it is important to highlight the limitations of getting access to fisheries research from a social perspective, to what happens at sea and how the fishers behave there. That is a research constraint for many researchers in this field for practical reasons related to being allowed on board, especially for women researchers in a male-dominated context, as it was discussed in Chapter three.

7.5. Policy Recommendations

Finally, four main policy recommendations derived from the research findings:

- In geographical and extended complex regions like the Magellan region, it is necessary to take advantage of artisanal fishing as a source of knowledge on marine ecosystems by considering the fisher as a key informant.
- Promoting the local consumption and appreciation for local marine resources by creating places in the harbors where locals can buy the product at affordable prices.
- Boosting fishers' active participation in regional organizations by giving more access to funding, training opportunities according to the fishers' needs, and democratic participation in decision-making processes inside the local organization.
- Promoting alternative upgrading processes focused on non-tangible aspects instead of product transformation by using fisheries' certification regarding sustainability, quality, or highlighting its particularities through property rights' tools such as denomination of origin.

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Appendices

1. Appendix 1: Quantitative indicators on contribution of small-scale fisheries related to wellbeing

Employment in SSF by gender
GDP contribution of SSF
SSF fish production as % of total national production
Fish as % of national animal source food
Energy consumption per ton of fish caught
% part-time vs. full-time fishers in SSF sector (economic integration of SSF into larger economies)
Seasonal and annual variability in SSF employment (stability of employment in SSF)
Rates of women's formal and informal paid work in SSF (gendered contribution of work in SSF)
Degree to which distinctive material culture aspects of SSF (e.g. architecture, dress, boat design)
Number of distinct SSF "ethnic groups" recognized
Number of distinct fisher languages or dialects
Subjective wellbeing of SSF compared to that of general population
Fisher and non-fisher perceptions of the sub-national, regional and national economic, cultural and social values of SSF
Richness of SSF systems of indigenous knowledge
Degree to which indigenous knowledge informs formal understandings of fisheries ecology
Spatial extent of SSF along national inland and marine coastlines
Degree to which SSF rights to coastal space are more formally recognized
Degree to which indigenous SSF management institutions are present
Degree to which arrangements exists for SSF to contribute to formal fisheries governance processes

Source: Taken from Johnson et al. (2018, p. 9).

2. Appendix 2: Fisher's Interview and Survey

RESEARCH
THE EFFECTS OF GLOBALIZATION ON HIGH-VALUE ARTISANAL FISHERIES IN THE MAGELLAN AND THE CHILEAN ANTARCTIC REGION

Interview number _____ Date: _____Time: _____
Place: _____
Occupation: _____
Institution/organization: _____

I. SOCIODEMOGRAPHIC FISHERS PROFILE

1. Age range: [1] 20-30; [2] 30-40; [3] 40-50; [4] 50-60; [5] >60

2. Gender: […] M […] F
3. Place of birth_____
3.1. If the place of birth is different than now, to specify for how long has been the person lived in the region_____
4. Years in the fishing sector: _____
5. Education:

( ) Complete primary school ( ) Incomplete primary school ( ) Complete high school ( ) Incomplete high school ( ) Complete university () Incomplete university () Complete technical Education ( ) Incomplete technical education ( ) Other: _____

6. Marital status _____
6.1. *In the case of divorce or separation to specify the year since that happened* _____
7. Family nucleus (a brief description of the family nucleus

Member	Age	Occupation	Education	Do they live with you?

8. Income:

8.1. How often do you receive income? Weekly _____ Fortnightly _____Monthly _____ Other: _____

8. 2. In the list below: Where do you identify your monthly income?

( ) Less than 200.000 chilean pesos
( ) 200.000 – 350.000 chilean pesos
( ) 350.000 - 500.000 chilean pesos
( ) 500.000 -650.000 chilean pesos
( ) More than de 650.000 chilean pesos

8.3. Your income comes from:

( ) Fishing
( ) Aquaculture
( ) Commercial activities
( ) Other: _____

9. Personal and real property ownership: Which kind of properties do you have?

9.1. House: ( ) Own ( ) Rented ( ) Lent ( ) Other _____
9.2. Car: ( ) Yes No: _____
9.3. Vessels:

Vessel Own: ( )Yes Number _____No: _____Size (in meters): _____

9.5. From the list below: Which goods or services do you have access in your house?

Assets	Yes	No
Internet conecction		
Cable TV		
Electricity		
Tap wáter		
Heating		
Computer		
Laptop		

II. ANALISYS OF THE KING CRAB VALUE CHAIN

10. COSTS AND REVENUES

10.1. Which are the main reasons why the King crab has a high price compared to other seafood products?

10.2. Many fishers mention that the industrial plants give them money (habilitación) in order to buy the necessary inputs related to their labor at the sea (faena). Which are the consequences of requiring it? Which are the acquired compromises by the fishers that apply for it? Does everybody use this instrument? What do the fishers need to do in order to apply for it? Which is the average amount of money that a plant gives to the fisher?

10.3. When you go to the sea do you know how much money will you receive due to the delivered fish to the industrial plant (cash, deposit, bank check)?

10.4. How much money do you receive for one kilogram of King crab? How is this price calculated?

10.5. The King Crab prices change from the beginning to the end of the season. Could you identify which were the prices at the beginning of the season and then at the end of it? Do you remember a season when the prices experienced an important increase?

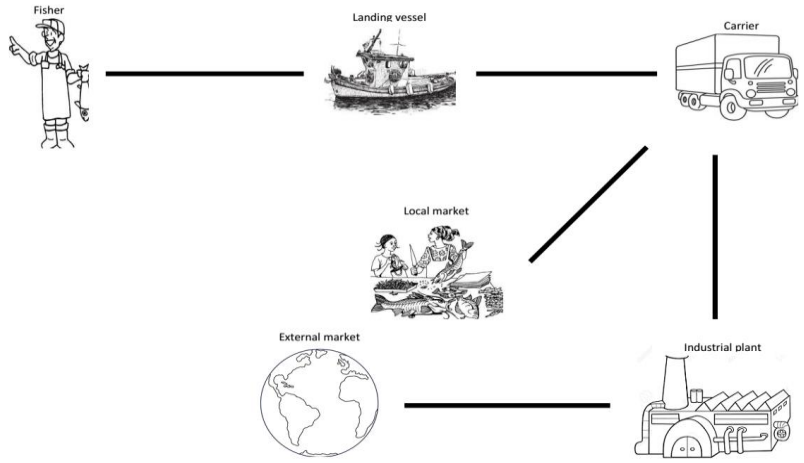
10.6. Do you know the price of the King Crab in the market of destiny? Yes ( ) No ( )

11. ACTORS AND FLOW OF MONEY

11.1. This is an image that describes, in a general way, the productive process of the King Crab since it is catched until it comes to the local or external market. According to this image: Could you identify more actors (institutions, people or enterprises) which are involved in this process? Thus, could you give an estimation, based on your own experience, about which are the POSSIBLE revenues that the actors receive through the chain? Feel free in mentioning those actors that you consider participate, directly or indirectly, into the process.

KING CRAB VALUE CHAIN

According to your experience which kind of actors (enterprises, organizations or individuals) are directly or indirectly related to this picture?



12. PROCESSES

12.1. From an economic perspective, the exploitation of a product could imply new technology in order to increase the efficiency in the capture and to achieve competitiveness in terms of market. Thus, How much do you think that the fishing techniques have change during the last years?

( ) A lot
( ) Not too much
( ) Few changes
( ) Nothing

12.1.a. If the answer is A LOT, Asking how the fishing have change regarding gear and techniques.

12.1.b. How all these changes have influence on your occupation as fisher?

( ) Positive
( ) Negative

12.1.c.1 Why do you think that?

12.2. In previous interviews many fishers agreed that the King Crab moved far from the coast deeper into the sea. So, they have to navigate longer distances and to fishing deeper. What is your opinion about it? Have this phenomenon prolonged the fishing labor season for fishers related to this specie?

12.3. Do you know what happens to the King Crab after the industrial plant? Do you know which markets or countries are the main destinies for this product?

12.4. Do you know how this product is commercialized?

( ) Fresh
( ) Processed (frozen)
( ) Other: _____

12.4.a. If multiple answers: Which one has the best price?

III. EFFECTS ON THE WELLBEING OF ARTISANAL FISHERS

13. Income

13.1. Regarding your income, do you think that it is:

( ) High ( ) Good ( ) Regular ( )Low ( ) Bad

13.2. Do you think that your income has ( ) improved, has ( ) diminished or has ( ) been constant through the time? Why do you think that?

14. ***Employment***

14.1. What is your employment condition? Do you have…?

Permanent contract ( ) Temporary contract ( ) Casual work ( ) Without contract ()

14.2. Do you consider your job as artisanal fisher as:

( ) Stable ( ) Unstable

14.2.a. Why do you think that? Has been different? When and why has been different?

14.3. Do you work just for one industrial plant or boss?

Yes____ No _____ 14.3.a._____ How many? (If the answer is no)

14.4. Do you think that the King Crab extraction has influenced on the employment creation in the last 10 years?

( ) Yes ( ) No

14.4.a. Why?

14.4.a.1. If the answer is YES: What kind of employment has it created (direct or indirect)?

14.4.a.2. If the answer is NO: Why?

15. Foreign investment

15.1. Do you think that the extraction of King Crab has influenced on:

( ) Openings of new local businesses

( ) Restaurants

( ) Repair and gear shops

( ) Tourism

( ) Transport services (maritime, terrestrial, aerial)

( ) Other: _____

( ) New foreign investment

( ) Industrial plants

( ) Foreign capital enterprises (hotels, restaurants, supermarkets)

( ) Other: _____

16. Food security

16.1. Do you or your family eat seafood products at home?

Yes _____ 16.1.a. How and how frequently do you eat them?

No _____ 16.1.b. Why don't you eat them? Reasons ( ) Price ( ) Preferences ( ) Other reasons: _____

16.2. According to your opinion is the King Crab consumed by the people in the region?

Sí Yes_____ 16.2.a How do they eat it (fresh or prepared)?

No _____ 16.2.b Why?

16.2.b.1 If the answer is NO Was it different in the past? Was the King Crab or other seafood products more consumed in the past? Why was like that? Why do you thing that something changed? When did this change happen?

16.3. Is there a local market for the King Crab in the Region?

Yes _____ 16.1. Where it is? By whom it is integrated?

No _____ 16.2. Why? What are the main reasons?

16.4. Does any public institution or organization promote the consumption of seafood products (in this case the King Crab)?

Yes_____ 16.4.1. How do they do that?

No_____ 16.4. 2. Why?

17. Social Mobility

17.1.a Social mobility refers to the possibility of people in overcoming social constraints, mainly those related to poverty, and being able to have access to more and better resources such as education, health, goods, etc., where labour is a factor of social mobility. Thus, has been the fishing a tool for social mobility with effects on your personal welfare?

Yes _____ No _____

17.1.b Why?

18. Level of cohesion, social relations and resilience

18.1. In previous interviews some fishers mentioned that long labour seasons at the sea have provoked some struggles in their families, mainly with their partners. What is your opinion about it?

18. 2. From 1 to 5 sort the below problems according to their importance in the artisanal fisher sector:

Separation or divorce: _____

Alcoholism: _____

Indebtedness: _____

Drug addiction: _____

Other: _____

18.3. Do you think that the artisanal fishing sector is well-organized in this region?

Yes _____

No _____ 18.3.a. Why? Which are the main reasons?

18.3.b. If the answer is YES. Which are the most common organizations in the region?

( ) Unions ( ) Cooperatives ( ) Associations ( ) Other: _____

18.3.c. Are you part of one of these organizations?

YES _____ 18.3.c.1. Why? What is the main interest in being part of it?

No _____ 18.3.c.2. Why?

18.4. How would you describe the relations with other fishers?

( ) Very good ( ) Good ( ) Regular ( ) Bad ( ) No relation or very bad

18.5. Why do you consider them like that?

18.6. In case that another fisher faces some problems, for example, being severely ill or having some financial problems (debts). Is there any instrument or mechanisms among fishers in order to support this person?

18.7. Regarding the place where the fishers work: Could you describe how do they define who, where and what happens, if there is any agreement among them, when the mechanisms are not respected among the fishers?

18.8. How would you describe the relations among fishers and the Government?

( ) Very good ( )Good ( ) Regular ( ) Bad ( ) There is no relation or very bad

18.8.1. Why?

18.2. Which are the contact mechanisms? Could you identify some of them?

18.3. Is there any conflict among artisanal and industrial fisheries in the region?

18.4. In 2010 a semi-crisis in the extraction and commercialization of King Crab was recorded due to the international financial crisis. From your own experience as a fisher, do you remember similar periods?

YES ( ) NO ( )

18.4.1. If the answer is YES: If you were affected because of that how did you overcome it?

19. *Social security*

19.1 Regarding your health condition. Do you consider your health as:

( ) Excellent ( )Very good ( ) Regular ( ) Bad

19.2 Why do you consider it in that way? Being a fisher have influenced somehow on your health?

19.3 Are you subscribed to some pension system such as AFP?

YES: _____ 19.3.a Since when are you subscribed? _____
NO:_____19.3.b Why? _____
19.4. Do you have access to the health care system? (ISAPRES or FONASA)
Yes _____ 19.4.a Since when are you subscribed? _____
No _____ 19.4.b Why? _____

20. ***Knowledge***

20.1. Did you have the opportunity of taking some training programs related, for instance, to business management, new technologies or techniques in fisheries, environmental topics, laws, marketing, etc.)?
( ) YES 20.1.a. What kind of training did you receive?
20.1.b Are these programs part of some initiative in the fishing sector? Have they influenced your performance as fisher?
( ) No 20.1.c Why? (There are not opportunities, other interests, etc.)

21: **Future Artisanal Fisheries**

Is there future for the artisanal fishing in the region?
YES ( ) NO () Why?_____

END OF THE INTERVIEW
THANK YOU SO MUCH FOR YOUR TIME AND COLLABORATION

3. Appendix 3: Interviewed Fishers: Boat Size and Number of Traps

Survey	Kind of actor	Boat size	Number of traps	Total	Comments
1	Owner	13,5	250	250	
2	Middleman	15,5	700	2800	Average, the middleman has 4 boats, each of them with 700 traps
3	Middleman	13,5	1200	4800	Average, the middleman has 4 boats, each of them with 1200 traps
4	Owner	11,5	400	400	
5	Owner	10,6	800	800	Average, the middleman has 3 boats
6	Owner	11,22	300	300	
7	Owner	9,7	200	200	
8	Fisher	NR	NR	NR	
9	Middleman	12	700	2100	Average, the middleman has 3 boats, each of them with 700 traps
10	Middleman	16,5	800	800	Average, the middleman has 4 boats,
11	Owner	10,9	300	300	
12	Owner	10	400	400	
13	Fisher	12	600	600	
14	Fisher	NR	NR	NR	
15	Middleman	NR	800	4000	The middleman has 5 boats, each of with 800 traps
16	Fisher	NR	100	100	
17	Owner	11	600	600	
18	Fisher	NR	NR	NR	
19	Fisher	NR	1000	1000	
20	Owner	11,9	NR	NR	
21	Owner	11,98	500	500	
22	Middleman	12,6	300	900	The middleman has 3 boats, each of them with 300 traps
23	Owner	11	300	300	
24	Fisher	14	NR	NR	
25	Owner	10	400	400	
26	Fisher	14,2	700	700	
27	Fisher	NR	100	100	
TOTAL				**22350**	
Average				**1064.3**	