

May 2023

ASSESSMENT OF DESIGN STANDARDS FOR FISH LANDING CENTERS IN THE CITY OF ADEN

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Alkaderi, Abdulnasser Abdulla and Fadhl, Gawaher Khaled (2023) "ASSESSMENT OF DESIGN STANDARDS FOR FISH LANDING CENTERS IN THE CITY OF ADEN," *Emirates Journal for Engineering Research*: Vol. 28: Iss. 1, Article 4.

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1. INTRODUCTION

The fisheries industry in Yemen is currently under the pressure to improve the quality of the landed catch in order to increase exports towards the USA and European market. Aden has a rich wealth of fish variation, as its sea stock achieve a high economic value, through the important role played by the fish landing centers in the marine fisheries sector. Fish landing centers consider one of the most important projects to country's economy, as it is responsible for exporting marine products, which consider a national wealth to bring hard currency to support the national economy. The lack of facilities, which built on the coastal shores in Aden city and their failure to be maintained, is a major obstacle of receiving and fish products marketing centers. Fisheries products usually pass during chain of work in fishing landing centers by different stages such as, landing, sorting, packing, storage, and shipping. However, the absence of fish unloading berths and service facilities, including refrigerated fish stores, ice plants, freezers, and marines refueling facilities, impedes access to the required quality in terms of hygiene conditions for the production and marketing of fisheries products.

1.1. PROBLEM STATEMENT

Fisheries products usually pass during chain of work in fishing landing centers by different stages such as, landing, sorting, packing, storage, and shipping. However, the absence of fish unloading berths and service facilities, including refrigerated fish stores, ice plants, freezers, and marines refueling facilities, impedes access to the required quality in terms of hygiene conditions for the production and marketing of fisheries products. Thus, the final fish product value is lost, so according to this perspective, the research problem was determined:

“The local fish landing centers and auction squares in Aden city, of their current form, suffer from a specific problem, which lies in their lack of many important services responsible for the process of handling, processing, packaging and transporting fish products to domestic consumer according to quality assurance standards. Hence, those fish landing centers do not keep up the international landing centers”

1.2. RESEARCH OBJECTIVES

Aden has a rich wealth of fish variation, as its sea stock achieve a high economic value, through the important role played by the fish landing centers in the marine fisheries sector. Fish landing centers consider one of the most important projects to country's economy, as it is responsible for exporting marine products, which consider a national wealth to bring hard currency to support the national economy. Therefore, the research will achieve numbers of goals:

1. To develop the existing fish landing center in order to, facilitates handling fish products and provide comfortable environment for sellers and consumers.
2. To raise the level of income and increase employment opportunities for individuals in order to reduce poverty and improve fisherman livelihoods business.
3. To provide sufficient quantities locally consumed marine products, such as Indian mackerel, Whitefin Trevally and Yellowfin Tuna at reasonable prices accessible to all citizens.
4. To increase food security through improved fish handling, quality and safety of fish by identifying the hygienic requirements that need to be met at the fish landing centers in Aden in order to deliver safe fish product with acceptable quality.

1.3. RESEARCH METHODOLOGY

The research applies a quantitative-descriptive method by collecting data from the existing fishing landing centers in Aden city. The collected information include planning and design considerations of fishing harbors. In addition, handling practices within fish landing centers by identifying the

hygienic requirements in order to deliver safe fish product with acceptable quality. Therefore, different tools have been used to collect data.

1.3.1. Primary data

Primary data were collected through the data related to the characteristics of the fishing harbors, which involves key informant interviews. The data include assessment socio-economic aspects of fishing harbor infrastructure.

a) Stakeholders' interviews

The research relies on depth semi-structured interviews with two target groups, i.e., governmental agencies and private institutions. Governmental agency represented by General Authority for Fisheries in the Gulf of Aden e.g. the general Manger of fish harbors and landing centers and the manager of Dockyard fish service complex who was directly related to the auction activities of fishing catches. Stakeholders of private institutions represented by Al-Jabal Agency for fishing. The Interviews questions aim to find out the performance level of existing domestic fishing landing centers and the hygienic practices responsible for the process of fish handling. Furthermore, to find out the challenges that fish landing centers face in reality, to try to overcome them.

b) FAO Fisheries Technical papers

FAO fisheries technical papers documents have been prepared within the framework of the Regular Program activities of the FAO Fish Utilization and Marketing Service, to meet the demand for a concise, technical, documents on small-scale fish landing and marketing facilities aimed at facilitating the planning of fish handling for the small-scale fisheries sector. It is intended as a reference not only for engineers and for architects involved in the design and rehabilitation of fishing ports but also for non-technical staff at departmental level in government institutions that may influence technical decisions in the field to avoid the mistakes of old. This manual covers all the aspects of fishing port infrastructure, from inception to final design as well as the construction and management of the fishing port or landing once constructed.

c) Survey and measurement

Fish landing sites encounter infrastructural problems, where have challenges with the state of the equipment (e.g. ice machines and freezers), which require repairs or replacement. The fish landing sites and auction markets are not maintained frequently, however they operate throughout the year and provide essential services to the fishers, fish vendors, fish exporters and the public. Moreover, the level of activities at landing sites is high and don not corresponds to the availability of ice, fuel and fish customers. Infrastructure Assessment analysis include potable water, sanitary sewers, existing building structures and electrical systems. Mapping used to illustrate the area's structure, which is obtain from Google earth, and then transfer it to GIS program to identify the study areas. Photos also capture harbors' visits and documenting of the conditions of port facilities.

Physical aspects include:

- Fish landing sites' infrastructure, e.g., electricity , water and roads network
- Breakwaters/wave attenuation structures.
- Basic service at fish landing centers sites, e.g., cold stores, ice plant, fuel station, etc...
- Environmental matters, e.g. solid and liquid wastes management, and water pollution...etc.

Socio-economic aspects include:

- Unofficial Markets
- The gender.
- Fisheries associations and cooperative.

- Post- harvest fish losses.

1.3.2. Secondary data

secondary data were collected through literature review related to upgrading of fishing harbor, fish auction squares, post- harvest fish losses production and relevant policy documents in Aden and other countries was conducted using online search engines.

a) *Executive regulations of Law no. (2) of 2006*

The Regulations in Law No. 2 of 2006 discuss the organizations of auctions squares within fish landing centers to achieve a permanent balance between resources to protect fish wealth, controlling the quality of marine products and balance of fish prices in Aden city. It include general principles of fishing activity, management of fish resource, and regulation of traditional coastal and industrial fishing.

b) *Fish guide book*

The General Authority for Fisheries in the Gulf of Aden has worked with Marine Science and Research Center and to document all types of marine species that are available within territorial borders of Yemen water. The fishery guidebook, which is published at first time in Yemen, includes different pictures, characteristics and multiple names of the different marine species.

c) *Traders records*

The reliance on memory recall, for those traders who do not keep records have affected precision of data collected. In addition, the data collected is limited mostly to catch. Additionally, fishers are at times unwilling to share information from their fishing activity to data collectors.

1.4. RESEARCH SCOPE

This study aims to analyze the condition of existing fish landing centers, which are considered one of the most important projects that possesses an economic and social standing within the fisheries sector. There are five main fish landing centers projects in Aden city as illustrated in Figure1, which a ministerial decision was issued in accordance with *Law No. 2 of 2006*. The General Authority for Fisheries in the Gulf of Aden supervises them. The research will focus on analysis the performance of them according to available services they contain.

2. THEORETICAL FRAMEWORK

The theoretical framework demonstrates the site investigations that usually prior to undertaking detailed planning and design activities. Then it indicates the global design standards of fishing harbors' buildings, which include buildings, are required within the port boundary. Finally, it mentions the local design standards for fishing ports, that will be used later to assess the case studies.

Fishing port: It is a place that has a function as the central of fishermen activities and accommodates the activity of fishermen. The existence of fish port became one of the factor that implies the performance of local fishermen. If there is no fish port, the fishermen activities would be difficult to be circulated transparently to markets.(Multazam & Rahmawati, 2020). Therefore, Fishing ports are a type of commercial ports, but they are usually small when compared to the usual commercial ports, and they do not need all that is necessary for commercial ports. (ILO, 2010).

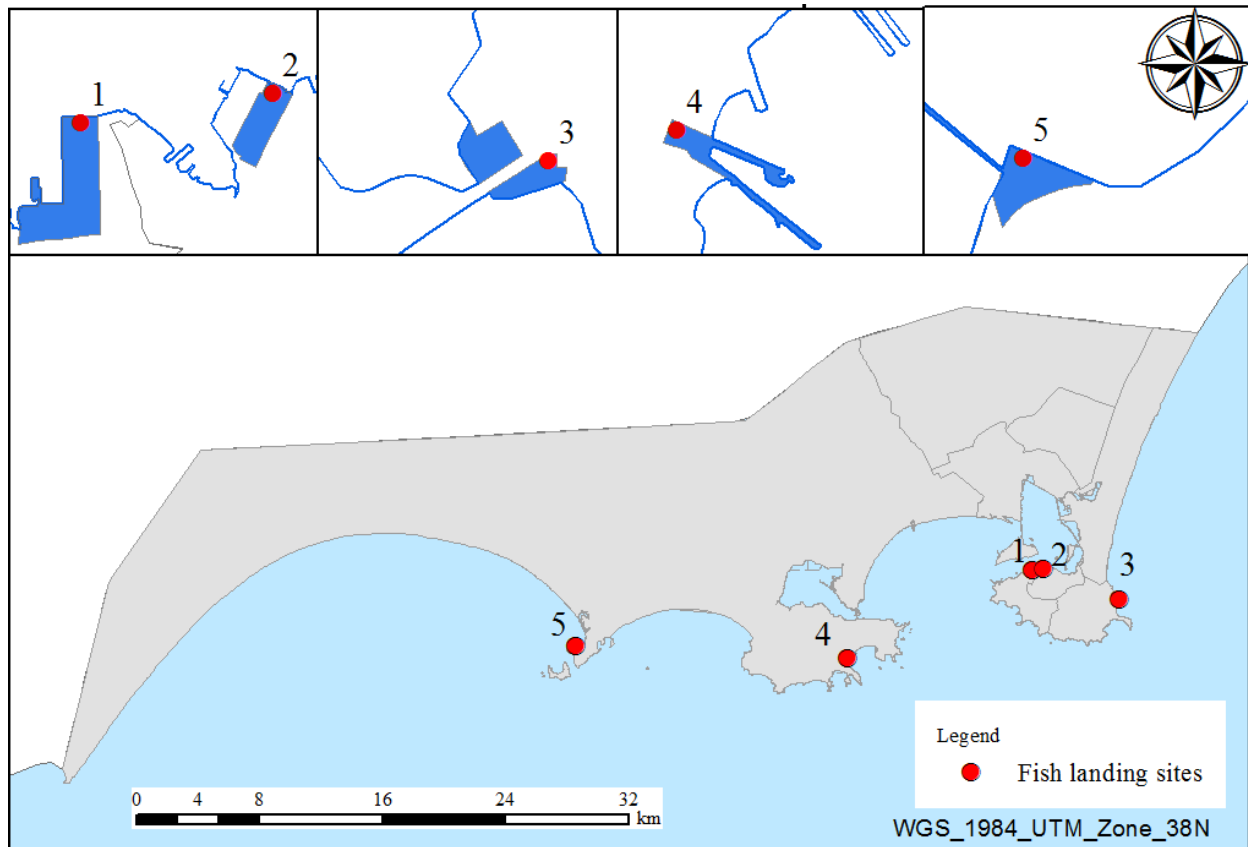


Figure 1. Map clarifies the main fish landing centers in Aden city- GIS Map, 2022.

2.1. FISHING HARBORS' SITE INVESTIGATIONS

The selection of any harbor location is directly affected by the function that the harbor is designed to fulfill. This, of course, presupposes that a need exists for the particular kind of harbor considered. The selection of a location for a fishing harbor is governed by proximity to fishing grounds, adequate housing for fishermen, service facilities for fishing boats, and markets for fish caught. In addition, there are another important specific considerations include off-site evaluation of land uses and relationship to security, site planning and building configuration and location, setback distances, access control; and parking. Careful consideration is given many factors in determining the best location for a harbor. (Bryan, 2019). In order to confirm the development suitability of a site, it is customary to perform a series of site investigations and analyses prior to undertaking detailed planning and design activities.

2.1.1. HYDROGRAPHIC SURVEYS

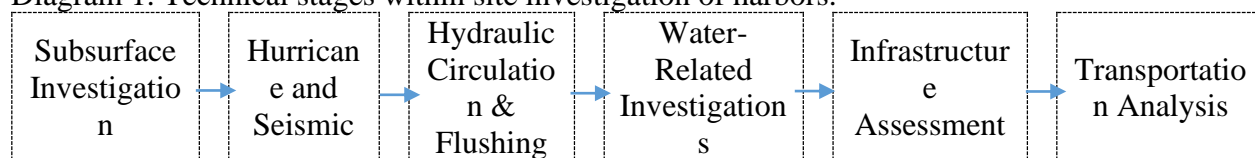
In the past, many artisanal shelters and fishing ports were built at convenient locations, with no particular attention paid to such environmental factors as wave heights, sudden changes in water depths, uncharted reefs, currents, tidal streams, seaweed and mobile beaches (sand drift). Many of the structures were subsequently expanded and, in countless cases around the world, many of the problems that used to be considered minor have now developed into major ones, with some shelters. For example, fouling up with seaweed or silting up (shelter mouth facing the wrong direction) or just being inaccessible in rough weather (reefs too close to entrance channel). A hydrographic survey, also known as a bathymetric survey, is therefore essential if the correct design

decisions are to be made right from the project inception stage to ensure that the landing is easy to use and free of major maintenance problems under all conditions. (Sciortino & FAO, 2010).

2.1.2. TECHNICAL ANALYSIS

The technical analysis is one of the most important steps during site investigation. It is the process of collecting information, assessment of the data and reporting potential hazards beneath a site which are unknown. Subsurface intrusive sampling and testing techniques help geoscientists and engineers assess the nature and extent of stratigraphy and mechanical properties of the various units of soil and rock present below surface. Technical analysis goes through several stages, as shown in Diagram 1. Then it includes the final- result of the geotechnical site investigation, laboratory tests, conclusions & recommendations for the proposed site. The objective of all technical analysis's stages is to gather the information needed to carry out the risk assessment, in order to be in a position to assess the presence and significance of contamination of land. The earlier that existing site conditions and design constraints are established in the planning process, the more efficient the development process will be. When this occurs late in design or during construction, costly and time-consuming design changes or change orders often result. (Bobrowsky & Roberts, 2016)

Diagram 1. Technical stages within site investigation of harbors.



2.1.3. ENVIRONMENTAL STUDIES

Ports in areas where hurricanes and monsoons are common natural occurrences may need a safe haven or storm shelter inside the port basin or close by as an added safety measure for floating vessels. This investigation provides design criteria for the most costly element of harbor development program, which is breakwaters. Knowledge of the existing environmental conditions of the site is critical. To prepare a technically sound and cost-effective harbor development plan, it is necessary to perform a detailed analysis of the natural forces associated with wind, waves, currents and water level changes. In order to Achieve harbor tranquility goals typically requires the use fixed structures that do not move relative to the waves. Protection from waves and currents is achieved with the construction structures generically referred to as breakwaters.

More precisely, the term “breakwater” is reserved for those devices or structures that effectively block 90% of the wave action. Fixed breakwaters typically appear in one of the three forms. The most common form of wave protection is the rubble mound breakwater as illustrated in Figure 2. However, the typical breakwater can be assumed to be composed of multiple layers of graded stone sizes, ranging from small material in the core to large material on the surface. The purpose of a breakwater is to establish an area of calm sea where boats can be moored safely during rough weather. It is important for the local community that such a breakwater can withstand the pounding of waves that are normal for the area. If the breakwater cannot stand up to normal conditions, the fishing fleet may be badly damaged. On rocky coastlines, breakwaters in depths exceeding 3 m should not be attempted without technical assistance. (Drive, 2020).

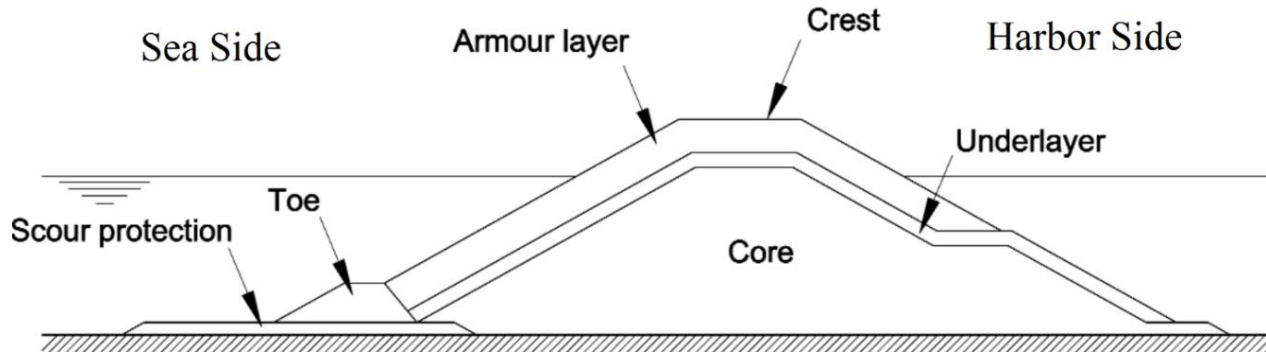


Figure 2. Cross section of typical rubble mound breakwater (CIRIA et al., 2007).

2.1.4. CONSTRUCTION MATERIALS

The investigation should include a combination of telephone interviews and field visits to determine potential sources of appropriate high-quality, low-cost construction materials. Site visits, material sampling, and a quality assurance testing program are usually part of this investigation. Site development materials include the basic materials that the engineers familiar with in upland site design. When waves crash in the sea or in generally high winds, sea-spray occurs. Sea-spray is a spray of saltwater, which contains a high concentration of mineral salts, predominantly chloride ions. These salts do not dissolve in the air directly and are carried throughout the coast in the form of particulate matter or in the form of microscopic airborne water droplets. Salts accelerate the corrosion processes of materials and therefore when in these forms, the salts are largely responsible for the corrosion of primarily metallic materials along the coastline. These salt-water environments may often cripple local marine and fishing industries through the corrosion of their factories (Grythe et al., 2014). The salt deposits and the buildup thereof does bring a fourth dimension to the material -that of time. The salt ages the characteristic outer appearance of the materials due to the consequence of the salt deposits leaving behind a stain or a mark which starts to create various layers of color shades which act as traces of salt buildup over the years. These traces left behind are further emphasized against an otherwise arguably dull and solid colored background. As the appearance of the material continues to change over time so does the material's character creating a changing experiential quality. The buildup of salt for instance may lead to rust forming on a metallic material if not treated correctly. The rust might represent decay, while for others may find the rust beautiful as it adds a sense of character and "life experience" to the material.

2.2. GLOBAL DESIGN STANDARDS OF FISHING HARBORS' BUILDINGS

A fishing harbor contains multifunctional facilities that provide sufficient requirements for the capture of fish and its consumption. Large fishing vessels and huge number of fish creates a demand for well-bred maintenance and repair facilities not only for the vessels but also for the equipment as well. An all-inclusive fishing harbor should include fish processing facilities, refrigerators, ice plants and administrative offices and some other utilities inclusive of roads, parking areas for private and commercial vehicles, sufficient space for loading and unloading and also areas for future expansion. (Sadeghi et al., 2018). Buildings are required within the port boundary to house the different operations required to make the fishing port functional. Typically, the following buildings are required:

2.2.1. UNLOADING AND PREPARATION AREA

At fish landing centers, the fish should normally be unloaded from the vessels, tipped into market containers. Several operations take place in fish preparation area inside landing sites such: product delivery, shredding, partition, Storage in cold stores and Selling. (Neufert, 2000). It should be a substantial area provided in the docks to support vessel unloading of fish. Processing activities are performed face to face as shown in Figure 3. Extension of each processing table per group is set at 0.7 m deep x 2 rows and horizontal width of 0.7 meters and additional 1 meter for raw fish stock and temporary storage totaling 1.7m wide. Weighing scales are needed at spaces of fish preparation. They should be capable of weighing loads of up to 200–300 kg; incorporate a rapid tare device with a range of 50 kg; and should be constructed of corrosion resistant material. (Consultants, 2003)

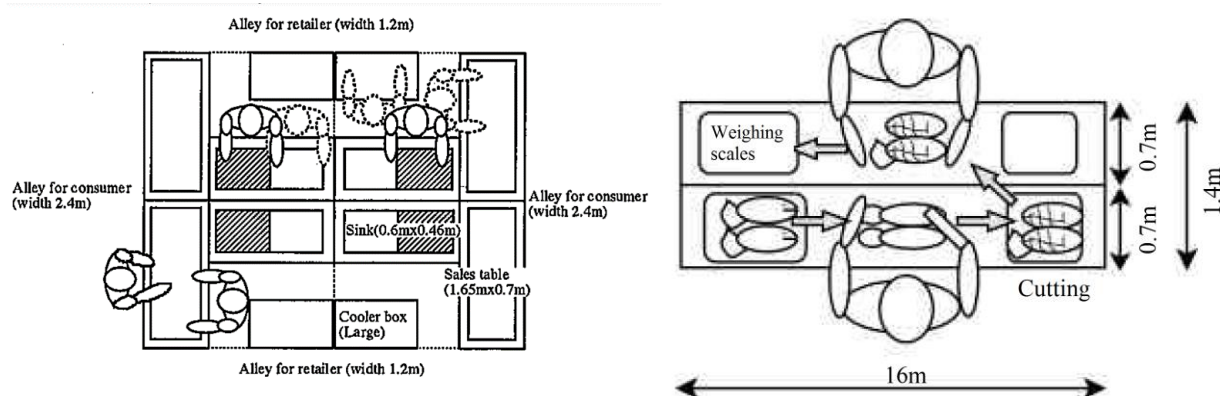


Figure 3. Processing table diagram. (JICA, 2008) & (Consultants, 2003).

2.2.2. AUCTION / SORTING HALL

In designing new fish marketing or sorting premises, a smooth sequence of operations from the receipt of the fish to its loading and transportation should be achieved. The structure should be a single-story building – a short distance from the landing area – to enable fast handling of fish along the quay and marketing operations inside the market hall. This type of design will also allow easy access to vehicles for loading purposes. Figure 4 illustrates a small artisanal auction hall. In hot climates hollow-brick walls or chain-link fences are often used. An adequate pitch of the roof serving a rainwater collection system is also important. (Sciortino & FAO, 2010).

Moreover, the building should provide adequate natural light for most operations to be carried out. Adequate windows and skylights should be provided to reduce the need for electric lighting. Artificial overhead lighting should be provided in order to allow personnel to work early in the morning before sunrise. Fluorescent lighting is particularly suitable (daylight type) for fish-market areas where a shadow less light with very little glare is required continuously for a long time. A light level of 220 lux as minimum is considered adequate. All lighting fixtures should be watertight. Given the size of most roofs, due consideration should be given to installing solar PV panels on the roof in order to run the building lights on solar power. (Sciortino & FAO, 2010).

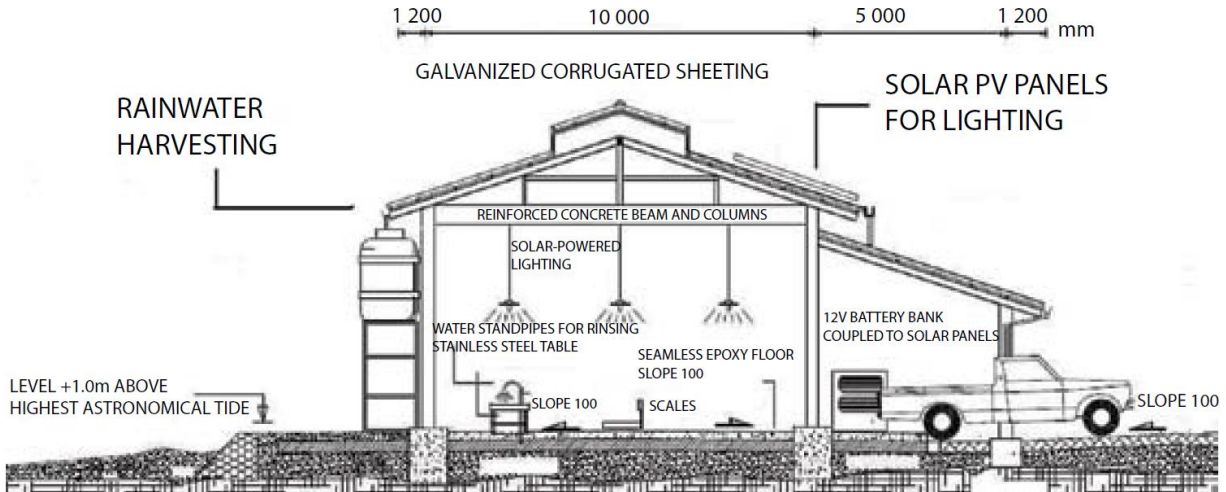


Figure 4. A small artisanal auction/market hall (Sciortino & FAO, 2010).

2.2.3. CHILL ROOMS AND COLD STORES

Refrigeration is the total process of reducing the temperature of a food and maintaining that temperature during storage, transport, and retailing. If the temperature of the food does not fall below one where ice is formed in the food, the food is considered chilled and the temperature reduction process is called chilling. If ice is formed then the food is considered frozen, and the temperature reduction process is called freezing. Chilling and freezing are two of the most common methods for preserving foods. Carried out correctly, they can provide a high-quality, nutritious, and safe product for consumption with a long storage life. (James & James, 2014).

2.2.3.1. CHILL ROOMS

Refrigerated chill rooms are required for the temporary storage of freshly iced fish. The operating temperature inside a chill room is around 1 °C. Chill rooms are expensive and need to be designed properly by an expert. The design should take into account:

- Total maximum weight of products to be stored.
- Handling methods to be employed.
- Ambient temperature of the products entering the chill store; and
- Availability and cost of electricity, labor and servicing facilities.

2.2.3.2. COLD STORES

Cold stores generally consist of a single-story building having a single or a multiple number of cold rooms operated at temperatures in the range -24 °C to -30 °C. In warmer countries, an enclosed handling area may be necessary and protected against rain and direct sun-light should be provided by a roof canopy. The forecourt of a cold store should have sufficient space for maneuvering vehicles, and for parking of trucks awaiting loading and unloading. Access road width should allow the largest trucks to pass. For example, if the truck width were 2.5 m, the access road would require having a minimum width of 6.5 m. (Graham, 1984).

a. Stores with unit coolers: The most widely used method of cooling modern cold stores is by means of unit coolers with fan designed with good air flow characteristics (or good circulation of the air) as illustrated in Figure 5. This type of cooler is generally the cheapest to install. The main disadvantage is that using this type of cooling unit do not allow for uniform distribution of the air

within the store. This gives rise to poor storage conditions where the air circulation is either too high or too low by suspending the unit cooler from the ceiling. (W.A. Johanston et. al., 1994).

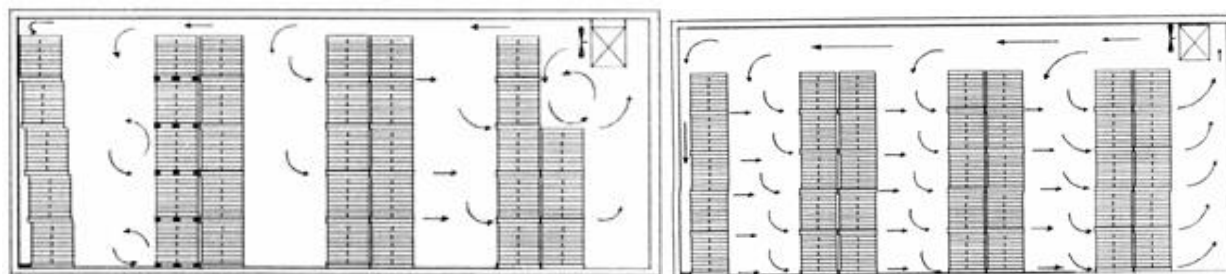


Figure 5. Fish cold stores with unit coolers (W.A. Johanston et. al., 1994).

b. Prefabricated cold stores: there are "building kits" available on the market for small modular cold stores including wall and roof panels, loading ramp, canopy as well as refrigeration plant. A typical example that is illustrated in Figure 6 is a cold store with a storage capacity of 200 ton. A suitable building structure built with self-supporting polyurethane insulated panels faced inside and out with galvanized and plastic coated steel sheeting, as well as a prefabricated floor. The only local requirement is a concrete floor slab on which the building is erected. (W.A. Johanston et. al., 1994).

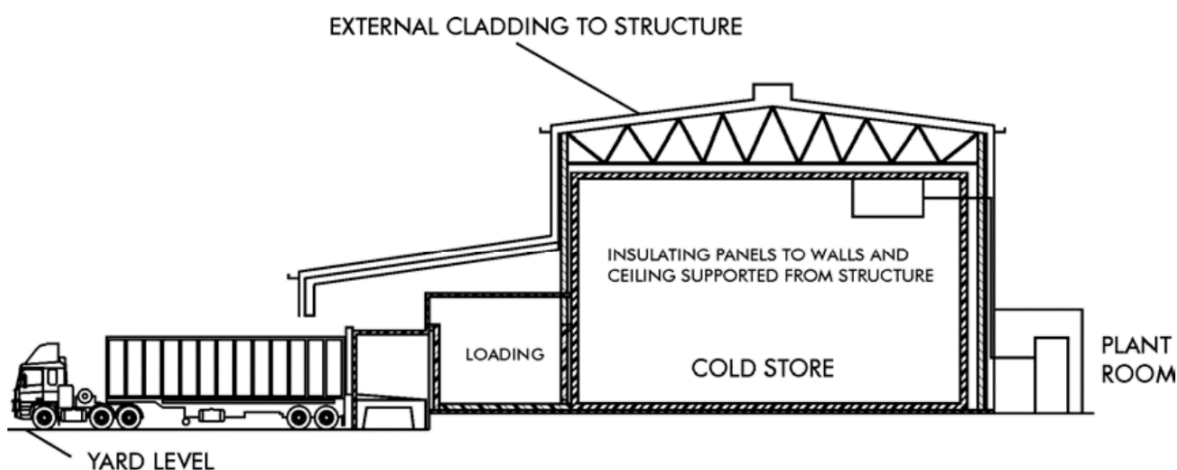


Figure 6. Internal insulation system with full external wall and roof cladding. (TPMA, 2006).

2.2.4. ICE PLANT

In order to maintain the quality of the landed fish after fish landing, it is necessary to assure ice supply for fish marketing. Ice is available in several forms such as blocks, plates, tubes, shells, soft and flakes. There several types of ice maker such as block ice plant, flake ice plant, tube ice plant. Flake ice is the most popular form for industrial use because of its cooling efficiency. I is also relative dray and will not stick together to form clumps when stored. Cooling capacity is more for flake ice due to a large surface area for heat exchange. I also cause minimum damage to the fish. (Ninan, 2018)

2.2.5. WORKSHOP FACILITIES

Workshops are an integral part of a fishing port. The workshop building may be built in concrete and masonry or in an all-metal construction as illustrated in Figure 7. (Sciortino & FAO, 2010). The Workshop should be located close to the area where craft are retrieved from the water. This facility is usually located as close to the docks as possible in order to increase the operation ratio of fishing boats. Fishing boats are required to be lifted-up for repair, by either slipway or crane, or both of them are required to be equipped. However, in regard with fishing boats over 34 ft., because of their hull structures and strength, it is difficult and dangerous to hang up them by a crane, so that slipway is required.(Consultants, 2000). Furthermore, Artisanal fish landings located on beaches require a clean level platform for the repair of nets. This platform often incorporates small gear stores for the storage of bulky equipment. (Sciortino & FAO, 2010).



Figure 7. All-metal workshop under construction. (Sciortino & FAO, 2010).

2.2.6. ADMINISTRATION BUILDING

Irrespective of the size of a fish landing or fisheries port, an administration building should always be included in the layout. An administration building may consist of a single room with one desk for the harbor master to a proper building with offices for the harbor master, statistics officers and other key personnel. Generally speaking, the larger the port, the more management staff are required and, hence, the larger the building required. Figure 8 illustrates a typical ground-floor plan for a two-story building suitable for port administration. The top floor should be reserved for the management staff, whereas the ground floor should include all types of interface services, such as police, customs, if required, and bank or post office. (Sciortino & FAO, 2010)

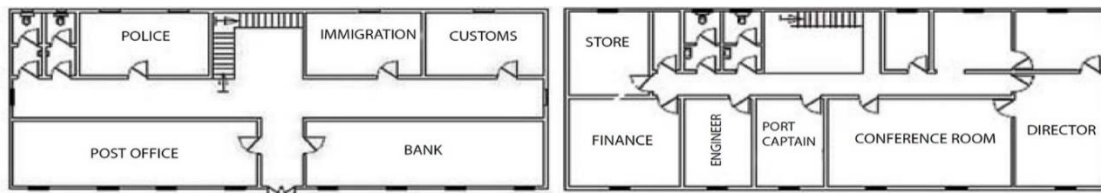


Figure 8. Typical layout of a large two-story administration building (ground floor at left).

2.2.7. MISCELLANEOUS

Ancillary functions to support a full-service commercial fishing facility include food-service functions. Therefore, the establishment of canteen mainly for fishermen should be exists. A one-

storied building must be constructed in order to make it accessible, because it is expected that many fishermen utilize the facility. Secured day room lounge, and laundry for fishermen should be included in the harbor design. (Consultants, 2000).

2.3. LOCAL DESIGN STANDARDS OF FISHING HARBORS ' INFRASTRUCTURE

1. Ice producing capacity and demand for ice: which means ice producing capacity must equally distributed over the fishing communities.
2. Freezer room and cold storage use and capacity: fishers and vendors often prefer the use of their won ice boxes that are placed on-site.
3. Port capacity in terms of occupancy of vessel moorings: usually vessels move and are mooring depending on where they have access to ice and markets. A great degree of flexibility is available to vessels as the jetties are government owned
4. Locker room and storage: All landing sites must have lockers available for fishers, however these are frequently fully occupied and there is generally a demand for more locker space, especially to store outboard engines and fuel tanks.
5. Fish handling capacity at the landing sites: sites must have official sorting and processing areas that carried out in the fish landing facilities. The locations for fish processing are must be fenced off and protected to improve food safety and hygiene.
6. Utilities: all landing sites are must be connected to the general electricity grid, the water system of the National Water & Sewerage Authority and have at least one Landline, Internet and telephone connection.

3. FIELD FRAMEWORK

The Field framework demonstrates the fisheries sector in Aden, which include the Regulations in Law No. 2 of 2006 discusses organizations of auctions squares. Then it indicates the data of main fish landing centers in Aden, which were through key informant interviews. The data include assessment socio -economic aspects of fishing harbor infrastructure.

3.1. ADEN AS A PORT CITY:

Aden locates in the southwestern corner of the Arabian Peninsula, linking the Indian Ocean and the Red Sea. This location makes the city one of the most important Yemeni ports, because it controls the southern entrance to the Red Sea. The presence of the port plays an important role in the supply of chains as well as provides labor and movement. In addition, provides a benefit through the economic activities carried out by the port. The port of Aden is located between (Shamsan mountain, which has a height of 553 meters) and Little Aden (Muzalqam mountain, which has a height of 374 meters). The northern land boundary protects the port area from the northeast and southwest monsoons winds across the hills. The port of Aden covers an area of approximately eight nautical miles from east to west and three nautical miles from north to south and includes three separate areas: Outer harbor, Inner harbor, and oil Aden terminal as shown in Figure 9. The inner harbor contains Aden container port, and Al Mualla berth, harbor control tower and ships slipways & workshops. (Engelberts, Wormsert, 2020)

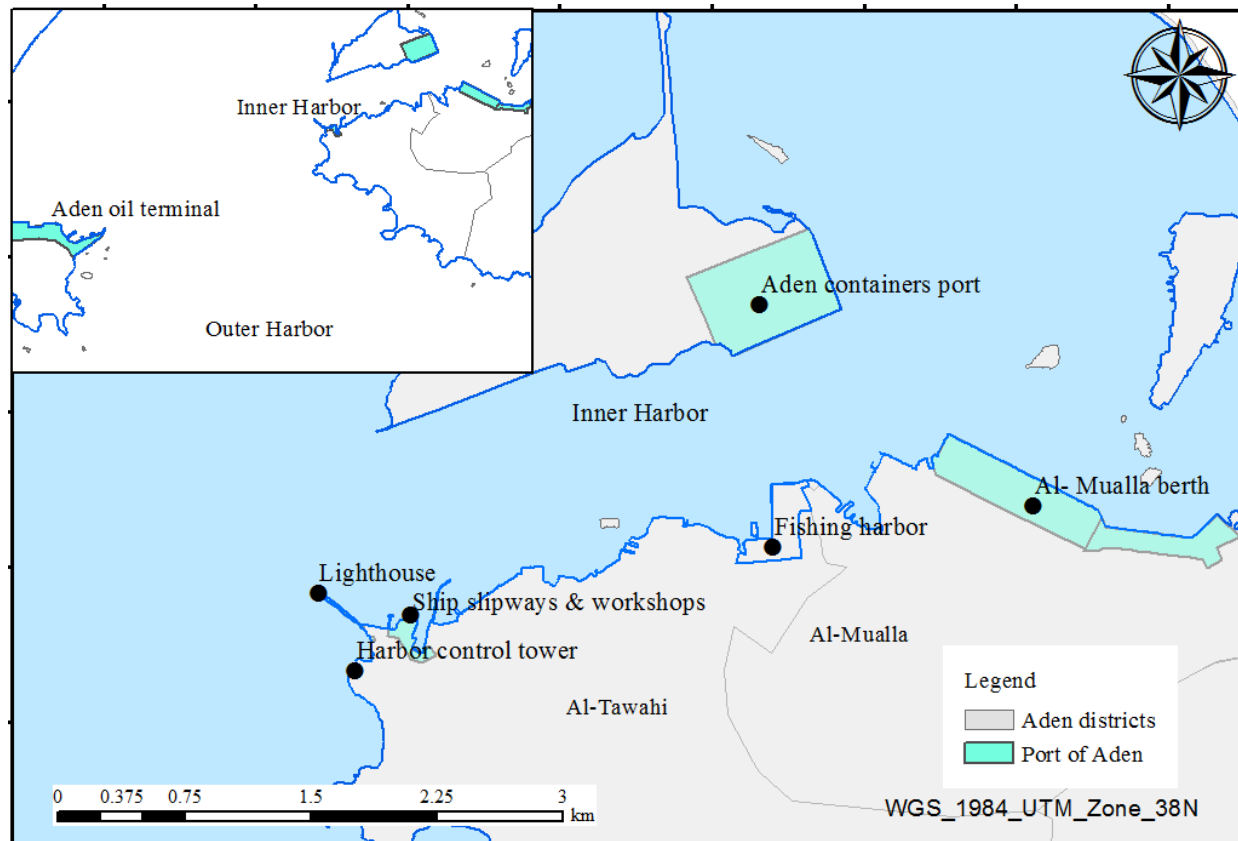


Figure 9. Map clarifies the port of Aden location - GIS Map, 2022.

3.1.1. FISHERIES SECTOR IN ADEN CITY

Fishing is considered one of the main traditional occupations in the Aden region, where the fishermen's villages are concentrated in Qa'wa, Amran, Fam, Al Kheesa and Sira. There are also many temporary wooden fishermen's huts scattered along the coastal strip (from Al-Alam to Qaw'ah). Traditional fishermen constitute the main producing segment that covers the fish needs of the region's population, in addition to exporting fish outside the Republic of Yemen. (Bawazir, 2001). The fisheries sector is considered one of the most important economic sectors after the oil sector in Yemen for national development. It represents a major source of employment, income and food in all coastal areas. This sector has the 3th ranks in terms of economic importance in Yemen, as it provide job opportunities for 1.7% of the workforce. (organization, 2017). The Gulf of Aden and the Red Sea are characterized by a high productivity of fish because of their exposure to high water currents in the summer, which makes them breeding sites for many marine species. There are more than 600 species of fish in Yemeni territorial water. Aden is famous for its abundance all kinds of fresh fish and characterized by a high productivity of marine fish. However, the people in Aden find certain kinds of fish that consume more than others do. (Aden, 2001)¹. Auction squares are the places designated for the trading fish products, which the sale is made to the internal fish markets due to the abundance of fish in return for demand. The auction squares on coasts are the starting point for the fish-marketing network in Aden Governorate.

It is considered one of the main tributaries in the distribution and marketing of fish from production sites (supply) to consumption sites (demand). In addition, and it is also important sites for buying,

¹ General Authority for Fisheries in the Gulf of Aden

selling and trading of fish products, and the link Between the fisherman and the buyer, the seller and the consumer and the investor.(Abd Latiff, 2002).

The Regulations in Law No. 2 of 2006 discusses organizations of auctions squares within fish landing centers to achieve a permanent balance between resources to protect fish wealth and controlling the quality of marine products and in Aden city. The

Article 15 of Law No. 2 of 2006 specified the entitlement of the auction squares owner, the public auctioneer, and the associations from the total service fees as follows:

- 1% for the auction squares owner in the landing site.
- 2% for the public auctioneer.
- 2% for the cooperative in which the fisherman is a member.
- 3% for the government entitlement of fish products.

3.2. MAIN FISH LANDING CENTERS IN ADEN

Fish landing centers are the only outlet for marketing fish products of all kinds .It serves the fishermen and employees in the fish processing industry, and sell the products of the traditional fisherman. They contribute to develop the professional and economic role of fish producers and associations, strengthening the sector's role by creating added value, and limit the manipulation of government revenues and fishermen's rights. Moreover, Fish landing centers aim to achieve effective coastal control over traditional fishing activities in terms of production, fishing methods and licensing issuance. Aden city overlooks a coastal strip of approximately 181 kilometers in length. The strip bordered by Al-Alam area to the east and Mukhaidir village, which is adjacent to Qaw'ah village to the west. A number of fish landing centers are spread along the coastal strip of Aden governorate. The governorate of Aden includes five fish landing centers in which a ministerial decision was issued according to Law No. 2 of 2006. The General Authority for Fisheries in Gulf of Aden and the General Administration of Fish Ports supervises these center.

Table 1. Main fish landing centers in Aden Province.

No.	Fish landing centers	District
1	Fishing harbor for coastal and industrial boats	Al-Tawahi
2	Dockyard Fish Service Complex	Al-Mualla
3	Sira landing center	Crater-Sira
4	Al-Dharba landing center	Al-Buraiqa
5	Amran receiving center	Al-Buraiqa

3.2.1 ADEN FISHING HARBOR FOR COASTAL AND INDUSTRIAL FISHING VESSELS

Aden fishing harbor is the base for large vessels, which are working in fishing in the Arabian Sea, the Gulf of Aden and the Red Sea. It locates in the Hugif area, at Al-Tawahi district as shown in Figure 11. Mountain of electricity and the General Authority for Maritime Affairs borders Aden Fishing harbor to the east. From the north it surrounded by the container port and the international corridor of Aden port. Hugif area and the main road, which connected Mualla and Al-Tawahi borders it to the south. Moreover, Tourist pier and a steamers fuel filling station are on the western side of the harbor. The fishing harbor is a multi-purpose fish complex, and a landing center that

receives large coastal and industrial fishing vessels of more than 20 meters in length. The fishing port covers an area of 8.5 hectares and is considered one of the largest projects of fisheries sector that has been implemented with the help of the Soviet Union. Its construction was completed in 1988. It was supervised by the General Authority for Fish Services and Marketing, while at the present time it is supervised by the General Authority for Fisheries in Aden Gulf, which is managed by the General Administration of Fish Ports and Landing Centers. (Office, 1984).

Aden Fishing harbor Components:

a. The Refrigerator:

It follows the port with a capacity of (3000) tons. The refrigerator includes an ice plant with a capacity of (100) tons per day. In addition, it includes fish cold store with a capacity of (200) tons, in addition to a freezer with a capacity of (25) tons per day. The preservation and freezing units preserve fish after receiving it directly from the fishing boats. This refrigerator has an important role, because it preserve fish products, especially commercial ones, until appropriate markets are found in terms of value, instead of direct marketing at sea (especially squid). However, this refrigerator and its accessories are currently not working. Now there are two refrigerators with a capacity of 200 tons have been developed with advanced technology that operate on Freon gas.

b. The Floating Dock:

The floating dock with a payload of (1,500) tons performs the tasks of maintaining and repairing fish boats, and reduce the expenses of maintaining fishing boats and to expedite maintenance work in order to gain additional days to operate the fleet for longer periods in fishing operations.

c. The berth is illustrated in Figure 10 and consists of:

- The berth adjacent to the water basin is 80 m long and 6 m deep. (A)
- A long berth in front of a 3000-ton refrigerator, 320 m long, and 6.5 m deep. (B).
- A medium berth adjacent to the port administration building, with a length of 135 m, and 7 m deep. (C)
- An unfinished sidewalk in front of ammonia refrigerator, with a length of 85 m, and a 6.5 m deep. (D)

c. Workshops:

The fishing port includes a large central workshop and two additional small workshops. These workshops carry out the tasks of maintaining and repairing fish boats, which provide services all disciplines in mechanics, electricity, and refrigeration, turning and welding.

f. Fiberglass boat factory:

Fiberglass boats are made of fiberglass-reinforced plastic, however it is not working at the moment.

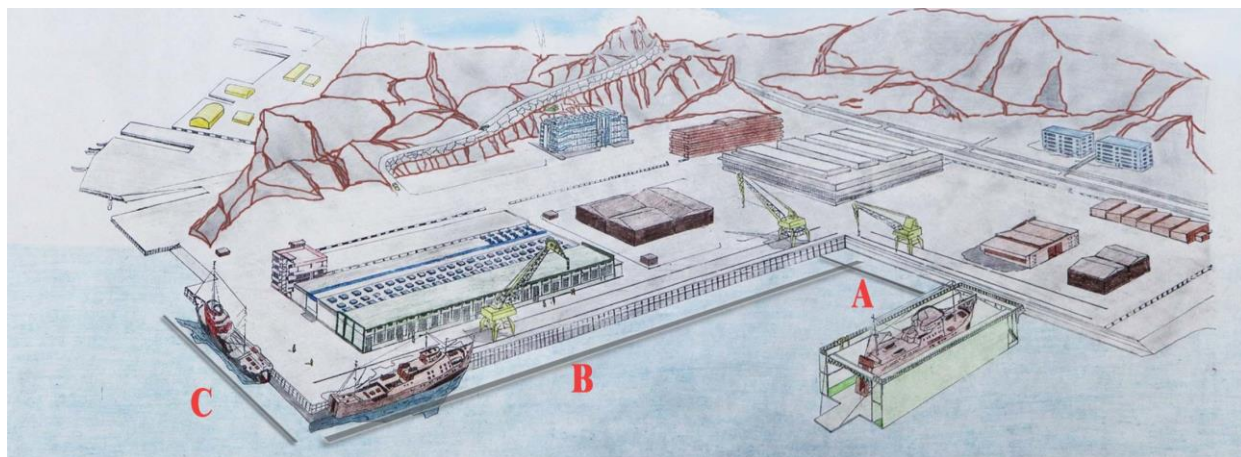


Figure 10. Berth of Aden fishing harbor - General Authority for Fisheries. Gulf of Aden, 2022

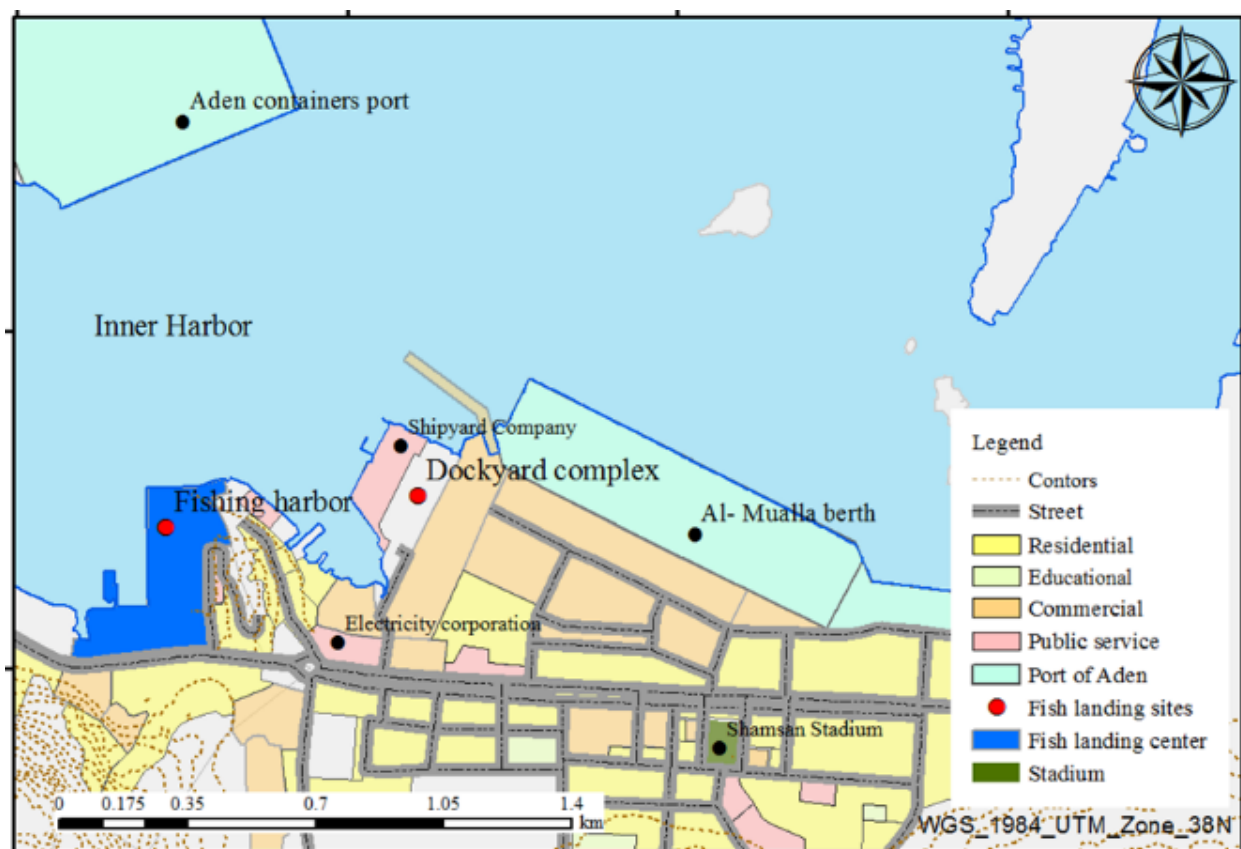


Figure 11. Map clarifies the location Aden fishing harbor- GIS Map, 2022

3.2.2 DOCKYARD FISH SERVICE COMPLEX

The name Dockyard goes back to the period when the French businessman “Anthony Bess” who came to Aden and carried out many commercial activities. He was the first businessman that builds a pure steel ship through his company (Aden Dockyard Ltd). He was the first person that establish a factory for sailing boats that use diesel engines (Ghulam, 2014). In 2021, the Dockyard Service Center was named (the Dockyard Fish Services Complex), after merging the Ministry of Agriculture and Irrigation with the Ministry of Fisheries. The center is considered as an integrated

production unit as it is specialized in the field of fish landing, preparation, freezing and preservation. The Dockyard fish Service complex locates in Al- Mualla district. The complex's site is bordered by the sea of Aden inner port from the northern side. It is adjacent to the shipyards company from the western side as shown in Figure 12. The site area of Dockyard location is about 30,300 square meters². The Ministry of Fisheries in cooperation with the People's Republic of China built the components of the site in 1978. The Dockyard Service Center is one of the important state-owned projects that has an economic and social standing, due to the services and facilities it provides to fishermen and investors in the fisheries sector. It is considered one of the most important fish landing centers in the governorate of Aden, where the center works to balance the value of fish in the local market.

It was supervised by the General Organization for Fish Services and Marketing, but now it is supervised by the General Authority for Fisheries in Aden Gulf, which is managed by the General Administration of Fish Ports and Landing Centers. The Dockyard contains refrigerator with a capacity of 800 tons, which include three fish freezers, each one with a capacity of 10 tons/ day and ice plant with a capacity of 42 tons / day. Furthermore, it include two auction halls , fish landing berth of 52 meter, fishermen's Hostel, administration building and fuel station.

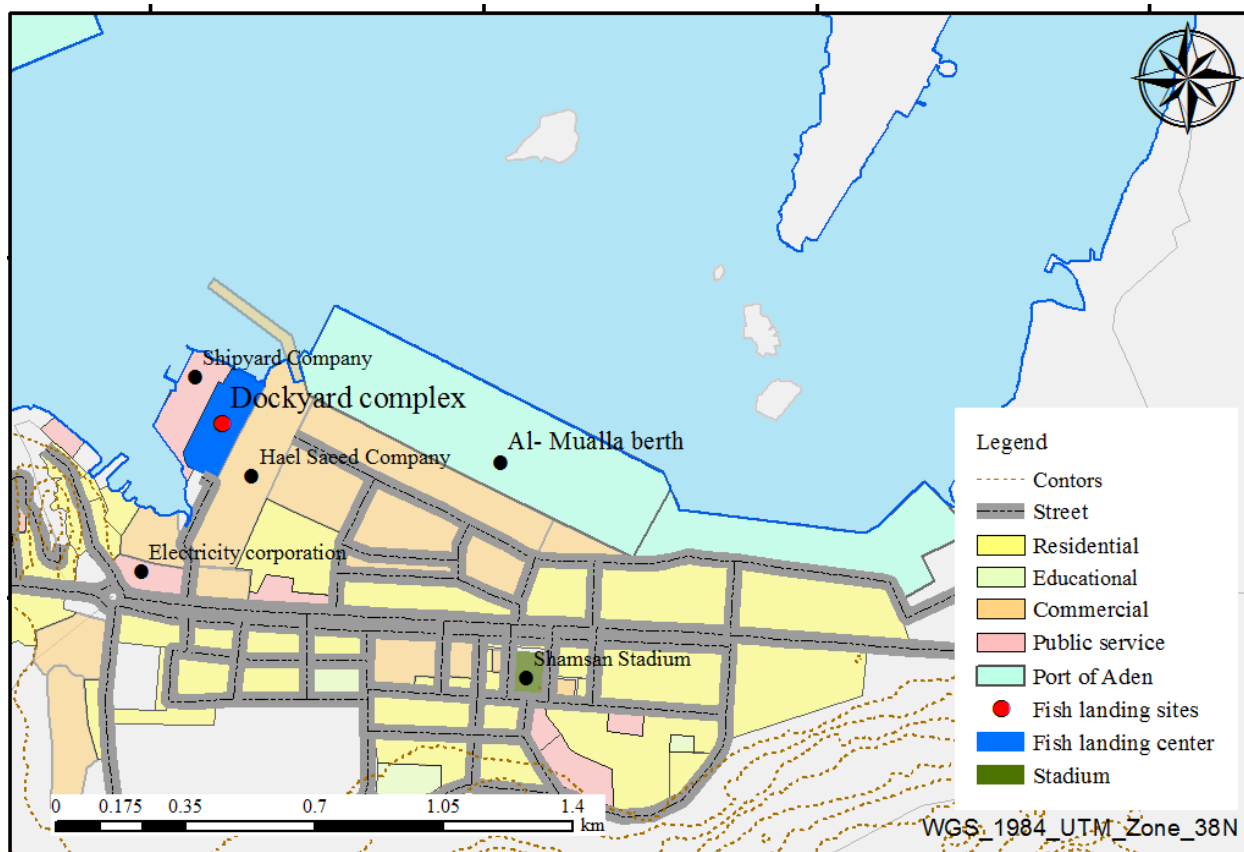


Figure 12. Map clarifies the location of fishing harbor and Dockyard fish service complex- GIS Map, 2022.

² Ownership documents of lands and buildings of the general corporation branch for service- Al-Mualla, Aden.



Figure 13. Using of insulated trucks within dockyard because of unworked refrigerator – Authors, 2022



Figure 14. Fishing boat mooring on Dockyard fish complex's landing berth – Authors, 2022

3.2.3. SIRA LANDING CENTER

Sira landing center is considered one of the most important fish landing centers in Aden city, that it has been distinguished by being one of the oldest marinas in the Arabian Peninsula, overlooking the Sira Castle.

It is characterized by a natural quay, which is a flat rocky mountain whose height is equal to the seacoast level of Aden city. The name Sira refers to the entire island of Sira, including the old fortress (Sira Castle), which local scholars differed with its name. The Portuguese colonists called the name Sira, which means a mountain on this spot.

Sira in Arabic means small fish, sardines, and canned salted fish known as sardines. (Saleh, 1999). The center is characterized by the depth of seawater adjacent to it, and allows vessels to reach this berth, so that it is easy to unload goods without obstacles. Sira Mountain constitutes a natural protection for Sira landing center from the arrival of the great waves as shown in Figure 17. It locates in the Crater District under the historical Sira castle. Sira landing center including the fish market was built with an urban manner and restricted the area to sellers in 2006, providing the fishermen with selling and buying in accordance with the architectural and traditional style of the area shown in Figure 15. The site area of the center is about 3350 m², which include the fish market and administration zone³.

Sira landing centers borders by Sira Mountain from southeast side. From the east, it is borders by the sea, which adjacent to Crater district. Now it is supervised by the General Authority for Fisheries in the Gulf of Aden⁴, which is managed by the General Administration of Fish Ports, landing centers and Gulf Sira Society. Sira landing center contains a natural marina for boats called in vernacular (Al Kheesa), fuel station, Administration building and auction square. The center works to the auction and display fish products that come from small fishing boats called (Al-Hori). Where all kinds fish products are landed from the boats after entering the center by laborers who

³ The site area calculate using Arc GIS program

⁴ It is owned by a private sector (a merchant named Ali Salam)

transport them in plastic baskets and spread them on spaces raised above ground surface with a height of not less than 30 cm, and then the auction process is carried out either wholesale or retail



Figure 15. Indoor view of Sira landing center – Authors, 2022



Figure 16. Outdoor view of Sira landing center – Authors, 2022

3.2.4. AL-DHARBA LANDING CENTER

Al-Dharba landing center locates in Al-Buraiqa district. It has a strategic location that connect more than village such as Fuqm, Amran, Al-Farsi, Al-Khisa coastal villages and Kobjen as shown in Figure 19. The name Al-Dharba goes back to Al-Dharba area, which is a coastal zone located along the coast of Al-Khisa village .The site area⁵ of the center is about 11,300 m² including center landing berths. It is supervised by the General Authority for Fisheries in the Gulf of Aden, which is managed by the General Administration of Fish Ports and Landing Centers. In 2010, the Ministry of Fisheries constructed the components of Al-Dharba landing center. Al-Dharba landing centers contains a landing site that facilitates entry of fishermen's boats, and landing of their fish products. In addition, auction square protected from the sun's rays in which fish products are displayed. A group of administrative offices and water& electrical networks. However, the center lacks cold stores, ice plant, fuel stations, which considered important services to facilitate anglers' work.

⁵ The site area calculate using Arc GIS program

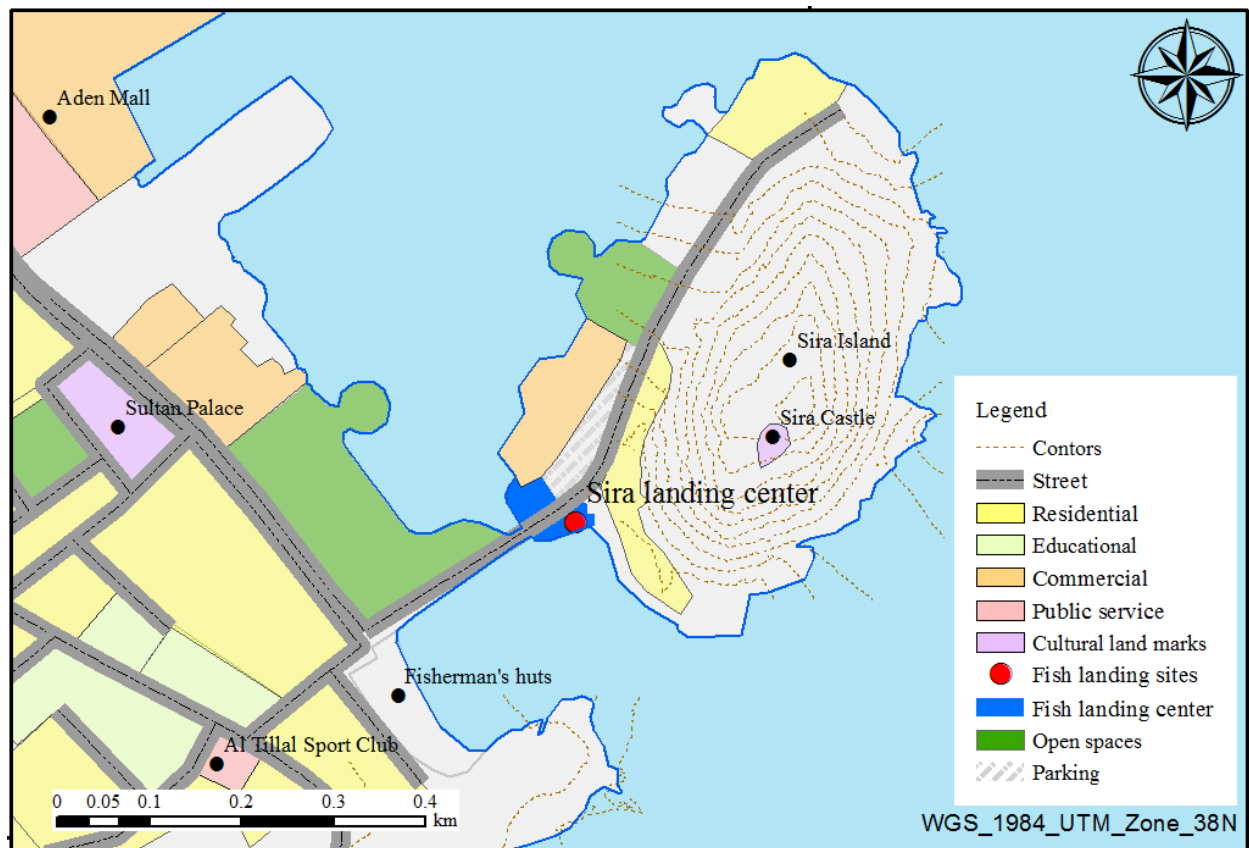


Figure 17. Map clarifies the location of Sira Landing Center -GIS Map, 2022.



Figure 18. Auction square of Al-Dharba –Authors, 2022

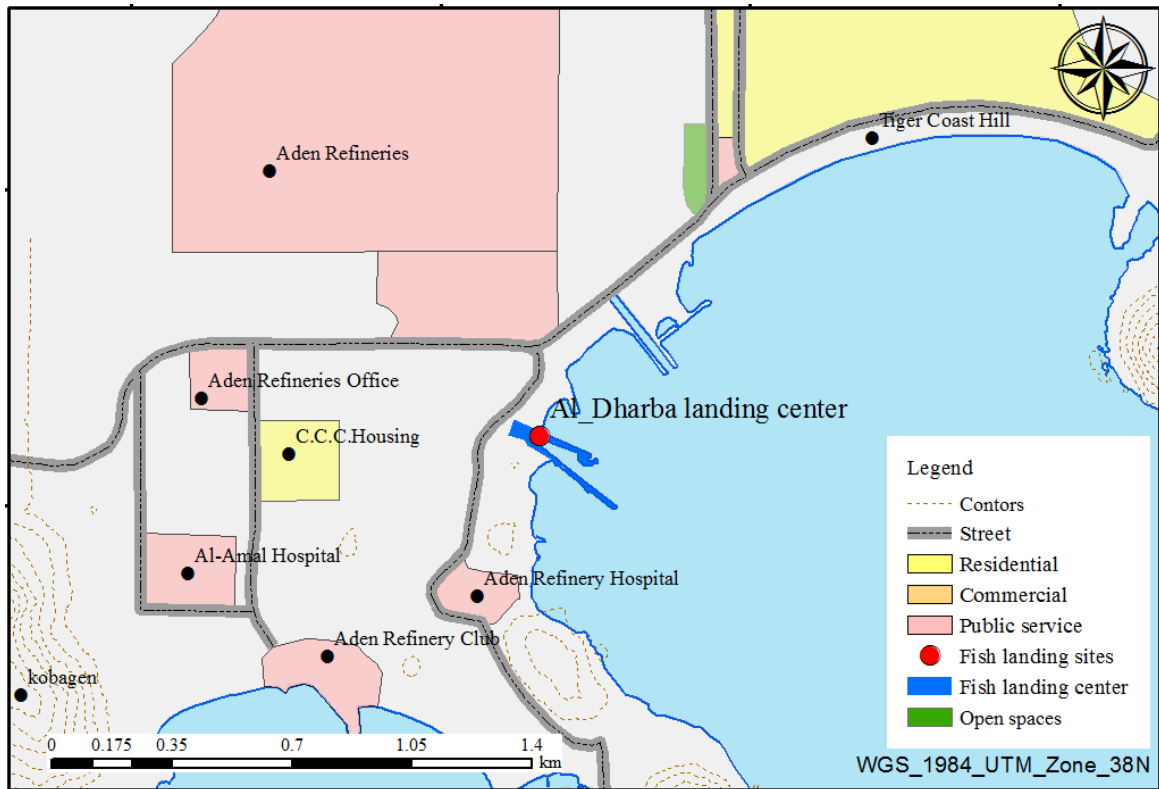


Figure 19. Map clarifies the location of Al-Dharba Landing Center – GIS Map, 2022.

3.2.5. AMRAN RECEIVING CENTER

Amran Receiving Center is located in Al-Buraiqa district, specifically in Amran coastal area. The site area locates in the center of Amran at the entrance to the Ras Amran area (Imras). An asphalt road from the southern side borders the center, however from the east it is bordered by the sea as shown in Figure 20. This building and the auction square was established in 1975, and the refrigerator was installed in 1978. The site area⁶ of the center is about 7400 m². The General Organization supervised it for Fish Services and Marketing, but now it is supervised by the General Authority for Fisheries in the Gulf of Aden, which is managed by the General Administration of Fish Ports and Landing Centers, and the Gulf of Aden Society. Amran center contains a refrigerator of a capacity of 10 tons, ice plants with 4 tons capacity, steam depot & wooden warehouse, power station and auction square.

⁶ The site area calculate using Arc GIS program

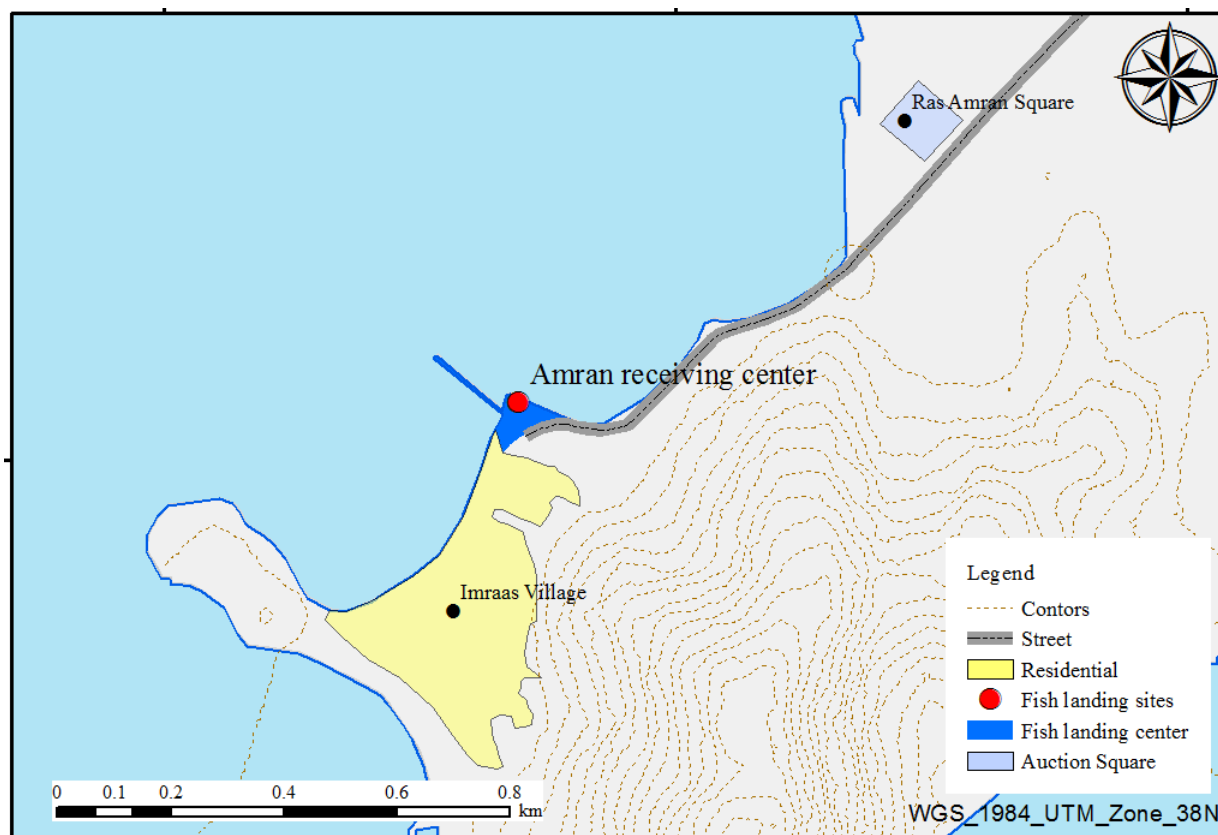


Figure 20. Map clarifies the location of Amran receiving center- GIS Map 2022.

4. RESULT AND DISCUSSION

Ports play a major role in the fishing industry. They give vessels and crews access to essential services and supplies, and enable vessel operators to land their catch. Fish port is a place that has a function as the central of fishermen activities and accommodates the activity of fishermen. Therefore, the existence of fish port became one of the factor that implies the performance of local fishermen. If there is no fish port, the fishermen activities would be difficult to be circulated transparently to markets. When planning a fishing port, whether it be a small landing jetty on a beach or a large deep-water port, it is better to design a layout with arrangements flexible enough to permit adjustment at a future date. Due to the incremental growth in the world population and the current trend of globalization, there is a significant interest for harbor development whether this includes constructing new harbors or existing ports that need to improve or grow their ability. During the discussions with people who are responsible of each landing center, the importance of these centers was explained in relieving fishermen's suffering for selling their fish products, therefore, the authors come up with the following findings:

1. Buildings should conform to national architectural and sanitary standards, irrespective of the size of the port. Therefore, the challenge for the designer is to capitalize on the opportunities by integrating public access into the harbor design without intruding into the working element of the facility.
2. An all-inclusive fishing harbor should include fish processing facilities, refrigerators, ice plants and administrative offices and other utilities inclusive of roads, parking areas for private and commercial vehicles, sufficient space for loading and unloading.

3. Fish landing sites suffer of major difficulties that anglers complain about, for example: the absence of ice plants, insulators & baskets for fish transporting, and qualified preparing spaces for the catches.

4. The rehabilitation of the main fish landing centers in the Aden city will prevent the spread of Illegal auction squares to practice their work (for example, Taiba market in Mansoura district), which does not have the elements as auction squares in terms of hygiene, sanitation and the protection from sunlight.

This research summarize rapid assessment of main fish landing centers in Aden city by describing the condition of all the fish landing centers as clarified in Table 2 . Therefore, the government supposed to work on the development of auction squares, which scattered on the coastal strip to become fish landing centers, because the importance of landing centers lies in regulating fish handling operations well so that they could reach the consumer with high quality and less price. Unfortunately, post-harvest losses occur in most fish distribution chains due to the poor services of fish landing sites.

Where the impact of the loss is not limited to the loss of income of fishermen, processors and traders, however to the contribution to the lack of food, as the loss of fish means less fish available to the consumer. Through field trips to the fish landing centers and the various auction squares in Aden city. It was found quantities of unwanted fish, dumped on the coasts of the landing centers, which affected the marine environment. Therefore, it is necessary to establish small Fish waste grinding plants in order to grind fish and extracting from them feed fertilizers and fishmeal in each fish landing center

Table 2. Assessment on the condition of the landing site infrastructure.

Fish landing centers	Aden Fishing harbor	Dockyard fish service complex	Sira landing center	Al-Dharba landing center	Amran receiving center
Location	Al-Tawahi	Al-Mualla	Crater	Al-Buraiqa	Al-Buraiqa
Quay / berth	Yes	Yes	No	No	No
Jetty/ pier	No	No	No	Yes	Yes
Administration	Yes	Yes	No	No	No
Auction square	No	Yes	Yes	Yes	Yes
Cold store	Yes	Yes	No	No	No
Ice plant	Yes	Yes	No	No	Yes
Boat facility	Yes	No	No	No	No
Fuel station	No	Yes	Yes	No	No
Water network	Yes	Yes	Yes	Yes	Yes
Electrical network	Yes	Yes	Yes	Yes	Yes
Sub- road	Yes	Yes	Yes	Yes	Yes
Parking	Yes	Yes	No	Yes	No
Fence	Yes	Yes	No	Yes	No

Social impacts:

1. Unofficial markets: parallel fish markets exist outside the official government owned and operated fish landing and fish market sites. These markets generally do not use ice and are selling fish cheaper than at official market sites. It is noteworthy that these unofficial markets are also not subject to landing, fishing cleaning or fish vending fees. Moreover, the landings and sales go unrecorded and, due to no or limited ice use, the food safety for consumers is a risk.
2. The gender: the capture fishing operations at sea are dominated by men in Aden. The cold room attendants and ice machine technicians are all men. However, women play an active role in fish processing and small-scale fisheries. Women employed by the Government at the landing sites and markets generally carry out administrative roles. They also take part in net making, sewing and mending. It has been found that the percentage of women workers varied from 20-50% across the fish-processing workforce.
3. Cooperative structures: Very few formal and functioning cooperative structures exist for the fish landing sites and fish markets around Aden city. Discussions related to cooperatives generally receive a positive response and fishers on the whole are willing to consider forming cooperatives to increase revenues and share benefits with others. Many fishers did, however, note during interviews that significant improvements in management and organization between them would be needed if such endeavors were to be successful.

Financial impact:

1. Income from landing sites and fish markets:
Each of the government owned and operated fish landing sites in Aden provide services to the fishers and fish vendors, as well as to the general public. The services are many and include a wide variety, including the sale of ice, provision of fish vendors, space, cold storage space rental, and ice bin and scale rental, washrooms, and water & electricity supply. In order to maintain, upgrade and replace these facilities and to keep a high service level provided to the sector user fees are charged for the services and products provided.
2. Equipment costs: Fish landing sites have challenges with the state of the equipment (e.g. ice machines and freezers), which require repairs or replacement. The level of activities at fish landing sites is high and do not corresponds to the availability of ice, fuel and fish customers. the volume of fish landed would be able to generate an additional annual income. Such annual earnings could easily to replace the ice machines and freezers at the fish landing sites at the end of their lifespan.

5. CONCLUSION

There are a number of priority recommendations for fish landing and fish market infrastructure and equipment, as well as human resources, which would be able to generate substantial benefits for the Aden fisheries sector and contribute to the economy development objectives of the country. The priority investments would be focused on jetty construction and upgrades, development of a vocational program for fisheries, fencing of the fish landing site and processing places and increasing the ice supplies to fishers. The total budget required for the priority investments identified can largely be recovered within a few years. Various additional recommendations are made as well related to investments that would further increase the functioning of the landing sites,

reduce costs and increase benefits. Such as increasing the processing of fish, the improvement of data collection and analysis for fisheries management, establishment of an inventory of equipment and spare parts, as well as carrying out an assessment for investment in solar panel to reduce the electricity costs at the landing sites and fish markets.

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APPENDICES ONE: STAKEHOLDERS' INTERVIEWS TRANSLATED TRANSCRIPT

Government Institutions- interviewees:

1. Eng. Nael Al- Sarory - the general Manger of fish harbors and landing centers/ General Authority for Fisheries in the Gulf of Aden / Aden.
2. Captain Rashed Saeed - the manager of Dockyard fish service complex/ Aden.

Private Institution- interviewees:

3. Khaled Fadhl Jabal: The owner of Al- Jabal Agency for fishing / Aden.
Interview translation transcript 1

Interviewer: Gawaher Khaled - Date: 09.08.2022

Interviewee: Engineer Nael Al- Sarory - the general Manger of fish harbors and landing centers/ General Authority for Fisheries in the Gulf of Aden / Aden.

➤ What is the function of the fish landing centers?

It aims to improve the handling of fish products in a way that preserves their quality, in addition to setting an appropriate price for them, and ensuring the flexibility and transparency of commercial transactions, as the public auction plays the role of mediator between sellers and buyers of fish products. The Trapping Act mandated fees for commercial transactions and services that take place at a fish auction. The government, in addition to associations, benefits from these fees, according to the regulations as follows:

- The owner of the arena is entitled to 1% for his services.
- The auctioneer, as a consideration for his services, is entitled to 2%.
- The association to which the fisherman belongs is entitled to 2%.
- The state revenues from the value of traditional fishing production of caught fish and crustaceans shall collect 3%.

➤ What does the general administrative structure of the fish landing centers consist of?

The general administrative structure of the fish landing centers consists of the administration and following sections:

Director of the Center - Collection and Revenue Department - Coastal Control Department - Statistics Department - Quality Department - Research and Studies Department - Operations Room Department - Weighing Staff Department - Auctioneers Department - Services Department.

➤ Do you consider the buying price of fish products affordable and how the has it been determined within all fish landing centers?

No, I do not think that the selling price of fish products is affordable for everyone, and the reason is that supply versus demand. For example, during the wind season, fish production decreases, and therefore supply is less compared to demand, and the value of fish increases.

There are also a number of objective reasons for the variation in fish prices in a coastal city abounding in abundance of fish, namely:

- Increase in fuel prices.

- Selling fishing gear with hard currency.
- Increasing the prices of marine engines.
- Overfishing and unlicensed fishing.
- Marine pollution (changes in the marine environment).

Despite mentioning the objective reasons, there is a main (non-objective) reason, which is the smuggling of fish within large tankers outside the city of Aden through agents, and it is not supplied to the local markets.

- What criteria has been used in determining the selling price for fish products?
(1) Direct observation, (2) Personal communication, Agent/ broker, (4) Other (specify)

The price of fish products is determined by two criteria: abundance of production and supply in exchange for demand. The process of buying and selling takes place in an auction, with agents who buy fish products at a wholesale price.

- Are there any contractual arrangements in buying fish product? If Yes what kind of arrangement?

Previously, there were contractual arrangements in fishing, which was a contract with private companies (Chinese, Russian, and Egyptian) that carried out coastal and industrial fishing according to fisheries legislation. Now, there are no contractual arrangements with traditional fishing because it is free fishing and with small boats.

- What are the main problems that you encounter as the general Manger of fish harbors and landing centers in Aden?

One of the most important problems is the poor services of the landing centers and the main auction squares, which led to the opening of new auction squares belonging to the private sector. These arenas are illegal, unlicensed, and do not carry the specifications of an auction arena. In addition to the weak implementation of the Fisheries Legislation Law related to auction yards and landing centers.

- Who is the authority responsible for locating fish landing sites?

Fisheries legislation specified that the Ministry and its offices determine the landing centers and forest yards on the coastal strip of the Republic, and take into account when determining the proximity of the site to the density of boat berthing, the proximity of the site to the roads leading to the marketing centers.

- Who is the authority responsible for the management the Dockyard complex?

The Dockyard complex is supervised by the General Authority for Fisheries and managed by the General Administration of Landing Centers and Fish Ports, as there is no overlap in the management of the complex.

Interview translation transcript 2

Interviewer: Gawaher Khaled - Date: 09.09.2022

INTERVIEWEE: CAPTAIN RASHED SAEED - THE MANAGER OF DOCKYARD FISH SERVICE COMPLEX/ ADEN.

➤ How does the Dockyard Center work and what the quantities of fish products has been harvested in normal busy day?

Fish transport vehicles loaded with various fish come from the various governorates to the center every evening of every day, and they stop at the location specified for them in the forest, and their fish are removed to specialized stalls, and they are forested according to the rules and regulations. As for the berth, which is 52 meters long, it receives snipes that come from the sea and small traditional fishing boats called al-Hori of various sizes and loaded with various fish, as well as sharks of all kinds. The quantities are ranged between 10-14 tons per day.

➤ What are the rules for conducting an auction at the Dockyard Complex?

Access to the fish auction is limited to fishermen and fish dealers. As for the way it is operated, the regulation of the fish auction mentions the procedures for regulating fishing operations and ensuring the reliability of sales and fish. In addition, the regulation includes the conditions of sale by defining the services of the fish auction in order to organize and ensure the smooth operation of the auction with the aim of fixing the prices of fish offered for sale in public auction.

➤ What are the main problems that you encounter as the general Manger of fish harbors and landing centers in Aden?

Destroying basic buildings that play a major role in improving, handling and preserving fish products, such as:

- The work of fish preparation plants, freezers, and storage refrigerators has stopped.
 - Stopping ice factories that play a major role in preserving the quality of fish.
 - The electricity network, sewage network, and water network are worn out.
 - The private generators used to feed the complex are worn out.
 - The fishing berth for receiving boats, including Al-Sanabiq, are worn out.
- What is people's opinion on the quality of fishing products that buy in Dockyard complex? (Poor, average, good).

The opinion of the public about the quality of fish products in the dockyard complex is average, as the public desires a typical market in which all means of preserving the product and cutting methods for marine products are available.

➤ What other marketing costs do you incur in Dockyard fish service complex?

The dockyard complex for fish services provides a range of services such as: fish transport vehicles, fish boxes, water and electricity fees, and contract workers for fish handling for which a rate of 2% is due (as there is no fish association in the dockyard). In addition to 1% for the ownership of the yard, meaning that the center charges 3%.

➤ Why do not allocate an amount of the general revenue, which represents 3%, for the rehabilitation of refrigerators and maintenance of the Dockyard Complex?

We cannot, because these amounts are considered state revenues and are supplied to the Central Bank on a daily basis, as the Ministry of Fisheries represented by the General Authority is not financially independent, and therefore the Authority cannot dispose of state funds.

- In your opinion what needs to be done to improve Dockyard fish products Quality and trade?
 - As a quality: training and qualification of the government sector by providing workers specialized in fish handling, preparation and storage.
 - As a trade: openness to the private sector and its participation in exporting fish products abroad.
- Generally, how do you view Dockyard fish service complex?

My view of the dockyard complex is that it is the center at the level of the Republic of Yemen in the field of fish handling and marketing that serves the traditional and coastal fisherman in addition to the investor. It also contributes to facilitating dealings between fish sellers and buyers in all respects. It occupies its economic and social place, through the services and facilities it provides to fishermen and merchants, and provides fish to citizens at reasonable prices. It also helps in supplying the national economy with local currency and achieving food security for the local market.

Interview translation transcript 3

Interviewer: Gawaher Khaled – Date: 16. 05.2022

INTERVIEWEE: KHALED FADHL JABAL: THE OWNER OF AL- JABAL AGENCY FOR FISHING / ADEN.

- What are the Fish Products handled within dockyard complex

Main fish products in circulation in the existing fish market are tuna fish, King mackerel, cobia, grouper, emperor and shark,. In each case, large-scale wholesaling to traders is performed but there are no retail sales to general consumers. Fresh fish is landed by small fishing boats in late afternoon every day and is sold to local fish markets and partly to general consumers, but in small quantities.

- What are the seasons for catching fish in the city of Aden?

It is difficult to carry out traditional fishing activity during the months (May-September) because of bad weather. Strong winds and high sea wave's increase, so fishermen move their boats to the most protected areas Therefore fish products are caught in small quantities, and this period is called the northern season. However, during the months (October-February) fish products are caught in large quantities, because the wind speed decreases, and this period is called Al-azib season.

- What can facilitate the fees collection within Dockyard complex from fishermen?

Computers facilitate data collection within Dockyard complex. This will mean that landing costs and dues data can be recorded on a daily basis and the use of paper records can be phased out. This will improve fees collection and increase revenues from fish landing centers