

WATER TRANSPORT

DESIGN RESEARCH SEMINEER

MVDSPL-31

PANKAJ KULI

146390008

Late Prof. K Ramachandran



INDUSTRIAL DESIGN CENTRE

INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

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DECLARATION

I declare that this written submission represents my idea in my own words, and where others' ideas or words have been included, I have adequately cited and referenced the original source. I also declare that I have adhered to all principles of academic honesty and integrity and have not falsified, misinterpreted or fabricated any idea/data/facts/sources in my submission. I understand that any violation of the above will be cause for disciplinary action by the institute and can also invoke penal action from the sources from which proper permission has not been taken, or improperly cited.

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APPROVAL SHEET

This Mobility & Vehicle Design DRS report entitled “Water Transportation”, by Pankaj Kuli is approved in partial fulfilment of the requirement for Master of Design degree In Mobility and Vehicle Design.

Project Guide :

Chair Person:

Internal Examiner.:

External examiner:

Acknowledgment

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Pankaj Kuli

Date:..

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WATER TRANSPORT

- Water transport is the cheapest and the oldest mode of transport. It operates on a natural track and hence does not require huge capital investment in the construction and maintenance of its track except in case of canals.
- The cost of operation of water transport is also very less. It has the largest carrying capacity and is most suitable for carrying bulky goods over long distances.
- It has played a very significant role in bringing different parts of the world closer and is indispensable to foreign trade.



Brief History of Water As a Form of Transportation

Historically, societies have always located near water, due partly to the fact that water enables more efficient travel compared to going over land. Waterways are critically important to the transportation of people and goods throughout the world. The complex network of connections between coastal ports, inland ports, rail, air, and truck routes forms a foundation of material economic wealth worldwide.

Early Water Transportation

- Dug-out canoes made from a hollowed out tree are presumed to be first boats.
- Egyptian Reed Boats (4,000 BC) used for fishing
- Ancient boat builders included the Phoenicians, Egyptians, Chinese, Greeks, Turks, and Norsemen.
- Most used a combination of oars and sails for propulsion.

Economic Impacts of Early Water Transportation

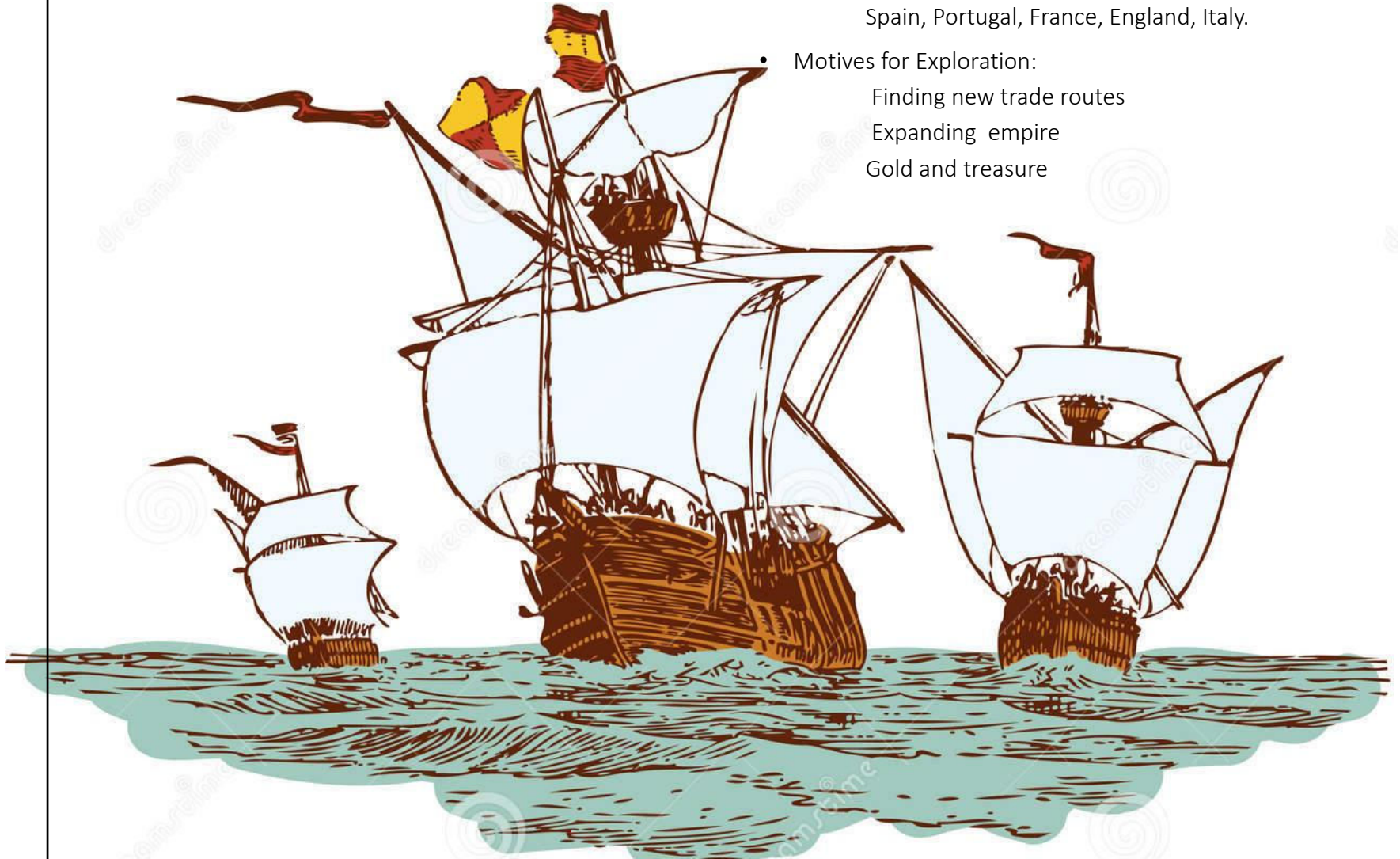
- Earliest remnants of human existence is found near water.
- Water transport provided means of trade which led to stable food sources. Water transport was quicker and used less energy compared to overland travel.
- Larger loads of goods could be
- Carried farther distances.

Water and Early Explorers

- Scylax of Caryanda – Greek (6th Century BCE) explored the Middle East.
- Saint Brendan - Irish explorer (484 - 578) sailed to Scotland, Wales, Brittany, the Canary Islands, Azores and Iceland.
- Eric the Red – Viking (950-1003) first European to sail to Greenland.
- Abu Abdullah Muhammad Ibn Battuta – Moroccan (1303-13650) who sailed to Africa and Far East.

Age of Exploration

- Age of Exploration began in 1400's.
- Countries with sponsored exploration:
Spain, Portugal, France, England, Italy.
- Motives for Exploration:
Finding new trade routes
Expanding empire
Gold and treasure



Famous Explorers and Their Countries

Marco Polo - Italy

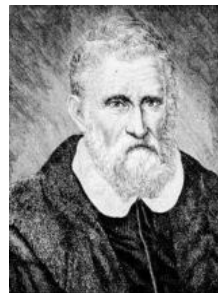
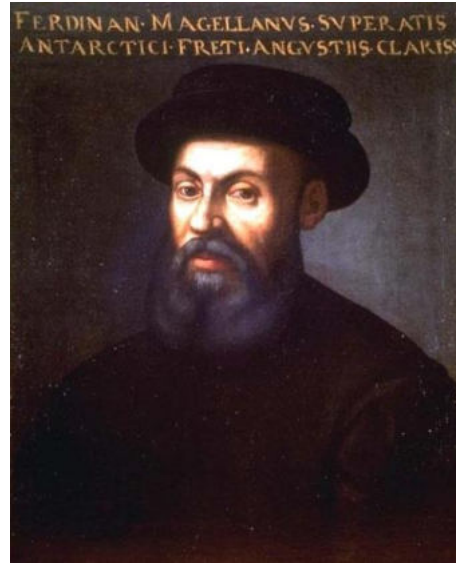
Christopher Columbus (Italian) - Spain

Ferdinand Magellan – Portugal

Vasco da Gama – Portugal

Francisco Vasquez de Coronado – Spain

Sir Francis Drake - England



The Age of Canals

- As people began to understand the economic advantage of water transport by barges and river vessels cities and states financed the building of canals and locks.
- Locks were primarily used as small portages to navigate past obstacles such as waterfalls, rapids, and shallows.
- Canals were used to join navigable bodies of waters.





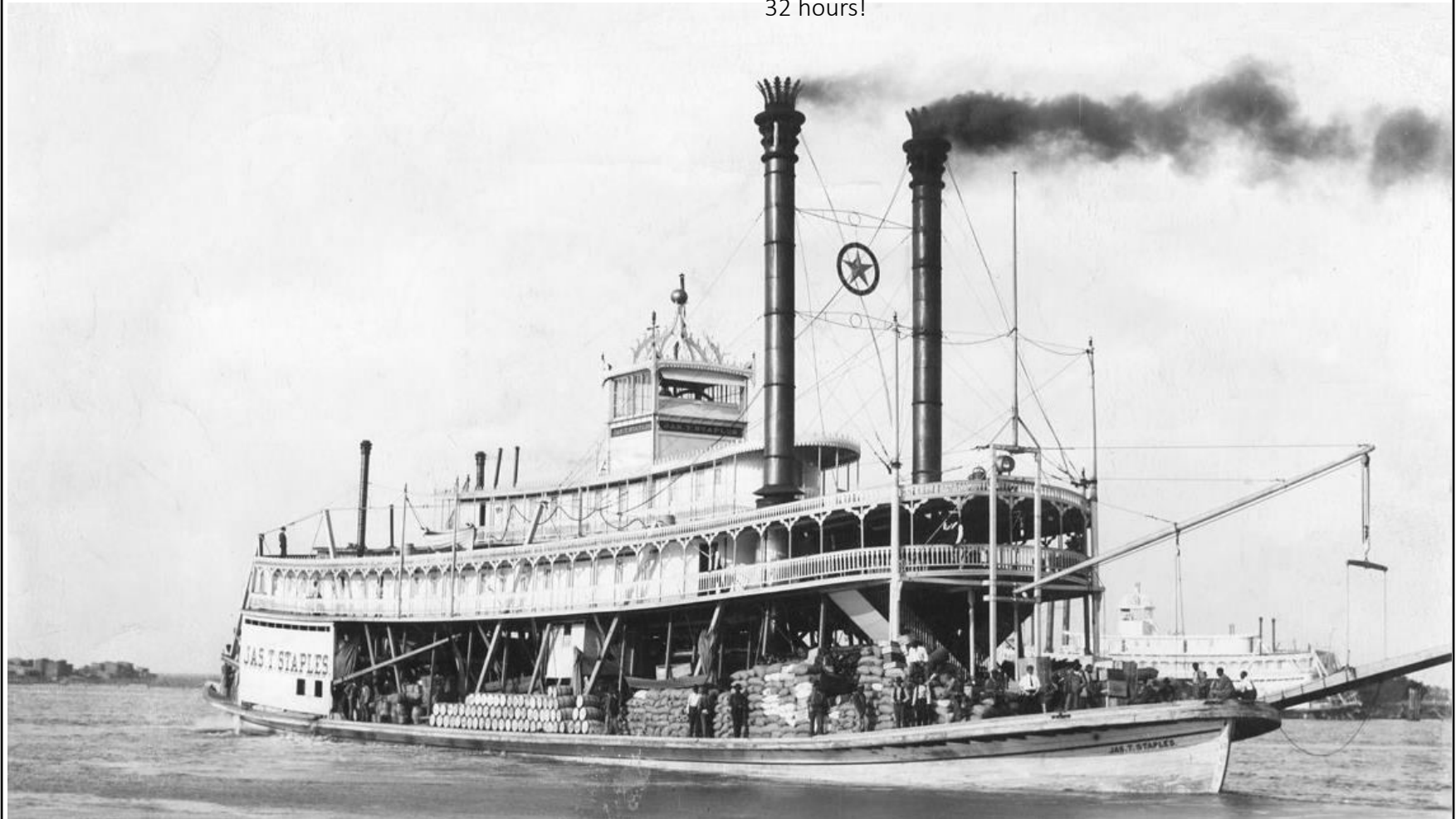
Erie Canal

- Proposed in 1808 and completed in 1825.
- 363 miles long and was known as the 8th wonder of the world at the time it was built.
- Joins the Hudson River to Lake Erie
- Composed of 18 aqueducts and 83 locks
- The original canal was 40 feet wide and only 4 feet deep. It could accommodate barges carrying 30 tons of cargo.
- Over the years it was enlarged several times to its final dimensions of 12 to 14 feet deep, 100 to 200 feet wide and having locks that could accommodate 3,000 tons of cargo.

Steamboats

A steamboat is a boat in which the primary method of marine propulsion is steam power, typically driving propellers or paddlewheels. Steamboats sometimes use the prefix designation SS, S.S. or S/S (for 'Screw Steamer') or PS (for 'Paddle Steamer'), however these designations are most often used for Steamships. The term steamboat is used to refer to smaller, insular, steam-powered boats working on lakes and rivers, particularly riverboats. As using steam became more reliable, steam power became applied to larger, ocean-going vessels

- Earliest US steamboat was built by John Fitch in 1787.
- First successful application of steam to power a paddle wheel boat was by Samuel Morey in 1793.
- Robert Fulton built the first commercially successful steamboat in 1800.
- The passenger steamboat North River Steamboat (also known as the Clermont) could make the 150 mile trip in 32 hours!



Paddle steamer

A paddle steamer is a steamship or riverboat powered by a steam engine that drives paddle wheels to propel the craft through the water.

In antiquity, paddle wheelers followed the development of poles, oars and sails, where the first uses were wheelers driven by animals or humans.

Modern paddle wheelers may be powered by diesel engines. Save for tourism and small pleasure boats (paddle boats), paddle propulsion is largely superseded by the screw propeller and other marine propulsion systems that have a higher efficiency, especially in rough or open water.

Economic Effects of Paddle Steamers

- Paddle Steamers made freight transport more affordable.
- Paddle Steamers made the Mississippi River and its Tributaries a major freight transport corridor for agricultural and manufactured goods.
- Steamers offered different rates for upstream and downstream traffic.
- Downstream rates were more inexpensive due to the boats ability to use the river current, and thereby using less energy.

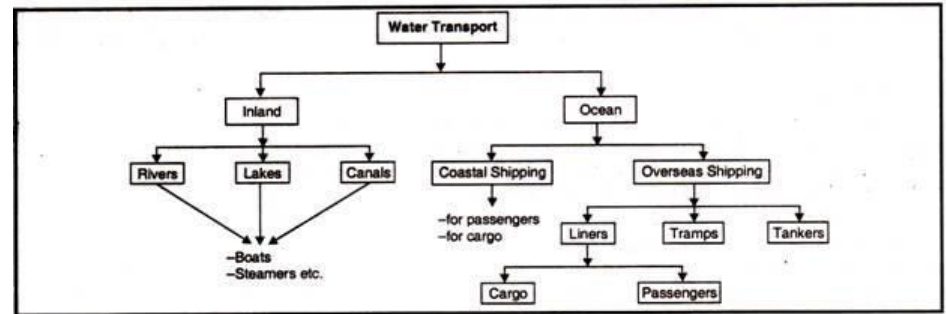


KINDS OF WATER TRANSPORT

Water transport consists of

1. Inland water transport

2. Ocean-transport



INLAND WATER TRANSPORT

RIVERS

Rivers are a natural waterway which can be used as a means of transport. They are suitable for small boats as well as big barges. River transport played a very important role prior to the development of modern means of land transport. Their importance has gradually declined on account of more reliable and cheaper transport services offered by the railways.

CANALS

They are artificial waterways made for the purpose of irrigation or navigation or both. Canal transport requires a huge amount of capital investment in construction and maintenance of its track i.e., the artificial waterways. The cost of the canal transport is, therefore, higher than that of river transport. To add to it, the cost of providing water for the canals is also a very big problem of canal transport.

LAKES

Lakes can be either natural like rivers or artificial like canals.

MODES OF WATER TRANSPORTATION

Ferry
Boat
Ship
Submarines



1.FERRY

Ferry is a boat or ship (a merchant vessel) used to carry (or *ferry*) primarily passengers, and sometimes vehicles and cargo as well, across a body of water. Most ferries operate on regular, frequent, return services. A passenger ferry with many stops, such as in Venice, Italy, is sometimes called a water bus or water taxi.

TYPES OF FERRY

Ferry designs depend on the length of the route, the passenger or vehicle capacity required, speed requirements and the water conditions the craft must deal with.

Double-ended- ferries

Hydrofoils

Hovercraft

Catamarans

Turntable ferry

Roro

Cruise ferry

Pontoon ferries

Double-ended- ferries



Double-ended- ferries have interchangeable bows and sterns, allowing them to shuttle back and forth between two terminals without having to turn around. Well-known double-ended ferry systems include the Staten Island Ferry, Washington State Ferries, Star Ferry, several boats on the North Carolina Ferry System, and the Lake Champlain Transportation Company.

Hydrofoils



Hydrofoils -have the advantage of higher cruising speeds, succeeding hovercraft on some English Channel routes where the ferries now compete against the Eurotunnel and Eurostar trains that use the Channel Tunnel. Passenger-only hydrofoils also proved a practical, fast and relatively economical solution in the Canary Islands but were recently replaced by faster catamaran "high speed" ferries that can carry cars. Their replacement by the larger craft is seen by critics as a retrograde step given that the new vessels use much more fuel and foster the inappropriate use of cars in islands already suffering from the impact of mass tourism.

Hovercraft



Hovercraft were developed in the 1960s and 1970s to carry cars. The largest was the massive SR.N4 which carried cars in its centre section with ramps at the bow and stern between England and France. The hovercraft was superseded by catamarans which are nearly as fast and are less affected by sea and weather conditions. Only one service now remains, a foot passenger service between Portsmouth and the Isle of Wight run by Hovertravel.

Catamarans



Catamarans are normally associated with high-speed ferry services. Stena Line operates the largest catamarans in the world, the Stena HSS class, between the United Kingdom and Ireland. These waterjet-powered vessels, displacing 19,638 tonnes, are larger than most catamarans and can accommodate 375 passenger cars and 1,500 passengers. Other examples of these super-sizer catamarans are found in the Brittany Ferries fleet with the Normandie Express and the Normandie Vitesse.

Turntable ferry



This type of ferry allows vehicles to load from the "side". The vehicle platform can be turned. When loading, the platform is turned sideways to allow sideways loading of vehicles. Then the platform is turned back, in line with the vessel, and the journey across water is made.

RORO

A cruise ferry is a ship that combines the features of a cruise ship with a RoRo ferry.



Pontoon Ferry



Pontoon ferries carry vehicles across rivers and lakes and are widely used in less-developed countries with large rivers where the cost of bridge construction is prohibitive. One or more vehicles are carried on a pontoon with ramps at either end for vehicles to drive on and off. Cable ferries (next section) are usually pontoon ferries, but pontoon ferries on larger rivers are motorised and able to be steered independently like a boat.

Boat



Boat- is a watercraft of any size designed to float or plane, to work or travel on water. Small boats are typically found on inland (lakes) or in protected coastal areas. However, boats such as the whaleboat were designed for operation from a ship in an offshore environment. In naval terms, a boat is a vessel small enough to be carried aboard another vessel (a ship). Another less restrictive definition is a vessel that can be lifted out of the water. Some definitions do not make a distinction in size, as 1000-foot bulk freighters on the Great Lakes are called oreboats. For reasons of naval tradition, submarines are usually referred to as 'boats' rather than 'ships', regardless of their size and shape.

Boats can be categorized into three main types:

Unpowered or human-powered boats. Unpowered boats include rafts and floats meant for one-way downstream travel. Human-powered boats include canoes, kayaks, gondolas and boats propelled by poles like a punt.

Sailboats, which are propelled solely by means of sails.

Motorboats, which are propelled by mechanical means, such as engines.

Ski boats are specialized motorboats specifically designed to safely tow one or more water skiers. This is achieved by using a high-horsepower, marine automobile engine, usually positioned in the midsection and powered through a direct drive to the propeller. A skier is pulled on a towrope attached to a tow bar located in front of the drive motor and affixed to the bottom of the hull. Each approved towboat must meet or exceed a preset set of standards defined by the USA Water Ski Federation, formerly the American Water Ski Association, AWSA



Ship

A **ship** is a large buoyant watercraft. Ships are generally distinguished from boats based on size, shape and cargo or passenger capacity. Ships are used on lakes, seas, and rivers for a variety of activities, such as the transport of people or goods, fishing, entertainment, public safety, and warfare. Historically, a "ship" was a sailing vessel with at least three square-rigged masts and a full bowsprit.

Ships and boats have developed alongside humanity. In armed conflict and in daily life they have become an integral part of modern commercial and military systems. Fishing boats are used by millions of fishermen throughout the world. Military forces operate vessels for combat and to transport and support forces ashore. Commercial vessels, nearly 35,000 in number, carried 7.4 billion tons of cargo in 2007. As of 2011, there are about 104,304 ships with IMO numbers in the world.

Types of Ships

Dry cargo ships - tramp freighters, bulk carriers, cargo liners, container vessels, barge carriers, Ro-Ro ships, refrigerated cargo ships, timber carriers, livestock & light vehicle carriers.

Liquid cargo ships - Oil tankers, liquefied gas carriers, chemical carriers.

Passenger vessels

Liners, cruise and Special Trade Passenger (STP) ships

Cross-channel, coastal and harbour ferries.

Luxury & cruising yachts

Sail training and multi-masted ships

Recreational boats and craft - rowed, masted and motorised craft

Special-purpose vessels - weather and research vessels, deep sea survey vessels, and icebreakers.

Submersibles - industrial exploration, scientific research, tourist and hydrographic survey.

Warships

Surface warships - deep and shallow draft

Submarines

The Future

- Although water transportation is one of the oldest forms of transportation, it will remain important to future economies.
- The Panama Canal is currently undergoing expansion. The (Set of Third Locks Project) which is scheduled to be finished by 2015 will
- Create a new lane of traffic
- Allow more ships to use the canal
- Allow larger ships to use canal.
- As a result of the expansion of the canal, many ports on the Atlantic seaboard and Gulf Coast are expanding to meet the anticipated demand.

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