UiT
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The Governance of the Angolan Industrial and Semi-industrial Fisheries

A Governability Assessment of the Commercial Fishery

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Tromsø – Norway

DECLARATION

I hereby declare that this work is the product of my own research efforts, undertaken under the supervision of Professor Dr. Petter Holm, and has not been presented elsewhere for the award of the degree. All the sources have been duly and appropriately acknowledged and therefore bear a sole responsibility for any shortcomings.

Tromsø, Norway

May 2018

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CERTIFICATION

This is to certify that this thesis was supervised in accordance with the procedures laid down by UiT – The Arctic University of Norway, Faculty of Biosciences, Fisheries and Economics, Norwegian College of Fisheries Science.

Professor Dr. Petter Holm

Supervisor

DEDICATION

To my lovely spouse, **Chesira Evelaine Códia**

You’re my best friend

My unique Love ‘til the end

You’re my best choice

My greatest Rejoice.

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ABSTRACT

Angola has a very long coastline, and shares the Benguela Current Large Marine Ecosystem (BCLME) with Namibia and South Africa in the SADC region, one of the most productive LME in the world. The fauna is rich in small pelagic species, crustaceans and demersal fish community, explored by the commercial fishery. Understanding governability as a process of finding balance between the needs and capacities of the governing system, enables to devise ways of managing the challenges fisheries are confronted with. The aim of this study is therefore to look at the elements of fisheries management systems focusing at the governance systems of the Industrial and Semi-industrial fisheries of Angola, using the governability assessment framework rooted in the perspectives of interactive governance. The claims are that a better knowledge of the governing system, the system-to-be-governed and the interactions among them are determinant factors for an improved and qualitative governance of the Angolan commercial fishery. For more clarity on the characteristics of the systems under analysis and their interactions, semi-structured interviews with important stakeholders were conducted. After the analysis, the study reveals variations in some features of the systems (e.g. environmental variabilities, fishing pressure, scientific information and participation) that are key elements for the governability process. The study provides inspirational ideas on governance interactions that can enhance governability and the attainment of the goals set.

Keywords: Governability, Governability Assessment, Interactive Governance, Angolan Industrial and Semi-industrial Fisheries, System analysis.

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LIST OF ABBREVIATIONS AND ACRONYMS

AC - Angola Current

BC – Benguela Current

BCC – Benguela Current Convention

BCLME - Benguela Current Large Marine Ecosystem

CECAF - Eastern Central Atlantic Fisheries Committee

CCRF - FAO Code of Conduct for Responsible Fisheries

COMHAFAT - Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean

CPUE - Catch Per Unit Effort

DNP – Direcção Nacional das Pescas (National Directorate of Fisheries)

EEZ - Exclusive Economic Zone

FADEPA – Fundo de Apoio ao Desenvolvimento da Indústria Pesqueira

FAO - Food and Agriculture Organisation of the United Nations

GEPE – Gabinete de Estudos, Plneamento e Estatística

ICCAT - International Convention for the Conservation of Atlantic Tuna

IMO - International Maritime Organization

INFOPECHE - Intergovernmental Organization for Marketing Information and Cooperation Services for Fishery Products in Africa

INIP- Instituto Nacional de Investigação Pesqueira

IVQ – Individual Vessel Quota

LMEs - Large Marine Ecosystems

LOA - Length Over All

LRBA – Lei dos Recursos Biológicos Aquáticos (Law of Aquatic Biological Resources)

MARPOL - 1973 International Convention for the Prevention of Pollution from Ships and 1978 Protocol

MINPESMAR - Ministério das Pescas e do Mar (Ministry of Fisheries and the Sea)

N/A - No information available

O - Overfished

OECD - Organization for Economic Co-operation and Development

SAP - Strategic Action Plan

SEAFO - South East Atlantic Fisheries Organisation

SECC - South Equatorial Counter Current

SNFPA - Serviço Nacional de Fiscalzação Pesqueira e da Aquicultura

SOLAS - International Convention for the Safety of Life at Sea

TAC - Total Allowable Catch

TDA - Transboundary Diagnostic Analysis (TDA)

U – Slightly under-fished

UNCLOS – United Nations Convention of the Law of the Sea

UNDP – United Nations Development Program

USD – United States Dollar

VMS - Vessel Monitoring System

WG – Working Groups

CHAPTER 1: INTRODUCTION

1.1 Settings

The governance of fisheries has always proved to be a very challenging task (Chuenpagdee & Jentoft, 2009). Although governing efforts have been undertaken, it is still unpopular to find a fishery that is well managed and viable in biological and socioeconomic terms (Song & Chuenpagdee, 2010) and the general answer to the question about the governance of fisheries if it has dramatically improved or not, is still a very firm no (Miles, 2010)(Miles).

The Angolan vast coast possesses significant marine biodiversity and habitats that provide productive fishing grounds to the coastal cities. The fauna is rich in small pelagic species, crustaceans and demersal finfish community. Some of the living resources it harbours have a transboundary nature particularly the small pelagic fish in the Benguela Current Large Marine Ecosystem (BCLME). The marine ecosystem is richly blessed with an abundance of economically valuable non-living marine resources especially oil and gas, where Angola after Nigeria is the largest oil producer in Sub-Saharan Africa. Fisheries play a very important role for the country and its people as sources of animal proteins, employment, and food to population of the coastal regions (where it is often the only source of livelihood for the poorer population groups) as well as a significant source of income of foreign currency.

The Angolan commercial fishery is characterized by three types of fisheries namely, the industrial and semi-industrial fisheries (the focus in this study), carried out mainly by foreign vessels leased to, or in joint venture with Angolan companies and lastly the artisanal fishery. The Industrial and semi-industrial fleet have greater percentage contribution to the total marine catches followed by the artisanal fisheries. Similar to many fisheries around the world, this sector has been governed to achieve managerial-based outcomes where management and conservation methods are focused on Effort control and Catch control and other related tasks. The activities are aided by legislative instruments (the Fisheries Law (*Lei 6-A/04*)), and two presidential Decrees containing detailed management measures and provision for duty free quotas for import of horse mackerel respectively. The expected results range from the guarantee of the sustainability of the resources and well functioning of the ecosystems, to job creation and improved quality of life of its people.

In acknowledging the importance of these 'first order governance' tasks, is equally important to look at other aspects that can affect the human, biodiversity and environmental health and the governability (as defined in chapter 2) of the fishery. This means looking to the fishery at the perspective of ecosystem governance by gaining proper understanding of the human system and that of natural system including the existing interactions among them (Kooiman, Bavinck, Jentoft, & Pullin, 2005). The globe is becoming like a small village connecting producers and resources as well as market more than ever through globalization, which brings its own problems. The management and governance capacities of fisheries differ worldwide and in most cases, such capacities are not at levels that enable the governing actors to address in more effective way the identified needs and demands (Song & Chuenpagdee, 2010). In the search for solutions, many remedies are proposed (based on disciplinary backgrounds) but most of them fail to account for the contextual variation and consequently fail to achieve their objectives (Jentoft, 2007a).

Unquestionably, governing fisheries pose many challenges that frequently make somethings inevitably go in undesirable direction. It is in such situations that many voices are echoed: scientists engage in discovering the nature of the problem, managers devise the quickest solution possible and the politicians look for the fall guy; while the resource users and the public are desperate for help and in need of information, lawsuits are meticulously prepared by the environmentalists (Chuenpagdee & Jentoft, 2009). The reported state of the Angolan marine resources (underutilized while others are overexploited), the natural environmental oscillations and anthropogenic threats, require immediate intervention in the form of effective resource management measures. Governance is therefore critical for the fisheries and if its process is well understood and where necessary, governance is improved, it becomes the heart of effective conservation and wise utilization of the common natural resources (MRAG, 2018). Assessing the features of diversity, complexity, dynamics and scale of the coexisting systems (i.e. the governing system, the system-to-to-be-governed and their interactions), is possible to identify the unbalances between these systems and improve their governability.

1.2 Research problem

The contribution of fisheries to the economic growth, food security and poverty alleviation as well as employment is a reality acknowledged worldwide. However, reports have shown that since the late 1980s, the global marine fisheries landings have declined by about 0.7 million tonnes per year and at least 28% of the world's fish stocks overexploited or depleted, and 52% fully exploited in 2008 (Mora et al., 2009). The share of fish stocks within biologically sustainable levels has exhibited a downward trend worldwide from 90% in 1974 to 68.6% in 2013 and consequently, 31.4% of fish stocks were estimated as fished at a biologically unsustainable level and therefore overfished (FAO, 2016). Such negative impacts result from severe reductions in abundance, leading to changes in population genetic structure, harm the recovery potential of many stocks, trigger broader ecosystem changes, threaten livelihoods, and endanger food security and efforts towards the reduction of hunger (Mora et al., 2009).

The global fishing effort, depletion of marine fish stocks, are evaluated to approximately 50 billion US dollars in terms of economic loss (Anticamara, Watson, Gelchu, & Pauly, 2011). In part, the increase in fishery activities in the recent decades are the result of a growth in human populations, and the increase in fishing pressure threatens the sustainable removal of target and non-target species (Mccluskey & Lewison, 2008). Furthermore, the fishing effort, expressed as total engine power and number of fishing days in a year (kilowatt days), showed no significant changes in previous years (1950 to 1970) and increasing from then to present day (Anticamara et al., 2011). In the region of SADC in which Angola is part of, the most important commercial stocks are between fully exploited and overexploited (not always as a result of historical over-exploitation rather than current excesses (FAO, 2016).

Like in most African marine ecosystems and the world at large, the Angolan marine ecosystem is not immune to the cumulative effects of population growth, over-fishing, rising levels of pollution and degradation of habitats, climate change and deficiencies or challenges in the governance of the resources and other ecological and social problems. The challenges are not only those related to overfishing but also inefficient statistical information (Angelini & Vaz-Velho, 2011), scientific uncertainties (INIP, 2016), including monitoring, control and surveillance. Angola was ranked 51st in world catch in 1999 with a total of 169, 799 tonnes (FAO, 2014b), and at the third last position in terms of compliance to the UN code of conduct for responsible fisheries (Pitcher, Kalikoski, Pramod, & Short, 2009). Others studies showed

concerns about the status of the stocks (Roux & Shannon, 2004), reliability of available information and conflicts (Lankester, 2002); (Agritrade, 2004). Angola with its three main ports: Luanda, Benguela (in Lobito) and Namibe, and its role as a major oil producer has resulted in a significant increase in the number of large oil tankers traversing the BCLME (Hamukuaya, Attwood, & Willemse, 2016). With the advent of peace in 2002, emphases was put on diversification of the economy, and the interest of many companies to enter the fishery is visible therefore, a more efficient and continuously improved governance is worthwhile.

The challenges faced in fisheries governance sometimes exceed the ecosystems' carrying capacity and that of management systems, and can become limiting factors to the governability process. It is agreed among scholars that, governance goes beyond what is traditionally known as management (Bavinck et al., 2005) and that the causes of continued decline of most commercially important fish stocks worldwide are rooted in failures of governance (Miles, 2010). In order to prevent ecological and economic destruction of the world's fisheries is necessary to have in place resource governance regimes (Johnsen, 2014), while acknowledging as well that there are no arrangements and specific measures that should be established for the achievement of a more successful system of governing fish and all other living marine resources (Johnsen, 2014). The dynamics and complexities are so intrinsic in fisheries and coastal systems that sometimes, governors are confronted with challenging and complicated tasks with which they find no solution, the uncertainties are always present with regards to the available tools in use, the list is so long that such problems deserve being termed as "wicked" (Jentoft & Chuenpagdee, 2009a).

Based on the interactive governance perspective, governance is not just about the selection of appropriate tools or even instruments from a standard toolbox, there is no single type of governability situation available, therefore, governability has to do with the governing system's capacities to handle the problems that plague the fisheries system (Bavinck, Chuenpagdee, Jentoft, & Kooiman, 2013). This study aims therefore at performing a governability assessment on the Angolan Industrial and Semi-industrial fisheries. Rooted in the interactive governance principles, the analysis include the various features of the system-to-be-governed, the governing system as well as the existing interactions between and within the systems and how these interactions affect the governability of this important fishery sector.

1.3 Research objectives

The main objective of this thesis is to conduct an exploratory and critical study of the Angolan Industrial and Semi-industrial fishery, focusing on the Interactive Governance as the analytical perspective to address its governance. It explores the capacities of governing system to realise the envisaged objectives and the challenges that influence its governability. The author is neophyte in the governability assessment process however, believes that the study may form the basis for further or deeper studies of the components covered. In this attempt, due to the nature of the subject (multidisciplinary), is the authors' desire to learn more about the multi-dimensions of fisheries governance.

Taking into account the tool in use (for the governability assessment), not fully developed although widely applied, the components of this framework will not be applied in their entirety and/or profundity as elaborated further in section 5.5. The comprehensive, flexible and systematic way of analysing governability is a key novelty of the framework, making it possible to illustrate the systems and their inherent features that affect governability. It should also be mentioned that it is difficult to predict the level as well as the quality of the data for a better assessment due to its exploratory form and time frame allocated to the study. Aware of these and some other existing limitations, the study will have to be necessarily limited in terms of extent and depth of the analysis without necessarily undermining the most important factors that can portray clarity to the theme as well as those that can limit the fulfilment means of this important study.

1.4 Research questions

The terms used in formulating the research questions are technically specific, based on the Interactive Governance upon which the study focuses and will be defined and discussed in chapter 2. Four questions are posited, forming the foundation of the research:

1. How is the Angolan Industrial and Semi-industrial fisheries governed?
2. To what extent does the capacities of the Governing System meets the needs of the System-to-be-governed?
3. What features of the systems constitute limiting factor to the governability of the fishery?
4. What is the socioeconomic contribution of the Industrial and Semi-industrial fisheries?

1.5 Relevance of Study

There is an increase in fishing activities worldwide driven by many factors and posing pressure on the marine and other aquatic resources and consequently, threatens the sustainability of the resources. Governing fishery resources has been proving to be critical. It involves formulation of better management plans and well-organized or coordinated fishery data collection as lasting access to these resources is concerned. This research explores the elements of fisheries governance systems of the Angolan fishery sector and attempts to explore the challenges and advancements of the sector, the variations in effort and catch, the stauts of the stocks and suggest governability aspects for the sustainability of the resource and for better socioeconomic and biological outcomes. It also contributes to the body of literature on the Angolan fishery and to the discourse about governance of marine resources.

1.6 Structure of the Study

This study is structured into six (6) chapters in total. The theoretical framework and literature review in chapter 2, and includes a detailed explanation of the governability assessment framework. Chapter 3 provides insights of the methodological approach and research design adopted in answering the research questions. The limitations encountered in the process of data collection, the process of data analysis through assessment of the system properties and attributes related to the Industrial and Semi-industrial fishery of Angola are also presented in this chapter. Chapter 4 presents a brief history of Angola and the fishery sector. In chapter 5, the results and discussion on how the governing system and the system-to-be governed influence each other is given; it is also discussed in here the governability challenges and limitations and consequently their impacts on the achievement of the envisaged goals. Chapter 6 is the concluding chapter of the study and contains a short summary of the findings of the thesis in relation to the research questions.

CHAPTER 2: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Introduction

In this particular section the key concepts, theories, and models are provided serving as support, guidelines and justification for this study together with the literature review. This aims to elucidate and guide the more appropriate way of exploring and understanding the attributes of governance that can bring about deliberate transformations and contribute in building a more resilient socioeconomic and ecological systems.

2.2.1 Theoretical Framework

The never-ending but ever increasing dependence of coastal communities on the marine environment for their livelihoods is extensively addressed in the academic settings. The common property nature of these marine resources poses major challenges for their governance and a test to the management (i.e. fisheries management). The conceptualization of the fishery system can play a positive role in clearly identifying the main actors, the components as well as the process within the fishery sector itself that are determinants for a successful management. Fundamental concepts of Fisheries management, Governance and its orders and styles are provided. In order to conceptualize the objectives of the study and frame the empirical data it is here applied the Interactive governance approach and the governability assessment framework, which will also be elaborated further.

2.2.2 Fisheries Management

Scholars have defined Fisheries management, as an integrated process that seeks to improve the benefits the society receives from fish harvesting (Staples et al., 2014). Includes information gathering, analysis, planning, consultation, decision-making, allocation of resources and formulation and implementation as well as enforcement (where necessary) of regulations or rules governing fisheries activities. These rules and regulations define where, how and how many fish can be harvested in a specific year. The main goal of fisheries management is to ensure the continued productivity (sustainability) of the resources and accomplishment of other fisheries objectives, that is, ensure sustainability by harvesting as much resources as possible without destabilizing the marine ecosystem for the benefit of the generations to come (Staples et al., 2014). This task involves the use of scientific data and complex models to predict the effects of current fishing efforts on the future number of species or stocks.

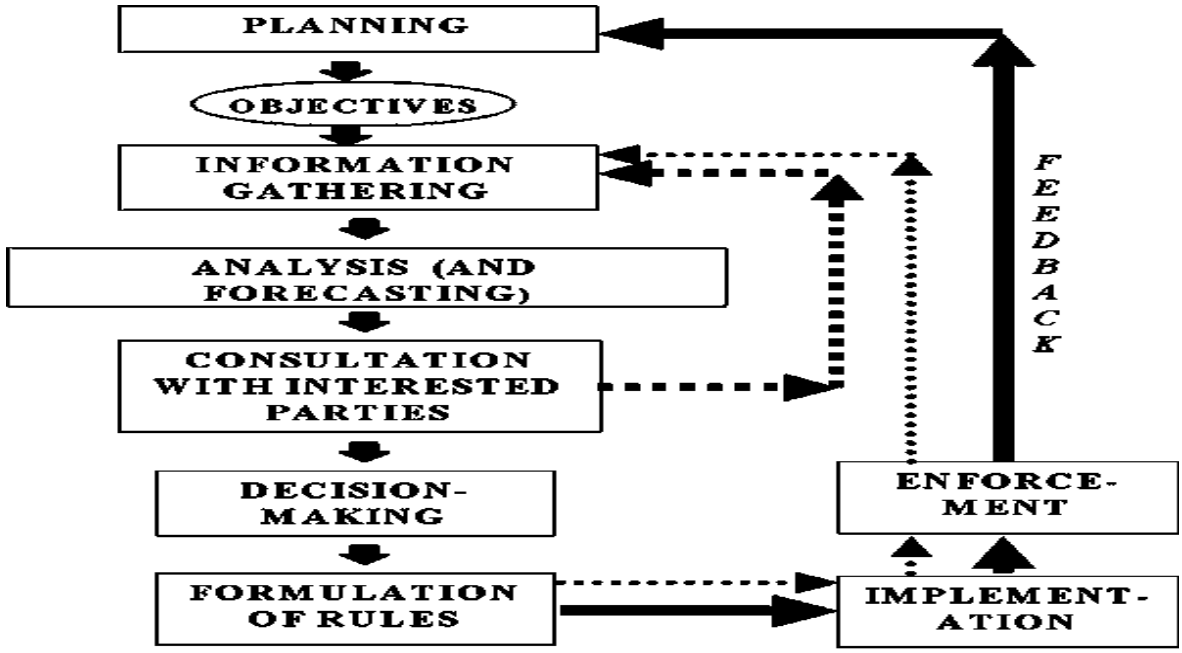

Figure 2. 1 Diagrammatic representation of the functions and responsibilities of a fisheries management authority in relation to fishing, and the inter-relationships between the functions (Cochrane & Garcia, 2009).

2.2.3 Management strategies

Management strategies exist in many fisheries worldwide, for clarification one would find it important that the concept is anticipated by its definition. Therefore, management strategy is the totality of the management measures that a given fishery has selected to achieve its biological, ecological, economic and social objectives (Cochrane & Garcia, 2009). Fisheries sector is a very important segment which involves many interests, and regulating it in a better way however is a challenge. Such challenges raise questions like: "does a good regulatory system exist (Jentoft, 1993)?

Each fishery can apply many of the existing management measures such as input (effort) and output (catch) controls and technical measures (such as regulations on fishing gears e.g. on mesh size to improve the selectivity of a fishing gear in order to reduce the bycatches of juvenile fish, time and area restrictions respectively). Other examples of management measures include establishing a minimum size, a seasonal closure of the fishery, limiting the total number of vessels in a fishery, and a licensing scheme (Cochrane & Garcia, 2009). The analyses of catch and effort data helps in great manner in providing estimates of current and unexploited stock biomass, as well as other parameters of fish population dynamics. The results from these studies

provide managers with estimates of the potential yield of fish stocks, taking account of uncertainty and variable recruitment. It was also pointed out that in order to effectively control a fishery, it is important firstly to understand the dynamic interactions taking place between the fishery resource per si, the fleet operating on these very resources and the catches from these fishing operations; additionally, it is important to find ways to properly model these interactions (Nuske, 1982).

2.2.4 Governance

Before advancing to the governability assessment, it is important to have some fundamental concepts connected to it defined or clarified. There are solid arguments about the changes that have been taking place concerning the terms "governance" and "government". The former is of greater attention and explanation in this particular paper.

Some have argued that despite the popularity of the term (governance), its use is very imprecise (Rhodes, 1996). As prominent scholars pointed out (Bavinck et al., 2005), all talks around fisheries governance and the necessity for a new perspective, aim not to portray an image of a currently ungoverned fisheries (because truly they are). In contrary, the aim is to lead people to recognize that the crises and conflicts in the sector are indicators that in fact there are grave problems with the past and present governance (Kooiman et al., 2005). With this in mind, it is then possible to look for better ways to strengthen and enhance present systems. Governance can be seen as the reflection of how communities, societies and organizations such as fisher cooperatives and government agencies, organize themselves in order to make important decisions regarding the use and protection of their common resources, avoiding in this way unsustainable practices; it helps to analyze and consider issues related to power, knowledge and legitimacy (Armitage, Charles, & Berkes, 2017). The term "Legitimacy" is clarified further in this chapter.

2.2.5 Fisheries Governance

The modern fishery governance is defined by FAO as "…*the exercise of economic, political and administrative authority*". It is characterized by: "*guiding principles and goals (conceptual and operational); the ways and means of organization and coordination; the infrastructure of socio-political, economic and legal institutions and instruments; the nature and modus operandi of the processes; the actors and their roles; the policies, plans and measures that are produced; as well as the outcomes of the exercise*" (FAO, n.d.).

Fisheries governance sets up the overriding principles and objectives of the fishery sector. Includes the development of policy and regulatory frameworks, makes the connection between government and civil society while harmonizing individual, sectoral and societal perspectives. Also, seeks to maintain the social order and the productive socio-ecological systems; it legitimates and balances the interactions among stakeholders, enforces decisions and regulations and last but not least, it conditions the allocation of power, resources and benefits and maintains the governance system capacity to learn and change (FAO, n.d.). Fisheries governance is the activity of regulating the existing relationship between humans and their fishing resources and the way they exploit these fishing resources (Johnsen, 2014).

2.2.6 The Interactive Governance Theory

The terms "governance" and "government" have many different uses. Currently, the use of governance is not synonym of government, but yes it means a change in the meaning of the government, referring to a new process of governing, or changed condition of ordered rule or the new method by which society is governed (Rhodes, 1996). Additionally, governance is the self-organizing inter-organizational networks and these networks although already self-organized, the capacity to regulate them is still not developed, requiring therefore managerial reforms such as managerial styles based on facilitation and accommodations and new forms of cooperation as a government (Rhodes, 1996). Therefore, from the views of interactive governance theory, governance in simple terms is "*the whole of public as well as private interactions taken to solve societal problems and create societal opportunities. It includes the formulation and application of principles guiding those interactions and care for institutions that enable them* (Kooiman et al., 2005).

2.2.7 The orders of governance

Governance involves many activities ranging from daily short-term decisions for minor issues to the development of strategic plans for long-term and major issues. In this perspective, governing activities are divided into three interrelated categories of human activities termed as "orders of governance" which are seen not as geographical or temporal scale, but as layers, each layer encompassing and acting on the layer below (Bavinck et al., 2005):

- ***The first order of governance:*** involves the daily activities and interactions of people (mostly fishery governors) to solve a particular problem.
- ***The second order of governance:*** develops the capacity to undertake first order governance, provides rules on how things are done.

- ***In the third order*** *(or meta-governance*): articulates the main normative principles and values and guide the behaviour of first- and second-order governing.

2.2.8 Legitimacy

For a legitimate and effective governance of fisheries, the interactive governance perspective suggests that the three orders of governance are necessary for the achievement of both, short and long term goals (Bavinck et al., 2005). The orders of governance highlighted above bring us back to the issue of "legitimacy" which for instance in a fisheries management system, reflects how fishers react to the rules the system contains and this may become a determinant factor for success or failure of the system. It is agreed by many that, "*the higher the degree of legitimacy of a management system in the eyes of its users, the greater its chance of achieving its goals*" (Kooiman et al., 2005). This is simply because it maximizes respect, and provides support among those who are affected by the rules, who in turn will then be more willing to abide on such existing rules (Bavinck et al., 2005).

Therefore, the legitimacy crisis in fisheries is the product of lack of opportunities for users to participate in the management. In most cases the fishers reactions to these are twofold (Jentoft, 2000): first, is "**the exit response"** – they disobey the rules to show their dissatisfaction (i.e. purposely exceed the quota), whose consequences are the risks of criticism, moral condemnation and others. Second, is the "**voice"** – their dissatisfaction is taken to a proper forum; they seek peer group support, media and others, including government and may result in criticism and repression and the best solution to this is co-management (Jentoft, 2000). Other fundamental principles to consider for legitimacy, which affect the observance of regulations, among resource users: **Legality and morality** - A legitimate management system, bases his rules on existing laws. However this is not sufficient because those affected may find it illegitimate and also because legitimacy can change over time, as an example of this is that of individual vessel quota in the Norwegian fishery; therefore, justification by some moral principles and values is a must. **Subjective and objective –** management system must be supported by respect to standards of rationality, reason and justice, otherwise fishers will consider it hard to accept (Jentoft, 2000). Institutions should be open for communication and give fishers the opportunity to express themselves.

2.2.9 The Modes or Styles of the governance Theory

In all societies according to the governance theory, based on their locus, three required common modes or styles can be distinguished (Kooiman et al., 2005): **Hierarchical governance** which characterizes the interaction between a state and its citizens (a top-down style of intervention) expressed in policies and in law. Although many changes has been taking place in this category, the state continues to be the central governing unit in modern society**. Self-governance**, this describes a situation in which actors take care of themselves without governmental intervention or policies, that is, it comes by mutual agreement. Under this situation, the liberal government highlights societal self-governing capacities, while the social governments may down play them by choosing to deregulate or even incorporating self-regulatory capacities in their governance frameworks. The third style is **co-governance** (called co-management in fisheries but at a lesser degree in comparison), where the parties in a given society unit for a common purpose, using their positions and identity in the process. In mind, and stake their identity and autonomy in the process and a key distinguishing factor is that no one actor is in control, thus the interactions are horizontal.

2.3 Fisheries governance views of globalization

The above mentioned problems (including the ones in chapter 1) are just portions of global challenges and concerns in capture fisheries as well as aquaculture with respect to harvests, fish stocks and health of aquatic ecosystems which are constantly attributed to the increasing demand, short supply, overfishing and unsustainable fishing practices.

Globalization has its influences on how fisheries is today: its operations, social structure and organization. According to some scholars, the advantages or disadvantages of globalization depend largely on its drivers (Kooiman et al., 2005). For the particular case of fisheries, its impacts either positive or negative, should be measured on how it drives the development of fisheries. They emphasized without hesitating that the concerns afore mentioned including ecosystem health, social justice, livelihoods, food security and safety and increased effort in industrial fishery are the results of globalization evidenced from the 20th century (Kooiman et al., 2005).

2.4 Governability

As afore mentioned, the governance of fisheries and coastal areas is challenged by numerous problems which are termed as "wicked problems" (Jentoft & Chuenpagdee, 2009b), in the sense that they are very complex and tricky, problems which are difficult to define and delineate from other and bigger problems. They are not solved once and for all instead they pose a constant challenge and one is never sure or certain when or if such problems are solved. From the views of the Interactive governance theory these wicked problems are called the ''governability'' issue and that there are limits to how systematic, effective and rational a governing system can be in solving them (Jentoft & Chuenpagdee, 2009a).

By definition, governability is the overall capacity for governance at a given social entity or system (Scholtens & Bavinck, 2013). The argument behind the theory is that fisheries and coastal systems are inherently diverse, complex, dynamic and operating at multiple scale levels and such characteristics constitute a challenge for their governability; the more diverse, complex and dynamic the systems are, the more difficult it is to govern their functioning (Scholtens & Bavinck, 2013) and (Chuenpagdee & Jentoft, 2009).

2.5 The Governability Assessment Framework

In order to assess the capacity of a system for governance, it is necessary that that same system be split into three sub-systems: *the governing system, the system to be governed,* and *the governing interactions* between these two (Bavinck et al., 2013). On one hand according to the scholars (Jentoft, 2007b), the governing system is social or man-made, in it we find the institutions, steering instruments and mechanisms; on the other hand, the system-to-be-governed is a combination of two entities, that is, partly natural and partly social. Consisting of an ecosystem and the resources that are found in it, a system of users and stakeholders who form political coalitions and institutions among themselves. A closer look is also be given to the relationship and interaction between the two systems. Interactions are seen as the exchanges taking place in a context of interdependency which at the same time affect the partners involved (Kooiman et al., 2005). The main goal of the governing system is to influence the interaction between the social and the natural sub-systems being governed (Jentoft, 2007b).

The four features (diversity, complexity, dynamics and differences in scale) identified by the authors in the system to be governed are determinant factors for the success or failure of governance, therefore they require an appropriate analysis (Bavinck et al., 2013). A framework

of the governability assessment is presented bellow (Figure 2.2) and clear definition of each of the terms is provided (Jentoft, 2007b).

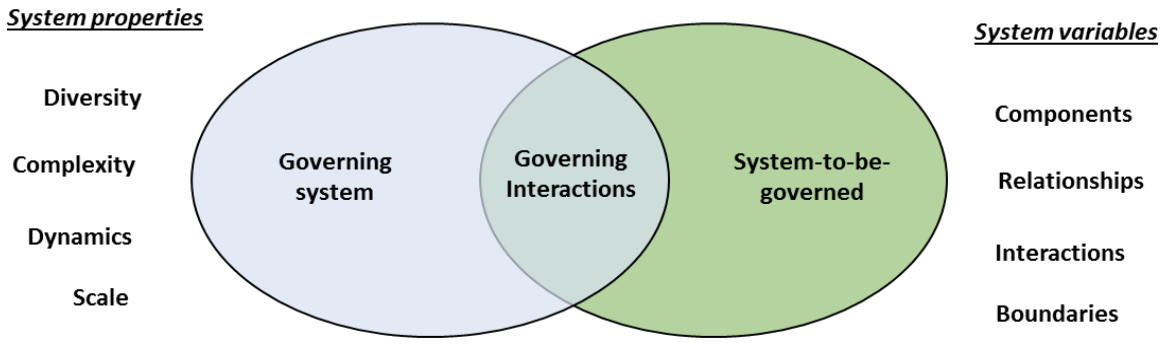

Figure 2. 2 Governability Assessment Framework (Jentoft & Chuenpagdee, 2009a)

- **Diversity** relates to the spatial variability in natural, social and cultural conditions. There are possible variations in number and characteristics of components (species, stakeholders) for instance, small versus large-scale marine ecosystems; the rules under which they operate may differ from group to group and area to area. The higher the diversity levels in the system, the lower its governability.
- **Complexity** refers to the interactiveness, overlap and interdependence of the systems. An example of this is that of many living marine organisms that feed on one another and both of them form a food chain.
- **Dynamics** deals with the variations taking place because of the tension within or between the systems. These changes can be fast, unpredictable and irreversible (e.g. incidents like oil spills, natural catastrophes, etc.).
- **Scale or Vulnerability** refers to the fragility of the systems-to-be-governed, its susceptibility to be irreversibly harmed. It looks at how operations take place at different levels in the ecosystem, governance and time. This can be due to natural limited information and other external factors that are often difficult to predict.

2.6 Literature review

This section has as focus to take a closer look at previous studies on management and the strategies employed; looks deeply at the governance of marine (common) resources, learn from the past experiences especially their procedures in carrying out similar studies and their findings in order to make where possible, comparisons with the present one.

Input and output controls are commonly used in the fisheries lexicon although the categories of each other should be clearly understood and the consistency in their application desired for understanding the types of objectives that they are appropriate to address (Morison, 2004). Studies of this kind have been taking place all over the globe and for a considerable number of species such as the Australia's Northern Prawn Fishery (Bishop, Venables, & Wang, 2004), Malawi (Mwakiyongo, 2002), the New Zealand black cardinalfish (Dunn & Bian, 2009) just to mention but a few. Giving due importance to accurate fisheries catch and effort information facilitate sustainable fisheries management and reduce the occurrence of bycatch, discards, help to monitor fishing capacity and also illegal fishing (Mccluskey & Lewison, 2008). In search for better alternatives to achieve the objectives, fisheries economics may enter into error for instance setting a TAC at either too high or too low, and unexpected realizations in terms of the catch-effort relationship may be set at inappropriate level (Kompas, Che, & Grafton, 2008).

For instance, fishing effort, catch, and resource dynamics as well as prices were used (Onal, McCarl, Griffin, Matlock, & Clark, 1991) as parameters to investigate overfishing by time period and fishing area with the aid of appropriate model (multi-period mathematical programming model). However, the interests may vary in this sector and the political opinions can be divided so, if agreement is not met the whole system may end up paralyzed and the crisis prolonged (Jentoft, 1993). A very long list and yet incomplete of aspects showing how a good management system should look like was given by a prominent scholar (Jentoft, 1993) which includes prevention of overfishing and overcapacity, ensure that total quota is taken and much more. With the aim of sustaining and maximizing the fishery, total catch (or time series of total catch) on its own plays an important role as indicator for the status of the fishery. Makes it even possible to classify the fishery as either "undeveloped", "developing", "mature" or "senescent" by using a generalized fishery development model and also, in combination with fishing effort (if data is available), mangers are able to estimate the Catch Per Unit Effort (CPUE) which gives indications of the status of the fish stock (Hoggarth et al., 2006).

From the perspective of fisheries governance, scholars have identified strong negative trends with three related components: a) the decline or collapse of fish stocks worldwide, and the degradation of aquatic ecosystems. There is a worldwide crisis in fisheries management, leading to the extinction of some species and even the collapse of others such as the cod stock off Atlantic Canada (Raakjær, 2009); b) fishing overcapacity is another negative aspect. Too

many vessels and too many people fishing, their aggregate activity is to be blamed for the collapse of fish stocks and lastly c) is management; fisheries managers have been unable to reverse the trend; for this reason, the foundations of fisheries management theory including their practice have been called into question (Kooiman et al., 2005). It is necessary to acknowledge that crises and opportunities take place very often in different mixes in a given society and sector, and governing all this should be a matter of concern.

As mentioned earlier, globalization cannot go blameless in all this. The global markets for fish and fish products have changed in great manner over the past decades, these include the development of new products and more sophisticated methods of production, fragmentation and outsourcing of production processes, and changing value (OECD, 2010). These changes seems to be continuous, never ending and ongoing process where operators together with fisheries value chain (fishers, fish farmers, traders, processors and retailers) are endlessly searching for new opportunities, seeking for low production costs and profitable investment opportunities in an business arena that has become increasingly internationalized (OECD, 2010). The increased growth in fish production and trade that the world has experienced is attributed to the increased effort more visible in the industrialized fisheries and the levels of technology of fishing vessels and gears has its inputs on this. According to scholars, such modernization endeavor took fisheries observers to label this process as Fordism, described as: "*the ideal organisation of production and implies a perception of the relationship between humans and the sea" where production in the view of Fordism "is based on product standardisation, production process decomposition, technological intensity, relatively inflexible production designs and large production volumes* (Kooiman et al., 2005)).

The beliefs behind it was that people would have the ability to understand and manage their environment in a such way that it would be possible to achieve consistent results just as they predicted which has proved to be untrue in many ways. In the industrial fishery, Fordism is expressed by mass capture techniques and efficient high-speed production (Kooiman et al., 2005). This is a reality observed now when it comes to harvesting. The driving force of globalisation is justified by the need to secure access to fish, to ensure economic returns on capital invested in fishing vessels. Where national fisheries management frameworks are limited in terms of access to national resources, the only way out of deploying capacity is by

seeking access to foreign or high seas resources through access agreements, joint ventures, setting up foreign operating companies, and much more (OECD, 2010).

To address these issues effectively requires also governance systems that look to them in a global way. In the absence of a very sound fisheries governance, better livelihoods, justice and other important aspects of life might seem to be impossible. Fisheries governance plays an important role in the formulation of national fisheries management plans and structuring of a well-coordinated fishery data collection, vital for ensuring lasting access to the marine and other aquatic resources. Fisheries-related conflicts such as competition for resources (between fishers, communities and nations), declining fish stocks that lead to reduced incomes can be prevented where efficient governance system is present (SF, 2017).

CHAPTER 3: METHODOLOGY

It is here understood as *research methodology the* way to systematically solve the research problem, this implies studying how the research is done scientifically including the numerous steps adopted in studying the research problem along with the logic behind them (Kothari, 2004). In this chapter, the author provides justification in choosing the method applied in carrying out this research. A description of the methodological design of the study and of accessing the study area is given. Furthermore, a discussion concerning data collection method, data source and data analysis methods is provided including the reliability, validity and limitations encountered during the data collection process.

3.1 Research process

The Angolan Industrial and semi-industrial fishery was studied through the interactive governance system approach. The discussion has its basis on the governability assessment framework, facilitated by the governability assessment matrix the framework produces. The complexity of both the topic and the conceptual framework used demanded as a consequence, a dynamic research design but kept within the standards. Problems may differ from case to case and so their resolution, thus the author felt the necessity to design his methodology (Kothari, 2004). The qualitative research methods are used here to explore the substantive areas which little or much is known in order to gain novel knowledge, but some data where suitable may be quantified based on the knowledge of the subject studied where quantitative research methods are applied. The research process seeks to identify and explore specific patterns in data collection in relation to the aims, objectives as well as research questions the study seeks to address.

3.2 The Governability Assessment Matrix

The governability assessment (referred to in Chapter 2, section 2.5) seeks to examine each component with regards of its inherent and constructed qualities in all dimensions and also as part of the systems that they are related to, providing a clear idea of what contributes to the desired governance performance and what hinders it (Chuenpagdee & Jentoft, 2009).

With bases on afore concepts of governance and governability, a matrix (Table 3.1) was elaborated to assess the governability of the Angolan Industrial and Semi-industrial fishery. The assessment is also rooted in the model provided in Chapter 2 (Figure 2.2). A better understanding and application of the conceptual framework required getting access to important sources of information. The book *Fish for Life. Interactive Governance for Fisheries (*edited

by Kooiman et. al (2005)) and *Interactive fisheries governance: a guide to better practice (*edited by Bavinck et al (2005*))* were fundamental to this study. Additionally, good examples were obtained from Articles of prominent scholars such as Jentoft and Chuenpagdee (2009), Chuenpagdee and Jentoft (2009), Onyango and Jentoft (2010), Song and Chuenpagdee (2010) and Scholtens and Bavinck (2013).

The main components in the matrix include the natural system to be governed (Natural SG) which focuses on the ecosystem and the resources found in the Angolan marine ecosystem. The Social system to be governed (Social SG), deals with the stakeholders and all the groups of interest who direct or indirectly are affected or are affecting the marine ecosystem. In the Governing system (GS) we find the institutions and management that aims at protection and conservation of the resources found in the marine ecosystem. Furthermore, the Governing interactions (GI) which describe how the System-to-be-Governed and the Governing System influence each other. Finally, the Scale deals with the fragilities and other external factors that may affect the systems-to-be-governed.

The analytical evaluation of governance is performed by questioning the key variables that determine the achievement or hindrance of its outcomes, empirically such questions need to be translated into specific research questions based on the context within which a study is undertaken (Chuenpagdee & Jentoft, 2009). It looks for a proper match between the natural and socio-economic characteristics of the fishery, and its governing institutions with the aim of attaining governance effectiveness. It constitutes functional unit just like a pot and a lid (*as a badly fitting lid negatively affects the cooking process, the cook will try to improve the fit by adjusting one of the two pieces*), the interest are the improvement of the match between the system-to-be-governed (pot) and the governing system (lid) (Scholtens & Bavinck, 2013).

Additionally, in the view of the dynamic nature of the components, a proper match cannot be limited to the architecture alone as the example provided above (the structural match). This is because fisheries systems, are made up of people, ecosystems and institutions which are not fixed but yes in a constant changes or fluctuations, therefore if the governing system is not continuously fine-tuned, would soon lose its grip on the system-to-be-governed, resulting in a poor match and hence the governability will also be low (Scholtens & Bavinck, 2013).

Table 3. 1 Governability matrix for the assessment of the Angolan Industrial and Semi-industrial fishery.

	NATURAL SG	SOCIAL SG	GS	GI	
Diversity	Which important resources exist in and around the Angolan coast, their status, distribution and ecosystem they belong?	Who are the stakeholders in the fishery?	Who is part of the GS? Institutions, Authorities?	**Representation** What are the interactions and who is taking part?	**Components**
Complexity	How do the resources relate/connect with each other?	How do the stakeholders interact with each other? Communication, compliance, conflicts?	What are the goals of the governing actors? Cooperation? Differences?	**Communication** How do governing interactions affect governance?	**Relationships**
Dynamics	Which changes could affect the ecosystem biological and physical state?	How have the interactions of stakeholders changed over time? How catches have been fluctuating?	What have been the changes in the GS and how have they affected the interactions in the governing system?	**Adaptation** How do changes affect the interactions between institutions?	**Interactions**
Scale	What are the natural boundaries of the Angolan coast?	What are the boundaries set between stakeholders (Social and economic boundaries; regional connections and Globalization)?	What are the boundaries of the institutions? Local, regional, national? History, functions?	**Collaboration** What is the scale of interaction between local, regional, national?	**Boundaries**

3.3 Methods of Data collection

Gathering data is of vital importance as it aids the researcher in the quest not only for answers but also for solutions. Quantitative and qualitative data were both collected in the course of this research. Quantitative data are defined as measurements that can be recorded on a natural scale, while qualitative data are measurements not measured on a natural numerical scale but possible of being classified into one or even more groups of categories, (Singpurwalla, 2017). Through observation and use of semi-structured interviews as suggested by many prominent scholars (Kothari, 2004) and (MacDonald & Headlam, 2008), relevant representative of local institutions involved in the governance of fisheries were interviewed, including responsible of fishing companies, fishers and fish sellers aided by observations (that is, observing them) during their activities.

3.3.1 Observation

Observation is a commonly used method of data collection, as part of *a mixed methods approach* and with greater emphasis in behavioral studies (Kothari, 2004). Provides useful insights in relation to the everyday life activities of those participating in the research contributing to the richness of the data (Patton, 1990), it can be in the form of photographs, audio and visual recording. It may involve a participatory approach, the researcher participates in the daily life of the targeted group (overt or covertly) but keeping good distance for a better observation and data recording (Fetterman, 1998) or non-participatory, there is limited interaction with those being observed (Cohen & Crabtree, 2006). The method eliminates subjective bias if conducted appropriately, the information gathered through this method relates to what is currently happening regardless of past behavior, future intentions or attitudes and does not depend on the respondents' willingness to respond thus, demanding less active cooperation on the part of respondents (Kothari, 2004). The researcher used both approaches at different degrees. The use of the last approach was limited to the inexperience about the skilled job of the interviewed as well as their working time. However, it helped in terms of objectivity and neutrality and in obtaining unbiased views obtained as informal relationship was cultivated. Participatory observation approach provided a direct experience to the subject under study and an opportunity to see and hear what in fact is taking place. The researcher spent a month taking part in the activities of the National Directorate of Fisheries, observing, engaging and obtaining relevant data from management information systems. Three weeks were spent in exploring the main fishing towns, open-fish markets, shops as well as landing sites.

3.3.2 Semi-structured interviews

In the interview method, three types of interviews are distinguished: structured, semi-structured and unstructured. Among these, the semi-structured was of greater use and therefore adopted in this study as this is an interview technique more focused on addressing key themes rather than specific questions. It gives more flexibility between the researcher and the respondent in the sense that the former has the possibility of answering to the responses of the interviewed and creating themes and other issues as they emerge in the process (MacDonald & Headlam, 2008). The list of questions and topics is loosely followed by the researcher, who engages in a conversation in an effort of drawing information from his respondents. The researcher applies some discretion with regards to the order of asking the questions (but they must be standardized) and in this way many relevant issues can be explored and enrich the study (Harret & Bradley, 2009).

A structured interview scheme was used aiming to obtain local fishers, fish sellers and other stakeholders' perceptions about the management strategies in use, their participation in decision making, their challenges in the fishery sector or business, compliance to the rules and bureaucratic procedures. Another section of the interview aimed at getting the governing institutions' view of the sector, that is, the challenges and advancements, the status of the resources, biomass and distribution.

Figure 3. 1 Port of Namibe, early Friday morning. Author's own shot. Field work, July (2017)

3.4 Data source

Data collection activity took place between June-August in Angola, from the main coastal provinces with the most important landing sites of the country (Figure 4.1). The Ministry of Fisheries and other subsectors provided relevant data. Primary data obtained includes photographs and audio recordings, later transcribed (written down) for better use and application. The National Directorate of Fisheries (DNP) provided important secondary data: effort and landings data, harvest quota, taxes, licensing system, fleet characterization and composition. The data includes scientific survey reports of the Angolan marine resources with information on biology, distribution and biomass status provided by the National Institute of Fishery Research (INIP). Published journals, articles and documents from internet relevant to the topic were used.

3.5 Reliability and validity

In quantitative and qualitative research, the use of the terms “reliability” and “validity” is very common. On one hand, reliability is the extent to how consistent the results are over time as well as an accurate representation of the total population under study. That is, if it is possible to reproduce the results of a study under the similar methodology then the research instrument is considered to be reliable, it carries the idea of replicability or repeatability of results or observations (Golafshani, 2003). On the other hand, validity looks to how the research truly measures that which it was intended to measure, seeks to determine how truthful the research results are (*does the research instrument allow you to hit "the bull’s eye" of your research object?*) (Golafshani, 2003).

The reliability and validity of the data were in part, affected by time limitation. As stated earlier, the fieldwork took place between June and August. In that very same period, the country was preparing to elect the new president and government. Many activities were going on and most of the governing institutions were not function in their fullness since they were organizing themselves in finalizing important reports and make room for transition. The information collected from the governing institutions offers a high degree of reliability and validity. The interviewing experience has also its interference however, the skills to carry them out increased during the process.

3.6 Limitations

Constrains are always there in one way or the other, therefore managing them and recognizing the limitations is a task for the researcher. Some informants due to lack of time could not offer themselves for interview neither by phone nor by email, leaving some questions without sufficient answers. Finances also constituted an issue that posed limitations on the research process. It can be said that, the research process was successful despite the constraints the researcher encountered.

3.7 Data Analysis

The analysis was performed by reviewing the data collected and applying the conceptual interactive governance framework with the aim of providing a clearer picture that describes the governance process of the Angolan Industrial and semi-industrial fishery. The properties and attributes of the system are presented, then their levels addressed in the best manner possible, followed by the orders of governance and interactions. Additionally, the author where appropriate, examined part of the data with the aid of computer software (MS Excel). Chapter 5 presents the results of the systems analysis and their attributes translated into governability levels. This will enable to depict the influence of each component on governance performance and the challenges of the Governing system. The match between the System-to-be-governed and the Governing System shows the capacities and potential of increasing governability as well as to maximize the ability of achieving the goals envisaged. Furthermore, section 5.5 provides additional discussion summarizing the findings with respect to the research questions. Finally in chapter 6, a conclusion is given and contains a short summary of the findings of the thesis in relation to the research questions and generic perspectives.

CHAPTER 4: BRIEF HISTORY OF ANGOLA AND THE FISHERY SECTOR

4.1 Study Area

This study covers the most important fishing grounds located within the Angolan Economic Exclusive Zone (of 200 miles), focussing the North (Luanda), Centre (Benguela) and South (Namibe) fishing grounds.

Figure 4. 1 Map of Angola showing the three major fishing grounds (edited by the author).

Source: https://www.africaguide.com.

Luanda province Benguela province Namibe province

4.2 **Brief History of Angola**

The Republic of Angola is located in Southern Africa, around 12°30'S Latitude and 18°30'E longitude. Covers over a total area of 1,246,700 Square Kilometers. Its bordering countries are the Republic of Namibia to the south, the Democratic Republic of the Congo to the north, Zambia and the Atlantic Ocean to the east and west respectively. Luanda is the capital and largest city of Angola (Figure 4.1). Angola population is approximately 24,383,301 and Luanda alone hosts approximately 7,000,000 (2014 Census).

After a very long period of conflict, Angola gained its independence on the 11th of November 1975. However, sadly another 27 years of civil war ravaged the country and disrupted rural transport infrastructure including people's mobility of goods and services, production and marketing. The civil conflict finally knew its end in 2002. Angola is a Democratic country with a multi-party system. The politics has a framework of a presidential republic in the sense that the President is both the head of State and of the government. The government exercises the executive power and to the President, parliament and government is vested the legislative power. It is also the President, who appoints the Governors of the 18 provinces and the Ministers. Economically, despite the current grave crisis, timidly Angola's future seems to be brighter than it has been for many long decades. Recently the government focus has been on promoting growth in other sectors not related to oil (the backbone of the country's economy), and diamonds and include agriculture, fishery, livestock, water supply and transport, housing and public services such as schools and hospitals.

4.2 The fishery sector

The marine fishing industry is divided into three different fleets: the Industrial, Semi-industrial and the artisanal fishery. The commercial fishery comprises two fleet segments depending on their total size (length): the Semi-industrial fleet segment that comprises vessels between 14 to 20 m LOA and the Industrial fleet segment with 21 m LOA and above. In general, the fishing industry of the country developed by 1950's being able to export large quantities of marine resources (Agostinho, Fielding, Sowman, & Bergh, 2005) but due to the war, this sector of the economy disrupted and hence the need and dependence on import of food. It was registered that (which would be obvious) before independence, foreign vessels and foreign nationals dominated the fishing industry and total catches exceeded 300 000 tons. Then the catches declined later on in 1960; the production increased and reached nearly 600 000 tons

in 1972, but the fishery experienced a collapse during the war of independence. Many fish processing plants became obsolete and the exporter of fish-meal (by 1986) could no longer supply for its market (Agostinho et al., 2005).

There are three major fishing towns in the country: Namibe, Benguela and Luanda. Namibe was founded in 1840 and Moçâmedes is its capital city. Namibe grew into a fishing port, having about 143 fishing vessels in 1960s and many fish processing plants (FAO, 2014a). Apart from fish and other marine resources, the city is home of beautiful beaches, the Namib Desert with its eye-catching plant *Welwitchia mirabillis* and the oldest and largest national park (the Iona National Park). Until today, Namibe retains its position as the first largest fishing town in the country. Benguela, with the same capital's name, was founded in 1617 also by the Portuguese administration. In the 1974s experienced growth in sisal and fishing industries, triggering a boom in financial and construction services.

Luanda, is both the capital city of Angola and capital city of Luanda province. It was founded on the 25th of January, 1576, by the Portuguese Paulo Dias de Novais. Is the most important, most populous and the largest city in Angola. Major constructions have been taking place in hopes to rebuild its architectonic structure and bring about development. Recent reports (believed to be an underestimation) (FAO, 2014a), indicate that fisheries or aquaculture support direct or indirectly the living of about 100 000 persons. In terms of production, 90% of the country's fish production is commercialized in the domestic market, utilized either in fresh or frozen form while the other portion is normally processed as salt-dried fish, fish meal and canned fish (FAO, 2014b). As anticipated above, the country due to the deficiencies brought by conflicts still relies on imports of fish and fish products to supplement domestic production.

Angola is a signatory of the United Nations Convention on Law of the Seas (UNCLOS), introduced and worldwide implemented in the 1970 and entitles coastal states to establish exclusive economic zones (EEZs) of 200 nautical miles (nm), the coastal states have rights and duties with regards to the exploitation and management of the resources in their jurisdictional zone (UNCLOS, 1982). Illegal fishing constitutes a threat to the governance of many fisheries, it is therefore, important to look at the challenges that fisheries management face not only within but also beyond the exclusive economic zones (EEZs). The long period of civil war brought its own challenges like overpopulation of the coastal zones, reduced technical capacity of some institutions to respond to the challenges (like illegal fishing in the high seas).

Despite all the challenges, the industrial and semi-industrial sectors are still producing and they were responsible for 57 percent of the total marine catches in 2009 (FAO, 2014b), mostly taken from the southern coastal provinces Namibe and Benguela which benefit from the Benguela Current (BC) and Luanda in the North. Reports has been showing changes in the fishery sector (Appendix B), in 2016, for the harvest of demersal species a total of 113 fishing vessels were licensed of which 80 for the Industrial fleet and 33 vessels for the Semi-Industrial fleet. In the same year, for the pelagic species, 100 industrial fishing vessels were licensed and 57 for the semi-industrial fleet which totalized 157 fishing vessels (DNP, 2016).

Angola long-term vision document "*Angola Visão 2025"*, with four overarching objectives, gives emphases on promotion and acceleration of growth and competitiveness through economic diversification, poverty reduction through human capital development and targeted interventions, specifically through private sector job creation including the balanced growth and harmonized development alongside natural resource protection (Angola Visão 2025). The direct conservation measures as pointed out by Pope (in (Cochrane & Garcia, 2009)) aim essentially on limiting the proportion of fish killed each and every year by fishing, rather than limiting the sizes, or the areas and times at which fish are captured but more is required for a better resource governance.

CHAPTER 5: RESULTS AND DISCUSSION

5.1 Results - The systems of the Angolan Industrial and Semi-industrial fisheries

In this chapter, through the analysis of the data collected, the interactive governance is applied by firstly presenting the system properties and attributes as well as the assessment of their levels. This aims at giving a description of the governance process of the industrial and semi-industrial fishery. Furthermore, a study is done on the system-to-be governed, the governing system, their interactions and how they are linked or influence each other. For clarity, the assessment process commences by looking at the first component of the matrix (Diversity) culminating with the last component (Scale), exploring each property attribute from the Natural System-to-be-governed (Natural SG) to the Governing interactions (GI). The chapter also provides a summarized discussion with focus on the governability challenges, the limitations and consequently their potential impacts on the achievement of the envisaged goals. The discussion proceeds with respect to the research questions (Section 5.5). It should be pointed out that, taking into account the dynamic of system analysis used, part of the discussion with regards to the research questions and findings are embodied in each component of the matrix and the attributes addressed.

5.2 The System-to-be-governed

As anticipated in chapter 2, the system-to-be-governed combines two different entities that is, partly natural and partly social and includes the ecosystem and the resources that are found in it, a system of users and stakeholders who form political coalitions and institutions among themselves

5.2.1 The Natural System

The natural system is the marine ecosystem and the geographical area where the commercial fishing activities (of the two fleet segments) take place and the resources in it. Starting from its *diversity*, Angola features 1600 kilometers of coastline, along the southern eastern Atlantic, from 5º to 16º S, to the Cunene River mouth with beautiful tropical beaches. The coastal area is characterized by a typical tropical regime in the northern part and a more temperate one in the south, where the southward warm Angolan current and the northward cold Benguela current meet and form the Angola-Benguela front (Figure 5.1), with an average position at 17ºS. Small pelagic species, crustaceans and demersal finfish community dominate the fauna.

One cannot talk about fisheries in Angola without mentioning the Benguela Current Large Marine Ecosystem (BCLME) that the country shares with Namibia and South Africa in the SADC region. The BCLME extends from the Cabinda province in the north of Angola to Port Elizabeth (South Africa) in the south (encompassing the entire coast of Namibia. It is one of the world's delineated 64 Large Marine Ecosystems (LMEs) and one of the most productive ecosystems in the world. Supports an abundance of marine and other resources that contribute significantly to economic growth of the three countries. Studies reveal that the mean annual primary production is approximately greater than 300 gC.m-2 .y-1, putting it in the category of Class I highly productive ecosystems (Cochrane et al., 2009).

The most important marine resources of Angola are demersal finfish, such as *Dentex macrophthalmus, Dentex angolensis, Epinephelus* spp, *Merluccius* spp, *Pseudotolithus typus* and *P. senegalensis,* including cephalopods, shrimps, lobsters and crabs. Some important pelagic species are *Sardinella aurita, Sardinella maderensis*, *Sardinops sagax, Engraulis encrasicolus,* and also the Cunene *Horse mackerel* which is one of the main food fish for Angolans. The country have some important high seas or offshore resources - the Tunas – and the main species include *Thunnus abesus, Thunnus albacore (Albacore), Thunnus alalunga, Katsuwonus pelamis and Skipjack tuna*. The pelagic species group is mostly caught with trawls and seines or purse seines and longline (for tunas), while the demersal group are caught with trawls and gillnets (DNP and INIP, 2017).

The *complexity* of the Angolan ecosystem is the result of two principal current systems that constitutes its continental shelf namely, the tropical warm waters of the Angola Current (AC) flowing from the south and the cold northward current, the Benguela Current (BC). The meeting point of these two currents is at a point called Angola-Benguela Front (ABF) and as illustrated below (Figure 5.1), this is considered as a permanent hydrographic feature located between 14°S – 16°S. However, studies have observed that episodic intrusions of warm, saline water southwards can displace the front to approximately 23°S, consequently affecting the overall biological productivity of the LME (Shillington, Reason, Duncombe Rae, Florenchie, & Penven, 2006). The phenomenon was baptized as the Benguela Niño, due to their similarities to the El Niño of the eastern tropical Pacific Ocean (Shannon et al., 1986). These currents have also great impact on the water column and influence the spatial distributions and diversity of the flora and fauna (Angelini & Vaz-Velho, 2011). High diversity and low productivity

characterizes the AC, supporting large populations of sardinellas, sciaenids, Dentex spp and many other species.

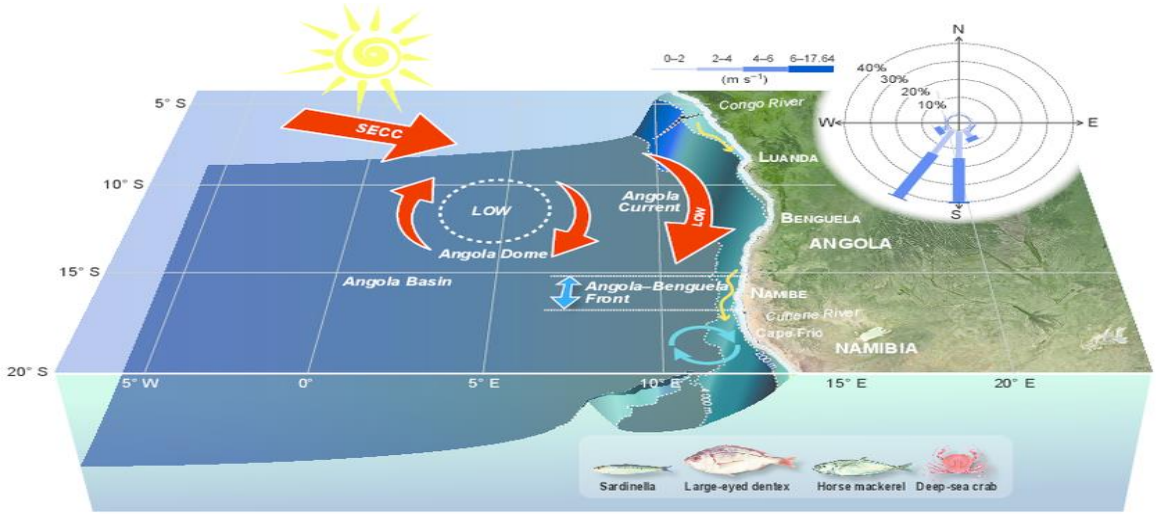

Figure 5. 1 Map of the Subsystem north of the Angola–Benguela Front, showing main physical and chemical features: South Equatorial Counter Current (SECC), Angola Current, Kelvin waves (yellow arrows) and low oxygen water (LOW), and the main exploited living marine resources. The image of the sun depicts solar heating (insolation) as one of the drivers of the subsystem. Source: https://www.researchgate.net.

The system has a temperate climate and plays a role in the global climate and ocean processes. Intense coastal upwelling drives the production of plankton that supports the living of these fish populations. This primary production varies at seasonal and inter-annual time scales in the BCLME, making it complex and highly variable (Heileman & O'Toole, 2008). The world oceans at higher latitudes, and upwelling systems are dominated by herbivorous copepods (of the family Calanidae). Includes the genera *Calanus* and *Calanoides*, but new studies, show that for the west coast of Africa, the Gulf of Aden and off the Somali coast, *Calanoides carinatus* dominate the mesozooplankton in terms of biomass, representing a crucial trophic link between the primary producers and pelagic fish stocks (Auel, Hagen, Ekau, & Verheye, 2005).

Also, fisheries have been declining and copepods have decreased trend in the south but increase in the north of BCLME (Verheye, Lamont, Huggett, Kreiner, & Hampton, 2016). Many of the species are widely distributed within national exclusive economic zones (EEZs), and a number of other species are considered to be distributed across national boundaries, this

is a significant feature of the Benguela Current. Apart from fishery resources, the system is also bestowed with abundance of other natural resources specially diamonds which are explored on-shore along the coast and oil and gas off-shore.

With regards to the *dynamics* of the natural system, it is generally known that intense variation in currents as the ones discussed above, can have many effects on the growth and recruitment of fish stocks. Some of these environmental drivers can cause changes in phytoplankton biomass and production. These include surface warming, increased wind stress and upwelling, extension of low oxygen zones, changes in nutrient distributions, and increased stratification. Scientists worldwide are concerned about climate change so Angolan marine ecosystem is not an exception to this phenomenon. Angola is characterized by two different highly productive systems, the seasonal coastal upwelling, which is characteristic of the northern and central part of the country specifically southward to Tômbwa in Namibe province; the second is the almost permanent upwelling in the southern part of the area which coincides with the northernmost extension of the Benguela Current (Bianchi, 1992).

The discharges from the Congo River and the shelf-break upwelling are important sources for nutrient enrichment of the Angolan marine waters and contributing also for an enhanced production (Bianchi, 1992). In the Angola-Benguela Front, and the northern Benguela shelf region, changes have been noticed. The studies reveal that overall abundance of fish eggs and larvae in 2002 during the months of February/March was unexpectedly low and this is the period considered as the season when pelagic fish, especially sardine and anchovy show a second reproduction peak (Boyer et al., 2001 in (Ekau & Verheye, 2005). With this observation, the researchers reached to the conclusion that other environmental factors such as oxygen concentration in the water column, played a critical role in the reproduction and recruitment of fish (Ekau & Verheye, 2005).

Previous studies documented variations in the BCLME, with regards to phytoplankton biomass and primary production at seasonal and inter-annual time scales. Others (Verheye et al., 2016) revealed that there are no strong evidence of decade-scale changes or the expected ecosystem-wide increase/decrease in production in response to projected increases/decreases in upwelling-favourable winds. Harmful algal blooms (HABs) and Sulphur eruptions can negatively impact the ecosystem by introducing toxins that are detrimental to marine and human life; these HABs are experienced in the coastal waters of all three Benguela countries and the

frequency of occurrence varies in time and space (Hamukuaya et al., 2016). Plankton being ideal indicators of ecosystem change, a long term and continued transboundary monitoring of their communities would be a positive response. Actions in this regard are already being performed using advanced technologies such as satellite imagery of ocean colour as well as the deployment of Continuous Plankton Recorders from ships-of-opportunity (Verheye et al., 2016).

The status of the stocks have been subject to investigations. The demersal species have been subject to annual surveys since 1990 during the months of February – April with the aim of mapping and describing their distribution including the composition and abundance. Assessment and management of demersal species is by group of species, since the fishery is multi-specific. The most recent annual survey reports show lower biomass values estimates for all the most important commercial demersal species when compared to previous years; possible causes are pointed out which include variability of oceanographic conditions and increased fishing mortality (Michalsen, Estevão, Olsen, Macueria, & Kvalsund, 2016). Cruise surveys are conducted to estimate the abundance of pelagic species. They aim to monitor the pelagic fish resources and to improve the understanding and knowledge in terms of the biology, ecology and population dynamics of the species in relation to the environment and the whole ecosystem. They make use of the echo integration as the principal tool for estimating stock abundance of pelagic species, forming the basis for recommendation on the TAC (INIP). Studies show that most of Angola fish stocks are currently estimated to be fully or overexploited such as the *Cunene horse mackerel* (severely overexploited), with particular exception of the *Sardinella* stocks which are considered to be slightly underexploited (FAO, 2014a).

The most recent annual surveys indicate a sharp decrease of the most important commercial pelagic species in terms of recruitment however, there is a deficit in terms of updated information (for the year 2016) to verify this trend (INIP, 2016). These schooling pelagic species may be caught in great abundance during the demersal surveys and the 2016 survey (although focused on demersal species) noticed a drastic reduction in comparison to the 2015 survey (Michalsen et al., 2016). Additionally, the 2016 survey, although it did not cover all the area were the species occur, revealed that the abundance of the *Sardinops sagax* (targeted in the survey) in Angolan waters is presumably zero while and the *Trachuras trecae* is being harvested above the sustainable levels (INIP, 2016). Variability in the distribution pattern,

recruitment overfishing and El Niño events are pointed out as causes that negatively affect the resources abundance (Michalsen et al., 2016); (INIP, 2016).

Although efforts are being made to assess the status of the stocks, most of them are still overfished (O), slightly under-fished (U) while no updated information is available for some (N/A) especially the demersal species (Table 5.1). According to INIP, due to statistics inconsistencies and the multi-specific nature of the fishery, the status of the stocks are described based on the tendencies of biomass indexes and use precautionary principles to advise on management measures (INIP, 2016). The lack of information makes it difficult to attribute a final status for the stocks.

Table 5. 1 Status of the main commercial stocks.

Species	Status	Year of assessment	Reference
Demersal species	N/A	2016	INIP/IMR
Seabrims (*Sparidae*)	N/A	2016	INIP/IMR
Croakers (*Sciaenidae*)	N/A	2016	INIP/IMR
Grunts (*Haemulidae*)	N/A	2016	INIP/IMR
Groupers (*Serranidae*)	N/A	2016	INIP/IMR
Snappers (*Lutjanidae*)	N/A	2016	INIP/IMR
Hakes (*Merlucciidae*)	N/A	2016	INIP/IMR
Pelagic species	N/A	2016	INIP/IMR
Cunene Horse mackerel (*Trachuras trecae*)	O	2015	INIP/IMR
Cape Horse mackerel (*Trachuras capensis*)	O	2015	INIP/IMR
Sardinella aurita	U	2015	INIP/IMR
Sardinella maderensis	U	2015	INIP/IMR
Sardinops sagax	O	2015	INIP/IMR
Tunas	N/A	2015	INIP/IMR

Author's own Table. Source: INIP/IMR

In terms of its geographical *scale*, the Benguela Current ecosystem stretches along the south-west Atlantic coast of Africa from central Angola through Namibia to the south coast of South Africa, and is bounded by the Angola-Benguela Front in the north and the Agulhas Current in the South (from between roughly 14 and 170 S to between 36 and 370 S). It covers the West Coast of South Africa, the entire Namibian coast, and southern Angola to an extent depending on the position of the Angola-Benguela front illustrated above (Figure 5.1). The Namib Desert (one of the oldest deserts in the world) forms the landward boundary of a large part of the BCLME (Figure 5.2).

The principal upwelling centre in the Benguela is situated near Lüderitz in southern Namibia (the most concentrated and intense found in any upwelling regime). The BCLME Programme focuses on the areas over which the three countries have some jurisdiction, i.e. their Exclusive Economic Zones, extending 200 nautical miles seawards from the land. There were identified two different faunal complexes along the Angolan coast: first, is the "Guinea-tropical fauna" found in the northern and central region. Second, the "Benguela fauna", more predominant off southern Angola but the boundaries between these two faunal complexes are not sharp (Da França, 1968 in (Bianchi, 1992). The studies pointed out that faunas originating outside the Angolan coast meet and overlap along the Angolan shelf and therefore it should be considered as an area of biogeographic transition between the Guine-equatorial province and the South African province (Bianchi, 1992).

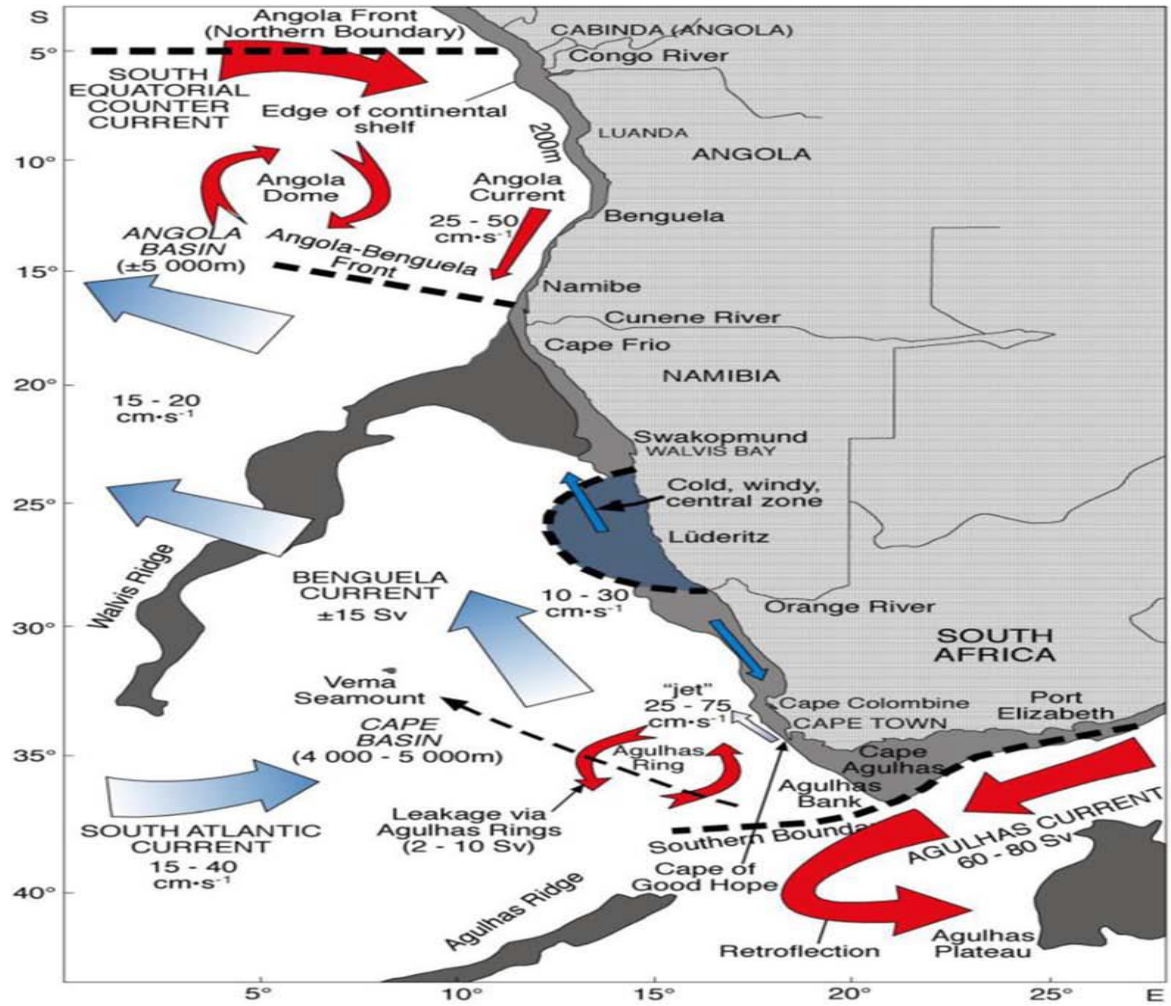

Figure 5. 2 Main physical features and surface currents in the BCLME: blue arrow – cold current; red arrow – warm current (Hempel et al., 2008 in (Hamukuaya et al., 2016)).

Table 5. 2 Main commercial (fish) resources targeted by the Industrial and Semi-industrial fleet and their area of distribution. The numbers in brackets indicate sources of data.

Species	Species group (1)	Area of Distribution (2)
Demersal	Sea breams (Sparidae)	Entire coast
	Croakers (Sciaenidae)	Entire coast, but mostly north and centre
	Grunts (Haemulidae)	Entire coast
	Groupers (Serranidae)	Entire coast, but mostly north
	Hakes (Merlucciidae)	North and centre
Pelagic	Horse mackerel	Entire coast, but mostly in the south
	Sardinellas	Entire coast, but mostly north and centre
	Tuna	Entire coast
Author's own table. Source: (DNP (1); INIP (2), 2017)		

Among the groups of species, commercially important to Angola, some are shared stocks with Namibia and South Africa. A fish stock whose population migrate or extends across the Exclusive Economic Zones (EEZs) of adjacent countries, is said to be shared and normally fished by more than one country (Sumaila, Ninnes, & Oelofsen, 2006). For Angola, these species include deep-water red crab (shared with Namibia), hake, horse mackerel, and sporadically sardine and anchovy (Sumaila et al., 2006); (Hamukuaya et al., 2016). The stock of *Merluccius polli* (Benguela hake), in the past was harvested as a bycatch but now has become a targeted species and according to studies it now appears to be fully exploited as a result of rapid increased effort in last years (FIRMS, 2010). The tunas in general have high metabolic rates that allows them to exhibit high growth rates. The Angolan coastal tuna species are found along the entire coast between 20 – 150m depth, the high seas species are highly migratory; in terms of size they range between 43 and 47cm (INIP, 2017). The natural system can be considered geographically large in size deduced by the migratory nature of the species which can be found in the local, national and regional systems.

Overall, the size of the natural system and its interconnectedness to other subsystems pose some governability limitations including the status of stocks, caused mostly due to the prolonged fishing pressure. The biodiversity of the system and living patterns of the resources are increments to the governability limitation including environmental fluctuations and human impact on the ecosystem. The system is highly diverse, complex but relatively moderate in dynamics and low in scale. The system oscillates between low and moderate governability.

5.2.2 The Socioeconomic System

The Socioeconomic system in terms of its *diversity*, comprises a very wide range of stakeholders exploring the resources, however, the commercial fisheries (industrial and semi-industrial) are the most extended sector involved in activities in the system. Other interested parties include the artisanal and recreational fishers who are organized in the form of cooperatives and associations. The diversity of the system is also seen in their religious (predominantly Catholics and Protestants) and political affiliations.

From the total of 30 000 workers directly involved in activities in the past (1992), 18 000 pertained to the artisanal fisheries and the rest to the industrial fisheries and public administration while the informal fish trade activities was dominated mostly by women (approximately 5000) (Sumaila et al., 2006). The dominant presence of women fish-traders in the coastal towns is still visible today (Figure 5.3 and Appendix A). In recent years, the number of fish workers is reported to have increased to over 23 000 of artisanal fishermen and between 2,000 and 30 000 of people involved in informal fish trading, supplemented by agricultural and commercial activities to increment their income (Sumaila et al., 2006). Other important stakeholders are from the oil and gas, and mining industry (although not central to this study). The tourism industry is also present and positively growing. Researchers and environmentalist from many institutions and academic community are involved in studying the system, especially the BCLME through the BCC and it can be suggested that this portrays a high level of diversity. Such range of representation pose challenges to governability. Mostly due to conflicting objectives in their multi dimensions.

The *complexity* of the socioeconomic system is characterized by the relationships among the stakeholders and how they are involved in the use of the Angolan biotic and abiotic resources. This includes threats the interactions pose to the natural system and challenges to the governing institutions. Due to the prolonged period of war that devastated the country, most people took refuge mostly in the western coastal provinces (Benguela, Luanda and Namibe) and residing in informal settlements surrounding the urban centres. Luanda accommodates the majority of this population; the climate of the coast is mostly semi-arid, therefore limited for agricultural activities that makes this people rely increasingly on the sea for their livelihood. Serious pollution threat (such as untreated sewage discharged into the sea in high volumes) has resulted from an increased urban population. Such problems are complex and wicked enough to challenge the fisheries governing institutions and their governability capacities.

(1) (2)

Figure 5. 3 Women fish traders in Namibe (1) and Luanda (2) Fish market.

Source: Own shot (1) and Evelaine (2), Fieldwork (July 2017).

A wide range of fish species (from the natural system) are harvested by the Angolan commercial fleet. The main impacts of fisheries on the ecosystem are commonly known among the fisheries scientists from the non-optimal harvesting of resources to fishing overcapacity (the primary cause). Sometimes the number of fishing vessels harvesting the same resources tend to be too high. This led the management authorities to take actions about the strategic reduction of fishing vessels. Minor conflicts occur between the two fleet segments (Lankester, 2002) but not to an alarming degree in recent years and most of them are related to competition for the same resources as well as for the same fishing zones or areas.

The management measures establishes that the industrial fishery should take place beyond the 12 nm but sometimes the industrial fishery performs their activities within that range, that is 8 – 10nm, an area allocated to the semi-industrial fishery. The former complain for the lack of resources in the allocated areas, which does not compensate their costs for fuel, engine repairs and nets resulting in great loss; while the latter, complain for the invasion and for the fact that the industrial trawlers almost leave nothing behind for them and they feel penalized apart from negatively affecting the fish biomass. From the views of the governing body, this

issue is minimized as they do not always reflect the reality on ground but have allegedly the tendency of violating the established laws and to minimize the great effort the managing authorities has been making to regulate the fishing activities. However, it is important to point out that such problems where they occur, if not controlled and solved can lead to a depletion of the resource below sustainable levels (NOAA, 1995), including high by-catch and undersized catches and consequently affecting food security, livelihoods and fishing environments (Salayo, Ahmed M., Garces, & Viswanathan, 2006).

Three coastal sates actively take part in exploring the central area of BCLME ecosystems and there are conflicts of interest. The oil and gas industry in Angola is responsible for a bulk of marine pollution, the country has numerous platforms operating where sewage, food and galley waste, oily water discharge pose threats to the ecosystems (Rohr, Sherman, & Aquarone, 2008) and most of them as a result of oil spills emanating form shipping activities and those taking place in ports. The tankers (large and small coastal ones) are utilized for the transport of crude oil from the production facilities to the capital city in Luanda and to other Angolan ports as well as overseas. In Namibia, the mining industry has plan to explore marine phosphate (activity that has never been done anywhere else in the world) and Namibian coastal waters are now facing the threat of being the testing ground (Earth Organization, 2016).

Specialists and international experts are concerned about destruction of the building blocks of the marine ecosystem and fish stocks. In addition is the harm to hatcheries for fish species; negative effects on zoo-plankton, increase algal blooms that harm shellfish and other species, change in the nutrient balance in upwelling affecting the BCLME which relies heavily on the upwelling of nutrients which are carefully balanced (AVAAZ, 2016) and (Earth Organization, 2016). Nature itself surprises men even with all the technological advancements in predicting its effects, as if this were not enough, they are deliberately to the destructive outcomes of it with their unsustainable practices (AVAAZ, 2016). *The hunger for immediate and voluminous gains makes them blind to care for the future* (say the public). Obviously, such issues sometimes are far beyond the capacities of fisheries governors, but the results are reflected negatively in their governability potential.

About the *dynamics* of the socioeconomic system, it was observed that the fishers, fishing companies and vessel operators depend directly on the fisheries for their living and subsistence and consequently have high interest in the sector. In 2016, the demersal fleet was composed of

80 industrial fishing vessels and 33 semi-industrial vessels while the pelagic fleet had 100 industrial fishing vessels and 57 for the semi-industrial (Appendix B), totalizing 180 industrial fishing vessels and 90 semi-industrial fishing vessels (Table 5.3). Industrial and Semi-industrial fishing in Angola is mainly performed by foreign vessels, a dependence imposed by the long period of conflict that left its capacity in an obsolete state. Foreign fishing fleets operating in Angolan waters land portion of their catch at Angolan ports to increment the local supply of fish. Some foreign vessels operating in the Industrial and Semi-industrial fishing are from Spain, Japan, France and Italy.

Table 5. 3 Annual Industrial and semi-industrial fleet size, 2011– 2016

Year	Fleet Segment		Total
	Industrial	Semi-industrial	
2011	118	71	189
2012	108	56	164
2013	172	50	222
2014	164	76	240
2015	157	95	252
2016	180	90	270

Author's own Table. Source: National Directorate of Fisheries, 2017

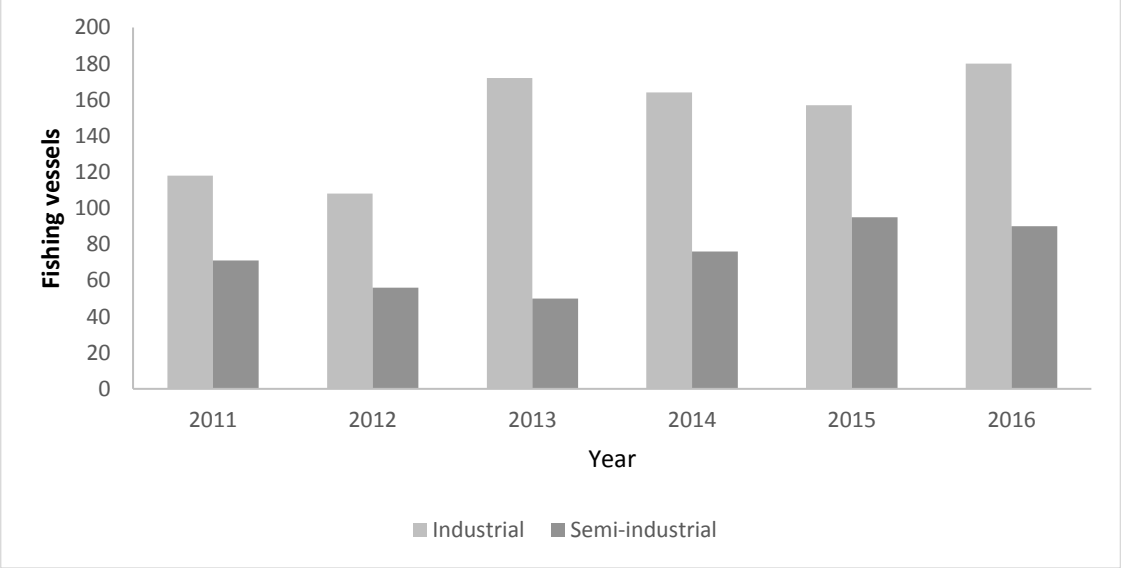

Figure 5. 4 Annual Industrial and semi-industrial fleet size, 2011– 2016

Source: National Directorate of Fisheries, 2017

According to reports (FAO, 2014b), 90% of fish production in Angola is consumed internally in local markets. It remained unclear during the study whether this proportion is calculated including the amount not landed by the foreign vessels. Horse mackerel is not exploited due to its status but can be imported duty free. The main gain Angola receives from offshore resources (Tuna fishery) is in form of licensing fees. Angola although rich in many other resources, is still in need for food, employment and generation of more income. A lot have been done in terms of policies and immediate interventions at the GS level that encourage maximization and diversification of the economy. The fishery sector has the potential to achieving these goals.

Table 5. 4 Industrial and Semi-industrial fish production (Tonnes), 2011-2016.

YEAR	Fleet segment		TOTAL
	Industrial	Semi-industrial	
2011	80057	93023	173080
2012	144843	108471	253314
2013	169216	96856	266072
2014	202560	105561	308121
2015	214892	103257	318149
2016	195120	110940	306060

Author's own Table. Source: National Directorate of Fisheries, 2017

From the table above (Table 5.4) it is be observed that the total landings show an increasing trend where the industrial fishery has higher values. In 2016, the Total fish production was estimated at 531842 Tonnes. According to DNP, a total of 10 fishing vessels were introduced in the pelagic fishery and they also experienced an improved quality in the fish report data, resulting in the increased production observed. The figures, suggest that the year 2016 has the lowest total quantity of landings compared to the previous two years. One reasons is seemingly the economic crisis assaulting the country, fishing companies and vessels' owners, lack of foreign currency to access necessary material from abroad and other logistic needs. The country's demand for fish is high and what is sold internally does not fully satisfy this demand due to many factors that affected the distribution of this product as stated in previous chapters. Most fish products are imported from Namibia, South Africa, Portugal, Spain, Mauritania, New Zealand and others. Angola exports some fish products to different countries to maximize income and foreign currency (Table 5.5), include crustaceans, molluscs, seals, fish oil, fish meal, and more. Larger national fishery production is normally sold fresh and deep frozen, dried or salted and some smaller quantity is canned.

Table 5. 5 Export of fish and fishery products, 2013-2016.

Year	Quantity (Ton)	Value (USD)	Value (EUR)
2013	26,689.00	19,900,752.69	22,518,255.00
2014	43,452.00	10,394,121.59	29,302,637.18
2015	21,465.00	11,528,160.65	30,529,126.00
2016	65,246.00	34,452,989.67	N/A

Author's own Table. Source: DNP

The export of fish and fishery products play a significant role for the country's economy, but its greater importance is linked to the development of the fishery sector itself and contributing to the socioeconomic development. Angola exports are still dominated by the oil sector which represents over 95% and in the recent years there have been a sharp decline which negatively impacted the economy of the country reducing its revenues from an annual average of 10.3% (from 2004-2014) to only 1.5% (since 2015) (World Bank, 2017). This has negatively affected not the oil sector alone but also the non-oil revenues.

The boundaries (*scales*) of the socioeconomic system have been addressed with the establishment of some rules imposed on stakeholders, in order to regulate the activities of the fishery sector. The newly-enacted policies and regulations include measures to ensure sustainable fisheries such as suspending fishing activities to allow stocks to replenish, technical and support measures include the restriction of the industrial fishing vessels in areas of greater recruitment and undertake cruise surveys to map eggs and larvae distribution (INIP, 2017). There are also protective measures such as establishment of marine protected areas (MPAs) for threatened species and habitats, and contingency plans (for managing oil spills, invasive alien species and other forms of pollution (DNP, 2017). The phenomenon of globalization apart from increasing the connectivity among countries in the region and the world at large, the range of the socioeconomic activities has also increased and consequently the governing actions and interactions. In Angola, all the industrial vessels allowed to operate in its territory (national or chartered) must be equipped with a Vessel Monitoring System (VMS); but with the existing capacity for monitoring, control, and surveillance (MCS), enforcement cannot be ensured along the entire coastline.

According to the SNFPA, as a result of the last decades of conflicts, the system for surveillance and control gradually become unable to respond to an increasing activity of IUU fishing within its EEZ (SNFPA, 2017). A total of 73 cases of transgression to the fisheries

legislation and illegal fishing were recorded in 2007 (SNFPA, 2017) which include fishing in restricted areas, use of unathorized fishng gears and more (Appendix Da). The activities were detected within the entire geographical area of Angola EEZ and are suspected to be extensive to the adjacent waters of Angola EEZ related particularly to tuna and shark fisheries. The SNFPA has intesified since then the implementation of control measures such as port control (Appendix Db) and has been further strengthened with the implementation of the SADC MCS regional program for MCS capacity building; in collaboration with donor society, modernization and restructure of the inspection and surveillance systems are under way as well as training (SNFPA, 2017). With across borders and across sectors works, critical steps are being taken by BCC countries to protect the shared marine ecosystem and ensure the long-term future of the ocean-based economies and societies (Neto et al., 2016).

In general, the very wide range of stakeholders depending on the marine resources is a challenge to the governability of the socioeconomic system and the interaction between them. The increased number of informal fish traders portrays social issues imposed by the lack of other alternative sources of income, additionally is migration to coastal areas for lack of livelihoods during the civil conflicts, pollution and other external and internal factors. Such problems are sometimes beyond the capabilities of the fisheries governors alone making the system to be less governable.

5.3 The Governing System

The governing system (GS) reflects the institutions that form the jurisdictional framework of the sector - a social or man-made system - (Jentoft, 2007b) and are the ones who govern the natural and the social system of the fishery. The Ministry of Fisheries and the Sea (MINPESMAR), is the management authority/body of Angola fishery resources. Upon this institution, rests the governance of the Angolan Industrial and Semi-industrial fisheries. This governing body is aided by different Directorates and/or institutions in order to carry out its plans and objectives.

The *diversity* of this system is characterized by the existence of many subunits or institutions. There are mostly hierarchical in their form of operation and stablished top-down. Among the institutions, are the National Directorate of Fisheries (DNP) at the national level, which has the power and responsibility of designing, directing, monitoring and implementing fisheries policies and secure sustainability of fisheries resources. The MINPESMAR mandates the DNP to ensure the management, conservation and protection of biological resources and establish

effective monitoring, and control mechanisms for fishing. INIP has the mandate of carrying out fisheries research activities within the framework that support integrated management of aquatic biological resources and quality control of fishery products and by-products. The tasks of the National Surveillance Directorate (SNFPA) are the inspection and control of fishing activities to prevent and repress irresponsible practices, ensure the preservation and reconstitution of marine stocks.

Other subunits and/or institutes include the office of Planning, studies and statistics (GEPE), which provides technical support service of transversal character, the main tasks are the preparation of policy measures and overall strategy of the Fisheries Sector, studies and makes regular review of the general implementation of the activities of other departments within the Ministry, coordinates the statistical activity. The Artisanal Fisheries Development Institute (IPA); The Institute of Fisheries Research (INIP), and the National Institute for the Support of Fishery Industry (INAIP) and Fund for the Support of the Development of Fishery Industry (FADEPA). Each coastal province has a Provincial Directorate of fisheries and they all report to the National Directorate of Fisheries in monthly bases. The sub-units presented above, are not involved directly in the governance of the two fleet segments but constitute an important component in the general discussions and consultations for future agreements, funds and development programs.

The management and conservation methods of the Angolan Industrial and Semi-industrial fisheries have focus on Effort control and Catch control, where the core legislative instruments are the Fisheries Law (*Lei no.6-A/04 de 08 de Outubro*), which defines the maritime boundaries. This Law harmonizes the old Fisheries Law (*Lei no.20/92, de 14 de Agosto*) and incorporates international law provisions that Angola has ratified such as the UNCLOS (MINPESMAR, 2014). An annual presidential Decree containing detailed management measures applied, including Total Allowable Catches (TACs) and closed seasons. A further annual presidential Decree provides for duty free quotas for import of *Horse mackerel*, a shared resource between Angola and Namibia. The key provisions of the Lei 6-A/04 (the Fisheries Law) include: setting of TACs, seen as a primary measure; granting of rights and fishing licenses; granting of quotas (Art 35) and the criteria for their allocation to Industrial and Semi-industrial operators (Art 22).

The marine commercial fishery is managed by a Right-based approach in the form of individual vessel quotas (IVQ), disaggregated from a scientifically-based TAC, and regulated by a set of management measures and enforced by a Monitoring Control and Surveillance system (MCS). The TACs presented below (Tables 5.6 and 5.7) are the overall quantities for the entire demersal and pelagic fishery respectively. These quantities are allocated to individual vessels as IVQ and a Tax in $ per ton is charged on harvest quota. Regarding the quota allocation, there is a very strict procedural protocol to be observed before a vessel can be licensed and be given a harvesting quota. The DNP initially grants the fishing rights as outlined in the LRBA (Art 31) to all interested parties who meet the requirements including technical capacity in form of concession rights which have a validity of up to 20 years (MINPESMAR, 2014). Preference is given to national citizens (without prejudice to the legal provisions on the Law of the Sea (UNCLOS). and the SADC Fisheries Protocol (Art 32)). Furthermore, prioritize operators with land-based infrastructure (such as processing plants), proven capability and record of responsible behaviour. Additionally, specifying fishing effort which includes species restrictions, minimum sizes, zones, limits on numbers of vessels, closed seasons, gear restrictions based on gear type and targeted species (type, dimension and mesh size), and other measures. Operators who meet these requirements have priority in the allocation of IVQ. The Law on private investment is also part of the management system. For a better and more effective surveillance, the Fishery Law (Lei n.° 6-A/04), mandates the installation of satellite tracking devices (VMS) in the entire fleet.

These regulations and management measures are oriented for the maximization of fishery results both physical (catches) and economic (income), at the same time avoiding overfishing. The TACs are fixed by executive decree after seeking technical advice of experts from the Ministry and the board of managers for Integrated Aquatic Biological Resources Council (LRBA, Art 19). A summary of some regulations and management measures employed for the industrial and semi-industrial fisheries are also given (Table 5.8). Closed seasons are established by executive decree for the fishery of certain species and/or gear types or areas. For the year 2017, the closed fishery for demersal species was set between the months of April to June and for the pelagic fish species (specifically horse mackerel) between June to August. The survey estimates mentioned in section 5.2 above, form the basis for recommendation on the Total Allowable Catch (TAC). From the figures (Table 5.6) it appears that more often than not,

quotas are set almost at the same level from one year to another and for all species with few exceptions (as elaborated further in section 5.5).

Table 5. 6 TACs of main commercial demersal e pelagic resources (Tonnes), 2012 -2016.

Demersal resources/groups	**2012**	**2013**	**2014**	**2015**	**2016**
Seabreams (Sparidae)	11321	11321	11321	11321	11321
Croakers (Sciaenidae)	18458	18458	18458	15458	15458
Grunts (Haemulidae)	21312	21312	21312	21312	21312
Groupers (Serranidae)	584	584	584	584	584
Hakes (Merlucciidae)	12589	12589	12589	12589	12569
Bigeye grunt (Brachydeuterus auritus)	14000	14000	14000	10000	10000
Other species	17899	17899	17899	24899	24899
Subtotal	**96143**	**96143**	**96143**	**96143**	**96143**
Pelagic resources/groups					
Cunene Horse mackere (Trachuras trecae)	15000	15000	55000	55000	55000
Cape Horse mackerel (Trachuras capensis)	50000	40000	30000	30000	30000
Sardinellas	150000	150000	150000	150000	150000
Sardinha do Reino (Sardinops sagax)	10000	10000	10000	0	0
Chub mackerel (Scomber japonicus)	8000	8000	14000	14 000	14 000
Other species	1869	1869	7869	7869	10869
Subtotal	**234869**	**224869**	**266869**	**256869**	**259869**
GRAND TOTAL	**331012**	**321012**	**363012**	**353012**	**356012**
Source: MINPESMAR, 2017					

Table 5. 7 Total annual fish production and TACs, 2011-2016

Year	**Catch**	**TAC**
2011	173080	331012*
2012	253314	331012
2013	266072	321012
2014	308121	363012
2015	318149	353012
2016	306060	356012
Source: MINPESMAR, 2017. *Adjusted value		

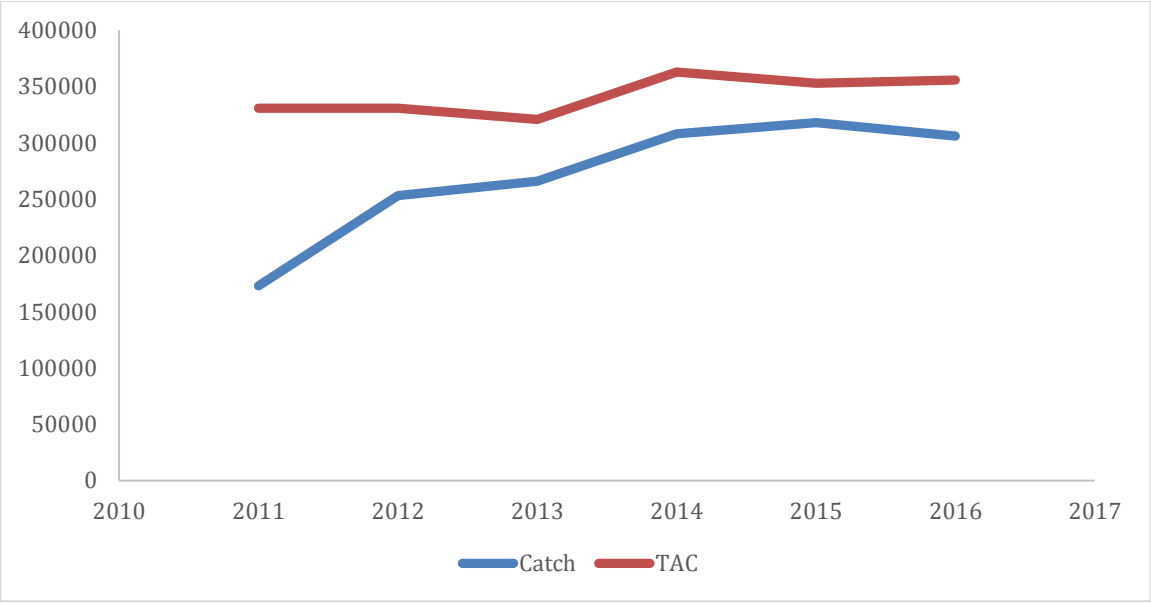

Figure 5. 5 Total annual fish production and TACs

Table 5. 8 Summary of the Fisheries Regulations (2016)

Management Measures	**Description**
Licensing	The allocated quota should not exceed the established TACs. IVQ, Tax in $ per ton is imposed on harvest quota. No other vessel can be registered when the TAC for each fishery is reached.
Mesh size regulations	Shrimp: 50 mm Demersal species (except Cape hake): 80mm Cape hake: 110mm Crab: 100mm Purse seines: 25-30mm
Closed seasons	Demersal trawlers: April, May and June for the entire coast
Restricted fishing zones	No fishing activity is allowed in Estuaries
Monitoring, Control and Surveillance	All industrial and semi-industrial fishing vessels independent of gear type should have VMS and GPS installed and observers on board

Author's own table. Source: MINPESMAR

At a regional (SADC), multilateral and international levels, Angola is establishing agreements with many fisheries management organizations for the exchange of information and where necessary a shared responsibility. Angola shares the BCLME with Namibia and South Africa. Given the richness of this system and its importance to the nation's economy in particular and the SADC region at large, the country also partakes in its governance. In this particular, the governing system consists of the three coastal States. These three countries signed an Interim Agreement to establish the Benguela Current Commission (BCC) achieved by January 2007. In March 2013, the collaboration among them was strengthened by the signing of the Benguela Current Convention (BCC), ratified by July 2014 becoming the first formal LME framework in the world (Neto et al., 2016). Below (Figure 10) is a summarised illustration of the structure of the BCLME governing system (GS).

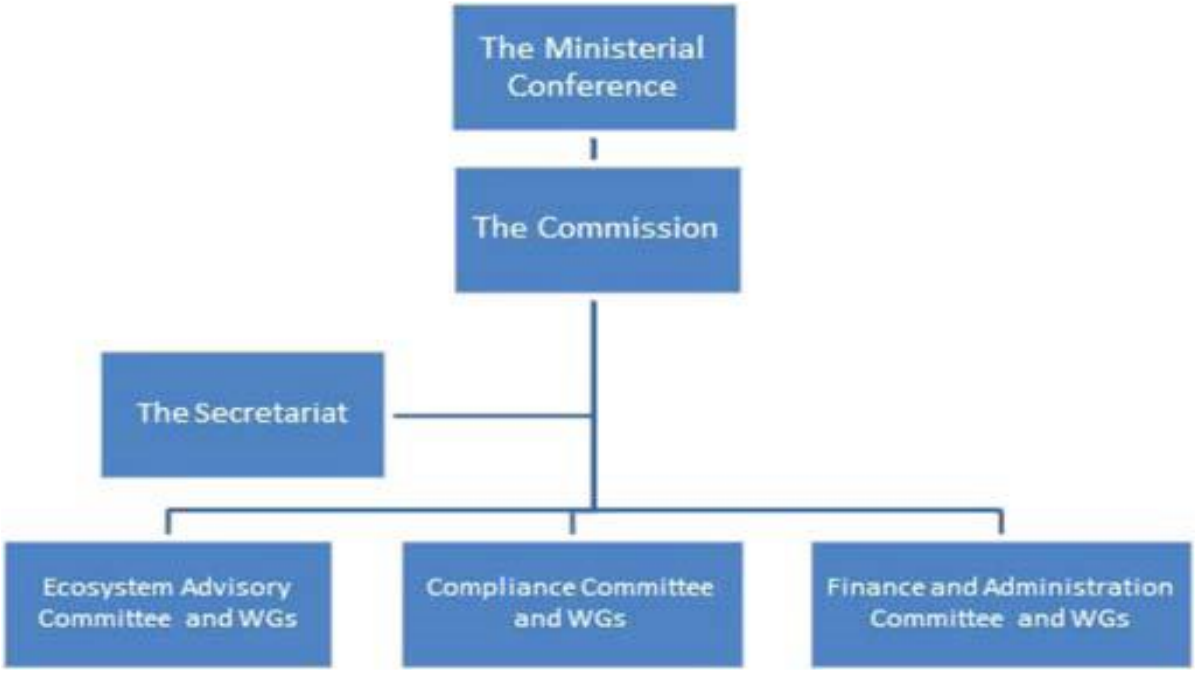

Figure 5. 6 Structure of the Benguela Current Commission (Hamukuaya et al., 2016).

Angola has ratified the SADC Fisheries Protocol whose main objective is the promotion of responsible and sustainable use of the living aquatic resources and aquatic ecosystems, the conventions establishing the COMHAFAT whose aims is the promotion of active and organised cooperation in the area of fisheries management and development in the Region. Additionally, the ICCAT, an inter-governmental fishery organization responsible for the conservation of tunas and tuna-like species in all waters of the Atlantic Ocean and adjacent seas; CECAF which facilitates the coordination of research and encourages education, training and assist the

members in an advisory management capacity in establishing policies to promote the rational management of resources. Among others, are the INFOPECHE, SEAFO, the SOLAS Convention, generally one of the most important of all international treaties concerning the safety of merchant ships, MARPOL a convention covering prevention of pollution of the marine environment by ships from operational or accidental, the CCRF **(**FAO Code of Conduct for Responsible Fisheries) and many others. Considering the many existing sub-units of the governing system, makes the level of its diversity to be high.

The Governing System (GS) has institutions that collaboratively work for the protection, conservation and sustainability of the marine ecosystem, and this portrays its *complexity*. Institutions have the tendency of forming other sub-units, sectors or departments whose positions, goals and views may differ and thus, reflecting a certain degree of complexity (Rhodes, 1996). Among the many different objectives of the Sub-units of the Governing System, the more prominent ones are presented in the next paragraphs. The reality of the fishery sector and that of the lives of people, require concrete actions possible of leading to improved conditions. The Government has many objectives whose aim is the creation and establishment of a positive macroeconomic state which involves reforms from legislative and administrative reforms to financial and fiscal reforms. This as a result will motivate the private sector contribution in rebuilding the countries productivity. Thus, the Ministry of Fisheries, supported by the government itself is fully engaged in the implementation of development policies embodied in the National Development Plan (PND 2013-2017).

The objectives and priorities of the fishery are towards the maximization of the sector's potential in line with the PND which serves as the main vehicle to guide and intensify the pace and quality towards the improvement of the lives of the citizens (MINPESMAR, 2014). Among the objectives, are the promotion of competitiveness and development, not only of the Industrial and Semi-industrial fisheries, but also the artisanal and aquaculture fisheries in a sustainable manner. Additionally is the promotion of employment or job creation; fight against hunger and poverty; give its contribution to food and nutritional security and promote the industry for the production of salt (MINPESMAR, 2014). Furthermore, is the development of actions that seek the rehabilitation and construction of support infrastructure for fishery production in the country as well as build on Angola’s reputation for good management and responsible fishing activities.

The goals of other departments and institutions under the MINPESMAR may differ internally at a very minimum extent as they seek to operate in accordance with the goals established by the MINPESMAR. They seek the rational exploration of aquatic biological resources within the biological sustainability limits and protection of the aquatic environment; they enforce the laws and regulations, encourage good practices of resource harvesting and sustainability. In order to meet the objectives, some priorities were established for the period 2013-2017. These include sustainably increasing marine fishery and aquaculture production; revitalize the fishing industry and improve the infrastructures for the conservation of fishery products; combat illegal fishing, under the terms recommended by the FAO; priorities are also directed towards Aquaculture development, increase salt production, dried fish, canned fish and training of staff.

Based on ecological criteria, the definition of Large Marine Ecosystems (LMEs) include bathymetry, hydrography, productivity, and trophically linked populations and its concept for ecosystem-based management incorporates five-module approach which are focused on: 1) productivity, 2) fish and fisheries, 3) pollution and ecosystem health, 4) socioeconomics, and 5) governance (Sherman et al., 2009). Therefore, the BCLME Programme aims at the sustainable and integrated management of the Benguela Current ecosystem as a whole focusing on transboundary management, through use of the Five Modules and Indicators afore mentioned. Its comprehensive program through the Transboundary Diagnostic Analysis (TDA) and the Strategic Action Plan (SAP), identifies basic underlying transboundary problems and indicates areas in the BCLME requiring action.

Among the main areas identified (Neto et al., 2016) for regional action and the required policy actions (Appendix C) include living and non-living marine resources, where actions are directed to ensure the identification of stocks which are marine transboundary resources and their cooperative management and harmonization of research and management plans and implementation. Understand the ecosystem impacts of exploration and extraction activities. Productivity and environmental variability, where better understanding of the ecosystem and predictability of climate change impacts and climate variability constitute the fundamental policy actions (Appendix C). Pollution, the expected action is the improvement of the understanding of harmful algal blooms and hypoxia. Ecosystem health and biodiversity, whose policies aim at the reduction of threats to species and habitats as well as strengthen the ability to monitor ecosystem health; Governance, strengthen human and institutional capacity and

mechanisms to implement the SAP and the harmonization of policies and legislative frameworks.

The SAP summarizes the regional framework for the BCLME Programme. It includes details of challenges facing the BCLME in regards to transboundary management. Establishes fundamental principles for integrated management, specifies the nature, scope and timetable for deliverable management policy actions. Also, details the institutional arrangements for ensuring delivery; elaborates on cooperation between the BCLME region and external institutions; specifies how the BCLME Programme will be financed during the start-up and implementation phase; and outlines approaches to ensure the long-term self-funding of the integrated management of the BCLME. The Benguela Current Commission (BCC) is responsible for the management of the entire ecosystem (becoming an example to other LME countries).

Concerning the *dynamics*, the governing system has been going through different phases. In previous years, the Ministry of fisheries operated under the Ministry of agriculture, which used to be designated as "Ministry of Agriculture, Environment and Fisheries. In 2012, the fisheries sector assumed a new stand being established then as the Ministry of Fisheries until 2017. With a new president in the command of the Nation's destinies, at the beginning of the year 2018, a new designation was incorporated with which is now know, that is, Ministry of Fisheries and the Sea. The changes in the naming were also accompanied by changes in the governing structure as well as in the bureaucratic structure. In part, this probably influenced the role and dynamics of the governing system and possibly hindered its performance at a local, national and regional level in terms of objectives fulfilment. With regards to the mandates and procedures of the Ministry, there is a noticeable positive stability. The slowness in bureaucratic systems have been dealt with by the implementation – still in progress - of an electronic system (to improve data base, companies registration, facilitate the public to access relevant information and other services) that will reduce paper work-load and speed up the timing of procedural protocols.

Reduced number of qualified personnel and limitation in terms of information gathering challnenges the regional GS as this can affect decision making process as well as the implementation of management measures for governing the natural system (Hamukuaya et al., 2016). However, it is here recognized the actions of the governing institution in furthering

efforts for capacity building and training as well as in acquiring relevant technologies to better respond to the demands of the new and modernized world. The isolated cases of conflict between industrial and semi-industrial fisheries do not pose a great challenge to the dynamics of the governance process and governability. It is advisable though not to overlook them and offer opportunities to express themselves and be heard. This apart from offering an opportunity for the governing authority to improve its image and the relationship with the operators, it also promotes a fertile ground for all to learn, change and adapt. In the contrary, legitimacy issues may arise and lead to perpetual non-compliance among the fishers regarding the regulations established by the government (Onyango & Jentoft, 2010).

Many activities have been put in place by the Governing system (GS) to help the recovery of ecosystem such as scientific studies, mechanisms to control exploitation of living marine resources, governance arrangements and capacity building (as stated earlier). Most of commercially important species in the BCLME are shared stocks, the 2002 agreement between Angola-Namibia on these resources, makes provision for the fixing of a starting point of the maritime border at the Kunene River mouth running out westwards, parallel to the line of latitude (Cochrane et al., 2009). Another main goal of BCLME was to have a self-sufficient Benguela Current Commission (BCC) established in order to implement an ecosystem-based management approach in the three countries of the BCLME and this goal was met in 2007.

There are limitations or boundaries (*scale*) in the governing system (GS) at local/national level that affect its performance. These are mostly related to inefficiencies in terms of information about other targeted species such as *Horse mackerel*, *Sardinellas* and *Tunas*, in the latter, the effort on the resource is unknown and consequently difficult to apply any model for estimating the trends of CPUE (INIP, 2017). This poses not only a challenge to management but also a risk to governance of the resources and decision-making process.

Each of the three countries sharing the BCLME is unique in terms of their capacity and limitations. Include research and management, policy, economics, and social sciences, constituting a major constraint in the attempt to implement EAF. At the regional level, the establishment of the BCC was a key step toward ensuring management of human impacts on the BCLME as a whole. The Commission help to ensure cooperation over regional issues such as pollution, management of shared fish stocks, and regional steps to address the impacts of marine mining and that of oil and gas production on the environment.

In summary, there is high heterogeneity in the Governing system in terms of number of existing subunits that supports it as well as relevant stakeholders reducing governability. It is challenging to measure the effects resulting from the interdependence in the system. The changes taking place are not immediate but continuous and positive. Stakeholders influence in the governing system is limited and thus in overall, the level of governability of governing system is somehow stable or moderate as elaborated more in the discussion (section 5.5).

5.4 The Governing Interactions

The governing interactions are characterized mainly by how the two systems (SG ana GS) interact, and the existing institutional arrangements that enable the coexistence of their relationships (Chuenpagdee & Jentoft, 2009).

The Governing Interactions (GI) as shown in chapter 3 (Table 3.1), consist of the interactions between the system-to-be-governed and the governing system. In this subsection of the diversity component, the analysis of the interactions in Angola fishery sector are addressed first and furthermore, it looks at the interactions with its neighbouring countries and some specific interactions within each of these countries are presented at later stage.

Looking at the *diversity* of the GI, it is here pointed out that the Angolan commercial fisheriy (Industrial and Semi-industrial) targets small pelagic species, demersal finfish, and Deep-water shrimp, and are all closed access fisheries. In terms of participation, the technical interactions involve many departments of the MINPESMAR with different roles from registration of the companies to granting of licenses. The stakeholders follow the established processing of the application by submitting it firstly to the Secretariat of the Office of the Minister who then send the entire documentation to the DNP for verification. The documentation is forwarded to the Legal Office to verify the legal instruments while the DNIP proceeds to inspect the establishment or inland infrastructure and verify hygienic health requirements. Once registered, the company is granted a concession for fishing right which has the duration of 20 years.

As mentioned earlier, the Ministry of Fisheries through the DNP deals with licensing and regulates the fishery in a combination of catch controls (in form of TACs with the scientific advice of the Angolan Fisheries Research Institute (INIP)), effort regulation, and technical measures (Personal professional knowledge). INIP plays a very significant role as they provide the best available scientific information; the level of interaction (communication) between DNP and INIP is characterized more by cooperative relationship than hierarchical. The model for license application include information such as the identity and indication of the applicant's

principal place of business or domicile, type of fishing to be carried out, the species or groups of species to be captured and vessel's IMO number. The SNFPA makes inspection for verification of vessel data compliance prior to the granting of a fishing license for the vessel only; the license has duration of one year and is renewable as long as resources are available. Bottom trawling in the southern region is banned due to declining biomass of Cunene horse mackerel; artisanal fishery is entry limited (only members of fishing communities are allowed to fish) but no overall limit on total effort or output.

As far as the protection of the resources is concerned, fishing right holders have rights and obligations. Among them is to avoid catching endangered species and do their level best harming them; the society in general is called to participate in raising awareness about the guiding principles for resources protection and the community observers are to record and report such negative activities (LRBA, Art 68 and 152). The existing industrial fishermen association do not have a direct involvement in decision-making, however they play a significant advisory role in the Annual Advisory Council. Information about the level of intervention and their capacities is limited. A continuous strengthening of this interaction is ideal since the contrary, display a decreased legitimacy towards the Laws and regulations among the fishers (Onyango & Jentoft, 2010).

Agreement on maritime borders between Angola and Namibia was signed in 2002, making provision for the fixing of a starting point of the maritime border at the Kunene River mouth running out westwards, parallel to the line of latitude (as stated in section 5.3). Additionally, the two countries have signed a Memorandum of Understanding (MoU) in June 2014. The MoU seeks a cooperation for the implementation of its protocols. The Action Plans focus on the economic cooperation for the fishery sector and promotion of joint ventures; MCS, which includes training on joint patrolling activities and transboundary inspections. It also looks at the fisheries research and the need for harmonization of research methodology, sharing of information in aquaculture and inland fishery, and the need for harmonized policies, reciprocal working visits of technocrats to fishing industry.

At a regional level, there are many differences in terms of regulations for the access to the resources. In Namibia, scientists from the Ministry of Fisheries and Marine Resources, set recommended harvest levels, and methods. This is done after consultations with representatives of the fishing industry. The decisions are based on the best scientific information available to

the Marine Resources Advisory Council. This council, is also informed by the Directorate of Policy, Planning and Economics on issue related to the social and economic performance of the respective fisheries, including the possible outcomes of all management options selected. The Minister then decides on the management actions to be taken that is, TACs (Cochrane et al., 2009).

In South Africa, the Minister of the Department of Environmental Affairs and Tourism takes the ultimate management decisions, based on scientific advice, largely but not exclusively related to the status of target stocks, generated by Scientific Working Groups. A comprehensive and highly transparent sector policy and rights allocation process was established for all commercial fisheries sectors followed up with a subsistence and small-scale fisheries policy development process (Cochrane et al., 2009). The BCC Secretariat together with regional and international partners are involved in the coordination of research activities, capacity building, as well as to assist the committees for the provision of scientific advice. It should therefore be emphasized that the efforts, interests and openness of the governing authorities towards the stakeholders is evident. A good sign for a more qualitative and effective governance of the BCLME.

The BCC as a multi-sectoral inter-governmental initiative, mandates the three countries to promote the long-term conservation, protection, rehabilitation, enhancement and sustainable use of the BCLME for the long-term social and economic benefits to the people of the SADC region. As it can be observed, there are many variations at the national level among the countries and within the fisheries in each country in terms of management approaches and their efficacy towards the system-to-be-governed and the governing system, including the interaction among the three states. The public in general have limited participation in the governing interactions and their knowledge about the governing system in general is moderate. Management tends to be predominantly top-down but well-supported by scientific advice (through regular assessments of the target stocks), mostly stock-based and national in scope, but consultation with stakeholders is present (BCC, 2013).

When it comes to the *complexity* of the GI, the flow of information, that is, communication and the degree of cooperation among the actors or representatives through governing interactions may influence the overall performance of governance. The information is mostly communicated through e-mails when it involves meetings with other parties either national,

regional or international. In most cases apart from emails, letters (for direct delivery) are also sent to reinforce the information. Catch reports from all coastal towns are submitted to DNP on monthly bases. Fishing operators are required to communicate their intent for entry-exit in Angolan waters to the MINPESMAR or the DNP, the same applies for landings or transhipment operation. Technical interactions involve sharing of data and information which is communicated through internet (and also via VMS although with technical limitations) and by phone.

Regionally, the BCC coordinates the partnership between the governments of Angola, Namibia and South Africa. Twelve (12) ministers, four from each country head the Ministerial Conference, the Secretariat works with regional and international partners to coordinate research and capacity building programs and assist the committees that provide scientific, management and financial advice (Neto et al., 2016). The Commission uses this science-based advice to make management decisions. Differences within each country exist in terms of management measures applied especially for the Horse mackerel where the fishery in Namibia is industrial, large midwater trawlers, purse seiners while in Angola fishery is diverse artisanal, and Semi industrial purse seine. This particular species has its spawning ground in south of Angola where its fishing is banned due to declining in stock and migrates to Namibia where fishing is allowed, these are complex transboundary aspects taken into considerations and pose challenges in devising common management strategies.

Regarding the *dynamics* of the system (in terms of its adaption), the governing authorities have been constantly interacting and seeking better ways to manage the system and to adapt to the demands of the continuously modernized world. Limitations with regards to resources and capacities for law enforcement and compliance still challenges the GS and consequently reduces the impact and effectiveness of their response. Transboundary surveys of commercially important fish stocks using the swept-area method in combination with acoustics, are conducted annually in Angola since 1985 and in Namibia since 1990 using the Norwegian research vessel Dr. Fridtjof Nansen; the three BCC Member States have research vessels, with Namibia and South Africa having acquired new state-of-the-art, multi-purpose research vessels (Cochrane et al., 2009). However, as pointed out in previous studies (UNDP, 1999), the lack of collaborative assessment and monitoring and inefficient management of regional resources continue to be a threat to the sustainable use of the resources. Implementation of many devised

national and regional action plans are hindered by many factors including human, scientific, technological and financial factors. These and many other aspects consequently may affect the ability to adapt but the degree of its impact can be regarded as moderate.

About its *boundaries* (in relation to collaboration), the Governing interactions (GI) between stakeholders face many challenges, but in overall a good work has been done. Currently, despite the fact that there is a scientific observer system in place, there are problems with the implementation of monitoring, control, and surveillance. Fishers' collaboration with regards to timely delivery of catch/landings reports is not efficient enough and demands continuous action from DNP for timely submission. The reasons behind the noncompliance are not clear. Most of the landing sites are in need of restructuring or maintenance due to afore mentioned reasons and at the same time there is need for the development of new landing sites. On this regard, a fishing port and a cold store are under construction in Tômbwa municipality (Namibe), expected to be operational in the near future. The facility will have a docking capacity of up to 10 boats at a time, with support infrastructures (NNN, 2016). These are some responses of the GS seek to mitigate the needs of the SG. The actual macroeconomic state, affects fishers and fishing companies and the industry at large. Regionally, sanctions for non-compliance tend to be patchy, with some notable, high-profile successes, but much non-compliance occurs on the coast with increased tendency; conflict resolution is not well developed and plans to fully develop effective co-management are in place (Cochrane et al., 2009).

In summary, the GI are characterized by high diversity and there are organizational and ministerial differences in terms of regulations for access to the resources which somehow may affect governance especially in terms of meeting the objectives. Communication, reflecting *complexity* of the system is moderate with increasing tendency. In terms of its *dynamics (*adaptation*),* is low despite some national and regional action plans delayed due to issues ranging from socioeconomic to scientific ones. The scale of the system is low and the overall governability of the GI is is at high level.

5.5 Discussion

This section provides a discussion summary framed within the context of the research questions. First, the properties and attributes of the systems analysed will be summarised then, translated into levels of governability (Table 5.9). As anticipated in section 1.3, the framework is not developed in its fullness although applied by many scholars. It seems inherent in the tool that determinations of the levels tend to lean on the assessors' knowledge, challenging in this way their justification. Its use in this work can be interpreted as a test of its applicability. The discussion is kept within the realms of interactive governance rather than that of political discourse. In the latter, governors are the ones blamed for failing to deliver as promised, implying that "*management failure is government failure";* the former, suggests also looking outside government and that the inherent diversity, complexity and dynamics within which governors, individuals or agents operate have their own impact on what can be achieved (Chuenpagdee & Jentoft, 2009). This study aims to analyse how the Angolan Industrial and Semi-industrial fishery is governed and the different components of the systems that impact its governance performance, from which ideas and suggestions that can enhance governability can be taken.

Table 5. 9 Summary of the system properties levels, attributes and governability

System Properties	System-to-be-Governed		GS	GI	GI Attributes
	Natural SG	Social SG			
Diversity	High	High	High	High	Participation
Governability	*Low*	*Low*	*Low*	*low*	
Complexity	High	Medium	Medium	Medium	Information
Governability	*Low*	*Moderate*	*Moderate*	*Moderate*	
Dynamics	Medium	High	Medium	Low	Adaptation
Governability	*Moderate*	*Low*	*Moderate*	*High*	
Scale	Low	High	Low	Low	Collaboration
Governability	*Moderate*	*Low*	*High*	*High*	

The Natural System

The assessment showed that there are many differences among the systems of the Angolan Industrial and Semi-industrial fisheries and consequently portraying different levels of governability. While the natural system is highly diverse, resulting from the abundance and variety of biodiversity it harbours, its complexity is likewise diverse. The system is moderate in its dynamics portrayed mainly by the impoverished status of the resources over the last decades. The scale of the natural system has low governability, despite the existence of some migratory species considered shared resources. Its size and interconnectedness to other subsystems and the response of the Governing system capacities to account for the issues emerging from the SG (the socioeconomic subsystem) is greatly challenged. The overall governability of the natural system oscillates between relatively low and moderate.

The study showed that most of the species are widely distributed within and across national exclusive economic zones. The natural system is managed as a territorial sea, reflecting the abidance to international principles and regulations (UNCLOS, 1982). The annual survey reports on demersal species show lower biomass values for the most important commercial species compared to previous years but caution is suggested in interpreting the data. The multi-specific nature of the fishery and inconsistent statistical information are reasons for describing the status of the stock based on the tendencies of biomass indexes as well as the application of precautionary principles to provide management advice (INIP, 2016). The pelagic stocks are currently estimated to be fully exploited or overexploited. There is a sharp decrease in terms of recruitment (Michalsen et al., 2016); (INIP, 2016) therefore, in both cases (for the pelagic and demersal stocks), caution is required on the part of the GS since the near constant TACs seems unresponsive to the underlying trend (as elaborated in the next paragraphs).

Environmental fluctuations such as oxygen concentration in the water column (Ekau & Verheye, 2005), including the biodiversity of the system and living patterns of the resources, negatively affect fish recruitment. For the particular case of Angola, human activities such as the prolonged fishing pressure and other activities appear to have greater impact on the ecosystem as observed by other studies (FAO, 2014b) and (Pitcher, Kalikoski, & Pramod, 2006). The distribution and transboundary nature of some species and technical aspects limit their full assessment such as those near the coast were the research vessel could not reach (INIP, 2016). It seems from the analysed data that effort measured in its simplest form as number of

fishing vessels (without undermining other important parameters such as day at the sea, engine power), has not yet satisfied the aims of the GS. The increased production taking into account the impoverished status of the stocks requires a continued response as far as its sustainability is concerned. In fact, there are situations where the vessels are able to increase their harvest as result of technological improvement (e.g. fish-finders and advanced fishing gears and methods), despite the existence of regulations to reduce fleet size or tonnage, a scenario known as "the capacity-creep" (FAO, 2004). Overcapacity can bring about issues like overfishing, IUU and economic waste for a society over the short and long term. Among the many strategies used to moderate fishing capacity, the better and long-lasting solution is still applying directly or indirectly, fair and firm limits on fishers' access to fish stocks (FAO, 2004).

Socioeconomic System

Fisheries play a very important role for the Angolan society especially the coastal dwellers. The living of many citizens depends on fishery either as a source of animal protein or income generation portraying a high diversity. The wide range of stakeholders depending on the marine resources is a challenge and makes its medium complexity. Other sectors of the economy, including oil industry and mineral extraction in Angolan waters, and the region respectively pose threats to the sustainability of the natural system that affect the social system and reduce its governability. As pointed out in section 5.2.1, the increased number of informal fish traders portrays social issues imposed by the lack of other alternative sources of income, migration, pollution and other external and internal factors showing high dynamics as well as scale. These problems exceed the powers of the fisheries governors making the governability of the social system less governable or law.

The socioeconomic contribution of the fishery to the world is broadly acknowledge despite all the infirmities it faces. Angola has been supporting its citizens and the economy with its timidly but improving industry. Studies reveal that in recent decades the contribution of the world's marine capture fishery to global economy has been showing to be smaller than it could be and if governance of marine fisheries is improved, society could capture part of this economic loss (Arnason, Kelleher, & Willmann, 2009). According to some studies, the absence of economic policies and strong institutions lead to the collapse of the fishery and they suggest the broader strengthening of economic policies and institutions for social and economic governance (Petersen, 200).

The results of low level in the governability of the system are mostly external to the fishery GS. Angolan industrial and semi-industrial fisheries has the potential to significantly increase and becoming the basis for economic growth, creation of alternative livelihoods, generate jobs and contribute to food security and poverty reduction, especially in rural and coastal areas. Studies recognize the Angolan fishery sector as a decisive sub-sector for the country in terms of social impact and remains the third-most important industry after oil and diamond mining, providing half of animal protein to population (Sumaila, 2016); (Veras, 2016). To increase fishery results is necessary that the improvement of fisheries governing systems is accompanied by the implementation of comprehensive reforms, which as a result will increase the natural capital (fish stocks) and reduce negative impacts of the fisheries (Arnason et al., 2009). (Kilduff, Carmichael, & Latour, 2009). From the governing entities, this implies in most cases, making hard choices (Safina & Brown, 2017), balancing scientific information against the various desires of stakeholders, whether they are commercial harvesters, recreational fishermen, or environmentalists (Kilduff et al., 2009).

The Governing System

The Governing system presents high heterogeneity in terms of subunits or its supportive institutions and number of relevant stakeholders. Its hierarchical and top-down set up makes it highly diverse. Although the complexity is moderate, it is difficult to measure or predict the effects resulting from the interdependence in the system that may reduce or increase its governability. The dynamics is moderate with tendencies to reduce especially due to the new political reforms in the country. The efforts towards improvement of the sector and search for mechanisms to improve stakeholders' participation in the operations of the system portrays commitment. The results although not immediate, are continuous and positive. Engagement with regional entities is good putting its scale at low level. This improves the match and governability of the GS and its interactions with the SG. The overall assessment indicates that the level of governability of the governing system is moderate.

Governing systems have plans and objectives to accomplish which are focused in many or specific aspects. These objectives reflect the willingness of the governing system to meet to needs of the system-to-be-go-governed. They are mostly, related to fundamental socioeconomic and environmental perspectives. One issue that characterizes most of the coastal cities and the fisheries itself in developing countries is that related to poverty that the sector actively seeks to

address. Described as a pervasive issue, poverty apart from affecting a considerable number of people, it is also a complex problem that is difficult to define, explain and solve (Onyango & Jentoft, 2010). Poverty has been addressed around the world over the past years with focus mostly on the economic (low income) and biological (overexploitation) aspects of the problem (Béné, 2003). Although these aspects are reality, the focus should not be limited on them for this can lead to the tendency of overlooking other elements which are likewise crucial. Fisheries objectives sometimes are more focused on maintaining or increasing the quantity of capture fishery production while the economic health of fisheries and fishers is given less attention (The World Bank, 2005).

The assessment with regards to the improvement in the quality of life for the populations, the interactive governance framework provides an approach that can be inter alia the availability of marine products for direct consumption and for industry processing, and the creation of new jobs (Onyango & Jentoft, 2010). Fish production of the last six years shows an increasing trend which seems to correspond to the objectives set of increasing productivity. The country has the highest domestic fish consumption of the SADC region, estimated at 11.1 kg/person per (Sumaila, 2016) and other studies revealed that 85% of fish production in 2016 was consumed domestically, 10% less than that provided by the FAO two years earlier (Veras, 2016). Regionally, is Namibia who enjoys the most economic benefit from the BCLME fisheries, almost US$2.2 billion in total economic impact and supporting about 75 thousand jobs (Sumaila, 2016).

There are efforts being made to strengthen the Angolan fishmeal and fish oil industry in a sustainable way. Most of these factories are concentrated in the municipality of Tombwa, in Namibe province. Complying with the management measures for marine fisheries, only a limited number of fishmeal and fish oil factories can operate so that the sustainability of resources and food supplies to the population is not negatively affected. Programs are carried out to encourage production and export of these products, including technical support to potential investors, fuel subsidies and foreign exchange availability to address import needs (FIS, 2016). Issues related to poverty are not limited only to the resources themselves but also directly linked to the social and institutional aspects that govern the access of people to the fisheries resources (Béné, 2003). Despite of the three states of the BCLME having adequate management and institutional systems for fisheries management, the performance in terms of

fulfilment of objectives differs within and between countries, management tends to be predominantly top-down although scientifically well-supported (Cochrane et al., 2009).

The depletion of natural renewable resources is a worldwide concern that has been proving to be difficult to appease. Sustainable fishing through good practices and others make the extended list of recommendations (Jentoft, 1993). This leads to argue that the needs and match between the governing system and the system-to-be-governed can also be seen in the way power is exercised by the governors; the way access and allocation of resources is carried. According to the recent history the infirmity of resources depletion results from the absence of effective governance, where the demand outstrips the biological capacity of sustaining a particular fish stock (FAO, 2018a). it is argued therefore, that power can affect the governance objectives if it is not effective enough and for governors, such powers are translated in form of decision making, implementation and enforcement (Jentoft, 2007b). But in doing so, it is important to know the limits in using the institutional powers to avoid reduction in the levels of governability (Jentoft, 2007b) and legitimacy (Rhodes, 1996).

A more sustainable and equitable governance of common pool resources, necessitates ensuring that those who are affected by the rules (known as stakeholders in ecosystem approach to fisheries) are also given the opportunity to participate in modifying them (Ostrom, 2008). The idea is that if a given action will bring benefits to a group, that same group will show more interest to engage and stick together in achieving those goals (Ostrom, 1990). The policies and plans of developing fisheries management strategies must be directed or focused on people involved in fisheries and their communities as well as their complexities and taking also into account the processes of poverty, the need for livelihoods and implications for how, why, where and when people fish (FAO, 2018b). Therefore, the fishery itself is required to setup a stakeholder and control system in close collaboration with all those involved and definitely establish the fishery (patterns and areas) as well as having a common comprehension of the communal, financial and ecosystem goals to be attained (Cox, Arnold, & Villamayor, 2010).

Action is been taken concerning ensuring sustainable fisheries. The governing system of the Angolan commercial fishery have demonstrated this by the including in its objectives the commitment to respect the Code of Conduct for Responsible Fisheries (CCRF) and ongoing initiatives reflecting a precautionary approach in catches, and taking into account the overall objectives of sustainable fisheries development. It is known that the CCRF is voluntary by

nature, being under the jurisdiction of the participatory nations. This reduces the power of it, but if successfully implemented, most of human right and socio-economic issues in fisheries sub-sectors will be welladdressed. Certainly, the benefits will not be limited to fisheries and fishermen alone but will include achieving sustainable livelihoods, social stability, food security, and sustainable social and economic development for the nations. Furthermore, the hopes and aspirations of the poor and the vulnerable fishery-dependent people can be raised to greater levels of satisfaction and realization if the same spirit present in the creation of this Code is reflected in its execution or application.

The lack of appropriate database and statistical catch information pose serious risks and challenges to the management of resources worldwide. The Angolan LRBA in its Article 9 provides room for precautionary approach and this has been an important aid to the Governing system. The result showed that most species are managed by TACs for the overall density estimates (Agritrade, 2004), (INIP, 2016). As pointed out in section 5.2, the TACs present a near constant trend (Table 5.5) with particular exception to year 2015 and 2016, for *Sardinops sagax* species with no TAC established. The former issue (constant TAC), seems to indicate limitations of the role of assessment and advice creating a mismatch that may affect the governability of the natural subsystem. According to recent studies (Jennings, 2016), this may raise questions regarding the procedures for establishing TACs for data limited stocks. Also, may decrease legitimacy and governability of the socioeconomic system and their compliance.

For the last case (the Sardinops sagax), It is more probable that the uncertainty on stocks information was too high as the last scientific reports pointed out (INIP, 2016). The LRBA on its Article 20 provides the conditions of changes in TACs for a specific period. This may occur when new scientific information proves reduction, extinction of failures in sustainable recruitment or any other situation that threatens the resources or the environment (MINPESMAR, 2014). Acknowledging the many existing uncertainties and limitations, the use of precautionary principle is a positive action concerning responsible fisheries and sustainability of the resources. It is however, important to point out that data deficient fisheries are prone to incur into grave problems due to excessive precaution, and includes overfishing, under-fishing, limited access to certification, additionally, the governing authorities may end up not providing clear evidences to the society; thus the higher the uncertainty, the higher the risk (Jennings, 2016). It was observed elsewhere that inadequate control – even when

assessments and quotas are being used for the management of the fisheries, these two mechanisms - control and enforcement - are often lacking (UNDP, 1999). The governing systems in this regard are expected to offer a timely response as well as to understand in its fullness the ongoing issues on ground and provide aid to the best of their capacities (Bavinck et al., 2013).

The Governing Interactions

The GI of the Angolan Industrial and Semi-industrial fisheries are characterized by the existence of organizational subunits at a local level and ministerial entities at regional and others at international level. These and other factors as seen in section 5.4, makes the system highly diverse. Differences in terms of regulations for access to the resources exist which somehow may affect governance especially in terms of meeting the objectives. Communication, reflecting *complexity* of the system is moderate with increasing tendency and also expressed in the strengthening of the collaborative actions at regional level. In terms of its *dynamics (*adaptation*)*, is low despite some national and regional action plans delayed due to issues ranging from socioeconomic to scientific ones. The scale of the system is low and the overall governability of the GI is at high level.

Governability can be determined by the quality of governing interactions between the GS and SG. The more the world becomes connected, the more they share on what happens at any given setting. Looking to the governing interactions, governors should not ignore ethical issues and moral attributes that may influence participation as this may hinder the co-management of the ecosystem (Chuenpagdee & Jentoft, 2009). A deficiency in these interactions compromise the attainment of the envisaged objectives. In this case, is necessary to ensure that the levels of participation, communication, adaptation and collaboration are efficient.

The GS has demonstrated a positive interaction towards the SG and maximized by its cooperative role with neighbouring counterparts. Although the GS has limited technological power, it has been able to account for the sustainability of its ecosystem. There are reduced cases of infringements as the protection of the resources is concerned. If efforts are continued towards community observers to record and report negative activities (LRBA, Art 68 and 152), and encourage their level of intervention it will increase the overall governability even more but the contrary is likewise true as a consequence of decreased legitimacy (Onyango & Jentoft, 2010). Another positive aspect of the fishery sector is the Action Plan resulting from Agreement

on maritime borders Angola-Namibia (signed in 2002), which emphasises training on joint patrolling activities and transboundary inspections, including research and harmonization of research methodology and sharing of information. In addition to this, is necessary that the GS maximizes the availability of information to the public about its functioning and that of the natural system being governed. As Jentoft (2009) pointed out, this will enable the stakeholders' voice to be heard, to be influential as well as to be informed about what and why decisions are made.

As pointed out in previous paragraphs, the governing system of the Angolan Industrial and Semi-industrial fishery and that of the region at large has a hierarchical approach as defined by many scholars (Kooiman et al., 2005) and its operation is mostly top-down (Cochrane et al., 2009). Studies have shown that a shift to a more horizontal model opens more opportunities for inclusion of the social system in decision and policy making processes, favouring the improvement of the overall governability of the systems (José, Paladines, & Chuenpagdee, 2015). The governmental actions towards management should be shared with all the participants and providing them with trainings that can improve their skills, make them participants in the decision-making process and help them to have better lives. Additionally, governing systems need to ensure the sustainability of fish stocks and equitable distribution of the benefits, the policy-makers must recognize the important contributions that fisheries make at international, national and local levels (FMSP, 2015).

A mutual interdependence in the Angolan Industrial and Semi-industrial fisheries exist. Its people depends on it and the economy much more wanted to be diversified counts on its people. That is, a permanent bond or link, between the GS and the SG. Such union will become more pleasing and beautiful, as collaborative actions are continuously, implemented, improved and encouraged among the systems through their interactions.

CHAPTER 6: CONCLUSION

This chapter leads to the conclusion of this study and provides a short summary of the findings of the thesis in relation to the research questions and generic perspectives. The study was more oriented into providing inspirational ideas that can maximize the governance capabilities and effective use of the common natural resources. The application of interactive governance to the Industrial and Semi-industrial fisheries has shown the usefulness of the approach in assessing governability in many aspects. The approach facilitates not only the identification of weakness but also gives orientation on 'where to look' and 'what to look for' (Bavinck et al., 2013) in the natural and social systems and explore the potential of governing interactions. The framework enabled a systematic study of the fishery and the key components involved in the governance process. It allowed also to depict and illustrate the necessities of the system-to-be governed, the governance capacities, challenges and limitations. The author believes that there is scope for furthering the questions addressed in this study.

In this research, the first question focused at understanding the Angolan Industrial and Semi-industrial fisheries governance. The governance of the commercial fishery is well supported by institutional, legal and regulation tools that guide the dealings towards both subsystems of the SG and inherent interactions. The study reveals that the governability of the governing system of the Industrial and Semi-industrial fisheries is moderate, its diversity (as expressed in its number of supportive sub-units) and dynamics (of the past difficult years) influences its level of governability. Its moderate level of governability shows resilience of the system capacities to deal with issues around it. The organization and operational aspects has great influence in terms of scale.

The second question focused the capacities of the GS to meet the needs of the SG. Looking at the different features of the two distinct sub-units of the system-to-be-governed that is, the Natural system and Socio-economic system, there are aspects to consider for the overall governance. In the former (governed as a territorial sea), the challenges derive from the size of the ecosystem, interconnectedness and living patterns of the resources and environmental variabilities. Additionally, recognizing the qualitative improvement of catch/landings reports and scientific surveys for stock assessments, there is still a reduced knowledge about the system and the status of the stocks at large, constituting main factors to the governability limitations and efforts are still needed so that the issue in not perpetuated. In the latter (with a hierarchical form), the governability is limited due to many factors. Although some (e.g. lack of alternative

livelihoods, migration to coastal areas), are beyond the capabilities of the fisheries governors alone, the degree of participation and representation within the governing system could be improved and play a more significant role not only for the decision-making process but also on other stakeholders and improve legitimacy. In general, the GS has been doing well based on the available potential it has.

The third question aimed at the features of the systems that limit the governability. The explorative nature of the study enabled to illustrate them throughout in the SG, GS and GI. These include the inherited fragilities of the prolonged social instability, worsened by financial and technological factors as well as human and scientific capacities that hinder many national and regional action plans and interactions. Furthermore, regional differences in regulations for access to the resources reduce the governability and may negatively influence the attainment of projected objectives.

Finally, the fourth question addressed the socioeconomic importance of the Industrial and Semi-industrial fisheries. The result shows that the support of the Angolan fishery to its citizens is significant. Continuous strengthening of economic policies and institutions for social and economic governance (Petersen, 200) is encouraged. The sector survived the sad past of long unsustainable exploitation of its resources but still playing its decisive role in terms of social impact, from single fish traders to fishery governors or administrators.

Reiterating, based on the principles of interactive governance (Song & Chuenpagdee, 2010), (Bavinck et al., 2013), the level of governability is determined by the overall governance performance. This means looking to the characteristics of the system-to-be-governed, the capacities of the governing system and quality of the interactions among them. The study shows that the governability of the Angolan Industrial and Semi-industrial fisheries is moderate. This moderate or stable status can be interpreted in its great efforts of ensuring the continuous progress of the sector, despite the past difficult reality and the most recent ones of which it is difficult sometimes to not influence its normal functioning. The management principles of common pool resources (CPRs) suggests that governmental authorities shouldn't be of any hindrance to the appropriators to organize themselves and if possible to create their own institutions (Ostrom, 1990). This implies also acknowledging that the efforts of a centralized government alone in the management of natural resources cannot guarantee the sustainability of CPRs. Thus, allowing stakeholders to form their own institutions empowers them and

consequently helping significantly to the well-being of the resource status. In attempts to give answers or solutions to issues arising from the management of resources, some authors (Jentoft, 2007b) have partially answered that the limits of governability can be directly associated to how well the social aspects of the responsible governing system interacts with the system being managed. In fact, as observed in many settings, reaching a consensus among the stakeholders on the objectives of an ecosystem approach being it biological or economic, constitutes a great challenge (Cury, Mullon, Garcia, & Shannon, 2005).

Among the many management measures used in conservation of common natural resources, TACs are among them. They are normally set based on precautionary management strategies and harvest control rules aimed at contributing to rebuilding depleted stocks and laying the foundation for improved profitability in fisheries (Gullestad et al., 2017). In this regard, incremental efforts are encouraged towards increasing knowledge of the SG, as the process requires good understanding especially of the natural sub-system and the resources in it. Many organizational subunits characterizes the governing interactions between GS and SG. A more deepened inclusion of the social counterparts could play a positive role within the governing system and ultimately improve legitimacy and compliance. The regional differences in regulations for access to the resources partly reduces the governance effectiveness. With respect to the boundaries of the GI, a continuous effort to strengthen the capacities regarding the control of fishing activities, rules and law enforcement is vital. Regionally, the three States have adequate management and institutional systems for fisheries management. Additionally, challenges regarding the transboundary nature of some of the living resources unites the governing institutions in devising common management strategies.

The study also acknowledges that the socioeconomic reality the country faces now poses a challenge to the governing system to devise strategy for a short-term response to the many problems the fishery in general is going through. The governing system of the Industrial and Semi-industrial fisheries has been proactive in its dealings among the systems. Fisheries science always face challenges in terms of sufficient human and fiscal resources that can satisfy the increasing demand for data collection as well as to conduct species stock assessments (Kilduff et al., 2009). The continuous improvement and balance in the expansion of knowledge base for decision-making is encouraged. It reduces the reliance on fisheries science and quantitative data alone (biology, oceanography, economics and mathematical representation of resource trends),

acknowledged to adopt holistic approach but looking to the fishery also as complex socio-ecological systems which recognises the important role of social science information and local and indigenous knowledge in enhancing understanding of the fishery system (Sowman, 2011).

There are never a certainty that a selected solution will solve the problem and rushing into a conclusion about the nature of a problem is inappropriate (Jentoft & Chuenpagdee, 2009a). But the goals are and still should be the protection of the resource and the provision of the greatest good to resource users (Kilduff et al., 2009). The Angolan ecosystem in particular and African LMEs in general possess significant marine biodiversity and habitats, and they are vital to the coastal cities and countries respectively. The Angolan marine ecosystem, the BCLME riches and their supportive role to the economies is invaluable, and their beauty shines for the joy of their dwellers and those attracted to appreciate it. However, its diversity, complexity and dynamics showcases a test that leads people to acknowledge that there are indeed, limits to governability.

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APPENDICES

Appendix A: Fieldwork images of the study area

Women fish traders in Luanda open market (1)

Women fish traders in Luanda (2)

Frozen fish in one of Luanda's shop center (3)

Namibe fish market (4)

Port of Namibe "landing ground" (5)

Dry salted fish inside Namibe fish market (6)

Source: Author's own shots, credit: Evelaine (1-3, including cover page).

Appendix B: Annual Industrial and Semi-industrial fleet size, 2011– 2016.

Year	Demersal fleet segment		Total
	Industrial	Semi-industrial	
2011	55	26	**81**
2012	60	14	**74**
2013	73	7	**80**
2014	71	22	**93**
2015	66	30	**96**
2016	80	33	**113**

Year	Pelagic fleet segment		Total
	Industrial	Semi-industrial	
2011	63	45	**108**
2012	48	42	**90**
2013	99	43	**142**
2014	93	49	**147**
2015	91	65	**156**
2016	100	57	**157**

Author's own table. Source: Data provided by the National Directorate of Fisheries, 2017

Appendix C: The main themes of the Strategic Action Programme (2015–2019) for the BCLME and their respective Policy Actions

Theme	Policy Action
Living marine resources	Ascertain which stocks are marine transboundary resources. Manage hared stocks cooperatively by harmonizing research and management planning and implementation. Implement ecosystem-based management. Ensure compliance with management and conservation measures.
Non-living marine resources	Understand the ecosystem impacts of exploration and extraction activities. Integrate and implement international standards for exploration and extraction.
Productivity and environmental variability	Improve the understanding of the BCLME ecosystem. Improve the understanding and predictability of climate change impacts and climate variability. Improve the understanding of harmful algal blooms and hypoxia.
Pollution	Monitor and manage coastal water quality around pollution "hotspots". Improve the understanding of river pollution in the BCLME. Prevent, abate, mitigate and prepare for oil spills. Prevent, abate and mitigate against marine litter. Understand the impacts of noise pollution and mitigate as necessary. Reduce emissions of greenhouse gases.
Ecosystem health and biodiversity	Reduce threats to species and habitats. Strengthen ability to monitor ecosystem health
Human dimensions	Ensure consistency of human dimension data across countries. Expand the knowledge base in respect to human dimensions in the BCLME region. Incorporate human dimensions into resource management decision-making. Implement regional cooperation for safety-at-sea. Develop constructive participation by stakeholders and reduce conflicts
Governance	Strengthen national human capacity to participate in BCC processes. Strengthen national institutional capacity and mechanisms to implement the SAP and IP. Strengthen and harmonise policy and legislative frameworks. Strengthen information, communication and awareness mechanisms. Strengthen the governance structures and procedures for the BCC. Strengthen regional and international cooperation. Establish sustainable financing mechanisms. Review and monitor progress in implementing the SAP.
Potential for economic development	Adopt and use integrated ocean and coastal management. Develop a supportive funding and revenue model for marine transport and infrastructure. Develop adequate infrastructure such as port facilities, pipeline networks to enable successful offshore oil and gas exploration. Establish a funding platform (aquaculture development fund) to address challenges in financing aquaculture in the region; improve market accessibility. Conduct research to better understand the potential for extracting minerals in a responsible and sustainable manner. Manage competition for shared resources by employing adequate spatial planning. Enhance key economic sectors, i.e. marine transport and manufacturing; offshore oil & gas and fisheries; Achieve sustainable oceans development through integrated ocean governance, ocean protection and marine spatial planning.

Authors' own table with minimum text edit. Source: (Neto et al., 2016)

Appendix D: Most frequent infringements and some port control measures (SNFPA).

a) Most frequent infringements registered:

- Unauthorised fishing;
- Fishing in prohibited area;
- Use of gear that does not correspond with those specified in the fishing certificate;
- Trawling in pair;
- Using the double bag in the cod_end;
- Operation related to unauthorised fishing;
- Leaving Angolan waters without permission;
- Discharge of toxic substances at sea;
- Fishing without any document raised the vessel.

b) Port control measures applied:

- Vessel registration certificate;
- Navigation certificate;
- Fishing license;
- Fishing area;
- Authorization from the Flag state to unload the catches in Angolan ports;
- Fisheries Log book;
- Navigation Log book;
- Bill of Landing;
- Quality control and hygienic certificates.