CHAPTER - 3

JAPANESE PORT SYSTEM: AN INFRASTRUCTURE FOR ITS OVERSEAS TRADE
At present Japan relies on marine transport to move the majority of the goods essential for its inhabitant's daily lives. Ports and harbours serve as focal points for the industrial activities that support regional economies. They also function as marine recreation sites, as well as processing areas for sewage and other waste products. Japan's ports and harbours, play an essential role in the social and economic activities of its citizens. According to Ministry of Infrastructure, Land Transport and Tourism (MILT), 'Japan is a long, narrow island country; it has remarkably high proportion of coast line which spans 34,600 km to total land area (380,000 sq km) has generated an extremely large member of ports'. The Ocean Policy Research Foundation is of the opinion that about 45 percent of the entire population of Japan lives near the harbours. The Ports and Harbours in Japan 2008 describes, 'Ports are the mainstay for 99 percent of Japan's foreign trade and 42 percent of its domestic distribution' (Ports and Harbours in Japan, 2008:1).

### 3.1 Evolution of Japanese Port System

Trade between Japan and China started in 6th century. During 11th century, an artificial island, Kyoga Island was constructed at the site of present day Hyogo Prefecture where trade ships from other countries could anchor. Sakai Port in Osaka began to flourish in the 16th century just one century before Japan entered into the Edo period. Japan's port and harbour matured under the Meiji government's policy of industrial promotion, national wealth and military strength. Yokohama and Kobe were established as major foreign trading station to promote the heavy growth of industries around the present metropolitan and coastal region of Japan. In 1921, government took initiatives to develop land for expanding coastal industries to support the construction of ports and harbours, therefore The Public Waters Reclamation Law was enacted. After World War II, during 1950s Japan experienced both a rapid population increase in urban areas, intensive efforts

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9 Ports are break-of-bulk points. Traditionally, the chain of transport has been interrupted in the port itself and cargo is stored in warehouses, silos or tanks. As a result of the great diversity of goods, numerous general purpose and specialized installations are necessary to enable the port to fulfill its entrepot function (Hanappe and Savy, 1980:13). In this era of globalization ports have evolved from being traditional interfaces between sea and land to providers of complete logistics networks. Ports are being differentiated by their ability to handle the latest generation of container ships coming on stream. According to a study by ocean shipping consultants it is expected that by 2010, 8,000 TEU ships will be dominant in all trades. (Coulter, 2002: 137). Hub ports are potential lucrative targets for terrorists. They may link up with pirates to hijack carriers of LPG and turn them into floating bombs to disable ports'. (Richardson, 2003:12).
were made to improve the network of ports, railroads and highways and thus the Port and Harbour Law was enacted in 1950s, as Japan’s first basic law covering the construction, improvement, management and operation of Ports and Harbours. This law clearly states that ports were to be managed by port management bodies and the foundation for the current Japanese system of port management by local government entities was established.

**Table 3.1 Major Port Legislation in Japan**

<table>
<thead>
<tr>
<th>Year</th>
<th>Name of the Legislation</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>Port and Harbour Law</td>
<td>It sets the regulation of port planning, construction, management and operation</td>
</tr>
<tr>
<td>1953</td>
<td>Port Construction Promotion Law</td>
<td>It sets regulation for port development planning and construction</td>
</tr>
<tr>
<td>1959</td>
<td>Law on Measures for the Development of Specially designated Ports</td>
<td>It sets regulation for port development planning and construction of specially designated port.</td>
</tr>
<tr>
<td>1961</td>
<td>Law on Emergency Measures for Port Development</td>
<td>It sets regulation for port development planning and construction</td>
</tr>
<tr>
<td>1999</td>
<td>Private Finance Initiative Law</td>
<td>To promote private sector participating in infrastructure.</td>
</tr>
</tbody>
</table>

The above table shows the enactment of important port legislation that took place after World War II for the enhancement of port facilities. In 1960s, Japanese economy enjoyed a high population growth, due to expansion of economy, industrialization and growth of trade, leading to a shortage of port capacity. In 1961, the Law on Emergency Measures for Port development came into force and the First Five Year Port Development Plan was devised. From the mid 1950s to the mid 1960s when economic reconstruction efforts raised lead construction expenditures all across the country port construction also got priority in economic policy.
3.2. Port Management

Japan has port and harbour policy for providing planned long term development of the country’s trade in response to changing socio-economic development and port related demands. The Port and Harbour law was introduced during early 1950s when Japan was all set to develop its infrastructure after World War II. The law sets the basic regulations on development, use and management of ports and harbours. During the same period foreign cargo wharves were constructed based on government policy to counter excessive ship traffic. During 1970s there was development of large scale industrial lands and wharves for large specialized bulk carriers\(^{10}\) for establishing heavy chemical industrial belts. Along with it container terminals were established in response to the introduction of marine container transport, wharves for importing coal and Liquefied Natural Gas (LNG), terminals were also built in order to deal with the diversification of energy sources and ensure a stable supply of energy. Initiatives were taken for developing green belts and marinas to satisfy the increased demand for recreational facilities. Projects like ‘Ports and Harbours’ in the 21st century was enacted in 1985, followed by ‘Developing Affluent Waterfronts’ in the year 1990, to transform ports into high quality, comprehensive harbour areas for commuters and residents. The development of ports has proceeded systematically according to five year investment plan. The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) compiles a national level budget for the development of ports and harbours to ensure the systematic implementation of each ports development plan. According to the Port and Harbour Law, port management bodies of major ports that have a strong connection to the national interest are required to formulate port plans and submit to the MLIT. The port plans establish policies for port planning, port capacities, the scale and maintenance of the port environment.

MLIT enacted the Port Improvement Promotion Law in 1953 to discuss with various ministries about raising funds for port related matters. Port facility development projects and land reclamation works in coastal areas require massive amounts of capital and port management bodies acquire most of this capital by issuing local bonds. Port functional facility development projects are designed to develop quay walls, necessary for efficient

\(^{10}\) According to Safety of Life at Sea (SOLAS), bulk carrier means a ship which is constructed generally with single deck, top-sided and hopper sided tanks to carry dry cargo in bulk for example ore carriers.
functioning of ports and land required for wharves, warehouses cargo handling equipments and tugboats. Land reclamation projects of coastal land involve creating green belts, marinas and parks for recreation and commercial uses. MLIT including the Ministry of Finance, Ministry of Agriculture, Forestry and Fisheries oversee the various social and economic port activities. Both marine zones (port area)\textsuperscript{11} and land zones (heater front zones)\textsuperscript{12} exist in Japan. Port authority of Japan does not interfere with the ventures of the private sector. There are many privately owned wharves in Japanese ports. To cope up with the rapid economic growth that began in Japan since 1950s coastal lands were reclaimed and sold to private entrepreneurs for the construction of chemical and steel plants.

Table 3.2: Classification of Ports and Harbours in Japan, 2008

<table>
<thead>
<tr>
<th>Category of the Ports</th>
<th>Numbers in 2008</th>
<th>Major Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specially Designated Ports</td>
<td>23</td>
<td>It serves as bases for the international marine transport network</td>
</tr>
<tr>
<td>Major Ports</td>
<td>128</td>
<td>It serves as bases for both the international as well as the domestic marine transport network. It also includes ports that are important for Japan’s economic development.</td>
</tr>
<tr>
<td>Local Ports</td>
<td>914</td>
<td>All other ports which are classified as Specially Designated Ports or major Ports</td>
</tr>
<tr>
<td>Harbours for Refugee</td>
<td>35</td>
<td>It is a harbor that allows small vessels to anchor during heavy windstorms or rainstorms. They are not used for loading and unloading of cargoes or passengers.</td>
</tr>
</tbody>
</table>

Source: This is a modified version of the table produced by MLIT, 2008. Data are used from Ports and Harbours in Japan, 2008:14.

\textsuperscript{11} Marine zones refer to zones authorized by the national government as areas required for the management and operation of ports. (Ports and Harbours in Japan, 2008:9).

\textsuperscript{12} Land zones are designated in the city Planning Law or authorized by the national government (Port and Harbours in Japan, 2008:9).
There are totally 1042 ports in Japan as of April, 2008. Of this 128, are classified as major ports and 23 of these major ports are classified as specially designated major ports, which are mainly international ports. Map 3.1 shows major ports as well as the designated recycle ports of Japan

3.3. Port of Tokyo

The Port of Tokyo lies at the head of Tokyo Bay on Honshu Island’s Pacific Coast, is one of the biggest industrial urban area of Japan. The Port of Tokyo is near to the Port of Chiba and the Port of Yokohama which are just 20 kilometers and 23 kilometers away from it. The port consists of piers of different purposes which act as the gateways of the sea; the most important ones are Hinode, Shibaura, Takeshiba, Harumi, Aomi, Oi and Shinagaura. According to MLIT (2008), the size of the container terminals and the volume of commodity transaction are highest in Japan. The port of Tokyo, once known as the Port of Edo, developed as a strategic water transportation hub for supplying goods and materials to the former capital Edo, became a gateway for international trade in 1941. During the Edo period, landfill operations began in preparation for the construction of residential dwellings, and today the emergence of the waterfront city on the landfill sites in the Port of Tokyo has developed huge urban infrastructure. Beside this, the Bureau of Port and Harbour of the Tokyo Metropolitan Government and the Tokyo Port Promotion Association have opened Tokyo Minato-Kan (Tokyo Port Museum) to give visitors a glimpse of history of the Port of Tokyo as well as the current condition and future plans for the waterfront city.

Tokyo Tube Tunnel beneath the Port of Tokyo was completed in 1976 to form a crucial link in the Tokyo Port Metropolitan Expressway Loop Road that serves the Odaiba\textsuperscript{13} and Tokyo Bay Waterfront areas. Continuous growth of traffic in Tokyo waterfront area means that traffic flows will eventually exceed the capacity of the tunnel; therefore the authorities are currently examining alternatives to avoid future traffic congestion.

\textsuperscript{13} Odaiba is a large artificial island in Tokyo Bay, across the Rainbow Bridge from Central Tokyo. It was initially built for defensive purposes in the 1850s dramatically expanded during the late 20\textsuperscript{th} century as a seaport district and has developed as a major commercial residential and leisure area since 1990s.

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3.3.1 Port History

According to Ports and Harbour in Japan (2008), 'A small fishing village called Edo existed on the site of the modern Port of Tokyo for centuries. As early as 1392, many ships were moving in and out of the Port of Tokyo’s harbour and the Medieval Shinagawa Port bustled with commercial activity.' (Ports and Harbour in Japan, 2008:23). According to MLIT (2009), 'This early port, the fore runner to the modern Port of Tokyo, contributed to the development of marine transportation in Japan'. According to Encyclopedia of Japan (2008), 'Tokugaura Ieyasu made the Port of Tokyo/Edo his base, and when he became Shogun in the early 17th century, Edo became the de facto capital of Japan and the center for the national military government. In 1612, the Tokugaura Shogunate began to rebuild the existing port by adding extensive berths and port facilities. Throughout, the 1600s, the Port of Tokyo grew rapidly and its population exceeded a million by the beginning of the 1700s' (Encyclopedia of Japan, 2008:17) At this time, the Port of Tokyo was an important distribution point for supplying goods to the people of Edo. Development of the modern Port of Tokyo did not begin until the Meiji Period, when land reclamation and dredging projects began. Commodore Perry arrived in Tokyo Bay and the Shogunate began to build gun batteries at the harbour. According to Simon, 'In 1858, the U.S. Japan Amity and Commerce Treaty opened five ports and two cities in Japan to foreign trade and international contact after a long period of isolations. After over two and a half centuries of military rule, the Tokugawa Shogunate was overthrown and Imperial rule was restored. Emperor Meiji moved to Edo in 1869, and the Edo castle became the Imperial palace' (Simon, 2000:32). According to Mayer, 'The city of Tokyo was established and the Port of Tokyo became the national capital until the municipality was abolished and merged with the metropolitan prefecture of Tokyo in 1943' (Mayer, 1973:23). MLIT are of the opinion that after the occurrence of Great Kanto Earthquake in 1923 till the occurrence of World War II, full-scale construction of the Port of Tokyo was undertaken. During this time there was completion of the terminals like Hinode, Takeshiba and Shukaura, which laid the foundation of the modern Port of Tokyo.
This growth came to a halt when U.S. forces requisitioned the Port of Tokyo after World War II. During 1945, the city was bombed and more than 200,000 people were killed; therefore the Port of Tokyo was completely rebuilt after 1945 and continued to flourish. In 1941, however this port was proclaimed an international port. There was a tendency to redevelop and re-establishment of domestic industry around the Port Area. In 1950, the Toyosu Coal Terminal began operations and the Port Law was promulgated by the Japanese Government. In 1951, the Port of Tokyo was designated as a major port and placed under the administration of the Port of Tokyo’s metropolitan government. The Shinagawa Container Terminal was completed in 1967 and the first container ship, the Hawaiian Planter arrived at the Port of Tokyo. By 1974, the Cargo Terminal had been completed and ferry operation was underway, gradually there was development of Harumi Passenger Ship Terminal in 1991, followed by Rainbow Bridge in 1993. The late 1960's witnessed a new concept in transport with the emergence of world wide revolution freight containerization and the Port of Tokyo responded swiftly to this new challenge. According to the opinion of Bureau of Ports and Harbours (2009), containerization has brought the first, fully containerized vessel to call on Japan into the Shinagawa Terminal in 1967, ushering in era of flourishing activity as an international trade port.

3. 3.2. Port Administration

The Bureau of Port and Harbour of the Tokyo Metropolitan Government is the sole authority responsible for managing, administering, maintaining and upgrading the port. It also develops reclaimed lands, the water-front sub-center, seaside parks, and implements measures to mitigate high tides and make plans for developing fishing ports. The Port of Tokyo not only serves the local metropolis but also serves much of the Shinetsu Region and the Southern Tohoku areas having a population of about 40 million people. The Bureau has worked hard to assure that Port of Tokyo should keep up with the changing maritime commerce environment by enhancing terminals for container, ferries and specialized cargoes and by providing ample ware houses storage and distribution centers located on reclaimed lands behind the terminals and transportation networks. According to the Bureau of Ports and Harbour of Japan (2009), Port of Tokyo covers over a
thousand hectares of land area and 5.3 hectares of water surface. Its breakwater is over 8.5 thousand waters long and its wharves and piers are over 22.7 thousand meters. This port contains over 209.4 thousand square meters of public transit sheds and more than a million square meters of public open air storage yards. It timber basins cover over 999 thousand square meters and the Port of Tokyo’s Heliport covers more than 147 thousand square meters.

3.3.3 **The Port of Tokyo’s Oil Container Terminal**

It is one of Japan’s most modernized container terminal with forty trading companies have their ultra-modern distribution facilities. This terminal is served by seven large seal berths to accommodate the largest container vessels. The Port of Tokyo has increased its capacity for handling a wide range of agricultural and marine products. Earlier Harumi Terminal was used for this purpose, but from 1999, Oi Food Stuff Terminal was created with larger capacity to handle wheat, fruits, vegetables and seafood imported from Africa, New Zealand and the Northern Seas. In 1989, the Wakasu Construction Materials Terminals opened for public use in the Port of Tokyo to handle sand, gravel and marble chips.

The Aomi Container Terminal can accommodate large container vessels upto 50,000 DWT. The Aomi Cargo Distribution Center occupies two buildings behind the wharf and has capacity to handle store and convey cargoes. Shinagawa Container Terminal is a public terminal managed by the Tokyo Metropolitan Government, it was opened in 1967 and the oldest container terminal in Japan. Today it serves as container routes to China, Korea and Southeast Asia. The Tsukishima Terminal in the Port of Tokyo is a fisheries base specializing in marine products and has large-scale cold storage warehouses. The Oi Food stuffs and Marine Terminals and the Tsukishima Terminal together represents the major food source for the Tokyo Metropolitan area. Odaiba Liner Terminal can accommodate vessels upto 15,000 DWT. The terminal handles a variety of cargoes that include steel, machinery, lumber, paper and fruits. It has many transit sheds and private ware houses to effectively handle the full range of cargoes. The Bulk Cargo Terminal at the Port of Tokyo Inner Central Breakwater Reclamation Area is a public terminal that handles mainly coal, silica sand and other bulk cargo imports. This terminal is fully
equipped with unloaders, conveyor belts and a variety of other cargo handling machinery. Expecting continued and increasing demands for these materials, the Port of Tokyo will continue to develop large-scale terminals in the Outer-Central Breakwater Reclamation Area. The Lumber Terminal and Timber Basin has the capacity to store upto 200,000 cubic meters of Lumber. These lumbers come from Canada, United States and Malaysia. The Shihaura Terminal handles general cargo carried by conventional vessels and it has extensive transit sheds and storage areas. It handles general cargo carried by conventional vessels and has extensive transit sheds and storage areas. The Hinode Terminal is the oldest terminal in this port and developed as a passenger ship terminal and promotional centers for the location of commercial, business and other facilities. The Multipurpose terminal was completed in 1996, opened for use to area residents. It has an earthquake resistant wharf designated for handling relief goods in case of a disaster. The Shinagawa Domestic Trade Terminal specializes in handling newsprint, automobiles and miscellaneous roll-on/roll-off cargoes on routes with the Port of Hokkaido. The Tatsumi Terminal opened in 2002 which also handles steel and other goods between the Port of Tokyo and Port of Hokkaido. The Harumi Passenger Ship Terminal opened in 1991, the year when the Port of Tokyo completed its 50th year of service to the nation after World War II. This terminal is mainly meant for welcoming both foreign and domestic luxury cruise ships. Since it was known as Edo Port, the Port of Tokyo has been a center for distribution of goods throughout Japan. With a long history as the country’s major domestic marine transport lease, this port has long handled cargoes of food stuffs, paper, steel, automobiles and other products that satisfy domestic consumers.

3.3.4 The Tokyo Waterfront City

According to Bureau of Port and Harbour of Japan (2009), ‘The development of Tokyo Waterfront City on the coast of Tokyo Bay is one of the largest urban development projects developed by Tokyo Metropolitan Government. Its purpose is to establish a base that enhances Tokyo’s vitality and appeal as well as being a venue of exchange opens to the world’ (Bureau of Port and Harbour of Japan, 2009:13). In the waterfront city, many infrastructural facilities such as water works, sewerage plants and electric power cables are housed in underground multipurpose ducts that utilize the underground space just
LOCATION OF THE SIX MAJOR PORTS OF JAPAN IN TOKYO BAY AREA


Legend:
- City
- Front
- Main Roads
- Expressways
- Expressways Under Construction
- Sea
- Port
below the roads and green parks. The Map 3.2 shows the development of six major ports along the coastal areas of Tokyo Bay - Port of Tokyo, Port of Kawasaki, Port of Yokohama, Port of Yokosuka, Port of Kisarazu and Port of Chiba. This map also shows the expansion of waterfront areas along the Tokyo Metropolitan Region which includes the port of Tokyo as well. This has mainly happened because of the expansion of industrial areas of Japan along the coastal areas for exporting and importing cargoes.

This waterfront city is capable of withstanding an earthquake of the same magnitude as the Great Kanto Earthquake of 1923. Under this project diverse urban functions are arranged making the optimal use of the available space. At present more than 700 private companies are working and employing about 30,000 people. This Waterfront City forms a Tokyo Bay's coastal city axis area together with Yokohama, Kawasaki and Chiba.

Figure 3.1  Container Cargo Volume, Port of Tokyo, (1997-2001).
Unit in Million Tons

The above diagram shows the container cargo volume of the Port of Tokyo for the year 1997 to 2000. It is seen that the imported cargo handled at the port remains higher than the volume of cargo exported. This illustrates the fact that how transformations in the
economic and social structure of Japan have brought with them in an increase in the demand for products from abroad.

Figure 3.2 Value of Foreign Trade, Port of Tokyo, (2002-2007).
Unit in Trillion Yens

The above figure 3.2 shows the value of foreign trade from 2002 to 2007. It is seen that the value of imports exceed the value of exports for every year. Port of Tokyo is famous for the largest container cargo volume in Japan enhances its international competitiveness through cost reduction and service improvement which is important for the development of the economic society in Japan. In order to achieve this, the Tokyo Metropolitan Government has determined to formulate a program for Super Hub Port Promotion and proceed with various types of initiatives in cooperation with the Port of Yokohama. According to Bureau of ports and Harbour of Japan (2009), "The Super Hub Port concept represents an attempt to selectively and intensively nurture container terminals offering excellent costs and services as a national government policy initiated for the

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14 Super Hub Port Project is an effort aimed at reducing port costs by 30 percent and shortening lead time (the time between when a ship enters port and the offloading of freight becomes possible) from three or four days to one day by efficiently operating large-scale container terminals having three or more berths on an integrated basis under a single operator in order to achieve a cost and service level that surpasses Asia’s other main ports. (Ports and Harbour Bureau, 2006:34).
The purpose of promoting the priority reinforcement of the international competitive strength of Japan's 'container ports.' The Port of Tokyo is the representative of all ports in Japan that handle international trade. The coastal area of Tokyo Bay surrounding the Port of Tokyo is the home to a high concentration of not only port and harbour's logistics function, but also the nation's major production, commercial business and urban functions. The Tokyo Bay Bridge connecting Wakasu with the reclaimed site inside the central breakwater is scheduled for completion by the end of 2010.

3.3.5 Recommendations for the Improvement of the Port of Tokyo

The Port of Tokyo should be made more environmentally friendly. Efforts should be made to provide water areas and conserve and revitalized the natural environment taking the land and water areas between offshore Kasai to offshore Haneda as a single unit while creating habitats for a broad diversity of living beings. There should be sufficient waste disposal area which is one of the biggest port problems at present times. The port should be capable of transporting goods and should keep the international distribution function open for the maintenance of economic activities in the event of a big earthquake. There should be expansion and reinforcement of foreign trade container terminal functions, terminal sites are to be expanded at the existing Oi and Aomi Container Terminals. There is need for construction of the new container terminals in the Outer Central Breakwater Reclamation Area and the New Waste Disposal Area to serve key navigation routes and coastal routes from Asia. All terminal handling foreign trade containers shall be designated as zones for the special promotion of effective management. There should be expansion of the Harbour Marine Transportation Network.

According to the Tokyo Waste Landfill Management Office (2009), there should be conservation and revitalize of the natural environment and expansion of water spaces. Sand beaches, tidal flats and other habitat environment shall be created for a diversity of living beings in the central breakwater offshore area. There is an urgent need for the development of small piers for boarding marine buses at the Jonanjima and Wakasu

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15 There are facilities at the Port of Tokyo that specialize in the handling of sand, gravel and other construction materials as well as logs and lumber in order to respond to the demand for the construction of residence, office building & other structure in the Tokyo Metropolitan Area. There is also a log handling pond where the imported logs are dumped into water, then gathered into raft and towed to the Timer Basin.
Seaside Parks, Toyosu, Harumi and other locations as well as the expansion of the harbour marine network linking the Tokyo Waterfront City with other districts while promoting improved passenger ship functions at the Hinode and Harumi Terminals. The Port of Tokyo Promotion Council consisting of personnel concerned with the Port of Tokyo, formulated initiatives for the advancement of the Port of Tokyo as an Action Plan in April 1999 with the aim of providing the Port of Tokyo with international competitiveness. The Council devised a New Action Plan in March 2004 to serve as a guideline for initiatives for solutions to new issues being confronted by the port taking into account remarkable progress at ports in other Asian countries, advancements in distribution innovation and changes in the circumstances surrounding the Port.

Waste has been dumped into Tokyo Bay since 1927. Ashes and non-flammable waste are generated by small and medium size industries near to Tokyo Bay. Water and sewage treatment facilities generate sludge. All of this waste is sent to the waste landfill outside central breakwater and the new sea-based waste landfill. Tokyo Metropolitan Government has formulated a waste disposal plan and promotes waste recycling and reductions in waste generation. Plastic is particularly light and bulky and takes up valuable space in landfills. The TMG regards waste plastic as useful resources and promotes recycling of Pet Bottles for making fibers or can be burn to produce heat for power generation which is known as thermal recycling. Waste landfills are managed and operated under environment related laws and regulations including the Waste Management and Public Cleaning Law. Measures are taken to prevent dispersion of waste and control pests at waste landfills. As the waste decomposes, it generates gases called methane which is used to generate electric power and it is utilized at the landfills to help prevent global warming. Waste disposals in landfill have a great impact on environment. In future efforts and research are required to promote more recycling activities.

3.4. Port of Yokohama

The Port of Yokohama is the capital of Kanagawa prefecture on the Eastern Pacific Coast of Japan. It is located on Tokyo Bay, about 15 nautical miles southwest of the Port of Tokyo and 9 nautical miles northwest of the Port of Kisarazi. This port is operated by the
Port and Harbour Bureau of the City of Yokohama in Japan. The construction of International Passenger Terminal in 2002 made easy access to expressways and airports; it is now capable of accommodating almost all cruise ships. According to Jenkins ‘it is Japan’ top most cruise port in terms of number of visiting ships for four consecutive years’ (Jenkins, 1979:259). From a small fishing village to an international port, Yokohama has contributed immensely to Japan’s economic success. In 1981, the Port of Yokohama and the Port of Vancouver concluded the sister ports agreement to exchange information and in 1983, the Port of Yokohama and the Port of Shanghai became ‘Friendship Port’, which in now Yokohama’s biggest trade partner in terms of container volume.

3.4.1. Port History

Yokohama was a small fishing village till the end of the feudal Edo Period, when Japan held a policy of national seclusion having little contact with foreigners. A major turning point in Japanese history happened in 1853 when Commodore Matthew Perry arrived south of Yokohama for trading with Japan and Tokygawa Shogunate agreed by signing the Treaty of Peace and Amity. During those days only two wharfs were built in place of the present day Osanbashi and were too shallow to dock all the ships. In order to make the port into a modern day berth, the then Japanese Government began launching a succession of construction projects in 1889. In turn, the Port of Yokohama became Japan’s leading trade port and the doorway to Japan.

After the Meiji Restoration of 1868, the port was developed for trading silk, the main trading partner being Great Britain. According to Hammer, ‘Japan’s first railway was constructed in the same year to connect Yokohama to Shinagawa and Shimbashi to Tokyo’ (Hammer, 2006:143). The early 20th century brought rapid industrial growth to the Port of Yokohama, the coastline became saturated with factories and reclamation work began on the wide and shallow beach between Kawasaki and Kanagawa. This new area was called the Keihin Industrial Zone. In 1923, the Great Kanto Earthquake destroyed the Yokohama Port, again it was rebuilt and remained undistributed till the beginning of World War II. During this phase construction of coastal reclamation work was done and Tsunami-Kanagawa area was created along with Ebisu Jakara and Daikoku
Zones. The port activities were temporarily suspended after World War II, when American forces confiscated almost all port facilities and used them as their command base for their military activities within Japan. Private trade was almost halted after the War, however resumption of normal port functions began quickly. Takashima, Yamanouchi, Osanbashi and Shinko Piers which was captured during the World War II were freed but till date some portion of Shinko Piers are under the control of United States. The Harbour law which was enacted in 1951 effectively transferred the control of the Japanese Ports from National Government to State Government. During this phase, the city of Yokohama created the Port and Harbour Bureau for management and development of the Port of Yokohama. The rapid resumption of foreign trade brought along with the growth of Japanese ports, factories developed along the Keihin Industrial zone and until 1967 the port handled all types of cargoes in separate units. Just before the introduction of containerization, each ship had to be loaded and unloaded individually, which used to consume more time and man power. With the introduction of container freight, large steel shipping boxes and the gantry cranes made a vast improvement in the safety, security and efficiency of transporting and handling cargo.

3.4.2. The Yokohama Port Terminal

According to Yokohama Port Public Corporation (2009), ‘The Yokohama International Port Terminal is a location of complex movement and interchange between visitors to Yokohama and its inhabitants between differing modes of transportation and between both urban and aquatic landscapes’. The Port of Yokohama is on the routes connecting East Asia and North American and its container terminals are located near to the mouth of Tokyo Bay. Various piers are constructed for handling different types of commodities, they are Minami Honmoku Pier which is closest to the sea makes it possible for ships to shorten their navigation time, Yamanouchi pier, Detamachi Pier, Daikobu Pier, and Kanazawa Timer Pier. Short description of the piers is as follows. Map 3.3 shows the layout of the Port of Yokohama and the descriptions of different piers are as follows.
PORT OF YOKOHAMA

Legend
- Planned Harbour Line
- Main Roads
- High Standard Container Terminal Zone
- Harbour Limits
- Gulf Line Of Expressway
- Port
- Peripheral Green Space Planning
- Earthquake Resistance Birth
- Container Terminal

Source: Port & Harbour Plan (2008), Yokohama Port Public Corporation, Yokohama
3.4.2.1. Honmoku Pier

It was constructed between 1963 and 1970 with four jetties in a comb-like shape and the most important pier to handle more than 60 percent of the container cargoes of this port. It is planned to build 10 container berths including 4 deep berths of 15 meters or more. It is the single terminal of the largest class in Japan and has a berth length of about 1400 meters and a terminal area of 50 ha. This pier also accommodates various types of vessels from full-container ships to Ro/Ro ships and also serves as a waste disposal site. Since, it is located in the deep water area, it is possible to construct very deep quay walls.

3.4.2.2. Yangshita Pier

The constructional work for this pier started in 1953 and ended in 1963. It focuses on conventional cargo, handles mainly the export of metal work and machine products to Southeast Asia and Middle East.

3.4.2.3. Osanbashi Pier

It is the oldest pier at the Port of Yokohama, constructed between 1889 and 1896 as a full-scale, modern port and harbour facility. Shinko Pier is located roughly in the centre of the port of Yokohama. It was constructed at the beginning of 20th century was designated as the nation’s first modern pier with excellent harbour facilities. It was damaged by the Great Kanto Earthquakes in 1923 and is the only pier that still preserves historical facilities such as the Red Brick ware Houses which was opened to public in 2002. It has been redeveloped under the Minato Mirai 2 project and in 1993 the passenger terminal was constructed. Yokohama World Porters was opened as a Foreign Access Zone (FAC) facility and Yokohama International Seamen’s center was completed to serve both domestic and foreign sailors. Yamanouchi Pier along with Takashima Pier was developed for domestic trade. After World War II, it was used for ships on Southeast Asia and Middle East Route services. Datamachi Pier – It was constructed in 1954. This pier has transit sheds especially for bananas and vegetables since it is the main unloading site for these items at this port and also known as “Banana Pier.”
3.4.2.4. Daikoku Pier
It is the largest island type pier at this port. There are a large number of private warehouses and the total storage area exceeds 1000,000 cubic meters. From 1996, the Yokohama cargo center began its operation to meet the large increase in imports. It is designated as the first comprehensive bounded area in eastern Japan.

3.4.2.5. Kanazawa Timber Pier
It started operating in 1970 to meet the sudden increase in the import of timber. To cope up with the increase of demand for area for marine recreation, the Yokohama Bayside Marinas, one of the largest marinas in Japan is being constructed utilizing the water area previously used for floating timber.

3.4.3. Yokohama Port Public Corporation (YPPC)
According to Bureau of Ports and Harbours, Japan (2009) 'the YPPC is a public service corporation established in December 1981 to manage and serve the port’s overseas container terminals'. YPPC has constructed, based and managed the port’s terminals dedicated to foreign trade cargoes to provide Yokohama Port with more efficient functions adaptable to the recent trends distribution. According to YPPC (2009), 'at present it maintains and manages 10 container terminals, two multipurpose terminals and 8 conventional terminals. The Port and Harbour Bureau of the City of Yokohama is the main port authority'.

3.4.4. Development of the Port of Yokohama
The Yokohama Bayside Marine District is responsible for marine related activities. It has already developed green area and promenade along the bayside. Lands are already reclaimed for business use and development of roads, railways and ferry services has been established to make a commercial hub center. Yokohama Bayside Marine Corporation is responsible for management and construction of marine facilities. The famous Uminokoen Marine Park located near to Yokohama Hakkeijima Island has been built on reclaimed land for marina related activities. The Port and Harbour Plan for the Port of Yokohama contains the basic plans specified by the Harbour Administrator of
Yokohama. This plan contains logistics related matters such as berths, piers planning and harbours road planning for improvement of transportation efficiency. According to the Bureau of Ports and Harbour, City of Yokohama (2009), ‘Ports and Harbour Law of Yokohama specified to develop systematically and maintain the space of the port area which is made up of both water and land’. The port authority is now focusing more on planning for beaches, water area, green area and waste disposable sites. There is also an urgent need for planning of earthquake resistant berths which will act as a guideline for development of harbour facilities used by the harbour administrator and private businessmen who operates their work in the harbour.

Figure: 3.3 Planned Green Areas in Yokohama Port, 2009.

Units in hectares

Source: Bureau of Ports and Harbour, Port of Yokohama (2009).
The above figure 3.3 shows the planned green areas within the Port of Yokohama in near future. At present it is planned to make 134.1 hectares of green areas along different Piers. The proposal for allocating maximum space for green areas is for Daikoku pier, Honmoku pier and Kanazawa area. There is a proposal for creating the high-standard container terminals in Honmoku Pier and Daikoku Pier as well. Accommodation of large containerships in Minami Honmoku Pier and creation of advanced physical distribution to activate industries in coastal areas are also in the main agenda.

Suggestions are also given to improve the water quality and revitalize the nature in the harbor and to expand and reinforce earthquake – resistant berths so that marine transportation fulfills an important role in case of a large scale earthquake and to provide quick services for emergency relief. The Port of Yokohama has been expanding into the sea since its inception during the Meiji Era, and very little renovation has been done for the early built structures. To construct and renovate the waterfront area, the Port Bureau handled the projects like development of Minato Mirai 21 and renovation of Osanobashi Pier. Two routes with ten lanes are completed like that of Tokyo Bay Shore Expressway and the Yoko-Hane Expressway for Tokyo and Towe Expressway for Shizuco.

3.4.5. Port Commerce

According to Bureau of Ports and Harbours of Japan (2009), ‘The Port of Yokohama is Japan’s second ranking container port and one of the country’s oldest international trading ports. In 2006, Yokohama saw an increase in cargo volume of 3.7 percent and 11.4 percent increase in container volume’. Yokohama Port Public Corporation says port of Yokohama at present has 30 container terminals out of which Honmoku, Daikoku and Minami – Honmoku piers are owned by them.
The figure 3.4 shows the ship movement in the port of Yokohama from 2000 to 2008. It is seen that from 2001 there is an increase in Container ships as well as Ocean Going Ships, but there is a slight decrease in Coastal Ships. This explains the fact that with the expansion of both volume and value of trade, Container Ships are gaining grounds, as well as with the increase in cargo distribution, there is also increase in ocean going vessels.
Figure 3.5: Value of Trade, Port of Yokohama, 2000-2008.

Unit in Million Yen.

The above figure 3.5 shows the value of trade both in terms of exports and imports handled by Port of Yokohama from 2000 to 2008. The major exported items are finished automobiles, auto-parts, and industrial machinery. The major imported items are farm and marine products, machines and commodities. It is expected that the volume of cargoes that would be handled by the Port of Yokohama in 2010 will increase due to the growing automobile industry, acceleration of international specialization in the production fields, borderless economy under the Free Trade Agreement (FTA), expansion of Japan-China Trade and development due to Super Core Port. According to YPPC's estimation the total volume of cargo the port would handle at the end of 2010 will be about 150 million tons and the number of cargoes handle may exceed 4 million TEU.

3.5. The Port of Nagoya

The Port of Nagoya is the Capital of Aichi Prefecture in East Central Japan. It is located at the head of Ise Bay off the Pacific Ocean and just 20 kilometers north-west of the Port of Kinuura and 140 kilometers east of the Port of Osaka. This port is Japan's third biggest incorporated city and rank fourth in terms of most populous metropolitan area. The port
was officially opened in 1907, then developed rapidly and named as a specially designated major port by the national government in 1951. It was hit by the Ise Bay Typhoon in 1959 causing tremendous damage to its facilities, it has grown steadily ever since, becoming one of Japan’s top international trade ports and holding number one position in the country for total volume of cargo handled and trade value. This port was designated as ‘Super Core Project’ in 2004, since then it has implemented various key measures to strengthen its international competitiveness.

3.5.1. Port History

The Port of Nagoya got its name from the Nagona Manor that was built there in the 12th century A.D. and played a critical role in shaping Japan’s history. During the Meiji Era, when Japan was opened to the world, this port industrialized quickly and created transportation links with rest of the areas of the world. During World War II, it was known for its foundaries, machineries and heavy metal products which were exported to different areas. The automobile industry which was born in 1920s in the Port of Nagoya for example the Toyota Motor Corporation which was started as a loom-making company, today it is the biggest automaker to dominate the Port of Nagoya’s economy along with Mitsubishi and Honda. The head quarters of most of the international corporations are located here like Toyota, Suzuki, Honda, Olympus, Yamaha and Makita.

3.5.2. Port Description

There are many important terminals in this port, their descriptions are written as follows-

3.5.2.1. Nabeta Pier Container Terminal

It started its operation since 2001 and handles mainly Chinese and Korean Cargo which accounts for approximately one-third of the total container cargo volume handled at the Port of Nagoya. It is well equipped with earthquake resistant design, with gantry crane and a container yard with anti-liquefaction features. A new project for constructing the third berth at this terminal is approved in the fiscal year 2009 budget by the Japanese ports and harbours are often built on artificial fills, near to the Bay area where this fills are typically placed over bay mud which amplifies earthquake shaking. Ports are generally consisting of bulk storages facilities and wave houses, cranes to move large containers through rail networks to other areas of land. Liquefaction can cause large areas to sink below the water surface, therefore rail get buckled and misaligned. Lateral spreading is a major problem with ports and harbour (Nagoya Port Terminal Public Corporation, 2009).
Ministry of Finance. Since there is a rapid increase in the volume of cargo in recent years due to lack of berth facilities vessels have to wait offshore for a long time so to meet the infrastructural inadequacy this berth will be constructed.\footnote{This berth will reinforced earthquake resistant structure with a water depth of 12 m and a total quay length of 250 meter and is planned for completion by the end of 2015. (Nagoya Port Terminal Public Corporation, 2009).}

3.5.2.2. **Tobishima Pier South Side Container Terminal**

This terminal was developed with collective efforts by both public and private sectors. According to Nagoya Port Terminal Public Corporation, (2009), ‘Aiming to further strengthen international competitiveness and to cope with the increase in international container cargo and large containerships, a first deep-water high standard container berth (quake-resistant) of 16 cubic meters was opened in 2005 in this port, followed by an opening of the second berth in 2008.’ Nagoya Port Terminal Public Corporation also took initiatives in constructing a 16 meters berth which will be equipped with a size of a super post panama gantry cranes capable of handling 22 rows of boxes on deck and accommodates larger containerships.

In the Port of Nagoya there are three big channels – East Channel (16 metre deep), West Channel (14 m deep) and the Central Channel (16 metre deep). There is a need for expansion and dredging of the East and West Channel due to increase in the size of containerships in recent years. Garden Pier features the port building like the Port of Nagoya Public Aquarium and the Port of Nagoya Villagio Italia while the Minamihama Pier is the Nagoya Port Sport Fishing Area, a unique fishing space on the high tide breakwater. Shimp Pier contains two car terminals owned by a major automobile manufacturer. These facilities are equipped with yards capable of accommodating a total of 38,000 cars, an inspection facility and a test course. The Tokai Motohama Pier on the east side of the port unloads 60,000 tones of iron ore and coal daily to produce iron and steel which is then shipped from one berth to another in the same terminal.
3.5.3. The Port of Nagoya Ferry Berth Corporation

According to Nagoya Port Terminal Public Corporation (2009), 'the Nagoya Ferry Berth Corporation was established in 1971, funded entirely by the Nagoya Port Authority with the aim of constructing, managing and operating its own ferry terminal. There is a rapid increase in container cargo in recent years and enhancement of foreign trade container terminals has become an urgent issue'. The Nagoya Port Terminal Public Corporation (NPTPC) was founded in 1993 adding international container terminal operations to the existing business activities to the Nagoya Ferry Berth Corporation. Now NPTPC is in charge of construction, management and operation of its international container terminals as well as the ferry terminal at the Port of Nagoya. Funds required for terminal construction and improvement are obtained from the national government and the Nagoya Port Authority in the form of interest free loads, bonds and debentures from private financing institutes. The NPTPC has developed foreign trade container terminals at Nabeta and Tobishima Piers and a domestic ferry terminal at Sorami Pier, playing an important role in the comprehensive development of the facilities at the Port of Nagoya. The ferry terminal consists of two berths constructed by Nagoya Port Public Corporation in 1970s as a base for large and long haul car ferry services.

3.5.4. Nagoya Harbour Network

It has been established by government offices, disaster prevention organizations and port-related companies in response to the new provisions to the SOLAS convention adopted by IMO. This network develops preventive measures and finds early solutions to port-related crimes. This port has 287 berths all total, out of which 129 are public berths and 161 are private berths spread out across 17 terminals which are specialized to accommodate certain industrial products or transport modes. Some are designated to handle a particular class of products like timber, grains, petroleum and natural oils. Major industrial complexes such as oil, refineries, steel mills and automobile export bases, well equipped with cargo handling facilities are in operation in the waterfront areas. The waterfront area is larger than the area of Port of Tokyo and the Port of Yokohama combined. According to NPTPC (2009), the Port of Nagoya's Inner Port are four mooring buoys, out of which three buoys can accommodate two 27,000 DWT vessels and
the fourth buoys can accommodate one 20,000 DWT vessels. This port has big warehouses, and cargo handling yards.

3.5.5. Hinterland of Nagoya

The entire Chubu region is the hinterland of the Port of Nagoya which is linked to every region of the country via the road network. The Nishi-Nagoyako line or known as Aonami Line of the Nagoya Rinki Kosoku Railway went into operation in 2004 linking the port directly with downtown Nagoya. The region forms an enormous economic entity in itself. In 1959, the Chubu region was heavily damaged by the Ise Bay Typhoon. The existing shore protection facilities are now 40 years old that was once constructed in 1960s. Developing waterfront disaster prevention bases are the need of the hour to resist earthquakes like Tokai, Tonanki and Nankai from which the region has suffered earlier. According to the Nagoya Customs Reports (2009), ‘the total trade value for the year 2008 which passed through Nagoya Port reached 16.36 trillion yen which was once again the largest amount among all ports in Japan for the eight consecutive year. Surpassing Port of Tokyo, Port of Yokohama, Port of Osaka and Port of Kobe, Port of Nagoya has led Japan in total freight handled for six years and in value of trade for 8 years’. This port is Japan’s leading physical distribution gateway to the world. According to Japan Statistical Year Book (2008), ‘Nagoya has handled about 11 percent of the country’s total trade value which accounted for 62 percent of Japan’s trade surplus. This port is the first automobile exporting port in the country where almost 2 million finished automobiles are exported every year. It is also the third largest container port in Japan’ (Japan Statistical Year Book, 2000:32).
The above figure 3.6 shows volumes of cargoes which include both imports and exported items handled by the Port of Nagoya for the year 2006 and 2007 in the form of Bar Graph. This port imported cargoes from China, Hong Kong and Thailand more than what it exported in 2006, except for USA. China has recently emerged as one of the major trading partners of Japan in recent years.

Over the past several years, larger container ships have come into use with the aim of reducing shipping costs. This has given rise to an urgent need to construct efficient high standard container terminals to meet the demands for efficient cargo handling and greater utilization of information technology. According to the Nagoya Port Plans, Automated Cargo Handling Systems such as remote control/automatic rubber tired transfer crane (RTG) and automated Guided Vehicles (AGV) will be introduced in terminal operations. The Port of Nagoya has grown remarkably along with the development of the industries.
and economy of the Chubu region and serves as a driving force to support people's lines. The increase in international container cargo has been particularly outstanding, so that it has developed into one of the largest international container ports in Japan.

**Figure 3.7: Different Ship Arrivals in the Port of Nagoya**

The figure 3.7 shows the arrivals of different ships in the Port of Nagoya for the year 2001 to 2005. The bar Graph indicates that from 2001 to 2005, there is an increase in Container Ships apart from the increase in Ocean Going Vessels, however there is a slight decrease in Coastal Vessels from the year 2004 to 2005. This picture reveals the same results with the case of Yokohama Port which has been discussed earlier. The most important point here to be noted is that due to the increase in importance of container cargoes, there is an increase in container ships.

**3.6. Port of Kobe**

The Port of Kobe is an excellent natural harbour, flourished as a hub of trading with the Chinese Continent and Korean Peninsula during ancient and medieval times and since then it 1868, it opened as a major Japanese International Port, to support Japanese lives and industries. Located almost at the center of the Japanese archipelago Kobe Port is on
major international sea routes to over 500 ports in over 130 countries and regions including North America, Europe, Australia, China and other countries in Asia. In 2006 Kobe Airport opened and Kobe Kanku Bay Shuttle, a ferry service between Kobe Port and Kansai International Airport. As an important urban infrastructure, Kobe port will continue to develop as part of an international port city to meet the public needs.

In 1868, Port of Kobe was opened for trade to the outside world. In the past 140 years, Kobe city was developing with Port of Kobe side by side. It was the first port to build container dock, and continuously rebuilt and upgraded the dock facilities in order to meet the requirements of international container shipping industry. The present Kobe Customs was the then tax office created in 1867 to check the incoming and outgoing cargo. Port of Kobe possess sophisticated know-how and expertise with a long history of 140 years covering all aspects of international trade and logistics and is also home to a wide range of highly experienced private enterprises and related administrative authorities. This port is currently making every possible effort to enhance its usefulness and competitiveness as a part capable of fulfilling the diverse logistics needs of its customers. It is pushing ahead with positive measures for improvement and reform, including the reduction of various costs, deregulation of limits and the creation of new systems as well as attracting customers to sites for port-related use and inland industrial distribution group. The world’s major carriers provide direct links between the Port of Kobe and the various ports around the globe, providing the shortest lead times between Japan and the world’s leading ports in the number of liner routes served and the frequency of sailing assures efficient, problem free export and import services to and from any place in the world at any time. According to Kobe Port Annual Report (2003), ‘after the first container vessel entered Kobe Port in 1967, there was a sharp rise in the volume of marine container cargo transportation. In 1976 Kobe port ranked 2nd worldwide for the amount of container cargo handled in the port, marking its transformation into a truly international port’(Kobe Ports and Harbour Office, Increase in Cargo Volume and the Advent of Container Vessels, 2003:62).

Damages are caused by the Great Hanshin-Awaji Earthquake of 1995 in the Southern Port of Hyogo prefecture put a severe economic strain on the area. Normally Kobe Port
accounts for about 30 percent of the nationwide container cargo trade and the loss of the port functions affected not only the economic activity, but there was a huge amount of rubble left from the damage, which was later on used for landfill purposes. This earthquake-damage to the Port of Kobe has resulted in an increase in business at the other ports like in Yokohama, Osaka, and in South Korea. Even after three years, the Port of Kobe couldn’t get back the same status which it holds before the occurrence of the earthquake. Kobe City in Japan covers a long and narrow stretch between the coast and the mountain. Kobe is recorded in history as one of the first cities to open for trade with the West in 1868 and started taking a modern shape since 1921 with the completion of the comb shaped new piers one, two and three. The Maya Pier was completed in 1967 as the first container terminal in Japan while the reclamation work of the Port Island began in 1966.

3.6.1. Port Description

According to the information available from Hyogo- Kobe Business News (2009), after getting recovered from World War II, Japan entered a period of economic growth, this brought an increase in the volume of foreign trade to Port of Kobe and hence new facilities like the Shinko and Hyogo Wharves were constructed. According to MLIT (2009), ‘Kobe Airport is an artificial island off the Coast of Port Island, gives easy access to cities in Japan and is directly connected to Kansai-International Airport by a high-speed vessel, enabling smooth travel to and from various places in the world’. MLIT are in the opinion that there was a need to construct a modern port appropriate for this full-fledge container era and also to cope up with the increase in cargo volume during the years of economic expansion after World War II has resulted in the formation of the Kobe Port Development Plan. Based on this plan construction was initiated and first man-made Island of its kind worldwide, the marine metropolitan island known as Port Island was made. Urban transportation system called the port liner was constructed connecting Port Island with the central area of Kobe- Sannomiya, which is first of its kind in Japan. Port Island was constructed with the aim of future expansibility of maritime trade, concentration of related business and to create convenience in exchange and collaboration with overseas countries in handling cargoes. Map 3.4 gives a ready reference of the layout of Kobe Port. The descriptions are as follows.
LAYOUT OF THE PORT OF KOBE

Legend
- Trunk Roads at Work
- Proposed High Standard Container Terminal Zone
- Japan Railways
- Harushin Expressway
- Harbor Trunk Roads at work
- Trunk Roads(Panning)

Source: Kobe Port Terminal Corporation, Kobe (2008)
3.6.1.1. Rokko Island

The plan for construction of Marine Culture City-Rokko Island was designed to meet the demands created by the trend towards large vessels and the multifarious changes in the physical distribution systems, through the provision of modern port facilities, other functions such as residential areas, offices, educational facilities, cultural activities are also taken into account.

3.6.1.2. Minatojima Tunnel (M.T)

In July 1999, M.T. was put into service connecting the Shinko Higashi Wharf with Port Island. It was constructed due to the increase in traffic expected with the advent of the high standard container terminal. Along with Osaka Port, Kobe Port is working to achieve an integrated “Hanshin Port” in order to form a super Hub Port\(^{18}\). Port of Kobe Earthquake Memorial Park situated in the Meriken Harbour, the eastern end of Kobe Port Meriken Park. It is designated to pass down memories of disaster caused by the Great Hanshin Awaji Earthquake which struck the area on January, 1995. There is also Kobe Maritime Museum built in 1987, to commemorate the 120\(^{th}\) anniversary of the opening of Kobe port.

3.6.2. Kobe Port Administration - Kobe Port Terminal Corporation

It is mainly associated in building, leasing and maintaining container terminals, liner terminals and ferry terminals in Kobe Port where vessel operating companies and harbour transportation companies can rent their respective terminals. The Kobe Port Authority is managing the Port and Harbour facilities where the common users are used for the facilities except terminals in service under KPTC. Kobe Port Administration decided to reorganize the existing Kobe Municipal Ferry Terminal Corporation and established KPTC on December, 1981. According to Kobe Port Terminal Outline Report (2008), ‘the dissolution of Hanshin (Osaka and Kobe) Port Development Authority which had been constructing those container and conventional liner terminals of Osaka and Kobe Ports since 1967 was formalized by the law related to dissolution of Foreign Trade Port

\(^{18}\) Japan’s Super Hub Port Project is an effort aimed at reducing port costs by 30 percent and shortening lead time from three to four days to one day by efficiently operating large-scale container terminals having three or more berths on an integrated basis under a single operator in order to achieve a cost and service level that surpasses Asia’s other main ports (Ports and Harbours Bureau, Japan, 2006).
Development Authorities promulgated in 1981’ (Kobe Port Terminal Outline Report (2008:23). Kobe Port construction office since its establishment in 1934 has engaged in the construction of a large number of port facilities. In future, it has a plan to promote a variety of district development and harbour planning projects that will contribute to both the expansion of the national economy and the livelihood of the citizens, including the promotion of a Super Hub Port, counter measures for large scale earthquakes in 2008.

Kobe is the western most port among other big five ports of Japan (Tokyo, Yokohama, Nagoya and Osaka). Kobe is considered to be the last port of export and the first port of import, it is more linked with China which is at present its major trading partner. A total of 77 container liner routes connect the Port of Kobe and China with 81 ships sailing per week. Kobe is also linked with other ports in Chugoku, Shikoku and Kyusyu regions by coastal feeder and ferry services networks. According to the Development of Kobe Port Report (2009), ‘The coastal feeder network features 66 sailing per week and tramper service to 26 ports in Japan. Port of Kobe is located at a foothill of the range of Mount Rokko, flat lands are limited and constructions of artificial islands have carried out to make Port Island, Rokko Island and Island of Kobe Airport’. According to the Kobe Port Annual Report (2003), ‘in 1980, 80.3 percent of the total container volume handles in the whole Kobe Port was handled on Port Island, amounting to 16.71 million tons of container cargo’ (Kobe Port Annual Report, 2003:89).

3.6.3. Efficient Cargo Distribution by High Speed Railways

The opening of the Kobe Freight Terminal Station which provides direct connection with the incoming and outgoing trains of the Sanyo Main Line, has resulted in drastically reducing the transit time of cargoes passing through the Port of Kobe. The establishment of container freight station for Japan Freight Railway Company (JR Freight) in the Port of Kobe has ensured smooth transfer loading from marine containers to JR Freight containers making possible the efficient distribution of imported cargo throughout Japan. With an environmental friendly mode of transport Kobe offers connections with major cities throughout Japan in less than 48 hours. There is a weekly shuttle service connecting the Port of Kobe and Port of Tianjin in China in 50 hours operated by Japan Freight Railway Company and the high-speed ferry Yanjing of China Express Line since 2006.
The link up of rail transport with a high-speed ferry has made high-speed fixed time transport possible. Mainly Japan imports textiles, apparel, frozen and chilled food from China and exports auto parts and electronic goods.

3.6.4. Advantages of the Port of Kobe

Port of Kobe is easier to use and it is quite competitive. No rivers flow into the Port, dredging is unnecessary, the port is ideal for mooring, since it has little variation in tides. There is reduction of rents for port sites for the use of wharf areas and sheds. Toll tax reduced for Harbour Highway, there is decrease in crane feed for coastal feeder cargoes, improvement of Port of Kobe’s Electronic Data Interchange (EDI) system establishment of Voyage Recorder System and sea-land information exchange system. Recent establishment of high-standard container terminals with deep-draft berths, construction of joint depots and construction of Trunk road linking Port Island and Rokko Island and exemption of toll axes for the Maya Ohashi Bridges, gives this port a better advantage.

Port of Kobe remained one of the world’s busiest container ports from 1973 to 1978. The 1995 Great Hanshin Earthquake diminished much of the port city’s prominence when it destroyed and halted much of the facilities and services there, causing loss of 10 trillion yen or 2.5 percent of Japan’s GDP at that time. It was one of the world’s busiest ports prior to the earthquake but despite the repair and rebuilding it was never regained its former status as Japan’s principal shipping port. Now it is Japan’s fourth busiest container port. According to the information available from Kobe Port Terminal Corporation (2009), Kobe Port was considered the center of Asian trade during 1980s. Unfortunately with the changing economic situation in Japan and the development of ports overseas, this dominance has gradually declined. In 1994 cargo handling volume increased considerably in Asian ports such as Singapore, Pusan and Kaohsiung while decreasing in Kobe along with the decrease in the transshipment rate. The year 2010 foresees an expansion of intra-Asian trade but there are worries that due to damage from the earthquake, Kobe Port will not be able to compete with other ports of the world.

George Hsu, the Expert on Port technology said cargo flow from Southeast Asia has decreased where as cargo from mainland China has increased. Kobe Port is in a strong
position to share in these transshipments. According to professor Katsuhiko Kuroda, University of Tokyo (2009), ‘Kobe Port handled 30 per cent of Japan’s international container traffic before the Hanshin Earthquake, after the earthquake when almost all the ports function were paralyzed, the shipping companies, shippers searched new alternative routes, this has reduced the importance of Kobe Port to some extent’.

3.7. The Port of Osaka

According to the Bureau of Port and harbor, City of Osaka, (2009), ‘Osaka is a centrally located, large metropolis that boasts the third largest population of Japan (2.63 million in 2005)’. The Kinki region of Osaka forms the country’s major production and consumption area, together with the Tokyo Metropolitan Area, it serves as the nation’s center of production and economic activity. Since then it played an important role in pursuing foreign trade of Japan. This port was opened in 1868 as a modern port of Japan in the name of Nani Watsu. Along with the increase in volume of containers trade due to the enormous amount of commerce with Asian countries such as China, the port is currently the largest hub of medium and long distant car-ferry routes in the country uniting various areas of western Japan. The Port and Harbour Plan of Osaka formulated in 1957 and once revised in 1997 according to the needs of the people, indicates the future direction for development. The plan was altered to put more emphasis on port management and revitalization of the waterfront area with the next revision scheduled for the middle of 2010. This plan has pointed out some important facts for discussions- firstly the relative world ranking of Japanese ports has declined due to rapid growth of other Asian Ports thus demanding enhanced international competitiveness. Secondly there is need to enhance domestic trade wharf function to handle larger domestic ferries and an increase in Ro-Ro cargoes. The waterfront area needs to be revitalized through redevelopment that takes advantages of regional features and promotion of private sector development. For creation and preservation of a favourable port, environmental measures must be taken to reduce production of carbon dioxide and securing waste disposal facilities. There are some improvements done in the Port of Osaka. Waterfront Greenery and beaches are being upgraded and efforts are underway to improve water and sediments quality to preserve and create a favourable port and harbour environment. The New Island district is
expected to play a role as a waste disposal area which is not changed from the existing plan. In order to promote transportation mode shift from trucks to vessels and railways for medium and long distance freight in the Seto Island Sea, wharves for ferries and Ro-Ro vessel are being reinforced and enhanced by restructuring the existing wharves. There are proposal for construction of wharves which is highly earthquake resistant and open spaces to provide emergency transport of cargo.

3.8. Other Ports

3.8.1. Port of Chiba

The Port of Chiba is the Capital of Chiba prefecture in Japan. It rests on the Boso Peninsula across Tokyo Bay. In the late 20th century, this port underwent rapid industrial growth. It is a major industrial seaport that handles some of the largest volumes of cargo in Japan like crude oil, iron ore and LNG.

3.8.2. Port of Fukui

It lies on the west central shores of the Sea of Japan on Japan’s main island, Honshu. The Fukui Port Association established in 1999 contributes to the development and support of the industrial economy of the area by promoting the Port of Fukui. This port handles about 1.8 million tons of freight each year; about 80 per cent gasoline used in Fukui Prefecture comes through this port. This is Japan’s 4th largest national petroleum storage base, storing about six days worth of nation-wide consumption for energy emergencies.

3.8.3. Port of Kawasaki

The Kawasaki Port offers good access via well developed network, not only to the Tokyo Metropolitan Area but also to other Kanto regions, Southern Tohoku and Yokohama city. There is a Kawasaki FAZ Distribution Center. This center offers distribution, processing, exhibition and other services.

3.8.4. Sandai Port

Sandai Port is located adjacent to the city of Sandai with a population of 1 million, the economic, political and cultural center of the Tohoku region. It plays a major role as the base for the distribution of goods in the area. Sandai Port serves the regular route of
container ships, following Ports of Tokyo, Yokohama and other regular routes for overseas container such as North America and Southeastern Asia.

3.8.5. Sakai Port
The Sakai Port Area has a geographic advantage over Sanyo and Kansai area. It not only directly faces countries across the Sea of Japan but also offers regular container sea-line services to and from those countries where in future more economic exchange is to be expected.

3.8.6. Yokkaichi Port
This port was opened in 1899, as a raw wool and cotton importing port, was designated as a specially important port for foreign trade in 1952. The port has been playing a vital role as a major international trading port in central Japan and an energy supply base with some of Japan’s leading petro chemical complexes nearby. To meet ever diversifying needs of physical distribution and to help streamline cargo movements, the port continues to enlarge and improve its facilities and creates the waterfront to which citizens feel a sense of closeness. With crude oil and petroleum products making up about 90 percent of the total imports, this port has developed as an energy material importing port. Already some 120 years ago the Port of Yokkaichi was the biggest commercial port in the Ise Bay, the inauguration of liner service between Yokkaichi and Tokyo in 1870 led to a sharp rise in cargo and passenger. In 2004, it was designated an Ise Bay Super Core Port by the national government.

3.8.7. Port of Hitachi
This port acts as the gateway to the northern Kanto region, rapidly developing into a major distribution point for both domestic and international cargo that makes the best use of a loading edge container terminal. It handles oil products, mining equipments, lumber and transport goods. It has been used as East Japan’s main base for foreign automobile.

3.9. Port Problems
Beach erosion has become a serious problem in Japan as the natural sandy beaches are rapidly disappearing. Constructions of artificial coastlines or seawalls are underway to save the ports from such disaster. In Japan, coastal work is separated into four sectors -
port construction is carried out by the fisheries agency and the port department respectively. Other coastal works are carried out by the river department and protective works on the coastal forest and farmland is overseen by the Ministry of Agriculture. According to the author Uda overall measures to solve the problems are difficult to adopt due to the sector by sector administrative system. Problem lies in the management of the coastal land. Construction of fishing ports, management of coastal forests and shore protection works are carried out by the Fishing Bureau, the Agriculture and Forestry Bureau and by the Civil Engineering Bureau of the Prefectural Government. Each work is planned so as to present the maximum economic rationality in the short term without consideration of the degradation of the environment in the surrounding area. Sand deposit in the navigational channel of the fishing port was regarded as an obstacle and dumped in the offshore zone or used as materials for land reclamation by one management office where sands are removed by longshore sand transport, the beach slope became very steep. The seawall, concrete armour units and detached breakwaters were installed as counter measures against beach erosion by a different coastal management office. True adjustment of the flow of sand which is an obvious physical phenomenon through cooperative work among various management offices is troublesome and the work gets postponed.

3.10. Urban Development Projects

Wide area should be denoted for disaster prevention centers to convert large cities into zero-emission cities. To form more green areas in water-front zones as well as restoration of seas, there should be establishment of a support system to build a recycle material distribution system. There should be coastal conservation program to cope up with the rise in sea-level. The risk of large scale high tide disasters has increased in recent years in proportion to the increase in the population of urban waterfront areas and to the deterioration of coastal conservation facilities. Coastal problems in Japan are not simply due to problems in coastal engineering but are caused mainly a result of the social system in Japan including the legal system. The authors consider that researchers engaged in coastal engineering should take action to solve these coastal problem including not only technological aspects but also institutional aspects and publicize the real situation of the
coasts. He feels it is very difficult to change these situations through only administrative efforts; a flexible social system should be made, for this mutual exchange of information is necessary.

3.11. World Shipping

According to the International Shipping and World Trade Center, (2009), ‘Shipping is truly the lynchpin of the global economy, without shipping, intercontinental trade, the bulk transport of raw materials and the import-export of affordable food and manufactured goods would simply not be possible.’ (IMO, 2009, International Shipping and World Trade Center: 9). Globalization has been made possible by dismantling of barriers of trade, capital mobility, technological advances declining of transport costs, communications and computing’. According to International Maritime Organization (2009), ‘Global trade has permitted an enormous variety of resources to be widely accessible and thus facilitated the widespread distribution of common wealth’ (ibid:10).

The international maritime Organization is of the opinion that the eternal triangle of producers, manufacturers and markets are brought together through shipping. Shipping is the only real cost-effective method of bulk transport over great distance and because of this global system of trade has moved forward together hand-in-hand. This has always been the case and will remain so for the foreseeable future.

It is generally accepted that more than 90 percent of global trade is carried by sea. Globalization, liberalization and industrializations of national economies have fuelled free trade and hence there is a growing demand for consumer products. Technological advancement have made shipping an increasingly, efficient and swift method of transport. According to Review of Maritime Transport (2008), ‘an estimated 80% of the total trade volume is carried by sea which reached 8.02 billion tons in 2007. The fleet has been growing steadily over the years in number of ships and DWT enjoying a boom in shipping’ (UNTAD, Review of Maritime Transport, 2008:23). Today ships are high value assets, with the larger of them costing over U.S. $ 100 million to build. They are also technically sophisticated, modern and IMO has played and continues to play an important part in shaping ship-building industries. According to Fair Play World Fleet Statistics (2008), ‘today’s world fleet of propelled sea-going merchant ships of no less than 100 GT
comprises 99,741 ships of 830.7 million GT with an average age of 22 years are registered in over 150 nations and manned by over a million seafarers of virtually every nationality'(Fair Play World Fleet Statistics, 2008:12).

**Figure 3.8: Development of World Fleet**

**Unit in Millions of DWT**

<table>
<thead>
<tr>
<th>Year</th>
<th>Other Carriers</th>
<th>Oil Tankers</th>
<th>Dry Bulk Carriers</th>
<th>General Cargo Carriers</th>
<th>Container Cargo Carriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
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<tr>
<td>2007</td>
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<td>1980</td>
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</tbody>
</table>

Fleet Production by Millions of DWT


The above figure 3.8 shows the development of world fleet by million of DWT.\(^{19}\) The fleets include Oil Tankers, Dry Bulk Carriers, General Cargo Carriers and Container Cargo Carriers. It is seen in the diagram that there is more production of Oil Tankers since 1980, followed by Dry Bulk Carriers, Container Cargo Ships and General Cargo bulk carriers. Today the medium- sized Container Cargo Ships has the ability to accommodate several different box sizes cargo are the natural successors of the old general cargo vessels. There are many different types of tankers, ranging from those carrying crude oil, through those built to transport various refined hydrocarbon products, to highly specialized ships that carry liquefied petroleum gas and natural gas. According to IMO (2009), 'the world’s largest ship today is a 564, 65 DWT tanker with an

\(^{19}\) Dead Weight (DWT) is the weight that a ship can carry when loaded to its mark, including cargo, fuels, freshwaters, stores and crews.
interesting and varied history. It was built in 1976 and having undergone some works to
increase its load carrying capacity and was finally floated 2 years later and named as
Seawise Gaint’.

Table 3.3: World’s Bulk Carrier Fleet

<table>
<thead>
<tr>
<th>Type of Vessels</th>
<th>Size in DWT</th>
<th>Numbers in World production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handies</td>
<td>10-49,999</td>
<td>3212</td>
</tr>
<tr>
<td>Panamax</td>
<td>50 - 79,999</td>
<td>1453</td>
</tr>
<tr>
<td>Cape size</td>
<td>80,000 and Above</td>
<td>796</td>
</tr>
</tbody>
</table>


The above table 3.3 shows in terms of size, the world’s bulk carrier fleet has three
categories, ships of 50,000 – 80,000 DWT which is named as Handies, then comes
Panamax ships of 50-79,999 DWT and followed by Cap size which is more than 80,000
DWT. Bulk carriers embrace a number of variations – single or double, hull with or
without their over cargo-handling equipment, but all are characterized by the huge catch
covers that can be rolled or lifted away.

3.11.1. Ship Building and Ship Machinery Industries

Shipping is perhaps the most international of all the world’s great industries. Tankers and
bulk carriers are in high demand in the world market. There is a steady upward trend with
the increase in maritime transport due to the recent expansion of imports by China of
bulk cargo, including iron ore as well as crude oil. Ship prices are rocketing, international
competition is expected to further intensify in future because China is capitalizing on its
low labour cost to expand its ship building capacity, currently it accounts for producing
about 10 percent of the total tonnage of ships built in the world, according to Japan’s
Ship Owners Association (2009).
The figure 3.9 shows ship production by different major countries of the world from 1980 to 2005. It is seen that till 1995, Japan was the leading producers of ships in the world, South Korea though occupied the second place was far behind Japan in ship production. This picture changed within a period of five years time. From 2000 onwards South Korea replaced Japan to become the major ship builders and China is also taking initiatives in recent years for building ships, as indicated in the Bar Graph. Europe is lagging far behind Japan and South Korea and its ship production has decreased in recent years. The Demand for shipbuilding in the world is expected to climb in future, since the tonnage of newly built ships in 2006 has increased in comparison to that of 2005 and the willingness of coastal shipping operators to construct new coastal vessels to replace old ones is recently recovering, following an increase in the volume of marine transport.

3.11.2. Coastal Shipping

According to IMO (2009), ‘It is one of the trunk distribution industries in Japan which supports its economy and national life, accounting for about 40 percent of domestic distribution and in particular about 80 percent of transport of fundamental goods for
industry'. Given the importance of revitalizing coastal shipping in order to realize the construction of new coastal vessels replacing old ones on a stable and adequate scale, an "Action Plan for Promoting the Construction of New Coastal vessels to substitute Old Ones" was formulated in 2006, to solve these problems.

**Figure 3.10: Movement in Cargo Transport Volume by Transport Facilities**

*Unit in Million Tons*

The above figure 3.10 shows movement of cargo transport volume by different mode of transport from 1970 to 2005. It is seen that maximum movement occurred by coastal shipping, followed by road vehicles and rail and air. However after 1995 there is a slight increase in movement of cargoes by roads this is mainly due to the expansion of road networks, and increase in piracy along the sea coasts has compelled the coastal countries to develop alternative routes through land.

The international shipbuilding market mainly for large sized ocean going ships is the only global market that has competition among business operators from each country. The
policy of a country and order acceptance practice of shipbuilders directly affects the competitive environment in the international shipbuilding market. Japan will go for bilateral and multilateral discussions at a government level since in future the competitive environment in the international shipbuilding market will intensify due to expansion of facilities by the newly developing shipbuilding countries. There is need for coordination in international policy making.

3.11.3. Roll-On/Roll-Off Ships or the RO/RO Ships

According to International Maritime Organization (IMO), the Roll-on/Roll-off Ship or the Ro-Ro Ship is one of the most successful types operating today. The term Ro-Ro is used for all Ro-Ro vessel is intended. It is used in many shipping routes since its flexibility, ability to integrate with other transport system and high speed of operation has made it popular. The modern Roll-on/Roll-off ship can trace its origins back more than one hundred years to the early days of the steam train. Ships were specially designed to take trains across rivers which were too wide for bridges. The ships were equipped with rails and the trains simply rolled straight onto the ship which sailed across the river to another rail berth where the train would roll-off again. As the name implies, cars and lorries can drive straight onto a Ro-Ro ship at one port and off at the port on the other side of the sea within a few minutes of the ship docking. According to the report produced by IHS, Global Insight (2009), shipbuilding is more concentrated among a few countries—particularly South Korea and Japan, with highly developed shipyards.

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20 The International Regulations for Preventing Collisions (IRPC) at Sea in 1972 contain a series of measures to improve the safety of shipping in confined waters, such as straits and narrow channels. These include the introduction of traffic separation schemes and other routing measures. Ro-Ro ships such as passenger ferries frequently operate in such waters which are not only confined but are frequently congested as well. The measures adopted by IRPC for Ro-Ro ships as have been very successful in this regard in reducing the head on collisions in such congested water
Figure 3.11: The Production of Ro-Ro Ships by Different Countries, 2006 - 2007

Unit in Percentage Values

2006

- Singapore: 1%
- Indonesia: 8%
- Malaysia: 2%
- United States: 1%
- South Korea: 34%
- Poland: 0%
- Taiwan: 5%
- Denmark: 3%
- Germany: 10%
- China: 21%

2007

- Indonesia: 7%
- Philippines: 1%
- Singapore: 1%
- Malaysia: 2%
- United States: 0%
- South Korea: 30%
- Poland: 3%
- Taiwan: 3%
- Denmark: 1%
- Germany: 11%
- China: 26%
- Japan: 15%

2008

- Indonesia: 4%
- Philippines: 1%
- Singapore: 1%
- Malaysia: 1%
- United States: 0%
- South Korea: 29%
- Poland: 1%
- Taiwan: 3%
- Denmark: 3%
- Germany: 0%
- China: 31%
- Japan: 17%

Legend:
- South Korea
- Japan
- China
- Germany
- Denmark
- Taiwan
- Poland
- Philippines
- Singapore
- Indonesia
- Malaysia
- United States
The above figure 3.11 demonstrates that South Korea's dominance in shipbuilding has slowly eroded over the last three years, as its market share declined from 54 percent to 43 percent between 2006 and 2008. The main beneficiary has been China whose ship production has increased from 95 in 2006 to 164 in 2008. Germany, Indonesia and Malaysia are also among the highest producers in the list.

3.12. Containerization

In 1968, the first Japanese Container Vessel appeared. The Hakone Maru which could carry 752 TEU\(^{21}\) operating on shipping lines between Japan and the West Coast of the United States.

Figure 3.12: Transitions in Large-scale Container Ships

![Figure 3.12: Transitions in Large-scale Container Ships](image)

Source: Maritime Industries Research Institutes Public Corporation

The figure 3.12 shows the increase in vessel capacity in TEU from 1960 till 2010. There is a drastic change in the capacity of vessel in 2010 which is 13,000 at present, earlier in 2005, it was 9150. By 1970s ships were capable of carrying 2000 TEU. This trend

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\(^{21}\) TEU indicates the load capacity based on the conversion of 20 feet containers.
towards large scale container ships continued at a rapid pace and in 1980s the advent of Panamax Containerships.  

3.12.1. The Era of Containerization

Over the port several years, container ships have come into use with the aim of reducing shipping costs. This has given rise to an urgent need to construct efficient, high standard container terminals for efficient cargo handling, greater utilization of information technology and to accommodate the growing volume of imported cargo.

The above figure 3.13 shows the production of Oil Tankers, Passenger Ships and Cargo Vessels in both number and weightage from 1930 to 1945. This is the phase before and during

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22 The largest vessels that could transit the Panama Canal. In 1988, Super Panamax Containerships that could carry more than 4000 TEU appeared (larger than Panamax). Later on the 1990s ships appeared that could carry 6000 TEU and this have increased in 2000s.
after World War II. It shows that the production of cargo ships both in number and weightage was highest among all other ships, followed by Oil Tankers and Passenger Ships. Gradually the production of these three ships declined during the end of World War II, when Japan was destroyed fully.

Figure 3.14: Production of Different Vessels in Number and in Gross Tonnage of Japan, 1946-1965.


The above figure 3.14 shows Japan’s production of Oil Tankers, Passenger Ships and Cargo Ships from 1946 to 1965. This is the phase when Japan started recovering from the devastation of World War II till the achievement of the status of a developed country. Within a span of fifteen to twenty years, it rebuilt the whole of its economy its overseas trade expanded followed by the increase in production of Oil Tankers, Cargo Ships and passenger Ships. Though the production of Container Ships started from 1965 which can be called as the beginning phase of Containerization for Japan, but the data produced from Japan’s Ship Owner’s Association are not available.
With the growing trend towards container ships in the liner sector of the shipping market, faster distribution and processing of larger volumes has become possible. This has led to more manufacturing of products in multiple countries, spurring on the development of the global economy. According to Akimoto, 'the hub ports that handle container ships are gradually becoming more systematized'. Moreover, as networking on a global scale develops between hub ports, the feeder services networks links the hub ports with regional ports and land and air transport systems. He further argued, 'in container shipping, raw material and products are shipped from regional ports in containers and are gathered together at the hub ports'. (Akimoto, 2006: 10).

**Figure 3.15: Production of Different Vessels in Number and in Gross Tonnage of Japan, 1966-1985.**

The above figure 3.15 shows the production of four different vessels- Oil Tankers, passenger Ships, Cargo Ships and Container Cargoes from the year 1966 to 1986, over a period of twenty years. It is seen that after 1966 the production of Cargo ships, Passenger Ships and Oil Tankers have increased, but their production excluding the Passenger Ships started to decline from 1973, where as the production of Container Ships have increased.
These Oil Tankers as well as the Cargo Ships were replaced by the Highly sophisticated Container Ships.

Figure 3.16: Production of Different Vessels in Number and in Gross Tonnage of Japan, 1986-2004.

The above figure 3.16 shows the production of Oil Tankers, Passenger Ships, Cargo Ships and Container Ships from 1986 to 2004. It is seen that from 1987 there is reduction in the production of Oil Tankers and Cargo Ships, however the production of Passenger Ships has increased. There is a slight decrease in the production of Container ships as well, this may be because of Container Ports in Japan are not experiencing rapid cargo handling growth. In recent years, the ever growing size of containerships, major Asian ports have been upgrading their container cargo handling capabilities gradually lowering the international competitiveness of Japan’s port. To outstrip major Asian competitors Japan reorganization of port is taking place. The port of Tokyo has successfully redeveloped to receive large sized container vessels and is observing increased and well-balanced incoming and outgoing traffic. The port of Kobe still needs to implement further
measures to attract new users and previous users due to the Great Hanskin earthquake currently, the vast majority of liver cargo is containerized because container traffic is advantageous in terms of convenience and efficiency as well as of cargo safely for example contributing to labour saving in loading, unloading, sorting and packaging. The projects are being implemented in a selective and focused manner in appropriate response to trends in hinter land business needs and to help boast private sector demand and employment. Developing and improving logistics bases to enhance Japan’s domestic sea transport system which is environmentally friendly and efficient in energy consumption and seamless inter modal transport. These terminals will not only accommodate larger and faster ships but will also allow smooth and quick linkage of ships to land transportation.

According to Sakhuja (2007), ‘Containerization has thus emerged as a popular mode of transportation and brought a revolution in maritime transportation system. It is considered as one of the century’s most important innovations in commerce’. He further argued that this is the most convenient, safe and cost effective mode of transporting large volume of goods and has reduced handling time by minimizing break-bulk operations thereby permitting the shipping infrastructure to keep up with increasing volumes of goods to be transported. He also mentioned in his article on “Container Shipping: Backbone or Achilles Heel of Maritime Commerce”, that limited budgets, poor staffing, and outmoded technology of different trading agencies of underdeveloped countries can hamper the process of container shipping in the years to come. (Sakjuja, 2007:13).

3.13 Major Shipping Companies

3.13.1. Mitsui O.S.K. Lines (MOL)

It is known for designing ships and the first ship designed by this company was Atagosan Maru built in England. The Hikosan Maru was Japan’s first bulk carrier designed by this company played an important role in transporting coal from Australia during Sino Japanese War. Another known ship called Oigawa Maru was built in the same decade served for 55 years in transporting goods to Kobe, Osaka and Tokyo ports. MOL operates the world’s longest fleet of bulk carriers, offering stable, mass-volumes, transport of dry bulk cargo. It provides a range of specialized carriers designed and constructed for each
cargo’s characteristics and conditions of loading/unloading ports. These vessels include iron-ore carriers that have become successively larger, to the needs of specified ports and wood chip carriers that transport light weight, high volume transportation of pulp and lumber. Demand for transport of iron-ore and coal grows every year as steel product’s demand increased around the world, particularly in China. This company has launched the world’s largest iron ore carrier of 300,000 deadweight tons. According to MOL Development Plan (2009), ‘It has also planned to launch a new class of bulk carrier called the Handy-Cape for transshipment of cargoes through Panama Canal in the near future. MOL has a wide variety of tankers from very large crude carrier (VLCC) of more than 20,000 DWT to mid-size and small tankers called Suezmax and Aframax tankers. They all contribute to the safe, reliable delivery of crude oil around the world. MOL is currently involved in about 25 percent of the world’s LNG transport in terms of ownership, management and operation of LNG carriers’. According to the Mol Environment and Social Report (2009), ‘the MOL Group has the business of Ocean shipping engages in the transport of a broad range of commodities that contribute to industrial growth and better lines for people not only in Japan but also around the world’.

MOL was the first Japanese shipping company to launch a pure car carrier and is known for developing ground breaking environmental technologies for designing various eco-friendly ships. It is trying use renewable energy sources to achieve zero emissions in ports by effectively utilizing power generated by solar panels and surplus power from the ship generators. Euphony Ace in 2005, Courageous Ace in 2003, Eternal Ace in 1988, Kanada Maru in 1971 are some of the ships invented by MOL Groups. The MOL Technology Research Center was opened at its present location in Ota Ward, Tokyo in 1982. It has analyzed bunker fuel and lubricating used on ships, developed bunkers, fuel pre treatment equipment, researched ways of cutting carbon dioxide emissions and improved storage and transport technology including developing refrigerated containers. In 2007, MOL took delivery of the Brazil Maru one of the world’s largest iron ore carriers which operates on a long term contract for transporting this raw material for steel. This ship reduced CO₂ emissions per ton-mile between Japan and Brazil by nearly 20 percent compared to conventional ships. As a result of improved transportation
efficiency and innovation of environment friendly technologies in ship building the Brazil Maru was selected as the ship of the year 2007 by the Japan Society of Naval Architects and Ocean Engineers. Eco sailing thoroughly adopted within MOL Ocean shipping is one of the most efficient modes in the entire transport industry. MOL is promoting the adoption of electrically controlled engines that reduce nitrogen oxide, soot and smoke by more effectively controlling the intake and exhaust gases.

3.13.2. Nippon Express

It opened its overseas representative office in New York in 1958 and now spread to over 382 locations in 37 countries. This company provides overseas subsidiaries comprehensive support from freight information to accounting systems. It offers sophisticated logistical solutions backed by the world’s largest global logistics network and highly trained human resources. Imabari Shipbuilding Company Ltd has recently completed the construction of Tsuruga Crude Oil Carries at the Saijo Shipyard in 2009. The vessel has the maximum size to pass through the Strait of Malacca and an energy saving devise is installed to reduce the oil spillage. Namara Shipbuilding Company Limited delivered Gry Bulker, a bulk carrier at the Imari shipyard, an environmental friendly ship, this vessel is designed to carry bulk coal and iron ore between Asia and Australia to have flexibility for port restrictions. Other new ships constructed by different ship builders are Orient Hope, Meteors, Mol Sparkle, Lowland Brabo, Global Mermaid and Eagle Kuching. Recently Sanyos Hishino Meisho Corporation has completed construction of ‘Crossandra’ for the delivery of coal and iron ore from Australia to Japan. To import gasoline light oil and naptha, Onomichi Dockyard Company Limited has made Emerald, a cargo tanker with a capacity of 53,500 cubic meters. There is an advanced gas detecting system to avoid emission harmful gas into the atmosphere. Kawasaki Shipbuilding Corporation has constructed the new bulk carrier “Cape Canary” for “K” Line Bulk shipping limited at the Sakaide Shipyard. The vessel is the first type of the large bulk carrier services newly developed by Kawasaki. Mitsubishi Heavy Industries limited has completed construction of a roll-on/roll-off type vehicle carrier, Queen Sapphire with a car carrying capacity of 6400 units in passenger car. Nissin Truck
Network has a very effective system of branch and sales offices located all across Japan and delivers freight from coast to coast.

3.13.3. NYK Super Eco Ship 2030

Shipping is one of the most eco-friendly forms of transportation. However, green house gas from shipping is increasing along with the growth of world trade. Keeping in view the above concept, NYK has planned to introduce the Super Ecoship by 2030. It has been estimated that if the volume of goods transported increased 3 per cent every year, the volume in 40 years will be 3.3 times today’s volume. To cut total carbon dioxide emissions in half by 2050, and also to cut it per ton-mile by 85 per cent NYK is striving for further technical and operational innovation. NYK’s effort to produce NYK Super Eco Ship 2030 as, a mile stone for the year 2030 in collaboration with Elomatic Shipbuilders, Finland and Garroni Progetti of Italy, would not only bring zero emission but also develop world trade with better cargo handling facilities. At present vessels are propelled by diesel engines that burn fossil fuel, so to develop a sustainable society clean energy should be used.

3.13.4. Inchcape Shipping Services (ISS)

It is the world’s leading marine service provider. It has a network of 245 offices all over the world. It mainly handles items on oil, cruise, container and bulk commodity sectors as well as serving naval, government and inter-government clients. Over the past twenty years, it has developed an increasing specialization in the handling humanitarian goods for a number of the leading global private organizations in this matter.

3.13.5. American President Lines Pvt. Ltd (APL)

APL has been serving Asia for well over 100 years, transporting cargo to more than 30 countries, offering direct service between the Fareast, the Middle East and the subcontinent. It has now established its office all over the world providing more than 60 weekly services reaching over 25,000 locations in 140 countries. APL is wholly owned subsidiary of Singapore based Neptune Orient Lines, a global transportation and logistics
company engaged in shipping and related business. APL’s containership fleet is among the most modern and largest in the world.

3.13.6. Omori Kaisoten Business Group

It carries out international intermodal transport services for a variety of cargoes ranging from project cargo to small scale cargo. The intermodal transport includes overseas ocean transport, direct import and export and multilateral transport. Omori’s multi-purpose distribution centers built in Japan are equipped with electrically driven storage rocks, constant temperature warehouses and other material handling systems. Shokai Company has been engaged in the domestic and international shipping business which is necessary for mass transit for almost a century. It has obtained several container terminals in Nanko area of Osaka, each of them can accommodate container ships with deadweights of 50,000 tons. These terminals are especially effective in handling diverse cargoes and are used on bases for the sea and land.

3.14. Environmental Concern and Responses

In 1973, IMO adopted the International Convention for the Prevention of Pollution from ships now known universally as MARPOL which has been amended by the protocols of 1978 and 1997 and kept updated with relevant amendments. MARPOL has greatly contributed to a significant decrease in pollution from international shipping and applies to 99 percent of the world’s merchant tonnage. Reduction of pollution generated by ships have been achieved by addressing technical, operational and human element issues and are all the more noteworthy when compared with the significant growth in the world’s shipping industry, both in the size of the world fleet and the distances that it travels.

The operational and construction regulations introduced by MARPOL, which entered into force in 1983 have been a success, with statistics from reputable industry and independent bodies showing that these regulations such as the introduction of mandatory traffic separation schemes and international standards for seafarer training have been instrumental in the continuous decline of accidental oil pollution that has taken place over
the last 30 years. MARPOL provides rules for the prevention of pollution caused by noxions liquid substances in bulk. From 2007, MARPOL imposed restricted rules for operational discharges of tank washings. Ship has helped greatly in the protection of the marine environment from Chemical Spillages. This has helped greatly in the protection of the environment from chemical spillages. IMO regulates the right of states to intervene on the high seas to prevent mitigate or eliminate danger to their coastlines from pollution following a maritime casualty.


It provides the framework for facilitating international cooperation and mutual assistance in preparing for and responding to major oil pollution incidents. OPRC 1990, recognizes that successful preparedness and response relies on good co-operation between government and industry. There are numerous examples of how this cooperation has served to strengthen the collective capacity for oil spill response around the world. Over the years, the IMO has put in place a comprehensive set of regulations covering liability and compensation for damage caused by oil transported by ship through which the shipping industry provides automatic cover of up to US $1 billion for any single incident, regardless of fault.

3.14.2. Prevention of Air Pollution from Ships

Air pollution from ships causes a cumulative effect that contributes to the overall air quality problems encountered by populations in many costal areas and also affects the natural environment such as through acid rain.
Exhaust gases are the primary sources of emissions from ships. Carbon dioxide is the most important GHG emitted by ships both in terms of quantity and of global warming potential other GHG emissions from ships are less important, according to the report produced by Norwegian marine Technology Research Institute in 2000 on Green House Gas Emissions.\(^{23}\)

In June 2000, the IMO Study on Greenhouse Gas Emissions from ships presented a comprehensive assessment of the contribution made by international shipping to climate change. It established that ships contributed 1.8 percent of the world’s total CO\(_2\) emission and cautioned that is none of a list of measures identified as offering considerable potential for reducing CO\(_2\) emissions from ships were applied, the projected annual growth in fleet size could lead to an increase in fuel consumption of some 72 per cent

\(^{23}\) International Maritime Organization (IMO) is the United Nations specialized agency that develops and adopts global regulations on safety, security and the prevention and control of marine pollution from ships. IMO’s vision is to reduce to the barest minimum all adverse environmental impacts from ships. Shipping which transports 90 percent of global trade is statistically the least environmentally damaging mode of transport when its productive value is taken into consideration. IMO’s original mandate was principally concerned with maritime safety. (IMO and the Environment, IMO Report, 2009 :3).
between the years 2000 to 2020 with a consequential increase in CO₂ emissions.²⁴ The second IMO GHG study was published in 2009, this is the most comprehensive study of the level of green house gas emitted by ships currently under consideration within IMO and other organizations. According to this study, international shipping was estimated to have emitted 870 million tones or about 2.7 percent of the global emissions of CO₂ in 2007. CO₂ was the most important GHG emitted by ships, both in terms of quantity and of global warming potential, other GHG emissions from ships were less important. By the end of 2050, it is expected that ship emissions could grow by 200% to 300% in absence of any effective regulations with the expansion of world trade.

### 3.15. Ship Recycling

When ships reach the end of their working lives, recycling is the most environmentally friendly way to dispose of them. Many of the components and much of the steel is reused in those countries where the ships are dismantled. There are concerns about environmental and working conditions in ship recycling yards and in view of this, IMO took action to develop a realistic and effective solution to some of these concerns. In May 2009, IMO adopted the Hongkong International Convention for the safe and Environmentally Sound Recycling of Ships, 2009. The new convention balances safely and environmental concerns with the commercial requirements of seaborne trade and the ship recycling industry. It emphasizes on the fact that ships should be recycled after reaching the end of their operational lines, but donot pose any unnecessary risk to human health and safety or to the environment. It addresses concerns raised about the working and environmental conditions at many of the world’s ship recycling locations.

### 3.16. Ballast Water Management

IMO Globallast management Programme Report (2009) says ‘all ships need to carry ballast water to keep them stable in the water. Taking on ballast water and discharging it must be carefully controlled to ensure the safety of the vessel and the seafarers on board.²⁴

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²⁴ The Annex VI to the International convention for the Prevention of Pollution from ships which regulates the discharge of nitrogen oxides (NO₂) and sulfur oxides (SO₂) contained in gas emitted from ships was implemented in 2005.
Taking up of ballast water from one part of the world and discharging it elsewhere can upset the marine ecology of that area. The report has given estimation that at least 7,000 different species are being carried in ships, ballast tanks around the world. Shipping transfers approximately 3 to 5 billion tones of ballast water internationally each year. A similar volume may also be transferred domestically within countries and regions each year. IMO’s initiative to adopt the International convention for the Control and management of ship’s Ballast water and Sediments, 2004 indicates all ship to carry out ballast water management procedures. All efforts are on the way not to have an adverse effect on the safety of the vessel and will not solve one environment problem by creating another. From 2003, Japan supported the research and development of a new type of vessel called the non-ballast water ship capable of navigating safely without carrying ballast water in transit. It has been confirmed that the non-ballast ship performs satisfactorily in comparison with a traditional ship.

3.17. Control of Harmful Anti-Fuelling Systems

Hulls of the ship need to be kept smooth from marine plant growth to ensure maximum performance and full efficiency. In the past many of the paint coatings that were used were harmful to the marine environment. The IMO has adopted International Convention on the Control of Harmful Anti-Fueling systems on ships, 2008 to prohibit the use of harmful organisations in anti-fouling paints used on ships.

3.18. London Convention and Protocol

The Convention on the Prevention of Marine Pollution by Dumping of Waster and other Matter 1972 (The London Convention) was one of the first global conventions to protect the marine environment from human activities and has been in force since 1975. Its objective is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes. In 2006 the London Protocol came into force to prohibit all kind of dumping except dredged material, sewage sludge, fish wastes vessels and organic materials of natural origin.

The Maritime Bureau is implementing comprehensive Measures for the Greening of Maritime Transportation in order to reduce 1.4 million of CO₂ emission volume by 2010
to meet the targets that have been planned in Kyoto Protocol. Kaoulides says ‘the Maritime Bureau is working as part of a 5-year plan, from fiscal 2007 onwards, on the research and development of a new technology to reduce the environmental burden as part of the “Comprehensive Measures to Reduce the Burden on the Environment Originating from ships”’ (Kaoulides, 1993: 23). He further said that the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection suggested that land based discharges such as sewage, industrial effluent and urban/river run off, together with atmospheric inputs from land industry sources account in 1990 for some 77% of marine pollution generated from human activities while maritime transport was estimated to be responsible for some 12% of the total.

**Figure 3.18: Overview of Total Sea Pollution, Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP), 1990.**

Unit in percentage values

Source: Port State Control and Jurisdiction evolution of the Port state Regime, Kaoulidas (1993), pg 24.

According to UNEP has brought out an report on Marine Litter in 2005 concluded that marine litter posses a vast and growing threat to the marine and coastal environment. It is estimated that about 6.4 million tons of marine litter are disposed in the oceans and seas each year’. According to other estimates some, 8 million items of marine litter are dumped in oceans everyday, approximately 5 millions of which are thrown overboard or
lost from ships. It has been estimated that over 13,000 pieces of plastic litter are floating on every square kilometer of ocean today.

The shipping industry is also a relatively small contributor to the total volume of atmospheric emissions compared to road vehicles. There have been much improvements in engine efficiency, improved hull design and the use of ships with larger cargo carrying capacities have led to a reduction in emissions and an increase in fuel efficiency. An example of this kind is the world’s first largest car and truck carriers (LCTC) with an 8,000 car equivalent unit (Cell) capacity, the Aniara built at Daewoo shipbuilding and Marine Engineering in the Republic of Korea for Wallenius Wilhelmsen Logistics (WWL) is considered to be the most environmentally friendly vessel of its type. It includes a ballast water treatment system, biodegradable oil in the hydraulic systems, and tin-free anti foulant bottom paints. The Aniara has been awarded a Green Passport by Lloyd’s Register providing details of all potentially hazardous materials and substances on board. WWL has also announced its Orcelle vessel or the “Dream Ship” for 2025 by using wind, sun and wave. The technical and operational measures will not be sufficient to satisfactorily reduce the amount of GHG emissions from international shipping in view of the growth projections of human population and world trade. As a measure to prevent the spread of sea pollution caused by oil spills, large oil recovery vessels capable of effectively recovering spilled oil are deployed at some core ports to ensure that at least one of them can arrive at an oil spill site within two days from its home port. Local government are in charge of collecting garbage and oil floating in port waters while the national government is in charge of other areas using clean up vessels. Map 3.5 shows the movement of ships along the coastal area of Japan to prevent marine disaster.

Seiryu Maru is engaged in dredging to ensure safety navigation of ships. In case of a major oil spill this ship is promptly dispatched to the site to engage in oil collection so as
SHIP MOVEMENT ALONG THE COASTS OF JAPAN TO PREVENT MARINE DISASTER

SE A OF J A P A N

EAST CHINA SEA

PACIFIC OCEAN

to minimize oil pollution. **The Hakuryu** - It is used to collect garbage and oil in Ise and Mikaway Bay. It has an environment monitoring facility that conducts periodic water quality checks in the Bay. Green areas are to be further developed so as to create pleasant and attractive waterside areas for the public. Enhancing sea traffic system as barrier-free measures, so as to support regional activities should be given priority.

Maritime security is an integral part of IMO’s responsibilities. A comprehensive security regime for International shipping entered into force on July, 2004. Kaoulidas has argued that, ‘the mandatory security measures adopted in 2002 include a number of amendments to the 1974 safety of life at sea convention (SOLA)’ and ‘the most far-reaching of which enshrines the International Ship and Post Facilities Security Code (ISPS) Code which contains detailed security related requirements for governments, port authorities and shipping companies’ (Kaoulides, 1993: 21). The establishment of Port State Control as a legal institution to enhance enforcement of international maritime legislation followed after the loss of Amoco Cadiz off the coast of Brittany in 1974 (Hare, 1996) and to prevent pollution (Cuttler, 1995). According to Port of Osaka Entrance and Departure Manual, ‘PSC can best be described to be the right of a country to inspect a vessel coming into its port. It is not an obligation according to the IMO convention. (Eg., SOLAS, MARPOL)’. It further stated that ‘if a country decides to exercise this right, a set of IMO resolutions, are applied which covers the basic principles on how substandard vessel should be identified and be treated’ and ‘all ships which come from foreign ports intend to enter ports in Japanese waters are required to report security information of their ships to designated Coast Guard Officers before entering into port’ (Port of Osaka Entrance and Departure Manual, 2009: 15).

### 3.19. Port State Control (PSC)

Port State Control as one of the most effective measures for eradication of substandard shipping will continue to play its important role. For reporting and storing of port state inspection results and facilitating exchange of information in the region, a computerized, database system, the Asia – Pacific computerized Information System (APCIS) was established. According to the Annual Report on the Port State Control in the Asia Pacific, the central site of the APCIS is located in Moscow under the auspices of the Ministry of
Transport of the Russian Federation (The Annual Report on Port State Control in the Asia-Pacific, 2008:5)\textsuperscript{25}. Establishment and effective operation of regional cooperation regimes on PSC has formed a worldwide network for elimination of substandard shipping. Currently there are a total of nine regional PSC Agreements covering the major part of the world. In Japan, the PSC is implemented by 43 local offices within the framework under the Memorandum of Understanding on PSC in the Asia-Pacific Region (Tokyo MOU) in cooperation with neighbouring countries.

\textbf{3.20. Investment in Human Infrastructure}

According to MLIT, 'Marine transport which is indispensable for the society and economy of Japan as a maritime state is supported by seafarers engaged in ship navigation and ocean going engineers who manage and support it on land' (MLIT, Report on Maritime Affairs, 2007: 1). It is the duty of the Japanese government to take an active role in employing excellent Japanese Ocean engineers for securing the safety and stability of marine transport. Investment in human infrastructure is a necessary condition therefore the Human Infrastructure Task Force was established within the Maritime Affairs Sub Committee of the Traffic Policy Council (2007) which investigated and discussed an ideal maritime policy to secure and nurture human resources in the field of maritime affairs. The Promotion Council for Securing and Nurturing Ocean-going Japanese Seafarers was established in 2007 under an agreement among the Japanese Ship Owner's Association, All Japan Seamen's Union and the Ministry of Land, Infrastructure and Transport with a plan to promote marine engineering.

Since nearly half the skilled technical experts for shipbuilding in the Japanese shipping industry are over 50 years old, an unprecedented rapid and large scale alteration of generation will take place in the coming decade (Report on Maritime Affairs, 2007: 2). Any lack in skills by the younger generation may hamper the competitiveness of Japanese ship building industry which Japan has excelled through. With such conditions keeping in mind, an intensive training project was commenced in 2004 to ensure expert workman techniques related to shipbuilding that could be smoothly passed on to the

\textsuperscript{25} The Annual Report on PSC in Asia-Pacific region is published under the auspices of the PSC Committee of the Memorandum of Understanding on Port State control in the Asia Pacific Region. This report is the 14\textsuperscript{th} issue and covers PSC activities and developments in the year 2008.
younger generation. According to MLIT, ‘in 2006, the Nagasaki Area Shipbuilding and Ship Machinery Industries Technological Training Centre was established and a human resources development project has been underway since April 2007’ (Report on Maritime Affairs, 2007: 2). The report further states that ‘Safety Management Seafarers Labour Division was created in July 2006 in the Maritime Bureau of the MLIT in order to conduct unified planning/gestation and guidance for the services to be provided for safety management and seafarer’s labour’ (Report on Maritime Affairs, 2007: 3). It clearly explains that as Japanese seafarers have become increasingly scarce in recent years, there are shortage of pilots with sea captain experience is anticipated in the near future, raising apprehension of a potential inability to maintain smooth shipping traffic operations. The Council for the Reform of Japan’s Pilotage Service System was established, as a platform for discussing the need for improving operational efficiency/accuracy of the piloting service which is an important part of the port service and based on the perspective of strengthening the international competitiveness of Japanese Ports.

The number of seafarers having peaked at about 278 thousand in the year 1974 has continued to decline ever since in both categories of ocean goings ships and fishing boats. The main cause behind this decline in both categories include the increasingly severe international competition in the area of ocean transport and a falling number of fishing boats due to more stringent international reinforcement of fishing regulations. Ageing is also another great problem, maximum seafarers are aged between 45 years old and above. The Marine Technical Education Agency was inaugurated in April, 2006 unifying the Marine Technical College and the school for Seafarers Training in order to respond more accurately to the needs of the maritime industry and to provide more efficient services. Japan is contributing significantly toward establishing policies and training for seafarers in developing countries as well, making wide use of its knowledge on seafarer administration and training for international cooperation. In addition, Japan is promoting coordination with respect to policies for seafarers through the exchange of information and opinions with ASEAN countries.