AGRODEP Working Paper 0021

January 2016

An Analysis of the Fishing Industry in Namibia: The Structure, Performance, Challenges, and Prospects for Growth and Diversification

Blessing Chiripanhura
Mogos Teweldemedhin

About the Authors

Blessing Chiripanhura is a Senior Lecturer at the University of Namibia, Windhoek in the Department of Economics.

Mogos Teweldemedhin is a Lecturer at Namibia University of Science and Technology in the Department of Natural Resources & Agricultural Sciences.

Acknowledgement

The researcher gratefully acknowledges funding of this research by AGRODEP's Innovative Research Grant (Contract No. 2014X205.CHI). I would also want to thank the anonymous reviewers who assisted me to develop the arguments in the paper.

This research was undertaken as part of, and partially funded by, the CGIAR Research Program on Policies, Institutions, and Markets (PIM), which is led by IFPRI and funded by the CGIAR Fund Donors. This paper has gone through AGRODEP's peer-review procedure. The opinions expressed here belong to the authors, and do not necessarily reflect those of AGRODEP, IFPRI, PIM or CGIAR.

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Abstract

This paper analyses the structure of Namibia's fishery sector, which consists of both marine-based fisheries and aquaculture. The study examines the sectors' governance structure and the evolution of fishery stocks and assesses the performance of the sector in terms of catch effort, sectoral contribution to GDP, employment, and contribution to international trade. The analysis concentrates on the marine-based fisheries and applies two analytical methods: a qualitative approach that solicits views from local fishing associations and companies and a quantitative approach that uses the decision support model to identify realistic export opportunities. The main challenges inhibiting the growth of Namibia's fishery sector include a shortage of skilled labor, a lack of vessels, seismic impacts of oil exploration, and threats posed by proposed phosphate mining at sea. The paper also examines the government's drive for value addition, arguing that what is deemed value addition from one angle may constitute value destruction from another. The authors also argue that the drive for value addition may cause companies to face problems with their current trading partners, who may use sanitary and phytosanitary measures to restrict the entry of processed fish into their markets.

Résumé

Cet article analyse la structure du secteur de la pêche de la Namibie, qui consiste en pêche maritime et en aquaculture. L'étude examine la structure de gouvernance du secteur et l'évolution des stocks de pêche, et évalue la performance du secteur en termes d'effort de capture, de contribution sectorielle au PIB, d'emploi, et de contribution au commerce international. L'analyse se concentre sur la pêche maritime et applique deux méthodes d'analyse: une approche qualitative qui sollicite les points de vue des associations de pêche locales et des entreprises et une approche quantitative qui utilise un modèle d'aide à la décision pour identifier les opportunités d'exportation réalistes. Les principaux défis qui limitent la croissance du secteur de la pêche de la Namibie incluent une pénurie de main-d'œuvre qualifiée, un manque de navires, les impacts sismiques de l'exploration pétrolière, et les menaces constituées par les mines de phosphate en mer. Le document examine aussi la volonté du gouvernement pour la création de valeur ajoutée, en montrant que ce qui peut être perçu comme création de valeur d'un côté pourrait constituer une destruction de valeur de l'autre. Les auteurs font également valoir que la volonté d'ajout de valeur peut amener les entreprises à faire face à des problèmes avec leurs partenaires commerciaux actuels, qui peuvent utiliser les mesures sanitaires et phytosanitaires pour limiter l'entrée des poissons transformés sur leurs marchés.

1. Introduction

This study examines the structure and performance of Namibia's fishery sector and seeks to shed light onto barriers to the expansion of the sector. The fishery sector's growth potential has long been recognised by the Namibian government, both under the Targeted Intervention Programme for Employment and Economic Growth (TIPEEG) and more recently under the government's Fourth National Development Programme (NDP 4). Specifically, the fishery sector has significant opportunities for output growth, value addition, and employment creation. It has also been also targeted for investment by the government and has the potential to develop an enhanced value chain with significant linkages to the rest of the economy. Thus, in 2015, Namibia's Ministry of Industrialisation Trade and SME Development, in a bid to enhance agricultural performance and value addition, contracted a consultancy company to perform a value chain analysis of the agricultural and fishery sectors.

This paper seeks to explore and examine the demand and supply conditions of fish and fish products, highlighting prospects for growth and expansion. Our analysis contributes to the national development agenda (under NDP 4) and Vision 2030, which is a milestone envisioned for significant industrial development.

Namibia is regarded as an upper-middle-income country, with a GDP per capita of approximately US$ 5,293. Despite this status, however, the country is characterized by many social and economic challenges. Income inequality is high (with a Gini coefficient of 0.59), although it has been falling over the past 25 years; poverty levels and the cost of living are also high, and thus quality of life is not in unison with the country's macro indicators. The incidence of poverty is estimated at about 30 percent of the population, and it is estimated that about half of the poor population is in severe poverty. Nonetheless, severe poverty has declined remarkably over recent years (Chiripanhura and Nino Zarazua, 2014).

The majority of the population is rural, but urban poverty is deeper than rural poverty. Namibia's human development index is rather low, at 0.61 (ranked 128th out of 186 countries). Unemployment averages about 30 percent of the labor force and is worst among youth. The economy relies on exports, mainly of primary products. For the bulk of its consumption requirements (Africa (consumption goods, banks and insurance companies, building and engineering materials, cars, etc.), the country relies on imports from South Africa. Apart from its internal social and economic challenges, Namibia is largely an open economy and is therefore vulnerable to the vagaries of global economic fluctuations, especially through its exposure to the South African economy.

As part of its initiatives to address these varied challenges, the Namibian government has established a series of five-year national development plans, a national Vision 2030, and several other interventions. These programs aim to promote 'star' industries that exhibit significant growth potential (notably tourism

and fisheries), to create sustainable jobs, and to foster the development of a manufacturing base (GoN, 2004; 2012). This study focuses on the fishery sector because of its potential to create sustainable jobs and because of the government policy to promote the sector for value addition and employment creation.

The fishery sector contributes an average of 3.5 percent to Namibia's real GDP. It is administered by the Ministry of Fisheries and Marine Resources (MFMR) and is regarded as an important sector because (i) it is the fourth-largest foreign currency earner (as of 2012); (ii) it is a big employer, especially in the Erongo region, employing 25,000 people in 2012; and (iii) it has potential to contribute to the country's food security and livelihood diversification. Nearly half the harvested fish is exported to the SADC region, and domestic consumption is about 10 percent of the harvest. Fish exports increased by 42 percent in 2012 following larger catches and increased value addition (MFMR, 2013).

To our knowledge, no similar studies have been carried out in Namibia's fisheries sector using the methods that we employ. This study is therefore unique not only because it is the first such study to focus on both sea and fresh water fish production, but also because it applies methodological triangulation to present different perspectives of the sector.

The study also analyzes both sea and fresh water fisheries and argues for greater investment in the sector and in export diversification and intensification. Export diversification would reduce the sector's vulnerability to international economic shocks and could potentially unlock additional supply potential. The exploration and analysis of alternative markets include an in-depth market analysis and analysis supply strategies for the most lucrative export opportunities (Sakarya *et al.*, 2007). The success of these strategies depends on the identification and selection of new markets for fish and fish products.

1.1 Objectives of the study

The primary objective of the study is to provide a comprehensive analysis of the fishery sector in Namibia. The study examines the challenges faced by firms in the sector and explores ways to enhance the sector's economic contributions. The study has the following specific objectives:

i. To conduct a review of literature on the fishing industry. This involves analysis of demand and supply and of market availability;
ii. To identify fish types, quality and quantity, and fishing companies' competitiveness relative to other producers, and in line with requirements of identified and proposed markets;
iii. To identify export (or supply) strategies for Namibian fish and fish products to international markets;
iv. To suggest alternative export markets and marketing systems required to respond to the market demand and government push for expansion of the sector; and

v. To identify factors influencing fish marketing that can be dealt with at technical or political levels.

Methods of analysis

A number of methods are applied in order to meet these objectives. We apply both qualitative and quantitative techniques in order to take advantage of the strengths of each methodological approach. We apply the qualitative methodology to collect data on the operations of the fishery sector and the challenges facing fishing companies. We conduct in-depth interviews with representatives of fishing associations in order to gain a clear understanding of the operations in the sector. We also conduct literature review to understand the laws governing the fishery sector and to review research that sheds light onto the structure and operations of the sector.

We apply quantitative techniques to establish the performance of the fishery sector and to determine prospective export markets. Here we use the decision support model to select export opportunities with high potential for viability.

The study is structured as follows. Section 2 lays the foundation of the study by presenting background information on the structure of the fishery sector. Section 3 examines the economic performance of the sector and identifies the range of products and the sector's contribution to the economy in terms of, among other things, value addition and employment. Section 4 contains the empirical analysis of how fishery sector exports can be promoted and diversified. This section is divided into three sections, namely:

a. a section that analyzes data collected from fishing associations and fishing companies. This section also presents a detailed analysis of the challenges faced by fishing companies;
b. a detailed analysis of realistic export opportunities for Namibia using the decision support model. This section presents a detailed analysis of the existing export situation for selected fish and fish products; and
c. a section that examines prospective diversifications for the sector.

Lastly, Section 5 presents the challenges and prospects for fishery sector growth. It discusses the issues that the government, fishing associations, and fishing companies all need to consider in order to promote the sector in line with the guidance envisioned in the national development plans and national Vision 2030. The section also concludes the study.

2. Background to the Fisheries Sector

Namibia's main economic sectors are mining and quarrying (11.3 percent of GDP in 2012, of which 8.3 percent was diamond mining), agriculture (5 percent), and fisheries (3.8 percent) (Namibia Statistics Agency, 2012). The fishery sector presents a success story of sustainable natural resource exploitation in

the country. With a coastal border stretching about 1,500km, Namibia has a rich marine ecosystem well-fed by the Benguela current system; this current is rich in pelagic (deep sea) and demersal fish, supported by plankton production driven by intense coastal upwelling. Because much of its coastline is desert, the Namibian coast has few urban settlements, unlike other coastlines around the world that tend to be very densely populated. This low settlement density means that there is little pollution in Namibia's marine waters, hence the good quality of the marine ecosystem (IMF, 2011). This environmental advantage could potentially be exploited to expand and brand Namibia's fish and fish products.

The cleanliness of Namibian waters ensures that the country has access to high quality fish with an international appeal. The sustainable exploitation of this resource relies on the excellent management of the MFMR. The development of the fishery sector is entrenched within the context of the country's five-year national development programmes (NDPs); the fourth such plan, covering 2012-17, is currently in implementation.

The NDP 4 has three main goals: fostering faster and sustainable economic growth, creating employment, and enhancing income equality. The plan identifies four areas of strategic focus: logistics, tourism, manufacturing, and agriculture. In resonance with the national Vision 2030 plan, the development plan emphasises the national goal of industrialisation and manufacturing, of which mining and agriculture form the core. The intention is to create and enhance synergies between these sectors through the processing of raw materials from the primary sectors and the creation of jobs in the manufacturing sector. The fishery sector is one sector in which, through sustainable management of fish stocks, the government is pushing for greater value addition and sustainable job creation. The government has been working with private sector fishery enterprises to create jobs and, more specifically, to increase the value of the sector to achieve both higher earnings on processed fish exports and higher levels of employment. Given that fishery firms have to apply for their quotas every year, the general view, even from the workers' perspective, is that these higher quotas should be given to firms that are creating more jobs, especially through value addition, and to those that are reducing the seasonality of employment in the sector. Firms that have installed capacity to add value and therefore operate all year round also have better capacity to push for higher quotas. On the other hand, the Ministry of Fisheries and Marine Resources is committed to maintaining a fair balance between the total allowable catches and quota allocations in order to sustainably manage marine fish resources (MFMR, 2013). For these reasons, we examine the government's goal value addition and critically evaluate the extent to which it can be achieved.

The fishery sector consists of a primary sub-sector that harvests fish and a manufacturing sub-sector that processes fish for both the local and export markets. The sector can also be divided into two sub-sectors by resource type, namely marine-based resource exploitation and aquaculture. The former is dominated by private enterprises with no direct government financial support and is internationally competitive. It is

mainly concentrated at Walvis Bay and at Luderitz. Aquaculture is strongly supported by the government in order to create jobs and improve food security and nutrition within the country. This sub-sector is concentrated in the northern and southern part of the country. The main challenge to aquaculture development is inadequate water supplies, given that a large portion of the country is desert and that there are few perennial rivers in the north and south of the country. As such, there is potential to establish fresh water fisheries in the north-eastern and southern parts of the country. The central regions of the country are generally dry and are dominated by animal husbandry activities, especially cattle rearing.

This study focuses on both sub-sectors in order to emphasize the possible synergies between the two. Both marine-based fishing and aquaculture are examined to the extent permitted by the existing data, but there is more emphasis given to marine-based fishing because of data availability and the position that it currently occupies in the Namibian economy. In the following section we analyze the structure of the fishing sector.

2.1 Structure of the fishing sector

As an entry point to examining Namibia's fishery sector, we start by analyzing the legal framework governing the sector, as well as the sector's institutional set-up.

Legal framework

The fishery sector's legal framework, as with the sector itself, can be divided into two parts: one part governing the exploitation and management of marine resources and another governing the aquaculture sector.

Marine resource exploitation and management

When the country gained independence in 1990, Namibia's marine resources were mainly exploited by foreign fleets and a few privileged Namibians, and many species were over-exploited due to an open access policy (Lange, 2003) The new Namibian government proclaimed an exclusive economic zone (EEZ) to establish exclusive rights over marine resources within a 200 nautical mile distance from the shore, in line with the United Nations Law of the Sea. Through the Ministry of Fisheries and Marine Resources, the government formulated a policy framework to rebuild fish stocks and to manage marine resources more sustainably. A fishery sector white paper was developed with three main objectives: (i) rebuilding fish stocks and controlling their exploitation; (ii) establishing effective mechanisms for the monitoring and surveillance of resource use and exploitation; and (iii) establishing a flourishing fishing industry that would add value to the resource and empower the Namibian public. The framework emphasised the need for the 'Namibianisation' of the sector through affirmative action policies aimed at promoting the participation and ownership of fish resources by formerly disadvantaged Namibians. To ensure the realization of these objectives, the Namibian government introduced the Sea Fisheries Act in 1992. This act set out the institutional framework for the operation and management of the fishery sector, including the granting of

non-transferable quota rights, the setting of total allowable catches (TACs), and the directing of data collection and research on marine resources.

The bases for quota allocation are employment creation and corporate social responsibility, including the upholding of government standards, rules, and regulations. The issued rights last for periods ranging from seven to twenty years, conditional on the aims and objectives of the Act, including ownership, investment levels, and fishing experience. For example, in hake fishing, the initial quota stated that about 60 percent of the allocated quota must be landed onshore for processing; the remaining 40 percent could be frozen and exported directly from the sea. However, as there is preference for landing wet fish onshore in order to promote and sustain onshore employment, the 60:40 policy was amended to 70:30 in order to strengthen value addition initiatives and employment creation.

The 1992 Act was repealed in 2000 and replaced by the Marine Resources Act; this new Act was supported by the 2001 Regulation No. 241, which regulated the exploitation of marine resources. The regulations govern the granting of rights, allocation of quotas, and licensing of activities in the fishery sector. They also govern the non-commercial exploitation of marine resources (e.g. recreational activities) conservation measures (e.g. control of trawling activities and measurement of meshes) and determine the fishing seasons for various species. Further, the regulations outline the compliance and control measures provided for under the Act, as well as applicable offences and penalties.

The Marine Resources Act and its accompanying regulations enhanced Namibia's position as a developing country with a coastal border that requires effective management in line with international guidelines. The Act emphasizes the country's obligations to effective and efficient management of fish resources and allowed the country to sign agreements like the Law of the Seas (1982) and the UN Fishing Stocks Agreement (1995). Namibia also joined the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the South-East Atlantic Fisheries Organisation. Commercially exploitable fish varieties like hake, horse mackerel, pilchard, and anchovy are managed through quotas and TACs, in line with the international agreements signed (e.g. ICCAT sets the tuna quota depending on what Namibian companies are able to catch). Other controls in place include restrictions on by-catches, protected areas, and closed seasons to enable successful recruitment of stocks. There is also a restriction on the mesh size that can be used (for hake, monk fish, and deep sea red crab), on minimum size restriction (for horse mackerel and rock lobster), and on effort (for rock lobster, no more than 100 traps per vessel). Finally, there are also provisions for the harvesting of seals, which are predators to a variety of local fish types (Edoff, 2012). Sea inspectors and observers are tasked with the enforcement of these regulations, and penalties for any breach of the provisions of the Act are levied accordingly.

The management of marine resources was further strengthened by the introduction of the Marine Resources Policy of 2004. This policy details the history of the fishery sector and emphasizes the need for greater

involvement of Namibians in the management and exploitation of the country's fish resources. The policy covers issues of marine sector resource development and ownership, as well as the implementation, monitoring, and control of resource use. While fishing companies often prefer to process fish at sea to ensure higher prices for their products, the 2004 policy, with the Marine Resources Act, encourages onshore processing of wet fish to create employment. The regulatory framework for this policy is therefore adjusted continuously in order to meet government objectives without compromising the viability of the country's fishing companies.

Marine resource management under the current legal framework involves stock assessments through annual surveys and modelling to inform decision-making (e.g. setting of the TAC) and prevent over-exploitation. Scientific studies and resource modelling are central to stock management. The stock assessment methods in place utilize survey data (e.g. two annual surveys of the pilchard stocks, in March and in October) and commercial catch-per-unit efforts to adjust TAC levels (for hake, horse mackerel, pilchard, monk, orange roughy, and deep sea red crab). In addition, the legal framework protects the marine environment by monitoring the quality of coastal waters and preventing the discharge of raw waste into the sea. Nonetheless, there is need for closer cooperation and coordination among different government ministries whose responsibilities overlap on the marine ecosystem. These include the Ministries of Fisheries and Marine Resources, Environment and Tourism, and Mines and Energy; issues that exist among these different ministries include the mining of phosphates at sea, as well as seismic activities and oil and gas exploration.

This last issue - seismic activities emanating from petroleum exploration - is of significant concern to the fishery sector. Fishing Industry Associations, through the MFMR, are lobbying for the implementation of the Environmental Management Act (EMA) 7 of 2007; however, it is alleged that the Ministry of Mines and Energy has been avoiding the implementation of this Act (ostensibly because petroleum exploration is not explicitly listed for environmental impact assessment under the EMA), instead preferring to allow seismic activities under the Petroleum Exploration and Production Act.

Marine sub-sector institutional framework

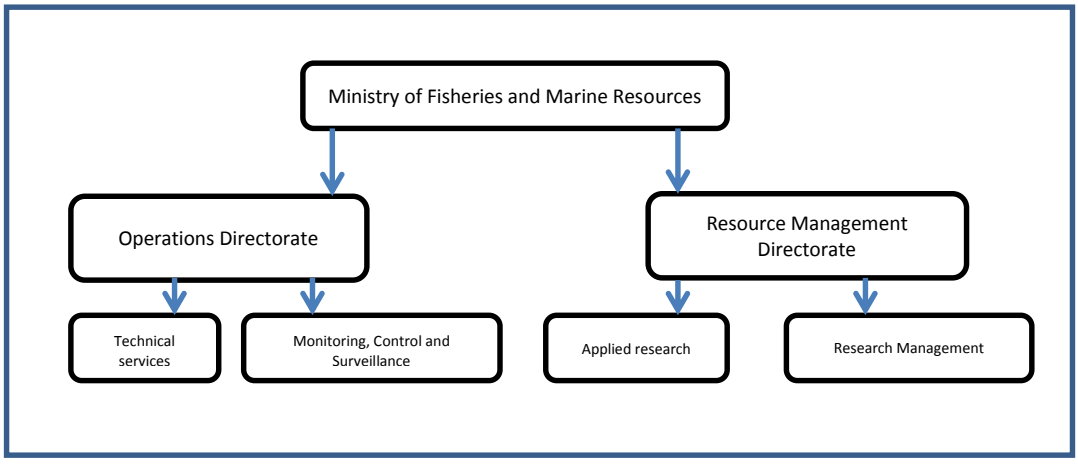
The exploitation and management of marine resources fall under the MFMR, which has four directorates: resource management and scientific research, operations and surveillance, policy planning and economics, and aquaculture. The Marine Act provides for the existence of a Marine Resource Advisory Council as a primary channel for consultative engagement of stakeholders on all policy matters. The Fishing Industry Associations are a consultative channel for engagement on resource use, sectoral development, and economic engagement nationally and internationally. For example, in 2014, the Fishing Industry Associations engaged the government in negotiations to change the tuna fishing season from the current October-April season to September-August.

The MFMR is responsible for protecting, monitoring, and managing marine resources in a sustainable manner. Given the export-orientation of the fishery sector, the MFMR is also mandated with ensuring that only high-quality fish and fish products are exported. The Ministry currently uses the Namibian Standards Institution (NSI) to meet and maintain the minimum standards set by trading partners. The hazard analysis and critical control points system (HACCP) is a quality control programme used to identify and assess the possible risks associated with different stages of fish production that may compromise the value chain. The system allows for full traceability of food sources in order to isolate cases of contamination.

The MFMR is also responsible for the inspection of marine vessels and for ensuring that on-board handling and processing systems meet and maintain set standards. The MFMR is responsible for the collection and analysis of marine data; it conducts surveys, monitors recruitment rates, and handles quota allocations and licensing issues. It also determines TAC levels, thus ensuring sustainable stock levels. Quotas can be increased and/or reduced for particular individuals in line with provisions of the Marine Resources Act. For example, in 2014, the Ministry issued additional quotas of mackerel and hake (1,000 tonnes each) to cushion companies against the adverse effects of seismic activities.

The sector's institutional framework is represented schematically in Figure 1 below. The figure shows that the management of marine fisheries is performed by two directorates in the MFMR. The Operations Directorate is responsible for technical services and for monitoring, control, and surveillance. The Resource Management Directorate is responsible for the collection and maintenance of statistical data and for directing research as required by the Ministry.

Figure 1: Institutional framework – Marine-based fisheries



Source: MFMR website

Structure and distribution of the marine fisheries activities

As highlighted by the legal framework above, the fishery sector consists of a largely successful and export-oriented marine resource sector and an up-and-coming aquaculture sub-sector, which includes fresh water fish farming. Namibia has made significant progress in laying the groundwork for developing of the fishery sector, from the elimination of fish poaching by vessels from as far afield as Spain and Russia to the establishment of local participation, regulation, and monitoring of the exploitation of fish resources. It was hoped that greater dynamism could be injected through higher value addition, but this goal has not been realized for a variety of reasons, including declining stocks and the opaque nature of some fishery operations. We will explore these challenges in our discussion of the possible expansion of processing activities and foreign markets for Namibian fish.

The various policy papers and Acts governing the fishery sector are discussed in Sherbourne (2013). Broadly, the fishing industry falls under the MFMR and is administered under the Marine Resources Act and the Aquaculture Act. The exploitation of marine resources is reserved for companies that meet certain criteria set by the government. One of the main drivers of the new fishing sector administration was the implementation of an indigenization policy that sought to increase the participation of formerly disadvantaged Namibians. The government also sought to increase employment creation and value addition in the sector. Fishing rights were given for periods ranging from three to ten years (extended to between seven and twenty years in 2001), and quotas were determined annually in line with the set total allowable catch (TAC) for various types of fish.

The MFMR and fishing companies cooperate to ensure that marine resources are used optimally and sustainably. The TAC is increasingly set on the basis of scientific information, reducing uncertainty and generating greater trust and cooperation between the Ministry and the fishing companies.

Marine resource exploitation distinguishes among different types of licenses depending upon sea depth, as follows:

1. First level of harvesting is for companies with the right to fish small and pelagic fish, that is fish that dwell close to the surface of the ocean (e.g. some species of tuna, pilchards, and anchovy). The fishing season runs from January to August. Fish can be canned or processed for fish oil and/or fishmeal. After a significant increase in catches in the 1990s, pelagic fish harvests declined toward the end of the decade, resulting in a prohibition on trawling in shallow waters (Sherbourne, 2013). The collapse of pelagic fish stocks also resulted in a reduction in the processing capacity onshore, culminating in job losses. Sherbourne (2013) reports that by 2012, there was only one pelagic fish cannery and two fishmeal plants in Walvis Bay. Since 1991, tuna has also been caught in Namibian

waters. Tuna caught using long-line fishing method is exported to Japan, where it is a delicacy and fetches a premium price. Tuna caught using pole fishing is canned abroad.

2. The second level of harvesting targets mid-water fish stocks (i.e. the fish found between the ocean surface and the bedrock). This includes horse mackerel and hake. The fishing season runs all year round. Mid-level fish are mainly harvested using trawling methods. Many quota holders do not own vessels, so they hire labor, mainly from abroad. Mid-level fishing forms the core of the Namibian fishing industry; since independence I 1990, the hake industry in particular has contributed significantly to onshore jobs.
3. The third level, demersal fishing, exploits fish resources found near or at the bottom of the sea. These consist of species like hake, sole, and monk. The fish are either processed on-board and/or ferried for onshore processing.
4. The fourth level is deep-water fishing, which targets orange roughy (processed onshore) and alfonsino (processed off-shore). Since deep-water fishing began, the catch size has declined consistently over time.

Other sea products in Namibia include crabs, rock lobster, oysters, seals, guano, and seaweed. Crabs are processed offshore, while rock lobster lands onshore wet. Oysters are farmed and sold both locally and internationally. Male seals and pups are harvested for fur, fat, and meat, and two types of seaweed are harvested.

To control the exploitation of marine resources, the MFMR sets strict TACs. The TAC system is monitored by the Inspectorate Department, both on-board and when the fish lands onshore. There are penalties for over-fishing and for by-catch[1], and unexploited quotas revert back to the Ministry.

Although there is still significant participation of foreign-owned companies in Namibia's fishing industry, there is also a multiplicity of smaller indigenous companies, many of which hold fishing rights but which lack fishing boats and, as observed by Sherbourne (2014), make money from selling their rights to boat owners. The majority of mid- to deep-water quota holders do not own boats, so they rent from boat owners, the majority of whom are foreigners.

Aquaculture production and management

The second part of the fisher sector is aquaculture. Aquaculture is divided into fresh water fisheries (mainly tilapia and catfish) and mari-culture or marine-based fish farming (mainly oysters, abalone and seaweed). The fresh water sub-sector products are geared for the local market, for food security reasons, but they also find their way into neighbouring countries (specifically Botswana, Zambia, and Angola). The marine-based sub-sector is generally capital intensive; its products are of high value and are geared for the export market.

[1] By-catch means the fish/marine resources that are caught unintentionally while catching a given targeted species.

Early in the new century, the government formulated the Aquaculture Policy of 2001 and enacted the Aquaculture Act No. 18 of 2002, supported by the Aquaculture (licencing) Regulations of 2003, to govern the exploitation of aquaculture resources, including the issuance of licences, monitoring, and regulation. The government also controls the importation and exportation of aquaculture products.

In 2004, the government produced the Aquaculture Strategic Plan to guide the implementation of the Aquaculture Act. This was further enhanced by the introduction of import and export regulations in 2010. Fresh water sub-sector activities are mainly located in the Caprivi, Kavango, Omusati, and Hardap regions, while marine-based activities are located in Luderitz and Walvis Bay. The marine sub-sector is mainly dominated by private enterprises, while fresh water sub-sector activities are dominated by community-based cooperatives and private small-scale fish farms.

There has been significant financing given to the aquaculture sector in order to enhance domestic food security, employment creation, and livelihood diversification in communal areas (e.g. selling fish at fish markets). Between 2003 and 2011, the government invested N$15 million in the sector. As a result, aquaculture has grown consistently in Namibia.

Aquaculture institutional framework

The MFMR is the primary agency promoting the aquaculture sector through the Directorate of Aquaculture. The directorate is responsible for the sustainable development of aquaculture to achieve employment creation and to enhance nutrition and food security in the country. It is also responsible for the maintenance of genetic bio-diversity aquatic ecosystem integrity. The Minister consults with regional authorities, local councils, and traditional authorities to set up aquaculture projects. Below the Ministry is the Aquaculture Advisory Council, which can be tasked by the Minister with investigating aquaculture issues and advising on policy issues. The Ministry has overall responsibility for the conduct of all aquaculture activities, and these activities are restricted to those issued with licences. The licences are not transferable without the Minister's approval.

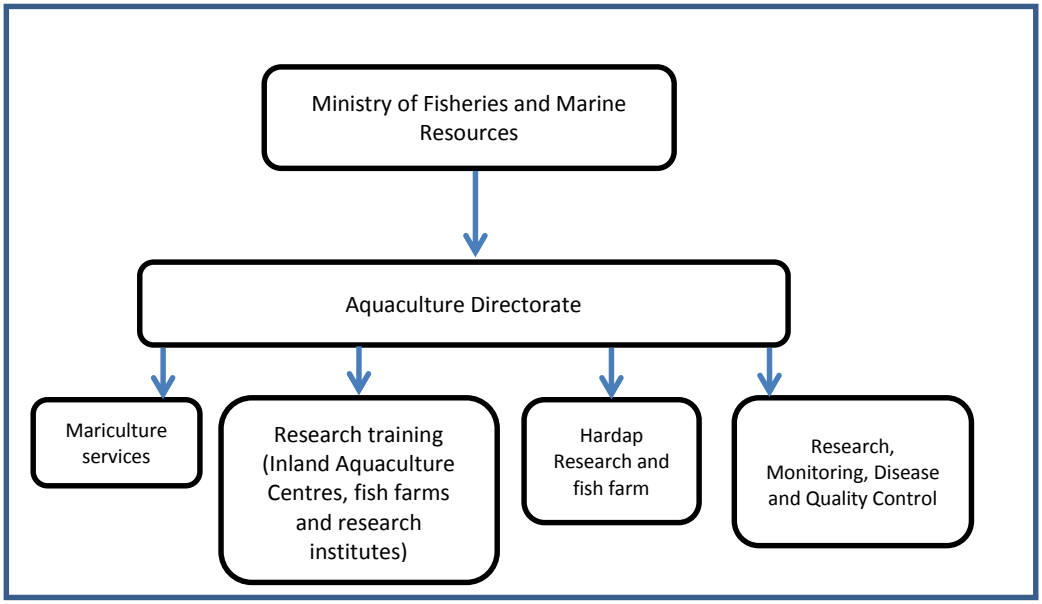
The Aquaculture Act provides for the appointment of inspectors who have the right to enter aquaculture facilities and to inspect the premises and documents in line with the provisions of the Act. The inspectors conduct inland patrols on rivers and dams around the country to ensure that fishermen operate within the provisions of the law. These inspectors confiscate illegal fishing gear like drag nets, mosquito nets, multi-filaments, shade nets, and canoes; they also seize illegally harvested fish and fine operators who fail to renew their licences.

The government funds a number of aquaculture centers (including Onavivi, Ongwediva, Kamutjonga, Epalela, Zambezi, and Hardap Inland Aquaculture centres). These centers are responsible for the production of fingerlings (that is, juvenile fish), which are distributed to fish farmers; this is done because ordinary

farmers lack the technical know-how and financial ability to produce fingerlings themselves. The government's funding of these centers supports the national goal to make aquaculture a sustainable and thriving industry by 2030. Some centers, notably Kamutjonga, also conduct aquaculture research and train farmers in the operation and management of aquaculture projects.

The current institutional framework is represented schematically in Figure 2.

Figure 2: Institutional framework – Aquaculture fisheries



Source: MFMR website

Structure and distribution of the aquaculture activities

The mari-culture sub-sector is mainly based in Luderitz, Swakopmund, and Walvis Bay. This sub-sector mainly produces abalone, seaweed, oysters, and mussels for export. In 2004, there were six companies in mari-culture, employing about 85 workers. These companies produced about 600 tonnes of oysters. Seaweed is grown in the Luderitz lagoon and is largely exported. In 2004, there were 120 tonnes of seaweed produced. Fifteen tonnes of abalone were produced in 2004.

The fresh water sub-sector consists of the growing and harvesting of fish from rivers, lakes, and fish farms in the northern regions of the country. This sub-sector receives a significant amount of funding from the Ministry, in line with the country's food security initiative. In the 2010-11 budget, N$82 million was allocated to aquaculture; in the 2011-12 budget, the allocation was N$72 million. Water scarcity is a real challenge to this sub-sector; the lack of perennial rivers in the central parts of the country limits agricultural activities unless irrigation is used. Perennial rivers are found in the north /northeast and in the south of the country, and communities that live along these rivers have, for centuries, relied on the water and fish resources for their livelihoods. Given the high levels of poverty and unemployment throughout the country,

the government introduced policies to promote fresh water fish production. In the northern regions of the country, about 50 percent of the rural population relies on fish for employment, income, and food.[2]

A number of fish farms exist in Namibia, including Kamutjonga Inland Fisheries Institute, Caprivi Inland Aquaculture Centre, Ongwediva Inland Aquaculture Centre, Omahenene Inland Aquaculture Centre, Epalela Fish Farm, Mpungu Fish Farm, and Hardap Aquaculture Project (Eco Fish Farm). Onavivi Inland Fisheries was set up with the support of the Spanish and British governments; it produces fingerlings for small-scale farmers. The Katima Mulilo Hatchery was inaugurated by the Minister of Fisheries and Marine Resources in March 2015. There are also other smaller fish farms across the country that receive technical support from the MFMR. The main types of fish produced by these farms are tilapia, tiger fish, and various types of catfish.

The challenges facing aquaculture vary from low uptake of fish as a source of protein to limited production capacity. Fresh water fish farming is used mainly for subsistence; this sub-sector is labor-intensive, involving the putting up and maintaining of ponds, maintaining of water quality, feeding of fish, and removing of waste). In some areas of the Caprivi region, recreational fishing also contributes to local authorities' revenue.

Production statistics for fresh water fish are very poor; it is estimated that total output averages about 3,000 tonnes per year. However, fresh water fish makes up a major part of the economy in some regions of the country, notably in Katima Mlilo, where the fish market supplies traders from as far afield as the DRC and Zambia. Catfish output in 2001 was 100 tonnes, while that of tilapia was 525 tonnes (MFMR Aquaculture Strategic Plan, 2004). The following section examines the evolution of the fish stocks over time.

2.2 Evolution of the marine fish stocks, 1990-2014

The success and development of the fishery sector depends on enacting the proper management processes. As mentioned earlier, independent Namibia inherited over-exploited fish resources and hence needed to quickly set up legal and institutional frameworks for the rehabilitation and control of fish stocks; the declaration of the EEZ was an important step.

Lange (2003; 2004) and Sherbourne (2013) provide a detailed historical analysis of the background of commercial fishing. Paterson *et al.*, (2013) discuss the historical background of fishing in Namibian waters from as far back as the 18th century to independence in 1990. During this period, the international exploitation of Namibia's sea resources resulted in the depletion of resources like the southern right whale, seals, and seabirds. During the South African occupation from 1914, fish resources continued to be over-exploited, resulting in the population collapse of some species like rock lobster, whose current exploitable

[2] See MFMR website, http://www.mfmr.gov.na/types-of-aquacultures.

biomass is less than 500 tonnes. The exploitation of small pelagic fish started in the 1940s, dominated by South African companies. During this time, Walvis Bay grew as a fishing town. The landings of small pelagic fish peaked in 1968 at 1.5 million tonnes, but the biomass collapsed significantly thereafter, as was the case with many other fishery types. Next came the exploitation of mackerel and hake stocks starting in the 1960s; landings of hake increased to reach a peak of 800,000 tonnes in 1972 (Paterson, *et al.*, 2013), but declined thereafter. Hake fishing during this period was dominated by international industrial fishing fleets from Europe, notably Russia and Spain.

Starting in the late 1960s, the exploitation of marine fish resources in Namibian waters was governed by quotas set by the International Commission for the Southeast Atlantic Fisheries and by the South African administration in Windhoek for inland resources. The Commission sought to regulate the exploitation of fisheries in order to avoid over-fishing, but its efforts generally failed. Roux and Shannon (2004) argue that likely under-reporting of catches and increased fishing efforts played a major role in bringing down fish stocks in the mid-20th century. The Commission ceased to exist in 1990 following Namibia's independence and the declaration of the EEZ.

A United Nations Environment Programme (UNEP) (2006) causal chain analysis of marine resource depletion found that, in the Benguela current region, excessive fishing efforts, increased fleet capacity, and improved fishing technology all pose immediate threats to aquatic resources and result in overfishing. The study lists Namibia specifically as facing increased risk of overfishing. This report prompted the Namibian government to increase expenditures on surveillance, monitoring, and control of marine resources. MFMR scientists inform the setting of TACs and the management of stocks; in addition, the international community (e.g. Norway) plays an important role in providing materials and technical know-how so that Norway can manage its fish resources effectively. However, there is still a need for improved and accurate recording of catches through improvements to the country's fish information management system.

The cornerstone of fish resource management is the total allowable catch (TAC) (based on the concept of maximum sustainable yield), fishing rights allocation, and effective enforcement of the legislation governing the fishery sector. The harvesting of seals also helps maintain a healthy stock of fish. The TAC sometimes has to be reduced in order to allow for the recovery of fish stocks. For example, a critical decline in sardine stocks in 2007 resulted in the TAC being reduced to 10,000 tonnes. Successful recruitment during 2008 and 2009 contributed to larger sardine biomass in succeeding years, but recruitment rates remained low in 2010 and 2011. The sardine biomass is reported to have declined from 0.331 million tonnes in 2011 to 0.116 million tonnes in 2012. Table 1 below shows the TAC, total landings, and the variance for different fish species that are commercially harvested in Namibian waters. A longer series of TACs and landings from 1997-2012 is provided in Appendix 1.

The figures in Table 1 differ from those contained in the analysis of the state of marine resources (MFMR 2013: 9-13) because there are differences in the fishing seasons for various species. However, both the table and Appendix 1 show that the landings for the main species were less than the allowable catches (hake, mackerel, monk, red crab, and rock lobster).

Table 1: TACs, Landings and variances of commercially harvested fish species, 2007-12

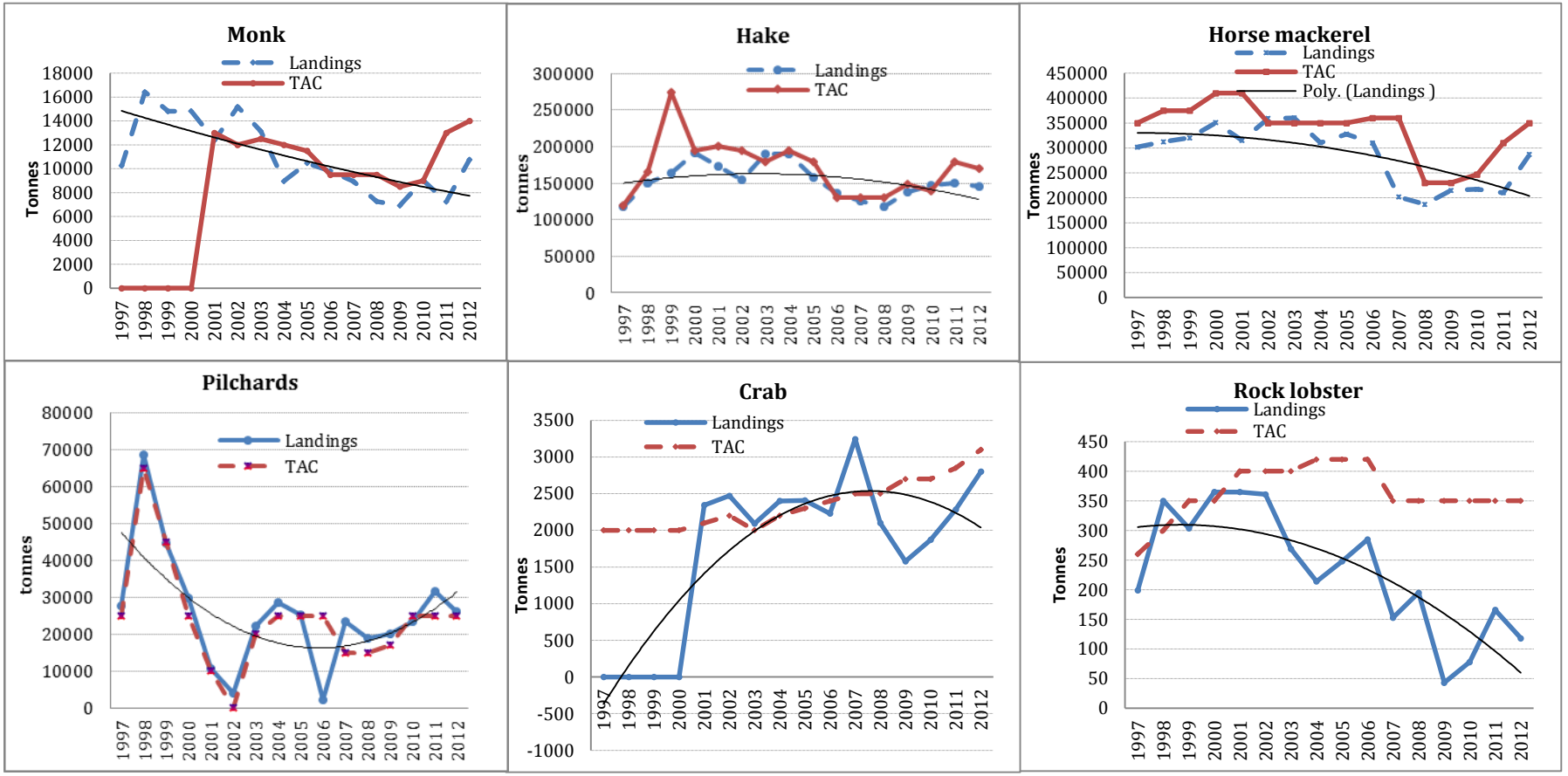
		2007	**2008**	**2009**	**2010**	**2011**	**2012**
	TAC ('000 tons)	15	15	17	25	25	25
Pilchard	Landings ('000 tons)		18.75	20.14	23.4	31.77	26.26
	Variance((-) if under-catch)		3.75	3.14	-1.6	6.77	1.26
	TAC ('000 tons)	130	130	149	140	180	170
Hake	Landings ('000 tons)		117.29	137.31	146.35	146.68	145.93
	Variance((-) if under-catch)		-12.71	-11.69	6.35	-33.32	-24.07
	TAC ('000 tons)	360	230	230	247	310	350
Horse mackerel	Landings ('000 tons)		187	215.1	217.1	198.67	286.93
	Variance((-) if under-catch)		-43	-14.9	-29.9	-111.33	-63.07
	TAC ('000 tons)	2.5	2.5	2.7	2.7	2.85	3.15
Red crab	Landings ('000 tons)		2.1	1.65	2	2.29	2.8
	Variance((-) if under-catch)		-0.4	-1.05	-0.7	-0.56	-0.35
	TAC ('000 tons)	0.35	0.35	0.35	0.275	0.35	0.35
Rock lobster	Landings ('000 tons)		0.2	0.043	0.082	0.167	0.118
	Variance((-) if under-catch)		-0.15	-0.307	-0.193	-0.183	-0.232
	TAC ('000 tons)	9.5	9.5	8.5	9	13	14
Monk	Landings ('000 tons)		7.27	6.92	9.03	7.24	10.76
	Variance((-) if under-catch)		-2.23	-1.58	0.03	-5.76	-3.24

Sources**:** Author's calculations plus Tables 6 and 7 of the MFMR 2012/13 Annual Report

One of the main reasons for these under-catches is that companies may be left with small amounts under their quotas that do not warrant taking a boat to sea. If they do attempt to fulfil those small amounts, they risk exceeding their quotas and getting fined. Companies are also fined for the by-catch of non-quota species. The lack of a mechanism to consolidate remaining quotas between firms often means that the firms choose to forgo their remaining quotas.

The relationship between allowable catches and landings is illustrated in Figure 3 for six main fish types. The panels show the same picture of under-catches, except for pilchards. Additionally, fitting trend lines on the graphs indicates that, other than red crabs, there was a declining trend for both landings and allowable catches up to about 2007-8; starting in 2011, many of the stocks seem to be recovering, except for rock lobsters. Paterson *et al.,* (2013) support this general observation of declining stocks; it is possible that current high expectations regarding the potential of the fishery sector may not be realized because of these declines.

Figure 3: TACs and landings of selected commercially exploited fish species (with trend line), 1997-2012



Source: Produced by the author using the MFMR's data (Appendix A1).

A further discussion of the evolution of fish stocks is illustrated in the 2012-13 MFMR annual report. The report shows that the total hake biomass increased by 70 percent between 2012 and 2013, driven by growth in the non-fishable biomass. The fishable hake biomass (size>35cm) was reported to have been declining since 2011, but there was above average recruitment in 2013. Horse mackerels had an estimated biomass of 2.6 million tonnes in 2012; the catch-per-unit effort declined compared to 2011.

The 2012 survey of monkfish reported a 54 percent decline in biomass to 22,000 tonnes, accompanied by declining length sizes. The catch-per-unit effort rose since 2007, but with reduced landings of juvenile stocks. For red crab, the catch variability over time was high between 2011 and 2013; survey data shows that the biomass increased by 64 percent between 2011 and 2012, but with poor recruitment during 2013. For rock lobster, there was a 38 percent decrease in landing in 2012-13 compared to the previous period.

The amount of large pelagic fish harvest increased from 1,856 tonnes in 2008 to 3,711 tonnes in 2011. The amount of tuna harvested decreased from 146 tonnes in 2008 to 75.1 tonnes in 2010, before increasing to 263 tonnes in 2011. The catches of large pelagic fish are affected by a lack of adequate locally owned vessels. Instead, local operators rely on South African vessels that come only for a few months and that have been reported to be coming for shorter periods in recent years. This lack of local capacity has resulted in large variability in output over the years across the major fish species – swordfish, sharks (blue and short fin mako), and tuna (yellow fin and skipjack). There is no TAC for tuna, but Namibia is allocated a three-year rolling quota by the International Commission for the Conservation of Atlantic Tunas (ICCAT). For the period 2014-16, the ICCAT swordfish quota was 1168 tonnes. For albacore, Namibia was allocated a quota of 3600 tonnes. Any unused portion/excess is added/deducted from the succeeding quota limit.

Snoek, a migratory species, has no specified TAC. Harvested tonnage increased from 500 tonnes in 2001 to 1,575.4 tonnes in 2011. The stocks of species like kob and steenbra collapsed in the 1990s, resulting in controls placed on their exploitation. The stocks of orange roughy collapsed around 2008, and the species is currently under a moratorium.

Namibia has 26 colonies of Cape fur seals, which are natural predators of fish; the government keeps control on seal numbers in order to grow fish stocks. The seals are harvested for their fur and fat. The highest number of seals was recorded in 1993-94, at 840,000; there was then a dramatic drop in the seal population in 1994, but the numbers have been rehabilitated and reached 1.2 million in 2013. Since 2001, the harvesting of seals has been controlled by a TAC; beginning in 2009, the TAC was pegged at 80,000 pups and 6,000 bulls, and the average harvest has been 44,000 pups and 5,000 bulls. Apart from the benefits provided by fur and blubber, the management of seal numbers is very important for the sustainable exploitation of fish stocks and for Namibia's overall economic growth.

3. Economic Performance and Contribution to the Economy

The fishery sector is very important to Namibia in terms of jobs, food, and employment. Based on its historical development, the sector is export-oriented; however, a lack of financing at the time of independence resulted in the Namibian government inviting back international fishing companies that had fished in Namibian waters prior to independence. Under the 'Namibianisation' drive, these firms were required to form joint ventures with Namibian counterparts in order to receive fishing quotas. However, it has been observed that only a minority of indigenous firms benefited from these quotas, with little investment in infrastructure or equipment purchases (Melber, 2003).

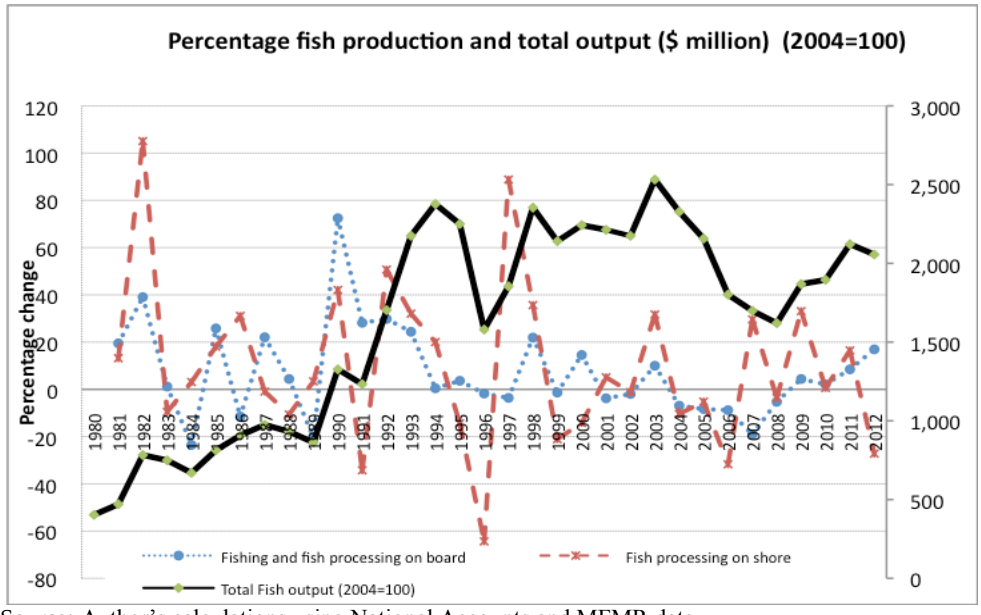
Statistics are readily available for the marine fishery sub-sector. On the other hand, while the aquaculture sub-sector is heavily supported by the government, it has scanty statistical data for analysis. We consulted different sources in order to generate a full picture of the aquaculture sub-sector. However, this study largely focuses on the marine fishery sub-sector because of its larger data availability and its contribution to GDP and employment.

3.1 Marine fisheries

Output trend

Fisheries are one of Namibia's main natural resources, given its long shoreline stretching for hundreds of kilometers from South Africa to Angola. The value of fish and fish products increased significantly between 1990 and 2003. From 2003-2008, that value declined, but it has recovered consistently thereafter.

Figure 4: Fish production volumes and value, 1980-2012



Source**:** Author's calculations using National Accounts and MFMR data.

Figure 4 shows the percentage change in the value of fish processed on- and offshore. There is quite some variability in onshore processing, and from 2007, offshore processing has been increasing. This increase in offshore processing provides a challenge to the government, which wants to increase the number of jobs in the fishery sector, since such jobs cannot be located offshore due to capacity constraints.

Employment

Employment in the fishing industry has increased steadily over time. While a total of 2,784 people were employed in the sector in 1991, in 2011, the sector employed over 13,000 workers. Table 2 shows the total number of employees in the sector since 2006.

Table 2: Breakdown of employment in the fisheries sector

Fisheries	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Hake	7055	6701	6176	8956	..	..	..
Monk	235	236	239	350	..	..	..
Crab	53	58	50	81	..	..	..
Rock Lobster	369	342	342	455	..	..	..
Large Pelagic	878	688	740	593	..	..	..
Small Pelagic	2244	3247	3037	1361	..	..	..
Horse Mackerel	748	672	848	1029	..	..	..
Total crew	**11 582**	**11 944**	**11 432**	**12825**	**12913**	**13000**	**..**

Adapted from MFMR, 2010.

Employment in the fishery sector has grown steadily except in 2008. The three main sub-sectors in terms of employment are hake, small pelagic, and horse mackerel production; hake and mackerel production contribute significantly to exports. There are fears that some fish varieties are being over-exploited (see trends in Figure 3). The reduction of the number of vessels from nearly 270 in 2006 to below 200 by 2010 partly indicates a reaction to these fears.

Table 3: Number of licensed vessels by fishery, 2006 – 2010

Fishery	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Small pelagic	16	9	11	10	8	8	7
Demersal Trawlers	78	87	91	71	63	68	85
Long liners	39	30	18	18	13	11	11
Midwater	10	13	10	9	9	11	18
Deepwater	4	2	0	0	0	0	0
Large pelagic	65	67	88	48	40	71	70
Line fish	15	15	15	15	14	18	29
Crab	2	2	3	3	3	3	5
Rock lobster	18	32	31	29	33	33	27
Monk	22	20	25	16	16	16	18
Total	**269**	**277**	**292**	**219**	**199**	**239**	**256**

Source: MFMR, 2013.

The reduction in capacity may also have been a response to market conditions, especially on the export market, where incomes declined due to the global financial crisis. However, capacity increased again between 2010 and 2012; in particular, the number of demersal trawlers and mid-water fishing vessels increased significantly. Currently, there are more than 100 licensed demersal trawlers, mainly targeting hake. Between 2010 and 2012, the number of large pelagic fishing vessels increased by 75 percent, while that of long-line fishing vessels doubled. There were small decreases in capacity in rock lobster and long-line fishing, such that overall, the fishing capacity across different species increased by 28.6 percent. The increase in capacity confirms the recovery of the fisher sector from the global financial crisis and also indicates investors' confidence in the export market.

Value-addition

The government hopes that more jobs will be created onshore if more processing takes place within the fishery sector (MFMR, 2004; 2010). The value added by the hake sector has been increasing over time and provides a good example of what other sub-sectors can potentially accomplish with respect to value addition. However, value addition could come at a price. Paterson *et al.*, (2013) problematize the drive for value addition as follows: firms have been encouraged to invest in capacity for value addition, and this excess capacity, especially in the hake sub-sector, is being used to push the government for higher TACs, which in turn compromise stock management. Kirchner and Leiman (2014) argue that there now exists excess capacity in the hake sector and that the government's persistence in incentivising new investments puts significant pressure on the profitability and sustainable management of hake stocks. The MFMR and the Namibian Hake Association dispute these arguments, however, contending that both the management and harvesting of hake are sound.

Figure 3 indicates similar concerns that stock management may need to be enhanced. The figure indicates a trend of declining hake stocks, raising concerns about the future capacity of the sub-sector to increase volumes. It may not be surprising that the WWF-SA's Southern African Sustainable Seafood Initiative (WWF-SASSI) listed the sustainability of Namibia's hake 2015 the yellow color code, which indicates to consumers that the consumption of the fish types needs to be treated with caution.[3] The next code is red, signifying that the consumption of a species should be avoided because stocks have become unsustainable.

Value addition also faces other significant internal and external challenges. Domestically, processed fish is more expensive than unprocessed fish and will therefore likely have low uptake. In terms of exports, processed fish has to meet given minimum hygiene and packaging standards that may be too onerous for small firms. Given that unprocessed fish has a ready market, there may not be enough incentive to engage in riskier value addition, especially for small and medium-scale enterprises.

[3] More information about the classification is available at: http://www.namibianfishingindustry.com/, April 2015.

Despite these challenges, however, in 2013, the MFMR reported increased activity in pursuance of value addition and new markets for the fisheries sector. Rock lobster is currently exported frozen or cooked to Japan, frozen whole to the EU, and live to China. Demand from local hotels and restaurants for rock lobster amounts to less than 10 percent of total production / catch. Crabs are exported as frozen whole round, meat, flakes, sections, and live. The main markets for crab are China, South Africa, Spain, and Japan. Live crabs tend to fetch higher prices than processed ones; hence profit maximizing firms may see no need to process crabs. Seal products are mainly exported to Turkey and China.

Monk fish is processed into skinless and skin-on monk tails and can also be exported whole. Monk fish is mainly exported to Europe. Pilchards are mainly canned in sauce or processed into fish meal, fish oil, or frozen cutlets. Over 90 percent of pilchard products is exported to South Africa, where it is marketed on the African continent under South African brands. Locally, canned pilchards are marketed under the Lucky Star and Ocean Fresh brands. Frozen pilchard cutlets are exported to Thailand and Malaysia, while fish oil goes to Turkey. For tuna, swordfish, and shark, the main markets are Spain, the USA, and Japan. Long-lining tuna goes mainly to the Japanese market, where it is prized for sashimi. There is very little demand for these types of fish on the local market.

Namibian hake plays a very important position on the international market, especially in the EU, where it enters through Spain and is marketed under local brands, especially Vigo. Hake is processed into skin-on or skinless fillet, headed and gutted, baby hake, cutlets, blocks, minced, tails, sausages, roes, and prime quality fresh chilled products. Local demand for hake is very limited, in part because of its high price. On the other hand, horse mackerel, while exported both whole and frozen, is mainly consumed locally and within the sub-region; the DRC is the main importer of Namibian horse mackerel. African fish cuisine tends to prefer whole fish (headed) than cuts. This is one of the reasons behind the popularity of mackerel and tilapia. The competitiveness of mackerel prices in the region is heavily influenced by transportation costs (see Section 5). Sherbourne (2014) examines the structure of value addition in the fishing sector (Table 7.8: 152) as adapted and modified below in Table 4.

Table 4: Structure of value addition in the fisheries sector

Type of fish	Value addition activity / process	Market
Hake	Frozen retail and catering packs; individual specifications of skin-on/off fillets or pin bone in/out; glazed hake steaks (skin-on or skinless)	Local supermarkets, restaurants, hotels and consumers
	Long-line catch chilled fresh and airlifted to markets	Europe
	Skinless baby hake frozen at sea	USA
Monk	Skin-on/skinless processed at sea, wrapped individually and packed frozen	Catering sector
	Frozen boneless fillets processed onshore (brands include Benguela and Puerta) and frozen tails	Supermarkets
	Frozen fillet and deboned tails	Exclusive restaurants
Horse mackerel	Frozen whole or dried; tinned in various sauce types	African market
	Fish meal	Fish farm feeds locally
	Powdered fish soup	Local market
Kingklip	Skinned and skinless fillets wrapped in bone out, individually quick frozen	Catering industry, European supermarkets
Orange roughy	Skinned larger fillets in shatterpacks; glazed skinless fillet bagged and frozen	Catering and retail sectors
Pilchard	Pull-string catch upmarket canned	UK market
	Canned whole or minced pilchards	South Africa; local market
Large pelagics	Albacore tuna chilled fresh	Spain
	Gilled and gutted high quality big eye and yellow fin tuna	Japan and US
	Sea frozen tuna, shark and swordfish; tuna loins and steaks vacuum packed	EU
	Tuna, marlin and swordfish	Europe (smokeries)
	Freshly chilled swordfish	US
Deep sea red crab	Onboard production of sections and claw products, legs and crab flake	Asian market
	Onshore processing	Local restaurants
Lobster	Onshore processing - frozen tail, whole lobster (cooked and uncooked)	Japan and US
Other species: - chub mackerel	Skinless and boneless loins	Europe
- oil fish	Oil-fish portions; frozen skinned and skinless fillet and loins	Europe and Russia
- silver angel	Frozen loins and bellies, pin bone out	Exported to Europe

Adapted from Sherbourne, 2014.

Overall, the fishing sector's contribution to GDP remains relatively small (see Table 5). Export value has been increasing over time, but the domestic market consumption value remains very low. One challenge to value addition is that many smaller fishing firms do not have adequate freezer equipment on their vessels and are therefore forced to land much of their catch. Larger firms with larger on-vessel freezing capacity export larger proportions of their catch as frozen fish. This scenario means that overall, there are fewer fish available for onshore processing. It is therefore risky for any firm to invest in increased onshore processing capacity with no guarantee of adequate supply of raw fish. In addition, there is little incentive to bring more fish onshore, given that frozen fish is in higher demand and can be readily exported. However, many small

firms face binding financial constraints that make it impossible for them to invest in more freezing and/or processing capacity.

Another challenge to value addition is the lack of a Namibian fish brand, which has made it difficult for the Namibian fish sector to break into high-end international fish markets. In addition, exports of processed food to developed countries have to meet stringent hygiene conditions which local firms may find difficult to meet. It is possible, though, to develop new products that can be channeled into less protected regional markets. A number of companies have been investing in such product innovation; one example is the Etosha Fishing Company, which has ventured into producing tinned horse mackerel under the Efuta brand. This product is available on the Namibian and South African markets. While the product was launched in other African countries, its take-up has been challenged by the price sensitivity of many African consumers, who would rather buy cheaper (albeit lower quality) tinned fish from China and Hong Kong than high quality Namibian tinned mackerel. Thus, although value addition tops the government agenda regarding the fishery sector, there are costs that, if not partly shouldered by the government, (e.g. marketing, negotiating product entry conditions, free trade arrangements, etc.), will act as a disincentive to value addition.

Table 5: Value added and its distribution

Value of production (N$ million)	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Landed value	3,146	3,772	4,290	5,087	4,620	4619	5833
Final Value	3,985	4,843	5,084	4,789	4,889	5334	8433
Value of exports	3,883	4,711	4,935	4,637	4,264	4984	5766
Domestic market	102	132	149.6	152	625	350	2667
Value added	839	1,071	794	-298	269	715	2,600
Sectoral contribution to GDP	3.84%	3.44%	3.17%	3.70%	3.53%	3.74%	3.45%
Contribution to Employment	11 582	11 944	11 432	12825	12913	13000	

Adapted from MFMR, 2013.

Table 5 shows generated value addition and its distribution. To promote domestic fish consumption, the Namibian government established the Namibian Fish Consumption Promotion Trust in 2001 with the mandate to ensure that fish is affordable and accessible. The trust conducts awareness and public education campaigns around the country, educating the public about the benefits of consuming fish. To ensure affordability, the trust is allocated an annual quota every year that allows it to catch fish, especially horse mackerel and hake, which it then sells to the public at cost through a network of fish shops around the country.

The bulk of the harvested fish is exported fresh, frozen, or chilled. There has been little movement along the value chain toward the local production of value products (e.g. ready-made fish meals, fish fingers, etc.), but such products are imported, especially from South Africa.

Revenues

The fishing industry is a major source of revenue for the government through quota fees, corporate taxes, licence fees, and other levies. To gain fishing rights, fishermen pay quota fees, a form of rent that must be paid to the government irrespective of whether the holder catches fish or not. The fee level is set in such a way that those utilizing Namibian-owned vessels pay lower fees than those hiring foreign-owned vessels. In addition, hake right holders using Namibian-owned vessels and carrying over 90 percent Namibian crew pay a more favorable fee compared to vessels employing fewer Namibians. Any fish landed onshore is subject to lower quota fees (MFMR, 2001). Finally, fishing companies are obliged to contribute to the Marine Resources Fund levy, which is collected to fund research and training and development in the fishery sector.

Table 6: State Revenue from the marine fishing industry, 2005-2010 (N$'000, current value)

	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Quota fees	68,299	107,218	59,255	68,800	78,500	120 947	109,926
Marine Resources Fund levy	12,446	12,561	12,075	18,733	19,228	14,497	16,424
By-catch fees	11,199	9,639	10,837	8,410	15,972	6,964	6,024
License fees	93	91	85	86	82	79	131
Total revenue	92,037	129,509	82,253	96,029	113,782	142,487	132,505

Source: MFMR, 2013.

Table 6 shows a positive trend in the value of revenue realized by the MFMR, except for the period 2011-12. Quota fees are the main drivers behind the trend, while by-catch fees have been declining over time. Of particular importance is the Marine Resources Fund levy mentioned previously; some Fishing Associations are worried that the levy is too costly, while others worry that the quality of personnel trained for the sector is rather poor.

3.2 Aquaculture

The assessment of the economic performance of the aquaculture sector is quite challenging because of limited data availability. However, the MFMR has a mix of data for the years 2008 and 2010 and for several other years, which gives us a glimpse of what is taking place in this sub-sector. Inland fisheries from rivers and lakes are not commercially exploited, but many households and communities derive their livelihoods from these waters. In some areas, fishing is seasonal (that is, it takes place during the flooding period), while in others, it is perennial (along the perennial rivers in the north and south, and on lakes).

As mentioned previously, inland aquaculture centers are responsible for the distribution of fingerlings, an important input in aquaculture projects. Table 7 shows the amount of fingerlings that were distributed in a given year, the number of farms receiving fingerlings, and the total harvest.

Table 7: Fingerlings distribution and freshwater fish production, 2008 and 2010

	Total number of fingerlings distributed			**Number of fish farmers who received fingerlings**			**Number of fish harvesting farms**			**Total fish harvested (tonnes)**		
Year	2008	2009	2010	2008	2009	2010	2008	2009	2010	2008	2009	2010
Total	158,902	125,761	130,295	140	73	74	47	48	41	12.1	11.4	..

Source: MFMR, 2010/11.

There was a substantial decrease in the number of fingerlings distributed between 2008 and 2010; the same is true for the number of farmers receiving fingerlings. Although many farmers received the fingerlings, a large number did not report any harvest. This may be a result of poor data collection, or it may be that the farms failed to produce anything; more likely, the farms surveyed are subsistence farms.

In 2012, 234,020 fingerlings were produced and distributed, representing a 313 percent increase over the 2010 figure. A harvest of 8.277 tonnes of fish in 2012 was a 43.5 percent increase over the 2010 figure. The value of the 2012 fish was N$124,55, a 49.7 percent increase over the 2010 figure. Basing on these MFMR (2012: 38-40) figures, it appears that there has been remarkable growth in the fresh water aquaculture sub-sector; it is also apparent that these figures are an understatement of the total value of production, as they do not take into account subsistence production. As acknowledged by the MFMR (2013), not all fish from Lake Liambezi is traded at the Katima Fish Market; hence some production goes unrecorded. In addition, the value of sales at both the Katima Fish Market and the Zambezi region are estimates rather than actual figures.

The situation is also hazy for the export-oriented mari-culture sub-sector, as there is no consistent set of statistics to show the developments in the sector. However, the production and value figures for 2008 are shown in Table 8.

Table 8: Mariculture production and value, 2008

	Total production (tons)	**Total value (N$'000)**
Oyster	434	17,360
Abalone	3.6	1,350
Seaweed	132	792
Total	569.6	19,502

Source: MFMR, 2008.

This table shows the importance and potential for the oyster farming sub-sector. This sub-sector contributed a substantial amount of money in 2008, earned mainly through exports. At the same time, the 2008 oyster output was a 28 percent decline from the 2004 figure. This could be because, while there is a large demand

for oyster fish, there are also substantial challenges faced by the producers. These include having only limited access to financing options and being priced out of the market for space /sea area by companies setting up fish farms.

The bulk of mari-culture output is exported, especially oysters and abalone. The main markets for oysters are South Africa and South East Asia, with a small proportion sold on the local market. For abalone, the main markets are South East Asian countries like South Korea, Japan, and Thailand. Fresh water fish is mainly sold on the local market, but there are also unrecorded exports to regional countries like Zambia, Congo (both Kinshasa and Brazzaville), and Malawi. There is no proper accounting for the exports; hence the sub-sector's full contribution to the economy is unknown. However, the sub-sector provides a main source of livelihood for more than 50 percent of rural households in the northern fish-producing areas. For fresh water fisheries from natural water sources, the MFMR (2013) reported that during the 2012 fishing season, the Katima Mulilo fish market sold an estimated 1,963 tonnes of fish, valued at approximately N$15 million, while the Zambezi region (including Lake Liambezi) harvested 5,340 tonnes valued at N$42 million.

As with production, aquaculture employment figures are patchy. The figures reported by the MFMR (2010) show that aquaculture employment increased from 422 in 2003 to 1640 in 2009. These figures appear to be a significant understatement as they only reflect formal employment, thus excluding the massive subsistence and informal sectors operating on natural water courses. It is anticipated that both the formal and the informal components of aquaculture will continue to grow and create more jobs in other sectors of the economy. In fact, the NSA's (2014) informal cross-border trade found that about 3 percent of exports passing through the Wenela border post into Zambia consisted of dry fish, mostly sourced from the Katima Mlilo fish market. At the Oshikango border post, the largest proportion of informal trade exports to Angola (16.2 percent) consist of fish and processed fish products. However, it is not possible to distinguish between formal and informal fish products passing through the border post.

The following section presents empirical evidence based on a survey of fishing associations and at least one member of each association, as well as a critical analysis of existing macro data from the sector.

4. Empirical Analysis

The empirical analysis section refers only to marine-based fisheries due to data limitations. The section critically examines the challenges that fishery operators face, as well as their hopes for improvement in the sector. We also scrutinize the factors determining exports and possible diversification options. The section includes three subsections that (a) present the views of the fishing companies and associations; (b) assess and evaluate realistic export opportunities using the decision support model; and (c) examine prospective diversifications for the sector.

4.1 Fishing associations and firms' perspectives of the sector

As part of the analysis of the possible expansion of the fisheries sector, we conducted interviews with fishing associations and their members. There are seven associations in Namibia's fishery sector: the Pelagic Fishing Association (PFA), the Namibia Hake Association (NHA), the Midwater Trawling Association (MTA), the Namibian Monk and Sole Association (NMSA), the Namibian Tuna and Hake Longlining Association (NTHLA), the Namibia Large Pelagic and Hake Longlining Association (NLPHLA), and the Namibian Mariculture Association (NMA). Researchers interviewed the chairpersons of four of these associations (PFA, NHA, NTHLA, and NMA). We conducted firm-level surveys at least one company operating under each of the associations; association chairpersons are elected from among workers of the various fishing companies and could therefore provide firm-specific data, performance information, and challenges.

The data was collected using questionnaires and detailed interviews. With the agreement of the respondents, the researchers recorded the interviews, while collecting other relevant information on the questionnaires. The recorded information was later transcribed and, together with the notes from the interviews, formed the basis of this analysis.

The questionnaire is divided into four sections. The first section asks about general views and operating conditions of firms under each association. The second section asks questions about export services, while the third section focuses on the sustainability of fisheries. The last section asks questions regarding rules of origin in the export market and how they influence performance.

General conditions of operations

The associations were asked to express their views regarding the state of the fishery sector, opportunities and challenges, possibilities for value addition, barriers to expansion, and the possible government assistance they may require. The PFA expressed concern about the under-utilization of capacity during the off-season. Its members end up with substantial surplus capacity, which could be used to process other types of fish. Some firms already do this by stocking and/or importing frozen fish, which they then process during the off-season. The PFA members mainly sell their fish to South Africa, where their product is in high demand; there has not been much effort to expand their market regionally, for two reasons. First, there is still unsatisfied demand on the South African market; second, the regional market is highly price sensitive such that the profit margins are very low. Moreover, there is high competition in the region from Chinese and Thai products that are both lower quality and lower price. The PFA stated that one of its main challenges is the high cost of capital, given the high cost of vessels. It also argued that there is a need for the government, through the Ministry of Industrialisation, Trade, and SME Development, to grant

manufacturing status to PFA members; this would give them tax relief so that they can build the capital base to invest in new vessels.

The NTHLA noted that the main challenge facing its members are high operation costs, particularly due to the majority of foreign-owned vessels (main from South African countries) that operate in the region. Of the association's seven locally owned vessels, only two were sea-worthy at the time of survey. This big dependence on South African vessels shows the vulnerability of the fishery sector in the sense that if no vessel comes from South Africa, then there will be no long-line fishing. Many quota owners cannot put together enough money to buy their own vessels, and financial institutions are sceptical of lending the required large amounts of money. In addition, fishery operations are threatened by seismic activities stemming from oil explorers; drilling companies want to operate their rigs during the fishing season, which interferes with fishing and fishing stocks.

The bulk of the fish harvested by NTHLA members is exported. South African vessels used in the fishing buy all of the fish caught at an agreed-upon price. These prices are low, implying a low return on the fish caught. Lack of local value addition means that potential jobs are exported to South Africa. However, for operators, it makes sense to export their fish because they cannot invest in fish processing when they do not own any vessels (as they do not have control over the supply of the raw material). The NTHLA called for value addition to fishing rights so that that its members can generate more income in order to build the capital to buy their own vessels. The association proposed that, since the fishing season runs for only six months of the year, of which South African vessels come for only one to three months, there is a need for both more local vessels that can operate for the full six months and other activities to occupy the remaining six months. The NTHLA proposed that the quotas should, as in earlier years, include harvesting other fish species, such as horse mackerel or hake. This would eliminate the seasonality of operations, and processing capacity could then be established.

Like the PFA, the NTHLA also cited access to finance as a big bottleneck; the association also pointed to high interest rates as inhibiting growth. A main concern was that the international quota for Namibia is continuously being reduced because Namibian fisheries are failing to meet it. The NTHLA's fear is that its members may lose the international quota altogether, or that it could become so small that some fishery operators would have to leave the industry. In addition, there is no guarantee that Namibia will be able to push for its quota to be increased since what it loses is allocated to other countries (e.g. Taiwan) that are always able to meet their (new) quotas.

The NMA expressed satisfaction with its relationship with the MFMR, but was concerned about the long-term viability of its members. This is because smaller operators have been barely breaking even over the past two or three years, in part because of sulphur poisoning. The association felt that the classification of aquaculture as 'fishing' is not appropriate in the sense that its members do not harvest an already existing

resource but rather grow one, like farmers; the classification of aquaculture as farming would allow its members to receive the same advantages that farmers get and to reduce the effects of the controls placed on fishing companies. Operators were concerned about the amount of time it takes to have their batches tested for heavy metals. The feeling was that laboratory staff could work with more urgency, and that this could reduce costs.

NMA members have a niche oyster and shellfish market in South Africa and China, with small amounts being bought locally by restaurants. NMA members do not export to Europe, but they are compelled to be in compliance with EU regulations in order to export to Asia. Although there is no local processing of shellfish, there is the potential to do so, especially in the long term.

The hake sub-sector is the most prosperous of the fishery sectors; it is also the most advanced sub-sector and is a major contributor to both government revenues and employment. The NHA has been working with the government to land the bulk of its catch (70 percent) for onshore processing. However, the association felt the playing field in the hake sub-sector is skewed in favor of companies with large freezer capacity, as these companies have lower incentive to land their catch onshore because frozen fish can be exported from offshore. It was thus felt that it may become necessary for the government to establish a formula that ensures that companies with large freezer capacity land a reasonable portion of their catch. This could be done through tying quota allocations to amounts landed for processing and the number of jobs sustained.

Members of the NHA face a number of bottlenecks. First, they find it very challenging to enter new markets because of a lack of knowledge and specialty marketing skills. There is no renowned Namibian fish brand, and government sometimes have differing requirements that make exporting difficult. One example is the difference between the Ministry of Agriculture and the Ministry of Fisheries and Marine Resources regarding trade with China. While the Ministry of Agriculture has been negotiating for direct exports of beef to China, the MFMR tends to leave it individual fishing companies to find their footing on the Chinese market. Because of stringent market access conditions, the fishing companies export to China indirectly. At present, lobster goes to China via Hong Kong, rather than directly as a Namibian product. In addition, access to finance is a major limitation to expansion. The fact that quota levels in the next period (following year) are not known makes financial institutions sceptical about lending to licence holders. It may be necessary to ensure that allocated quotas are not changed beyond a certain level (e.g. +/- 10 percent) per year so as to increase financial institutions' confidence in fishery operators.

Regarding value addition, the NHA sees a lot of potential among its members. New companies are innovating and coming up with new products, and there is the potential to produce more specialized cuts of fish and to enter secondary processing to produce fish fingers, ready-made meals etc. However, these advanced processing stages require the cooperation of the Ministries of Finance and of Industrialisation,

Trade and SME Development. The latter would need to grant operators manufacturing status so that they can get rebates that would allow them to build capital and invest in more machinery.

Skills requirements

The associations provided assessments of both fish demand and skills requirements for their sector. PFA members have realized a growing demand in the South African market over the past five years. However, their ability to meet this demand was constrained by a lack of capacity and of specialized personnel on vessels (e.g. engineers, operational/technical personnel). Where there are absolute labor shortages, members are forced to hire from abroad, which raises problems with Namibia's work permit system. The association advocated for better training of sea-going personnel to solve these issues.

The NTHLA gave a gloomy assessment of the past five years, stating that since the beginning of seismic operations in the fishing zone, catches have fallen from a high of 4,600 tonnes to the current 1,000 tonnes, with the decline being worse over the past three seasons. Hope is now pinned on the seismic activity taskforce and the inter-ministerial taskforce on seismic activities to address the issue of fishery losses and to pursue the possibility of limiting seismic activities to the off-season. Regarding the issue of staffing, the association highlighted the problem of recruiting senior and experienced staff, stating that it is not possible to find an experienced vessel skipper on the local market. Members have to hire from abroad; again, work permit requirements can be cumbersome and delay activities. Low-level skilled workers are readily available on the local market, however, and the association stated that the sub-sector could employ a lot more people because long-line fishing is labour intensive.

The NMA noted that after the global financial crisis, production stabilized between 2012 and 2013 and has been increasing steadily since then. Many of its operators are opting to diversify production in order to cross-subsidize losses in other product lines. This expansion is taking place under difficult conditions because banks are generally not keen to lend to aquaculture. The fresh water component is much better off because of government support; but the mari-culture sub-sector has not been so lucky; it has to contend with a long application process through Agribank to access finance. Regarding staffing, the mari-culture sub-sector mainly relies on in-house training, especially for managerial positions. Operators sometimes manage to find local skippers who then have to double up as supervisors to assist with operational activities like monitoring water color and temperature. For this sub-sector, recruitment can all be done from the local labor market.

The NHA gave a bright assessment of the operational environment over the past five years, stating that demand has been growing and that there are prospects to expand the market beyond Spain (which constitutes 60% percent of the current market) to include Italy. The association's members reported no problems with recruiting proper staff; these companies often have internal training policies to improve the

productivity of their workers. They are also able to better retain their workers, especially those entities with year-round operations. The main challenge for NHA is recruiting skippers and experienced engineers. Although the Namibian Maritime Fisheries Institute (NAMFI) trains seagoing personnel, some members of the association question the quality of these training programs. Some operators send their workers to South Africa for training. NHA members also complained about the lack of transferability of qualifications, which means that the qualifications of vessel operators trained in Namibia are not recognized in South Africa and Angola, where they may seek employment during the off-season. However, it is anticipated that the levy on the fishery sector will improve the availability and quality of sector-trained workers. It is also anticipated that lobbying of the institute and government should bring about standardization and transferability of qualifications.

Export services

The associations were asked about their members' experience in accessing export services (e.g. laboratory testing and certification for export), challenges with exporting to countries or regions with high sanitary and phytosanitary requirements, and any other export problems they may have experienced. The PFA stated that its members did not face significant export barriers since they do not sell to the EU. The bulk of its output lands on the South African market, on South African vessels. Operators also export to Asia (China and Thailand), where the health requirements are not very strict. On the other hand, the NTHLA felt that the operations of the NSI tend to be too rigid, especially after it failed an EU audit. The association applied substantial pressure on operators to meet the EU's minimum standards, but some of the requirements required time to be met; this could have been discussed with the EU to establish a grace period during which problems could be fixed. The main challenge that NTHLA members face with their exports is the possible occurrence of heavy metals in their product; the EU market is very strict regarding the presence of heavy metals. While the Asian market is not very strict, because of the low fat in Atlantic fish (as compared to Indian Ocean fish), the most lucrative market for the NTHLA is Europe, specifically Spain.

The NMA stated that its members find the export accreditation process cumbersome. Because of this, the main export market for its farmers is South Africa. However, there are fears that if the South African market raises the bar and requires that local operators meet all EU regulations (as has happened with other markets that do not have their own separate standards but require that exporters meet EU standards), the aquaculture sector will be substantially disadvantaged. The association felt that it was necessary for the NSI to simplify requirements for exports by integrating its standards with those of the EU. In addition, the association pointed to delays in getting lab results, which affects operations. These delays are blamed on a lack of experts, but the association felt that laboratory employment from the local labor market could be increased.

The NHA members do not face substantial difficulties in accessing the export markets, principally because many exporting operators have joint venture operations with overseas companies. However, these foreign

firms tend to have an upper hand and therefore benefit more from the ventures than local firms. It is very difficult for Namibian firms to individually export and market their fish in Europe. They therefore tend to operate with European firms that already have a brand name and logo known in the European market. In addition, the European firms do not want Namibian firms operating directly in the EU market, as this would present direct competition.

Sustainability of fish resources

The fishery sector occupies a unique and important position in the Namibian economy principally because of the renewable nature of the resource. Fisheries' sustainable exploitation will determine the future of the industry, and all the national associations joined in advocating for consistent resource management policies. The associations were asked about their views regarding the total allowable catch (TAC) policy, environmental and sustainability policies, international controls, and the role of the government. The PFA noted the importance of sustainable exploitation of the marine resources, stating that the government is doing a good job in managing fisheries. The NTHLA, although not affected by the national TAC, was worried about the internationally determined national allocation quota determined by ICCAT. Namibia is a member of the ICCAT group[4] that manages the exploitation of tuna resources. The group allocates quotas, and any unmet quotas are shaved off and allocated to other countries. The NTHLA stated that the Namibian quota has declined from about 5,000 tonnes in 2000 to 1,168 tonnes in 2015, and may be further reduced if the country continues to fail to meet the quota. From the NTHLA's perspective, Namibia is running out of time to prove itself and remain relevant and viable in the tuna harvesting market.

The NMA stated that it was pleased with the operations of the TAC system, even though its members were not impacted on by it. Producers have a ready market that they cannot fully satisfy, and the number of hatcheries limits production. The association felt that the sustainability of its members' operations could be enhanced if the government classified aquaculture activities as farming rather than fishing. It cautioned that although the government's support of fresh water fishing is welcome, there is a need to ensure that operators build the capacity to sustain themselves in the long term.

The NHA noted the importance of operating with the TAC in order to protect the fishery sector, and said that it believes the existing environmental regulations work well. It highlighted existing mechanisms that ensure that no fish is dumped at sea, thus ensuring that all stock is put into productive use. Yet these conditions are likely to change for the worse if marine mining is authorized by the Ministry of Environment and Tourism. The association called for a comprehensive, science-based environmental impact analysis to determine the extent of the environmental impact of marine mining, especially the extent to which it would affect the quality of Namibian waters and fish. The members of the association questioned why international

[4] Other members of the group include Brazil, South Africa, Taiwan and Uruguay.

mining companies wanted perform economic activities in Namibia that they could not perform in their own countries, and noted that some of these companies had been banned from conducting such underwater activities.

Rules of origin

The associations were asked about their views on rules of origin, preferential trade, and Namibia's export potential. The PFA said that rules of origin were not a problem for its members, given that they were mainly exporting to South Africa. The NTHLA believed the establishment and operation of the NSI ensures that all required standards are met and that all products are traceable to the vessels from which they come. Traceability was also highlighted as very essential by the NMA, under the provisions of ISO 17025. Regarding possible imports that could affect its members, the NTHLA stated that this was not a major problem, given that there is an import quota of 2,000 tonnes of tuna and that there is no big processing capacity for the product. This view was supported by the NHA, which reported very low competition on the local market. Apparently, some NHA members import frozen fish for processing.

From these interviews, a number of themes emerge, including a lack of access to finance, difficult operating conditions, stringent quality standards, and a lack of capacity to independently enter new markets. High dependence on one market can be disastrous, as seen during the global financial crisis; Spain's significant financial troubles hit the Namibian fishing sector hard, since Namibia's European exports mainly enter through Spain. Although the associations did not observe any lack of export markets, the following situational analysis shows that exports are restricted to about two dozen countries.

Situation analysis of fish exports and destinations

For the year 2011, the distribution of fish and fish product volume exports was as follows. The main export destinations were the DRC (23.5 percent), Italy (18.5 percent), Angola (7.5 percent), and Japan (7.4 percent). Namibia also exports to 18 other countries that, individually, accounted for between 0.5 percent and 6.2 percent. These numbers show that the market is varied, but shallow. Thus, there is the potential to expand and diversify Namibia's fish export market. E

Export destination information is supported by the analysis of fish exports by HS commodity description. The tables in Appendix A3 present the different HS commodity descriptions, the proportions exported, and the destinations for the years 2011, 2012, and 2013. In Appendix A3, Table 1, the top five product volume exports for the year 2011 were frozen mackerel to the DRC (14.3 percent), frozen coalfish to Italy (12.9 percent), frozen fish – nes[5] to the DRC (7.4%), toothfish (dissostichs ssp) to Italy (7.2 percent), and frozen mackerel to Angola (6 percent).

[5] nes = not elsewhere specified

The structure of fish exports was a bit different in 2012. Spain was the most important export destination (32.5 percent), followed by the DRC (17.3 percent), Italy (15 percent), and Angola (7.2 percent). Comparing 2011 and 2012 fish exports shows sizeable drops in exports to 2011's three main destinations.

The HS commodity analysis for 2012 is illustrated in Appendix A3, Table 2. The top three fish export products were frozen fillets of Haka blocks to Spain (11.6 percent), frozen fish - nes (9.9 percent), and frozen mackerel (6.5 percent) to the DRC. In 2013, the composition of the top five fish destinations also changed relative to the previous year; they were Spain (24.7 percent), the DRC (24.4 percent), Mozambique (12 percent), Italy (10.3 percent), and South Africa (6 percent). The top five destinations show that there is consistent retention of the export market to Spain, the DRC, and Italy, but that there is some reduction in trade volume in Spain and Italy (by 7.8 percent and 4.5 percent respectively). In 2013, there were increases in trade volumes to the DRC and Mozambique. Appendix A3, Table 3 shows near consistency between HS commodities for 2012 and 2013, with the main HS export products being frozen fillets of Haka blocks to Spain (14.1 percent), frozen mackerel (10 percent), and other frozen fish (9.6 percent) to the DRC.

Further analysis shows the different export categories by HS codes and commodity descriptions, percentage and trading partners to different destinations. In 2011, the top five product destinations were the DRC, Italy, Angola, Portugal, and Spain. In 2012, there was a completely different export commodity, seeming to indicate that there is no consistency in product supply, as exporters are probing different types of markets. In 2012, the top export destinations were Spain, the DRC, Italy, Angola, and Ireland. The 2013 export categories are slightly more consistent with those of the previous year, and top export destinations were Spain, the DRC, South Africa, Italy, and Mozambique.

This analysis has shown that the Namibian fishery sector depends largely on the export market for its profitability and viability. In order to assist the sector in identifying new market opportunities, the following section reviews literature regarding the methods of international market selection (IMS) as a precursor to the analysis of possible export market diversification. The section starts with an exploration of the different foreign market entry modes and selection criteria, laying the foundation for the application of the decision support model. The model then identifies markets with realistic export potential, thus highlighting marketing strategies that the fishery sector can adopt in order to enhance its international position.

4.2 Foreign Market Entry Modes, Market Selection and the Decision Support Model

Two questions arise out of the realization that exports are necessary: what mode should fishing companies use to enter the international market (entry mode selection), and how do companies select which markets to target (international market selection)? These questions have been researched extensively since the 1980s (Cundiff and Hilger, 1984; Connolly, 1987; Root, 1983, 1998; Valdani and Bertoli, 2006). Literature on the internationalization of multinational corporations identifies a number of institutional arrangements open

to firms that want to operate in foreign markets (Root, 1983; Friedman and Beguin, 1971). Anderson and Gatignon (1986) express the view that firms choose the mode of entry before choosing the market. These choices depend on how much control the company wants, as well as the costs involved. The underlying objective is to maximize risk-adjusted return-on-investment in the foreign market. First, firms may choose to open wholly owned foreign subsidiaries. Such an arrangement ensures total control of processes and strategies in the foreign market and also increases the share of profits; however, it requires high resource commitment, which reduces flexibility. Second, firms may enter into joint ventures with foreign firms already operating in the chosen market. This is a moderate control mode in which a firm may enter into a 50-50 joint venture with a foreign firm, or some similar equity arrangement, depending on how much control the firm wants to retain (Williamson, 1983). The challenge with this mode is often finding a suitable partner. Third, firms can enter into non-equity arrangements like licensing and/or contractual joint ventures. These are low control modes that reduce resource commitment, offer greater flexibility to respond to changing market conditions, and have lower returns. Minority equity and non-restrictive or non-exclusive contracts offer very low levels of control. Anderson and Gatignon (1986) apply the transaction cost theory to EMS and conclude that the default mode is low-level ownership until the firm has a good understanding of the market. They state that in a highly competitive market, a firm would benefit from not integrating with foreign partners because competition among partners can deliver honest conduct, high returns, and low risk. This approach also minimizes overhead costs.

The choice of an entry mode is also influenced by firm-specific factors and market conditions in the target export market. Using the institutional theory, Uhlenbruck *et al.*, (2006) observe that corrupt local government officials exert influence on the choice of an entry mode. Larger firms have a greater array of feasible entry modes than small- and medium-scale enterprises. This applies to Namibia's fishing companies because of their varying sizes. Musso and Francioni (2010) analyze both entry mode and market selection of small and medium enterprises (SMEs) and conclude that SMEs tend to exhibit passive and non-systematic behaviour toward EMS and IMS. They also observe a positive correlation between firm size and the probability of adopting a systematic IMS.

In general, IMS tends to be done systematically and involves many stages. It goes beyond traditional market selection approaches that rely only on the assessment of political and economic factors (Sakarya, 2007). There are several advantages for applying systematic approaches to IMS. Systematic approaches help firms evaluate all possible opportunities and allow firms to reduce the number of countries to focus on in detail before selecting the best option. They also help firms identify necessary changes in existing markets (Toyne and Walters, 1993) and identify markets in which firms can easily overcome the liability of being a foreign supplier. There are many models of IMS; for further details, consult Papadopoulos and Denis (1988) and Papadopoulos, Chen and Thomas (2002).

Researchers have developed many market selection models that emphasize the factors they believe influence such selection. Douglas and Craigs (1983) argue that firms do not have universal market selection models because market choice depends on firm characteristics. They argue that market selection is systematic rather than opportunistic. Moreover, Anderson and Gatignon (1986) propose a transaction cost approach to market selection, while Arnold and Quelch (1998) develop a market selection model based on long-term market potential. Hofstede (2001) presents a market demand-driven model, while Morosini *et al*., (1998) argue that cultural factors and cultural distance play important roles in market selection. From yet another angle, Porter (1990) applies competitive analysis to determine firms' selection of international markets. Swoboda *et al*., (2008), using the example of garment firms, argue that international market selection is determined by firms' circumstances and that the international market selection process is non-linear, contrary to risk and market attractiveness proposals. They argue that IMS is a multistage process in which screening is based on both macro and microeconomic variables. The screening also takes into account experiential market knowledge and cultural and physical proximity (Fenwick *et al.,* 2003).

A study by Gaston-Breton and Martin (2011) supports the multi-stage argument; it proposes a two-stage IMS and international consumer segmentation model consisting of macro and micro segmentation factors (that is, country- and consumer-level screening variables, respectively) to establish market attractiveness. Some general indicators of market attractiveness include market size and potential, level of national development (Sakarya, 2007), level of employment, and national income per capita in the target market.

Given the advantages of systematic approaches, this study adopts the decision support model. This is a multi-stage approach to market selection developed by Cuyvers et al., (1995). It helps narrow the selection of countries with realistic export potential and helps decision-makers arrive at focused and accurate evidence-based international market selection.

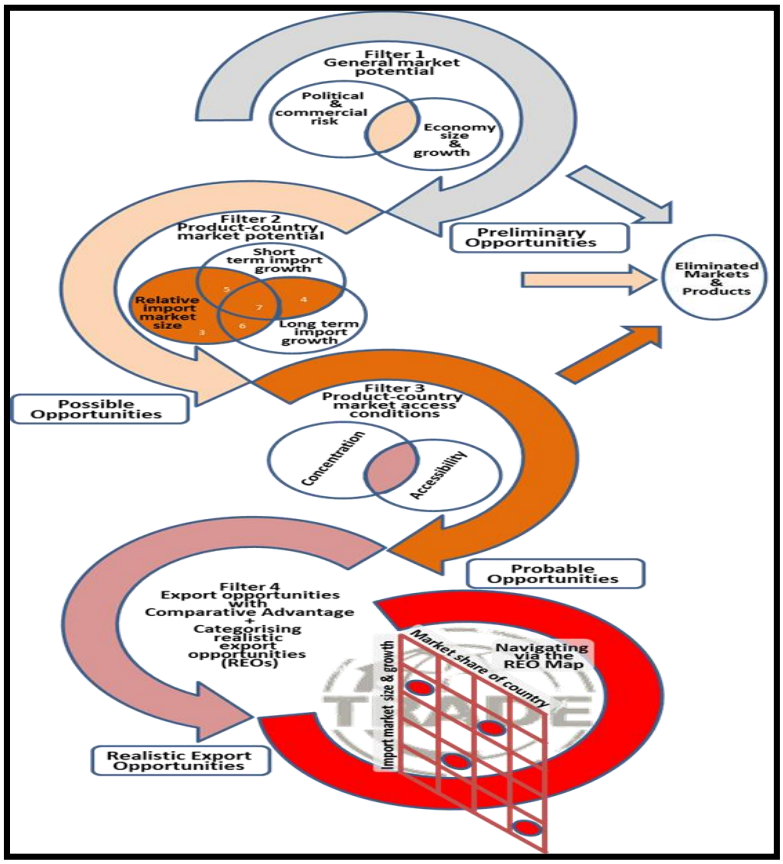
The decision support model[6]

The decision support model was first developed by Cuyvers *et al*., (1995:173-186) in order to identify the product-country combinations with the highest quality of export potential for a specific country. It was specifically designed to provide export promotion organizations with a more scientific way to determine the products and destination countries on which to focus their scarce export promotion resources. The model is used to identify export markets with the highest potential. It can assist fishing companies and their associations to make informed decisions regarding which markets to pursue, as well as to develop and promote a Namibian fish brand. The model is applied to fish and fish products classified at the 6-digit level of the Harmonised System of tariff coding. In the baseline of the model, all countries and fish and fish

[6] We received assistance with this part of the model and estimations from researchers at Northwest University, South Africa. The section was drawn on Cuyvers, Steenkamp, and Viviers (2012) and Steenkamp (2011).

products are considered and eliminated sequentially if they fail to meet specified criteria. The model also uses International trade data from the UN Comtrade database. The decision support model starts with all countries and products worldwide and then, through a screening process, identifies realistic export opportunities (REOs). The model consists of four consecutive filters that sequentially eliminate less realistic/interesting product-country combinations in an effort to categorize and prioritize REOs for the country for which it is applied. The filtering process is based on Walvoord's (1983) model of international market research and is illustrated in Figure 5.

Figure 5: The decision support model filtering process



Source: NWU representation constructed from Jeannet & Hennessey, 1988:139.

Filter 1 assesses the political and commercial risks of doing business with every possible importing country worldwide. It investigates macroeconomic indicators to determine if the importing countries have adequate overall market size and growth potential. Filter 2 assesses the import demand for the various HS 6-digit products in the remaining countries by analyzing import size and growth. Filter 3 examines the accessibility of each market by assessing the degree of market concentration and the barriers to entry. After the third filter, a list of export opportunities (product-country combinations) with potential can be extracted. Finally, filter 4 categorizes these potential export opportunities based on the strength of the exporting country's

relative market share (compared to that of the top six competitors) and the import size and growth in each of the identified markets. Each filter is discussed in detail below.

Filter 1: Identifying preliminary market opportunities

In this filter, countries that pose high political and/or commercial risks to the exporting country (filter 1.1) and that do not show adequate economic size and growth (filter 1.2) are eliminated. Starting with all possible trading partners (i.e. the rest of the world), this filter allows for the elimination of countries with limited trade possibilities. This makes it possible to concentrate on a limited set of product-country combinations in the consecutive filters.

Filter 1.1: Political and commercial risk assessment

The first criterion that is considered in filter 1 is the risk (political and commercial) faced by exporters in doing business with the foreign countries under investigation; many academic, private, and government institutions rate countries on the basis of this risk.[7] The decision support model uses the country risk ratings of the Belgian Public Credit Insurance Agency (Office National du Ducroire (ONDD)). The ONDD ratings methodology conforms to the OECD's Arrangement on Guidelines for Officially Supported Export Credits.[8] The ratings are general to any exporting country and can therefore be used by any exporter wanting to establish the degree of risk of dealing with a particular country. They are available on the ONDD website[9].

Commercial risk is defined as the risk resulting from the deterioration of the importer's financial situation, leading to the impossibility of payment for a consignment (ONDD, 2014). Indicators that are used to measure a country's overall commercial risk include:

i. economic and financial indicators that affect all companies' corporate results and balance sheets (e.g. devaluation of the currency, real interest rates, GDP growth, and inflation),
ii. indicators that reflect the country's payment experience (the ONDD and other credit providers' past experience with the country); and
iii. indicators that characterize the institutional context in which local companies operate (e.g. corruption index, transition economy) (ONDD, 2014).

[7] See http://www.countryrisk.com
[8] For more information, see Cutts and West, 1998:12-14; Moravcsik, 1989:173-205.
[9] www.delcredere.be

Political risk is defined as any event occurring in the importing country that would assume the nature of *force majeure* for the importer: e.g. wars, revolutions, natural disasters, currency shortages, and government action (ONDD, 2014). Some measures of political risk include:

i. assessment of the country's economic and financial situation. The assessment of the financial situation is based on external debt ratios and liquidity indicators, such as the level of foreign exchange reserves. A country's economic situation is evaluated using four sets of indicators: economic policy performance indicators (e.g. fiscal policy, monetary policy, external balance, structural reforms), growth potential indicators (e.g. income level, savings, investments), and external vulnerability indicators (e.g. export diversification and aid dependency).

ii. assessment of the political situation, which is based on a quantitative analysis of the political risks associated with doing business in the country (not specified by the ONDD, but obtainable from other data sources like the Quality of Government Dataset, ICRG dataset, and the World Bank sources (World Bank, 2014a)).

iii. payment experience analysis, which is based on data drawn from the ONDD and other credit insurers' past encounters with the country (ONDD, 2014).

The ONDD rates countries on a scale of 1 to 7 for political risk, where 1 indicates a low political risk and 7 indicates a high political risk. Political risk ratings are provided for the short, medium, and long term. The commercial risk rating is presented as either an 'A', 'B', or 'C', where an 'A' indicates low commercial risk and a 'C' indicates high commercial risk (ONDD, 2014).

The three political risk ratings for each country under investigation are transformed from a 1 to 7 scale to a 1 to 10 scale, whereas the commercial risk country rating is transformed in such a manner that a score of 3.33 is assigned to an 'A' rating, a score of 6.67 is assigned to a 'B' rating, and a score of 10 is assigned to a 'C' rating. This transformation is necessary for the construction of an overall country risk score. First, an average political risk score (simple average of the three political risk scores) is calculated for each country under investigation. Second, the average political risk score and the commercial risk score are weighted equally to calculate an overall country risk score for each country under investigation. The 80^{th} percentile of this country risk score is used as a cut-off value to eliminate less interesting countries from the analysis (i.e. countries with risk ratings greater than or equal to this cut-off value are eliminated from the analysis).

Filter 1.2: Macro-economic size and growth

Countries that pass through filter 1 have to pass another set of filtering criteria based on a country's size *(*measured by GDP and GDP per capita) and growth (GDP growth and GDP per capita growth values). The data can be obtained from the World Development Indicators. The cut-off points for the GDP and GDP per

capita values in each year are determined at the 20th percentile of the values for the countries for which all data necessary to run the decision support model are available. Countries are selected if the GDP or GDP per capita values for the country are higher than the cut-off values for at least two consecutive years of the most recent three-year period for which data are available. This ensures that countries that do not meet the requirements in only one year would not be eliminated for subsequent analysis (Cuyvers *et al*., 1995:178).

The cut-off values for the GDP growth and GDP per capita growth values are determined at the world averages for each year. Countries must show above average growth rates in both GDP and GDP per capita in all three of the most recent three-year periods in order to be selected on the basis of these criteria. To enter filter 2, a country must qualify based on filter 1.1 and filter 1.2 (i.e. the intersection of the two sets of outcomes).

Filter 2: Identifying possible opportunities

Filter 2 assesses the import demand for the various HS 6-digit product categories in the remaining countries in order to identify product-country combinations (markets) with adequate import size and growth. Three criteria are used in this filter: short-term import growth, long-term import growth, and import market size. Import data can be obtained from the CEPII BACI world trade database. This database is constructed from the United Nations Statistics Division's UN Comtrade database and reconciles the data reported by almost 150 countries. The CIF import values and FOB export values reported are reconciled to provide one trade figure for each bilateral trade flow, which excludes CIF costs. Furthermore, the CEPII team assesses the reliability of country reporting and takes reporting quality weights into consideration when reconciling the bilateral trade flows. The BACI database covers bilateral trade values at the HS 6-digit product disaggregation for more than 200 countries since 1995 and is updated every year (CEPII, 2013).

Short-term import growth is considered to be the most recent available simple annual growth rate in imports. Long-term growth is calculated as the compounded annual percentage growth in imports over a period of five years. Finally, the import market size is the total imports of country *i* for product category *j* (Cuyvers *et al*., 1995:178; Cuyvers, 2004:259-260). Therefore, a cut-off value for each criterion in filter 2 needs to be calculated. Cuyvers *et al.* (1995:179) argue that if an exporting country was already specialized in exporting a particular product category, the cut-off points for these markets need to be less stringent. Thus, the Revealed Comparative Advantage (RCA) index of Balassa (1964) is used to define cut-off points for each of the above-mentioned sub-criteria. The RCA indicates whether or not Namibia has a relative advantage (and therefore can specialize) in a particular fish product.

$$RCA_j = \left(\frac{X_j}{X_{w,j}} \right) \div \left(\frac{X_{tot}}{X_{w,tot}} \right) \qquad (1)$$

where: X_j is Namibia's exports (which is the exporting country for which realistic export opportunities are identified) of product *j*;

$X_{w,j}$ is worldwide exports of product *j*;

X_{tot} is the total exports from Namibia; and

$X_{w,t\ c}$ is total worldwide exports of all product categories.

If RCA >1, then Namibia has a relative advantage in producing product j for the export market; if $RCA_j \leq 1$, it has a relative disadvantage (compared to competitors) and does not export or exports very little of that product category.

Cut-off values for the variables of filter 2 are defined as follows (Cuyvers, 1997:5; 2004:260): For short- and long-term import growth, a scaling factor, s_j, is first defined (Cuyvers, 2004:260) in order to take the exporting country's degree of specialization in the exports of product category *j* into account when defining cut-off values:

$$s_j = 0.8 + \frac{1}{(RCA_j + 0.85)\exp^{(RCA_j - 0.0)}} \qquad (2)$$

The cut-off values for short-term and long-term growth rates are defined as:

$$g_{i,j} \geq G_j \qquad (3)$$

where $g_{i,j}$ is the import growth rate of product category *j* by country *i*; and

$$G_j = g_{w,j} . s_j, \text{ if } g_{w,j} \geq 0; \text{ or} \qquad (4a)$$

$$G_j = g_{w,j} \div s_j, \text{if } g_{w,j} < 0 \qquad (4b)$$

with $g_{w,j}$ being the growth of total world imports of product category j. The cut-off points are illustrated in Table 9.

Table 9: Cut-off points for short- and long-term growth

	(The exporting country for which the model is applied is not specialized in exporting product)	(The exporting country for which the model is applied is specialized in exporting product)
(World short- or long-term growth rate in product is positive)	Country i's short- or long-term import growth rate of product j ($g_{i,j}$) must be between one and two times the world growth rate for product j. For example: If $RCA_{n,j} = 0$ and $g_{w,j} = 5\%$, then	Country i's short- or long-term import growth rate of product j ($g_{i,j}$) is allowed to be a bit lower than, or equal to, the world growth rate for product j. For example: If $RCA_{n,j} = 1$ and $g_{w,j} = 5\%$, then

	s_j = 1.988 and G_j (cut-off point) = 9.94% If $RCA_{n,j}$ = 0.5 and $g_{w,j}$ = 5%, then s_j = 1.25 and Gj = 6.25%	s_j = 1 and G_j = 5% If $RCA_{n,j}$ = 1.5 and $g_{w,j}$ = 5%, then s_j = 0.895 and Gj = 4.475%

(World short- or long term growth rate in product is negative)	Country *i*'s short- or long-term import growth rate of product j ($g_{i,j}$) must be higher than the world growth rate for product *j*.
	For example:
	If $RCA_{n,j}$ = 0 and $g_{w,j}$ = -5%, then
	s_j = 1.988 and G_j = -2.5%
	
	If $RCA_{n,j}$ = 0.5 and $g_{w,j}$ = -5%, then
	s_j = 1.25 and Gj = -4%
		Country *i*'s short- or long-term import growth rate of product j ($g_{i,j}$) is allowed to be a bit lower than, or equal to, the world growth rate for product *j*.
		For example:
		If $RCA_{n,j}$ = 1 and $g_{w,j}$ = -5%, then
		s_j = 1 and G_j = -5%
		
		If $RCA_{n,j}$ = 1.5 and $g_{w,j}$ = -5%, then
		s_j = 0.895 and Gj = -5.59%

Source: Adapted from Cuyvers (1997:5; 2004:260)

This procedure is carried out for both short-term and long-term growth rates (Cuyvers, 1997:6; 2004:260). If the criteria above are met by a particular country for a specific product, a value of '1' (YES) is assigned in the short-term and/or long-term import growth columns in Table 11. A value of '0' (NO) is assigned when the criteria are not met.

Next comes consideration of the relative import market size of importing countries; the relative import market size (S_j) of country *i* for product category *j* is considered sufficiently large if

$$Z_{i,j} \geq S_j \qquad (5a)$$

where $Z_{i,j}$ is the ratio of imports of country *i* for product category *j* in total imports; and

$$S_j = 0.02Z_{w,j}, \text{ if } RCA_{n,j} \geq 1; \quad \text{or} \quad S_j = [(3 - RCA_{n,j})/100]Z_{w,j}, \text{ if } RCA_{u,j} < 1 \qquad (5b)$$

(Cuyvers, 1997:6; 2004:260). In equation (5b), $Z_{w,j}$ refers to the aggregate world imports of product group *j*. Table 10 illustrates the implications of the cut-off points.

Table 10: Illustration of cut-off points for import market size

(The exporting country n for which the model is applied is not specialized in exporting product)	(The exporting country n for which the model is applied is specialized in exporting product)

Country i's imports of product j ($Z_{i,j}$) must be between 2% and 3% of total world imports of product j.
For example:
If $RCA_{n,j}$ = 0, then
S_j (cut-off point) = 0.03 $Z_{W,j}$ (3% of total world imports of product j)
If $RCA_{n,j}$ = 0.5, then
S_j = 0.025 $Z_{W,j}$ (2.5% of total world imports of product j)
	Country i's imports of product j ($Z_{i,j}$) must be greater than or equal to 2% of total world imports of product j.

Source: Adapted from Cuyvers (1997:6; 2004:260)

Each product-country combination is assigned a value of '0' (NO) or '1' (YES) in the relative *import market size* column of Table 11, subject to the conditions in Table 10. The selection of markets in the filter is based on the categorization in Table 11.

Table 11: Filter 2 categorization of product-country combinations

Category	Short-Term import market growth	Long-term import market growth	Relative import market size
0	No	No	No
1	Yes	No	No
2	No	Yes	No
3	**No**	**No**	**Yes**
4	**Yes**	**Yes**	**No**
5	**Yes**	**No**	**Yes**
6	**No**	**Yes**	**Yes**
7	**Yes**	**Yes**	**Yes**

Source: Cuyvers, 1997:7; 2004:261.

A product-country combination is selected to enter filter 3 if it falls in category 3, 4, 5, 6, or 7 (Cuyvers, 2004:261), implying that a market should be growing adequately in the short or long term, and/or be of adequate size for it to be considered for further analysis.

Filter 3: Identifying probable and realistic export opportunities (REO)

Filter 3 assesses the accessibility of markets that pass through from filter 2. It allows for further analysis of product-country combinations (market accessibility) and implications of trade restrictions on export potential. Market accessibility is measured by weighted indices of product-country combinations constructed using eight parameters. Cuyvers *et al*. (1995) note that selecting an export market on the basis of size and growth alone does not necessarily mean that entry into that market will be easy. Thus, filter 3 takes into account trade restrictions to further screen the remaining possible export opportunities. This filter considers two categories of barriers to trade: the *degree of import market concentration* (filter 3.1) and *trade restrictions* (filter 3.2) (Cuyvers, 2004:261).

Filter 3.1: Degree of import market concentration

The assumption here is that a highly concentrated market (that is, one supplied by a small group of countries) is more difficult to enter than one with lower concentration. In a highly concentrated import market, a few exporting countries hold a relatively large market share and have a lot of knowledge about the market. Faced with such a market, Namibian fish companies would find it costly and rather inefficient to attempt entry; the same is true for export promoting agencies, which would rather concentrate on markets offering realistic opportunities of successful entry.

The decision support model uses the Herfindahl-Hirshmann Index (HHI) (Hirschmann, 1964) to measure the degree of market concentration. The concentration index is measured as follows:

$$HHI_{i,j} = \left(\frac{Z_{k,i,j}}{Z_{total\,i,j}} \right)^2 \qquad (6)$$

where $Z_{k,i,j}$ are the imports of country *i* from country *k*[10] for product category *j*; and

$Z_{total\,i,j}$ country *i*'s total imports of product category *j*.

An index of 1 indicates a highly concentrated market (where only one exporting country supplies the importing market), while an index closer to 0 indicates lower market concentration (that is, a more competitive exporting environment). Thus, the higher the HHI, the more difficult it will be to penetrate that particular market. However, there is a need to be mindful that concentration may be considered a bigger problem in a non-growing market (that is, a market in which market share has to be won from competitors, often those already firmly established) (Cuyvers *et al*., 1995). To simplify the model, a cut-off point for market concentration is designed depending on the category to which the various markets were assigned in filter 2; this point is defined as follows:

$$h_k = HHI_{i,j}, \qquad (7)$$

with the following implementation:

$h_k = 0.4$ for category 3;
$h_k = 0.5$ for categories 4, 5, and 6; and
$h_k = 0.6$ for category 7.

In relatively large markets, no more than 40 percent concentration is allowed. Large and growing markets can allow for a concentration ratio of no more than 50 percent, and markets that are relatively large and growing in the short and long term can allow a 60 percent level of concentration.

[10] The imports from the country for which the model is applied is excluded in the numerator of this equation.

Filter 3.2: Trade barriers

This filter incorporates information on the trade barriers that Namibian fish firms would face on international markets. These include tariffs, non-tariff barriers, trade costs, trade time, distance, infrastructure, and logistics. The World Economic Forum's Enabling Trade Report (2014:7) states that

> "data on non-tariff barriers are very outdated and the absence of a comprehensive, rigorous and global measure of non-tariff measures (NTMs) leaves a gap in any research regarding market accessibility. The assessment of NTMs should not stop at the border, but also focus on behind-the-border measures, such as product standards, conformity assessment regulations and subsidies. The International Trade Centre (ITC) is engaged in an effort to collect data for the elaboration of an indicator on the presence of NTMs affecting international trade. Having to rely on surveys by experts in the field, the process is inevitably slow and costly. The ITC is not yet in a position to provide an updated data set with a global coverage. To date, these data are available for only approximately 61 countries."

For this reason, non-tariff barriers cannot be included in our analysis. However, one way to envisage the restrictive impacts of trade barriers (including international transportation costs, all documentation, inland transport and handling, customs clearance and inspections, port and terminal handling, and official costs) is to consider the total cost of shipment. In this study, we use trade costs, calculated as an ad valorem equivalent (%) on the value of the goods and added together to arrive at the total ad valorem equivalent trade cost per product-country combination, as a measure of trade barriers. Appendix A4 shows the import tariffs that Namibian fish and fish products are subject to in various countries.

i. Ad valorem equivalent tariffs per product

Tariff information on the HS 6-digit product level for all the product-country combinations that enter filter 3 is gathered from the International Trade Centre's MAc Map. Ad valorem equivalent tariffs are used because it is difficult to compare specific product duties with ad valorem tariffs across countries. The MAc Map database is unique and is largely accurate in measuring the tariff levels faced by individual country exports because it accounts for bilateral, regional, and preferential tariff systems (IMF, 2005). The data is also available on an HS 6-digit level of disaggregation suitable for this study.

ii. International shipping cost per country

Matthee (2007) reviews the literature on the measurement and significance of factors influencing trade transport costs. International transport costs can be obtained as direct quotes from the shipping industry or transport operators (e.g. Limão and Venables, 2001:453 and Martínez-Zarzoso, Pérez-García and Suárez-Burguet, 2008:3146) or from national customs data in the form of CIF import values and FOB export values.

Another possible source is the International Monetary Fund Direction of Trade Statistics. An indication of bilateral transport costs between countries can be calculated by dividing the CIF import value by the FOB export value (e.g. Anderson and Van Wincoop, 2003; Baier and Berstrand, 2001:15; and Limão and Venables, 2001: 453), but this measure may be inaccurate for some countries (see Chasomeris (2007) on South Africa). In this study, we use the quote for the shipment of a 20-foot container of general cargo valued at US$20,000 (obtained from World Freight Rates, 2014) from the Walvis Bay harbour in Namibia to the nearest or most likely port[11] in the different countries that passed from Filter 2. To arrive at an ad valorem equivalent international shipping cost, the cost to import per country is divided by the value of the cargo (US$20,000).

iii. Domestic cost to import per country

The cost to import includes the documentation, inland transport and handling, customs clearance and inspections, port and terminal handling, and other official costs, exclusive of bribes (The World Bank, 2014b). This information is obtained from the World Bank's Doing Business Report. The fees levied on a 20-foot container of general cargo are used to calculate the cost of importing, excluding tariffs or costs related to ocean transport.

To arrive at an ad valorem equivalent, domestic cost is calculated by dividing the cost to import per country by the value of the cargo. The total ad valorem equivalent (%) trade cost of transporting goods from the harbor in the exporting country to the final destination in the importing country is calculated by adding the ad valorem equivalent tariff per product-country combination to the ad valorem equivalent international shipping cost and domestic cost to import. The cut-off point used in this study was the 80th percentile of the total ad valorem equivalent trade cost for all product-country combinations that entered filter 3. The product-country combinations (realistic export opportunities) that give the least cost combinations of the filter components pass to filter 4, which allows for the final analysis of exporting opportunities. Markets that are too difficult to enter, and whose access is too restricted, are eliminated from the analysis.

Filter 4: Final analyses of opportunities

Under this filter, there is no market elimination. Instead, the filter categorizes and prioritizes the realistic export opportunities; for each market from filter 3, it calculates the relative market share of Namibia's fish exports of product category *j* in country *i* ($\mu_{i,j}$) as:

$$\mu_{i,j} = \frac{X_{i,j}}{X_{6i,j}} \qquad (8)$$

[11] This information was obtained from the authors of the World Bank Doing Business Report to ensure that the international and domestic transportation costs are calculated using the same harbors.

where $X_{i,j}$ is Namibia's fish exports of product category *j* to country *i*; and $X_{6,i,j}$ represents the top six countries' total exports of product category *j* to country *i* .

This filter compares the relative market share of Namibia in each market that entered the filter and the relative market share of the six largest competitors in these markets. This results in the following categorisation of market importance:

i. $\mu_{i,j} \leq 0.05$: Namibia's relative market share is very small;

ii. $0.05 < \mu_{i,j} < 0.25$: Namibia's relative market share is intermediately small;

iii. $0.25 \leq \mu_{i,j} < 0.5$: Namibia's relative market share is intermediately high; and

iv. $\mu_{i,j} \geq 0.5$: Namibia's relative market share is relatively high.

These cut-off points are arrived at after several rounds of sensitivity analysis to test the stability and consistency of the results.

Overall, the filtering process leads to a matrix (Table 12) that categorizes the realistic export opportunities identified in filters 1 to 3 in terms of size and growth in demand, as well as Namibia's current market share in these markets. The classification in the rows of Table 12 is obtained from filter 2, which indicates the size and growth of imports of the different markets, while the columns are based on the relative market share of Namibia calculated in filter 4.

Table 12: Final categorization of realistic exports opportunities

Size and growth of importing market	**Namibia's market share of country (Filter 4)**			
	Relatively small	**Intermediately small**	**Intermediately large**	**Relatively large**
Large product market	CELL1 (REO-1)	CELL 6 (REO-1,1)	CELL 11 (REO-1,2)	CELL 16 (REO-1,3)
Growing (short- and long-term) product market	CELL 2 (REO-2)	CELL 7 (REO-2,1)	CELL 12 (REO-2,2)	CELL 17 (REO-2,3)
Large product market with short-term growth	CELL 3(REO-3)	CELL 8 (REO-3,1)	CELL 13 (REO-3,2)	CELL 18 (REO-3,3)
Large product market with long-term growth	CELL 4 (REO-4)	CELL 9 (REO-4,1)	CELL 14 (REO-4,2)	CELL 19 (REO-4,3)
Large product market with short- and long-term growth	CELL 5 (REO-5)	CELL 10 (REO-5,1)	CELL 15 (REO-5,2)	CELL 20 (REO-5,3)

Source: Criteria adapted from Grater & Viviers, 2012.

The table assigns the product-country combinations from filter 3 to each one of the export market possibilities, thus identifying the potential (demand) in a particular market (i.e. import size and growth) and the extent of current utilization (based on the relative market share). Export promotion agencies can also use these cells to formulate export promotion strategies for the markets identified as realistic export

opportunities. Cuyvers *et al*. (1995:183) suggest that an offensive market exploration export promotion strategy can be used for export opportunities in cells 1 to 10, based on the exporting country's relatively small market share in these markets. An offensive market expansion strategy can be adopted for export opportunities in cells 11 to 15 since the exporting country already has an intermediately large market share in these markets and since the demand is large and/or growing. Lastly, a defensive strategy may be necessary for export opportunities in cells 16 to 20 in order to maintain the market.

Taking the exporting country's production capability into consideration

The model has thus far considered the potential demand for product *j* (export opportunities) in different countries, without taking into account possible supply constraints in Namibia. The relative advantage of Namibia in the export market is accounted for by introducing the additional criterion that the RCA for Namibia should be equal to or greater than 1. From the literature, an RCA_j of at least one shows Namibia's specialization in producing and exporting the good *j* (Balassa, 1964). The RCA ensures that only products in which the exporting country has a significant presence in the market are selected as export opportunities. This analysis identifies possible and realistic export opportunities. With this information alone, however, it is difficult to prioritize export opportunities between products, sectors, countries, and regions, given that no value is attached to the product-country combinations yet. The size of the export opportunities has not yet been considered, and a ranking based only on the number of opportunities is not accurate. The calculation of a potential export value for each realistic product-country export opportunity combination is calculated as the average fish export shares of the top six exporters to a particular country (excluding Namibia). This average export share value indicates the size of the potential export market. If this average share is greater than Namibia's actual fish export share, the exporting opportunity falls somewhere in cells 1 to 10; if the average share is less than Namibia's actual share, the exporting opportunity falls somewhere in cells 11-20. In other words, when Namibia's actual export share is greater than the average of the top six competing exporters, then Namibia is one of the main exporters to that particular market, and exporters may want to pay particular attention to such markets.

Determining local production versus re-exports

The last factor to determine in applying the decision support model is to check whether the goods that Namibia exports are produced in Namibia or are just re-exports. An analysis of the country's social accounting matrix shows that it exports petroleum products even though it is a net petroleum product importer and has no productive capacity for such products. In addition, goods to Angola, the DRC, Zambia, and Zimbabwe transit through Namibia. It is thus important to determine whether the fish and fish products exported from Namibia are actually produced locally. This determination is based on the calculation of a Revealed Trade Advantage (RTA) index (Vollrath, 1991). The RTA index accounts for exports and imports

simultaneously and is used as an indicator of product-level competitiveness, unlike the RCA index that indicates relative export advantage or competitiveness only. The RTA is calculated by the formula:

$$RTA_{ij} = RCA_{ij} - RMA_{ij}, \qquad (9a)$$

$$RMA_{ij} = \left| \left(\frac{M_{ij}}{\sum_{t,t \neq j} M_{it}} \right) * \left(\frac{\sum_{n,n \neq i} \sum_{t,t \neq j} M_{n,t}}{\sum_{n,n \neq i} M_{n,j}} \right) \right| \qquad (9b)$$

where M represents imports; *i* is a country; *j* is a product; *t* is a time indicator, usually a year; and *n* represents all countries. Therefore, this measure implies a Relative Import Advantage (RMA). Because international trade data potentially contains spurious transactions or shocks, the RTA is calculated over a five-year period in this instance. When $RTA > 0$, it indicates a positive comparative advantage (trade competitiveness). In such a case, it is assumed that the majority of the product exported is locally produced.

Model results and interpretation

The model takes into account all fish products and countries and sequentially eliminates products and countries that fail to meet specific criteria. For the available data, we started with 149 countries. After applying filters 1 and 2, 98 countries remained for consideration. These constitute the potential export opportunities. After filters 3 and 4, 23 countries remain; these countries are further examined in terms of market performance, accessibility, and concentration. Table 13 shows the selection of the most attractive export markets; it also indicates those markets that export-promoting bodies and fishing companies may need to study in greater detail in order to determine market viability conditional on other factors such as sanitary and phytosanitary requirements, voluntary and compulsory product standards, consumer preferences, competitors, forecasts, and importing country market structure.

Table 13: Realistic export opportunities based on market share and potential importing countries

HS Code	Country	Total imports (US$ '000)	REO coordinate	Namibia 2013 exports (US$ '000)	Namibia specialised in exporting the product?	Does Namibia produce product?
030613	USA	3876179	REO 1,1	0	No	No
030420	USA	2977078	REO 4,1	4182	Yes	Yes
030613	Japan	2111221	REO 1,1	0	No	No
030420	Japan	1838769	REO 5,1	0	Yes	Yes
030379	China	1523837	REO 4,1	0	Yes	Yes
030420	Germany	1514528	REO 3,2	11643	Yes	Yes
030613	Spain	1153935	REO 1,1	0	No	No
030410	USA	1135341	REO 1,1	0	Yes	Yes
030343	Thailand	970924	REO 1,1	0	No	Yes
030212	France	931317	REO 1,1	0	No	No
030420	France	884933	REO 1,2	9510	Yes	Yes
030490	Japan	771131	REO 5,1	0	Yes	Yes
030614	USA	754523	REO 3,1	0	Yes	Yes
030613	France	713571	REO 1,1	0	No	No
030749	Spain	679436	REO 1,2	9861	Yes	No
030269	Italy	679435	REO 5,1	0	Yes	Yes
030379	Japan	624438	REO 3,1	3	Yes	Yes
030420	Spain	620365	REO 4,3	87926	Yes	Yes
030344	Japan	603542	REO 1,1	0	No	Yes
030420	Netherlands	585051	REO 5,2	7963	Yes	Yes
030319	China	538004	REO 1,1	0	No	No
030410	France	526664	REO 5,1	0	Yes	Yes
030749	Italy	514917	REO 1,1	183	Yes	No

N.B: In the analysis, Namibia is defined as a relatively small country
Only countries that potentially import more than US$ 500 million included.

The table considers the market share and potential of importing countries and a total exporting capacity of more than US$500 million. The table shows that USA is the top potential market, and that Namibia can potentially expand her export market for frozen shrimp and prawn, shelled or not (HS030613). Namibia already exports frozen fish fillets (HS030420) and can also potentially expand its foothold in that market, given the market size as well as the current market share. In addition, Namibia has a potential to export fish fillets and other fish meat, minced or not (excluding HS030302 and HS030420) to the USA. The US market for Namibian fish seems to exhibit long-term growth, and thus general market potential.

Japan is also classified as a large market with short- to long-term growth potential. Given the current competitive advantage, Namibia can export frozen shrimp and prawn, shelled or not (HS30613) and frozen

fish fillets (HS030420) to Japan. Exporting the latter will help diversify the market from its current concentration on the European Union.

The Chinese fish market is classified as large and exhibiting a long-term growth potential for Namibian fish. Namibia exports frozen fish not elsewhere specified (excluding fillets and other fish meat of 0304/livers and roes (HS030379)). There is a chance to increase the direct presence of Namibian fish in China, which currently enters China largely through Hong Kong. However, there is a need for caution on this market, as it is highly competitive and is itself a low-cost producer, making growth therein rather difficult. In addition, the fishing associations reported that only specialized types of fish and fish products are likely to perform well in the Asian market. This is because, in general, there is little preference in Asia for Atlantic fish because it has less fat than what is caught in the Pacific and Indian oceans. This means that Namibian exporters need to concentrate their efforts in those markets that value less fatty fish, especially the EU market.

The EU market offers exciting opportunities and challenges for Namibian fish. The table picks five main markets for fish and fish products, namely Germany, France, Spain, the Netherlands, and Italy. Germany is a large market with short-term growth potential. Since Namibia already has a rather large market share here (for frozen fish fillets (HS030420)), it can potentially exploit the short-term growth benefits offered by this market while positioning itself for a long-term presence. Existing historical ties between the two countries enhance this possibility.

France is categorized as a large market in which Namibian fish (frozen fish fillets (HS030420)) has a large presence. It also offers short- and long-term growth for fish fillets and other fish meats, minced or not (excluding HS0302) (HS030410), a market in which Namibia has a small share.

The bulk of Namibian fish currently goes to Spain and is marketed throughout the EU from there. The model categorizes Spain as a large market with long-term growth potential for Namibian fish (frozen fish fillets (HS030420)). Since Namibia already has a large market share there, exporters may need to ensure that they hold on to their share and perhaps diversify into other product lines. The latter could be quite a challenge, however, given that the existing market entry mode leaves the marketing and distribution of Namibian fish to Spanish and other international companies. This poses a challenge to any value addition that Namibia may wish to undertake, as such moves may destabilize existing trade arrangements and could be costly to Namibian companies. Namibian fish is known in the EU under non-Namibian brands, and breaking into the market with a purely Namibian brand will be a challenge.

Another potential market is the Netherlands. The model filters this as a large market with short- and long-term growth potential. Namibia already has a rather large market presence with frozen fish fillets (HS030420). There is thus potential for growing this market, including moving up the value chain.

However, potential growth strategies may complicate the relationships between Namibian firms and their EU counterparts.

Namibia is currently specialized in cuttle fish and squid (HS030749) and has the potential to export these to Italy and Spain. It has a small market share in Italy and a rather large market share in Spain. The country can benefit by increasing production and selling to these countries. In addition, there is potential to enter the large Thai market with frozen skipjack/stripe-bellied bonito (Euthynnus Katsuwonus pelamis) (HS030343).

The results of the model are indicative of the products and markets that Namibia could focus on to diversify and grow its fish market. Since Namibia does not specialize in all exportable fish commodities (column 7), there is need for more work and investment toward producing some of the fish products identified. However, market potential still does not guarantee success in a given market. There is still need for detailed market research and analysis of each of the opportunities identified.

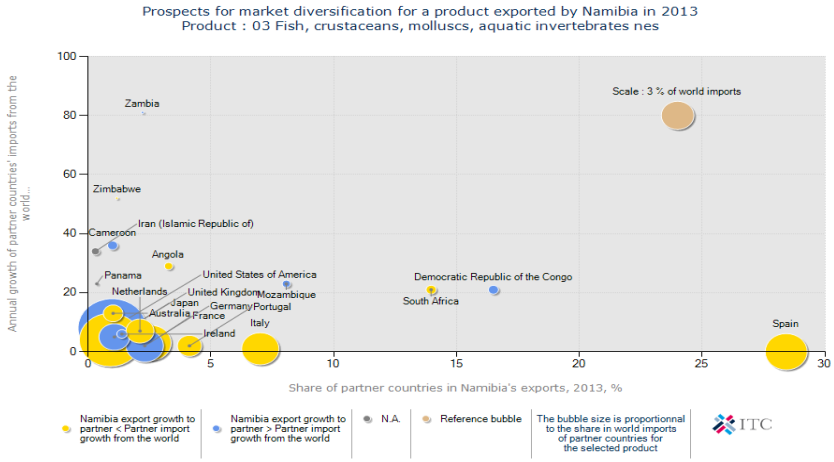
4.3 Prospective Diversification of Fish and Fish Products Export Markets

Further analysis of the export opportunities and prospective market diversification opportunities can be done at the product level. Figure 6 identifies potential export markets for products HS03 (fish, crustaceans, molluscs, aquatic invertebrates (representing all the general fish and fish products)) and HS0303 (frozen fish, whole). Namibia has comparative advantage in the latter and constitutes the largest proportion exported, in both volume and value.

Product HS03: fish, crustaceans, molluscs and aquatic invertebrates

Figure 6(a) illustrates Namibia's main export destinations for fish, crustaceans, molluscs, and aquatic invertebrates. It indicates the prospective market growth and demand from different regions of the world.

Figure 6(a): Export market diversification for product HS03 to the rest of the world

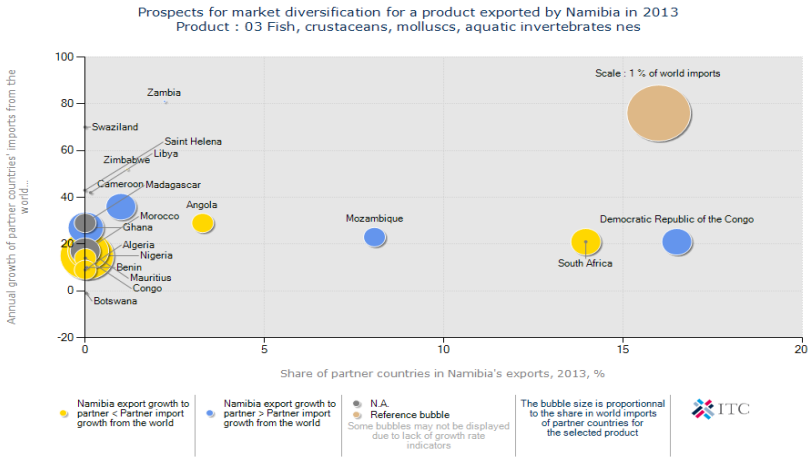


Source: Trade statistics for international business development (12/2014) (http://www.trademap.org).

The figure shows that the annual growth of partner countries' imports from the world are concentrated around 20 percent, with bigger bubbles for Japan and USA. Spain shows the largest portion share of Namibian exports (nearly 30 percent), followed by the DRC and South Africa, respectively. Namibia has an advantage in exporting to the DRC compared to other countries. However, Namibia's fish export growth to Spain, Portugal, Italy, and South Africa is less than these countries' imports from the rest of the world. The bubble graphs below show each of the main regions individually.

Figure 6(b) shows the prospective African export markets as mainly the DRC, South Africa, Mozambique, and Angola. The rest of the African countries individually constitute less than 1 percent of the market share.

Figure 6(b): Export market diversification for product HS03 to Africa

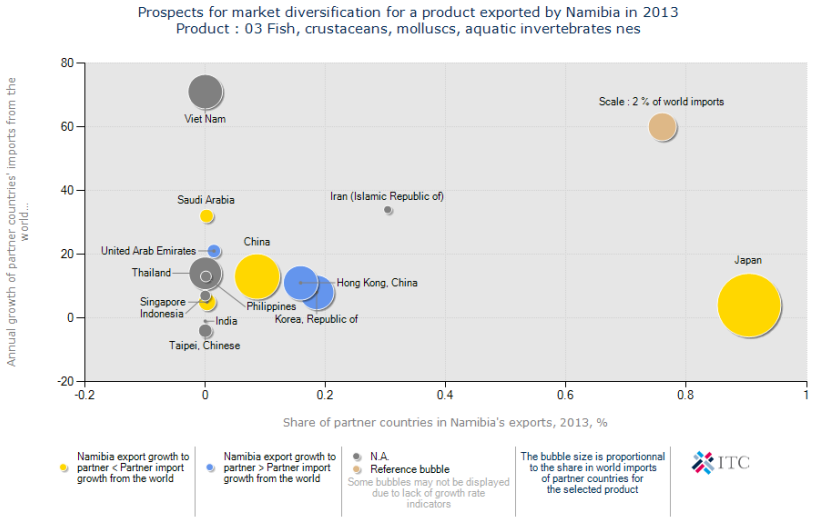


Source: Trade statistics for international business development (2014) (http://www.trademap.org).

Among the top export markets, the growth of Namibian exports to the DRC and Mozambique is larger than the growth of the imports of the two countries from the rest of the world. This means that there is potential to enhance market share in these countries. However, the situation is different when it comes to South Africa and Angola; the growth of Namibia's exports to the two countries lags behind world export growth to the two countries. This indicates markets in which there is competition, placing Namibia in a disadvantageous position.

The analysis of HS03 exports to Asia is shown in Figure 6(c). This figure shows that Namibia's exports to Asia are very low (less than 1 percent), which may be indicative of the lower demand for the product HS03 in that region. However, the growth of Namibia's exports to Hong Kong and the Republic of Korea is larger than the growth of the two countries' imports from the rest of the world.

Figure 6(c): Export market diversification for product HS03 to Asia



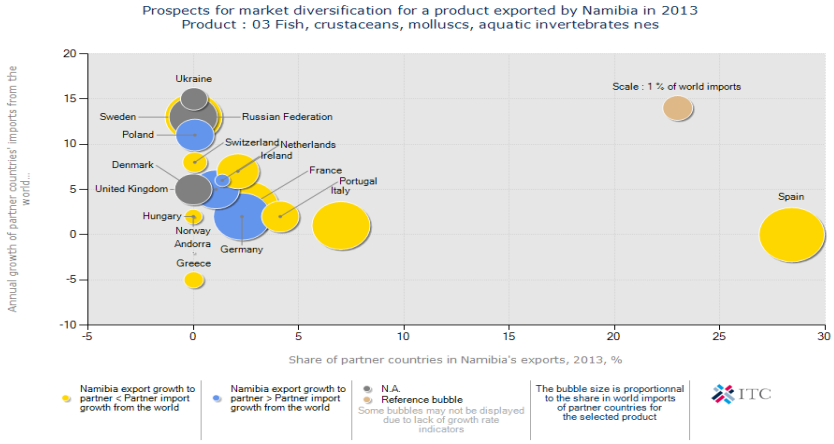
Source: Trade statistics for international business development (2014) (http://www.trademap.org).

On the other hand, the growth of Namibia's exports to China and Japan is less that the import growth of the two countries from the rest of the world.

The low export volumes to Asia can be explained by distance and by the fact that some fish harvested from the Atlantic Ocean has less fat than similar types harvested from the Indian Ocean. Many Asian countries also produce their own fish, perhaps more cheaply.

Figure 6(d) shows the prospective export of product HS03 to the EU. Many of the countries fall within the 0 to 5 percent growth band. Within these countries, Namibia has better export potential to Germany, the UK, and Poland, where Namibian exports are already growing faster than the three countries' imports from the rest of the world.

Figure 6(d): Export market diversification for product HS03 to the EU.



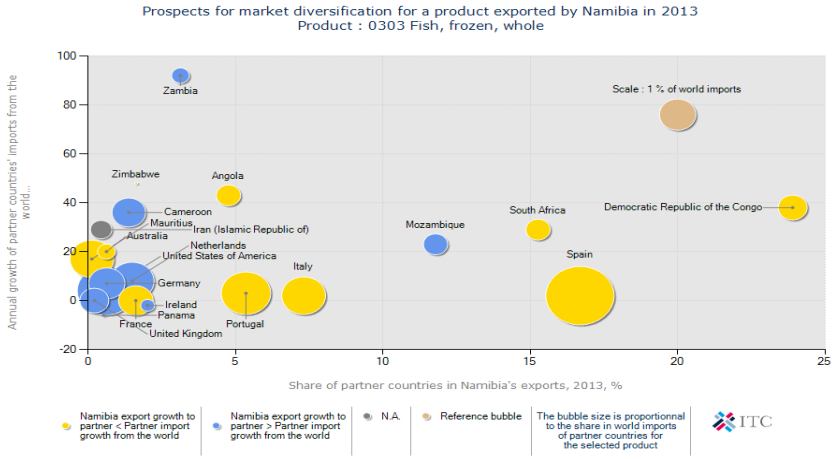
Source: Trade statistics for international business development (2014) (http://www.trademap.org).

Namibia also has the potential to increase exports to Italy, Ireland, Portugal, Sweden, and France, where its export growth has been lagging behind that of the rest of the world to the five countries. Spain is an outlier, consuming nearly 30 percent of Namibia's output of product HS03. However, Namibia would face high competition if it wanted to increase its export market in these countries.

Product HS0303: frozen fish (whole)

Figure 7(a) shows Namibia's frozen fish exports and indicates the prospective export market growth in different regions of the world. The figure shows that Namibia's frozen fish exports growth is higher export in Mozambique, Cameroon, the USA, and Germany compared to growth of exports from the rest of the world to these trading partners. However, growth to Spain, Portugal, Italy, Australia, France, South Africa, Angola, and the DRC is lower than growth of imports from the rest of the world to these countries. The latter would be very competitive markets.

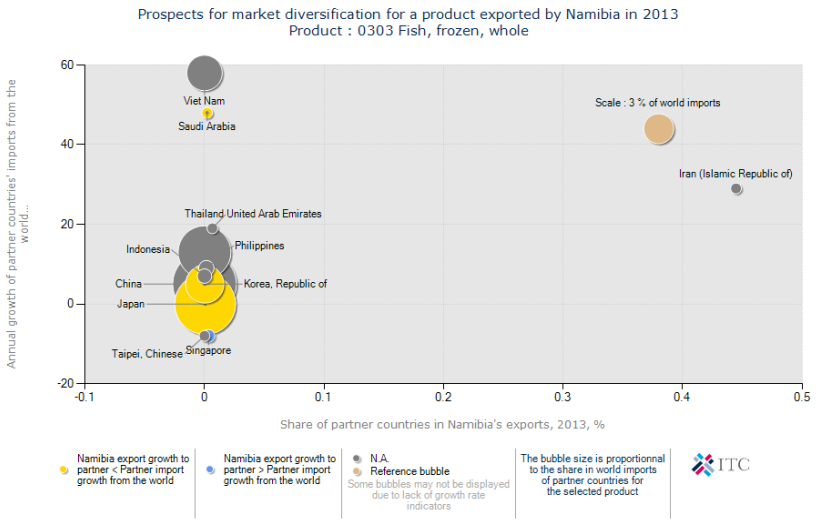
Figure 7(a): Export market diversification for product HS0303



Source: Trade statistics for international business development (2014) (http://www.trademap.org).

As for Asia (Figure 7(b)), the only opportunities for market expansion exist in Japan and China. Overall, fish trade with Asian countries is low, and the level of competition will be high if Namibia wants to increase its market share here.

Figure 7(b): Export market diversification for product 0303 to Asia

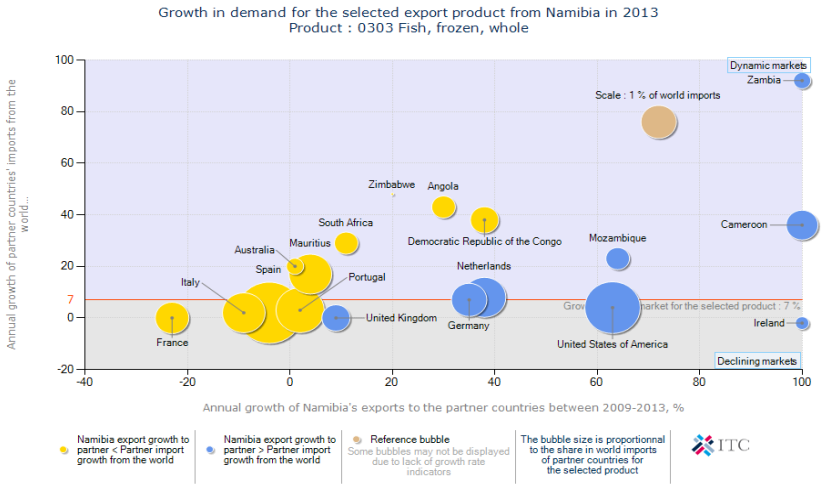


Source: Trade statistics for international business development (2014) (http://www.trademap.org).

As for exports of frozen fish to the EU and to African countries, the same picture emerges. Spain, Italy, Portugal, and France remain potential growth markets in the EU because Namibia's exports growth to these countries is less than the growth of imports from the rest of the world to the countries. These markets are also likely to be very competitive. The other markets in which Namibian fish export growth is larger than from the rest of the world could be important niches that exporters need to maintain. In Africa, the situation is different. For the DRC, there is potential for growing exports of frozen fish, as is the case with South Africa and Angola. Cameroon also appears as a high growth market in which Namibian frozen fish has dominance.

Figure 7(c) presents an interesting perspective regarding the worldwide growth of consumer demand for fish, pegged at 7 percent. The very high demand for fish in Zambia is an outlier. Given the geographical proximity of Zambia to Namibia, there is a potential to exploit this market opportunity. In general, the diagram shows above average growth in consumer demand in several African countries.

Figure 7(c): Global demand for Namibia's frozen fish



Source: Trade statistics for international business development (2014) (http://www.trademap.org)

In Europe, Spain remains the main market for Namibian fish. Although Italy and France have been observed to be markets with growth potential, the figure above seems to indicate that they will be highly competitive given the low growth in demand for fish.

5. Challenges and Prospects for the Fishing Sector Growth

The analysis of Namibia's fishery sector has shown that the country has several advantages in terms of product quality, a ready market for the product, strong and sustainable management of resources, and prospects for value addition (even though the latter needs to be treated with caution). The sector also has the potential to expand its export market both regionally and internationally, and there is positive discrimination in the allocation of quotas in favor of Namibians, which should enhance resource ownership and distribution. For continued good performances, however, fishery operators need to hone in their efforts in those areas in which they have comparative and competitive advantages. In addition, there are also important challenges that need to be addressed.

Indigenisation and a binding capital constraint

The 'Namibianisation' of the fishing sector, a form of affirmative action that favours Namibian-owned firms, has resulted in people and consortia winning fishing quotas without being able to fully exploit the resources. Some quota holders lack the necessary capital and have no access to credit (financial institutions are often hesitant to lend because producers lack collateral; annual quotas cannot be used as collateral). The allocation of quotas to people without a capital base has created a secondary market for fishing licences in which licence holders sell them to people or firms with the necessary fishing capacity. The existence of right holders with no direct involvement in fishing unnecessarily extends the value chain, which increases

costs and cuts down profitability. It therefore takes longer for those directly involved in fishing to accumulate resources to invest in capacity expansion. The general view of the fishing associations seems to be that there is a need to cut out the unproductive middlemen, who only represent a cost to the sector.

The problem of lack of capital is particularly acute for operators in trawling and deep-sea fishing. These operators often cannot buy their own vessels and have to rely on hired South African vessels. Furthermore, at the time of the interviews with the associations (in 2014), of the seven locally owned vessels, only two were reported to be sea-worthy. Given these challenges, it may be necessary for the government and financial sector to collaborate to build local capacity through the acquisition of vessels. Funding strategies have to be developed that will not put the burden on taxpayers (e.g. through the development of concessionary loan facilities or the introduction of venture capital).

The lack of access to capital and vessel ownership has resulted in the significant presence of foreign capital in Namibia's fishery sector. This has its own advantages and disadvantages when it comes to marketing. One advantage is that the partnership between Namibian and foreign capital allows the former to tap into the expertise of the latter in technical, managerial, and marketing skills. In addition, there is increased investment in the fishing sector from foreign investors. Joint ventures with foreign firms, especially those from Europe, allow local fish products to enter that market under European firms' brand names. This arrangement works perfectly as long as the local firms do not seek to operate directly in the EU market, as this will upset existing relationships. Local firms could seek greater returns from their fish by processing it and continuing to market it through their EU counterparts; the hake sub-sector is exploring this idea. As discussed previously, direct sales of processed fish products may prove to be a big challenge for local firms, not only because of opposition from their EU counterparts, but also because of protective laws in the EU market which will make such a development costly. Thus, value addition as advocated by the government is not necessarily *carte blanche*. In all the arrangements discussed, local firms need skillful negotiators in order to establish fair deals. Moreover, by engaging in further value addition, local firms will be entering into highly competitive sections of the international fish market, where they will be compelled to implement and adhere to international certification and standards for their products. One example is the introduction of the Hazard Analysis Critical Control Point (HACCP) food hygiene management system, which is approved by the EU, USA, and other developed countries.

The concern of possible opposition from trading partners was reported in the horse mackerel sector. One operator pointed out that some of their trading partners in the region have forced them to sign non-competition agreements which bar the local fish companies from exporting frozen mackerel directly to some regional markets. International partners, sometimes in collusion with government officials, make it difficult for outsiders to individually sell their fish to the local population. However, growth in the fishing sector will come from growth in exports to the rest of the world. On the African continent, mackerel is

performing well and has the potential to push into new markets, especially given the recent inauguration of a free trade zone including SADC and the East African Community. Growth in urbanization on the continent also creates new marketing opportunities. Improvements in economic management and growth in many countries, including those not dependent on natural resources, is creating the necessary demand for all types of food, including fish.

From another angle, the presence of foreign capital in the fishery sector, especially in the form of South African vessels, provides a ready market for locally caught fish. This presence also loosens the capital constraint that can potentially ruin Namibian operators. However, local fish firms complain that foreign vessel owners offer very low prices per kilogramme of catch, meaning that the right holders realize low returns on their fish. Worse still, the foreign vessels buy the fish and send it to South Africa for processing, reducing the chance for value addition and creating fewer jobs onshore.

The value addition policy drive

Over the past few years, the Namibian government has been pushing for greater value addition to fish resources. This drive has been met with varying levels of acceptance and success. Some companies have invested in new processing capacity and have developed new products. Between 1990 and 2003, a total of 23 processing plants were constructed. There was also significant investment growth between 2011 and 2015. Hake fishing companies invested N$187 million, while the large pelagic and monk fishing companies invested N$5 million and N$16 million, respectively. Some of this investment went to upgrading processing equipment and acquiring new vessels. Other firms have increased the utilization of existing capacity by importing frozen fish for processing during the off-season, thus reducing the down-time for both capital and labor. This is a new avenue that companies can explore as a way of increasing supply.

The growth of processing capacity has brought about another potential problem, however, in that it has allowed companies to lobby the government to increase total allowable catches. This may have negative impacts on recruitment rates and therefore the long-term sustainability of fish stocks. As shown by the TAC figures in Table 1, the trend since 2009 for many commercially exploited species has been upward. Paterson *et al.*, (2013: 7) notes that "indeed, the strong policy focus on job creation, designed to achieve the socio-economic development goals of the nation, has actually led to the perverse situation that the fishing and processing capacity in the hake sector is twice the size of the TAC and landings". The pressure for higher TACs has the potential to derail the resource management systems in place and may result in collapsing stocks. The need for survey data to inform policy formulation is therefore very critical.

There are some operators that argue against the government's push for value addition, saying that it may not be necessary because unprocessed fish already has a ready market and since they are failing to meet the existing export demand. Others feel that they will not be able to compete on the international market with

new brands of fish products. Processed fish is also more expensive than frozen fish, and some markets (e.g. the regional market, excluding South Africa) have relatively high demand price elasticity; any process that increases the price of fish may result in a loss of market share. One mackerel fishing company argued that competing with Chinese and Thai processed fish products on the African market is very difficult because the Chinese and Thai products are priced cheaply relative to the Namibian products. The company argued that even though the local fish is of higher quality and meets high quality control standards, the same might not be said of the competing products; however, the quality of Asian fish imports relative to Namibian products could not be verified. The failure of processed Namibian fish to compete against Asian imports in terms of price may be an indication that Namibia is a high-cost producer and loses competitiveness through value addition. If this is the case, then the best strategy for firms is to continue exporting unprocessed fish. Nonetheless, frozen Namibian mackerel is very popular within the region, and there is potential for further expansion there.

As mentioned previously, local firms already market their fish in collaboration with European companies in Europe, and any attempt to develop a Namibian brand will likely result in a loss of market share in that region. Some operators thus argue that value addition increases costs, which eat into their margins significantly. Although value addition is an important component in the development of the fishery sector, especially the processing of hake and mackerel (Sherbourne, 2013), some fishing associations argue that consumers are willing to pay a premium not for processed fish, but for the fish's freshness and quality. This means that consumers would prefer the current set-up in which some fish is exported from offshore, fresh.

The government is also promoting the local consumption of fish, but there are certain types of fish (e.g. hake and cape cod) that are generally too expensive for the local market. Further processing will not address this problem of purchasing power. In addition, the Namibian middle class is very small, and there is a preference for eating out at restaurants rather than buying ready-made meals.

From another angle, what the government sees as value addition could be viewed as value destruction. African fish cuisine is, in many countries, built around a whole fish (whether frozen or dried). Processing a fish, including cutting off the head will, in many such societies, destroy the product's value. It is therefore necessary to note that the drive for value addition may be opposed to the drive for increased local consumption. This implies that there is no one-size-fits-all solution to the fishery sector's growth and diversification challenges; it is necessary to tailor the products in line with individual market requirements. The fishery sector also needs to develop new, innovative strategies for foreign market entry, together with product differentiation that emphasises the strengths of the local industry, like sustainability initiatives and environmentally friendly production processes (e.g. eco-labelling and certification). Furthermore, the sector may need to work collaboratively to develop and establish Namibian brands on the international market. Fish firms need to invest in international market intelligence data gathering and analysis. Since individual

companies may not have the resources and technical skills to do so, and assistance from export promoting agencies may be necessary. This collaboration would allow the industry to better take advantage of opportunities and overcome potential threats.

Skills shortage and problems with boatmen's qualifications

The Namibian economy has abundant unskilled and semi-skilled labor; however, it faces a general shortage of skilled labor. Fishing companies often complain that they are not able to recruit engineers, electricians, diesel mechanics, and vessel skippers locally and are instead forced to recruit from abroad, which raises the challenge of rigid immigration controls. Although NAMFI is tasked with the training of sea-going personnel, some firms complain about the quality of such staff. In addition, firms are miffed by the lack of qualification comparability between locally trained personnel and requirements in South Africa and Angola. Boatmen's qualifications given by NAMFI are rejected as insufficient for the needs of international shipping, meaning that companies cannot use their boats to seek work in neighboring South Africa and Angola. It also means that boatmen trained in Namibia cannot secure employment in other countries during the Namibian off-season. Both companies and workers are unhappy with this situation and believe that the harmonization of domestic qualifications with international standards will be beneficial to everyone in the long run.

Another problem acutely affecting the lower ranks of the workforce in the fishing sector is low wages. Due to the combination of seasonal labor and low wages, making ends meet can be a very serious challenge for fishery workers, many of whom cannot afford to purchase the products that they produce. According to the Namibia Labour Force Survey of 2014, the average wage for the majority of workers in the agriculture and fishing sector is about $2,500. These low wages are, in part, attributed to the low skill levels in the sector. Apart from low remuneration, the fisheries sector is characterized by limited career opportunities. As noted by Paterson *et al.* (2013), low incomes and poor career prospects cause low job satisfaction and high turnover. The sector's workforce is also stratified along race and gender lines, inhibiting productivity growth and potentially instigating industrial disharmony. From the firms' perspective, there is a belief that some provisions of the Labour Act are making operations too costly (for example, having to pay workers during the off-season; however, this provision may still be to the companies' benefit, as it almost guarantees a full staff complement when they restart operations).

The challenging business environment

Fishing companies, like the rest of the Namibian economy, face a challenging operating environment. There is concern that the shortage of electricity in the region will have negative impacts on fishing companies, especially those investing in inland processing. The high cost of fuel (both diesel and electricity) adversely affects profitability, and many small companies struggle to remain viable. It is therefore not surprising that

there has been consolidation in the fishery sector, and that the sector is characterized by relatively large companies.

The variability of Namibia's exchange rate, especially over the past six years, has impacted firms' investment capacity. While firms benefit, in terms of local currency, from exchange rate depreciation, the same depreciation increases the cost of imported capital. Firms also have to contend with numerous levies and taxes. They argue that since they have to retrain employees with qualifications from local institutions including NAMFI, there is no justification for them to continue being taxed to fund the latter. Both exchange rate volatility and taxes may result in delayed investment decisions. These challenges bring about new business practices like equipment and capacity hiring over own investment.

Changing mindsets and dealing with water scarcity

In the aquaculture sub-sector, the main challenges faced by operators are water scarcity, the high level of capital intensity, and competition from other farming activities. In the areas where fresh water fish has been consumed for centuries, that fish has always been harvested from rivers. Changing people's mindsets toward growing fish and harvesting them from ponds takes time. This principle also applies to developing the expertise to conduct aquaculture. The government has developed regulations to govern the harvesting of fish on rivers and lakes so as to preserve resources and prevent the introduction of invasive species. In an interview with a tilapia farmer from the Erongo region, it emerged that tilapia is being imported from Vietnam, and that there does not seem to be adequate control at Walvis Bay. As with the processing of marine-based fish, the farmer complained that local producers are being undercut on price by the Vietnamese imports. It was also alleged that the production systems used in the exporting country do not meet the strict standards set out by the Namibian government.

Aquaculture has largely been a government initiative, with government research institutions and farms set up to develop the sub-sector. However, there are a few private entities involved in aquaculture. Overall, all fingerlings are produced and distributed by the government, including support for feeds. Government involvement in the sector is motivated by the need to guarantee food security, job creation, and income generation. The government receives support from experts from countries like Vietnam that have a significant presence in the aquaculture business. However, there is a need for more and better training and funding in order to promote the uptake of aquaculture locally. Given the shortage of water in the country, the promotion of aquaculture needs to be complimented by a national water policy that guarantees availability of and access to water by fish farmers. Furthermore, Namibia suffers from frequent droughts and flooding episodes. There may thus be a need to offer assistance to farmers, such as engaging with the financial sector to provide relevant insurance products.

Competition for coastal land and industrial (mis)classification

The mari-culture sub-sector specializes in producing high-value species like oysters, abalone, and mussels. Interviews with these producers revealed that they felt disadvantaged by the decision to classify their activities as fishing rather than farming. The current classification implies that mari-culture producers have to comply with certain legal requirements specific to the fishing sector; mari-culture operators find these requirements onerous, given the vulnerability of their sub-sector. NMA argued that the activities in the sub-sector are more related to farming (fish) than to fishing because they do not exploit an existing natural resource, but rather grow and nurture a resource that they will then harvest. Furthermore, the farmers face problems with respect to accessing suitable land, competing for coastal land with housing projects at Walvis Bay and Swakopmund. However, because housing projects have short-term and predictable large cash flows, the authorities tend to favor housing over oyster farming. City Councils are more willing to sell land to construction companies because those companies can afford high land prices and because the Councils will benefit from a constant inflow of income from housing. Moreover, banks are more willing to offer credit to construction than to fish farming because they see the latter as riskier.

In addition, mari-culture operators face significant challenges accessing lucrative markets like the EU. The latter has very high health and safety standards that Namibian producers cannot readily meet. Namibian producers have been exporting to Asia instead, but that market is increasing applying the same EU standards. Developing the ability to achieve these standards will likely be difficult, and operators may need government support through the introduction and implementation of graduated standards, and through negotiations with the EU to establish grace periods.

Access to data

The effective management of the fishery sector requires evidence-based policies. One of the big challenges facing policymakers is a lack of accessible data. In the process of conducting this research, we encountered many hurdles in accessing existing data because of the lack of a unified database, as well as sometimes cumbersome access procedures. Sometimes published data on the sector are incomplete (e.g. employment and production figures in aquaculture and mari-culture) or do not exist (e.g. allocation of fishing quotas by ethnicity and gender). Given that research on the fishery sector can contribute positively to the sector's development, failure to access existing data stifles research and hence evidence-based policy discussion and formulation. It is important that the responsible Ministries puts in place mechanisms to collect and update statistical data, especially disaggregated data.

6. Conclusion

This study has examined the structure, performance, and challenges of the fishery sector in Namibia. We highlighted that the sector is classified as a star sector that could contribute to the country's employment

and economic growth, in line with the national development programs. We have also examined the legal and institutional framework governing the fishery sector and the evolution of stocks, and have raised concerns about the growth of TACs and the pressure that this will have on stocks.

The study has highlighted the need for consistent policies that balance value addition and effective stock management in order to maintain the sector sustainably. It has also highlighted the reasons behind the government's drive for value addition, as well as the contradictions that may make stock management more difficult. There is a need for serious examination of the government's value addition policy because value addition may instigate problems for the fishery sector in the long run. There cannot be a one-size-fits-all solution for all types of fish and fish markets; it has been observed that what may be regarded as value addition for one fish type in one market may actually be value destruction in another. There is therefore a need for detailed analysis of price and income elasticities of the different fish and fish products in order to determine the implications of value addition. In addition, if local firms do not have full control over their marketing and distribution in foreign markets, they may end up losing market share in those regions if they decide on further value addition. Value addition could push firms into more competitive segments of the market that require the introduction of international quality standards. Meeting such standards will be costly but necessary if firms want to continue accessing the lucrative EU and US markets.

The problems and challenges facing fishery operators include a lack of access to finance, a shortage of skilled labor, a lack of locally owned vessels, the impacts of seismic activities and undersea phosphate mining on fish stocks, and the seemingly lack of policy coordination and consistency between the Ministries of Fisheries and Marine Resources, Mines and Energy, Industrialisation Trade and SME Development, and Environment and Tourism. The lack of coordination and agreement between these government ministries may result in fishing companies facing serious operational challenges both at home and abroad.

We used the decision support model to identify realistic export opportunities. This model provides important information that can lead to further research necessary for the diversification of markets. Judging from our model, the main challenge to the Namibian fishery sector is not necessarily a lack of a market for its products, but rather a need for market diversification to avoid the risks of market concentration. If value addition were pursued as an ideology, firms would need to develop and nurture new Namibian brands, explore new product markets, and perhaps develop new supply sources. Meeting these challenges is not necessarily insurmountable, but it will require dialogue and a coordinated approach by all stakeholders.

Lastly, this study calls on the Namibian government to maintain up-to-date and comprehensive data on fish and fish products and to allow researchers access to such data for analysis. The need for data collection and updating is most acute in the aquaculture sub-sector. Data access and information-sharing will improve transparency and oversight, and will ensure that future policy formulation and implementation is evidence-based.

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Appendix A1: TACs and Landings of Quota Species (tons), 1997-2013

Species		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Pilchards	Landings	27685	68562	44653	29702	10763	4160	22255	28605	25128	2314	23522	18755	20137	23424	31774	26260	
	TAC	25000	65000	45000	25000	10000	n/a	20000	25000	25000	25000	15000	15000	17000	25000	25000	25000	25000
	Variance ((-)ve if undercatch)	2685	3562	-347	4702	763	n/a	2255	3605	128	-22686	8522	3755	3137	-1576	6774	1260	
Hake	Landings	117583	150695	164250	191556	173277	154588	189588	189305	158060	135771	125534	117286	137312	146353	149816	145930	
	TAC	120000	165000	275000	194000	200000	195000	180000	195000	180000	130000	130000	130000	149000	140000	180000	170000	170000
	Variance ((-)ve if undercatch)	-2417	-14305	-110750	-2444	-26723	-40412	9588	-5695	-21940	5771	-4466	-12714	-11688	6353	-30184	-24070	
Horse Mackerel	Landings	301847	312422	320394	350819	315245	359183	360447	310405	327700	309980	201660	186996	215051	217094	210160	286930	
	TAC	350000	375000	375000	410000	410000	350000	350000	350000	350000	360000	360000	230000	230000	247000	310000	350000	350000
	Variance ((-)ve if undercatch)	-48153	-62578	-54606	-59181	-94755	9183	10447	-39595	-22300	-50020	-158340	-43004	-14949	-29906	-99840	-63070	
Monk	Landings	10259	16420	14802	14812	12390	15174	13135	8961	10466	9816	8932	7270	6922	9028	7243	10760	
	TAC	n/a	n/a	n/a	n/a	13000	12000	12500	12000	11500	9500	9500	9500	8500	9000	13000	14000	14000
	Variance ((-)ve if undercatch)	--	--	--	--	-610	3174	635	-3039	-1034	316	-568	-2230	-1578	28	-5757	-3240	
Crab	Landings	0	0	0	0	2343	2471	2092	2400	2408	2228	3245	2100	1577	1871	2285	2800	
	TAC	2000	2000	2000	2000	2100	2200	2000	2200	2300	2400	2500	2500	2700	2700	2850	3100	3150
	Variance ((-)ve if undercatch)	--	--	--	--	243	271	92	200	108	-172	745	-400	-1123	-829	-565	-300	
Rock Lobster	Landings	199	350	304	365	365	361	269	214	248	285	153	195	43	78	166	118	
	TAC	260	300	350	350	400	400	400	420	420	420	350	350	350	350	350	350	350
	Variance ((-)ve if undercatch)	-61	50	-46	15	-35	-39	-131	-206	-172	-135	-197	-155	-307	-272	-184	-232	

Orange Roughy	Landings	0	0	0	0	0	0	0	0	0	545	255	0	0	0	0	0	
	TAC	12000	12000	6000	2400	1875	2400	2650	2600	2050	1100	900	900	n/a	n/a	n/a	n/a	n/a
	Variance ((-)ve if undercatch)	--	--	--	--	--	--	--	--	--	-555	-645	--	--	--	--	--	
Tuna	Landings	1314	1442	1155	1419	3198	2837	3371	3581	3654	2903	4596	3281	4241	2884	4655		
	TAC																	
	Variance ((-)ve if undercatch)																	
Anchovy	Landings	2545	5193	412	146	0	0	0	0	0	0	0	0	0	0	0		
	TAC																	
	Variance ((-)ve if undercatch)																	
Seals	Number landed	25783	29475	25161	41753	44223	40000	34000	59407	64167	83045	34728	47603	41145	47821	0		
Landings of By-catches and non-quota species																		
Species		**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**		
Kingklip		2297	2211	3706	4568	6607	7210	6603	7067	5567	4493	4366	3424	4380	4810	3,045		
Others		0	0	0	0	30810	77407	33644	31997	18934	39891	40408	12973	15791	20563	29340		
Total (MT)		**2297**	**2211**	**3706**	**4568**	**37417**	**84617**	**40247**	**39064**	**24501**	**44384**	**44774**	**16397**	**20171**	**25373**	**32385**		

*Source: Adapted from MFMR Annual Reports, various issues and the MFMR Statistics Division

Appendix A2: Questionnaire for Fishing Associations / Key Informants

Name of Association: _____ Number of members: _____

1) GENERAL QUESTIONS

a) What do you see as the major challenges or barriers to the expansion of the fishing sector? (both Sea fish and fresh water fish):

b) The local consumption of fish is generally low. What can be done to increase local consumption?

c) What do you think are the bottlenecks / barriers to increasing fish exports?

d) What do you see as the opportunities for the fishing sector?

e) What are your views regarding value-addition within the fishing sector?

f) What type of support would you like from the government in this regard?

2) QUESTIONS RELATED TO SERVICES

a) Have you or your association members experienced any difficulties in accessing and/or providing services in the export market (please specify)?

b) What kind of difficulties? And how do you think the agreement with the EU should address these?

c) Have you experienced general problems with import, export, transit procedures and requirements in export markets? Please explain.

3) QUESTIONS RELATED TO SUSTAINABLE FISHERIES

a) What is your opinion regarding the TAC?

b) What effect, if any, do you think environmental issues have on your association members?

c) Do any of your customers require seeing your environmental or sustainability policy? Please explain.

d) Does your association have a written environmental policy?

e) Would you like to raise any questions regarding sustainable fisheries in relation to your exports (e.g. participation in Regional Fisheries Management Organizations, fisheries international agreements, commitments to global fisheries governance, etc)? Please indicate your area(s) of concern.

f) What do you think the government can do to help deal with these challenges?

4) QUESTIONS RELATED TO RULES OF ORIGIN

a) Are you aware of the significance of rules of origin in trade in fish and fishery products?

b) Which preferential rules of origin would you like to see applied for fish and fishery products in a trade agreement with the EU?

c) Overall, how do you assess Namibia's export potential for fish and fishery products? (Also explain what you think should be done to increase exports).

d) What kind of fish and fishery products are sensitive for the fisheries sector in our trade relations with the rest of the world?

e) Have you encountered any non-tariff barriers, such as sanitary requirements, to the export of fish and fishery products? If so, please specify region and requirements.

f) How has the supply of fish changed over the past five years? Explain how.

g) Are the members of your association able to recruit enough staff of the required skill levels? Why do you think so?

h) Are the association members able to retain enough staff of the required skill level? Why do you think so?

i) Are there any particular skills shortages in your workforce?

j) What are the three biggest issues that you think will affect your business over the next five years? Are there any other issues that are not mentioned in this questionnaire that you would like to address? [**End of questionnaire. We thank you**].

Appendix A3: HS Commodity Exports for Years 2011-13

Table A1: Namibian fish and fish product volume distribution in 2011 (considered only more than 1% trade)

HS and commodity descriptions	Percentage	Trading Partner
030374: Frozen mackerel	14.259%	CD: DEMOCRATIC REPUBLIC OF CONGO
030373: Frozen coalfish	12.873%	IT:ITALY
030379: Frozen fish, nes	7.428%	CD: DEMOCRATIC REPUBLIC OF CONGO
030422: Toothfish (DISSOSTICHS SPP)	7.233%	IT:ITALY
030374: Frozen mackerel	5.952%	AO:ANGOLA
030411: Fresh or chilled swordfish (XIPHIAS GLADIUS)	5.539%	PT:PORTUGAL
030378: Frozen hake	4.908%	IT:ITALY
030373: Frozen coalfish	4.152%	PT:PORTUGAL
030341: Albacore or longfinned tunas (THUNNUS ALALUNGA)	3.654%	ES:SPAIN
030422: Toothfish (DISSOSTICHS SPP)	3.333%	NL:NETHERLANDS
030229: Other fresh or chilled flat fish (excl. halibut, plaice and sole)	3.051%	ES:SPAIN
030373: Frozen coalfish	2.329%	MZ:MOZAMBIQUE
030429: Frozen fish fillets -- other	2.162%	FR:FRANCE
030374:Frozen mackerel	1.974%	CO:COLOMBIA
030379:Frozen fish, nes	1.381%	AO:ANGOLA
030429: Frozen fish fillets -- other	1.336%	AU:AUSTRALIA
030367: Frozen Alaska pollack (Theragra chalcogramma)	1.310%	ZW:ZIMBABWE
030411: Fresh or chilled swordfish (XIPHIAS GLADIUS)	1.264%	ZA: SOUTH AFRICA
030411: Fresh or chilled swordfish (XIPHIAS GLADIUS)	1.171%	UM: UNITED STATES MINOR OUTLYING ISLANDS
030353: Frozen Sardines (sardina pilchardus, sardinops spp) sardinella, brisling or sprats	1.100%	MZ:MOZAMBIQUE

Table A2: Namibian fish and fish product volume distribution in 2012 (considered only more than 1% trade)

HS and commodity descriptions	Percentage	Trading Partner
030474: Frozen fillets of Haka blocks, rect, of a mass of 7kg - 8kg, interleaving plast	11.60%	ES:SPAIN
030389: Other frozen fish, nes	9.92%	CD:DEMOCRATIC REPUBLIC OF CONGO
030354: Frozen Mackerel (Scomber scombrus, Scomber australasicus, Scomber japonicus)	6.51%	CD:DEMOCRATIC REPUBLIC OF CONGO
030353: Frozen Sardines (sardina pilchardus, sardinops spp) sardinella, brisling or sprats	5.90%	IT:ITALY
030469: Other frozen fillets blocks, rect, of a mass of 7kg - 8kg, interleaving plastics	5.41%	ES:SPAIN
030366: Frozen Hake (Merluxxius spp. Urophycis spp)	5.10%	ES:SPAIN
030384: Seabass (Dicentrarchus spp)	4.78%	IT:ITALY
030354: Frozen Mackerel (Scomber scombrus, Scomber australasicus, Scomber japonicus)	3.37%	AO:ANGOLA
030479: Other Frozen fillets blocks, rect, of a mass of 7kg - 8kg, interleaving plast	3.35%	ES:SPAIN
030254: Hake (Merluccius spp, Urophycis spp	2.95%	ES:SPAIN
030355: Frozen jack and horse markerel (Trachurus spp)	2.31%	AO:ANGOLA
030353: Frozen Sardines (sardina pilchardus, sardinops spp) sardinella, brisling or sprats	2.26%	IE:IRELAND
030474: Frozen fillets of Haka blocks, rect, of a mass of 7kg - 8kg, interleaving plast	1.99%	DE:GERMANY
030384: Seabass (Dicentrarchus spp)	1.92%	MZ:MOZAMBIQUE
030472: Frozen fillets of Haddock blocks, rect, of a mass of 7kg - 8kg, interleaving plast	1.90%	IT:ITALY
030354: Frozen Mackerel (Scomber scombrus, Scomber australasicus, Scomber japonicus)	1.43%	MZ:MOZAMBIQUE
030449: Other	1.38%	ES:SPAIN
030474: Frozen fillets of Haka blocks, rect, of a mass of 7kg - 8kg, interleaving plast	1.25%	FR:FRANCE
030449: Other	1.23%	PT:PORTUGAL
030499: Other	1.23%	ES:SPAIN
030355: Frozen jack and horse markerel (Trachurus spp)	1.12%	BZ:BELIZE
030345: Bigeye tunas (THUNNUS OBESUS)	1.05%	ZW:ZIMBABWE

Table A3: Namibian fish and fish product volume distribution in 2013 (considered only more than 1% trade)

HS and commodity descriptions	Percentage	Trading Partner
030474: Frozen fillets of Haka blocks, rect, of a mass of 7kg - 8kg, interleaving plast	14.11%	ES:SPAIN
030354: Frozen Mackerel (Scomber scombrus, Scomber australasicus, Scomber japonicus)	10.03%	CD:DEMOCRATIC REPUBLIC OF CONGO
030389: Other frozen fish, nes	9.62%	CD:DEMOCRATIC REPUBLIC OF CONGO
030389: Other frozen fish, nes	6.12%	ES:SPAIN
030365: frozen Coalfish (Pollachius virens)	5.85%	ZA: SOUTH AFRICA
030353: Frozen Sardines (sardina pilchardus, sardinops spp) sardinella, brisling or sprats	5.11%	MZ:MOZAMBIQUE
030384: Seabass (Dicentrarchus spp)	4.15%	IT:ITALY
030354: Frozen Mackerel (Scomber scombrus, Scomber australasicus, Scomber japonicus)	4.10%	MZ:MOZAMBIQUE
030355: Frozen jack and horse markerel (Trachurus spp)	4.08%	CD:DEMOCRATIC REPUBLIC OF CONGO
030353: Frozen Sardines (sardina pilchardus, sardinops spp) sardinella, brisling or sprats	3.08%	IT:ITALY
030384: Seabass (Dicentrarchus spp)	2.66%	MZ:MOZAMBIQUE
030472: Frozen fillets of Haddock blocks, rect, of a mass of 7kg - 8kg, interleaving plast	2.57%	IT:ITALY
030479: Other Frozen fillets blocks, rect, of a mass of 7kg - 8kg, interleaving plast	2.38%	ES:SPAIN
030474: Frozen fillets of Haka blocks, rect, of a mass of 7kg - 8kg, interleaving plast	2.04%	DE:GERMANY
030354: Frozen Mackerel (Scomber scombrus, Scomber australasicus, Scomber japonicus)	2.01%	ZM:ZAMBIA
030354: Frozen Mackerel (Scomber scombrus, Scomber australasicus, Scomber japonicus)	1.50%	IE:IRELAND
030389: Other frozen fish, nes	1.44%	FR:FRANCE
030474: Frozen fillets of Haka blocks, rect, of a mass of 7kg - 8kg, interleaving plast	1.41%	FR:FRANCE
030365 Frozen Coalfish (Pollachius virens)	1.35%	PT:PORTUGAL
030472: Frozen fillets of Haddock blocks, rect, of a mass of 7kg - 8kg, interleaving plast	1.13%	NL:NETHERLANDS
030354: Frozen Mackerel (Scomber scombrus, Scomber australasicus, Scomber japonicus)	1.04%	CL:CHILE

Appendix A4: Estimates of Tariff Levels Faced by Namibian Fish Exports

Namibia's fish and fish products exports face varying levels of tariffs around the world. High tariffs reduce the international competitiveness of the exports to the advantage of low-cost producers. The fisheries sector is generally highly protected in many countries, including those producing in small quantities. High tariffs and extensive domestic subsidies are usually introduced to encourage domestic production. It is important for the fisheries sector in Namibia to diligently study the international fish market, trade barriers, and export opportunities in order to enhance its position nationally and internationally. Table A4 shows estimates of import tariffs imposed on fish and fish products by various trading partners.

Table A4: Import tariff estimation faced by Namibia (%)

Importers	HS03	HS0303	HS0304	HS 0305	HS 0306	HS 0307
Algeria	29.9	30				
Angola	24.7	21	22	30	30	30
Antigua and Barbuda	16		10			
Argentina	9.7				10	10
Benin	11.3	10				
Botswana			30			
Brazil	9.2		15	4.5	10	
Cameroon	20.1	20				
Canada	1.1		4.6			
Chile	6					6
China	10.1	9.2		14.6	7.7	12.2
Congo	20.1	20				
Democratic Republic of the Congo	12	10		10	20	20
Dominican Republic	17.6			14.8		
Ghana	5	5				
India	30					
Indonesia	5.4	5.2				
Iran, Islamic Republic of	28.1	19.9				
Ireland			10			
Japan	4.6	4.3	10	10.4	2.7	8.2
Korea, Republic of	14.1	10			19.5	17.5
Morocco	10	10				
Mozambique			5			
Nigeria	10.7	10		15		
Norway			38.1			
Panama	13.1	12.8				
Philippines	7.3	6				
Russian Federation	6.7	6				
Saudi Arabia	2.9	5				
Senegal	11.3	10				
Taipei, Chinese	18.9	18.2				
Ukraine	1.3	0.4				
United Arab Emirates	2.9	5				
Uruguay	9.7	9.7		8.1	10	
Vanuatu	15.3					15
Viet Nam	13	14.5			5.7	11.3
Zambia	0.1				13.4	
Zimbabwe	5.8	2.9		7.5		15.3

03 Fish, crustaceans, molluscs, aquatic invertebrates nes; 0303 Fish, frozen, whole; 0304 Fish fillets and pieces, fresh, chilled or frozen; 0305 Fish, cured or smoked and fish meal fit; 0306 Crustaceans; 0307 Molluscs
Source: http://www.trademap.org, accessed on 20/12/2014

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