

# **MECHANIZATION IN FISHING**

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## **INTRODUCTION:**

- In previous decades the amount of fish was more and human population size was less at that time small amount of catch also were able to meet the demand of fish.
- Slowly – slowly population got increased and due to which development in fishing also was taken place to meet the demand of fish for increased population.
- The percentage of fish consumers also get increased due to cheap in price and high nutritive value of fish.
- so, to increase production of fish mechanization in fishing were taken place. Mechanization helps the fishermen to harvest more amount of catch in less time and by utilizing less energy.
- Mechanization also helps to increase fishing area.

## **CONCEPT OF MECHANISATION:**

- Mechanization of the production process is one of the main avenues for raising efficiency of production and development of any industry.
- Mechanization means use of mechanical implements in a production process instead of the traditional simple methods involving human and animal labour.
- It leads to a transformation from biological sources of energy to mechanical source of energy.
- Mechanization can be partial or complete. When machines are used along with traditional implements the mechanization is partial and when all

operations are mechanized, animal labour is completely eliminated and human labour is reduced to the minimum, it is complete mechanization.

- In other words mechanization refers to replacement or supplementation of animate power with electrical mechanical power.
- This replacement or supplementation may be partial or integrated.
- The distinction is made between partial and integrated mechanization of production process depending on the degree to which technical means are provided for production process and also on the types of jobs.
- In partial mechanization, production operations are mechanized but manual labor continues to play a significant part, especially in auxiliary jobs.
- In integrated mechanization of production process, manual labor is replaced by machine power in all basic operations of the production process and also in auxiliary jobs.
- In the context of the fishing industry, mechanization refers to application of machine power in propulsion of the craft and in fishing operations.
- On the basis of this, the mechanized crafts can be categorized in to 3 types: crafts with inboard engines where machine is used for propulsion as well as fishing (trawler, purse seiner etc), crafts with inboard engine where mechanical power is used only for propulsion (drift / set gill netter) and the crafts with out –board engines where mechanization is used only for propulsion.

### **MECHANISATION IN FISHING:**

- Fishing with craft propelled by wind and sails by muscle was the original method of fishing till the 19th century.

- Many of the most noticeable and important changes in the fishing industry have come in the past 150 years only.
- The modernization and other various developments in fishing industry what we see today have happened only at the advent of mechanization of fishing crafts.
- By the late 1800's sailing boats were replaced by steamships. The era of steamers, however was short as they were quickly replaced by motor driven vessels early in the 20th century.
- The next major advancement came in the 1940's when instrumentation was introduced into the fishing industry.
- During this time, technologies such as echo-sounder and sonar were introduced.
- An era of rapid technological development in vessel design began with the British factory trawler experiment in the late 1940's, which demonstrated the great advantage of large stern trawlers that processed their catch on board.
- The idea was quickly developed by countries seeking to fish distant sources and by the mid 1960's these large vessels (up to 100 meters long) were operated by the Soviet Union, the United Kingdom, Japan, Poland, East Germany and Spain.
- The development in fishing gear design and fishing gear accessories enhanced fish harvesting efficiency.
- Development in equipments, instruments, machines etc also leads to mechanization in fishing and development in fish production.

- Swivel, shackle, anchor, sinkers, floats, buoy were get developed which helped to reduce energy utilization and side by side increased CPUE also.
- The development in net making materials like synthetic fibres increased fishing efficiency.
- Some machines and equipments were also get developed and installed on the deck of boat for easy operation of fishing net.
- Some deck equipments are: - winch (Trawl), Gandries (Trawl), Power block (Purse seine), Triplex roller (Purse seine), Fish pump (Purse seine), water pump (Purse seine), Net roller (Gillnet), Net hauler (Gillnet), Line roller (Long line), Line hauler (Long liner), jigs (squid jigging) etc.
- Some acoustic equipments such as – echo sounder (water depth, fish stock), sonar (school of fish, distance on any object from boat, night visibility), Net sonde (Availability of fish in and around the trawl net) etc helps to increase fishing efficiency and CPUE.
- The development in boat design and their operating systems also helps to increase the fishing.

### **Mechanization in Indian Fisheries:**

#### **THE BEGINNING:**

- The subject of marine fisheries in India was a deferred state subject until the early forties of the 20th century.
- The attempts to mechanize fishing crafts have been made in the beginning of 20th century.
- In 1900, the Govt of Bombay made first attempt at trawling by engaging a steam trawler.

- Subsequently, several experimental and survey fishing operations were made till 1947.
- The concerted efforts at development of Indian marine fisheries were initiated only after the country became independent in 1947, through the national five years plans scheme which commenced in 1951.
- The history of programmed mechanization process in fishing industry can be traced back to 1950's.
- As soon as after the second world war, when the country faced with severe food shortage, the programme of mechanization of fisheries was also conceived as a part of the 'Grow more food Campaign'.
- Its main objective was to increase the production of the fish and also the income of the fishermen.
- At the dawn of independence, in some of the princely states like Travancore and British ruled states like Madras, some initiatives were taken to examine the possibilities of technological improvements in fishing
- As a stand of the nation's drive towards industrialization that took off during the decade after independence, mechanization programme was emphasized in Indian fishery.
- The national planning commission proposed a radical transformation of capture fisheries that paralleled India's Green revolution in agriculture.
- It was on the hope that the mechanized fishing technologies would boost catches to the level commensurate with the postulated wealth of the ocean, to contribute to the economic development of the country, and help to feed its burgeoning population.
- This radical transformation – which refers to the 'Blue Revolution'- was to be an all Indian affair, promoted by the Central Government and adapted with variation in every coastal state.

- Initiatives for Mechanization In the above context, in 1953 the government of India requested the FAO (UN) for assistance to improve available boats and design new improved types of fishing boats.
- The Government of India and FAO made an agreement and the FAO appointed Paul B. Ziener – the most reputed boat designer of the time – to advise and assist the Government of India on problem of boat designing.
- Later, FAO sent a second naval architect Kjeld Rasmussen in 1955.
- They spent a total period of 60 man months in India between 1953 and 1958.
- They were travelling extensively along the coastline of all the maritime states of India with the exception of Kerala.
- Kerala was excluded in order to prevent overlapping with the works of Indo-Norwegian Project (INP) which was expected to undertake a similar exercise.
- Ziener and Rasmussen identified that six of the traditional crafts could be economically mechanized while a large number of crafts could easily be motorized with out-board motors between 1954 and 1958; they tried to develop three prototypes of mechanized surf boats for India.
- But each one of these had some technical snags and operations from these prototypes proved financially unsound.
- Besides attempting to develop the mechanized surf boats, they had also tried to develop a number of new designs of mechanized boats from 1953 to 1963.
- In 1962, a finalized design of the craft was developed. It had a 40 HP diesel engine, a crew requirement of 5 persons and could fish at a depth of 20 fathoms (120 feet) and could stay in the sea for about 65 hours.

- Among the various crafts standardized, the four most important designs that became very popular among the fishermen are the 25 feet gillnetter, the 32 feet trawler and 32 feet gillnetter and 36 feet trawlers.
- Ziener and Rasmusen suggested a step by step approach rather than the sudden introduction of large, complicated and expensive machinery.
- They were of the opinion that staffing men with good understanding of commercial fisheries in the fisheries department, boats which can be driven by engine, facilities for engine installation and maintenance and financial facilities and training for fishermen are the requirements for a successful mechanization scheme.
- These factors seemed to have existed in the state of Bombay and the Director of Fisheries took initiatives of mechanization of existing boats called 'Lodhias' and 'Machwas' by merely strengthening the framework of the vessel to fit an engine.
- The experiment was an instant success. In a decade (by 1961) as many as 1500 boats were mechanized.
- But the efforts to modify the existing crafts in the other states met with limited success only.
- The period from 1963-1979 marked the development of medium and large fishing vessels, indigenous engine for fishing vessels, research on alternative materials for boat building, new and efficient designs of fishing gear and new methods of fishing.
- These developments were in response to the development of export market, especially for shrimps which resulted in increased capture fisheries and increased need for fishing vessels.

- As a result of the growth of capture fisheries and increased need for fishing vessels, local capitalists entered into the development and production of indigenous engines for mechanized boats.
- It also brought in the development of suitable net making materials stronger than treated cotton and also the evolution of suitable designs of nets for various types and sizes of boats.
- Another important outcome of these developments is the use of alternative materials on cost and efficiency grounds such as fiberglass, ferro cement, aluminum alloy and steel for construction of vessels.
- It also led to introduction of new gear designs and changes in methods of fishing.
- The fishing methods developed along with improvements in crafts are: gill netting, boat seining, bottom trawling, and purse seining, long lining etc.

### **INDO – NORWEGIAN PROJECT:**

- Another major initiative towards the mechanization of fishing industry in India was the Indo-Norwegian project (INP).
- After World War II the United Nations had initiated several technical assistance programmes for the benefit of developing countries, providing technical experts, services and training.
- Norway had participated in these programmes from the beginning.
- As that country is experienced in fishing, it was considered to be able to give technical assistance in this industry.
- India, with a tremendous potential for fishing and the growing demand for protein food, had to find the way to increase fish production.
- This brought India and Norway together under the auspices of the UN170.

- In order to get their assistance in the programmes of development projects, the Government of India signed a tripartite agreement with FAO and the Government of Norway on October 17, 1952.
- The supplementary agreement signed on January 24, 1953 gave shape to a project called Indo-Norwegian Project.
- This project was introduced in Needakara in Trivancore – Cochin state aiming at development of fisheries and fishermen community.
- Its original project area was some 10 square miles including villages Puthenthura, Neendakara and Sakthikulangara in Quilon district.
- Subsequently, it was extended to Cochin in 1957.
- Then the activities were extended to adjoining states of Tamil Nadu and Karnataka.
- Under INP attempts were made to improve and motorise some of the existing fishing boats in order to enable them to fish longer and further out sea. A
- Model of the dug-out canoe of Quilon district of Kerala was taken to Fjods of Norway and got motorized.
- After a few months, it was pronounced that it was unsuitable for motorization.
- This pronouncement by INP foreclosed the possibility of improving the existing craft designs in this region.
- As an alternative to motorizing the traditional dugout canoes, the INP introduced a smaller flat bottom boat, motorized with a small 5 HP engine.
- Sixty-seven such boats (22feet and 8 HP) were constructed between 1956-57 and distributed to fishermen at a highly subsidized cost of RS 2000.
- They did not take off as fishermen were not convinced of the economic superiority of these boats over their traditional canoes and their unfitness for

the rough surface condition and as there were no adequate landing facilities available for these boats.

- After 1959, INP began to introduce the larger type of mechanized boat with more powerful engines.
- In 1963, another mechanized boat of 25 feet was introduced.
- Until 1963, larger boats were above 22 feet length (ranging from 23.5 feet to 36 feet) and with the engine power of above 8HP (ranging from 16HP to 48HP).
- From 1962 onwards, the activities of INP located in Quilon were handed over to the Department of Fisheries, Kerala.
- Aspects of the project that remained were then renamed as the Integrated Fisheries Project (INP) and came under the control of Government of India after 1972.
- Thereafter, efforts in India were made without any foreign help under the auspices of the Central Institute of Fisheries Technology (CIFT) based in Cochin.
- Designs capable of trawling as well as hand lining, gill netting and purse seining.
- It introduced some important vessel modification, developed cheaper and suitable boat building materials as well as engine designs for better performance.
- During the period 1963-67, the CIFT standardized the design of four new mechanized boats.
- The first was a 30 feet vessel fitted with a 30-35 HP diesel engine that could fish up to a depth range of 15 fathoms with a crew size of 6 and stay at sea for 20-24 hours.

- The other three belonged to a class of vessels which could be used for a variety of fishing operations; stay out at sea for 3-7 days and fish at depth beyond 25 fathoms.
- Thus, as result of the governmental initiatives and various research and development activities under Indo-Norwegian Project, various designs and sizes of mechanized crafts were introduced besides specialized fishing vessels like trawler cum-fish carrying, trawler-com-purse seining, boats for long line fishing and trawling etc.
- This led to the shift of Indian fishermen from traditional fishing to mechanized fishing year by year. The number of mechanized boats effectively in operation on 1-3- 1969 in the eight coastal states, stood at 6515.
- Of the total number of boats in operation, 75% were in the private sector, 20% in the co-operative sector and the remaining 5% in the public sector.
- The number increased by 292% in one decade and stood at 19000 in the year 1979.
- It increased to 23000 in late eighties 35000 in 1992.
- Between 1960 and 1999 the mechanized crafts have increased 570% (It was only 110% in case of artisanal crafts).
- The number of mechanized crafts stood at 59000 in 2006.
- In the year 2010 the number of mechanized crafts in India increased to 72559 (CMFRI 2010) and in the year 2007 mechanized fishing contributed to about 71 % of the total marine fish landings of the country (CMFRI 2007)

### **THE MOTORIZATION ERA:**

- ✓ The mechanized crafts were first employed for Demersal trawling, targeting mainly shrimps.

- ✓ The lucrative world market for penaeid prawns in 1960s led to the introduction of small 32feet coastal trawler capable of catching them.
- ✓ Government's interest to promote export gave the further boost to trawling.
- ✓ A number of outside investors moved into reap the profits.
- ✓ Government's attempts to supply trawler to the actual working fishermen proved a failure and about 1000 trawlers distributed through co-operatives went into the hands of middlemen and outsiders creating a new class of absentee owners who had no long term stake in fishing but were after profit only
- ✓ While various new types of mechanized crafts were introduced through various governmental initiatives, most of the fishermen have confined themselves to fishing in shallow waters for various reasons thereby competing with traditional sector for the dwindling fish resources and creating conflicts.
- ✓ The keen competition from shrimp trawlers in the inshore waters prompted many traditional fishermen to adapt motorization of crafts to expand their fishing operation area which led to better financial returns.
- ✓ Simultaneously, the declining resources and increasing fuel cost compelled many traditional fishermen to prefer installation of out-board motors rather than adapting mechanization.
- ✓ Therefore, since 1979 the focus shifted to motorization of traditional crafts especially along the south-west coast of India.
- ✓ Pushed to the wall by these developments, the artisanal fishermen reacted strongly in the 1980's.
- ✓ Their response took two forms: Unionisation and motorization.

- ✓ Unionisation was for pressurizing the government for their rights in sea vis a vis mechanized boats.
  - ✓ Motorization was for competing more effectively and to reach distant waters in search of new fish resources.
  - ✓ Motorization is used to denote the use of motors on beach landing artisanal crafts to enhance their capabilities.
  - ✓ This is to contrast it with ‘mechanization’ which created new sector with larger harbor based boats.
  - ✓ In motorization, traditional crafts such as plank built boats, dugout canoes and catamarans are fitted with Out-Board Engines (OBE). In a motorized craft human labor power is substituted by mechanical power for propulsion and fishing continues to be done through human labor.
  - ✓ The engine is fixed to a bracket fitted on the starboard side of the craft.
  - ✓ The motorized fishing has contributed 24 % of the total marine fish landings of the country (CMFRI 2006) and 75591 motorized crafts were in operation accounting for 28.55% of the total marine fishing fleet size in India (CMFRI 2005).
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