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**Constraints and Challenges faced by Artisanal Fisheries in Beira-
Mozambique**

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Declaration

I, Celma Taibo Charfudine Omar, declare that is my original work and never been submitted to any other learning Institution before.

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Date:_____

Signature_____

Dedication

In loving memory of my father and brother, to my mom and sisters, the women of my life and, to my nephews Taibo, Yassira and Nashrah with all my love.

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Abstract

Considering the fact that 50.000 of the Mozambican families depend on the coastal fishery for livelihood it is likely that any changes in the production of the fishery may have impact on the socio-economic lives of those people. However, for the period 2001-2005 the production quantities in Beira have decreased by 71 % in the artisanal sector that leads to low income and make fishermen vulnerable and in poverty. Minimizing the constraints faced by artisanal fishermen is seen as vital to the entire economy. The study was based on questionnaire and involved a simple random sampling of 366 fishermen in Beira. The data was processed and analyzed using the SPSS. The study suggests that 39 % of the fishermen argue lack of capital either unacknowledged of the procedures of how to get loan from Banks and financial institutions preventing them to increase their production linked with low level of education perhaps the prime factor constrain the sector. The study also proposes that fishermen constraints depend on their level of education, length of experience and type of instruments. The study further suggests the need to reinforce the dissemination on the procedures regarding provision of loans or creating a financial institution addressed to artisanal fishermen.

Glossary of Terms

Artisanal Fisheries are coastal communities all along the coastline and in inland waters landing for subsistence and commercialization, the size of vessels is until ten meters.

By-catch: describes fishing creatures that are caught unintentionally by fishing gear that are often unwanted and unused.

Communal property: the resource is held by an identifiable community of interdependent users who exclude outsiders while regulating use amongst members. They are unlikely to be exclusive or transferable and are often rights of equal access and use.

Co-management: is the sharing of responsibility and authority between the government and local resource users to manage a specified resource.

Industrial Fishery is constitutes with larger vessels fishing for shallow water shrimp and resources in deeper waters, mainly for export.

Ndau is a local language spoken by people who live in Sofala Province.

Open access: the absence of well defined property rights. Access to the resource is unregulated and free and open to anyone.

Private property: the rights to exclude others from using the resource and to regulate the use of the resource are vested in an individual or group. They are recognized and enforced by the state and are usually exclusive and transferable.

Semi-industrial are the intermediate size is between ten to twenty meters and the boats are involved in shallow water shrimp fisheries for local consumption and export.

List of Abbreviations and Acronyms

CAP	Fishery Administration Commission
EEZ	Economic Exclusive Zone
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
IDPPE	Institute for Development of Small Scale Fisheries
IFAD	International Fund for Agricultural Development
IIP	Fishery Research Institute
INE	Instituto Nacional de Estadística
ITQ	Individual Transferable Quota
MP	Ministry of Fishery
MTn	Metical da Nova Família
NORAD	Norwegian Development Agency
SPSS	Statistical Package for the Social Science
TAC	Total Allowable Catch
UNEP	The United Nations Environment Programme
WB	World Bank

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Chapter 1: Introduction

1.1 Preamble

The large percentage of the coastal communities especially in developing countries is engaged in the fishery sector mainly the artisanal sector. The phrase *artisanal fishery* is sometimes used interchangeably with phrases like small-scale, traditional, and inshore or subsistence fisheries. Although these terms have slightly different meaning, they are generally used to define fisheries that have certain common characteristics. The mostly used definition of artisanal fishery is “ fisheries that are normally carried out by small scale fishing units, often consisting of kin groups using small occasionally powered boats or not at all. It is characterized by labor intensive and the investment levels are relatively low, with capital often borrowed from those who market the catch”, Habteyonas and Srimgeour (2000) and in addition, Momade (2005) defines artisanal fisheries as referring to fishing done by coastal communities all along the coastline and in inland waters landing for both subsistence and commercialization.

Similarly, several international organizations such as the Food and Agriculture Organization (FAO), The United Nations Environment Programme (UNEP), World Bank and Asian Development Bank have discussed the elements of a definition for artisanal, small scale, traditional fisheries, based on certain characteristics of them. The common characteristics for developing an understanding of artisanal, small scale fisheries may be based on recognition of the following:

- 1) They are traditional fisheries involving fishing households or small groups of fishery workers.
- 2) The fishing vessel could vary from gleaning or a one-man canoe to up to twenty meters, including trawlers, seines or long- liners.
- 3) They are relatively small fishing vessels, which may be non-motorized or use small board engines.
- 4) The fishing is confined to or is usually close to the coastline.

- 5) Use of fishing gear such as beach seine and gill nets, hook and line, traps and mosquito nets.
- 6) Use of labor-intensive technologies as mesh nets, oar, no-motorized boats.
- 7) Can be both subsistence and commercial, providing for local consumption or export as well.

Thus, as noted by FAO (2006) there is no agreement over what constitute the artisanal sector worldwide. Nevertheless, the general consensus among theories is that artisanal fisheries is in general, traditional fisheries involving fishing households, using relatively small amounts of capital and energy, relatively small fishing vessels, making short fishing trips close to shore, mainly for local consumption. In practice, the definition varies across countries. For example, from gleaning or a one-man canoe in poor developing countries, to more than twenty meters trawlers, seines, or long liners in developed ones. The growing importance of the issue with sight to poverty alleviation and assuming that the artisanal fishermen are considered poor by definition has generated an atmosphere of interest among researchers. One of the main aspects researchers have targeted is on the role that artisanal fisheries play in the growth and development of the overall economy.

However, despite the contribution of artisanal fisheries sector to the overall economy, there are theoretical as well as empirical evidence that the artisanal fisheries is decreasing the quantity captured because of limited fishing effort, lack of ice and fuel, lack of capital and training, fishing experience and the fishing instruments and the consequence of this factor have been often declining incomes, over exploitation of fish stocks and degradation of coastal zone environments. Where this situation exists, there is a threat for the population groups dependant on fisheries for their living and to the economic and social well-being of countries, or those areas, where the fisheries plays a significant role within the economy.

Studies about artisanal fisheries shows that country specially the developing ones attach a lot of importance to their problems because of the significance of them in the supply of

fish for food, as they account for the major part of the fish landed for direct human consumption specially in developing countries. The contribution of artisanal fisheries to income and employment, often in areas where there is no alternative employment, is also considerable with at least 100 million people wholly or partly economically dependent up on it (FAO, 1997).

However, there are some constraints that are affecting the production in the artisanal fisheries. Technology for instance, has also had some impact on the artisanal fisheries; however innovations in this sector have been relatively simple. Coupled with increased participation in the fisheries, the innovations have greatly increased artisanal fishing pressure. The increased participation is partly due to population growth, but also developments in agriculture and other sectors have caused displaced people to turn to the sea for their livelihood.

For instance, Habteyonas and Scrimgeour (2000), on their study in Eritrea found that one of the main constraints that are impeding the artisanal fisheries to increase their production is limited fishing effort and even increasing it, their production level still low. The other constraints that they found are the limited carrying capacity and power of their boats and also the lack of ice and fuel. The constraints besides those identified by Habteyonas and Scrimgeour (2000) is in the study made by Sesabo and Tol (2005) in Tanzania which is identified as the main constraints that are affecting the production of the artisanal fisheries the fishing experience which appears to be an important human capital for increasing fishing productivity.

In addition, this study also showed that the households with more years of experience in fishing are found to be more efficient than their counterpart. And also, they argue that future policies should be concerted to provide mechanisms which improve the access of artisanal fisheries to less destructive fishing tools as modernized instruments and boats to be able to access unexplored fishing ground thus, reducing the problem of over fishing. Furthermore, the other study carried out in Tanzania by Berachi (2003), showed that the fishermen in that country besides the decrease on their production there are also the

tendency to catch more small-sized fish and is the change in the catch composition that is making the price rise or drop. He revealed that the catches declines due to the effort pressure that is exerted in small fish and the fish prices have been significantly rising with the declining market suppliers relative to the increase in the population number. The other constraint pointed out is related to the high competition for the limited coastal fish resources which are making the fishermen using unsustainable methods that are making the fisheries not managed for economic efficiency.

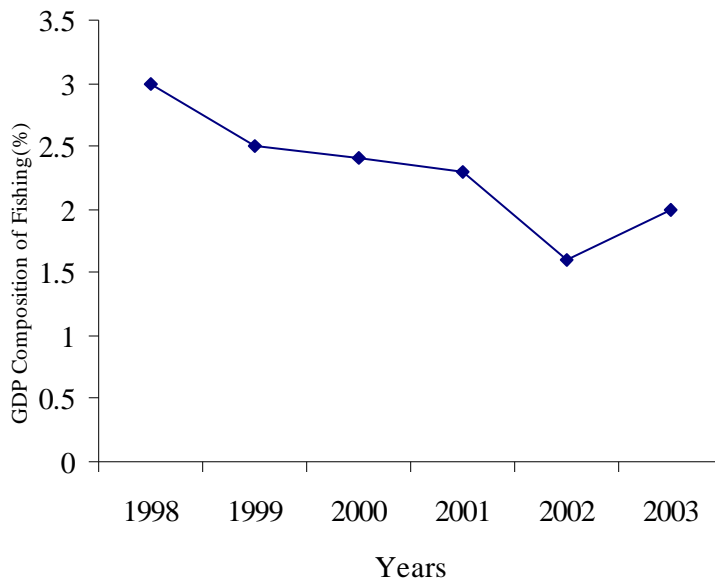
According to FAO (1993) there will be a significant global shortage of supply of fish in the future that will be different between countries and the overall effect will be a major rise in the real price of fish, which will have critically important consequences in several regards. Some of these consequences are the rise in prices that will stimulate even greater investment in fishing effort than already exists. This situation will lead to stock depletion that reduces supplies leading to additional price increases. Additionally, this continuous increase in real prices will generate severe effects on low income consumers, particularly those of the developing countries of Asia and Africa for whom fish is a critically important source of animal protein.

1.2 Background of the Study

The fishery sector in Mozambique plays an important role in the economy of the country contributing 13% of the export income and generates 50.000 jobs in the artisanal fisheries sector and provides protein to the local population. The referenced sector is dealing with a decrease in the production each year. In order to meet the local demand for fish and due to the decrease in production, the country are importing about 5000 tons per year and this amount is expected to grow, reflecting in part the population growth which is 2.6% annually (FAO, 2004). Besides, Mozambique is experienced tremendously high rates of population growth, that is, 16.075.708 in 1997 to 19.436.453 people in 2005 and the demand for fish product will increase due to this transformation and once again the fishery sector has to respond to this situation (INE, 2006). The study therefore seeks to determine the constraints that are affecting the production of the artisanal fisheries.

The Diagnostic Trade Integration (2004) as cited in Vida (2005) argues that the modifications in the fishing industry in Mozambique in terms of growing are not evident. The sector is one of the major exchange foreign earners but the figures shows a decline on its growth since 3% in 1998 to 1.6% in 2003 as shown in the figure 1.1 below:

Figure 1.1: Trend of Fishery Sector in Mozambique as a % of total GDP



Source: Diagnostic Trade Integration (2004) as cited in Vida (2005) based on Table C (Appendix C)

The graph below shows the weigh of fishery sector to GDP for the period 1998-2003. Even though the relative contribution of fishing to GDP declines the sector is leads with the implementation of the Master Plan and changes done in the governmental institutions that leads to management and support of the fishing sector. Other reason is that through the high of unemployment many people in fishing sector (artisanal fishing) notice the activity as a mean of subsistence.

The fishery sector in Mozambique is composed by 3 sectors that is, industrial, semi-industrial and the artisanal sector. The main fishery sector in Mozambique is the industrial and semi-industrial fishery, with over 70% of the active fleet targeting shrimp

(FAO, 2004). Semi-industrial is the intermediate group which size is between ten to twenty meters and the boats are involved in shallow water shrimp fisheries for local consumption and export. The sector is mostly consists of national companies with up to four vessels and their productive is comparatively poor due to the age of the equipment they use and ,this segment has less financial capacity to support vessel upgrading and modernization and consequently, operates with rented vessels. The industrial sector is consists of larger vessels fishing for shallow water shrimp and resources in deeper waters, mainly for export. This sector consists of joint ventures between the Government of Mozambique and foreign companies from Japan and Spain.

Moreover, according to the Fisheries Law in Mozambique the small-scale fishery includes the semi-industrial and the artisanal fishery. Under the socio-economic view, the artisanal fishery is defined as an enormous and badly defined group of fishermen, with multiple activities, alternating agriculture and fishing and with possibilities of alternative sources of income and credit (IDPPE, 1998). There are, among the artisanal fisheries, a small percentage of fisheries which use boat with motor that apart from producing for their own consumption they produce relatively larger quantities for the market compared to fisheries without boat.

The referenced group catches large species that are supplied to upper income strata in the centre and the other part are exported. The characteristic of the remaining artisanal fisheries sub sector is that a substantial part of the producers (about 40% according to IDPPE's frame surveys between 1990 and 1995) operate by foot either as fishers e.g. using small seine nets or collectors of mollusks and crabs, to a high extent producing for their own household consumption occasionally for selling or bartering surpluses.

The artisanal fisheries is considered as that fishery sector in which individuals or group of them are engaged in producing fish for subsistence and the surpluses for the commercialization and normally using traditional fish catching method. In order to support the artisanal fisheries, the government has introduced a number of policies protecting fishery resources and facilitating investments in infrastructure for fish

production and marketing. According to NORAD (2002), this sub-sector has a complex and diversified activity with its own socio-economic characteristics: the level of savings are very low or not available and one of the methods used to solve this problem has been the forced savings which consist of drying fish to give it more value and sell in big consumption centers; the fishing activity depends a lot on weather conditions and the seasonal variation will influence in the determination of the fish price; the artisanal fishermen are a big migratory group from one fishing centre to another, from one region to another.

The artisanal sector has been growing as a result of substantial investment and aid in a number of ways such as direct investments in the form of development projects financed through cooperation agreements and also the Artisanal Development Project in the northern province of Nampula. The establishment of a system of data collection and processing throughout the coastline has enabled the provision and processing of artisanal fishery data, providing some knowledge of the actual status of the fishery within the country. With better supporting infrastructure and lower transactions costs, artisanal fishers might break into the higher value export market, but their growth potential is limited by the threat of resource depletion and degradation of habitat.

Momade (2005), argues that the roots for the increase the standard of living on Fishery especially for the artisanal fishermen in Mozambique is in the uselessness of them to acquire credit in Banks and Financial Institutions in order to grow the possibilities of making a living outside fisheries and, in this way reduce the pressure on the sector. In addition, reducing the pressure on the fishery and the overcapacity of employment will be easier in case of alternative employment possibilities in the other sectors of the economy for instance, agriculture, and trade.

Also, Lopes and Gervasio (2000) and Amade (1999) in their study in Nampula and Inhambane Provinces respectively, show the necessity to arrange a community whose aim is to discuss and identify the major and priority problems that they have and the participation of the artisanal fishermen in the decision-making. Because of the harmful

and rudimentary instruments that the fishermen are using that are leading to unsustainable exploration in those areas, the solution was to create a resource management committee increasing in this way the level of awareness on the need for preservation and rational use of artisanal marine resources. Therefore, the introduction of management measures at the local level as well as the imposition of sanctions in case of violation, constitute important factors for the implementation of the co-management system in the referenced areas.

The principal management measures employed to control fisheries in Mozambique are licensing, quotas and a seasonal closure of the most important fishery but quotas are only employed in the industrial and semi-industrial fisheries of crustaceans. In the artisanal fishery the license is a fishing fee which is issued annually and is non-transferable and can be revoked by the fishing authorities. The closed season regulation, from December to February which is the growing fishing period was introduced in order to increase catches and to obtain a more profitable fishery during the main season which is the period after opening March- April.

The overall strategic perspective of the fisheries sector in Mozambique is represented by the Master Plan that was approved in 1995, with an accompanying Action Plan completed in 1996. The Master Plan highlights three main objectives which basically are: improved domestic food supply, improved national income, and increased standard of living among the fishing communities. Concerning to artisanal fisheries the specific actions deliberated are the reduction of post-harvest losses through improved vessels and fishing techniques, incentives to invest in the sector and, development of co-management mechanisms to solve the problems of local over-exploitation. In addition, the sub-sector is expected to benefit from introduction of areas reserved for artisanal fishing combined with obligatory use of satellite tracking devices by semi-industrial and industrial vessels, promotion of linkages between shrimp processing enterprises and artisanal fisheries, encouraging by-catch utilization on the part of artisanal fisheries and, promotion of sustainable use of shrimp resources through co-management.

1.3 Statement of the Problem

The 2006 Report of the Fishery Research Institute of Sofala shows that the production captured by the artisanal sector in 2001 was 1700 kg declining to 500 kg per day in 2005 representing a reduction of 71% which provoke at the same time a decrease in the income of this part of population (IIP, 2006). This decline in the production leads to low income and makes the fishermen vulnerable to this vicious circle of low production and low income and will put severe strains on the nutrition situation of the population groups with high dependency on fish for their protein supplies and for employment and income in Beira City.

Added to this situation, there are others factors linked to the artisanal fishing activity. Some of them are the size and type of the boats, the type of the instruments that are being used (some are traditional and harmful as the mosquito nets which capture fish in the growth phase that leads to fish losses and low quality), the high cost of the fuel. The high costs of the fuel in the market leads to trips reduction and consequently less quantity of capture, and also the artisanal fisheries do not benefit of an encouraging petrol price as lived to diesel which benefit the industrial and semi-industrial fisheries.

Moreover, unlike their corresponding part, fishermen in the artisanal sector have lack capital that are generated by lack access to credit from banks and other financial institutions created by the incapability of them to pay and high interest rate. As a result, they have little opportunity to invest and improve their production aptitude. For this reason, most of them are not able to operate their business with growth perception. Furthermore, the size of the fish captured reduced which leads to reduction on the price and the quality of the product.

1.4 Purpose of the Study

There are general and specific objectives of the study.

1.4.1 General Objectives

There is a significant global shortage of supply of fish in the world. Although the severity of the shortage will differ among countries, the overall effect will be a major rise in the real price of fish, which will have critically important consequences in several regards as on the consumers, traders and mostly on the fishermen (FAO, 2004). Such impacts would be the greatest in the East and South Asia where an additional 8.5 million tones will be required by the year 2010 to maintain the present levels of consumption. As such the present study investigates the specific constraints that affect the artisanal fisheries that lead to decrease in their production in Beira City.

1.4.2 Specific Objectives

- Evaluate the state of the artisanal fishery activity in Beira City.
- To illustrate how the level of education, length of experience and type of fishing instruments are related to the constraints faced by artisanal fishermen.
- To identify relevant mitigation strategies and policy options to address these problems and tackle the constraints protecting in this way the artisanal fishermen.
- Evaluate how constraints that affect the artisanal fishermen in Beira City are different from those available constraints studies in Mozambique and also over the world.

1.5 Research Questions and Hypotheses

The key research question addressed in the study is as follows:

1. What are the constraints that lead to decrease in production on the artisanal sector?

In addition to the above research question, the study was also guided by the following question:

2. How to overcome the constraints faced by artisanal fishermen?

Hypothesis of the study:

i) Null Hypothesis (H₀)

The constraints faced by the artisanal fishermen depend on the level of education, length of experience and type of instruments used in the activity.

ii) Alternate Hypothesis (H₁)

The constraints faced by the artisanal fishermen not depend on the level of education, length of experience and type of instruments used in the activity.

1.6 Justification of the Study

The artisanal fisheries are mainly consisted of individual fishermen or small groups of fishermen with very weak economic power. This sub-group provides a livelihood for more than 50.000 families in Mozambique, and supplies food for a large part of population and represents 25% of the total production in volume and, in addition it has a significant contribution of 13% to the foreign exchange earnings (FAO, 2004). In this view, identifying the main constraints that affects the low productivity will lead to appropriate policy design, better management of the resources and promote a better life condition to the fishermen as fishery is one of the key sub sectors of the economy in Mozambique and particularly in Beira city.

Understanding the constraints faced by the artisanal fisheries can be of a great importance to identify the main causes of the big gap in production especially of prawns that brings more percentage of income and are mostly used in exportation for the communities. The artisanal sector even brings a small contribution to external market it is responsible to local market fish delivery.

1.6.1 Contribution of the Study

It is believed that the research can be helpful to Ministry of Fisheries in design solutions and strategies in the process of formulating and implementing management measures to protect its fishery resources from the problem of overexploitation. Furthermore, the study can constitute a value added to the literature on artisanal fisheries in Mozambique and in Beira City in particular, by exposing new materials and new information concerning the factors that are provoke the low production in artisanal sector. Emphasis is given to this sector because the majorities of the fishermen are artisanal and face more severe problems than the industrial sector.

1.7 Scope of the Study

This study focuses on the main constraints that lead to low production in artisanal fisheries during 5 years from 2001 and 2005. The choice of the referenced period is related to more decrease in fish production in this sector that is not only affecting the fishermen households but also the export earnings of the country. The factors are limited to those provided by the artisanal fishermen, through the administration of questionnaires, the data and information was collected from the Ministry of Fisheries and the Institute for the Development of Small-Scale Fisheries in Beira which is the case study.

The study was being carried out in Ndjalane, Praia Nova, Estoril and Regulo Luis the coastal zone of Beira City. Those areas were chosen based on the information provided by the Institute for the Development of Small-scale Fisheries (IDPPE) of Beira City. According to the referred information, the largeness of the City's fishermen are there.

1.8 Limitations of the Study

On of the foremost limitations in undertaking the study was related to later respond from IDPPE and IIP in order to make available the information to proceed with the thesis.

Furthermore, Estoril and Praia Nova, the major fishermen location, have been relatively over-researched. This proved to be a big problem because there were demoralizing strong feeling that the previously surveys could not meet the fishermen expectations. For example, many of them though that they might personally benefit by responding the questionnaire and they expected that the government help them in some way. Since they do not distinguish any change from the previous studies, the fishermen do not have incentive to cooperate to the present study even knowing the enormous problems that they are continuous facing.

The last limitation was the failure by some respondents to answer some questions of the questionnaire. It was noted that most of the fishermen were not able to give certain information regarding to their daily sales, spending, and especially information concerning the quantity (kg) caught per day because they measure the product based on bucket or tin. Thus, it was difficult to convert it to kg. This problem was linked to the low level of education which in turn was confirmed in the questions related to the knowledge of what constitute financial institution and even knowing they do not know how to get loan from there. Nevertheless, by undertaking this research, an assessment of the state of knowledge regarding this specific constraint (lack of capital) will be useful in identifying new directions for further investigation.

Chapter 2: Literature Review

2.1 Introduction

In this chapter are discussed theories such as Hardin Theory (1968), Schaefer Fishery Model (1957) and Scott Gordon Model of Fishing Effort (1954). Besides this, the present chapter discusses on some empirical studies done on constraints of artisanal fisheries such as Habteyonas and Scrimgeour (2000), Sesabo and Tol (2005), Squires at al, (2002), Sequeira (2002) and Berachi (2003). Also this chapter discusses how the crew number and shortage of manpower, increase the number of fishermen in the same ground, lack of capital, level of education and fishing experience, the instruments that are being used and the consequences of use the illegal mesh size affects the performance of the artisanal fishermen.

The chapter then centers on studies on constraints of artisanal fisheries in Mozambique where is described the results on the studies in Kwirikwidge in Angoche District and in Inhambane Province referring to the co-management of artisanal fisheries as the solution for solving the problem of over exploitation and conflicts between the artisanal fishermen by Lopes and Gervasio (2000) and Amade (1999). In addition is discussed the study of Momade (2005) about the credit for small-scale fishing in Mozambique which aim is to show how the accessibility of loan to the fishermen is difficult but very important to increase the performance of this sub group of activity. All these studies which are related to the constraints of artisanal fisheries in different countries or areas have different conclusions some of them are found to be the same and the others differs in some aspects.

2.2 Theoretical Literature Review

Considerable number of theories is used to justify the management and use of the common pool resources as the fishery namely the Hardin's Theory (1968): The Tragedy of the Commons which concludes is that the fishery resources that are common are subject to over exploitation and degradation and there is need to alert situation to the

government to change the actual situation lived especially in developing countries, The Schaefer Fishery Model (1957) and the Scott Gordon Model of Fishing Effort (1954) which is detailed in the next paragraphs.

2.2.1 Hardin's Theory: The Tragedy of the Commons

The “commons” include natural resources such as fisheries, wildlife, forests, irrigation waters and pasture lands, which by their physical nature are owned by individuals but are shared by a community or group of users, such as fisheries. The fishery resources which are held in common are subject to over exploitation and degradation. This rationality was based on Hardin's theory on The Tragedy of the Commons which conclude that “freedom of the commons brings ruin to all”, (Hardin, 1968). The assumption was that when resources are limited and publicly owned, it is rational for each individual to exploit them, even though this behavior ultimately results in tragedy for the group. Hardin's solution was either to privatize the commons or keep them as public property, to which rights of entry and use could be allocated, that is, privatization or pass to government control.

Moreover, not all common property resources are subject to such a tragedy and are not overexploited thus, there is a rejection of the notion that is the common property nature of the resource which is the problem. The important issue here is not the type of resource but the property rights regime in combination with the resource it is subject to, namely open access, private property, communal property and state property. This separation between the nature of the resource and the property regime it falls shows that Hardin's theory in as much as it predicted a situation of a common property resource under an open access regime (Sequeira, 2002). However, other property regimes can and have also led to overexploitation, indicating that the provision of property rights alone is not enough.

The theory is relevant to this study in the sense that it partially support the problem under study when it consider the fishery sector as unprotected sector which operates with

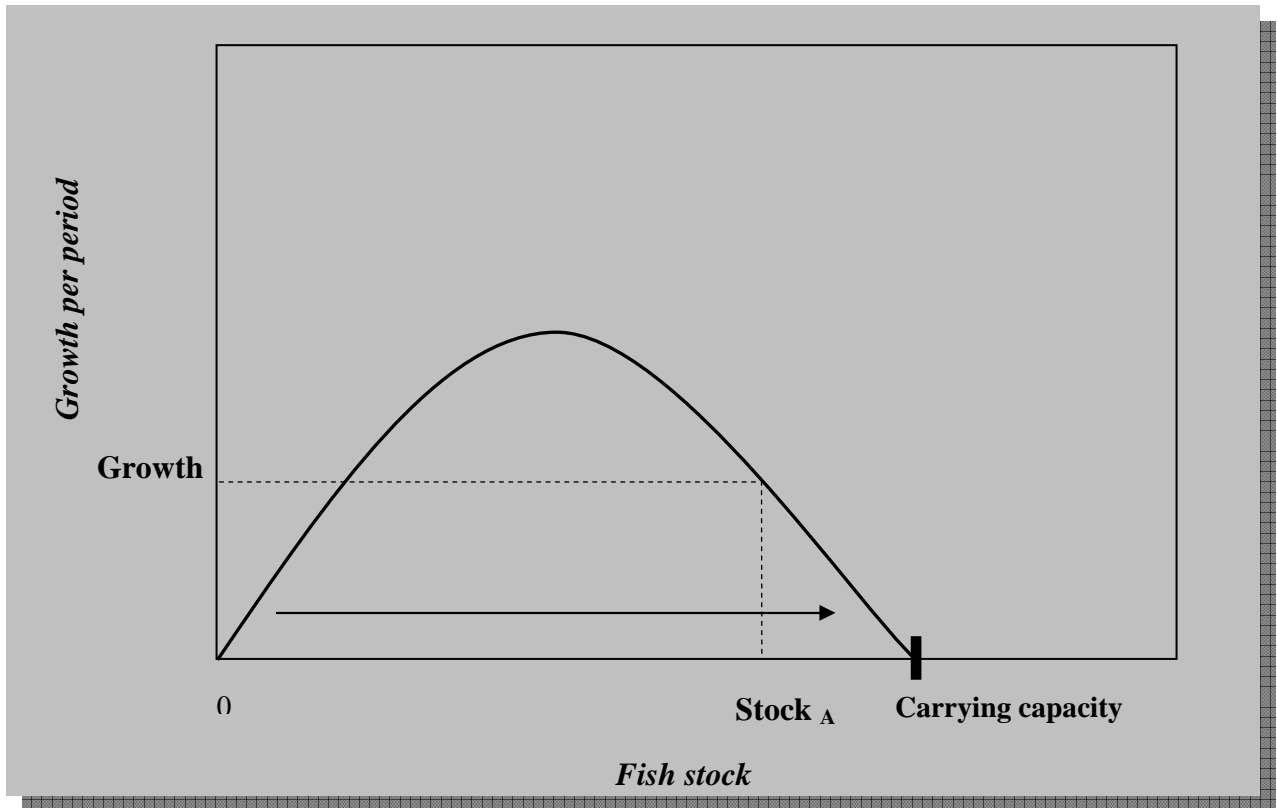
problems of over exploitation that leads to reduction on the production. Analyzing the above theory shows that dealing with the common property resources it is needed a more dynamic partnership using the capacities and interests of local fishers and communities, complemented by the ability of the state to provide enabling policies and legislation as well as enforcement and other assistance. This has been termed co-management. The co-management process is being considered as an important instrument not only for resource rationalization but also for consolidating the process of participation and interaction between the parties involved in the management of natural resources.

2.2.2 The Schaefer Fishery Model

The fishery resources have ability to rejuvenate and they are subjected to environmental shocks and variations, which are unpredictable that affects its management (Anderson, 2004). There are many uncertainties in fishing resources as future time path of price and costs that are not be predicted and because of resources environmental uncertainty, so the policymaker should decide the ideal fishing effort and how it can be achieved. Because of reduction on fish species there are some possible solutions to overcome this problem, which include: closure of fisheries, quotas, Government buyouts of fishing rights and regulations that require safer fishing equipment.

Fishery has as characteristics the small change or increment of growth at low and high stock level and the larger growth increment at middling population levels. The growth rate is relevant to fishing concerns because sustainable fish harvest cannot exceed the growth in fishes stock. Schaefer (1957) modeled fishery growth in fishes stock (see graph 2.1 below).

Graph 2.1: The Growth of Fish Stocks



Source: Anderson, D. (2004): Environmental Economics and Natural Resources Management, 1st Edition, Centre College, Thomson South Western, United States of America.

From the Graph 2.1 as population grows and approaches the maximum size (carrying capacity) the incremental growth declines and then, when the carrying capacity is reached there is no growth and the population remains constant. In the absence of the outside influences like fishing the carrying capacity is a stable equilibrium, which means that if the fish stocks deviate from this number, natural forces of growth or death will bring it back to that size. The slope of this function is always increasing as the stock increases. The minimum viable population is an unstable equilibrium because there is too few fish to maintain or increase the population, with more fish the population will increase toward the stable equilibrium at the carrying capacity.

The use of illegal fishing technology has played a major role in the fish stock depletion in many developing coastal countries where monitoring and enforcement of fishery regulations are far from being complete. The use of fishing nets with illegal mesh sizes is provoking catch in some fishes that were too small making the fishing activity unsustainable. Thus, the growth of the fish differs from the catch, that is, fish are being captured in the growth phase increasing in this way the fish losses.

2.2.3 Theory of an Open Access Fishery -The Gordon Model

The standard theory of an open access fishery was developed by Gordon in 1954. This model was designed to show the level of fishing which, in commercial terms, offers the optimum level of earnings and hence the optimal economic use of the resources. The model describes how an unregulated or open access fishery is expected to lead to economic inefficiency also called economic over fishing. One of the main preconditions for effective management of sustainable fisheries is the resolution of problems created by the ill-defined property rights. The first step towards such a solution is to appropriate and define property rights of this resource. The optimum point is referred as 'maximum economic yield' (MEY).

However, establishment of property rights should not be considered as a final solution to this problem. Governments or fishery managers need to accompany user rights of effective management tools and regulations for efficient utilization of these resources. These regulations include closed fishing periods, closed areas, size limits, quotas, gear regulation, restriction of entry to the industry. Fishery managers in different countries apply different types of rights based on management techniques to manage their resources. However, very few fisheries are aware of the laws that govern fishing activities impose to the extent that when laws are enforced they perceive them as constituting harassment. In the same view those regulations are difficult to achieve the appropriate results as the capacity to manage widely scattered fishing grounds is limited, (Berachi, 2002).

2.2.3.1 Criticism of the Gordon Model

The provision of property rights to solve the problem of fish management as stated by Gordon (1954) may not alone be adequate measures of managing fishery resources in a wise and sustainable manner. Habteyonas and Scrimgeour (2000) suggest that an additional technique is required to come up with improved resource management. This technique requires a more dynamic partnership between resource users and the government and this partnership is known as fisheries co-management. However, not all the strategies are equally applicable since adoption and implementation of management scheme requires considering the socio-economic, cultural and political situation of the country.

Clark (1980) as cited in Grønboek (2000) argues that the various instruments of the regulated open access as seasonal closure, limitations in fishing gear and a total allowable catch (TAC) results in inefficient producers that will be eliminated and the fishery sector still suffer from over fishing. The regulated open access has a limited effect on the over fishing problem in the long run as the fishermen have the opportunity to adjust their effort to the regulation. The inefficiency on the use of the resources lies on the open access conditions of its exploitation and on the absence of the property rights to the resource. In addition, Franquesa (2000) argues that the solution for this problem is not on just to assign property rights but on design of complex management system as restrict the permitted fishing techniques and establish annual licenses for given catches.

In order to reduce the level of fishing effort below the open access equilibrium (OAE), different management techniques can be applied. One of the main preconditions for effective management of sustainable fisheries is the resolution of problems created by the ill-defined property rights. The first step towards such a solution is to appropriate and define the property rights of these resources. There are some regulations useful for managing overexploited fisheries. These regulations include closed fishing periods, closed areas, size limits, quotas, gear regulation, restriction of entry to the industry.

The above theory is relevant to this study in the sense that it opens the minds for the reflection on policies for the involvement of fishers and other stakeholders at the local level in the management of coastal fisheries may in many cases be the only feasible way to establish rules and regulations that are actually complied with. One policy found to restrict the catch size is total catch quotas, called total allowable catch (TAC). This program stimulates races between fishers where the most efficient one captures as much as they can until the quota is reached. To overcome this problem a new approach, the individual transferable quotas (ITQ) was developed, where the quota is divided among fishers who may either sell the quota or buy it from other fishers. The model also shows that the fisheries suffers from economic over fishing that can be falling by reduce the effort level.

2.3 Empirical Literature Review

Although fishing may be a small sector of the world economy, it is making an overgrowing contribution to food supplies, employment, income and well being of coastal, river and lakeside communities. In the same view artisanal fisheries plays an important role as sole suppliers of fish protein to several hundred millions of people in developing countries. However, the rate of supply of fish is still low when compared with the demand for fish. The enormous constraints that artisanal fisheries faced as led to a set of questions relating to how far those constraints influencing their productivity.

FAO (2000) argues that the decrease in fish capture can be sign of over fishing in the sense that there is an increase in fishing effort by the artisanal fishermen. There are may be both biological and economic factors affecting over fishing. The biological over fishing is associated with decreasing growth in size and the total catch of a certain species may drop as a result of changes in target species in response to new market conditions and fishing methods. On the other hand, the economic over fishing occurs essentially when inputs are used leading to depletion of any rents which could be produced. Moreover, economic over fishing does not necessary imply biological over fishing. However, under open-access conditions a fishery will experience both biological and

economic over fishing for as catches decline, the price of fish rises and the cost per unit of catch increases. Additionally, under open access regimes, where there are no property rights, fisheries tend to become overexploited, property rights may be vested in the state or a group of states as public property, in a group of individuals or companies as private property rights, property rights are an essential basis for fisheries management.

Again FAO (2000) argues that there are many causes of over fishing and the profit maximizing behavior constitute the principal one for the artisanal fishermen. Adding to this, the excessive effort to achieve the necessary harvest of a given amount of fish is usually a consequence of large population size and lack of alternative sources and employment. Therefore, the excessive effort will lead to a resource depletion reducing the size of fish that lead to reduction on catch and on the income of the fishermen and consequently increase on fish price. The reasons that affects the fishermen performance is discussed in the next paragraphs.

2.3.1 Shortage of Manpower

Study by Habteyonas and Scrimgeour (2000), carried out in Eritrea, shows that in spite of majority of the fishermen belong to the artisanal sector it captured only 10% of the total production of the country comparing with the others sectors. However, Habteyonas and Scrimgeour (2000) pointed out that the low level of production in the artisanal sector in Eritrea results by limited fishing effort, lack of ice and fuel and shortage of manpower as the constraining factors facing artisanal fishermen. And doing a further analysis it reveals that the others constraints that still affecting the production performance are the improper use of the available finances, limited market outlets and lack of training constrain the sector.

Among them the crew number and the shortage of manpower was found to be the most important factor that affects production level. They argue that for every crew employed an extra kg of fish could be harvested given the other variables and the optimal crew number of the boat. Further analyses on this variable (crew number) show that, it is

affected by days per trip, types of boats and family size and hiring more crew can save fishermen from staying more days per trip in the sea. The foot fishers harvest less than those who have boats and also there are difference in the quantity captured among those who use different types of boats.

In the same view the solution to solve the shortage of manpower is the involvement of women in many parts of fishing activities that can at least reduce this problem in the industry. The participation of women in the fishery can be in retail fish marketing through the provision of basic training in market information, in minimizing post-harvest losses, by giving other alternative for fish as of fish sun dried, smoked dried, salted and dried and sometimes fried. Also the women can also play a role in complementary fishing activities such as net making and mending.

Chando (2002) in her study in Tanzania shows that employing women in the fish activity may be the solution to reduce the post-harvest fish by collecting shellfish and other marine life from the reef and mangroves, cleaning, cutting, cooking and preserving seafood, buying and transport, sitting in the market and selling seafood are also important. She also pointed out that the motivations and aspirations knowledge and experiences of these activities to women in the fishing communities may differ by age, ethnicity, religion and marital status. Besides, women play a crucial role in the development of a fishery, but they been neglected in planning and decision-making stages of many development projects.

2.3.2 Lack of Capital

Study by Sequeira (2002) carried out in Nicaragua shows that the cause of decrease in production on artisanal fisheries is related to financial constraints. She further argues that this factor have difficult the fishermen' activity to improve the quality of the production system and also that is not the acquiring of capital the solution of the problem. The capital can be used to buy new and modernized instruments of high technology which have to be attended with the fishermen knowledge about how to use the modernized

instruments. Similarly, this finding supports the view of Anderson (1986) and Friedman (1998) as cited in Sesabo and Tol (2005) in that artisanal fishery household in developing countries have been unable to fully exploit the available fish resources. In addition to this, it was observed that the tendency of households to fish in the same ground lead to the problem of over fishing, which in turn decreases fishing productivity. Besides, it is important to improving credit facilities that offers capacity to artisanal fisheries households to invest in more advanced fishing boats. As a result, households would be able to explore far away of fishing grounds, thus reducing the problem of inshore over-fishing.

Also, according to UK Department for International Development Report (2003), the limiting financial resource makes the artisanal fishermen unable to employ improved fishing methods to exploit the resources more effectively and in a sustainable manner. The empowerment of artisanal fisheries through facilitating the acquisition of improved gear and vessels will enable them to better exploit the resource through reaching alternative fishing areas or through more efficient fishing operations. In addition, the result shows that credit facilities to the artisanal fisheries are not easily available because creditors categorize fishing as high risk investment. The solution for this dilemma could be overcome through formation of viable fisher cooperative organizations through which credit and donor or government support could be channeled.

The lack of capital is an important factor that is considered in this study because of the importance of it in the fish activity and also because of the economic situation of this part of population. It is believed that by obtaining loan the fishermen will make their activity with growth perception in order to buy new instruments to increase production to their own consumption and as well as for export. Thus, the money that they acquire can be used to modernize their instruments of activity such as buy a new boats, more sophisticated instruments and to pay the assistance that are necessary to make to the older instruments. The low level of production in this sector that are making fishermen vulnerable are relating to low level of income leading to inefficient fishing practices which a loan or capital can help to change the situation.

2.3.3 Type of Instruments

Moreover, study by Squires et al (2002) carried out in Malaysia shows that the cause of decrease in the production on the artisanal fisheries is related to the instruments that are being used in the activity. In contrast to large-scale commercial fisheries, artisanal fisheries are owned-operated and labor-intensive, employing rudimentary technologies. Artisanal fishers harvest the sea from comparatively small vessels, powered by sail, paddles, or outboard motors of limited power. These problems are compounded by incomplete property rights and conflicts with large-scale, industrial vessels.

Due to open access and fisheries development policy promoting expansion of fishing capacity the over fishing has developed in inshore fishing grounds, yielding conflicts between large and artisanal fishers. Both large-scale, industrial fisheries, using trawl and purse seine gear and with a clear commercial orientation, built up a large portion of their fishing capacity to harvest the same resource stocks. Giving assistance directed to the harvesting sector aimed to increase the efficiency of traditional fishing methods, and include aid to introduce or upgrade the motors for traditional craft.

Likewise, Berachi (2003) on his study in Tanzania pointed out that the factor that is contributing to the decrease in the quantity catch is related to the increased use of fishing gears with reduced mesh size mainly seine nets and despite their official ban in shallow water areas by large number of fishermen has caused considerable damage by the indiscriminate catching of all fishers. The solution for this problem is educating local fishing communities on the effects of unsustainable fishing and the benefits of managed fishing resources. Therefore, there is an inshore over exploitation that can be seen as a consequence of the lack of capital and skills on the part of fishermen where the majorities who cannot afford bigger or motorized vessels have to concentrate in the coastal waters.

The type of instrument that is being used by the artisanal fishermen is an essential factor that is considered in this study because of the importance that this issue affects the level of production. The use of harmful and rudimentary instruments which include poor and

inefficient fishing gears and vessels, mosquito nets, illegal mesh size together with a lack of alternative employment opportunities and increased number of fishing households provoke degradation of fish stock and over exploration. This may lead to decrease in the quantity captured, small-sized fish and as a result, most households will continue to be trapped in poverty.

2.3.4 Increased Pressure on Fisheries Resources

Few coastal households have the capacity to successfully implement income diversification strategies to cope with poverty and income fluctuation, the lack of access to alternative livelihoods and income sources adds to the exploitation of marine natural resources above the level that would occur if these were available. The competition between the fishermen coupled with the desire to increase income has increasingly led to destructive fishing practices. According to studies of the UK Department for International Development (2003) in Kenya and Tanzania and equally Jiddawi (2001) in India, the poor performance of production per unit effort pointing to overexploitation of the fisheries resource by artisanal fishermen it is believed to be due to them to the limitation of the range of their fishing vessels which are not powered by motor engines and lack of proper management strategies.

2.3.5 Level of Education and Years of Fishing Experience

The other factor that affects production level compliance with the majority of fishermen have never been to school and never had the opportunity to undertake any kind of training related to their profession associated with their exploitation and utilization. A large percentage of fishermen have marketing problems due to lack of training and marketing knowledge of tools that can be used to sell their products in order to increase their income and fixes the price properly. Study by Sesabo and Tol (2005) carried out in Tanzania shows that the efficiency of individual fishing households is positively associated with fishing experience. They shows that the demand for fish in Tanzania is increasing due to the increase in population living along the coast and with the expansion

of tourism activities and as a result, the number of households participating in fishing is increasing due to high price driven by high demand of both fish and fish products.

Following the study of Squires et al (2002) in their study in Malaysia concerning fishing experience they argue that it is an important factor that has to be considered in other to increase the quantity of catch because it provides better knowledge about the location of fish, weather patterns, currents and tides, bottom conditions and how to best catch the fish. In addition, schooling can improve literacy and cognitive skills which may reduce technical inefficiency by increasing the ability of fishermen to adopt technical innovations.

The other factor besides those identified above is pointed out by Berachi (2003) arguing that the reduction in the quantity caught can be explained by the effort that is exerted in the small fish which does not contribute a lot in terms of total weight in yield. He also pointed out that reducing the fishing effort will raise productivity of marine fisheries which also result in the unemployment of fishermen who will be eased out of fisheries. Thus, the rest of the economy may not have enough room to accommodate the displaced fishermen.

This is an important conclusion because this study notes that the artisanal fisheries pact with low production because of lack of experience and skills to deal with the fishery resources in order to improving their technical experience and consequently increases productivity. Acquiring knowledge about the status of the fish the fishermen can go beyond the fishery ground and captures the availability of the fish stock with high fishing efficiency and quality. The reason behind this is that most of fisheries resources near the shore are overexploited due to the use of poor and destructive fishing methods driven by an increase in population in coastal areas. The use of poor and destructive instruments in the artisanal fishery is used in this study to analyze the effects that such instruments have on the production capacity.

According to Seini, Nyanteng and Ahene (2000), a reduction in fish production in artisanal sector has serious implications on the economy in general which the main ones

is declining employment and income, impact on consumption and impact on fishery resources. These effects are crucial for policymakers, the fishermen and members of international and regional organizations. The constraints that are limiting increases in production of fish will put severe strains on the nutritional situation of the countries and population groups with high dependence on fish for their protein supplies and especially on artisanal fisheries. The consequence of a shortfall in supply will be increases in the price of fish meaning that consumer demand will switch to lower priced substitutes and the overall consequence would be that the existing supplies of low value fish that are important to the poorer sections of the population would be removed from within their purchasing power.

2.4 Focused Literature Review

Study by International Fund for Agricultural Development -IFAD (2000), as cited in Vida (2005), estimated that there are part of people including a majority of poor men and women that are directly involved in other activities as fishing processing and trade and they are dependent on the fisheries sectors as one of their main sources of livelihood. Despite the significant role and impact that the artisanal fisheries has on the supply, food and employment, few studies using different methods, have attempts to measure the size and the constraints faced by the artisanal sector in Mozambique. Some of them are study by Lopes and Gervasio (2000) in Kwirikwidge in Nampula Province and by Amade (1999) in Inhambane Province.

An empirical study carried out by Lopes and Gervasio (2000) in co-management of artisanal fisheries in Kwirikwidge in Angoche District shows that the great variation in the quantity of fish captured are related to many factors among which they pointed out that the people involved in fishing activity are aware that the fish they economically depend on, its part of renewable natural sources and the skills and the methods that the fishermen used are passing through generations. Again the authors show that the cause of reduced catches in Kwirikwidge is the use of the mosquito nets. This type of conflict is

born out of the concentration of beach seine nets in the same fishery, particularly at times of great migratory movements.

Similarly, concerning the instruments that the fishermen are using the study carried out by Amade (1999) in Inhambane Province shows that under open access, artisanal fishermen made some fisheries resources overexploited as a consequence of high fishing effort and the use of technological inefficiency of traditional fishing methods such as the mosquito nets. Also, artisanal fisheries employ less capital and the fishery effort is directly related to the number of fisheries involved in the fishery and the results shows that the whole group together can produce an unsustainable level of fishing effort. The issue of the methods and instruments used in the artisanal fishery will be analyzed in the present study. It is believed that the post harvest losses are caused by bad practices for fish handling and preservation would increase the supply of fish on the local markets. The destruction of fish habitats by using harmful fishing instruments has become the prime cause of the reduction of fish abundance.

Furthermore, Amade (1999) shows that the decline in the fish production in the inshore fisheries is resulted of an excess number of active fishing units and due to the excessive participants including a considerable number of small boats operating mechanically as well as manually seines. He argues that the strategy towards increasing the production is oriented to gradually reduction in the number of fishing units, represented by seines, which are the major source of fishing effort. On the other hand, this study also revealed that in general, the smallest boats produce lower quantity of fish with consequential lower income and the fishing opportunity will be offered through their integration into the medium boat category, which will operate offshore.

The foremost reason artisanal fishermen are decreasing in their productivity was that they see that the small boats can catch small quantity per trip and go inshore waters (Amade, 1999). Another reason the artisanal fisheries are reducing their production was that they see the overcrowding fishermen in the same area also due to the fishing licenses that has been issued that entitling the license holders to participate in fishery. The increase on the

number of artisanal fisheries in the same ground due to concession of license are not being analyzed in the present study and instead of this the lack of capital to them.

Again, according to Momade (2005) in Mozambique as well as in the most of the developing countries, the artisanal fishing activity has been answering for the need of jobs and income for the fishing communities. However, these opportunities to get a job and provide income in the perspective of Poverty Reduction Plan are every time restricted, for instance the difficult access to the financial services. Presently, fishery are financed through a variety mechanisms and sources sometimes in combination with loans from NGOs, government development funds, development program financed by bilateral, multilateral donors or development banks with credit aimed at developing the artisanal fishery sector.

To mitigate the difficult to access the credit by the artisanal fishermen in Mozambique because, mainly, of lack of collateral Momade (2005) suggests that the Government should promote actions for public and private establishment of effective programs and such programs should be converted in policies and strategies of financial services applied to artisanal fishery. Also, he argues that the support model of loans in groups (for instance, fishermen associations or commissions) could be a better way to reduce the operational costs of the financial institutions. On the other hand, these fishermen associations or commissions can still require guarantee thus the financial institutions will be minimizing a loans risk through loans in group and supportive guaranty.

Access to the credit by the artisanal fishermen from commercial banks, registered credit institutions, Governmental fund and or any kind of credit institutions is a necessary conditions to promote the fishing activity since the artisanal fishermen are poor and without any kind of guarantee. The financial instrument to promote credit access to artisanal fishermen is micro-credit. There are limited bank credit for artisanal fisheries and also few alternatives to acquire a loan outside the financial institutions (Momade, 2005).

2.5 Conclusions

The studies pointed above revealed different constraints faced by artisanal fishermen that lead to reduction on their production as lack of capital, type of instruments used in the activity, level of education and years of fishing experience, shortage of manpower in the activity. However, the majority of authors as Habteyonas and Srimgeour (2000), Chando (2002), Sesabo and Tol (2005), Sequeira (2002), Momade (2005), pointed as the key constraint faced by the artisanal fishermen the lack of capital because when this problem is overcome the fishermen can be able to fully exploit the available fish resources and avoid the tendency of the fishermen to fish in the same ground by buying more powerful and non-damageable instruments. The author agree that by solving the problem of lack of capital the others constraints could be minimizing and the solution can be the formation of fisher organizations that help to overcome other constraints including the lack of capital. Those organizations are allowed to giving loans, at a lowest interest rate, that can be in money or in sort as the artisanal fishermen is not being able to acquire loans from financial institutions because they are considered as high-risk investment.

The discussion concerning the lack of capital is an important issue but is not by giving money or other kind of materials or equipments the solution for the problems faced by the artisanal fishermen but also to provide transport and market to the product, the price, increase the quality of the product to stimulate the demand for it. As pointed by Habteyonas and Scrimgeour (2000) there are the shortage of man in the activity, this problem in Mozambique and also in Beira did not constitute dilemma because people that do not found job in the other sectors of activity engaged in the informal or in fish activity. The author agree that there is a fewer women in the activity which can be increased to achieve a better results in terms of sell the product, collecting, processing, activities that are not focused as the solution for solving part of the constraints faced by the artisanal fishermen.

Chapter 3: Research Methodology

3.1 Introduction

This chapter presents the methodology used in the research. It particularly describes all the activities done on the selection of the population and how the sample size was determined. It also shows how the sample for the survey data collection was chosen and briefly point up the reasons why certain methods were chosen instead of others. The objectives of the study were used to guide in the elaboration of the questionnaire. The chapter additionally explains how primary and secondary data were collected and on how the data was processed and analyzed. This study uses qualitative data collected from the questionnaire.

3.2 Research Design

To collect and analysis data the study was guided by descriptive and causal research. The descriptive variables in the study refers to determination of frequencies with which the level of education, length of experience and type of instruments occurs in relation to the various constraints faced by the artisanal fishermen and, the causal research refers to determination of the factors that is causing the decrease in production in the artisanal sector. The first research question was answered based on frequencies of responses, the second research question was answered based on the fishermen' opinions concerning overcome the constraints that they face. The hypotheses implied a relationship between the fishermen's level of education, length of experience and type of fishing instruments that are being used to constraints identified in the first research question. The design was based in the systematic sample method, open-ended, closed structured questionnaires and finally analysis of the data.

3.3 Sampling Frame

The population that was surveyed is the fishermen engaged in the artisanal sector in Beira City. The data concerning the number of artisanal fishermen in Beira City was provided by the census made by IDPPE in 2002. The first step towards identification of the sample population consisted of categorizing the number of total fishermen in Beira City. The second step consisted of group the areas that are the most representative or with large part of the artisanal fishermen among the coastal zone of Beira City. The final step was to find the number of fishermen recorded in each of the coastal zone. It can be remarked that this final step was not possible to be done because there is no information about the number of artisanal fishermen encountered in each zone. Thus, the solution for this obstacle was taking the equal number of fishermen in those areas.

3.3.1 Sample Population

The sample for the survey data collection was chosen randomly around the four zones of Beira namely Ndjalane, Praia Nova, Estoril, Regulo Luis. These areas were chosen because according to the information provided by the Institute for the Development of Small-Scale Fisheries (IDPPE) they represent the largest part of the total fishermen in Beira City. The population of artisanal fisheries in Beira is 1991.

3.3.2 Sampling Methods

The fishermen were selected using probability sample which is the method of simple random sampling. Here, every element has a known non-zero probability of being selected so that the sampling results can be applied to the universe through an interval size. The method consists in take all the elements in the population to be included in the sample. This method was chosen because as the systematic sampling produces much the same results as simple random sampling, the simple random sample is easier to apply; it does not require to divide the population into segments or strata and; it makes the sample representative than systematic sampling since in the systematic sampling when there are

periodic variations in the sample it may be very unrepresentative. The study does not use stratified random sampling because of the high mobility of the fishermen from one area to another which make impossible to know exactly how many of them are operating on each area.

3.3.3 Sample Size

The sample size was determined using the most common minimum sample size formula developed by Yamane (1967) that shows the appropriate mean to know the confidence and the margin of error.

$$n = \frac{N}{1 + N (e)^2}$$

Where: n is the sample size, N is the population size and e is the level of precision and also known as the sampling error.

$$n = \frac{1991}{1 + 1991(0.05)^2} = \frac{1991}{5.9775} = 333$$

Thus, the minimum number sample size was 333. However, this sample size was increased by 10% in order to make it more appropriate to draw conclusions that would be valid for the whole population. Therefore the sample was increased to 366. To cover the 4 areas in equal terms the number of the total fishermen was divided by the 4 areas. The number of fishermen interviewed on each area became as follows:

$$\text{Number of fishermen} = \frac{366}{4} = 91.5$$

So, it was interviewed 92 fishermen in Ndjalane, 92 in Praia Nova, 92 in Estoril and 90 in Regulo Luis.

3.4 Data Collection and Sources

This study uses both primary and secondary data. The primary data was collect from the questionnaires and from the opinions stated by the fishermen that helped to formulate strategies and identifying the problems that the sector suffer and, the secondary data collection was obtained from the books, reports published by IDPPE that the researcher found in their library. Also, the most important source of secondary data collection was obtained in the internet.

3.4.1 Primary Data

Primary data related to demographic and socio-economic characteristics as age, education, marital status, gender, experience was collected in order to identify the social status of the respondents and also to help in interpretation of results. There were also used opinions of the fishermen regarding how they expect that the Government should help them to overcome the constraints. The method used to collect the primary data was communication by personal interview to the fishermen. In this sense a structured questionnaire was developed with opened-ended and closed questions and it was translated from English to Portuguese in the period of the interviews.

3.4.2 Secondary Data

The secondary data are most useful for suggesting and interpreting the primary data and also serve as a base for final decision making. The secondary data was also used because it provides comparative data about the findings of the other authors and because the secondary data help the researcher to better state the problem and in this way avoid unnecessary information. In this study secondary data was collected from books, Government Policy Statements and from internet. The most used sources of secondary

data was internal data contained in the records of the Institute for Development of Small scale fisheries (IDPPE) and also to Fishery Research Institute (IIP) in order to gather information regarding the actual situation of the fishermen in terms of fish caught, trend of production and commercialization, the number of the fishermen in each area the constraints that they are facing and the aid that the Government is addressing to them. There was also used external secondary data obtained in Instituto Nacional de Estadística (INE) about the fishery GDP.

3.5 Data Collection Techniques

The questionnaire developed to collect the primary data started with a letter of introduction to artisanal fishermen. It then covered information regarding fishermen experience in working in the artisanal sector and their perception of being fishermen. Mainly, it contains questions on the reasons and motivations fishermen engaged in artisanal sector, their perception about the difficulties of being in this sector. The questionnaires were composed by 5 parts, the Part A is related to Background and the purpose of these questions was mainly to have a general overview of the social status of the fishermen that is useful in making comparisons, for instance, between the level of education and the constraints that the fishermen have. The Part B and C is related to the instruments that the fishermen used in their activity, the motivation in engage in the artisanal sector, the period they are in this activity and what they normally fish.

Also there are questions related to the source of money that the fishermen used to start the activity, especially on their knowledge about banks and financial institutions and if they tried to obtain money from Banks and financial institutions. The purpose of these questions was mainly to establish the relationship between types of fishing instruments and lack of capital. In addition, to show how fishermen that use different types of instruments are affected by the financial constraint. The followings sections' questions were on the costs and expenditures and on challenges faced by artisanal fishermen, how they overcome it and how the government can help to overcome those problems. The

purpose of these questions was mainly to notice if the fishermen pay the license and if it becomes one of their constraints.

3.6 Measurement validity and reliability

As one of the procedure to design a survey questionnaire, a pilot study was done before beginning the interviews and explains the questions to the respondents. The pilot test was important in order to determine the irregularities in some questions and if the words was easy to understand by the fishermen since they are people with very low education level. As all questionnaires, the pilot test was conducted in Portuguese language. However, the pilot test was made with 20 artisanal fishermen divided by the 4 areas that is, 5 fishermen on each area, during 1 week. After the pilot test the corrections were made based on it.

The interviews with the artisanal fishermen were conducted by the researcher and also by the 2 assistants who help to fill all the questionnaires. The assistants hired to collect data were chosen on the basis of their knowledge on the activity, on their experience in research. To be familiarize with the questionnaire, the assistants were given them prior to read and understand the questions and then to ask if there was any problem.

Another remarkable point that was used in the process of selection the assistants was the fact that they speak *Ndau*, the local language widely spoken in Beira City which allow to overcome the challenges encountered in the pilot test. Once the questionnaire was been delivered to the researcher it was checked to ensure it was filled in accordance to obtain proper results and also to ensure that there is no blank space and incomprehensive language and also it was observed the legibility specially on those open-ended questions that mostly ignored under pressure of time during an interviews. Any missing or inconsistent data was promptly corrected from the first questionnaires.

3.6.1 Coding of the Questionnaires

All the questionnaires have been numbering before being delivered. The questionnaire has 32 questions and the questions were numbering using the options 1 to 5 and for the option “others (specify)” was put 97. The Party A of the questionnaire has 9 questions, Part B and C has 7 questions each, Part D has 5 questions and Part E has 4 questions. The option answered by the respondents was used a tick, the same for the all questions to avoid problems when the data was processed. There are also questions with many options which the respondents should choose more than 1 among them and, in the open questions the respondents was asked to briefly state their opinions regarding how they overcome their constraints and how the Government can help them.

3.7 Data Analysis Techniques

As the questionnaire came from the field, they were being introduced in the computer according to their number. The primary data was processed and analyzed using the SPSS 10.0 version software package. The SPSS program was used as it allows to analysis of a large quantity of data (366 in this case) and can produce efficiency tables and graphs. The analysis also involved a comparison of the issues expressed by the fishermen and the results were presented in tables and pie charts.

3.7.1 Data Cleaning

In the process of data entry a few questionnaires comes with problems in some questions, for example, the assistants used some abbreviations to state the answers of the respondents in the questionnaire. The use of the abbreviations was made because of time constraints and also because of some respondents spoke in the local language and to translate to Portuguese need more time. These problems were solved in the presence of the assistants because they remembered all the abbreviations that they used and, it was uncomplicated because all the questionnaires were followed by the name of the assistants.

3.7.2 Chi-Square Test

To testify the hypothesis was used the chi-square test to know the degree of confidence in accepting and rejecting a hypothesis. This test is used most frequently to test the statistical significance of results reported in bivariate tables. The variable constraints faced by the artisanal fishermen were used as dependent and the independent variables were level of education, length of experience and type of instruments. The level of significance is 0.05, chi-square reveals that none statistically significant differences exist between the variables when $P > 0.05$ and if $P < 0.05$ there is statistical significance among the variables.

Chapter 4: Presentation of Results and Analysis of Data

4.1 Introduction

This chapter presents and analysis the data obtained from the survey carried out in Praia Nova, Estoril, Ndjalane and Regulo Luis. The survey sought to assess the constraints and challenges faced by artisanal fishermen. For this purpose, fishermen engaged in the artisanal sector were simple randomly selected. The method applied was the administrated questionnaire which involved both opened-ended and closed questions.

The survey covered 100 % of the sample previously target. The data contains information on fishermen's demographic and economic characteristics. It particularly provides information on fishermen experience in working in the artisanal sector including length of experience, motivation to engage in the artisanal sector, their perceived advantages and challenges faced in operating in the artisanal sector. Finally the data provides information regarding artisanal fishermen attitudes towards the source of the amount to start the activity and the ability of the fishermen to obtain a loan to increase their business activity.

4.2: Socio-economic characteristics

All of the fisheries interviewed were male because women are not engaged directly but in auxiliaries activities linked with the fish activity as collecting, processing, transport and sell the product. There are different age group between the artisanal fishermen, the good point is that there were no children in the activity and their parents argue that they are sending their children to school because they know the importance of education and also some of them do not want their children in this activity because of the many constraints met and also the lowest income gained. The majority of the fishermen interviewed were married.

4.2.1 Gender and Age

A total of 366 artisanal fisheries were surveyed of whom 100 % were male. These have similarity with some literature on artisanal fishery where they claimed that most fisheries in this sector are men. At the time of interview almost 80 % of respondents were more than 25 years old. The majority group with 38 % was in the range age 25-36 followed by 36 % in the range of 37-49 years old. Then, 13 % were between 18-24 years old, while 7 were under 18 years old. Among the sample 6 % were 50 and above years old.

Table 4.1 Distribution of Respondents by Gender and Age

		Total	Percent (%)
Gender	male	366	100
Age			
	under 18 years	25	7
	18-24 years	48	13
	25-36 years	139	38
	37-49 years	132	36
	50 and above	22	6
	Total	366	100

Source: Primary Data

4.2.2 Marital Status, Number of children and Dependants

The majority of respondents were currently married with 57 % while 25 % were single, 13 % were divorced and the remaining 5 % were widowed. 48 % of respondents did not have children, 39 % of respondents had between 1-3 children and 10 % had between 4-7 children. The remaining 3 % had more than 8 children. The majority of the respondents 74 % reported that they did not have dependants, while 24 % had between 1-3 dependants, 2 % had between 4-7 and only 1 % of respondents had more than 8 dependents. Fishermen in the artisanal sector were likely to be married and mostly not having children. Table 4.2 below summarizes this information.

Table 4.2 Distribution of Respondents by Marital Status, Number of Children and Dependants

		Total	Percent (%)
Marital Status	single	90	25
	married	210	57
	widowed	20	5
	divorced	46	13
	Total	366	100
Number of children	none	176	48
	1-3	144	39
	4-7	37	10
	more than 8	9	3
	Total	366	100
Number of dependants	none	269	73
	1-3	87	24
	4-7	8	2
	more than 8	2	1
	Total	366	100

Source: Primary Data

4.2.3 Level of Education

The level of education was investigated because it is believed that if the fishermen have high level of education they can explore properly and in sustainable manner the resource and can use the knowledge that have to obtain and use more efficiently the tools and also can promptly adapt to the implementation of the new technology if any. This finding can be compared to Squires et al (2002) who postulates that schooling can improve literacy and cognitive skills may reduce technical inefficiency by increasing the ability of fishermen to adopt technical innovations.

The survey results indicate a low education level among fishermen,, 88 % of respondents have an education level below the secondary school. From the sample, 28 % of all respondents had never attended school at all, 60 % which is the highest proportion had primary school and only 12 % of the respondents had completed the secondary school.

4.3: Analysis of the main Questionnaire

This section contains information regarding the type of instruments that the artisanal fishermen use in the activity, the periods that the fishermen is in the activity and reasons for engaging in the artisanal sector and the type of the product caught by the fishermen.

4.3.1 Type of Instruments

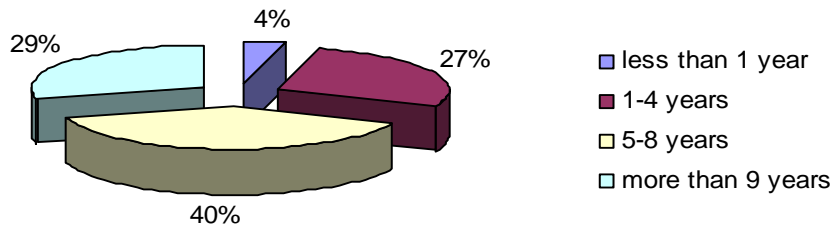
Results from the survey suggest that the artisanal fishermen used different types of instruments. The sector was mainly dominated by fishermen that used as the main instruments boat without engine, fish nets and oars 36 %. Boat with engine and fish nets were the second most popular fishing instruments with 24 % of the respondents. Then, 22 % of the sample used as the main instruments fish line and hook and 18 % used boat without engine, illegal fish net and oars as the principal instruments used in the daily activity. The use of such kind of rudimentary instruments is due to lack of capital to buy the modernized instruments used by fishermen of the other fishery sector.

4.3.2 Periods in the Artisanal Fishery Sector

It is important to analyze the period of the artisanal fishermen in the activity since this period can be related to the experience that they acquired from generations and are passing through the others. As shown in the figure 4.1 below, the periods of engagement in the artisanal fishery activity differ among the fishermen. The surveys results indicate that most part of the artisanal fishermen have more than 5 years in the activity. As can be seen in the figure above, 40 % of the respondents are in the activity between 5-8 years, followed by fishermen that have more than 9 years representing 29 %. It can observe that

27 % of the sample had engaged in the activity between 1-4 years and 4 % has been less than 1 year as artisanal fishermen.

Figure 4.1 Distribution of Respondents by period engaged in Artisanal Fishery Activity



Source: Primary Data

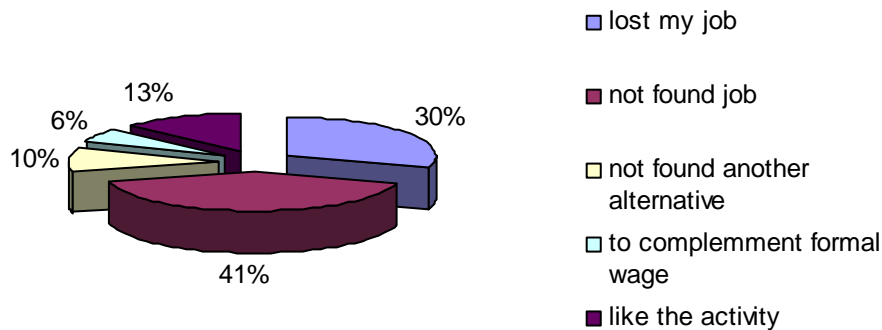
4.3.3 Reasons for Engaging in the Artisanal Fishery Sector

As shown in the figure 4.2, a number of factors were given from the respondents to clarify the reasons why they have engaged in the artisanal fishery sector. The study establishes that respondents were motivated to operate in artisanal sector for a variety of reasons. The two main ones were they not find work with 41 %, although the fishermen have tried to get a job outside the fishery but they did not find due to their low level of education. Fishermen that lost their jobs who represent 30 % argue that it happened because the factories where they worked closed.

However, 13 % of the respondents said that they engaged in the artisanal fishery sector because they like the activity and did not imagine their life outside the fishery activity and the same will be applicable to their children as this activity as being passed through generations. Only 6 % reported the necessity to complement the wage from the other

sectors that they have as being the main reason for engage in the artisanal fishery activity. The reason given by them was that the wage that they received was not enough to support the family and take care of the children.

Figure 4.2: Reasons for Engaging in the Artisanal Fishery Sector



Source: Primary Data

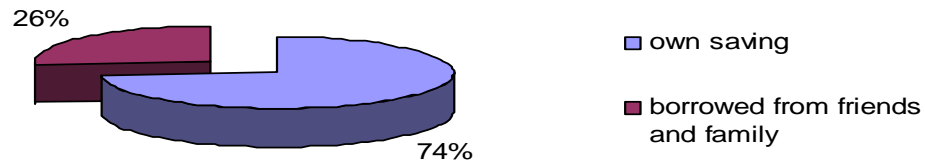
4.4: Financial Support in the Artisanal Fisheries Activity

The Financial Support is in Part C of the questionnaire. It is considered the source of activity capital, the amount of the initial capital used to start the activity, if the fishermen got loan from financial institution or if they tried to obtain it. It is also remarkable the reasons why some fishermen did not acquire loans from financial institutions.

4.4.1 Source of Activity Capital

The respondents were asked about their source of capital to start-up the activity. Figure 4.3 displays the main findings.

Figure 4.3: Source of Activity Capital



Source: Primary Data

From the figure 4.3 can be observed that 74 % of the respondents used money of their own saving and the remaining 26 % used borrowed money from friends and family to start the activity. It is important to remark that there was another alternative in the questionnaire as use of loan from a financial institution that was none of the respondents piqued it out.

4.4.2 Amount of the Initial Capital used to start the Activity

A question was asked to see how much money the fishermen used to start their activity. 41 % of the respondents answered that the amount they used was in the range between 101-500 mtn, 22 % 501-1000 mtn, followed by 15 % who said that used money in the range between 1001-1500 mtn and 13 % in the range between less than 100 mtn. The remaining 9 % was divided among fishermen who said that used money more than 2000 mtn and 4 % in the range between 1501-2000 mtn.

4.4.3 Loan from financial Institution

A question was asked to see whether the fishermen tried to obtain loan from the financial institution 93 % of the respondents answered in the negative while 7 % replied in positive

way. Following the same viewpoint for the respondents that positively answered that they tried to obtain a loan, the next question was in which financial institution, the respective amount and if they obtained the loan. Table 4.3 gives a summary of responses.

Table 4.3: Percentage of Loan Submission by each Financial Institution and the respective amount

Financial Institution	Number	Percentage (%)
Socrema	14	52
BIM	9	33
Novo Banco	4	15
Total	27	100
Value of Loan	Number	Percentage (%)
Less than 5000 mtn	11	41
5001-10000 mtn	4	15
10001-15000 mtn	5	18
15001-20000 mtn	1	4
more than 20001	6	22
Total	27	100

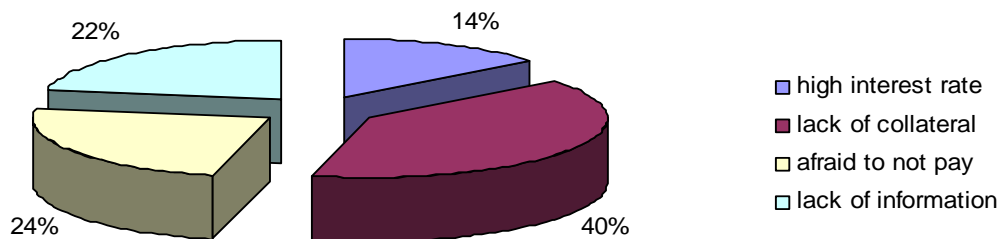
Source: Primary Data

Notable is the proportion of those respondents who had received a loan from Socrema with 52 %. This was followed by BIM with 33 % of all respondents, then Novo Banco with 15 %. The value of the loan varies from 5000 mtn to more than 20000 mtn. From the results it can be observed that 41 % of the respondents asked for a loan which value was less than 5000 mtn, followed by more than 20001 with 22 %, then by loan between 10001-15000 mtn with 18 %, and 15 % between 5001-10000 mtn. The remaining 4 % were of respondents that asked for a loan in the range between 15001-20000 mtn.

Respondents who mentioned that they tried to obtain a loan were asked if they got it and also to state the reasons why they did not obtain it. The respondents that tried to obtain a loan 93 % did not obtained it and only 7 % of the total respondents were positively successes in this process. Examining the reasons encountered by the artisanal fishermen in order to obtain loan a large variety of it was stated. It was surprising that 40 % had mentioned the lack of collateral as the main problem. That group argued that the lack of collateral represents the primary obstacle for their accessibility in order to obtain loan and puts them in unfair position because if they did not have money to take on their activity.

The other obstacle was 24 % of the fishermen fear to pay the loan because of the decrease in quantity of the production and also because of seasonality of the activity. There are another group of the respondents with 22 % that lack of information about the procedures to take in order to obtain a loan as they linked with the low level of education. The remaining 14 % is referred to high interest rate that is applicable in the financial institutions.

Figure 4.4: Reasons to not obtain loan in Financial Institution



Source: Primary Data

4.5: Costs and Expenditures faced by the Artisanal Fishermen

The costs and expenditures faced by the artisanal fishermen are considered in Part D of the questionnaire. In this part the fishermen stated the major costs that they encountered as the payment of the license and also are considered the affordability of the license to them. Large part of the fishermen with 42 % not pays the license because they see it as very expensive.

4.5.1 The Major Expenditure Faced by the Artisanal Fishermen

The primary expenditure that affects the artisanal fisheries in their daily activity is salt and ice to conserve the product with 54 %, followed by fuel with 18 %, the third is the fish net with 16 % and the smallest portion are divided by hook and fish line with 9 % and 3 % on boat damages.

4.5.2 Payment of License

The contribution of the artisanal sector is quite notable, 58 % of all fishermen reported that pay the license and the other 42 % that do not pay are those who see the license as very expensive.

Table 4.4: Affordability of the License

Affordability	Frequency	Percent (%)
expensive	312	85
cheap	9	3
affordable	45	12
Total	366	100

Source: Primary Data

It can be seen in the table 4.4 that 85 % of the respondents stated that the license is extremely expensive comparing to what they caught and sell that is why they did not pay

it, followed by respondents who saw the license fee as affordable with 12 % and then 3 % who saw as cheap and pay for it.

4.6: Constraints faced by the Artisanal Fishermen

A large variety of constraints were reported. It was not surprising that 39 % of the respondents had mentioned the lack of capital as the main problem faced by them. This findings add support to Habteyonas and Scrimgeour (2000) and the study of the UK Department for International Development (2003) who emphasize that the lack of capital constitute the foremost constraint faced by the artisanal fishermen as they need to buy more sophisticated and modernized instruments to exploit the available resources to increase their production and also that lack of capital makes the artisanal fishermen unable to employ improved fishing methods to exploit the resources more effectively and in a sustainable manner. The artisanal fishermen further argue that the lack of capital makes them not seeing their activity with growth perception. Concerning to ask for a loan from Banks and other Financial Institutions to deal with the lack of capital, the majority with 93 % mentioned that they did not tried to obtain it. The reasons for not trying were varied, 40 %, mentioned that did not have collateral.

The study also suggests that 24 % reported that is the fact that they afraid to not pay the loan the cause to not ask for it. This is an important finding which shows how relevant is the knowledge to pay and also to make a comparison between the cost of obtain the loan and its benefits since the fishermen are not having the necessary profit to pay the interest rate and to stay with any profit to continue with the activity. Therefore, 22 % mentioned that they did not know the procedures and 14 % revealed high interest rate applied in the financial institution.

These findings can be compared with the results obtained by Momade (2005) who investigated credit on small-scale fishery in Mozambique. His findings suggests that the fishermen can increase the standard of living of them if there is an accessibility to acquire credit in Banks and Financial Institutions in order to grow the possibilities of making a

living outside fisheries. This supports the idea that the fishermen are engaged in the fishery sector because of lack of employment and also because of the population growth.

Despite, the majority of respondents stated as the primary constraint the lack of capital (39%), the study also suggests that 25 % stated the lack of instruments. This finding reveals that it is related to the primary constraint (lack of capital) because the fishermen argue that they did not have money to buy new and modernized instruments to fish beyond the inshore water and in this way to avoid the high level of competition lived by them. The lack of instruments is also related to the type of instruments that the fishermen used in their activity. In spite of the majority use as main instrument boat without engine, fish nets and oars (36 %), they argue that they wish to have boat with engine to go beyond inshore water but the financial constraint impossibility this aim. Then, 18 % of the respondents reported they used boat without engine, illegal fish nets and oars because of lack of appropriate instruments and they know the damages that such practice brings to the resources.

These findings can be compared with results obtained by Squires at al (2002) who investigated the artisanal fisheries in Malaysia. Their findings suggest that the cause of decrease in the production on the artisanal fisheries is related to the instruments that are being used in the activity. And, in contrast to large-scale commercial fisheries, artisanal fisheries are owned-operated and labor-intensive, employing rudimentary technologies. Similarly, the finding of the study can be compared to Berachi (2003) who investigated artisanal fisheries in Tanzania who suggests that the factor that is contributing to the decrease in the quantity catch is related to the increased use of fishing gears with reduced mesh size mainly seine nets and despite their official ban in shallow water areas by large number of fishermen has caused considerable damage.

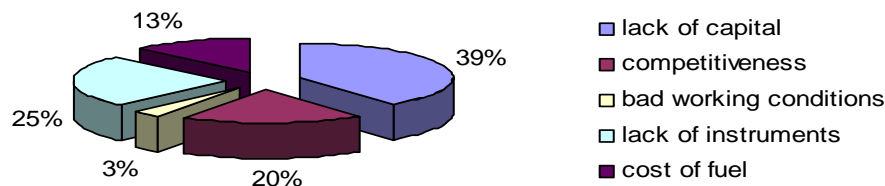
The study also suggests that 20 % of respondents state as main constraint the competitiveness lived in the sector. This finding reveals that the number of the fishermen is increasing and they are operate in the same ground and mostly using the same instruments which does not allow staying far from the others. The portion of the artisanal

fishermen that have a fish license (42 %) argues that this overcrowding of them in the same area could be reduced if the Government supervise the permits as they also consider the license high but they pay because they afraid the consequences of not paying.

The issuing of license coupled with fishermen that do not have license increase the competitiveness in the sector. These finding can be compared with results obtained by Amade (1999) who investigated artisanal fisheries in Inhambane Province suggests that the decline in the fish production in the inshore fisheries is resulted of an excess number of active fishing units and due to the excessive participants including a considerable number of small boats operating mechanically as well as manually seines. The competition between the fishermen coupled with the desire to increase income has increasingly led to destructive fishing practices.

The study also suggests that 13 % of respondents state as constraint the cost of fuel. This constraint is lived by the fishermen that operate by boat with engine and fish nets that use fuel as primary row material and without it they cannot operate. Since the major expenditure lived by the fishermen is salt and ice to conserve the fish, the followed expenditure is fuel because of the high price of it in the market and also because there is no reduction on it from the Government side to the fishermen.

Figure 4.5: Constraints faced by Artisanal Fishermen



Source: Primary Data

To have one trip per day the fishermen need at least 20 liters of fuel which cost to the fishermen nearly 1.200 mtn and this have to be justified by the quantity catch and sell in the respective day which are decreasing. The study suggests that 3 % of respondents stated as constraint bad working conditions. This constraint is related to the safe equipment that is necessary to the activity as well the lack of information about the state of the weather since many fishermen died when they are in the sea because of weather change and also because they usually fish at night.

4.6.1 Relationship between the Constraints faced by Artisanal fishermen and Level of Education

Table 4.5 demonstrates the relationship between the constraints faced by artisanal fishermen and level of education. It can be observed that 40 % of the respondents stated lack of capital as the prime constraint. This is followed by respondents that stated lack of instruments with 25 %, then by respondents that stated competitiveness with 19 %, then by respondents who stated cost of fuel with 13 % and last for respondents who stated bad working conditions with 3 %. When looking at the percentage of respondents it can be seen that there is no relationship between them, especially for lack of capital which is the prime constraint.

Table 4.5: Relationship between the Constraints faced by Artisanal Fishermen and Level of Education

Level of Education	Constraints faced by Artisanal Fishermen					
	Lack of Capital	Competitiveness	Bad working conditions	Lack of Instruments	Cost of Fuel	Total
Never	45	31	1	19	8	104
Attended	43 %	30 %	1 %	18 %	8 %	100 %
Primary	86	34	7	60	33	220
School	39 %	16 %	3 %	27 %	15.0 %	100 %
Secondary	16	5	4	11	6	42
School	38 %	12 %	10 %	26 %	14%	100 %
Total	147	70	12	90	47	366
	40 %	19 %	3 %	25 %	13 %	100 %

Source: Primary Data

Acknowledging the influence of the level of education on fishermen's capacity to deal with the various constraints, this study suggests that the artisanal fishermen had very low of education. 88 % of the respondents have an education level below the secondary school, 60 % of the respondents in the sample had primary school and 28 % never attended. One possible reason for this low level of education might be explained by the respondents' inability to procedure with the studies due to financial constraints. The importance of the level of education on overcome the constraint of lack of capital is indicated by the fact that those fishermen lack useful activity skills to function in the artisanal sector including how market the product, how to state the price comparing the cost encountered and the respective profit. For instance, looking at the percentage of lack of capital, it is decreasing as the education level increase from 43 % for fishermen who never attended school to 38 % for fishermen who have secondary school.

The table 4.6 shows the P-value to test the relationship between the constraints faced by the artisanal fishermen and their level of education and it shows that they are statistically significant at 0.007 ($P < 0.05$), that is there is relationship between the two variables. Therefore, the null hypothesis is confirmed in this study.

Table 4.6: Chi-Square Test for Constraints faced by Artisanal fishermen and Education

Chi- Square Test		Value	df	Asymp. Sig (2-sided)
	Pearson Chi-Square	21.024 (a)	8	0.007
	Likelihood Ratio	19.454	8	0.013

Source: Primary Data

4.6.2 Relationship between the Constraints faced by Artisanal fishermen and Length of Experience

The length of experience that fishermen have in artisanal sector might be another factor that influences them to deal with the various constraints. Perhaps, fishermen who have more experience in the activity are more likely to deal with the lack of capital because they might have more knowledge about the activity. This similarity the results found by Sesabo and Tol (2005) who show that the efficiency of individual fishing households is positively associated with fishing experience. Likewise, study by Squires et al (2002) concerning fishing experience, they argue that it is an important factor that has to be considered in order to increase the quantity of catch because it provides better knowledge about the location of fish, weather patterns, currents and tides, bottom conditions and how to best catch the fish. From the percentages of the constraints in relation to the length of experience it can be seen that there was no evidence of relationship between them. Table 4.7 below demonstrates the relationship between the fishermen's major constraint and length of experience.

Table 4.7: Relationship between the Constraints faced by Artisanal Fishermen and Length of Experience

Length of Experience	Constraints faced by Artisanal Fishermen					
	Lack of Capital	Competitiveness	Bad working conditions	Lack of Instruments	Cost of Fuel	Total
Less than 1 year	8	5	3	-	-	16
	50 %	31 %	19 %	-	-	100 %
1-4 years	40	18	-	31	8	97
	41 %	19 %	-	32 %	8 %	100 %
5-8 years	63	30	3	38	14	148
	43 %	20 %	2 %	26 %	9 %	100 %
More than 9 years	36	19	5	20	25	105
	34 %	18 %	5 %	19 %	24 %	100 %
Total	147	72	11	89	47	366
	40 %	20 %	3 %	24 %	13 %	100 %

Source: Primary Data

It can be observed that 40 % of the respondents stated lack of capital as the prime constraint. This is followed by respondents that stated lack of instruments with 24 %, then by respondents that stated competitiveness with 20 %, then for respondents who stated cost of fuel with 13 % and last for respondents who stated bad working conditions with 3 %. When looking at the percentage of respondents stated in the various constraints it can be seen that the percentage are almost decreasing as the length of experience increase. To test the relationship between them, table 4.8 demonstrates the P-value between the two variables.

Table 4.8: Chi-square Test for Constraints faced by Artisanal fishermen and Length of Experience

Chi- Square Test		Value	df	Asymp. Sig (2-sided)
	Pearson Chi-Square	42.837 (a)	12	.000
	Likelihood Ratio	42.450	12	.000

Source: Primary Data

Looking at the table 4.8, it appears that the constraints faced by the artisanal fishermen have a relationship with the length of experience. In fact, by looking at the chi-square statistics it is observed that there are strong statistically significant differences between the two variables. Note that the sig (2-sided) value 0.001 is less than the level of significance 0.05. Therefore, the null hypothesis is confirmed in this study.

4.6.3 Relationship between Constraints faced by Artisanal fishermen and Type of Instruments used in the Activity

The study indicates that the fishermen use basically 4 types of instruments namely boat without engine, fish net and oars; boat without engine, illegal fish net and oars; fish line and fish hook; and boat with engine and fish net. The most used instrument is boat without engine, fish net and oars with 36 %, followed by boat with engine and fish net (24 %), then by 22 % of respondents that use fish line and fish hook and last by 18 % of respondents that use boat without engine , illegal fish net and oars as main instruments.

Table 4.9 demonstrates the relationship between the constraints faced by artisanal fishermen and level of education. It can be observed that 39 % of the respondents stated lack of capital as the prime constraint. This is followed by respondents that stated lack of instruments with 25 %, then by respondents that stated competitiveness with 20 %, then for respondents who stated cost of fuel with 13 % and last for respondents who stated bad working conditions with 3 %. When looking at the percentage of respondents it can be

seen that there is no relationship between them, except in the case of percentages of lack of capital which are decreasing as the type of instruments become less rudimentary.

Table 4.9: Relationship between the Constraints faced by Artisanal Fishermen and Type of instruments used in the Activity

Type of Instruments	Constraints faced by Artisanal Fishermen					
	Lack of Capital	Competitiveness	Bad working conditions	Lack of Instruments	Cost of Fuel	Total
Boat without engine, fish net and oars	67	25	5	39	-	136
	49 %	18 %	4 %	29 %	-	100 %
Boat without engine, illegal fish net and oars	30	12	6	15	-	63
	47 %	19 %	10 %	24 %	-	100 %
Fish line and fish hook	27	21	-	31	-	79
	34 %	27 %	-	39 %	-	100 %
Boat with engine and fish net	20	14	-	7	47	88
	23 %	16 %	-	8 %	53%	100 %
Total	144	72	11	92	47	366
	39 %	20 %	3 %	25 %	13 %	100 %

Source: Primary Data

The importance of the type of instruments on the artisanal fishery activity is indicated by the fact that the most sophisticated and modernized instruments can lead to more production and consequently more income for the fishermen. The fact that the fishermen use rudimentary instruments because of lack of capital can be linked by the fact that they had low education level to operate with modernized instruments. As found by Berachi

(2003), fishermen in the artisanal sector felt that the factor that is contributing to the decrease in the quantity catch is related to the increased use of fishing gears with reduced mesh size which has caused considerable damage by the indiscriminate catching of all fishers. To test the relationship between them, table 4.10 demonstrates the P-value between the two variables.

Table 4.10: Chi-square Test for Constraints faced by Artisanal fishermen and Length of Experience

Chi- Square Test		Value	df	Asymp. Sig (2-sided)
	Pearson Chi-Square	193.805 (a)	12	.000
	Likelihood Ratio	184.552	12	.000

Source: Primary Data

Looking at the chi-square test in the table 4.10 it can be seen that the association between the constraints faced by artisanal fishermen and the type of instruments used in the activity it is statistically significant, since $P < 0.05$ which means that there is relationship between the two variables. Therefore, the null hypothesis is confirmed in this study.

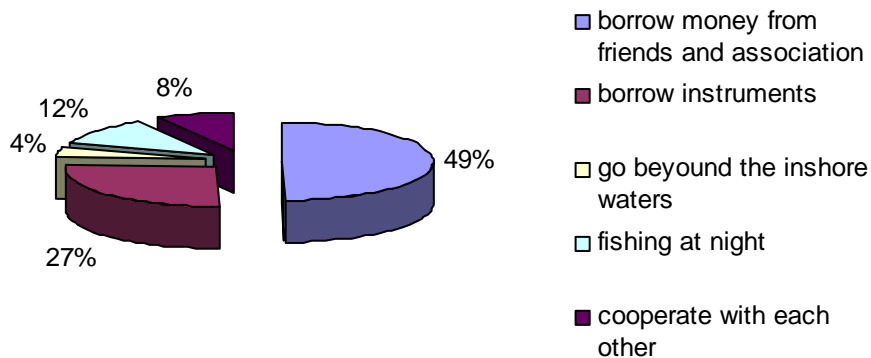
4.7 Overcoming of the Challenges faced by the Artisanal Fishermen

The artisanal fishermen stated the factors that they use to overcome those challenges previously identified. In figure 4.6 can be seen that 49 % of all fishermen reported that they borrow money from friends and associations to overcome with the lack of capital that they encounter in the activity, 27 % borrow instruments from friends that are not going to fish in that day to overcome the problem of lack of instruments.

To deal with the challenge of competitiveness 12 % of the fishermen go to fish at night when the others are at home or are coming from the sea, the other fishermen said that to overcome with the many challenges that they encountered in the activity 8 % argues that

the best way is to cooperate with each other in terms of borrowing money and instruments and the remaining 4 % overcome their challenges by going beyond the inshore water to catch more fish, to avoid the competitiveness but the boats and instruments that they use does not allow.

Figure 4.6: Overcoming of the Challenges faced by the Artisanal Fishermen



Source: Primary Data

4.7.1 Suggestions to the Government in order to overcome the Challenges faced by the artisanal fishermen

This question was developed to analyze the fishermen opinions regarding the government help in order to overcome the challenges. 37 % of the respondents argue that the Government should help them by giving ice and salt which are the products that are being used to conserve their fish for more days if it are not being sold rapidly, followed by 36 % of all respondents who argue that the Government should help in new materials and instruments because they stated that this constitute one of major challenge faced by them to deal with the competitiveness with the industrial fishery.

For the fishermen that use boat with engine they said that the cost of fuel is extremely high and the profit that they have does not support it, thus 15 % of the respondents argue that the Government should reduce the price of the fuel or to have a special price for the artisanal fishermen because of their major challenge which is lack of capital, this is followed by 6 % of the respondents that state that the Government should help by giving money as a loan because they see the possibility to get it from the financial institution very difficult, 5 % of the respondents stated that the Government should reduce the price of license as they see it as expensive, by reducing the price they will pay for it and avoid to work without permission and the remaining 1 % argue that the Government should construct a fishermen village where they stock their product and sell to their customers.

Chapter 5: Conclusions and Recommendations

5.1 Introduction

Mozambique artisanal fishery is certainly very large, having expanding greatly because of lack of employment in the other sector. Additionally, there is no doubt that this sector plays an important role in the national economy by providing employment, income and consumption for the huge part of population. However, this sector deals with many constraints that are causing reduction on its production. Besides this, the constraints that are affecting the sector are also affecting the standard of living of the population that depends on it. Moreover, artisanal fishery sector lack access to credit since lack of capital constitutes the main constraint which can overcome other constraints. This chapter presents the conclusions and recommendations derived from the research going into the research questions.

5.2 Research Conclusions

The results points to 4 important conclusions. *First*, and most important, there is the issue of lack of capital. In fact, the study suggests that many fishermen deal with problem of lack of capital and they do not asked for a loan on Banks and in other financial institutions because of lack of collateral. Others argue that they afraid to not pay the loan due to reduction on the production.

Second, the other constraints are lack of instruments, competitiveness, bad working conditions and cost of fuel. The study suggests that as the problem of lack of capital is solved the other constraints can be reduced since they depend on capital.

Third, the study suggests that to overcome the constraints that the fishermen faces, most of them borrow money from friends and associations. By doing so, the fishermen deal with the payment of an extra amount of money which constitute the interest rate applicable to time and value of the loan made.

Fourth, the distribution of respondents by level of education, length of experience and type of instruments used by the fishermen in the activity, in relation to the constraints faced by the artisanal fishermen demonstrates a relationship between them and it might be another factor to overcome the artisanal fishermen constraints. The study further suggests that as the level of education increase the lack of capital lived by the artisanal fishermen decrease, also as the type of instruments used by the fishermen become less rudimentary the lack of capital decrease.

5.3 Recommendations

Based on the conclusions of the study, it is strongly recommend to policymakers to open a financial institution addressed to fishermen to give assistance by providing loans with at low interest rate as they do not have collateral and face difficulties in obtain loans in Banks and financial institutions that already exist. This explanation should also involve how important is the accesses of loan and the respective repayment to benefit the other people and to future loans if they need. Moreover, policymakers should explain how the improvement in the artisanal fishermen activity will contribute to their own standard of living and also to the people that depend on the fish. The idea behind this is to help artisanal fishermen to recognize that remaining with those constraints limit their business growth and also the country Fishery Sector.

However, any effort to give incentives to artisanal sector fishermen to overcome their constraints through an explanation of the benefit of capital without considering a detailed explanation of how to use it will not be sustainable since the fishermen can use to extra expenses outside the fishery activity. Therefore, it is also suggested to policymakers to help artisanal fishermen to ponder capital against the other constraints: lack of instruments, competitiveness, bad working conditions and cost of fuel.

Provision of training is an indispensable factor for the rational management and optimal utilization of fish resources. Therefore, training programs should be based on clearly defined needs and realistic assessment of existing trained or experienced fisheries and

currently technology. This study suggests that as the artisanal activity is dominated by men, women can also help in the post-fish activity such as fish collection and processing thus, they should be included in all appropriate training activities. Where necessary, special training should be designed and provided for them.

It is further recommended to policymakers to understand the reality of the fishermen and thus to revise the regulation put in place particularly, the license concerning to its price and the area to operate, so that it can be obtained by all of them and in the same time avoid the crowding of fishermen in the same area. However, if this adjustment appears to be inappropriate, then it is suggested to policymakers to supervise the fishermen to avoid them to operate without regulations. It is also recommend to policymakers to install a reserve of ice and salt near the coastal areas to sell to the artisanal fishermen to overcome the problem of it and also avoid the post-harvest losses.

It is important to involve all groups concerned with fisheries management as administrators, researchers and fishermen in the process of formulating and implementing management measures. Fishermen will be more likely to comply with management measures when they are able to perceive the benefits which will arise from these measures and when they have been involved in the formulation of the measures.

5.3.1 Recommendations for Further Research

Having established the constraints and challenges faced by artisanal fishermen that cause the decrease in their production, further research is needed on those cities where the co-management process on the activity had started, in order to access the extent to which the constraints are overcome and ameliorate the living conditions of this part of population. Moreover, an evaluation of the difficulties they encounter and will encounter in the artisanal sector and an evaluation of whether their expectations are being met are other questions to be asked in future studies. These issues will help policymakers to evaluate whether further adjustments are needed and this help them to formulate policies that effectively benefit those fishermen with the aim to raise their standard of living.

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APPENDICES

APPENDIX A

CATHOLIC UNIVERSITY OF MOZAMBIQUE

FACULTY OF ECONOMICS AND MANAGEMENT

NAME STUDENT: CELMA TAIBO CHARFUDINE OMAR

STUDENT NUMBER: UCM/MA/05/008

I am a final year Master of Arts in Economics and Management student at the Catholic University of Mozambique. As part of the requirement for the degree program I am doing a research under the following title:

“Constraints and Challenges faced by Artisanal Fisheries in Beira: Mozambique.”

Please assist by completing the attached questionnaire. The information provided will be used exclusively for academic purpose and shall be treated in confidence.

Celma Taibo Charfudine Omar

APPENDIX B

QUESTIONNAIRE FOR ARTISANAL FISHERMEN IN BEIRA

Introduction

I am a student of the Catholic University of Mozambique. I am doing a research on the *Constraints and Challenges faced by Artisanal fishermen in Beira, Mozambique*. Please assist by completing this questionnaire. The information provided will be used solely for academic purpose and shall be treated in confidence.

PART A: Background

1. Date of interview _____

2. Area of the interview _____

Code	Area	Tick applicable
1	Macuti	
2	Praia Nova	
3	Estoril	
4	Regulo Luis	

3. Name of the interviewee _____

4. Age group of interviewee

Code	Age Group	Tick applicable
1	Under 18	
2	18-24	
3	25-36	
4	37-49	
5	50 and above	

5. Gender of the interviewee Male () Female ()

6. Marital status

Code	Marital status	Tick applicable
1	Single	
2	Married	
3	Widowed	
4	Divorced	
5	Separated	

7. Number of children _____

8. Number of dependants (other than own children) _____

9. Level of education

Code	Level of education	Tick applicable
1	Never attempted	
2	Primary	
3	Secondary	
4	Other (specify)	

PART B: MAIN QUESTIONNAIRE

10. Ownership Status of boat

Code	Status	Tick applicable
1	Owner	
2	Employee	

11. Type of boat

Code	Type	Tick applicable
1	Engine (<i>barco a motor</i>)	
2	No engine (<i>canoas</i>)	

12. What other equipment do you use in your fishing activities?

13. For how long have you been in artisanal fishermen? _____

14. What motivated you to engage in the artisanal sector?

15. What do you normally catch?

Code	Type caught	Tick applicable
1	Fish	
2	Prawns	
3	Lobsters	
4	Shrimps	
5	Other (specify)	

16. Please state the average quantity and value of sales of each type that you catch per day.

Code	Type caught	Quantity (kg)	Sales income (MZN)
1	Fish		
2	Prawns		
3	Lobsters		
4	Shrimps		
5	Other (specify)		

PART C: FINANCIAL SUPPORT

17. Where did you get your initial capital to finance your fishing activities?

Code	Source of capital	Tick applicable
1	Own savings	
2	Friends & relatives	
3	Loan from Bank	
4	Other (specify)	

18. How much money did you use to starting your business? _____(MZN)

19. Have you ever applied a loan from a financial institution? Yes () No ()

20. If yes, please state the name of the financial institution and the amount of loan.

Code	Name of institution	Amount

21. Did you get the loan? Yes () No ()

22. If yes what did you use the money for?

23. If you have never applied for a loan please give the reasons why.

PART D: COSTS & EXPENDITURES

24. What are your average daily expenses for your fishing project? _____ (MZM)

25. Please enumerate major expenditures for your project

Code	Expenditure Item
1	
2	
3	
4	
5	

26. Do you have a fishing license? Yes () No ()

27. If yes how much do you pay as license fees per term? *(Please specify the term)*
_____ (MZM)

28. Please comment on the affordability of these license fees to you

PART E: CHALLENGES IN ARTISANAL FISHERIES INDUSTRY

29. What major challenges do you encounter in your daily fishing activities?

30. How do you overcome these challenges?

31. What do you think should be done at policy level to help artisanal fishermen overcome these challenges?

32. Are there any comments that you would like to make?

Thank you very much for your time.

APPENDIX C

Table C1: GDP composition of Fishing

Years	% of GDP
1998	3
1999	2.5
2000	2.4
2001	2.3
2002	1.6
2003	2

Source: Diagnostic Trade Integration (2004) as cited in Vida (2005)

Table C2: Mozambique Population Growth

Years	Population Growth
1997	16.075.708
1998	16.451.650
1999	16.840.654
2000	17.242.240
2001	17.656.153
2002	18.082.523
2003	18.521.246
2004	18.972.396
2005	19.436.453

Source: Adapted from INE (2006)

APPENDIX D

Table D1: Distribution of Respondents by Age

Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	under 18 years	25	6.8	6.8	6.8
	18-24 years	48	13.1	13.1	19.9
	25-36 years	139	38.0	38.0	57.9
	37-49 years	132	36.1	36.1	94.0
	50 and above	22	6.0	6.0	100.0
	Total	366	100.0	100.0	

Source: Primary Data

Table D2: Distribution of Respondents by Gender

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	male	366	100.0	100.0	100.0

Source: Primary Data

Table D3: Distribution of Respondents by Marital Status

Marital Status		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	single	90	24.6	24.6	24.6
	married	210	57.4	57.4	82.0
	widowed	20	5.5	5.5	87.4
	divorced	46	12.6	12.6	100.0
	Total	366	100.0	100.0	

Source: Primary Data

Table D4: Distribution of Respondents by Number of Children

Number of Children		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	none	176	48.1	48.1	48.1
	1-3	144	39.3	39.3	87.4
	4-7	37	10.1	10.1	97.5
	more than 8	9	2.5	2.5	100.0
	Total	366	100.0	100.0	

*Source: Primary Data***Table D5: Distribution of Respondents by Number of Dependants**

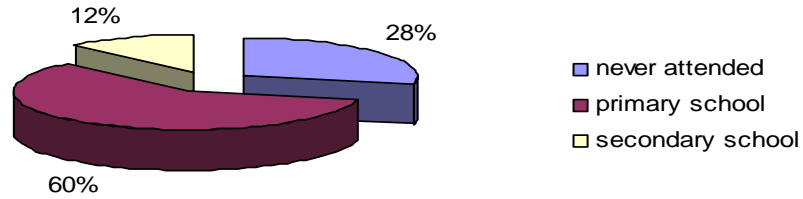
Number of Dependants		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	none	269	73.5	73.5	73.5
	1-3	87	23.8	23.8	97.3
	4-7	8	2.2	2.2	99.5
	more than 8	2	.5	.5	100.0
	Total	366	100.0	100.0	

*Source: Primary Data***Table D6: Distribution of Respondents by Level of Education**

Level of Education		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never attempted	104	28.4	28.4	28.4
	primary school	220	60.1	60.1	88.5
	secondary school	42	11.5	11.5	100.0
	Total	366	100.0	100.0	

Source: Primary Data

Figure D.1: Distribution of Respondents by Level of Education



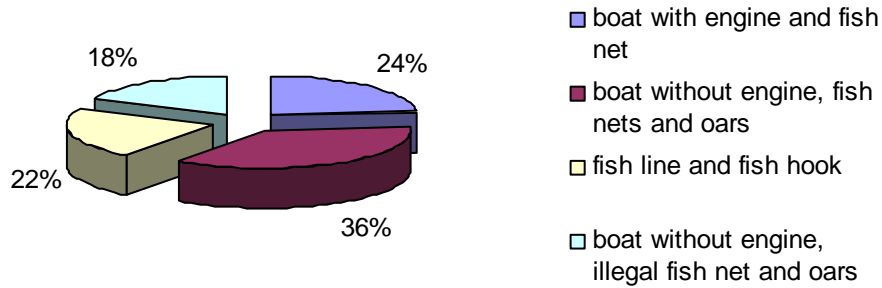
Source: Primary Data

Table D7: Distribution of Respondents by Type of instruments used in the Activity

Period in Fishing Activity		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 1 year	14	3.8	3.8	3.8
	1-4 years	97	26.5	26.5	30.3
	5-8 years	149	40.7	40.7	71.0
	more than 9 years	106	29.0	29.0	100.0
	Total	366	100.0	100.0	

Source: Primary Data

Figure D.2: Distribution of Respondents by the Type of Instruments used



Source: Primary Data

Table D8: Distribution of Respondents by Reasons Engaged in Artisanal Fishery

Reasons to Engaged in Artisanal Sector		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	lost my job	111	30.3	30.3	30.3
	not found job	150	41.0	41.0	71.3
	not found another alternative	38	10.4	10.4	81.7
	to complement formal wage	20	5.5	5.5	87.2
	like the activity	47	12.8	12.8	100.0
	Total	366	100.0	100.0	

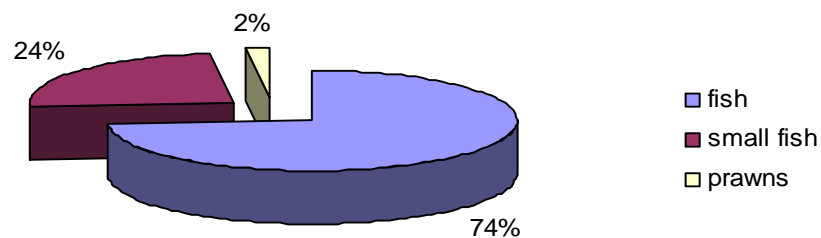
Source: Primary Data

Table D9: Distribution of Respondents by Type of Product Caught

Type of Product Caught		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	fish	273	74.6	74.6	74.6
	small fish	86	23.5	23.5	98.1
	prawns	7	1.9	1.9	100.0
	Total	366	100.0	100.0	

Source: Primary Data

Figure D3: Type of products Caught by the Artisanal Fishermen



Source: Primary Data

Table D10: Distribution of Respondents by Source of Activity Capital

Source of activity Capital		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	own savings	270	73.8	73.8	73.8
	borrowed from friends and family	96	26.2	26.2	100.0
	Total	366	100.0	100.0	

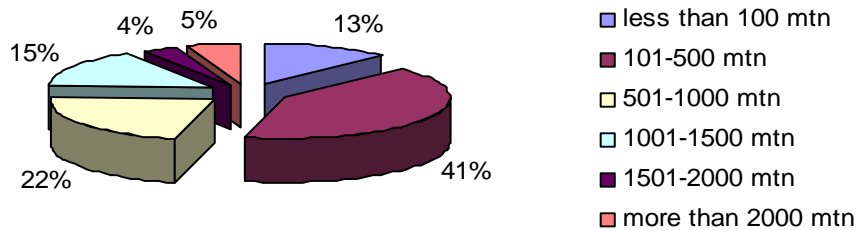
Source: Primary Data

Table D11: Distribution of Respondents by Amount of Money used to start the Activity

Amount of Money		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 100 mtn	46	12.6	12.6	12.6
	101-500 mtn	151	41.3	41.3	53.8
	501-1000 mtn	82	22.4	22.4	76.2
	1001-1500 mtn	54	14.8	14.8	91.0
	1600-2000 mtn	14	3.8	3.8	94.8
	more than 2000 mtn	19	5.2	5.2	100.0
	Total	366	100.0	100.0	

Source: Primary Data

Figure D4: Money Used to Start the Activity



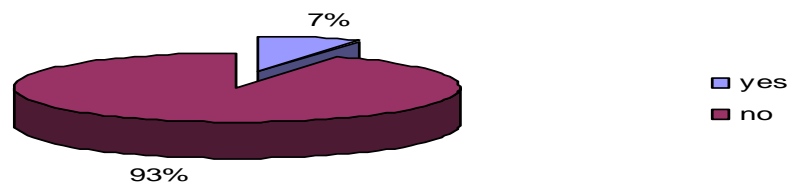
Source: Primary Data

Table D12: Distribution of Respondents by application of loan from a Financial Institution

Application of Loan		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	28	7.7	7.7	7.7
	no	338	92.3	92.3	100.0
	Total	366	100.0	100.0	

Source: Primary Data

Figure D5: Tried to obtain Loan in the Financial Institution



Source: Primary Data

Table D13: Distribution of Respondents by Name of Institution

Name of Institution		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		339	92.6	92.6	92.6
	Socrema	14	3.8	3.8	96.4
	BIM	9	2.5	2.5	98.9
	Novo Banco	4	1.1	1.1	100.0
	Total	366	100.0	100.0	

Source: Primary Data

Table D16: Distribution of Respondents by Amount of Loan

Amount of Loan		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than 5000 mtn	11	3.0	40.7	40.7
	5001-10000 mtn	4	1.1	14.8	55.6
	10001-15000 mtn	5	1.4	18.5	74.1
	15001-20000 mtn	1	.3	3.7	77.8
	more than 20001 mtn	6	1.6	22.2	100.0
	Total	27	7.4	100.0	
Missing System		339	92.6		
Total		366	100.0		

Source: Primary Data

Table D15: Distribution of Respondents by Tried and Get a Loan

Tried and Get Loan		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		339	92.6	92.6	92.6
	yes	2	.5	.5	93.2
	no	25	6.8	6.8	100.0
	Total	366	100.0	100.0	

Source: Primary Data

Table D16: Distribution of Respondents by Stating the Reasons Do Not Get a Loan

Reasons to Not get Loan		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	high interest rate	52	14.2	14.2	14.2
	lack of collateral	145	39.6	39.6	53.8
	afraid to not pay	88	24.0	24.0	77.9
	lack of information	81	22.1	22.1	100.0

Source: Primary Data

Table D17: Distribution of Respondents by Major Expenditure faced by Artisanal Fishermen

Major Expenditure		Frequency	Percent	Valid Percent	Cumulative Percent
	hook and fish line	33	9.0	9.0	9.0
	salt and ice	198	54.1	54.1	63.1
	fuel	66	18.0	18.0	81.1
	fish net	60	16.4	16.4	97.5
	boat damages	9	2.5	2.5	100.0
	Total	366	100.0	100.0	

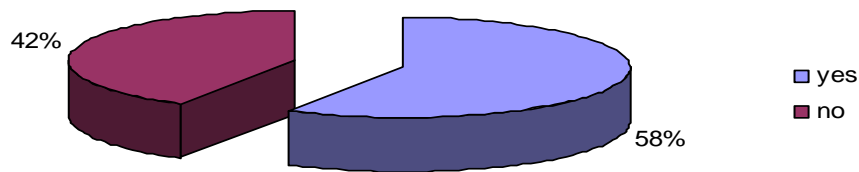
Source: Primary Data

Table D18: Distribution of Respondents by Payment of license

Payment of License		Frequency	Percent	Valid Percent	Cumulative Percent
	yes	213	58.2	58.2	58.2
	no	153	41.8	41.8	100.0
	Total	366	100.0	100.0	

Source: Primary Data

Figure D6: Payment of License



Source: Primary Data

Table D19: Distribution of Respondents by Affordability of license

Affordability of License		Frequency	Percent	Valid Percent	Cumulative Percent
	expensive	312	85.2	85.2	85.2
	cheap	9	2.5	2.5	87.7
	affordable	45	12.3	12.3	100.0
	Total	366	100.0	100.0	

Source: Primary Data

Table D20: Distribution of Respondents by Challenges

Challenges	Percentage (%)
Lack of capital	39
lack of instruments	25
competitiveness	20
cost of fuel	13
bad working conditions	3
Total	100

*Source: Primary Data***Table D21: Distribution of Respondents by Overcoming the Challenges**

Overcome of Challenges	Frequency	Percent	Valid Percent	Cumulative Percent
borrow money from friends and association	182	49.7	49.7	49.7
borrow instruments	97	26.5	26.5	76.2
go beyond the inshore waters	14	3.8	3.8	80.1
fishing at night	43	11.7	11.7	91.8
cooperate with each other	30	8.2	8.2	100.0
Total	366	100.0	100.0	

Source: Primary Data

Table D22: Distribution of Respondents by State the Government Help

Government Help		Freque ncy	Percent	Valid Percent	Cumulative Percent
	buy new instru ments	133	36.3	36.3	36.3
	give money	134	36.6	36.6	73.0
	construct a fisherme n village	2	.5	.5	73.5
	reduce the price of fuel	56	15.3	15.3	88.8
	give ice and salt	21	5.7	5.7	94.5
	reduce the price of the license	20	5.5	5.5	100.0
	Total	366	100.0	100.0	

Source: Primary Data

APPENDIX E

Table E1: Constraints faced by artisanal fishermen identified by different authors

Author	Country	Constraints identified
Anderson (1986) and Friedman (1998)	Tanzania	<ul style="list-style-type: none"> • Lack of capital
Berachi (2003)	Tanzania	<ul style="list-style-type: none"> • Lack of capital • Type of instruments • Increased pressure on fisheries resources
Habteyonas and Srimgeour (2000)	Eritrea	<ul style="list-style-type: none"> • Shortage of manpower • Low level of education • Lack of ice and fuel • Lack of capital
Jiddawi (2001)	India	<ul style="list-style-type: none"> • Increased pressure on fisheries resources
Sequeira (2002)	Nicaragua	<ul style="list-style-type: none"> • Lack of capital
Squires et al (2002)	Malaysia	<ul style="list-style-type: none"> • Type of instruments • Fishing experience
Sesabo and Tol (2005)	Tanzania	<ul style="list-style-type: none"> • Level of education • Fishing experience • Lack of capital
Mozambique		
Lopes and Gervasio (2000)	Nampula	<ul style="list-style-type: none"> • Type of instruments
Amade (1999)	Inhambane	<ul style="list-style-type: none"> • Type of instruments • High fishing effort • Excessive participants
Momade (2005)	Maputo	<ul style="list-style-type: none"> • Lack of capital
Research author	Beira	<ul style="list-style-type: none"> • Lack of capital • Lack of instruments • Competitiveness • Cost of fuel • Bad working conditions

Source: Author own assessment