

OPERATING A WHOLESALE FISH MARKET IN THE SULTANATE OF OMAN ANALYSES OF EXTERNAL FACTORS

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ABSTRACT

This study analyses the macro-environmental factors surrounding the new fish wholesale market which will be established in Oman. It determines the market stakeholders, their impacts on the market operation and the basic needs and management procedures for efficient market operations. In order to achieve the objectives of this study information was collected based on literature review of reports and related studies about wholesale markets and fish marketing systems. A semi-structure questionnaire was developed to collect related information from the key actors in the Icelandic Fish Auction System. Then two types of analyses were conducted: PESTLE- and stakeholder analysis to determine the external factors and key stakeholders and their impacts on the wholesale market. The main outcomes of this study are that market efficiency will be influenced by many factors such as poor infrastructures in landing centres, large numbers of small scale fishermen and the role of the truckers in the new marketing system. These factors have major impacts on the quantity and quality of fish that will be traded in the markets. There are some basic requirements that need to be considered such as: logistics, government rules and regulations, technology and the stakeholders' acceptance of the new system to ensure the success of the new market. It is hoped that the market authority would find the results from this study useful to improve the existing condition that may eliminate the development of the new fish wholesale market and to develop a long term plan for operating the market to overcome the market constraints.

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1 INTRODUCTION

The Sultanate of Oman occupies the southeast of the Arabian Peninsula and has a total area of 309,500 km². It is bordered by the United Arab Emirates in the northwest, in the west by Saudi Arabia and in the southwest by the Republic of Yemen. The country has a coastline of 3165 km from the Strait of Hormuz in the north to the border of the Republic of Yemen. The fisheries sector has been historically an important contributor to the Oman economy. In 2009 the total fish landed was around 158,000 mt and around 51% of the total landing was exported to more than 40 countries (MFW 2009b).

The sector has low contribution to Gross Domestic Production (GDP) with about 0.4% (MFW, 2009a). However, the sector and its related industries make direct and indirect contributions to food security because their products and services affect the daily livelihood of approximately 200,000 individuals in Oman (ESCWA, 2007). There are more than 30,000 fishermen who are involved in the harvesting sector (MFW, 2009b). The sector is expected to increase socioeconomic significance in the future and, therefore, the sector has received much attention in the country's economic development campaign (MNE, 2007).

However, the long-term potential objectives of sustainability will depend on market development and production growth. The available marketing network for fish does not promote these objectives (Omezzine, 1998). Therefore, it is very important to develop an efficient distribution system capable to meet different needs of different actors involved in the local fish marketing chain such as fishermen, processors, traders, consumers and international markets.

In 2008, based on the recommendations from studies conducted by the Ministry of Fisheries Wealth (MFW) and Sultan Qaboos University (Omezzine 1998, Omezzine 2004 and Al-Jufaili and Opara 2006a) a decision was taken to establish a large-scale, domestic wholesale market based in or close to Muscat, the capital city of Oman. The new market will be operated and managed by Muscat Municipality and the Ministry of Fisheries. The main objective of the new fish wholesale market is to provide significantly larger transaction opportunities in the country for fishermen, truckers, processors and retailers and to upgrade the current marketing system which has many weaknesses. These weaknesses are e.g. imbalanced distribution of fish between areas of production and consumption due to absence of wholesale market, poor quality and postharvest losses. The direct export of fish from landing centres by truckers to the neighbouring countries influences the value addition and shortage of fish supply in the local markets. The MFW funded a study on the Wholesale Fish Market, which concentrated on three main aspects: 1) benefits of the market to different actors in the fresh fish marketing system, 2) estimated cost and profitability of the market and 3) suggested rules and procedures for the new market (DFD, 2008).

In this regard, the main objective of this study is to understand the macro-environmental factors surrounding the new market and their effects on the market operations. In addition to that, a stakeholder analysis will be conducted to determine the expected influences of the market on different stakeholders. The basic requirements for operating the market will be determined based on these analyses and on the international experience of the Icelandic Auction System for fresh fish. Finally, generic market rules and procedures will be suggested.

The findings of this study will be a useful reference for both the Ministry of Fishery and the Muscat Municipality who will be the responsible authorities for the fresh fish wholesale market. Primarily, the basic needs and requirements need to be established

for operating the market. Secondly, the suggested rules and procedures should contribute to the development of best practices for the market operation

2 FISHERIES SECTOR IN OMAN

The Omani fisheries sector may be divided into two categories: traditional, based on artisanal fisheries, and commercial, with the former representing the cornerstone of the national industry. The artisanal sector is dominated by small scale fishermen who operate boats (traditional wooden and fiberglass with an out-board petrol engine) from 6-8 meters in length and Dhows (traditional wooden boat with an inboard diesel engine) with a length of 14-16 meters. Fishing boat tenure includes family-owned boats with family operator and non-family labour, and individually owned and operated boats with hired labour (Omezzine *et al.* 1996). These account for more than 80% of total landings. The commercial sector is represented by foreign fleets that have signed contracts with Omani fisheries companies and there are two types of vessels: trawlers and long liners. The total fish landings from the two sub-sectors covering the period from 1995 to 2009 are presented in figure (1). The traditional sector is dominant in terms of quantity and it accounted for around 85% of volume of the total fish landed.

The variations in the traditional fish landing during the period 1995-2009 may be caused by integrated factors. Fishing effort has increased during this period mainly due to the increasing number of fishermen. However, the annual landing fluctuates due to weather changes, which have major influences on the fishermen's activities especially during rough weather. The environmental changes influence the fish spawning and migration of fish stocks.

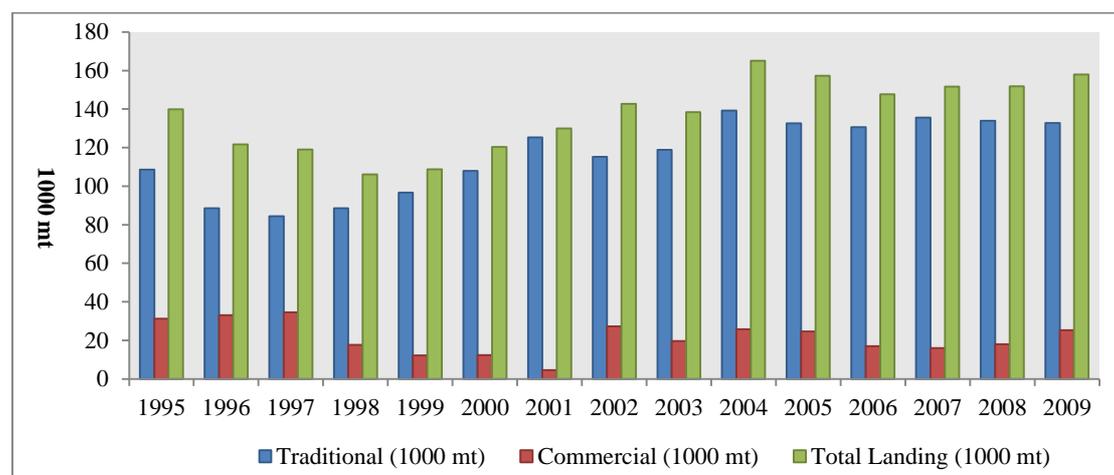


Figure 1. Traditional and commercial fish landings (1000 mt) from 1995-2009 (MFW 2009b).

Finally, there is inaccuracy in the statistical data, especially before 2007 that can be caused by the lack of human and technical capacity. But this has been solved after the establishment of the MFW, which has a department of fisheries data. In Oman the industrial fishing sector depends mainly on the foreign vessels fishing in Omani water on behalf of the national fishing companies for designated fees. The landing of these vessels fluctuated due to number of vessels, types of vessels (long liners or trawlers) and days of fishing trips in Omani water.

Fish exports are considered to be an important source of foreign exchange for the country. Oman's fish and fisheries products are exported fresh, frozen and processed to more than 40 countries around the world (MFW 2009b). During the period 1996-

2009, on average around 40.5% of the total fish landings were exported to international markets (Figure 2).

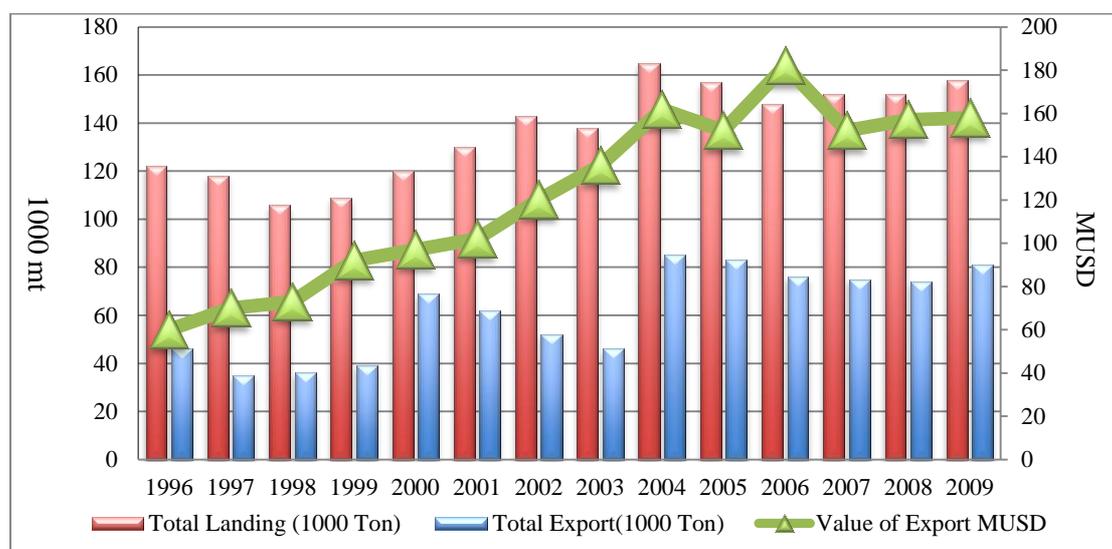


Figure 2. Fish landing and export (1000 mt) and value of export (1996-2009) (MFW 2009b).

However, the export share has been increased during the last five years up to about 50% of the total fish landing (Figure 2 & 3). The average share of the total exports in terms of quantity and value during the period from 1996-2009 was about 62% and 49% for the Gulf Council Cooperative Countries (GCC) market, 8% and 16% for the EU market, and 30% and 35% for the other countries, even though the average unit price of fish sold was highest in the EU market during the period. Of course, the unit price is influenced by the type of fish exported to the markets and quality.

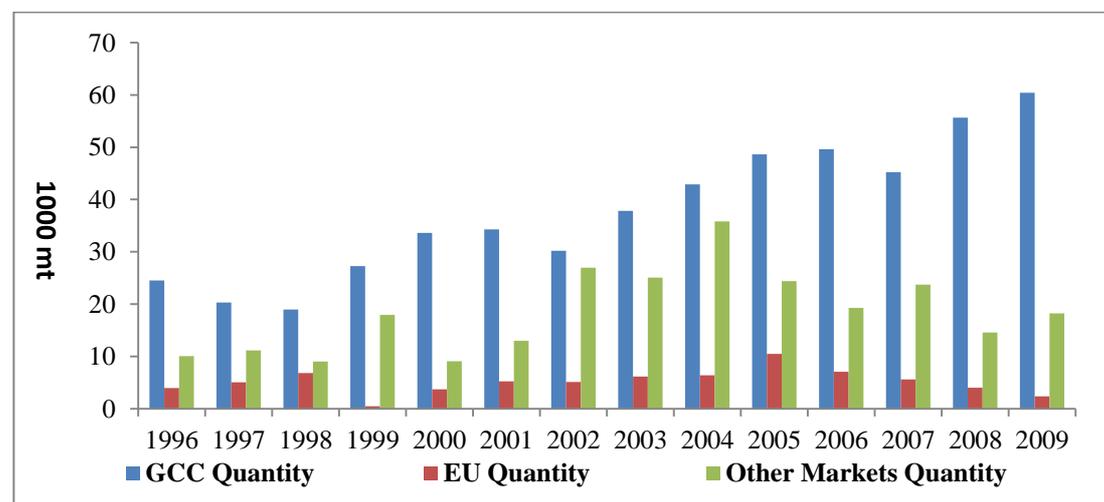


Figure 3. Fish export by markets GCC, EU and other markets (1000 mt) for the period 1995-2009 (MFW 2009b).

After the EU ban on fish imported from Oman in the period between 1998 and 1999, the total fish exported to EU market increased from around 400 mt in 1999 to more than 10000 mt in 2005. This increase was due to the increased number of approved companies, which increased from only 9 companies in 1999 to 25 approved

companies in the mid-2000s. Then, the total fish exported declined steeply to 2,000 mt in 2009 and the number of companies declined to 18 companies (Qatan, 2010). The reasons for this decline are the avoidance of local fishermen to supply fish to local processors because of their high fish quality requirements, the competition in the EU markets and difficulties facing processors in satisfying the EU requirements in quality and traceability (ESCWA, 2007). Due to the weak seafood processing industry and the international requirements in terms of quality and the small scale, traders (truckers) have become the main players in the fish trade. According to the Ministry of Fisheries statistical book, most fish exports from Oman are sent by road to other GCC States and sold in their wholesale markets as fresh fish, especially in the United Arab Emirates and the Kingdom of Saudi Arabia (MFW 2009b).

2.1 Fresh Fish Market System in Oman

The small scale fishermen offload their fish from their traditional boats in the landing centres. These can be open beaches, simple landing centres (with shaded places) or a modern landing site (fishing ports) facilitated by fish markets, ice plants and other services. They may sell their fish products directly to a range of buyers (Figure 4). Fishermen can also have an agreement to sell their fish directly to a particular buyer such as a middleman or processor. In addition to that, the auctioneers in some markets sell fish on the behalf of the fishermen for a nominal fee.

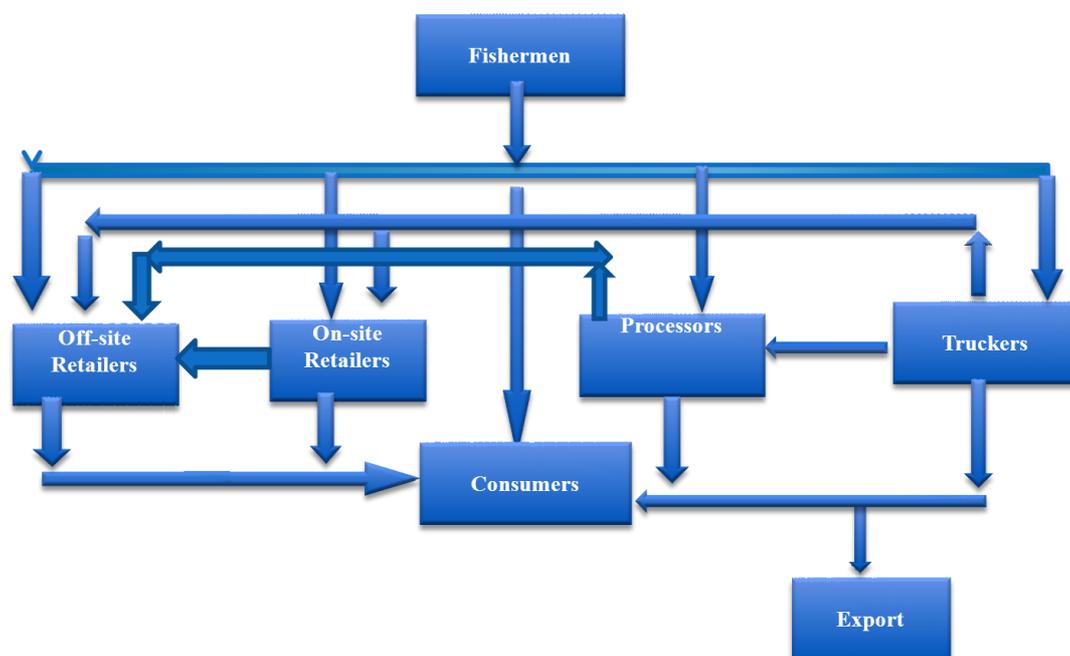


Figure 4. The fresh fish marketing system in Oman.

In the current fish market system in Oman there are no organized wholesale markets. The only markets are the markets at the landing centres (primary markets). The truckers (small individual traders) play a significant role in the fresh fish markets. They collect fish with their trucks from different landing centres in cooperation with the fishermen. There are two types of trucks used by these truckers: automatic refrigerators with capacity of 3-10 tons and smaller trucks without automatic cooling (capacity 1 to 3 tons). The bigger trucks are allowed to transport fish to neighbouring countries. Many of these truckers have problems associated with quality due to poor

fish handling and weak control of cool chain during the fish distribution. The truckers sell their fish to different buyers including processors, retailers and consumers in the local markets and export to the neighbouring countries markets. They are the main players in fish export to neighbouring countries. In 2009, around 70% of the total fish export was exported by truckers and 30% was exported by processors (fresh, frozen and processed products). All the quantity exported by the truckers was fresh fish directly from the landing centres (MFW, 2009b).

2.2 Constraints facing the fish marketing system in Oman

Since early 1970s, the government has given a lot of attention to the development of the postharvest sector. It constructed and operated fish processing plants in major communities. These governmental processing complexes were equipped with cold storage and ice plant facilities to preserve fish quality and in the mid-1980s those public facilities were privatized (Qatan 2010). In 1980, the Oman National Fisheries Company (ONFC) was formed with government assistance to purchase, distribute, and export the catches of local fishermen. In addition, many fishing ports were constructed at the main landing centres and currently there are 16 fishing ports with primary markets, ice plants and other services required by fishermen and traders (MFW 2010). There are 9 primary markets that have been established in 9 fishing ports. There are also about 30 fish retail markets mainly as a part of other food commodities markets (vegetable, fruits and meat) in the main cities where small retailers sell fish to domestic consumers (DFD 2009b).

Although a lot of development has been achieved in terms of infrastructures in the sector, there are still many constraints that need to be addressed to ensure the best utilization of the country's resources and maximization of the sector's contribution. Small-scale fishermen and traders dominate the Oman fresh fish sector and the marketing still occurs mainly at the landing centres. Truckers play an important role in fish marketing across the domestic and regional markets of neighbouring countries (Al-Jufaili and Opara 2006a).

There are many players involved in the fresh fish supply chain before the fishery products are delivered to the consumers. This range of handling steps contributes to the high incidence of quality losses which causes reduction in prices (Al-Jufaili and Opara 2006b). A report by the Economic and Social Commission for Western Asia (ESCWA) on the trade and environment dimensions of the fisheries sector in the Arab countries with particular reference to Yemen and Oman identified a range of factors that negatively influence performance of the fish exporters in Oman. These factors are a) poor post-harvest fish handling practices; b) underutilization of processing plants' capacity due to insufficient supply of fish, and c) avoidance of local fishermen to supply fish to local processors because of their high fish quality requirements (ESCWA 2007). There are also many problems that are causing weaknesses within the fish marketing system. They can be listed as (DFD 2009b):

- Large numbers of uncontrolled landing centres.
- Absent or poor market services at landing centres.
- Efficiency of small fishing boats in terms of fishing effort and quality of fish.

- Absence of wholesale markets to control the distribution between production and consumption areas in the local markets and export to neighbouring countries.
- Small scale fishermen and seasonal landings of fish affect the supply of fish in the markets.
- Insufficient seafood processing industries in term of value addition and introduction of new technology.
- The effect of truckers in the fresh fish market in terms of controlling landing sites, poor handling and the direct export of fresh fish to GCC markets.

The Ministry of Fisheries, which is the responsible authority for the fisheries sector, has put a lot of effort into developing the fisheries sector including harvesting and postharvest with the cooperation of public and private agencies. This attention is duly reflected in the previous national five year plan (2006-2010), but has gained increased attention in the recent five year plan (2011-2015).

2.3 Idea of fish wholesale market in Oman

The marketing system of fish in Oman involves two main types of markets, primary markets and retail markets. In the primary markets, activities take place on the landing centres where fishermen can sell directly from their boats or the fish is offloaded to the market place. The market has both retail and wholesale selling methods depending on types of fish, quantity and type of customers (household consumers or traders). In the wholesale selling method, both sellers and buyers can negotiate for the prices and traditional auction can be used to sell the fish. The primary markets can be categorized in three types according to their infrastructures

1. Open beach markets with no infrastructures
2. Fish stall market mainly with concrete floor and shaded roof. This type can be found on an open beach or as a part of the fish harbour facilities.
3. Modern fish market is a closed building with special places for wholesale and retail activities. This type of market has both water and electricity. The Ministry of Fisheries has established 16 ports and nine fish markets have already been constructed in fishing ports. These infrastructure projects are a part of the Ministry's long-term plan to construct more markets.

The second type of markets are local retail markets. These types of markets are established as a small part of other food markets such as vegetable, fruits and meat markets. These markets are the main suppliers of fish and other agriculture products in most of the cities. The retail markets can vary in terms of size and infrastructure. They are controlled by regional municipalities.

In 2008, the Ministry of Fisheries Wealth in cooperation with Muscat Municipality decided to establish a fish wholesale market in the capital city Muscat. The main objective of the new fish market is to provide much larger sales opportunities to local

fishermen, and much greater buying opportunities for exporters, processors, truckers and other merchants (Table 1). The long-term objective is to be the focal point for fish distribution in both the local market and regional market (GCC markets). The fishermen and sellers in the landing centres have the option to sell the fish directly to different traders in the supply chain.

Table 1. Description of the new fish wholesale market in Oman.

Items	Description
Type of Market	Secondary market between the primary markets and retail markets
Location	In Muscat the capital city of Oman and the market location is between 100 to 1000 km away from landing centres
Market Objective	To provide much larger sales opportunities in the country to fishermen, and much greater buying opportunities for exporters, processors, truckers and other merchants
Size of the market	About 3000 m ²
Fish market authority (FMA)	To be established by involving three institutions (Ministry of Fisheries, Ministry of Commerce and Industry, and Muscat Municipality)
Selling method	The market should sell fish by auction. It should prepare for the introduction of an electronic system, and should also prepare for remote offers and bids from the Sultanate and from other countries
Quality and safety standards	High standards for quality and safety will be considered during the market construction and operation
Market sellers	FMA authority will employ agents to receive, check, sort, and label fish

Source: (DFD 2008).

However, fish exported to the GCC markets has to be auctioned and licensed by the market, except for the fish from the landing centres located in the northern part of Oman (Batina and Mosandam), which are very near to GCC markets. The quantity expected to be traded by the fish market in the first year will be 30,000 mt. It is expected to increase to 60,000 mt in the second year of operation due to the acceptance of sellers and buyers of the new market. The market authority may implement a traditional auction system in the early stages, but new technology such as the electronic system and remote bidding will be implemented in the future, especially to solve the distance between the market and different landing centres (DFD, 2008).

3 METHODOLOGY

In order to achieve the objective of this study the following steps were conducted to collect and analyse the data and information related to the fish marketing system at local and international level.

3.1 Collection of Data

Information was obtained from two main sources:

1. Literature review: Several peer reviewed articles and relevant reports published by international organizations (FAO, ESCWA) were reviewed to gather key information about fish marketing systems and social and economic aspects of the fisheries sector in Oman. They included studies about fish marketing from developing and developed countries, and international reports about marketing systems and marketing guidelines developed by the FAO. The statistical data on fish landings and trade were collected from the Statistical Department of the Ministry of Fisheries Wealth and Ministry of National Economy in addition to some reports conducted by both authorities regarding the fisheries sectors.
2. Personal communication and visits: a semi-structured questionnaire was developed to collect key information regarding the basic requirements for operating an electronic fish market in Iceland (electronic auction, logistical needs, and management of fish markets). The questionnaire was given to key managers during visits to Icelandic fishing ports and to the central computer system for fish auction in Iceland. E-mail interview was conducted with Derek Forrester, Coordinator & General Secretary of the European Association of Fishing Ports and Auctions (EAFPA).

3.2 Data Analysis

The research is a descriptive study and much related information was collected based on the literatures review and visits. Two types of analyses were conducted: PESTLE and stakeholder analysis.

PESTLE analysis stands for Political, Economic, Sociological, Technological, Legal and Environmental. It is a useful tool for understanding the “big picture” of the macro-environmental factors that may affect organisation activities. It gives an overview of the surrounding environment of the operation and the opportunities and threats that lie within it. By understanding the environment, it is possible to take advantage of the opportunities and minimise the threats. For example, technology developments change the way that people work, their living standards and lifestyles (Johnson *et al.* 2005). The PESTLE factors need to be listed and it is necessary to determine the key drivers of change. These key drivers are the forces likely to affect the structure of an organisation. Two main steps were involved (Renewal 2003):

- 1) Listing of external factors of each of the PESTLE component influences on an organisation such as the Wholesale Fish Market.
- 2) Identification and recording of implications of each factor within the list of components. This was done by assessing positively or negatively the dynamic impacts of the factors by time on the market activities
 - Impacts of increasing significance (High)- Impacts of unchanging significance (Medium)- Impacts of reducing significance (Low)

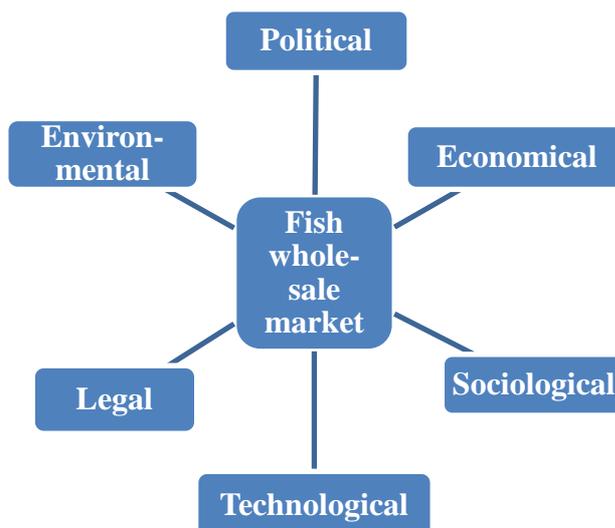


Figure 5. External macro-environment factors.

The second type of analysis is a stakeholder analysis that refers to the process of identifying and assessing the attitudes of stakeholders toward potential changes (most frequently a project). The stakeholders are individuals or institutions that may – directly or indirectly, positively or negatively – affect or be affected by a project or a programme. The stakeholder analysis involves sequences of steps as following (Europa 2004):

1. Identification of all stakeholders involved which may be affected by the problem or the project
2. Categorisation of all relevant stakeholders according to criteria relevant for the specific project (active, beneficiaries, affected, supporters, and opponents)
3. Analysis of selected stakeholders in detail such as characteristics, relations, interest, power

By conducting this analysis, it is expected to identify the benefits and the negative effects of the project on or by different stakeholders. This will help the project developer to establish necessary actions to solve or avoid expected constraints before establishing and operating the project.

4 TYPES OF FISH MARKETS AND DIFFERENT MARKETING SYSTEMS FOR FRESH FISH

Different types of markets within the fish distribution channels will be defined in this chapter, based on international experiences. The focus will be on the Icelandic fish marketing system that will be used as a benchmark for comparison. Information about the Icelandic system has been collected through visits and interviews of the main actors in the system.

4.1 Market and types of markets in the fisheries sector

Distribution methods vary according to the type of market such as financial markets or commodity markets, agricultural or fish market. In regards to this the following two definitions were selected. First, Houck (1984) defined markets as a collection of actual or potential buyers and sellers of a specific good or service. Based on this definition, the collection has two characteristics: (1) none of the buyers has the option to purchase the item from sellers outside this collection and (2) none of the sellers has the option to sell the item to buyers outside this collection.

The second definition states that a market is a series of services involved in moving a product from the point of production to the point of consumption. This definition emphasizes that marketing is a series of inter-connected activities. In the case of fish marketing it includes harvesting, transport, storage, processing, distribution and sale, sending information from production area to market (e.g. products available and volumes) and from market back to producing areas (e.g. prices and supply levels), and consumer preferences and changes in taste (FAO, 2005).

Markets are an essential link between production and consumption areas. In the case of the fishery sector the fishery products are channelled from the landing centres or areas of production to consumers through different kinds of markets (FAO 1999):

- Rural primary markets (production): Fishermen sell their fish directly to different buyers including retailers, wholesalers and consumers. These primary markets are organized in a central place in the villages or near the fishing landing centres.
- Assembly markets: These markets are larger rural markets that are found where greater quantities of products are traded by the producers themselves (fishermen), by traders, or collecting agents.
- Wholesale markets: Wholesale markets can be classified into two types: secondary and terminal wholesale markets (FAO, 1991). Secondary wholesale markets are located in districts or regional cities and take the bulk of their produce from rural assembly markets located in production areas, where the transactions are small-scale and usually take place between producers and traders. Terminal wholesale markets are located in major cities, where a product is finally channelled to consumers through trade between wholesalers and retailers. Product may also be assembled for export. The traders tend to be

well-organized and a commodity exchange may exist for forward trading. A variant on terminal markets are those that can be located at major ports (or a border railroad or sometimes an airport) dealing exclusively with import and export of product (FAO, 1991). Although the scale of secondary and terminal wholesale markets may be different in terms of the volume of products traded, there are a number of similarities. They both perform similar wholesale functions, the distinction between them being their location and the scale of their catchment areas. Secondary wholesale markets are essentially rural or located in a small city, with local catchment areas, while terminal wholesale markets are urban, with regional or national catchment areas.

- **Retail markets:** These are markets directly serving consumers and are found in main urban areas, such as provincial, town and small-city.

All these types markets play an important role in distribution of products such as food commodities (fish and fisheries products) to different consumers including local traders and international markets. Each of these markets are controlled or dominated by different sellers and buyers. Most countries have all these types of markets except for the terminal markets which are large-scale markets in terms of volume of traded products, distribution of products in the local markets or regional and international markets. Many countries, especially developed countries, have developed applied electronic auction system in their fish markets, e.g. Japan, Iceland and Western Europe. This electronic system allows producers to incorporate more chances to sell their products to local, regional and international traders.

4.2 Role of the wholesale markets in the fisheries sector

Marketing is the process of moving products from area of production (surplus) to area of consumption (demand). There are many complex steps involved before food, such as fresh fish, reaches the consumers including production, assembly, sorting, reassembly, and distribution. The social institution or mechanism that forms the linkage between the fishermen and retailers is the assembly and wholesale trading system. The wholesale market can organize a large number of producers (fishermen or farmers) to sell small quantities to be purchased by traders or wholesalers in bulk.

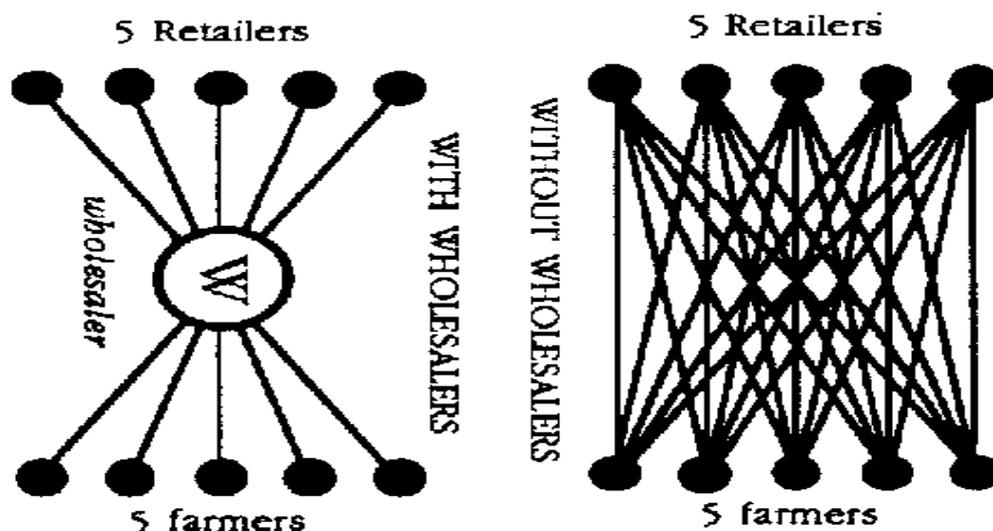


Figure 5. Market system with or without wholesalers (FAO, 1991)

Without wholesalers, retailers need to purchase directly from producers, involving many minor transactions, such as sorting, reassembly, storage and distribution functions. But, with the availability of the wholesale market, the wholesaler and assembler will perform these functions and retailers concentrate on selling to consumers.

4.3 Fish marketing system in countries with developing fisheries sector

The marketing system of any product is determined by factors such as scale of market participants, product characteristics, grade and standardisation and market information. In the case of a fish marketing system in countries with a developing fisheries sector it is characterised by a large number of producers (small scale-fishermen) and small traders or middlemen. In these regards two examples of fish marketing systems in Bangladesh and Malaysia are described to show how systems are implemented in most countries with developing fisheries sectors.

Marine fish marketing in Bangladesh is almost entirely managed, financed and controlled by a group of powerful intermediaries (Figure 7). The market chain from fishermen to consumers encompasses mainly primary, secondary and retail markets, involving sales agents, suppliers, wholesalers and retailers. Fishermen are the primary producers in the fish marketing chain. With a few exceptions, fishermen never communicate directly with wholesalers, retailers and consumers. Only around 1% of the fish is sold directly from fishermen or fish farmers to retailers and consumers (Rahman *et al.* 2009).

Fishermen tend to sell their catch at the landing centres (primary or production markets) to suppliers with the help of commission-based sales agents. The sales agents play a major role in the fish marketing system at primary markets (Ahmed & Sturrock 2006). The price of fish is affected by the seasonality of production, and weather conditions, which affects the quantity of the product available on the market. Price varies from market to market due to a larger concentration of consumers and superior family incomes (Ahmed & Sturrock 2006; Briones and Ahmed 2004).

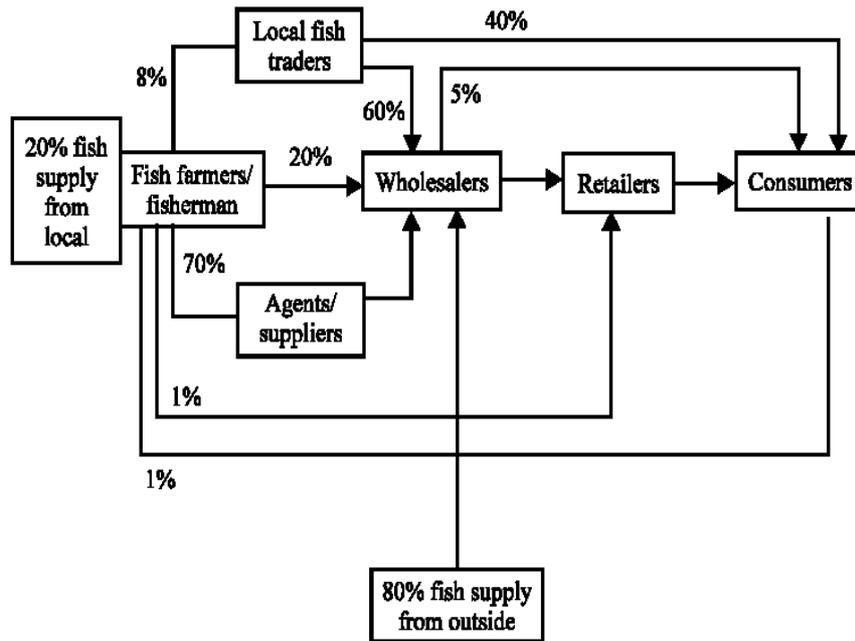


Figure 6. Fish marketing system in Bangladesh (Rahman *et al.* 2009).

In Malaysia, fish is landed at several landing centres along the coastline and is marketed by private fish traders/wholesalers (FAO, 2001). Fish is traded through private contracts at negotiated prices and public auctions in the landing centres and then transferred to the urban wholesale markets which are located in cities (Figure 8). One of the most characteristic features of the Malaysian value chain is the presence of middlemen at different points in the processes of collecting, buying, transporting, distributing, and selling aquatic resources. Small-scale fishermen with little capital are dependent on middlemen for marketing fish, equipment, and credit. The fish reaches consumers through a multi-level system, which may involve at least four transactions before the fish or fishery product is purchased by consumers in a public fish market or supermarket, or eaten at a restaurant/food stall (FAO 2001).

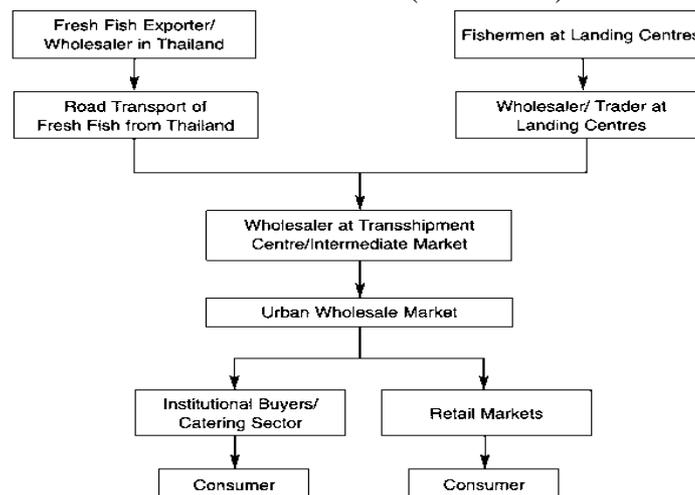


Figure 7. Fish marketing channel in Malaysia (FAO 2001).

In 2005, Fatima identified some of the constraints in the Malaysian agri-food business as: 1) inefficient flow and inaccurate market information, 2) poor logistics, 3) prices

negotiated based on market power of certain groups of traders rather than driven by market fundamentals, 4) complete isolation of marketing 5) four or more middlemen handle the product before it reaches the consumers.

4.4 The Icelandic fish marketing system

The Icelandic auction market was first established in 1987 in three Icelandic towns. The markets were connected by a local auction network. Each market had a personal computer, a modem and a printer. Prior to auction, all the buyers at each market picked up a print-out describing the lots for sale in terms of; species, weight, size, time since harvested, harvesting method, location and whether gutted or not gutted (Graham 1999). The auction followed the English method of bidding, with the central auctioneer progressively raising the price, with buyers at each auction able to hear him over a public telephone system.

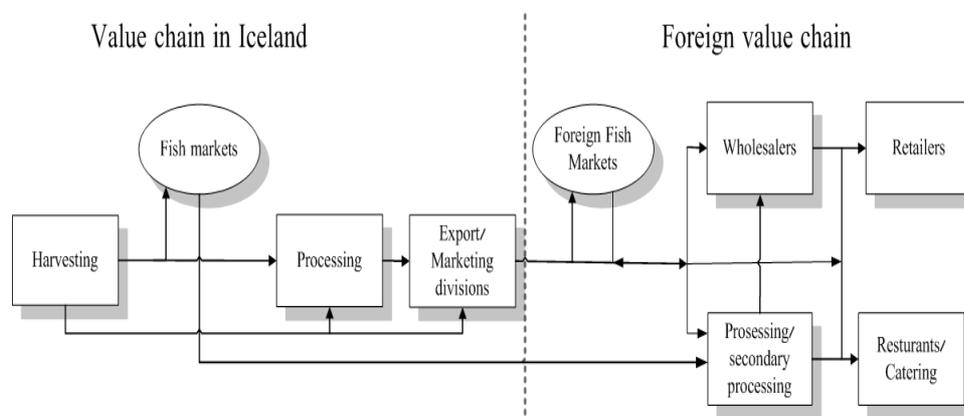


Figure 8. Fish marketing system for fresh fish in Iceland (Cod)

After the number of fish markets and auction companies increased the market introduced an online auction system. In 2010 there were 15 auction companies operating 30 fish markets at the landing places around the whole country. All these markets are connected to a single computer server or database, which is operated by a service company called Reiknistofa fiskmarkaða (RSF). The Icelandic Auction System procedures can be described as the following:

- A. **Small-scale fishermen and vessels** deliver the fish directly to the primary markets in the landing centres with all the information about the fish landed. They can also call the market and provide them with all information about their catch before landing. The basic rule in this process is the trust between sellers and primary markets, and the sellers know that if they provide any information about their catch which does not comply, they will lose the trust of the primary markets and buyers.
- B. **The primary markets** play an important role in the auction system. First, the markets receive the fish at the landing centres where quality checks, weighing,

sorting, icing and storage of fish are done before and after auctions and all the information about the catch is recorded. Then, they load the required information about the fish landed at the market or information received from the fish sellers into the database system. This information includes fish species, weight, quality grades, size, boat and vessels number, fishing grounds, and processing. The markets divide the catch into small or large lots. They organize the fish with ice in fish tubs after auction ready for shipment to the local and international buyers.

C. The Central Auction System Company is responsible for the central database for the electronic auction system. It is connected with all the primary markets in the landing centres, which include all the information about the fish sellers and buyers (credit information). All sellers and buyers have to register with an auction company. Each buyer should have credit by providing a bank guarantee for a specific minimum amount and receives an auction number, which will allow him to participate on the auction online from any location. An auction clock is used based on the Dutch (falling price) model. It also provides all the information about the fees related to the fish sold for different actors, including the primary markets, auction companies, fish tub rental company, transports and fish ports.

D. Delivery of fish from the primary markets to the buyers: The primary markets organize fish in tubs with ice and label for traceability before it is delivered to buyers. The buyers may use their own trucks or rent trucks to transfer fish to their processor. In Iceland the buyers have contracts with the transport companies. These companies transfer the fish under high quality standards immediately after auction ends. The primary markets can as well organise the fish in containers for the shipment to the buyers outside Iceland.

The fishermen can sell their catch very quickly just by sending the information to the market before the auctions take place. The system has built up trust between the fishermen, markets and buyers. There are a few cases when the fishermen's information is not accurate in terms of fish quality or size of fish. This can affect the future sales of the fishermen (situation on the primary markets). The buyers have the option to either accept or reject the fish lots if they do not comply with online information. Transportation cost of fish from the primary market or landing centres to the buyers can be very high due to long distances between landing centres and that most transport activities take place in the evening and at night after the auction is finished. The auction usually starts at 13:00 and lasts for 1-2 hours. Fish is sold with the guarantee of being delivered 1-2 hours prior to the opening of processing.

4.5 The basic factors in the Icelandic auction system

The primary markets in the landing centres, the auction company (RSF), Fish Tubs Company, and Fish Transport Company form the basic needs in the market system in Iceland.

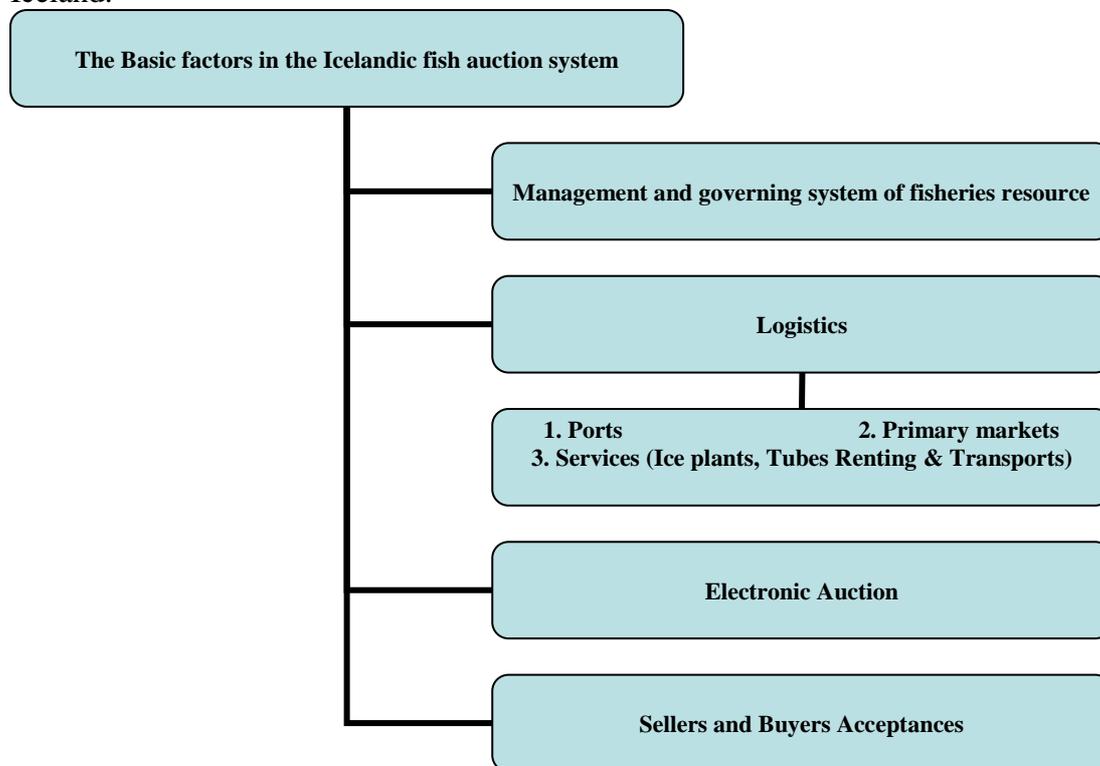


Figure 9. Basic requirements in Icelandic fish marketing system.

There are many factors that contribute to the successes of the fresh fish auction system in Iceland. There are management authorities and a governing system, logistics, electronic auction and fishermen's and buyers' acceptance (Figure 10). These factors play a major role in ensuring the sustainable development of the fisheries sector, speed up the time needed to sell and transfer the fish between the producers and buyers while satisfying both of them in terms of product diversity, quality and price.

A. The management and governing system of fisheries

Fisheries resources are one of the main contributors to the Icelandic economy. Iceland has implemented an effective management system to ensure that resources are utilised in a sustainable and responsible manner. The current management policy of the Icelandic government strongly promotes responsible fisheries through ecologically and economically sustainable management of the living marine resources (Icelandic Fisheries 2011). There are many measures implemented in the Icelandic fisheries management system, including individual transferable quotas (ITQs), area restrictions, fishing gear restrictions, and the use of closed areas to conserve important vulnerable habitats. These measures are all intended to support and secure the sustainability of the fish stocks and thus emphasise the economic benefits of the fisheries sector.

In Iceland, the Icelandic Food and Veterinary Authority (MAST) is the responsible authority for food safety and ensuring fish quality. The Act on Handling, Processing and Distribution of Marine Products (act no. 155/98) aims to ensure for consumers

Icelandic marine products which are healthy, fulfil the requirements set for quality, are processed under adequately hygienic conditions and are provided with satisfactory marketing and information (MAST 2011).

Finally, effective control and enforcement are an inseparable part of the responsible fisheries management and a good quality control system. The Directorate of Fisheries and MAST monitor Icelandic fisheries closely to ensure that all rules are being followed during the harvesting stage (vessels, gears) and post-harvesting stage including port control and weighing of all catches, handling in fish markets and processing.

B. Logistics

There are many services provided at the landing centres including fish tubs rental, fish transport, ice plants and the Central Auction Company. There are about 35 primary markets in landing centres. The main responsibilities of these markets are to transfer information between the producers (small scale fishermen and industrial vessels) and the buyers through the Central Auction System. These markets have cold storage and provide many activities such as sorting, weighing, labelling, and cooling of the fish before and after auction take place.

In Iceland there is one company responsible for fish tubs rental. The company owns about 60,000 tubs (small size 460 L and big size 600L). It has agreements with fish processors, primary markets, fishing vessels and exporters to provide tubs. The main advantage of this company in the Icelandic marketing system is reduction of cost for individual companies to own and manage their fish tubs.

There are mainly two companies responsible for providing transport and cargo services for fish buyers and sellers in Icelandic local markets and importing countries. The trucks used by these companies have capacity between 5 and 26 tonnes and have an automatic refrigerator system for delivering food products such as fish (EIMSKIP, 2010). They have contracts with fish buyers, industrial fleets, seafood processors and fish tubs rental companies. Fish quality is one of the concerns of these companies and to ensure that they transfer fish in tubs with ice and temperature around 0°C for fresh fish and around -20°C for frozen products. The fish transport companies have many advantages such as reducing the cost of operating and managing fish trucks for fish producers and buyers. This allows the producers such as fish processors to concentrate more on product development and marketing.

C. Electronic auction system

Electronic auction provides transparency and fairness to all participants – buyers and sellers – within an auditable process. The electronic sales offer the possibility of trade employing a variety of options for bidding patterns such as bid up – last (highest) bidder wins, falling price – first (highest) bid wins (Dutch auction system) and falling until 1st bid then bids rise until only one bid remains. The auctions may operate a closed network, a distributed open network or even on a remote server over the internet and buyers may still bid by voice with the auctioneer recording their offer or do so whilst hundreds of kilometres from the place of sale using the internet. Electronic auction has many advantages for different stakeholder groups, but at the same time the advantage for one player (e.g. seller) may be seen by another (e.g. buyer) as a disadvantage. The adoption of electronic system in fish market provides openness, fairness and transparency where the market is not restricted to a single physical location. It enables the concentration of supply and buyers and promotes

better quality and traceability. In addition some of the barriers can eliminate system efficiency including the ability to adopt a stringent quality and traceability control along the distribution channel from capture to buyers and the upgrade of infrastructure. Iceland has one of the most advanced fresh marketing systems in the world. The system is based on the Dutch auction bid and its online system allows buyers from any place to buy Icelandic fish from their office.

D. Seller and buyer acceptance

The system is dependent on trust between the buyers and sellers that has been built over a long time and is secured with bank guarantees. In 2003 an internet auction was introduced, which allowed buyers in the Icelandic market to be located outside Iceland. The change attracted international buyers that have been active in the market ever since. The system depends on the flow of information between sellers and buyers. The main challenge is to build trust based on the information between fishermen, primary markets and buyers. This is what has been achieved in the Icelandic auction system which is accepted by different actors and according to RSF 75% of fish is sold online even before reaching the primary markets (RSF, 2011).

4.6 Sydney Fish Market (SFM)

One good example of a fish market with an electronic system is the SFM, which has been using the Dutch clock auction since 1989. Adopted from the Dutch tulip auctions, the system ensures quick sales transactions of seafood by using two clocks simultaneously while achieving premium prices (Figure 11). SFM sells around 2700 crates at every auction or 65 tonnes of fresh seafood every day. There are 600 buyers registered to purchase from the auction. Before being eligible to bid at SFM each buyer must register with the market and receive a credit check and a weekly credit limit as well as a PIN number. The auctions are held from 5Æ30 a.m. every weekday. The Dutch clock auction is a silent auction, which begins at the highest price and drops until a bid is made. The starting price is usually set about \$2 above what the product is expected to receive. While the majority of products are sold through the Dutch clock auction, a traditional voice auction is used for live crustaceans and sashimi tuna. There are many benefits for the buyers to use the auction market including a wide range of fish species from Australia and overseas, high quality fish, quantity, speed of auction system and good loading facilities to load the product. SFM has worked to ensure the quality and safety of all products sold through SFM's wholesale auction by implementing a Quality Assurance Program, incorporating the hazard analysis critical control point (HACCP) system. The Quality Assurance Program is backed up by a number of support programs: personal hygiene policy, good handling practices, segregation policy, calibration, cleaning, pest control, maintenance and training.

4.7 Differences in fish marketing systems between countries with developing and developed fish sectors

Both developing and developed fish marketing systems face the same challenge to provide safe food of the right type and quality to the right place and to people who are willing and able to pay. There are many actors, enterprises and institutions involved in a fish marketing system. There are many differences between the fresh fish marketing

systems among countries, especially in terms of technology used, e.g. electronic auction system. These differences can be summaries as the following:

- The fish distribution channels in developing countries are multi-layer systems compared to developed countries. The producers are connected to the final buyers such as processors and retailers (see Figures 7 and 8). The long distributional channel has an influence on the fishermen's price share and increases the post-harvest losses due to poor logistics (transport and infrastructure).
- In developing countries there is a lack of transparency in terms of information flow. Prices are negotiated based on market power of certain groups of traders rather than driven by market fundamentals.
- In developed markets, fish prices are freely set by the market based on supply and demand. Producers are market-oriented and information flows more easily among all the actors.
- Introduction of modern technology in developed countries' fish markets like an electronic system allows the producers to sell their products to a large number of buyers in a short time and from different places and builds more trust between sellers and buyers.
- Some of these factors have major influences on the performance of the fish distribution channel in developing and developed countries. The use of technology has been one of the major factors in the development of the fish marketing system in developed countries.

5 ANALYSIS OF FISH WHOLESALE MARKET IN OMAN

Two types of analyses are used in this chapter: the PESTLE analysis and stakeholder analysis. The main objectives of these analyses are to understand the environment surrounding the markets and the main players in the fresh fish market system in Oman.

5.1 PESTLE Analysis

The fish wholesale market like any other project can be influenced positively or negatively by different factors in the surrounding environment. The effects of these factors can be in the short-run or long-run. Global fisheries sectors face many constraints at different levels due to environmental changes and human activities such as overfishing and pollution. These changes have caused an international alarm worldwide for better management for sustainable development of fisheries resources. Different external factors and their relative importance are listed in Appendix 1.

5.1.1 *Political factors*

Political factors in the external environment can have a huge influence on any project. For an organization, the following issues have to be considered: stability, position on markets, ethics, economy policies, international trading agreements. In the case of the fish wholesale market, the most influential factors are described below.

High interest among the government to improve the fisheries sector's contribution has been represented in the plan for diversifying sources of the national income, away from dependence on oil. The fisheries sector comes in the forefront in this respect due to its abundance and renewable resources. The intention of effective management of the fisheries sector has been reflected in the last Five-Year National Development Plan (2006-2010) and the current Five-Year National Development Plan (2011-2015) for the sector (MNE 2007). During last 40 years, the governmental plans for developing the sector have focused on establishing infrastructure in the sectors and provide soft loans for small-scale fishermen, traders and other investors in the sector. The fish market is one of the developmental projects in the sector. The government is interested in developing the sector in terms of infrastructure and providing soft loans for the processing industry. The fishing sector will have positive impacts on the market operations.

The government has put a lot of effort into building up capacity and has established two fishing institutes with the aim of training and qualifying the Omani youth to enable them to sail boats in coastal areas and open seas, to use the latest fishing equipment and safeguard fish quality by adopting scientific storing methods. These goals also include developing capabilities of the young youth in the fisheries sector, providing Omanis with more job opportunities, developing fishing methods and equipment in the country, enhancing revenue of fisheries, assisting in conducting research and studies relating to the fish sector. The institutes provide regular training to the fishermen in different fisheries aspects such as the use of fishing gears and quality.

5.1.2 Economic factors

The contribution of the fisheries sector to the GDP is still very low at around 0.4% in 2009. This is because the sector depends mainly on small-scale fishermen with insufficient fishing gear which affects the total landing, quality and selectivity. Therefore, it influences fishermen's incomes and availability of capital to invest in improvements. It causes a lot of problems for the processing industries to have sufficient quantity of high quality fish for processing and export to international markets.

For the success of the new fish wholesale market, there is a need to provide financial loans with low interest rate to vessels owners, traders and processors to improve their capacity during fishing and post-harvest stages. This is meant to increase the availability of fish and improve the quality in the wholesale market. The long-term goal is to increase the purchasing power of different customers in the market such as processors which may invest in improved technology to produce value added products.

5.1.3 Sociological factors

There are many social and cultural factors that influence the fish wholesale market. These factors can have a major effect on the continuous supply, quantity and quality of fish to the markets. The most important factors include the following:

a. Many fishermen depend on the sector as second source of income.

The artisanal fisheries sector is dominated by small-scale fishermen that number more than 30,000 fishermen, 14,000 fishing boats and around 600 traditional vessels (MFW 2009a). The artisanal sector is the main source of fish production with more than 80% of total fish landed. Based on the results of the boat survey conducted in 1995 by Ministry of Agriculture and Fisheries (MAF), 66% of the fishermen were full-time and 34% were part-time. A study conducted by Al-Marshudi and Kotagama (2006) about the socio-economic structure and performance of traditional fishermen in the Sultanate of Oman from a random sample of 1589 fishermen showed that 68% of the fishermen depend on sector as primary source of income and around 32% as secondary source. Al-Oufi *et al.* (2000) pointed out the consequences of low educational levels for traditional fishermen. First, employment opportunities outside the sector are substantially reduced. Second, even where employment could be gained, this would likely be unskilled and low-income based. Such a situation would likely result in the individual continuing to fish part time or returning full time to the fishing sector.

b. Age of fishermen

According to the results of the boat survey conducted in 1995 by MAF, the age structure of the fishermen was as follows: 60% of the fishermen ranged between 35 and 54 years of age, 20% were above 55, and 10% were under 35 (MFW 1995). Another study showed that the fishermen ages ranged from 20 to 70 years and 39% of the fishermen were in the 41–55 year range, while 13.5% were in the youngest group below 26 years of age (Al-Marshudi and Kotagama 2006). It is important to note that the Al-Oufi *et al.* (2000) survey found 64% of the fishermen within the 41–55 year range and only 4.6% in the under 26 year category. These studies showed that fishermen are ageing and fewer young people are entering the occupation. As the older

generation retires or leaves the fishing industry, the total number of fishermen may decline because the younger generation seems to have considerably less interest in fishing as an occupation.

These sociocultural factors will affect the number of fishermen in the sectors and their investment in the development of their fishing gear. In addition to that, their fishing activities will only concentrate on the area near to the coast line because of the limited range of fishing boats and gear, part-time fishermen and the effect of age. As a result their catch will be low in terms of quantity and species selectivity.

5.1.4 *Technological factors*

Technology is vital for competitive advantage, and is a major driver of globalization. The fisheries sector in Oman depends mainly on small-scale fishermen operating traditional wooden and fiberglass boats that are 6-8 meters in length with an out-board petrol engine and Dhows (traditional wooden boats with an inboard diesel engine) with 14-16 m length (Omezzine *et al.* 1996). Many of the landing centres are without appropriate infrastructure such as harbours, ice plants and markets. In terms of processing industries, they have numerous weaknesses such as storage capacities (chiller and freezers), and poor technology for value addition.

The weaknesses have three major implications. First, quantity and species selectivity of fish landed, which mainly depend on types of fishing boats and gear. Second, quality of fish which is affected by types of fishing gear, handling on-board, and the availability of suitable infrastructures and facilities in landing centres. Third, the ability of processors in terms of holding capacities and value added which increase the purchasing power of processors in domestic markets. The wholesale fish market will be affected by these factors either positively or negatively and it is necessary to solve these issues for the successful operation of the market.

5.1.5 *Legal factors*

Oman is a country with a good legal system that regulates all the activities such as civil, economical, investment, financial, environmental and consumer health and safety. In the case of fish wholesale markets many regulations have been issued covering all the harvesting and post-harvesting stages in the fisheries sector including fish resource management, fish handling, processing, storage and marketing. The government gives as well tax exemption for five years and renewable for a further five years (subject to certain conditions) for Omani companies involved in fishing, fish processing, fish farming and aquaculture (Saslo 2010).

The main issues with fish wholesale are enforcement of the regulations regarding quality standards of fisheries products, food safety, hygiene standards and fish handling because the food control system in Oman is multi-dimensional with many agencies involved. The fisheries sector needs a lot of effort (financial and human) to inspect and monitor a long coast line without controlling the landing centres.

Oman standards implemented in the seafood industries are equivalent to the international standards in the international markets (EU, USA) and there are 18 fish processors with EU standards certificate. But, new concerns that have appeared recently in the international markets such as eco-labelling, organic food and issues

related to consumer health need to be addressed. The local regulations need to be regularly updated to include any changes or requirement in the international markets. The industrial fleets and coastal fleet can play an important role in supplying the fish market with different species of fish with good quality. To achieve this, there is a need for reviewing the current regulations especially for industrial fleets (i.e. gear, landing, marketing and quota) to develop new regulations satisfying the governmental goals to develop the sector, including processing industries and consumers.

5.1.6 Environmental factors

The global conditions of major fish stocks are severe. Recent studies show evidence that more than 20% of the world fish stocks have collapsed, another fully 40% are overexploited, and the remaining 35% are fully exploited (Eggert and Grecker 2009). As in most developing nations, certain stocks of Oman's coastal fisheries have been overexploited and that has affected the livelihoods and the prosperity of coastal communities.

The primary factors are a combination of excess capacity and government transfers, which encourage excessive investment and activity in the fisheries sector, together with inadequate management of the resource. During the last two decades Oman has applied restrictions for certain endangered species of fish in (e.g. shrimp, lobster and abalone) during breeding seasons.

The FAO Code of Conduct for Responsible Fisheries was adopted in October 1995 to comply with international requirements and ensure long-run sustainable development. Oman has ratified a number of international treaties and conventions relevant to the management and exploitation of commercial fisheries, such as Indian Ocean Tuna Commission (IOTC). In general, these agreements have helped Oman to fulfil and implement the objectives and principles contained within the FAO's Code of Conduct (ESCWA 2007). The government developed and adopted appropriate policies and reviewed legal and institutional frameworks to support the sustainability of its national stocks.

Weather changes have major effects on the fish stocks and fishing activities. For example the small-scale fishermen and their limited boats are easily influenced by any weather changes that can cause them to stop their fishing activities. Especially during monsoon season in the southern part of Oman from June to September the sea is very rough and many fishermen stop their activities. Fish stocks are influenced by environmental phenomena such as red tide, which can cause fish mortality along the Omani coast line and fish movement away from infected areas.

Some emigrated species such as Kingfish and Yellowfin Tuna are affected by changes in weather and overfishing during the last 10 years and the total landings of these two species have steeply declined. To promote the best utilisation of emigrational and shared species Oman is working with regional countries under the regional bodies such as the IOTC and RECOFI (Regional Office for the Near East). Based on a long-run plan for diversifying sources of income and reducing the country's dependence on oil and gas many developing projects have been established along the coast line such tourism projects, commercial and industrial ports and industrial zones. These projects could have negative impacts on the marine environment in areas close to existing and planned industrial zones, unless integrated planning and sufficient investment in environmental management services are pursued from the beginning (ESCWA 2007). It can be concluded that the Omani fisheries industry is generally committed to compliance with environmental, quality and health standards, including international

standards such as HACCP, and existing Omani requirements. But, there is a need for more cooperation among different government agencies to adapt and monitor the implementations of these regulations in the sector to ensure sustainable development of the fisheries sector.

5.2 PESTLE analysis summary

From this analysis there are many factors that can affect the market activities positively or negatively in the short and long run. These factors can be summarized as follows:

1. **The government interest:** the government has put great attention on the fisheries sector especially in terms of infrastructure development and capacity building. The governmental effort needs to be continuous during the coming years to establish more fishing ports in the landing centres and develop the available ports. There is a need to provide loans to small scale fishermen, industrial fishing and processing. The long-run strategy of the government is to train the youths and fishermen in different fisheries fields. This attention is reflected in the establishment of two fisheries institutes. This is a very important step to improve the skills, awareness and responsibilities of small-scale fishermen, truckers and employees of responsible authorities.
2. **Introduction of new technology into the fisheries sector:** including the harvesting and post-harvest sectors. The lack of technology is one of the major weaknesses in the fisheries sector in Oman. It directly influences the landing, quality of fish and value addition. The fishermen, traders and processors have to develop their practices with government support for the changes.
3. **Fisheries management issues:** the Ministry of Fisheries Wealth is the responsible authority for managing the fisheries resource and has put a lot of effort to ensure the sustainability of the fisheries stock. Many regulations have been issued since 1981 when the first Marine Resource Law were signed. The Ministry already issued many management rules to limit the landing of overexploited stocks. The government has to continue its efforts especially to promote the scientific based management measures, monitoring and enforcement of the regulation and enhance the fisheries extension programmes for fishermen. Food quality and safety is also a major concern for consumers and will have major impact on fish marketing at national and international levels. The government will have to adapt its regulation to the basic important issues such as eco-labelling, organic food, and issues related to consumer health.
4. **Stakeholders' awareness and responsibility:** Awareness and responsibility of the stakeholders will affect the market activities, in terms of their ability to make changes such as investment in fishing gear, acceptance of new systems (e.g. electronic auction) and processing technology. The awareness and responsibility of stakeholders is important in terms of quality and the sustainable utilisation of the resource.
5. **Environmental changes:** One of the factors that can have a major effect on the market operation is the seasonality of fish landing and the effect of the

weather changes. The sustainability of the resource on the future will depend on the global governments' attentions and cooperation.

5.3 Stakeholder analysis for fish wholesale market

This type of analysis is very important to be conducted at an early stage before starting the project. The outcome of the stakeholder analysis provides useful information for the developer to understand their stakeholders and the positive or negative impacts of the project on them and their influences on the project.

5.3.1 Identification of fish wholesale market stakeholders

The distribution channel of fresh fish in Oman includes several intermediaries starting with the fishermen at landing centres, who can sell their fish to different buyers including traders or trackers, on-retailers, off-site retailers, and processors. Each one of these middlemen receives fish at a certain price and moves it to the next buyer with a higher price until it reaches the consumers in the local market or the importing agents in the international markets. The main objective for the government plan to establish the fish wholesale market is to provide much larger sales opportunities for Omani fishermen, and much greater buying opportunities for processors, truckers and other merchants. To achieve this objective it is very important as a preparatory step to identify the market current and expected stakeholders that can be affected by or can affect the market (Figure 11).



Figure 10. Wholesale fish market stakeholders
(MFW*: Ministry of Fisheries Wealth and MM*: Muscat Municipality)

5.3.2 Categorisation of the stakeholders

The stakeholders with an interest in the outcome of the project can be categorized into three main types: key, primary and secondary stakeholders. They include those who operate on the fish wholesale market and are affected by it positively or negatively, or are able to influence activities in a positive or negative way. Key stakeholders are those who can significantly influence or are important to the success of the project. Primary stakeholders are those individuals and groups who are ultimately affected by a project, either as beneficiaries (positively impacted) or dis-beneficiaries (adversely impacted). Secondary stakeholders are all other individuals or institutions with a stake, interest or intermediary role in the project and are indirectly affected by it. The fish wholesale market stakeholders are analysed and categorised according to the above categorisation (Figure 13).

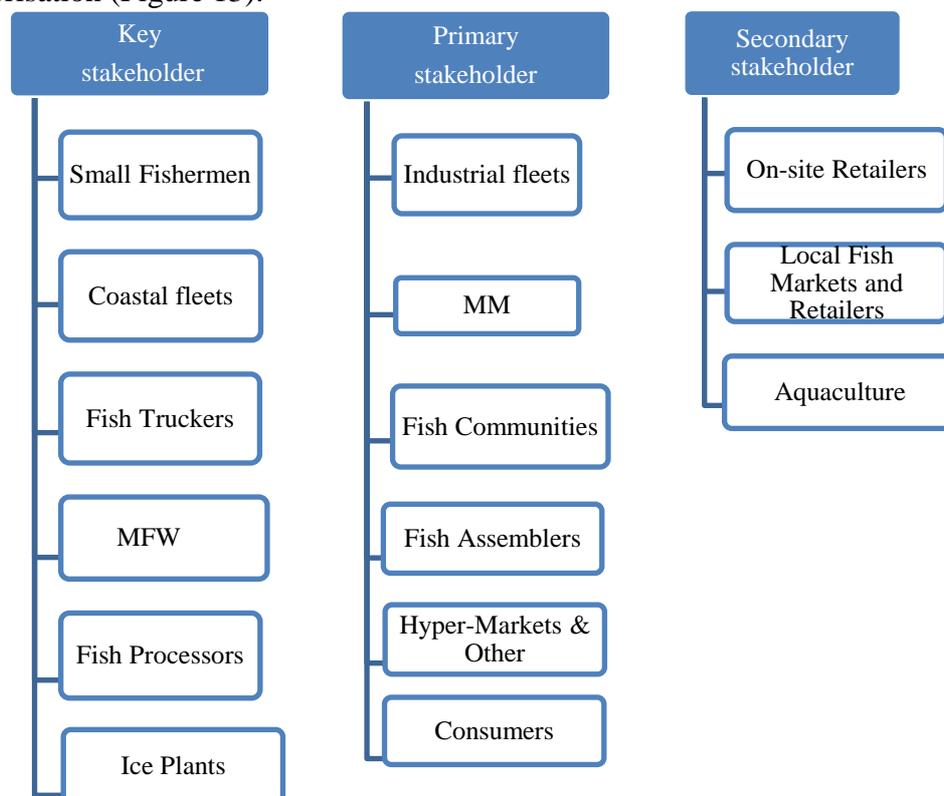


Figure 11. Categorisation of stakeholders groups
Aquaculture:* Only one shrimp farm project

5.3.3 Characteristics of stakeholders

The market stakeholders can be categorised into three groups: key, primary and secondary stakeholders. They are categorised according to how the market will affect them and how they will have an effect on the market operations. The key stakeholders include small-scale fishermen, truckers, coastal fleets, MFW, fish processors, assemblers and ice plants (Appendices 2A-D).

- A. **Small-scale fishermen** operate small boats between 5-9 meters in length (mainly fiberglass with an out-board petrol engine) and Dhows with 14-16 m length (traditional wooden boat with an inboard diesel engine). Fishing boat tenure includes family-owned boats with family operator and non-family labour, and individually

owned and operated boats with hired labour (Omezzine *et al.* 1996). The new market will allow the fishermen to sell their products to a wider audience of buyers, and not be restricted to sell in their landing centres. It is expected to improve fish prices and free flow of information. This is meant to increase their income and the stability in the fisheries' sector. However there are many challenges that may affect the small scale fishermen in dealing with the market such as quality, quantity of landing, selectivity and acceptance of the selling method implemented on the market, as well as the distance between the landing centres and cost of transporting fish to the market. These challenges are due to poor fishing gear, poor infrastructure, fisherman age and their dependency on the sector. Therefore, concentration is needed on barriers and to develop a good plan to solve these issues or eliminate their negative effects on the market and small-scale fishermen.

Fish Truckers are mainly individual traders with refrigerated or cool box trucks with capacity ranged between 2-7 tonnes and two types of trucks. The first type has thermal cool boxes and is mainly used ice to control fish temperatures. The second type is trucks with automatic refrigerators. Truckers are the major players in the current marketing system. They distribute the fresh fish directly from landing centres to the local markets and even export to neighbouring countries. In 2009, they exported about 70% of total fish export only as fresh fish to GCC markets. The new wholesale market is meant reduce the time and the cost of truckers to transport fish to GCC markets. Fish truckers will play the main role in transporting fish between landing centres and the market and from the market to the buyers, especially with the large number of sectorised landing centres and absence of specialized companies for fish transport. In addition, they can be buyers on the market and sell the fish on local and GCC markets. The truckers may not accept the new market easily because it may reduce their controlling power and increase the competition among traders, which will influence their marginal profits. The product quality is the main issue of concern for the market which is also a major issue for truckers due to poor handling of fish during transport.

- B. Fish processors** process and sell fish mainly to external markets. They produce mainly fresh, frozen and some value added products (canning, ready to eat food, salted, and dried). There are two types of processors with quality approved standards export (to the EU and US) and small processors with low quality standards. According to a fisheries establishment survey in 2009, there were about 30 processors but there are about 70 small drying salting facilities (DFD, 2009a). The new wholesale market may stabilise the fish supply by having access to a wider range of products without the need to go through third parties. It should be more efficient for processors by saving time and cost. This will make the investment decisions less risky and prospects for value added production much improved. The major concern for these processors is quality of the products. The processor's effect on the market will depend on their capacity, technology used in the market and investment in processing industry.
- C. The Ministry of Fisheries Wealth** is the responsible authority for the fisheries sector including harvesting and post-harvesting (fish processors, truckers and fish markets imports). Their main responsibilities are fish resource management, quality inspection, statistic data collection, research and fishing ports management. MFW will cooperate with other government agents such as the Ministry of Manpower

(Fisheries Training Institutions), MFW and Muscat Municipality and will be responsible for the new wholesale market. The government aims from this development project to improve the current market system and increase the socioeconomic benefits from the sector to different stakeholders. The market will be an important source of information such as prices and statistical data for responsible authorities. The major constraints that will be faced by the responsible authorities for the markets are the development and enforcement of appropriate procedures for fish handling along the distribution channel including the market to ensure the quality, free price determination and user satisfaction. The investment in the sector will be important for introduction of an electronic system, trained employees and infrastructure development.

D. Coastal Fleets have been recently introduced as multipurpose fishing vessels of length between 14-30 m. They have better fishing effort and storage capacity than the traditional boats. There are only 34 licenses issued for coastal fleets and only a few of them are in operation (MFW, 2009a). These licences are mainly owned by seafood processors and according to the MFW plan, their number will be increased up to 300 in the future. The landing of these vessels will be necessary for the future development of the market operations especially due to the limitations of the small-scale fisheries sector. But introduction of these types of vessels in the sector will depend on their cost and how much investors are ready to invest in them.

E. Ice plants

There are about 63 ice plants along the Oman coastline (DFD, 2009a) and they play an important role in supplying the small-scale fishermen and fish traders with ice. However, many of these plants have some difficulties with the quality of ice due to water used and the hygiene standards. The capacity of many of these plants is limited. Therefore, it is very important to promote the private sector to establish more ice plants and improve the existing plants. The new market will increase the need for ice consumption to keep the fish fresh along the distribution channel. The second group is the primary stakeholders that includes the industrial fleets, fish communities, fisheries assemblers and local retail markets. They will be affected by the market's positivity or negativity, but will not affect the market activities directly. For example, industrial fleets and fisheries assemblers may have more opportunities to sell their catches. In the case of the fisheries communities, the development of the marketing system will have positive impacts on the fishermen and traders income. But, some small traders such as on-site retailers may be affected by the market operations due to price increase. The third group includes hypermarkets, ice plants, MM, and aquaculture. They will be influenced indirectly by the market operation. The major expected impacts are for hypermarkets and ice plants. Hypermarkets started to expand in Oman during the last 10 years and most of them have specialized sections for fresh fish. Many consumers in large cities prefer to buy fish from them, even though their prices are higher. With the availability of the new markets, there are more chances for them to get more quantity of fish from different species, instead of depending on the truckers or processors to supply them with fish. Ice plant activities in the landing centres will increase due to the sellers' and buyers' quality awareness. The market quality standards for received fish from the landing centres will also have major impacts.

6 BASIC REQUIREMENTS AND MANAGEMENT RULES FOR WHOLESALE MARKET

This chapter will focus on the basic requirements for developing a good marketing system for fresh fish based on international experience such as the Icelandic system. From these experiences, some of the successful factors will be drawn and adapted for operating and managing the wholesale fish market in Oman with considering the environmental factors surrounding the market and structures of the stakeholders.

6.1 Basic requirements for fish wholesale marketing

In the case of the central fish wholesale market in Oman there are some basic requirements that have to be considered before and after establishing the market to ensure the success of market operations in terms of time of delivery from fishermen to the buyers and the quality of the products. These basic requirements include logistics, technology, fishermen and fish buyers' acceptance of the system and governance rules and regulations in the fisheries sector.

6.1.1 Logistics

Logistics is the science of planning, design, and support of business operations of procurement, purchasing, inventory, warehousing, distribution, transportation, customer support, financial and human resources. For the fresh fish wholesale market that will be established in Oman many logistics activities should be taken into account to support the market activities. These are: fishing ports, primary markets, ice plants, fish tubs, technology and transport.

Fishing ports are very important for providing services to the fishermen and for the development of other fisheries related services such as ice plants, fish markets, fish processors and other services. In Oman MFW has established 16 fishing ports with many services and encouraged the private sector to invest more in these ports. But many landing centres are still without or have poor infrastructure. There is a need to develop more fishing ports facilitated with all necessary services and to develop the current ports. The achievement of this objective will depend mainly on the government budgets for developing the sector and the private sector's contribution. In addition to that, control of fish landing in the fish ports will have major implications in terms of port services and fish quality.

Fish primary markets in landing centres (production markets) can play a major role in providing different services for both fishermen and buyers. In Oman these markets are the place where the fishermen can sell their landing to different buyers such as consumers, processors, truckers and retailers. The fishermen in some landing centres the markets are divided into wholesale and retail sale. For designated fees auctioning can take place in some markets. For the development of the fish marketing system in Oman, it is very important to determine the role of these primary markets and their relation with the producers (fishermen), consumers and wholesale market which is very far from many of the main landing centres (between 300 km and 1000 km). The role of these markets in the marketing system will depend on the following: the operating authority or organisation for these markets, technology used in the wholesale market in Muscat, the sellers' and buyers' availability and acceptance of the system implemented and quantity of fish landed. For example in the Icelandic system the primary markets in the landing centres play the basic role in the fish

auction system and in Oman these markets can play the same role. They can provide the following activities: fish handling from the boat or vessels, fish sorting and grading, fish labelling. They can store fish in ice or cold store before and after the auction, transport to buyers and, on weekends, arrange the containers or tubs before delivery to the buyers, and arrange the transports from the market to the buyers. These services are very important to control fish quality, provide information for both fishermen and fish buyers on the landing centres or on the wholesale market. These markets will be the collecting points for the wholesale fish market and depend on the type of system used for fish selling, a traditional system or an electronic system.

Ice plants are very important to be available in landing centres to provide ice to fishermen or vessel owners, fish markets and buyers. The quality, type of ice and quantity have major effects on the fish quality, especially in Oman where the temperature is very high and there is long distance between areas of production and consumers. Most of the fishermen use small fiberglass boats and traditional vessels without automatic storage or ice chiller. The fishermen have to carry ice with them during the fishing trips to store fish on board. Ice availability in all the landing centres is one of the basic requirements to ensure the quality of fish along the distribution channels. In addition, it may be a very interesting idea to investigate the introduction of mobile ice plants that can move along the coastline.

Fish transport is an important service in the fish marketing system. For example, in Iceland there are two private companies responsible for providing transport services for fish from the primary markets to buyers. These buyers have an agreement with responsible companies in each landing centre. The electronic auction market system calculates the transport fees and adds them on to the buyers' invoices and automatically transfers them to transport company accounts.

In Oman there are no companies specialized in providing transport services to the fish sellers and buyers. Fish transfer from landing centres to local markets and between traders is done by using trucks owned mainly by individual traders or fish processors. According to the stakeholder analysis the truckers are one of the key stakeholders whose will be influenced positively or negatively by the markets. Therefore it is needed to study the structures of fish trucks such as size, capacity, cooling system, distribution along the costal line and the ownership. Based on the study outcomes, it is very important to develop a good plan for operating these trucks and determine their relation to the markets. The transport fees need also to be estimated according to quantity of fish and distances.

Fish tubs or containers are widely used for fish storage on board, during landing, transport, processing and exports. There are different types of tubs used depending on fish species, size of boat and vessels and fish trucks. In many countries rental companies for fish tubs are established to provide tubs and containers to different actors along the fish distribution channel. The advantages of a fish tub company in the fish distribution chain are the reduction of the cost of buying tubs, maintaining, cleaning of fish tubs, storage area for tubs and time for following up tubs along the chain. The company renting fish tubs is working closely with the fish markets, transport companies and shipment companies. In Oman to develop these types of companies a good communication system is needed between fishermen, primary markets, wholesale market and buyers.

6.1.2 Market stakeholder acceptance and responsibility

The main factor for success of the wholesale fish market operation is the acceptance of the stakeholders, especially sellers and buyers. The users must accept and follow the rules and procedures required by the market to sell and buy their products, which satisfy their needs and requirements. According to the visit to the central auction company in Iceland, one of the main constraints faced by the introduction of the electronic auction was the sellers' (fishermen) acceptance. But in time the fishermen and buyers became more confident in the new system; around 50% of the fish sold in 2009 was sold before landed to the primary markets.

The responsibility of the stakeholders is very important to make changes and build trust between different users of the resources. The main issues that need to be taken into account for the success of the market are the improvement of the fish harvesting and handling procedures, quality awareness, labelling, bank guarantees for buyers and cooperation for sustainable development of the resources.

6.1.3 Governance rules and regulations

Fish and fisheries products are an important food commodity in international trade and for local consumption. Due to the increase in demand for fisheries products, fishing effort has increased which causes overfishing of many fisheries stocks. These factors have made a major influence at national and international level to manage the fisheries resources to ensure sustainable development of the fisheries stocks. Different countries have introduced different methods to ensure the sustainability of their resources such as use of a quota system. Consumers have major influence on trade of fisheries products in local and international markets. This influence can be categorized into two types of concerns; quality and safety of the fish and fisheries products and the sustainability of the resources (eco-labelling).

There is a need to have a good management system for the fisheries resources and the fish marketing system is very important to ensure the continuous supply of quality fish products. In Oman there aren't any regulations that have been issued in Oman during the last 30 years for both harvesting and post-harvest sectors. The fish market needs to have good management regulations covering both levels of fisheries sectors.

6.1.4 Technology

The Icelandic electronic auction started in 1986 by connecting three fish markets together with a communication network. Since 2004 the market has introduced a new online system. The development of the technology is supported by the better communication system in the country and the acceptance of the users. The electronic auction system ranges from simple to highly sophisticated. For example, Moby-clocks (mobile auction system) or the Auction Clock Screen are used in many fish markets. The Auction Clock can be connected by a private or an internet bidding system. It can operate the Dutch auction system for selling fish by which fish price begins at the highest and drops until a bid is made by buyers. This system is widely preferred because it is capable of performing many sales transfers in short time. It may follow the English auction system (rising bids). The auction clock shows all the information about the fish and price. In Oman introduction of the electronic auction system in the wholesale market operation will be necessary for the success of the market operations

due to the long distance between the landing centres and the market; this is one of the market barriers. However, there are some elements that will influence the level and type of electronic system including the logistics, acceptance and government support (regulation and financial). Oman has a good communication system in terms of mobile and internet connection.

6.2 Market management and operation rules

The development of good management procedures and rules are very important for the success of market operations. The generic rules and procedures are suggested based on international experiences including the Icelandic Marketing System and FAO publications (RSF 2011; FAO 1991; FAO 1999; and FAO 2005) and need be considered and taken into account by the Fish Market Management Authority (FMA) for operating and managing the market.

6.2.1 Transaction methods: auctions and sales

The key factor in the market operation is the sales method which will be adopted. There are many methods for sales of fresh fruit, vegetables and fish. First, in the private treaty method, sellers (producers/traders) rent a market stall from a market authority for a period of time to sell their produce or sell directly from the back of the truck. Sellers wait for an offer from a potential buyer. Second, commission sale is a method by which private agents sell the produce on behalf of the producers and obtain a percentage commission from the earning. Third, auction is a common method for selling produce where a large number of buyers are attracted to purchase goods at a competitive price. It means that the auctioneer starts at a price (minimum or high), usually based on the previous day's auction prices. If there is no bid, the "lot" is withdrawn from the sale (FAO, 1991). Many countries depend on the traditional auction system for selling and buying fish in their fish markets, even in developed countries such as the SFM in Australia.

6.2.2 Rentals, fees and charges

The use of the market's facilities must be in place, including rent and service charges to wholesalers for storing produce in the market and charges for using various services. The setting of appropriate levels of auction commission is likely one of the most important aspects. The FMA investigates at the project's feasibility stage and alternative rental levels and fee structures are fully tested during the financial and economic analysis.

6.2.3 Product handling procedures

Handling procedures is a critical step in both determining staffing levels and in designing an appropriate physical layout to understand the functioning of the market as a series of operational steps. Although there are differences in the detail of how produce is handled, the basic steps are the same. The accepted produce according to the market standard is weighed and changed in market containers with ice. Then products are labelled with full information such as species name, fishing ground, quality, weight, and lot number. The products can be kept chilled or at the auction hall

with ice, depending on the need to start auction. After the auction, the buyers have to take their products within 1 to 2 hours. It is very important to handle the products in the market according to good hygienic procedures to ensure the quality and safety of the products.

6.2.4 The auction

The auction should proceed under the supervision of a qualified auctioneer. A typical auction, in most tropical and arid countries, starts at 5:00 a.m. By 8:00 a.m. it is likely that most of the day's intake would be sold. In Iceland the auction is at 13:00. The buyers can check all the information about the fish for auction online. In some markets with traditional or electronic system buyers have to attend in person to see the product before the auction starts. Before the auction takes place, the fish lots should be labelled with full information such as supplier's name, fishing grounds, species, net weight of fish, size (small, medium, large) and fishing method.

6.2.5 Financial management

Markets generate a large number of transactions within a short period, requiring simple and standard procedures to handle them. A market accounting system operating along commercial principles is required. The market should develop good network connection with banks for detecting the fish price from the buyers and transferring the sales to the sellers and service fees. The system must allow auditing on a daily, quarterly and yearly basis.

6.2.6 Market information and extension

A major function of a modern wholesale market is market transparency by compiling information on market prices, quantities sold and qualities offered. This information is useful for both the market's management and for producers, so that they can choose both the location and timing of sales. It allows producers to delay harvest or store their products until prices are higher or transport facilities are available and helps them to make better long-term production decisions. In Iceland the allocation of individual transferrable quota for vessel owners allows them to be more market-oriented producers. In the new market a notice board should be provided in the market to display information on a regular basis. There should be also a good connection with national media regarding market information. The market has to establish their website for transmitting all market information.

6.2.7 Licensing

The FMA has to issue a license to all the market actors. The administration of such a licensing system will vary from country to country. Normally it will be the responsibility of the FMA or the Ministry of Commerce. The basis for the license will be a written agreement with the relevant authority or the market management board to comply with the market regulations. To ensure compliance with public-health standards and fair-trading practices it is often necessary for governments to appoint inspectors who make frequent visits to markets and who have the power to revoke licenses. All wholesaler agents, auctioneer agents and buyers who wish to trade at the

market should also be licensed and required to submit an application to the Market Authority for their consideration. Accepted applicants would be licensed to trade and be required to sign a trading agreement with the board.

6.2.8 Trading hours

Some markets allow trading hours to be fixed by the traders themselves. However, although some markets function over 24 hours, it is normal to regulate this so that the market can be completely cleaned for security purposes and, where an auction system is operated, to allow the books to be closed for the day. Therefore, market opening times for reception of products and time of auctions, if appropriate, will commence each day and the time at which the market will be closed should all be clearly specified. These hours should not follow those worked by government employees and should reflect the real needs of the market users. They may, however, vary during the week (reflecting religious customs) and by season, if this might have a significant impact on working temperatures or the amount of daylight hours available.

The commencement of each day's operation and termination is normally signalled by a buzzer or by the ringing of a hand bell. At the close of each day's sales, all buyers should be required to leave the market within a specified period, typically within one hour.

6.2.9 Liability and general regulations

The regulations should stipulate that all goods taken into the market would be at the sole risk of the owner and that the market authority would not be liable for any loss or damage, other than if it failed to make "reasonable" provision for security. The rights of users of the market to have any claim against the market authority on matters of public liability would also need to be limited. Some form of public liability insurance may be available to cover both those that work within the market and visitors. The regulations should require that all scales and measures used in the market should be regularly checked for accuracy by an independent authority. A notice board, listing the general regulations of the market, should be displayed at a prominent position near the site entrance and within all the main buildings.

6.2.10 Sellers

The regulations would also cover the activities of other traders and producers selling goods at the market. They should be required not to sell or expose for sale any unauthorized produce. Producers and other users of the market, including retailers, should also be required not to create or cause to be created any riot or disturbance or to remove damage or spoil any part of the market premises.

6.2.11 Buyers

First, the market has to develop an application form for the buyers. They have to complete the application before being buyers. The market may ask the buyers to provide guarantee (cash or bank guarantee). This can be used if the buyer fails to meet his financial obligations to the fish sellers. The type and amount of guarantee used will depend on the level of electronic system used. Also the market can check credit

status of the buyers. Payment can be made in cash before the product is removed from the auction floor. It can also be deducted from the buyer's account depending on the market system. For example, the Icelandic Dutch auction clock system is responsible for providing the transaction activities and distributes the fees to different actors.

6.2.12 Inspection, quality control and hygiene

In order to maintain the safety of foods, such as perishable items and food products, it is very necessary to maintain a high standard of public hygiene standards to comply with national and international requirements. The scope of such legislation is to ensure the quality of products. They include general matters relating to personnel hygienic standards, fish handling procedures, cleaning and disposal of waste materials, through to detailed technical requirements for the testing of produce for contamination. The market has to employ its own staff of inspectors to maintain the quality of the produce and to ensure that public ordinances are adhered to, particularly any relating to grading standards and to weights and measures. For larger markets, particularly those trading in meat and fish, it will be essential to have a fully equipped and staffed laboratory. The market can implement different food control systems such as HACCP system and ISO2200. In addition to that, the quality and safety of fish cannot be only achieved by market control, but should be started from the harvest and implemented along the supply chain until the produce reaches the market.

6.2.13 Product labelling

One of the major aspects for the new market is to establish a labelling system for traceability of the fish products. It should contain all information needed by buyers and exporters because labelling of fish products is an important concern in international markets. All actors along the distribution channel must be awarded and responsible for providing correct information, which is necessary to build trust between all the actors and the market.

7 CONCLUSION AND RECOMMENDATIONS

The wholesale market remains an essential link between production and consumption in many countries. The development of the wholesale market in Oman will provide a location where supply and demand can be concentrated, providing significantly larger transaction opportunities to fishermen, truckers and merchants. The new fish wholesale market will locate the main components of the market for fish in the Gulf region in the Sultanate of Oman. It is very essential for this type of market to be well managed to ensure the efficiency of market operation. Inefficient market operation will increase the risk of problems of hygiene, quality, price, transport congestion and cost of operation.

Therefore, there are many factors including logistics, technology, the acceptance of the sellers and buyers, and the government rules and regulations that have to be considered and their influence on market efficiency evaluated. It is also very necessary to understand the stakeholders' impacts on the market and the influences of the market operations on them. In Oman there are many weaknesses along the distribution channel due to poor or absence of the basic needs. Based on the outcomes of PESTLE analysis, stakeholders' analysis and the Icelandic experience, there are some barriers in the Oman fresh fish marketing system that may influence the wholesale market efficiency. Finally it is recommended that the following barriers are taken into account and the development of the electronic auction to be done gradually during a 3 year period.

7.1 Large number of small-scale fishermen

The small-scale fishermen in Oman are the backbone of fish landing. They are expected to be the main producers in the absence of strong industrial fishery. The main issue is how to collect or accumulate the small amount of landing from a large number of sellers from different landing centres and transfer them to the market while satisfying the market needs of quality and traceability. The following actions have to be taken by the small-scale fishermen to ensure the efficiency of the market. They need to adopt the best practice on board and during handling (ice, washing and protecting from damage). They need to deposit their catch and stock up on tubs or containers with ice in the main landing centres. Then these tubs are delivered to the wholesale market by trucks. The primary market can play an important role as collection points for fish. Introduction of an electronic system to connect with the wholesale market will have a major influence on the fish marketing.

7.2 Fish truckers

The truckers are individuals traders whose are responsible for transport and trading of fish. They buy fish directly from the fishermen in the landing centres and sell them to different buyers in the local market and export to GCC markets. These truckers can be grouped into two types of truckers, those with automatic refrigerators or cool box containers. The quality of fish will be one of the major issues due to poor handling by these traders. Also, the role of the truckers in the new marketing system needs to be defined. First, as traders buy fish from the small scale fishermen and sell through the market. Second as transporters collect fish from the landings centres and deliver to the market for designated fees. It is recommended to conduct a socio-economic study for the truckers to understand their structure, to determine the impact

of the market on their incomes and the impacts of these individual traders on market operations (quality and cost of transport). Based on this study, their roles will be evaluated and the best way to deal with the market suggested.

7.3 Landing centres' development

There are many services need to be provided in the landing centres to provide the suitable services of fish handling and ensure the quality of landed catches. These infrastructures are fish ports, landing jetties, primary markets, chill storage, weighing facilities with ice availability and box management. For the efficiency of the new market it is recommended that:

- Providing the necessary services in the main landing centres with fishing ports such as ice plants and primary markets.
- Establishment of new ports and landing jetties in the landing centres without infrastructure.
- Controlling the landing centres along the coastline, by issuing regulations to control fish landing from different landing centres to be in the nearest fish harbours for the areas with ports. This needs all the services to be available in the control harbours.
- Study the possibility of introduction of new technology for ice production such as mobile ice production plants that could be moved to follow the fishery along a coast to the highest demand site with daily deliveries to outlying landing centres timed to meet the vessels and return with their fish.
- Infrastructure should be designed to meet the future expectations, not existing circumstances, so the forward needs of producers and the markets to be addressed must be thought through.

7.4 Recommended steps for developing the auction system in the fish wholesale market

Auction is a common method for selling produce where a large numbers of buyers are attracted to purchase goods at a competitive price. During the last 20 years many fish markets in Western Europe, Iceland, Australia and New Zealand have introduced electronic auction system for selling fish. The development of this system in the Sultanate of Oman will depend on many factors. Some of them have been discussed in part 6.1. In addition to these factors, the cost of operation and good management system for operating the market will have a major influence on the market. The study suggests that the development of the auction system can be implemented in three phases to ensure the success of the market operations (Table 4).

Phase 1: Traditional auction system for selling fish may be needed at the early stage. The fish needs to be transferred by trucks to the wholesale market under good handling procedures and efficient traceability. The market in this stage needs to conduct the following:

- A fundamental principle that should apply to any sale by auction is that the item(s) being sold are as described, and with fresh fish this presents some important issues particularly on quality and traceability.
- The FMA needs to employ agents for receiving the fish, an auctioneer agent and set the different fees for the market services.
- The FMA has to issue licenses for different actors including the buyers, sellers and other agents.
- The authority has to develop suitable rules and regulations and define the rules of each actor involved in the market activities.
- Establish a management system for fish tubs and fish delivery to or from the market.
- Installing a private computer system for the auction system and develop a data base for the electronic system.

This stage is a preparation period for the electronic auction system and it may last for one year of operation.

Phase (2) Electronic sale system offers the possibility of trade employing a variety of options, and during this stage the market may implement the electronic auction and at the same time the voice auction. During this stage the following actions need to be taken.

- Introduction of electronic auction by operating a closed network and buyers can bid from a desk in saleroom or wireless button within auction hall depending on the market design.
- The most common way of communicating price to buyers is by means of a round “clock” or with falling price – first (highest) bid wins (Dutch auction system). The clock can be a screen fixed on the auction hall or a mobile auction clock.
- Before being eligible to bid at the market each buyer has to register and give a credit check.
- Buyers can check the fish in the auction hall before attending the auction.
- Provide training to the sellers, buyers and the market employees in different fields including quality, traceability and electronic system.

This stage is a preparation period for the electronic auction system and it may last for one year of operation.

Phase 3 The market may continue to use an indoor network connected with the primary markets in the main landing centres. This will allow the sellers to sell their fish from the landing centres. In addition to that, buyers can purchase fish by attending the wholesale market and from other primary markets. This is a very advanced stage, which may need many requirements before achieving to build the trust between different actors to accept the system.

- The FMA needs to expand their network to the primary markets in landing centres (9 markets) and this can be by internet connection, fax and mobile.
- A fundamental principle in this stage that fish being sold are as described and with fresh fish this presents some important issues particularly on quality and traceability.
- Buyers attending the wholesale market or primary markets can check the fish before the auction starts and for remote bidding buyers can check the fish information through the market electronic system.
- Buyers' and sellers' acceptance of remote bidding is very important and the accuracy of the data given.
- The more information available the greater the confidence of the buyer – but remember the market is responsible for accurate information after receiving the fish.

The market authority has to take into account the participation of buyers from GCC countries, because these countries are the traditional markets for Omani fish products. It is suggested to open access for few buyers from these markets at phase two. In conclusion, it is hoped that the responsible authority for the wholesale market finds this study useful to design appropriate procedures to overcome difficulties and constraints for efficient market operations.

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APPENDIX 1. PESTLE ANALYSIS

PESTLE analysis of the external factors and their importance (High=H, Medium =M and Low=L)			
Political Factors	Importance	Economical Factors	Importance
<ul style="list-style-type: none"> · Influence of Government stability · High interest among government to improve the fisheries sector · Political pressure from fishermen and vessels owners · Influence of fishermen & vessel owner on policy making and contributing to political decisions · Training effort · International agreements (e.g. IOTC, RECOFI) · Regional trade agreement 	<ul style="list-style-type: none"> L H M M H M H 	<ul style="list-style-type: none"> · Low average catches affect fishermen’s incomes and availability of capital to invest in improvements · Types of fishing gears used (quality and quantity) · Vessel and costal fleets contribution in total landing · Ease of access to loans · Low purchasing power among a large group of customers in the domestic market · The government policy to diversifying source of income 	<ul style="list-style-type: none"> H H M H H L
Sociological Factors	Importance	Technological Factors	Importance
<ul style="list-style-type: none"> · People more aware about nutritional value, quality & safety of fish · Zonation of the resource · Many fishermen depend on sector as second source of income · Age of fishermen · Lack of specialized education among fishermen · Influence of media 	<ul style="list-style-type: none"> M L H H H M M 	<ul style="list-style-type: none"> · Lack of infrastructure in landing sites · Inferior boat design · Inferior harbors design especially for small boats · Fisheries processors capacities (storage, processing & value added) · Selectivity of fishing gear (i.e. gillnets) · Lack of technological improvements (e.g. freezers, insulating boxes) · Transport Facilities (cool box, automatic refrigerators) 	<ul style="list-style-type: none"> H H M M M H M
Legal Factors	Importance	Environmental Factors	Importance
<ul style="list-style-type: none"> · Enforcement of the regulations <ul style="list-style-type: none"> - Quality standards - Food safety - Hygiene standards - Fish handling · Control landing sites and access to the resource · International market requirement (i.e. quality, safety, eco-labeling) · Regulating Industrial and costal fleets (i.e. gears, landing & marketing and transferrable quota) · Future changed in the legalization 	<ul style="list-style-type: none"> H H M H H 	<ul style="list-style-type: none"> · Sustainability of fish stocks & overfishing · International need for Eco-labeling · Weather changing and Seasonality · Attitudes to the environment from the government, media & consumers · Fish species · Hygienic conditions on-board boats and in landing sites · Current and future environmental legislative changes 	<ul style="list-style-type: none"> H M H M M H M

APPENDIX 2. CHARACTERISTICS OF STAKEHOLDERS

Stakeholder Analysis Matrix Fish Wholesale Market			
Stakeholder and basic characteristics	Interest and how affected by the project	Capacity and motivation to bring about change	Possible action to address Stakeholder interest
<p>Small scale fishermen Operate small boats between 5-9 meter length (mainly fiberglass with an out-board petrol engine) and Dhows with 14-16 m length (traditional wooden boat with an inboard diesel engine). Fishing boat tenure includes family-owned boats with family operator and non-family labor, and individually-owned and operated boats with hired labor (Omezzine <i>et al.</i> 1996). There are more than 32,000 fishermen, 14,000 boats and 600 daws (MFW 2009). They account for 84% of total landing.</p>	<ul style="list-style-type: none"> • High interest in increasing their income. • The market will provide good opportunity for them to sell their products. • Good information about fish price (Market-oriented) • Quality barrier • Transport cost to the market 	<ul style="list-style-type: none"> • High interest to deal with the market. • Limited fishing capacity (quantity, quality and species selectivity). • Long distance between the landing centres and the market. 	<ul style="list-style-type: none"> • Improve their fishing gear types and handling practices. • Implementing better sanitary practices on board and during handling. • Shortening of fishing trips. • Use of sufficient amount of clean ice. • Introduce fishermen cooperation for fishing and marketing
<p>Industrial vessels Foreign fleets working in Omani water with an agreement with local Omani company. They are two types: trawlers and seasonal long liners. In May 2011 trawling will be banned in Omani water. There are 17 long liners and 32 trawlers (Anon 2009). Industrial fishing accounts for 16% of fish landing (Anon 2009).</p>	<ul style="list-style-type: none"> • Low interest • Low effect by the market 	<ul style="list-style-type: none"> • They are aware of their market, but not the local market • These vessels have on board freezers • Can export their catches directly based on agreement • Market capacity for frozen products • Effect of trawl ban 	<ul style="list-style-type: none"> • Management regulations of industrial fleets to be reviewed including (quota, fishing gear, distribution of landing). • Role of local companies and their agreement with foreign vessels • Soft loans to local processors to improve their capacity and value addition
<p>Coastal fleets Recently introduced multipurpose fishing vessels medium size with length between 14-30 m. They have better fishing efforts and storage capacity. There are only 34 licensed issued for coastal fleets (MFW 2009) and only few of them are in operation. According to the MFW plan the number will be increased up to 300 fleets in the future.</p>	<ul style="list-style-type: none"> • High interest to increase their benefits • More opportunities to sell their landing • Good information • Allowed them to be more market-oriented • Need time and support to contribute to total landing 	<ul style="list-style-type: none"> • Depend on the investment in this type of vessels • Good fishing efforts (quality, quantity and selectivity). 	<ul style="list-style-type: none"> • Soft loans for these types of fleets • Introduce good communication system between the market and these fleets to sell their product (electronic auction)

Stakeholder Analysis Matrix

Fish Wholesale Market			
Stakeholder and basic characteristics	Interest and how affected by the project	Capacity and motivation to bring about change	Possible action to address stakeholder interest
<p>Seafood processors They process and sell fish mainly to external markets. They produce mainly fresh, frozen and some value added products (canning, ready to eat food, salted, and dried). Two types of processors with quality approved standards export (EU and US) and small processors with low quality standards. According to fisheries establishment survey in 2009, there were about 30 processors.</p>	<ul style="list-style-type: none"> • High interest to get more fish with good quality and from different species. • Saving time and cost to get raw materials • Allow the processors to develop value added products • Increase their incomes • Price my increase in the market 	<ul style="list-style-type: none"> • Continuous supply of quality raw materials will increase investment • Low quality standards in some processors • Limited capacity and technology for (storage and value added) 	<ul style="list-style-type: none"> • Increase their capacity • Create more value added products • Cooperate with the responsible authorities for the market • More awareness about quality
<p>Fish assemblers Fish traders with simple stall (mainly sorting place) to collect and sell fish. They locate near landing centres and sell their daily collection to different buyers including truckers, processors and they can export to neighbouring countries. There are about 12 assemblers (FES 2009).</p>	<ul style="list-style-type: none"> • Higher interest to get more opportunities to sell their fish • Reduce their time and cost of export • Increase their income in the future 	<ul style="list-style-type: none"> • Higher interest to get better price • Limited facility can effect on the quality of fish 	<ul style="list-style-type: none"> • Increase their capacity • Efficient communication with the markets • More awareness about quality • Soft loans
<p>Muscat municipality The responsible municipality for the capital area. It is responsible for constructing, operating and managing the fish market in cooperation with MFW.</p>	<ul style="list-style-type: none"> • High interest to develop the fisheries sector • Providing more fish in domestic market for processors and consumers 	<ul style="list-style-type: none"> • Increase socioeconomic benefits of the sector • Lack of experience in managing and operating fish central market • Distance between landing centres and market 	<ul style="list-style-type: none"> • Cooperation with MFW • Developed best practices for managing and operating the market • Training of employees • Improve communication
<p>Consumers</p>	<ul style="list-style-type: none"> • Consumers desire fresh fish at low prices. • The project will create more chances for local market traders and retailers to get more quantity of fish 	<ul style="list-style-type: none"> • Fish will be more available in the local market and with good price. • Consumers prefer some species and fresh fish 	<ul style="list-style-type: none"> • Educate the general public about different species nutritional value and quality of frozen products

Stakeholder Analysis Matrix Fish Wholesale Market			
Stakeholder and basic characteristics	Interest and how affected by the project	Capacity and motivation to bring about change	Possible action to address stakeholder interest

<p>Fish truckers Individual traders with refrigerated or cool box trucks with capacity ranged between 2-7 tonnes. They play a major role in distribution fresh fish from landing centres to the local markets and even export to neighbouring countries.</p>	<ul style="list-style-type: none"> • High interest to increase their opportunities to sell fish • Reduce the time needed to sell their fish • Reduce their role in the fish marketing system and exporting to GCC markets • Price of fish may increase 	<ul style="list-style-type: none"> • High interest to increase their income • Quality of the fish and mixed species. • Types of trucks used (automatic refrigerators and cool box). • Competition in neighbouring countries markets • Many truckers 	<ul style="list-style-type: none"> • Increase their awareness about quality, handling, sorting and use of ice • Control the direct export from landing centres • Organizing the truckers (cooperation) • Introduced efficient communication with them
<p>Ministry of Fisheries Wealth Responsible for fisheries sector including harvesting and post-harvesting (fish processors, truckers and fish markets imports). It conducts many activities such as resource management, quality inspection, statistic data collection, research and fishing ports management. For marketing activities it is only responsible for fish markets in fishing ports</p>	<ul style="list-style-type: none"> • High interest in improving the fish distribution channel. • Increase the selling and buying opportunities for fishermen and traders. • Centralize the fish distribution channel in the local markets • More investment need in the sectors • Privet sector cooperation 	<ul style="list-style-type: none"> • High interest to increase the socioeconomic contribution of the sector • Poor infrastructure and the effect on quality • Uncontrolled landing centres • Legal and management procedure (landing centres, export of fish, industrial vessels and market management) 	<ul style="list-style-type: none"> • Construct more fishing ports facilitated by necessary services • Control landing centres • Develop best practices to operate and manage the market with cooperation with Muscat Municipality and private sector. • Control direct export from landing centres and industrial fleets catch
<p>Aquaculture Sector contribution sill very low and only one shrimp farm with landing around 100mt/y. It is expected in the future to play an important role in production for local consumption and export.</p>	<ul style="list-style-type: none"> • High interest to sell their products different traders. • Increase opportunities to sell their production. • Market-oriented 	<ul style="list-style-type: none"> • High interest to get better price • Put more effort in quality and consumer health concerns • Species selectivity 	<ul style="list-style-type: none"> • Develop a good management plan for the aquaculture sector. • Given more investment opportunities for the new aquaculture projects. • Good communications between the market and farms. • Allowing international traders to participate

<p align="center">Stakeholder Analysis Matrix Fish Wholesale Market</p>			
<p>Stakeholder and basic characteristics</p>	<p>Interest and how affected by the project</p>	<p>Capacity and motivation to bring about change</p>	<p>Possible action to address stakeholder interest</p>

<p>On-site retailers Are local fish buyers in the landing centres</p>	<ul style="list-style-type: none"> • Low interest • Increased price of fish • High competition in landing centres 	<ul style="list-style-type: none"> • Low capacity and less motivation 	<ul style="list-style-type: none"> • Operating the markets in the landing centres
<p>Hypermarkets & retail stores Include hypermarkets, supermarkets and fish shops located mainly in big cities and many people target them to buy fish which is already cleaned and cut for cooking</p>	<ul style="list-style-type: none"> • High interest in the market • Provide more options (quality, quantity and species) 	<ul style="list-style-type: none"> • Provide more fish for their costumers • Limited capacity 	<ul style="list-style-type: none"> • Good communication with the wholesale market
<p>Local fish markets retailers Retailers in local fish markets. Most of the cities in Oman have retail markets and these markets can includes three different retail markets (vegetable and fruits, meat and fish)</p>	<ul style="list-style-type: none"> • High interest • Provide more options for getting more quality and quantity of fish. 	<ul style="list-style-type: none"> • Increase their benefits • Limited capacity 	<ul style="list-style-type: none"> • Cooperation between the retailers in the same market • Communication with wholesale market
<p>Fish communities Are local communities along the coast line</p>	<ul style="list-style-type: none"> • High interest • The market will provide good opportunities for selling fish • Better price • Increase fishermen income • Encourage fishermen to depend on the sector as source of income 	<ul style="list-style-type: none"> • Socioeconomic benefit of the sector increase for local communities. • Develop local committees for fishing and marketing 	<ul style="list-style-type: none"> • Development of primary markets • Good management of fisheries sector
<p>Ice plants Small processors to produce ice and mainly distributed along the coast line</p>	<ul style="list-style-type: none"> • High interest • Increase ice demand in landing centres 	<ul style="list-style-type: none"> • Increase their income • Capacity to increase production • Quality of ice produced 	<ul style="list-style-type: none"> • Implement good hygienic standards • Government inspection

APPENDIX (3) RECOMMENDED STEPS FOR DEVELOPING THE AUCTION SYSTEM IN THE FISH WHOLESALE MARKET

Phases	Method of sales	Period	Needs
1	Traditional Auction System	One year	Organize the fish truckers. Promote the hygienic procedures for fish handling and quality Awareness between actors Develop good management authority for the market. Employ good wholesale Agents on the central fish market (fish receiving, fish organizing for sale and other actives Auction Agent should be different company or responsibility of the market authority. Trust between sellers, buyers and market Installing private computer system for the auction clock which can be a big screen on the auction Hall or Mobile Auction Clock for the next stage Development of the infrastructures and market needs Training of market actors
2	Private Electronic Auction System and Traditional Auction System	One year	Good transport system Quality Awareness Good wholesale Agents in central market Implementing of private electronic auction system Providing working place for the market buyers with connection to the private electronic auction. Development of the infrastructures and market needs Responsibility and trust between different actors sellers, buyers and markets Training of market actors and fishermen
3	Private Electronic Auction System And connected with primary markets via internet or fax	One year	Development of transport companies Highly quality awareness Fully implementing of online electronic auction system Providing working place for the market buyers with connection good internet connection. Primary markets to be operated with wholesalers or agent responsible for transferred the information to the central market. Good internet connections Development of the infrastructures and market needs Responsibility and trust between different actors sellers, buyers and markets Training of market actors and fishermen