A STUDY ON THE IMPACT OF MECHANISATION IN MARINE FISHING INDUSTRY ON SOCIO-ECONOMIC EMPOWERMENT OF TRADITIONAL MARINE FISHERMEN IN KANYAKUMARI DISTRICT

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LIST OF ABBREVIATIONS

AFH	-	Actual Fishing Hours
ANOVA	-	Analysis of Variance
BOBP	-	Bay of Bengal Programme
CMFRI	-	Central Marine Fisheries Research Institute
EEZ	-	Exclusive Economic Zone
FAO	-	Food and Agriculture Organisation
FOREX	-	Foreign Exchange
FRP	-	Fiber Reinforced Plastic
GDP	-	Gross Domestic Product
Hp	-	Horse power
LED	-	Light-emitting diode
NGOs	-	Non-Governmental Organisation
OBMs	-	Out Board Motors
PC	-	Puduchery
TN	-	Tamil Nadu

Chapter - I

INTRODUCTION AND DESIGN OF THE STUDY

CHAPTER - I

INTRODUCTION AND DESIGN OF THE STUDY

1.1. INTRODUCTION

1.2 THE FISHING INDUSTRY IN INDIA

1.3 FISHING CRAFTS BEFORE THE ADVENT OF MECHANISATION

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CHAPTER - I

INTRODUCTION AND DESIGN OF THE STUDY

1.1. INTRODUCTION

Fishery sector occupies an important place in the socio-economic development of the country. The continued changes and up-gradation of existing fishing technologies and modernization helped to increase the efficiency of craft and gears. Fishery sector is an important sector in most of the developed and developing countries of the world from the standpoint of income and employment generation. The experiences in these countries indicate that the growth of the fishing sector stimulates the development and employment in related industries which contribute significantly to the total economic growth of the country. Besides providing direct employment, the sector is also an income generator as it supports canneries, processing establishments, gear and equipment manufacturers, boat yards, refrigeration and ice making plants and transport services in addition to those working in government and private fisher based institutions. Fisheries play an important role in augmenting food supply and raising nutritional levels of the population. Fish also yields several bye- products such as fish oil, fish meal, fish manure fish leather, fish glue etc.[1]The aquatic resources of the world are varied, extensive and rich in potential

1.2 THE FISHING INDUSTRY IN INDIA

In India fishing has been viewed by historians as one of the earliest forms of hunting. The prehistoric man used various kinds of fishhooks, harpoons made of bone, horn and bronze. In the Indian Archipelago, people fished with baskets and hooks and used rattles to attract fish and caught Periophthalmus (the mud skipper) with a spiked

[1] Younis. A. S and Donaldson. G, "**Fishery Sector Policy**"**, The World Bank Washington**, 1982, pp.5-6.

plank. The primitive man used even some of the modern methods of fishing such as fishing with board, with kite, with traps and snares (a device, usually consisting of a noose, for capturing birds of small animals).

Food-gathering people first obtained fish and shellfish from the shallow water of lakes and along the seashore, from small ponds remaining in inundation areas, from tidal areas, and from small streams. Some authorities believe that in the earliest of times fish were rarely caught because of the inadequacy of fishing gear. Shellfish, however, could be gathered easily by hand, and the prehistoric kitchen utensils indicate their importance as a food source. In earliest times most foodstuffs were used at once and not stored, but with the growth of population and food needs, scientifically proven techniques were developed for preserving fish. Drying, smoking, salting, and fermentation the same of the very early methods of preserving fish for fulltime use. It became desirable to catch large quantities, and specialized equipment was devised.

1.3 FISHING CRAFTS BEFORE THE ADVENT OF MECHANISATION

Before mechanization came to the fishing industry towards the end of the 19th century, sailing vessels were developed to suit the conditions of fisheries in different areas. The Grand Banks schooners were the peak of such developments. Sailing from New England, Nova Scotia, and Newfoundland, they fished cod during trips lasting up to six months. They salted their catch for export to Europe, Africa, and the Caribbean. Individual fishermen fished from small wooden dories, setting and hauling long lines by hand. Portuguese vessels also sailed annually to the Grand Banks, A number of them still operated alongside modern steel vessels into the late 20th century.[2] Smaller cutters and yawls worked around Europe using drift gill nets and set nets. Beam trawls were

[2] Linsay Y. Ross, Barbara Raas, Dryony Rass, "**Anaesthetic and Sedative Technics for Aquatic Animals**", III Edition, Black Well Publishing, Oxford, USA, 2008, pp.145-147.

used extensively in the North Sea and English Channel, particularly for flatfish, being towed down wind under sail and then hauled back to the vessel's side.

1.4 FISHING CRAFTS AFTER THE ADVENT OF MECHANISATION

As steam-driven winches came into use, fishing gear increased in variety size and weight. Fishing craft became motorized in the early 20th century. The inboard diesel engine became universally adopted except for the smallest boats, on which gasoline-powered outboard engines remain common. An era of rapid technical development in vessel design began with the British factory trawler experiment in the late 1940s, 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 resources, and by the mid-1960s these large vessels (up to 100 meters long) were operated by the Soviet Union, the United Kingdom, Japan, Poland, East Germany, and Spain. Equivalent development occurred in the exploitation of the huge resources of small pelagic fish, mainly for conversion into fish meal.

In the late 1940s small vessels, using hand-operated natural-fiber nets, fed small shore-based canning and fish-meal plants.[3] By the late 1960s, large fleets of 25-metre purse seiners were supplying factory mother ships capable of handling up to 3,000 tons per day. In the beginning of the 1950s, mechanisation took a great stride forward when the power block was invented for hauling the gear. Another important hauling device was a power-driven drum to haul and store seine nets, gill nets, purse seines, and even the large trawl nets.

India is the second largest producer of fish in the world, contributing to 5.68% of global fish production. India accounts for 2.5% of the global fish market and the

[3] Ahilan.B and Felix. R. Santhanam, "**Text book of Aquaculture**", Daya Publishing House, New Delhi, 2008, pp.39-40.

fisheries sector is a source of livelihood for over1.44 crore people. During the 11th five year plan, the fisheries sector contributed 1.1% to the GDP. Contribution to agricultural GDP in the year 2014-15 was 5.3%. Total production during 2013-14 is at 9.58 Million Metric Tonnes (MMT), (Marine- 3.44 MMT and Inland- 6.14 MMT). Overall growth in fish production in 2013-14 was 5.9% (Marine- 3.7% and Inland- 7.3%). Fisheries is one of the major forex earners with revenue reaching Rs. 18,856 crores in 2012-13, accounting for about 18% of agricultural exports. During 2013-14 the volume of fish and fish products exported was 9.8 lakh tones, worth Rs.30213.26 crores. The sector began playing a vital role in the Indian economy through its consistent contributions to the GDP, besides becoming a vital source of livelihood for about four million people including 1.6 million active fishermen.[4]

In India before the advent of independence, fishing was an entirely artisanal occupation with little intervention from the outside world. Fishers had to sell or barter their catch to procure other food items. Fishing technology during this early period was influenced by the availability and changes in the raw materials needed to make boats and nets and the markets for fish and fish products. The strong social cohesion in the fishery communities prior to "modernization" formed the basis for good governance. Ample examples of strong and viable traditional management systems exist in the different parts of the country with heads of villages, governing traditional fishing. These include exclusive rights to certain fishing areas (demarcated as zones running at right angles to the coast), sharing of the benefits of the harvest and conflict resolution.[5] The people exploited the fishery wealth and they used many indigenous methods for

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[4] Gopalakrishana .A and Grinson George, "**Marine Fishers: Experiences and Expectations**", **Blue Waters Newsletter**, CMFRI, Kochin, Vol. XVII, Issue 1, Jan 2016, p.12.

[5] Agriculture and Rural Development Sector Unit South Asia Region, The World Bank, "**India Marine Fisheries Issues, Opportunities and Transitions for Sustainable Development**", **Report No 54259**, 2010, p32.

fishing. The influence with the outside world resulted in many improvements in the indigenous methods of fishing and also contributed our inventions to the outside world.

1.5 FISHERIES IN TAMIL NADU

Tamil Nadu is the southern-most state of India with a coastline of 1076 km. Essentially, an east coast state, it extends around 60 km into the south west coast of India, gaining a foot hold on the fisheries of the west coast as well. Embedded in the Tamil Nadu (TN) coast is two enclaves of the Union Territory of Puducherry Puducherry, the capital city and Karaikal, a predominantly rural district with a coast line of 45 km. The significance of the geographical location of TN is that the fishermen of northern TN have potential access to the entire east coast up to the Bangladesh border while the Kanyakumari fishermen in the south have access to the entire west coast, up to the Pakistan border.[6] Another geographical aspect of great significance is that while half the coast line faces the open sea with a 200 nautical mile Exclusive Economic Zone (EEZ), the other half is proximate to the Sri Lankan coast line with an international maritime boundary that restricts the area available for fishing. At the closest point, the international boundary line is just 16 km away from Dhanushkodi on Rameswaram Island.

Another geographical and ecological feature of the TN coast is that it can be divided into four distinct eco-systems from a fisheries point of view. It has four "seas", as follows (north to south):

[6] At the moment, the Chennai fishermen make use of the opportunity on the east coast by fishing in Andhra waters with some of the multiday trawlers going up Visakhapatnam. On the west coast, the footprint of the Kanyakumari fishermen is much more substantial. The Colachel trawlers fish mainly in Kerala, while a significant number of motorized units seasonally migrate and fish in Kerala, Karnataka and Southern Maharashtra. The Thoothoor "shark boats" fish all over the Indian EEZ on the west coast using up to the Pakistan border using long lines and gillnets.

- Bay of Bengal, from Pulicat to Pt.Calimere (also called the “Coromandel Coast”)
- Palk Bay, from Pt. Calimere to Rameswaram Island
- Gulf of Mannar, from Rameswaram Island to Cape Comorin (Kanyakumari)
- Arabian Sea, from Cape Comorin to Neerodi on the Kerala border (also called the Kanyakumari coast)

Each of the four seas/ecosystems has its own peculiarities leading to the evolution of distinctive artisanal fisheries and identities. Rameswaram Island and the “Adam’s bridge” (a natural barrier just below the sea surface) that extends to the Sri Lankan coast, significantly limits movement of boats from the southern districts to the north and vice versa. However, with the exception of the 300 km Palk Bay coastline, the rest of the coast, in principle, has access to the “deep sea” and the “high seas”.

Tamil Nadu (along with Kerala, once part of ancient Thamizhagam), has the oldest marine fishing communities in India, with some of them having an unbroken tradition of over 2000 years. Interestingly, three of the four eco-systems are associated with particular communities (castes), which have a near total hold over that part of the coast. The Hindu Pattinavar community is associated with the Bay of Bengal or Coromandel Coast, the Christian Parava community with the Gulf of Mannar and the Christian Mukkuva community with the Arabian Sea coast. Though there is a smattering of other communities that co-exist in these three coasts, the overall ethos is that of the pre-dominant community on that part of the coast. The three big communities have well developed traditions and institutions that transcend the village

and embrace the entire zone they occupy. Strong self-governance is the hall mark of these three zones/communities.

The Palk Bay and the northern part of the Gulf of Mannar (Rameswaram to Vembar) are settled by an assorted group of communities, possibly much later in history. Some of these communities are considered marine fishing castes, while others are clearly small segments of agrarian castes that moved into fishing in the last century or so. This mosaic of communities make this zone more socially complex with a relative paucity of traditional institutions. Self-governing structures have emerged but are more fragmented than in the other three coasts. All fishing hamlets (some may be just streets in a larger habitation) are generally single caste and self-governed. This self-governing characteristic has not vanished despite 60 years of the Indian constitution and remains strong. This is not true just for TN, but for almost the entire Indian coastline.

1.6 FISH PRODUCTION

Three major sectors, namely the **mechanised** comprised of trawl fleet, gillnetters, purse seiners and ring seiners etc., **motorised** such as the gillnetters of different types, long liners, boat seiners, mini trawlers and bottom set netters and the traditional **non-motorised** sector comprised of catamarans, plank built boats, canoes and vallams contribute to the marine fish landings along the Tamil Nadu coasts.

1.6.1 Mechanised Sector

Among the mechanized units, trawlers landed 92.1 percent of the total catch followed by mechanized gillnets (4.2 per cent), mechanized bottom-set nets (1.3per cent), mechanized hooks & line (1.2 per cent) and mechanized purse seine (0.5 per cent). The catch per hour of the purse seine was the highest 1272kg/hr. followed by the

bottom-set net at 469 kg/hr., hooks & line at 94 kg/hr., gillnet at 59 kg/hr., trawl net at 51kg/hr., and lastly the bottom set gillnet at 3 kg/hr. The trend in trawl landings in Tamil Nadu during 1985-2008 shows that the catch continued to increase from 1 lakh in 1985 to 2.54 lakh tons in 1995, then it declined to 1.42 lakh tons in 2004 and revived back to 2.38 lakh tons in 2008. The catch per actual fishing hours (AFH) of mechanised sector during 2001-10 indicates that the catch rate was better in all the districts except the three districts of Thanjavur, Pudukottai and Ramanathapurambordering the Palk Bay. Motorised sector The motorized units are comprised of out-board units of gillnet, hooks & line, bottom set nets, trammel net, purse seine, traps and other gears, in which the gillnets landed the bulk of the total catch (59.0 per cent) followed by hooks & line (7.4 per cent), ring seine (7.1 per cent), bottom set nets (2.8 per cent) and all other gears put together contributed the balance 6.1percent. The trend in the catch and effort of motorized sector during 1986-2008 reflects a spectacular increase from 1991 to 2001 and then a gradual decline till 2004 with a revival in later years. The catch rate by motorized units indicates that the out board ring seine was the highest 735 kg/hr., followed by outboard purse seine (373 kg/hr.) and has also been observed to increase gradually with fluctuations.

The more commonly used gears in the motorized sector were drift/set gillnets, hooks and line, ring seine, boat seines and shore seines. As observed in the mechanised sector, the catch per AFH by motorised sector in the 3 districts of Thanjavur, Pudukottai and Ramanathapuram is also the lowest when compared to other districts.

1.6.2 Non-Motorised Sector

Non mechanized landings comprised 10.8 percent of the total catch by traditional units. The catch per hour indicates that the catch rate of small shore seine (Olaivalai) is 247 kg/hr., bottom set net is 62 kg/hr., hooks & line is 12 kg/hr., drift

gillnet is 11 kg/hr, and boat seine is 1 kg/hr. In contrast to both mechanized and motorized sectors, the catch and effort of traditional (non-motorized) sector continued to decline from 1985 to 2008 with violent fluctuation in landings and minor variations in the effort input. The catch per unit of non-mechanized traditional units registered a marginal increase from 1989 onwards with a decline during early 2000 and a revival after 2005. The more common gears used in the traditional sector were drift/set gillnets, hook and line, traps, boat seines, shore seines and scoop nets.

1.7 MARINE CRAFTS USED IN FISHING

While the previous section was aimed at explaining the evolution of the fisheries of Tamil Nadu & Puduchery from a historical point of view, this section is aimed at giving a snap shot of the fisheries at the moment. We start by describing the artisanal and mechanised fishing units.

1.7.1 The Artisanal Fishing Units

Though in terms of fish production, this sector comes a distant second to the mechanised sector, it has the largest number of fishermen involved. It is also the most ubiquitous due to its presence across the entire 1000 km coast in about 500 villages and about 300 beach landing centres. The following is a description of the main fishing units in the artisanal sector.

Kattumaram: A traditional fisherman is still associated in public mind with the Kattumaram, the small craft made of lashing together logs specially shaped to get the desired result. It is present in the Coromandel coast, southern Gulf of Mannar and the Kanyakumari coast, but this champion of surf crossing is now a marginal fishing unit with very few used for serious fishing. It had been adapted to the motor (diesel long-tail) and enjoyed great popularity as a motorised unit in the 90s and early 2000s, but the

tsunami accelerated its demise with the Fibre Reinforced Plastic Boat-Out Board Motor (FRP-OBM) combination replacing it in most areas.

The kattumaramis used in combination with a number of small gillnets and hand-lines. Mostly used within 1-2 km distance as a non-motorised vessel and with a crew of 1-3 persons. Tirunelveli district and the southern part of Kanyakumari district still have a preference for the motorised kattumaramin view of the extreme surf conditions. Kattumaram substitutes or "look-alikes" made of plywood or fibreglass are popular in Kanyakumari and they are often used with small imported OBMs (2-5 hp).

Small wooden canoes: Small non-motorised canoes called vathai or vallam are used for near-shore fishing with a variety of small gillnets in the Palk Bay and northern Gulf of Mannar. The crew size is 2-4 persons.

Large sailing vallam: In the Palk Bay, large wooden sailing boat or vallam have had a long innings. Using the unique balance-board mechanism, they can take a large sail and move at a fairly rapid clip when the winds are favourable. Now, they are also facing extinction like the Kattumaram with the post tsunami rush for FRP-OBM boats. Shore seines: In Kanyakumari and some pockets of the Gulf of Mannar, shore seines are still in operation. With the conversion from natural fibre to synthetic fibre, it is still an important gear for a section of fishermen in Kanyakumari. Only the owner and a small number of the 30-40 fishermen needed to pull the net depend heavily on it. The rest of the fishermen just "pile on" when they see a shore seine operation and get a share of the income.

1.7.2 Mechanised Fishing Units

Large motorised vallam: The Palk Bay and the Gulf of Mannar have a fleet of large wooden vallams with in-board diesel engines (15-25 hp). They specialise in use of

large drift nets and can be considered the aristocracy of the artisanal sector in the Palk Bay and Gulf of Mannar.

The FRP-OBM unit: This has become the most common fishing unit in TN & PC. 26'-30' flat bottomed FRP decked boats that can be comfortably beached are now found on all beaches. They are typically used with diesel long-tail motors (6-10 hp), an Indian version of petrol long tails found in South East Asia. A wide range of gillnets, hand lines, long lines, etc., are used for fishing on these vessels with crew size of 3-5. Though it is not easy to further categorise these fishing units, one can say that one group with small gillnets is involved in near shore fishing while those with large drift nets and long lines can go deep and far. Some of them do go for multi-day fishing (2-5 days).

The Ring-seine unit: This is a new unit that has gained sudden momentum after the tsunami. The ring seine (a small scale variant of the mechanised purse-seine) is an import from neighbouring Kerala where it has been in use for nearly 25 years (mostly as a banned gear!) to catch large shoals of oil sardine and mackerel. The increased abundance of oil sardines and the good market for it in Kerala (as fresh fish) and the Tamil Nadu poultry feed industry has triggered the adoption of the ring seines. A group of 7-8 FRP boats join hands in investing in a ring seine net for a few lakhs of rupees along with a larger boat to carry the net. The net-boat and the 7-8 FRP boats jointly participate in the fishing operations with a large contingent of labour (30-40 persons). While in some areas, this is a seasonal option for the FRP boat fishermen, they shift on a day-to-day basis from individual FRP boat fishing to ring seine fishing depending on the sighting of the big shoals. The ring seine is the most controversial gear at the moment. As a "bulk-catching method", it can affect those using smaller nets to target the same species. As the net size is growing, it is alleged that the rings hit the

sea bottom in shallow water harming the benthic area. Catch of juveniles is another major complaint. It is officially banned, but the efforts of the Department of Fisheries to stamp it out have not been successful. The community itself has banned it and hence there are parts of the coast (e.g., the Chennai coast) where it is not in use. In other areas, there are ring-seine villages and non-ring seine villages with considerable amount of heart burn about the new technology. Cuddalore and Tirunelveli districts have emerged as the main centres of this technology. In Cuddalore, after a conflict for 4-5 seasons, the ring seine fishermen and the others have reached an agreement to use it for six months only.

Other specialised or niche fishing: There are other groups in certain locations which undertake some special or unusual types of "fishing". In the Gulf of Mannar and Kanyakumari, there is a long tradition of "skin diving" for picking up pearl oysters, chanksand sea-cucumbers. With pearl oysters beds having been silted over after independence and sea-cucumber catching been banned since 2000, the divers in the Gulf of Mannar mainly depend on chanksfishing. This group is a few thousand strong. The Kanyakumari divers are a much smaller group, but use the skills for not just picking up chanks, but also for fishing with traps. They set lobster traps over specific crevices in rocky patches by diving and then dive again when it time to pick up the traps and lobsters trapped in them. Unlike the Gulf of Mannar divers, the Kanyakumari divers also undertake "normal fishing" using kattumarams or FRP-OBM units.

An interesting group in the Gulf of Mannar is that which undertakes seaweed harvesting. Seaweed harvesting is essentially a fisherwoman's job in some villages. Near the beach, they just bend down to pick up seaweed in waist deep water. Further beyond, they take small boats and undertake skin diving for harvesting seaweed. Seaweed is found in good quantities mainly in the northern Gulf of Mannar Another

unusual group of specialists are the Chunna Paravars who specialise in sea-shell picking near the shore in Tirunelveli and southern Kanyakumari districts.

Mechanised Boats

The trawlers: The trawlers constitute the bulk of the mechanised sector with around 5500 units spread out across the coast in a dozen important fishing harbours and another 10-12 minor centres where they are anchored in small numbers. Though the shrimp trawl was originally the main gear, now-a-days, the trawlers have developed a wide range of trawl nets to target a variety of resources at different depths. The High Open Bottom Trawl (HOBT) is perhaps the most common and popular gear as it targets a wide range of fin fishes in the mid-water column. Specialised trawls for crabs, sea-cucumber, etc., are also used by some groups, which are banned gears, technically.

In recent years the use of pair trawls, also banned, has become a major source of conflict between mechanised and artisanal boats as well as between sections of the mechanised boats themselves. The pair trawls are getting larger and the boats larger, giving the users bumper catches to the dismay of the others. In Rameswaram, it is acknowledged that the use of this gear aggravates the already difficult relationship between Indian and Sri Lankan fishermen in the Palk Bay. Interestingly, the Rameswaram fishermen also use the pair trawl to target oil sardine for 2-3 months in a year.

The trawlers of Pazhayar (Nagapattinam district) have an unusual diversification. They make use of the ring seines seasonally to target mackerel and carangids. The Kanyakumari trawlers (the ChinnaMuttom boats operating locally and the Colachel boats operating in Kerala) seasonally shift to long lining for perches and other valuable reef fishes.

Gill net boats: Mechanised gillnetters are basically meant to target large pelagics (seer, tuna) in deeper waters using drift nets. They are found only in a few pockets as gillnetting is a traditional fishing method and many of the artisanal units from Kattumarams onwards do gillnetting in deeper waters seasonally. A dedicated gillnet boat for fishing for large pelagic makes sense only in some pockets. Some of the so-called "mechanised" gillnetters are nothing but small boats with in-board diesel engines with a fishing capacity comparable to the motorised boats. Taruvaikulam in the Gulf of Mannar is unusual for its gillnetters operated by a group of fishermen belonging to a non-fishing caste.

The Thoothoor "shark boats': Though of gillnet boat design, the Thoothoor fleet of 500-600 boats have a distinct character of their own and need separate recognition and treatment. This fleet hails from a group of 6 villages (Eraiyumanthurai, Poothurai, Thoothoor, Ezhudesamchinnathurai, Eraviputhenthurai, and Vallavilai) on the Kanyakumari-Trivandrum border, but fishes all over the west coast of India up to the Pakistan border. Starting off as small 32' gillnet boats in the late 1980s, this fleet metamorphosed into long liners for shark all along the west coast of India. By mid-90s, they diversified from their bottom long-line (suitable only for fishing on the shelf) to surface long-lines to fish for oceanic sharks beyond the shelf. By 2000, they further diversified from shark fishing to tuna fishing, one group with long lines for yellow-fin and another with gillnets for skipjack. Today the fleet is much more diversified, with the following grouping: (i) mainly shark fishing, (ii) long lining and gillnetting for mainly tuna, (iii) gillnetting for seer, carangids, etc. This fleet is constantly innovating and changing strategy depending on changes in the fishing opportunities. It is India's only truly indigenous deep sea fleet. Developed purely with native intelligence and money from informal sources, it has achieved what Government of India's many

schemes for deep sea fishing have not achieved over the last four decades. The gradual evolution of this fleet has meant that some of the larger boats have hit the 20 m mark in terms of overall length. While the smaller boats go for week long voyages, the largest may go fishing up to four weeks.

1.9 STATEMENT OF THE PROBLEM

Dynamic changes have taken place in the Indian fishery scenario and there were many management interventions introduced by the state and central governments from time to time. Changes also have taken place in the crafts and gear, fisherfolk population structure, availability of resources and their spread, infrastructure facilities and management measures. Keeping this in view, the Programme of Mechanisation of Fishing under the scheme, increased financial outlays were provided over the plan period and assistance was obtained from international agencies, especially under the Indo-Norwegian Projects.[7]

The marine fisheries sector in Tamil Nadu plays a crucial role in the overall economic development of the state. There are 591marine fishing villages and 363 marine fish landing centres in Tamil Nadu (CMFRI, 2010). About 10692 mechanised units and 24942 motorised and non-mechanised units are engaged in marine fishing activities in the state. Trawlers (54%) and gillnetters (38%) are the main crafts in the mechanised sector. The human resource potential of the marine fisheries sector includes 192697 families with a total fisher population of 802912. The marine fish production in Tamil Nadu during the year 2011-12 was estimated at 6.30 lakh ton (CMFRI, 2012), contributing 10-12% of the total marine fish production in the country. The mechanised

[7] **Evaluation of the programme of Mechanisation of Fishing Boats**, CMFRI, PEO Study No.83, 1971, Kochi.

and the motorised sectors contributed 75 and 24% of the total landings respectively, while the non-mechanised sector contributed only 1%.[8]

Kanyakumari district is one of India's richest fishing grounds, the Wadge Bank about 10000 sq.km in area, 56 km south of Cape Comorine.[9] It has a 67.59 km coastline comprising 42 fishing villages with a total fishermen population of 1,43,388 of which 36,548 engaged in marine fishing, 1062 mechanised fishing boats, 630 motorized catamaran and 3147 motorised vallam with marine fish production of 52,378 tonnes (Rs.246.96 crores).[10] In Kanyakumari district fisheries sector has witnessed a steady growth, simple traditional activity in the fifties have transformed to a livelihood activity providing considerable employment opportunities and contribution to the food and nutrition security and foreign exchange earnings. It is estimated that for every fisherman engaged in primary fishing activity about four others are getting additional employment by way of post- harvest operation, fish marketing and a host of other allied activities.

The increase in number of mechanized and modern crafts and gears led to increase in fish production, increase in the fisheries activities, and development of the fisher folk in Kanyakumari District. But still the mechanized fishermen in this district are not having modern technology, not having adequate safety measures to protect their fishing crafts and gears and moreover, their socio-economic conditions have not improved considerably. As regards the mechanization of marine fishing though few studies have been conducted, there is no in-depth study on the impact of mechanisation in marine fishing industry on the socio-economic empowerment of traditional marine

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[8] Geetha. R, Narayanakumar. R, Shyam.S.Salim, "Economic Efficiency of Mechanised Fishing in Tamil Nadu- a case study in Chennai", CMFRI, **Indian Journal for Fish**, Kochi, vol. 61(4), 2014, pp.31-35.

[9] Lazarus. S and Joel.J.J, "**The Pelagic Fisheries Resources of Kanayakumari District**", Tamil Nadu, South India, Vizhinjam Research Centre of CMFRI, 1979, Vizhinjam, pp.9-28.

[10] **Kaniyakumari District Statistical Hand Book**, 2015.Govt. of Tamil Nadu, Chennai.

fishermen in Kanyakumari District. The researcher being the native of Kanyakumari District and belongs to the fishing community made an attempt to study the impact of mechanisation on the socio-economic empowerment of traditional marine fishermen in Kanyakumari district.

1.10 SCOPE OF THE STUDY

In the present research is an empirical study conducted in Kanyakumari district among the traditional marine fishermen who are practicing mechanized mode of fishing. This research covers the socio-economic conditions of the traditional fishermen practicing mechanized mode of fishing, the factors influencing the fishermen to practice mechanization in fishing, their socio-economic empowerment and the problems encountered by them.

1.11 OBJECTIVES OF THE STUDY

In any research, the objectives of the investigator need to be spelled out in unambiguous terms to start with. In fact, it is the objectives which give a sense of direction to the researcher. The present study is based on the following objectives.

1. To study the present trend in mechanization in marine fishing industry.
2. To assess the socio-economic background of traditional marine fishermen practicing mechanization in Kanyakumari district.
3. To identify the factors influencing the traditional marine fishermen to practice the mechanized means of fishing.
4. To examine the socio-economic empowerment of traditional marine fishermen practicing mechanization.

5. To analyze the problems faced by the traditional marine fishermen practicing mechanization in fishing in Kanyakumari district.

1.12 HYPOTHESES OF THE STUDY

Hypotheses form a vital part of any fact finding study. The researcher would be able to make precise contribution to the bank of knowledge hither to available on the marine fishing industry, both in terms of concepts and theories, while verifying the hypotheses. The hypotheses used in the present study are listed below.

1. There is no significant difference as regards the reasons for choosing fishing as the occupation among the traditional marine fishermen.
2. There is no significant difference as regards the factors influencing the fishermen to practice mechanization in fishing.
3. There is no significant relationship between the factors influencing the fishermen to practice mechanization in fishing and the profile of the traditional marine fishermen.
4. There is no significant difference in the socio-economic empowerment before and after mechanization among the traditional marine fishermen.
5. There is no significant relationship between the socio-economic empowerment fishermen practicing mechanization in fishing and the profile of the traditional marine fishermen.
6. There is no significant impact of socio-economic factors influencing fishermen to practice mechanization in fishing on the socio-economic empowerment.

7. There is no significant difference in the problems faced by the traditional marine fishermen.

8. There is no significant association between problems faced by the traditional marine fishermen and their profile.

9. There is no significant association between the socio-economic empowerment and the problems faced by the traditional marine fishermen.

10. There is no significant association between the socio-economic factors influencing the traditional marine fishermen to practice mechanization and the problems faced by them.

1.13 PERIOD OF STUDY

The data required for the study was collected from November 2014 to October 2015.

1.14 THE STUDY AREA

The study area covers 42 coastal villages of Kanyakumari district of Tamil Nadu from the two zones namely East zone and West zone. The coastal villages included in the study area from East Zone are Arockiapuram, Chinnamuttam, Kovalam, Keezhamanakudi, Melamanakudi, Pallam, Puthanthurai, Kesavanputhanthurai, Pozhikarai and Periakadu. The coastal villages included from the West Zone are Rajakkamangalam, Azhikkal, Keezhamuttam, Melamuttam, Keelakadiapattinam, Melakadiapattinam , Chinnavilai , Periavilai , Pudurmandaikadu, Kottilpadu, Colachel, Simon Colony, Kodimunai, Vaniyakudi, Keezhkurumpanai, Melakurumpanai, Keezhmidalam, Melmidalam, Enaiyam, Enaiyamchinnathurai, Enaiyamputhanthurai, Ramanthurai, Mullurthurai, Eraiyumanthurai, Poothurai,

Thoothoor, Ezhuthesamchinnathurai, Eraviputhenthurai, Vallavilai, Marthandamthurai and Neerodi.

1.15 SAMPLING DESIGN

The present study was conducted in Kanyakumari district and it has 71.5 Kms coastal length strategically located in Arabian Sea, from Cape Comorin to Neerodi. Fishing is the major source of employment in the costal economy and it also consists of different types of activities in fisheries ranging from production, marketing of fishes and dried fishes, fish processing, exporting etc.

Mechanised marine fishing craft owners from 42 coastal villages have been included in the present study. Mechanised crafts like motorised kattamaram, motorized vallam and mechanized boats are operated in these villages have been selected for the present study.

The total active mechanized marine fishing crafts of 4839[11] from 42 fishermen villages are categorized in to three categories namely mechanized boats, motorized vallam and motorised kattamaram by adopting stratified sampling technique. Since it is very difficult and time consuming to cover the entire mechanized marine fishing crafts owners in the present study, the researcher selected 484 (10 per cent) mechanized marine fishing crafts owners randomly from among the mechanized marine fishing crafts owners. The sample comprises of 63 motorised kattamaram owners, 315 motorised vallam owners and 106 mechanized boats owners. The details are shown in Table 1.1.

[11] **Tamil Nadu Marine Fisher Folk Census – 2010**, Kanniayakumari District, Department of Fisheries, Government of Tamil Nadu, Chennai, p.603.

Table 1.1

Sampling Design of the Study

Sl. No	Fishermen Villages	Total Mech. Crafts Owners (D) D=A+B+C	Sample Mech. Crafts Owners (10% of D)	Motorised Kattamaram Owners (A)	Motorised Vallam Owners (B)	Mechanised Boat Owners (C)
1	Arockiapuram	44	**4**	24	19	1
2	Chinnamuttam	70	**7**	0	9	61
3	Kanyakumari	301	**30**	24	177	100
4	Kovalam	76	**8**	14	61	1
5	Keezhamanakudi	86	**9**	29	57	0
6	Melamanakudi	87	**9**	0	87	0
7	Pallam	20	**2**	12	8	0
8	Puthanthurai	4	**0**	4	0	0
9	Kesavanputhanthurai	23	**2**	1	22	0
10	Pozhikarai	9	**1**	2	7	0
11	Periakadu	0	**0**	0	0	0
12	Rajakkamangalam	39	**4**	2	35	2
13	Azhikkal	74	**7**	49	19	6
14	Keezhamuttam	31	**3**	20	11	0
15	Melamuttam	230	**23**	56	146	28
16	Keelakadiapattinam	10	**1**	4	6	0
17	Melakadiapattinam	283	**28**	102	143	38
18	Chinnavilai	10	**1**	4	6	0
19	Periavilai	18	**2**	7	11	0
20	Pudurmandaikadu	61	**6**	19	42	0
21	Kottilpadu	39	**4**	16	17	6
22	Colachel	257	**26**	8	121	128
23	SimonColony	23	**2**	12	11	0
24	Kodimunai	31	**3**	8	19	4
25	Vaniyakudi	3	**0**	0	1	2
26	Keezhkurumpanai	133	**13**	30	100	3
27	Melakurumpanai	145	**15**	10	135	0
28	Keezhmidalam	26	**3**	1	23	2
29	Melmidalam	95	**10**	2	93	0
30	Enaiyam	141	**14**	17	124	0
31	Enaiyamchinnathurai	150	**15**	37	113	0
32	Enaiyamputhanthurai	364	**36**	62	298	4
33	Ramanthurai	140	**14**	16	122	2
34	Mullurthurai	49	**5**	14	34	1
35	Eraiyumanthurai	54	**5**	1	44	9
36	Poothurai	239	**24**	1	186	52
37	Thoothoor	303	**30**	1	66	236
38	Ezhuthesam Chinna Thurai	177	**18**	7	24	146
39	Eraviputhanthurai	135	**14**	5	24	106
40	Vallavilai	300	**30**	2	191	107
41	Marthandamthurai	246	**25**	1	234	11
42	Neerodi	313	**31**	6	301	6
	Total	**4839**	**484**	**630**	**3147**	**1062**

Source: Tamil Nadu Marine Fisher Folk Census -2010

Both published and unpublished secondary data were also collected from Central Marine Fisheries Research Institute (CMFRI), Central Institute of Fisheries Technology (CIFT), Fishery Survey of India, Directorate of Fisheries and publications of Non-Governmental Organizations like South Indian Federation of Fishermen Society (SIFFS). Information from magazines, journals, published articles, newspapers, published thesis, internet sources etc. were also collected for the study.

1.16 COLLECTION OF DATA

A comprehensive pre-tested interview schedule was prepared in regional mother tongue (Tamil). Before developing the interview schedule the researcher met the fishermen and had discussion with them to collect information related their occupation and the problems faced by them. The experts from the field and the officials from Central Marine Fisheries Research Institute (CMFRI), Central Institute of Fisheries Technology (CIFT), Fishery Survey of India and Directorate of Fisheries were contacted to collect the necessary information from them. After developing the rough draft of interview schedule a pilot study was conducted with the help of 50 prospective fishermen who are practicing mechanization in fishing. The pilot study was conducted in order to check whether the variables included in the interview schedule are appropriate. After conducting the pilot study suitable modifications were done in the questions as well as in the variables to fine tune the interview schedule. The final draft was used for the collection of data from the sample respondents.

1.17 TOOLS FOR ANALYSIS

The collected data had been processed with the help of appropriate statistical tools. The statistical tools were selected on the basis of the objectives of the study and

also the nature of data included for the analysis. The details of statistical tools and its relevance of application are summarized below:

ANOVA

ANOVA test is used by the researcher to find the significant differences among the three groups of respondents. The total variance in a set of data is divided into variation within groups and variation between groups.

The ANOVA technique is based on the concept of sum of squared deviations from a mean. Corresponding to the total variance and its two components, we have the total sum of squares (SS), between groups sum of squares (SS_b), within groups of squares (SS_w) is obtained by combining the sum squares i.e., the squared deviations of every raw score from its sample mean. The formula used is

$$SS_w = \sum_1 d^2 + \sum_2 d^2 + \sum_3 d^2 + \sum_4 d^2 + \sum_5 d^2 + \ldots\ldots\ldots\ldots\ldots\ldots \sum_n d^2$$

Where d = a deviation of every raw score of a category from its sample mean.

Between groups sum of squares (SS_b) is by calculating the difference between each sample mean and the total mean. The squared difference is multiplied by the sample size in the concerned category and these quantities. The formula is

$$SS_b = \sum[(x-x_1)^2 \times n]$$

Where,

X = any sample mean

X_1 = the total mean

n = the number of scores in any sample

SS_b = the between groups sum of squares

The total sum of squares (SS_1) is equal to a sum of within and between groups sum of squares.

$$SS_1 = SS_b + SS_w$$

Mean Square

The value of the sums of squares tends to become larger as variation increases and also as sample size increases. The mean square (or variance) is obtained by dividing SS_b or SS_w by the appropriate degrees of freedom.

$MS_b = SS_b/df_b$

$MS_w = SS_w/df_w$

Where,

MS_b = the between- groups mean squares

MS_w = the within – group mean squares

df = the degrees of freedom

df_b = k-1

fw = n_1-k

Where,

k = the number of samples (groups)

n = the total number of scores in all samples combined.

't' Test

't' test is used to study the significant differences among two groups of samples with respect to a variable. The "t-statistic" is defined as:

$$t = \frac{x-\mu}{s} \times \sqrt{n}$$

Where, S = $\sqrt{\frac{\sum(x - x^2)}{n-1}}$

The t-distribution is derived mathematically under the assumption of a normal distribution as:

$$f(t) = C(1 + \frac{t^2}{v})^{-(v+1)/2}$$

Where, $t = \frac{(X-\mu)}{S}\sqrt{n}$

C = a constant required to make the area under the curve equal to unity.

v = n-1, the number of degrees of freedom.

Garrett Ranking Technique

As per this method, respondents have been asked to assign the rank for all factors and the outcomes of such ranking have been converted into score value with the help of the following formula:

$$\text{Percent position} = \frac{100(Rij-0.5)}{Nj}$$

Where,

Rij = Rank given for the i^{th} variable by j^{th} respondents

Nj = Number of variable ranked by j^{th} respondents

With the help of Garrett's Table, the percent position estimated is converted into scores. Then for each factor, the scores of each individual are added and then total value of scores and mean values of score is calculated. The factors having highest mean value is considered to be the most important factor.

Mann-Whitney Test

The Mann-Whitney test is the non-parametric equivalent of the independent samples t-test. A Mann-Whitney's U test is also known as Wilcoxon Rank sum test, and basically a non-parametric version of t test. Mann-Whitney's U test can be considered as a non-parametric version of t test, a Mann-Whitney's U test compares the medians of the two groups, not the means.

The Mann-Whitney U test is used to test whether two independent samples of observations are drawn from the same or identical distributions. An advantage with this test is that the two samples under consideration may not necessarily have the same number of observations.

The Mann-Whitney test criterion is based on the magnitude of the Y's in relation to the X's, i.e. the position of Y's in the combined ordered sequence. A sample pattern of arrangement where most of the Y's are greater than most of the X's or vice versa would be evidence against random mixing. This would tend to discredit the null hypothesis of identical distribution.

The test has two important assumptions. First the two samples under consideration are random, and are independent of each other, as are the observations within each sample. Second the observations are numeric or ordinal (arranged in ranks).

In order to calculate the U statistics, the combined set of data is first arranged in ascending order with tied scores receiving a rank equal to the average position of those scores in the ordered sequence.

The Mann-Whitney test statistic is then calculated using U = n1 n2 + {n1 (n1+1)/2} - T, where n1 and n2 are the sizes of the first and second samples respectively.

We next compare the value of calculated U with the value given in the Tables of Critical Values for the Mann-Whitney U-test, where the critical values are provided for given n1 and n2, and accordingly accept or reject the null hypothesis. Even though the distribution of U is known, the normal distribution provides a good approximation in case of large samples.

Kruskal-Wallis Test

The Kruskal–Wallis one-way analysis of variance by ranks (named after William Kruskal and W. Allen Wallis is a non-parametric method for testing whether samples originate from the same distribution. It is used for comparing more than two samples that are independent, or not related. The parametric equivalent of the Kruskal-Wallis test is the one-way analysis of variance (ANOVA). When the Kruskal-Wallis test leads to significant results, then at least one of the samples is different from the other samples. The test does not identify where the differences occur or how many differences actually occur. It is an extension of the Mann-Whitney U-test test to 3 or more groups. The Mann-Whitney would help analyze the specific sample pairs for significant differences.

Since it is a non-parametric method, the Kruskal–Wallis test does not assume a normal distribution of the residuals, unlike the analogous one-way analysis of variance. However, the test does assume an identically shaped and scaled distribution for each group, except for any difference in medians. Kruskal–Wallis is also used when the examined groups are of unequal size (different number of participants).

1.18 LIMITATIONS OF THE STUDY

The researcher is conscious of limitations which are likely to be confronted with in the course of the present study. They are:

1. The primary data was collected from the respondents from Kanyakumari district so the findings from the study may not be applicable to the other places.
2. As the respondents are not having any proper records the information given by them are from their memory.

In spite of these limitations, the researcher is keen on rendering the study quite unique and scientific in every respect.

1.19 ORGANIZATION OF THE THESIS

The report of the research work is presented in seven chapters as detailed below.

The first chapter titled as 'Introduction and design of the study' deals with statement of the problem, objectives of the study, scope of the study, period of study, area of the study, hypotheses to be tested, sampling design, collection of data, plan of analysis and limitations of the study.

The second chapter titled as 'Review of literature' presents the literature reviews which are available in the subject chosen for the study.

Third chapter titled as 'Profile of the study area and mechanization in marine fishing' it deals with the population of the fishermen, their occupation, mechanization in fishing, mechanization of fishing in Tamil Nadu, mechanization of fishing in Kanyakumari district, allied infrastructure facilities available and marine fish production in Kanyakumari district.

The fourth chapter deals with 'Socio-economic conditions of the traditional marine fishermen and the factors influencing the traditional marine fishermen to practice mechanization in fishing'. In this chapter the socio-economic conditions of the

fishermen, reasons for choosing fishing as occupation and factors influencing the traditional marine fishermen practice mechanization in fishing.

The fifth chapter 'Socio-economic empowerment of the traditional marine fishermen' deals with the socio-economic empowerment before and after mechanization among the traditional marine fishermen, the association of socio-economic empowerment and the profile of the respondents, the impact of socio-economic factors which influences the traditional marine fishermen to practice mechanization on the socio-economic empowerment of marine fishermen.

The sixth chapter deals with the 'problems encountered by the traditional marine fishermen practicing mechanization in fishing'. It includes the technical, socio-cultural and economic problems faced by the traditional marine fishermen to practice mechanization.

The final chapter 'summary of findings and suggestion' deals with findings related to socio-economic conditions of the traditional marine fishermen, factors influencing the traditional marine fishermen to practice mechanization, the socio-economic empowerment of traditional marine fishermen and the problems faced by the traditional marine fishermen. The chapter also presents the suggestions based on the findings and interpretations of the study.

1.20 SUMMARY

This chapter highlights the methodology and design of the study where in the statement of the problem, objectives of the study, scope of the study, sampling design, collection of data, plan of analysis and chapterisation were dealt with in detail.

Chapter - II

REVIEW OF LITERATURE

CHAPTER - II

REVIEW OF LITERATURE

2.1 REVIEWS RELATING TO SOCIO-ECONOMIC STATUS OF FISHERMEN

2.2 REVIEWS RELATING TO IMPACT OF MECHANIZATION

2.3 SUMMARY

CHAPTER - II

REVIEW OF LITERATURE

Technological changes have transformed the fisheries sector of many third world nations. Bilateral and multilateral agencies have been instrumental in promoting fisheries development through the provision of capital and technical assistance which focused on developing the fisheries to reduce poverty, to improve the efficiency of fishers and also to have an overall economic development. The result has been widespread adoption of capital-intensive fishing technology.[1]

Though fisheries sector and fisher folk in India have drawn attention of many especially the academic community, fishing remained like most other productive activities, undeveloped. The operators were artisans who just made a living by practicing the eco-friendly methods developed over many generations. Due to the developmental initiatives taken by the Central and the State Government in the fisheries sector, the fishermen were come out of their traditional methods of fishing to mechanized mode of fishing. The change in the fishing mode from traditional to mechanization mode of fishing resulted in the socio-economic conditions of the fishermen.

In this chapter the reviews relating to the socio-economic conditions of the fishermen and the impact of mechanization in fishing are presented.

[1] Bailey Conner, "**The Political Economy of Fisheries Development in the Third World**" available from:https/www.springerlink.com/index.1982ftp://ftp.fisheries.ubc.ca/j.alder.../BaileyPolitEconFish.pdf., 1982.

2.1 REVIEWS RELATING TO SOCIO-ECONOMIC STATUS OF FISHERMEN

Central Marine Fisheries Research Institute (1977)[2] points out that majority of the fishermen belong to an economically weaker section and follow traditional methods of fishing employing indigenous crafts and gears. The average size of the fishermen family varies between 4 and 8 in different States. By and large, they are perennially indebted to the middlemen who advance financial help to them in times of need in return for their entire catch assessed at a low price. Several factors such as a low social status, poor economic conditions, illiteracy, middlemen, traditional, fishing equipment and methods of fishing, low production rate and income influence the socio-economic conditions of fishermen. Right from the beginning of the first Five Year Plan, this sector has been receiving considerable attention from the Government.

Nammalwar. P and Prakasam. V.R (1979)[3] while studying the Status and problem of fishermen in the Marine Fishing Industry point out that over-fishing threatens the fishery resources of our country and therefore regulation of a type, leading to a reduction in the number of units is desirable to conserve valuable resource to forestall economic difficulties and to reduce the clashes among different groups is desirable. Although advances have been made in fishing technology, practically it has not reached the poor fishermen. Several factors such as low social status, poor economic conditions, illiteracy, heavy interference of middlemen, traditional fishing equipments and methods etc. influence the socio-economic conditions of fishermen.

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[2] Central Marine Fisheries Research Institute , "Indian Fisheries 1947-1977", **Issued on the Occasion of the Fifth Session of the Indian Ocean Fishery Commission**, Cochin, 1977, pp74-77.

[3] Nammalwar.P and Prakasam.V.R, "Present Status and Problems of Fishermen in the Marine Fishing Industry", **Sea Food Export Journal**, vol.11(2), 1979, pp.27-30.

Annie Felice (1980)[4] made a study to provide a better understanding of the economic, social and cultural variable that act as casual or resultant factors of the adoption of modern technological innovations in fishing. The study made an attempt to establish a cause-effect relation between a set of personal, economic and social variables with the adoption behavior of a group of small fishermen who lived in the Vypeen Island. It was also found that with respect to the variables like assets, education level mass media, urban contact, aspiration and economic status, higher means were associated with adopter and non-adopters with respect to age and fatalism negative critical ratio was obtained. With respect to the mode of utilizing mechanized crafts given by government to fishermen 92 per cent of adopters and 100 percent of non-adopters had expressed their inability due to difficulty in meeting initial expenses heavy operational cost, poor quality of boats supplied and exploitation by middlemen.

Panikkar. K.K.P (1980) [5] has studied the coastal rural indebtedness in vizhinjam, south of Trivandrum, Kerala. The fishermen of the coastal villages borrow year after year and they are heavily indebted. But they are not in a position to repay the loan, either because the loans are larger or the income is not enough to pay off the debts. As such, the debt of the fishermen goes on increasing. This may be termed as coastal rural indebtedness. The fishermen of Vizhinjam borrow mainly from the money lenders since institutional credit is not available to then, There are two types of money lenders, namely, the money lenders who combine fish trading with money leading and professional money lenders. These money lenders usually charge high rate of interests, often 30 per cent and more. They don't keep proper accounts of repayment. They do not issue receipts for repayments. The boat owners also lend to the fishermen. In this

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[4] Annie Felice, "Tradition and Modernity in a Fishing Community-A Study of Technological Innovation in Fishing of Vypeen Island – Kerala", **Ph.D. Thesis, University of Kerala,** 1980.

[5] Panikkar.K.K.P, "Coastal Rural Indebtedness A Case Study", **Marine Fisheries information Service No.18, Central Marine Fisheries Research Institute**, Kochi 1980 pp.8-12.

system, for getting a loan, the fishermen as wage earner has to enter into a contract with the boat owner that he should work only in the boat of the owner from whom he has received the loan till it is rapid. Maximum amount of loan is spent for household expenditure is higher among higher income groups and lowers among the lower income groups considering all these facts, the author suggests that Rural Banks and co-operative societies should be established the activities of money lenders should be regulated and interest rates must be limited to a reasonable level.

Kurien John (1981)[6] pointed out that there are two reasons for the poverty of fishermen, namely the inequality in the asset holding among them and secondly the exploitation of all of them by those who are involved in the process of buying why they produce. As a result for the average traditional fishermen, saving from his income for investment is a painful task. Indebtedness among the fisherfolk is high. Credit in the form of wage advance is a very common phenomenon in traditional fishing communities. Credit of other forms may be obtained by pledging ration cards, gold and fishing nets with individual in the village who are not necessarily concerned with fishing. Fish merchants are a source of big credit. They normally lend large amounts to fishermen who own fishing equipments.

Paul Valiakandathil. S.J (1981)[7] studied the socio-economic conditions of fishermen in Poonthura, Kerala. He points out that since fishing is a seasonal occupation, majority of the fishermen are actively employed for a period of 6 months in a year. Their equipment is not usable beyond a certain depth. 10 percent of them have access to boats and nets, the other 90 per cent remain idle for a substantial part of the

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6 Kurien John, "Socio- Economic Conditions of Traditional Fishermen", **Central Marine Fishermen Research Institute, Bulletine No.** 30, 1981, pp.35-53.

7 Paul Valiakandathil. S.J, "Poonthura - A Case Study of Socio-Economic Conditions of Fishermen in Kerala", **Central Marine Fisheries Research Institute**, vol. 30, Kochi, 1981, p. 56-59.

year. Underemployment is a major problem in the area. The scanty income and the numerous demands upon it, keep the fishermen in a permanent state of bondage to the money lenders. The interest rate varies from 36 percent to 120 percent. In short, the rebuilding of the life of the fishermen group.

Sathiadhas and Venkattaraman. G[8] (1981) scientists from the premier marine research institution, Central Marine Fisheries Research Institute, made a study of the impact of mechanisation of fishing on the socio-economic conditions of the fishermen in 1981. The study established that mechanisation had brought out marked improvements in production, employment, infrastructure, export as well as social parameters like housing and education in the region. The study also pointed out to the rise in the level of indebtedness of the fishermen investors by way of acquiring the new fishing vessels.

Kalawar. A.G (1981) [9] examined the living conditions of fishermen in Maharashtra. According to him, the living conditions on the whole are deplorable. Owing to lack of economic development in this region, there is continuous exodus of labour from the coastal region. As a result, the female have to bear most of the burden of economic activity. Indebtedness in the fishermen community is widespread. Necessary infrastructure by way of communication and transport facilities, water supply and power should have to be provided on priority basis. This creates scope for setting up agro-based and fisheries-based industries.

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[8] Sathiadhas and Venkettaraman.G, "Impact of Mechanised Fishing on the Socio-economic conditions of the Fishermen of Sakthikulangara-Neendakara-Kerala", **Central Marine Fisheries Research Institute, Kochi, Marine Fisheries Information Service., Technical and Extension Series**, No.29, 1981.

[9] Kalawar.A.G, "Socio-Economic Conditions of the Coastal Rural Sector", **Central Marine Fisheries Research Institute, Bulletin** .No.30, 1981, pp.42-44.

Fernando Ambrose (1981)[10] suggested the following for improving the socio-economic conditions of fishermen at all fishing centres, sufficient cold storage and ice plants facilities must be provided to prevent fish from going waste. Internal market facilities must be developed with suitable transport facilities. Every fishing village should be provided with suitable road facilities with adequate feeder roads linking every fishing center. Fishermen should be educated sufficiently to preserve fish at the catching point itself. Modern fish processing units must be established in all the important fishing centres along with State fisheries units. Fishermen in the coastal area should be provided with proper sanitation and medical facilities, drinking water, wells and electricity. All important minor ports must be given top priority for berthing facilities and processing units with freezer-cum-ice plants for the use of small fishermen. Alternate jobs during off- season should be provided to the fishermen and their womenfolk.

In an article the **Central Marine Fisheries Research Institute (1985)** [11] analysed the living conditions of the small fishermen in India. Artisanal fishermen landed 40 percent of the marine fish production in India with traditional implements. They put in an effort of 8-12 hours a day in the sea to earn an income of 10-20 or even less. A square meal a day is a dream for many artisanal fishermen. The standard of living of these people is generally low. The villages are remote with little transport, communication and sanitation facilities and are exposed to the fury of nature. Educational status is low and drop outs are found both among boys and girls. One of the major constraints in the development of artisanal fishing industry has been the lack

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[10] Fernando Ambrose, "Community Development and Infrastructure Facilities for Improving the Socio-Economic Conditions of fishermen", **Central Marine Fisheries Research Institute, Bulletin No. 30,** 1981, pp.45-55.

[11] Central Marine Fisheries Research Institute, "Focus on Artisanal Fisherfolk"**, Newsletter, v**ol.27-28, 1985, pp.8-12.

of broad network of extension service with trained manpower reaching the fishermen at large and motivates them. The most important step in helping the fisher folk is to educate them and make them aware of the programmes available to them.

Ibrahim. P (1986)[12] aimed at tracing the course of mechanisation in fishing sector of Kerala in order to examine its impact on growth of out put, employment, income and consumption. He also studied the changes brought about in the organization and structure of the fishing community with particular reference to distributional justice. The study concluded with the findings that even before the introduction of mechanization the fishing sector of Kerala had begun to acquire features of capitalist relations of production, which the mechanization process attributed further. The mechanisation process even planned for increasing the income and employment levels of traditional fishermen but not fulfilled. It was noted that the fish production during the post mechanization phase did not show any significant increase and it was claimed that the rise may be due to price rise, quantity changes and species mix changes accounting only for 2% each. He was of the view that employment opportunities, per capita income of fisherman were also on the downward move and economic conflicts had begun to emerge in fishing sector.

In a desk review and resource investigation report, **Bhavani.V (1986)**[13] points out that very little information is available on the health and nutritional status of small-scale fisher folk of India's east coast. It is stated that the dietary habits of fishermen's families seem to be far from satisfactory. A survey undertaken for Bay of Bengal Programme in coastal villages of Kanyakumari and Tirunelveli districts presents that a

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[12] Ibrahim.P, "Fishing Industry in Kerala: A Study of the Impact of Technological Change", **PhD Thesis**, University of Kerala, 1986.

[13] Bhavani.V, "Food and Nutrition Status of small-Scale Fisher folk in India's East Coast", **BOBP/INF/9**, April 1986, pp.1-19.

considerable number of women and children suffer from partial blindness because of vitamin "A" deficiency.

Nishad. Y.P (1987)[14] institutional credit and subsidy are the important factors responsible for the mechanisation of fishing vessels. He has further observed that the benefit of increased output would occur mostly to the mechanised sector. A study conducted by the Madras Institute of Development studies has revealed that the landings by the traditional type of catamaran are poor and quite inadequate to maintain the small fishing families even at the subsistence level. The study has further made it clear that mechanisation can easily find a lasting solution for the problem appalling poverty among the fishermen.

Selvaraj. P (1988)[15] in his study has identified the fishing seasons for important species of fish groups and estimated the economics of different craft categories in the selected coastal fishing villages of Kanyakumari District of Tamil Nadu. He formulated suitable strategies for the development of fisheries sector for the betterment of fisher folk in the district.

The Central Marine Fisheries Research Institute (1988)[16] has studied the socio-economic conditions of fishermen in North West coast. Maharashtra and Gujarat are the important maritime States in northwest coast of India. About 180 fishing villages in 10 coastal districts of Gujarat and 375 villages in five coastal districts of Maharashtra are dominated by marine fishermen with a population of about four lakhs. The study point out that illiteracy is high in all the villages (48.75%). A significant

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[14] Nishad.Y.P, "Socio-Economic aspects of Motorization of Traditional Crafts", **Fishing Chimes**, Vol.7, No.7, October, 1987, pp.31-41.

[15] Selvaraj.P, "Status of Marine Fisheries of Kanyakumari District", **Fishing Chimes**, vol.8, No.1, 1988, pp.72-79.

[16] Central Marine Fisheries Research Institute , "An Evaluation of Fishermen Economy in Maharashtra and Gujarat –A Case study", **Special Publication**, No. 44, 1988, pp 1-80.

difference in the annual income between mechanized group to non-mechanised group and also between the villages existed. The level of indebtedness is found to be high in Maharashtra. Infrastructure facilities like jetty, link roads, ice and cold storage, transport, drying, curing yards are found meager in most of the fish landing centres. The fishermen are not getting remunerative price for their catch owing to the involvement of middlemen who advance money and do marketing of catches. Fishermen are generally unemployed and are not able to meet even their household expenditure during lean season in both the States.

Daniel Viswasam Samuel. A (1989)[17] points out that the study of the socio-economic conditions of fisher folk especially fishermen have been neglected by sociologists and economists. The fishermen have a very low status in the social hierarchy, which leaves them worse off than their counterparts despite the fact, that the involvement of the fishermen in the industry is considerable. But their role stands unrecognized. In a survey conducted in Tirunelveli district by the author, it was found that the extent of literacy among fishermen ranged from 65 per cent in catamaran motorized unit 37.19 per cent in mechanized unit. Being illiterate and have no other opportunity to work, the fishermen of artisanal unit help their menfolk in fish marketing and related sundry activities. More than 90 per cent of fishermen in the artisanal fisherman families possess skills in net making and fish processing.

Sathiadhas. R and Panikkar. K.K.P (1989) [18] are of the view that the successful implementation of any development programmes in fisheries depends upon the socio-economic conditions of the target group. Therefore, they conducted a study

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[17] Daniel Viswasam Samuel. A, "Economics of Marine Fishing and Role of Fisherwomen in Tirunelveli District in Tamil Nadu", **Fishing Chimes**, 1989, pp.55-63.

[18] Sathiadhas. R and Panikkar. K.K.P, "Socio- Economic status of Marine Fishermen along Madras Coast", Central Marine Fisheries Research Institute, **Marine Fisheries Information Service**, **No.96**, Kochi, 1989, pp.1-6.

on the socio-economic status of marine fishermen along Madras coast in 1984-85, in two fishing villages namely, Thiruvottiyurkuppam where non-mechanised fishing is carried out and Pudumanikuppam where fishing is done using mechanised craft. The study reveals that the average annual income of fishermen household works out at 7,600 and 4,500 and the per capita income Rs.1417 and Rs.837 respectively at Pudumanikuppam and Thiruvottiyurkuppam. Since Pudumanikuppam is a major landing centre, fishermen are not only engaged in active fishing but also in diversified fishery related activities. They realize better income due to comparatively higher prices and better infrastructure facilities. About 84 per cent of the fishermen households in Pudumanikuppam and 46 per Thiruvottiyurkuppam do not own means of production. There is a variation in daily expenses for catamaran owners, wage earners and families engaged in fishery related activities in these areas. The expenses incurred on health and education purposes are found to be very low in both these villages. Credit availability in these villages is also not sufficient. The average outstanding debt per indebted household ranged from Rs.200 to Rs.1000 for different categories of fishermen households. The role of commercial banks and co-operative societies in supplying credit is found to be negligible. Based on the study, it has been suggested that village level co-operative should be formed to cater to the needs of fisher folk. The fishermen should be initiated for the effective utilization of the harbour that is available. Since the employment pressure on the traditional sector is on the increase, alternate employment opportunities must be created.

Senthilathiban and Selvaraj (1989)[19] discussed the cost of production and net income of the fishing households in the selected fishing households in the selected fishing village of the undivided Thoothukudi district. The increase from fishing was

[19] Senthilathiban and Selvaraj, "Economics of Marine Capture Fisheries in Tirunelveli District of Tamil Nadu", **Fishing Chimes**, vol. 9(5), 1989, pp. 52-55.

found to be highly variable while fish catch was almost static due to traditional fishing methods. Rapid motorization adequate credit and marketing were suggested for improving economic status of fisher folk.

Sathiadas. R and Panikkar. K.K.P (1989)[20] in their article on "Costs and earning of trawlers operating at Thoothukudi fisheries harbour in Tamil Nadu" had studied the cost benefit relationship of three types of trawlers of sizes 8.5, 9 Meter and 9.5 Meter. Their initial investment, fixed cost, operating cost and returns were analysed. They had also calculated various key economic indicators for these types of trawlers. They calculated that the capital turn over ratio, rate of return to capital and payback period were better for smaller boats. But in terms of labour productivity, wages, quantum of catch, gross revenue and net profit, the bigger size boats were comparatively more efficient.

Jessy Thomas (1989) [21] analyses the relationship between education and socio-economic conditions of marine fisher folk. The study concludes that the low financial capital, weak social and human capital of marginalized communities and unfavorable physical surroundings along with the low quality of education resulted in social and economic deprivation.

Chidambaram. K and Soundrarajan. A (1990)[22]in their article on "Marine marketing in Trichendur area of Tamil Nadu" had analysed the marine fish supplies and studied the various marketing problems of the fishermen. They had made an empirical

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[20] Sathiadhas.R and Panikkar.K.K.P, "Costs Earnings of trawlers Operating at Thoothukudi Fishing Harbour", Central Marine Fisheries Research Institute, **Marine Fish Information Service, No.100**, Kochi, 1989, p.8.

[21] Jessy Thomas, "Socio-economic factor influencing educational standards in a marginalized community- A case study on Marine Fisher Folk of Kerala", **M.Phil Dissertation**, 1989, **Jawaharlal Nehru University** , New Delhi.

[22] Chidambaram.K and Soundrarajan.A, "Marine Fish Marketing in Thiruchendur Area in Tamil Nadu", **Fishing Chimes**, vol.1 (2), 1990, pp.43-55.

study based on survey method. By adopting simple random sampling technique, the relevant data were collected from 81 fishermen. In their analysis they had found that the fisherman played only a minor role in the actual distribution of fish. These fishermen were at the mercy of the middleman. The co-operative marketing union had remained dormant. The authors had suggested that the fishermen should be educated about the benefits of society.

James. P.S.R (1990)[23] in his titled "Marine fisheries not fully tapped" had analysed, the total marine potential and the average production in the mechanised and traditional sector. He had found that the coastal areas had been more or less fished at optimum level. However, the potential in offshore and deep sea fishing had not been fully tapped. He had suggested for joint ventures with countries having expertise and experience in high sea fishing for tapping the vast off - shore and deep sea fishing resources.

Sathiadas. R and Panikkar. K.K.P (1991) [24] have collected information relating to housing pattern, ownership of means of production, employment status, occupation, annual income, indebtedness, marketing problems etc. The study reveals that catamaran is the lone craft operating in that area. Chalavalai alone accounts for the major investment on gears. The major source of income comes from active fishing. The main source of borrowing is the money lenders. Easy availability of credit through institutional agencies, opportunities for supplementary occupations and better infrastructural facilities for marketing are some of the suggestions given for the economic improvement of traditional fishermen.

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[23] James.P.S.R, "Marine Fisheries not fully Tapped", **The Hindu Survey of Indian Agriculture**, Vol. 13(7), 1990, pp.203-205.

[24] Sathiadas. R and Panikkar. K.K.P, "Socio-Economics of Traditional Fishermen in Tirunelveli Coast of Tamil Nadu", **Journal of Marine Biological Association of India**, Vol.33 (1 and 2), 1991, pp.175-181.

Sathiadas. R and Panikkar. K.K.P (1991)[25] observed the income distribution and expenditure pattern of fishermen households representing catamaran owners and crew members of two fishing villages along Madras Coast and found that diversified activities and better infrastructural facilities were necessary for better income of the fishermen households and suggestions for the overall development of the traditional fishermen were also presented.

Ayyakkannu. K (1992)[26] makes a comparative analysis of the socio-economic life of the fishermen in Vethalai of Mandapam block and Thiresapuram of Thoothukudi. Fishermen in Vethalai go for fishing for at least fifteen days in a month. The most favorable season is the post monsoon period during which diving activity also goes on. Most of them used lobster nets. In Thiresapuram, shingi valai is the main gear used by the fishermen. Another interesting point is that there is a co-operative society in Vethalai village. Apart from this unit, 300 of the fishermen are members of the Mandapam fishermen co-operative society. But there is no co-operative society in Thiresapuram and fishermen of this village buy fishing equipments and spare parts from private shops.

Kurien John (1995)[27] examines the status of quality of life of fishermen using indicators like and ownership, housing amenities, educational level etc. Kruien termed the fishing community as an 'outlier' in the scenario of progress made by Kerala State and regarded the community as 'price takers'. Due to the perish ability of resources the fisher has to dispose the catch in the market creating a greater dependence of persons in

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[25] Sathiadhas.R and Panikkar.K.K.P, "Economics of Catamaran Fishing along the Madras Coast", **Journal of Marine Biological Association of India**, Vol. 33(192), 1991, pp.51-55.

[26] Ayyakannu.K, "Socio-Economic Profile of the Mandapam and Thoothukudi Sectors, South- East Coast India (GOM) with Special Reference to the Fishing Villages of Vethalai and Thiresapuram", In Proceedings, **Second Workshop of Tropical Marine Mollusc Programme** at **Annamalai University**, India, 1992, 4-14 May. Biol. Cent. Spl. Pub 10, 1992, pp.39-43.

[27] Kurien John, "The Kerala Model: Its central tendency and the outlier", **Social Scientist**, Vol. 23 No.1-3, 1995, pp 70-89.

trade. Except fish they have to buy all the provisions. This greater dependence on markets made them vulnerable and they are in the clutches of middlemen and money lenders. They are reduced to price takers for the produce of their labour and the inputs required for life and livelihood.

Bhatta Ramachandra (1994)[28] analyses the socio-economic conditions and tries to find the reason behind the low standard of living of fishers. Over exploitation of marine resources is the bane of marine fisheries resources in Karnataka.

Siddiqui (1995)[29] compared the socio-economic conditions of fishermen in Tamil Nadu and Orissa. The main livelihood of fishermen wholly depends on the catch of fish from fishing and marketing. Fishing season starts from August and continues upto March. Fishing is generally not undertaken for about 60 days in a year when the sea is rough or due to cyclonic weather. On the other hand mechanised fishing vessel owners are able to carry out their normal operations during the off-season also. The funds rose for the purchase of traditional craft or mechanised vessels are partly from their own sources and partly through money lenders. They are hesitant to avail bank finances they have to undergo. About 70 per cent of the persons interviewed were indebted for meeting their day to-day maintenance in time of poor catch or poor marketing, marriage expenses etc. The fish merchants or moneylenders are the source for providing loans at a higher rate of interest of 36 per cent. In the light of the above conditions, it is suggested that the fishermen should be motivated for undergoing training so that bank loans are availed by them for the purchase of fishing crafts or

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[28] Bhatta Ramachandra, "Socio-economic impact of fisheries development in Karnataka: An Analysis", **Role of Fisheries in Rural Development**, Daya Publishing House, New Delhi, 1994, p-33.

[29] Siddiqui, "A study of the Socio- Economic Problems of the Fishermen in Tamil Nadu and Orissa", **Fishing Chimes**, August, 1995, pp.48-49.

gears. Efforts should be made to provide basic infrastructural facilities like pucca road, drinking water supply, sanitation facilities, medical and school facilities.

Roy (1997)[30] in a study on the fisher people of Bangladesh highlights the plight of the fisher folk there. A large number of people living in the coastal zone depend directly or indirectly on fishing for their livelihood. They are not only trapped by problems in every direction, but the very nature of the problems-their complexity and their inter-relationship make finding solutions much more difficult. Fish they catch are bought by traders at a ridiculous price because the fishers are bonded by the credit they have received from the traders. Every year, there are natural disasters, floods tidal, boars and cyclones depriving them of life and property. They are thus trapped from both sides from the land by the fellow human being and from the sea-by nature and have nowhere to go. In addition to this a combination of over-fishing, destructive fishing, pollution and mangrove destruction has stressed fisheries stocks and catches and the catch per unit effort is declining with few or no alternative income opportunities available. This results in a reduction in the quality of life and finally migration and desperation. Therefore, the urgent need is to decide alternate income options to get out of fisheries, reduce fishing efforts and improve their quality of life. This requires real decentralization and devolution of powers to local communities.

The **Central Marine Fisheries Research Institute (1998)**[31] in a study on the Socio-Economic Conditions of Fishermen in North West coast of India points out that illiteracy was high (48-75%) in all the fishing villages along the coast. Significant difference existed in the annual income between the mechanized and non-mechanised

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[30] Roy, "Nowhere to Coastal people of Bangladesh", **Bay of Bengal Programme News**, June, 1997, pp.9-12.

[31] Central Marine Fisheries Research Institute, "An Evaluation of Fishermen Economy in Maharashtra and Gujarat- A Case Study", **Special Bulletin**, No. 44, 1988, pp.1-18.

groups and also between villages. The level of indebtedness was found to be high in Maharashtra. Infrastructural facilities like jetty, link roads, ice and cold storage, transport, drying, curing yards were found meagre in most of the fish landing centres. The fishermen were not getting remunerative prices for their catch owing to the involvement of middlemen who advance money and do marketing of catches. Fishermen remained unemployed and were not able to meet even their household expenditure during lean season.

Shanmugaraj *et al*. (1998)[32] in a project to find out the Socio-Economic Status of the Fisher folk Communities of the Gulf of Mannar Marine Biosphere Reserve, point out that there are 49 villages along the coast, of which 38 are in Ramanathapuram district and 11 are in Thoothukudi district bordering the marine biosphere area. The fishermen from these villages depend solely on fishing for their livelihood. The fishermen are well trained in sorting fish, cleaning, drying and marketing them. They also act as agents for the boat owners at auction centers and earn a good commission. The fisherman's daily income depends upon his day's catch, which is not regular, and at a steady level. The fishermen market their catch either individually or through their association or through agents. Normally, the fishes are auctioned at the landing centres. The community of the biosphere area feels that with the support of the government agencies, better decisions can be made on planning, allocation of area within the Gulf of Mannar for certain uses, fishing gears etc. The government should provide economic and other infrastructure facilities through society or village level organizations to improve their livelihood.

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[32] Shanmugaraj. T, Upreti and Ashok, "Socio-Economic Status of Fisher folk Communities in the Gulf of Mannar", **Marine Biosphere Reserve**, A **Survey of Tamil Nadu Forest Department**, 1998, pp.2-4.

Kurien John (2000)[33] in his article "The Socio-cultural Aspects of Fisheries: Implications for Food and Livelihood Security" illustrates the sharing pattern of fisheries, the traditional knowledge and technology and the food security issue.

Rajan. J (2000)[34] assessed the socio-economic condition of the traditional fisher folk community in Kerala by examining the intervention effect of Matsyafed in the traditional fishing economy of the state. The study analyses the effectiveness and popularity of the four major functions of the society like co-operation, input supply, market intervention and extension. According to the study there is a considerable difference in the social conditions of fishermen of different regions in Kerala and a marked improvement in economic and social life of the beneficiary group of Matsyafed. In the field of co-operation among the members and in the distribution of fishing input Matsyafed had made commendable achievement.

Verduijin. J.C (2000)[35] on behalf of the Bay of Bengal Programme (BOBP) had conducted a survey in Kanyakumari district to find the basic needs of 39 coastal fishing villages, which inhabit the 68 km stretch of the coast. Over the years, the intensity of fishing has increased partly on account of the increase in the active fishing population, partly due to the lack of alternative income generating opportunities and partly due to motorization and mechanization of fishing crafts. The resource has not kept up with the increase of effort, which results in a sharp reduction in catch per unit effort. Since the usage of mechanization in 1958, artisanal fishers have with dismay compared the landings of the mechanized crafts with their own meagre catches.

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[33] Kurien John, "The socio-cultural aspects of fisheries: Implications for food and livelihood security", 2000, available from: http://www.fao.org/DOCREP/004/Y1290e0ghtml.Accessed on 28th August 2007.

[34] Rajan.J, "**The Fishing Economy of Kerala" Analysis of an intervention**, 2000, Sajilee Publishing House, Kollam.

[35] Verduijin.J.C, "Basic Needs of 39 Coastal Fishing Communities in Kanyakumari District of Tamil Nadu, India", **Bay of Bengal Programme**, 2000, pp.1-24.

Besides, the artisanal fishers have often seen their nets destroyed by mechanized boats. With this background, the survey points out that the major problem as given by respondents is the non-availability of safe drinking water followed by sanitation and health care.

Narayanakumar. R *et al.* (2000) [36] have studied the Socio-Economic Conditions of Marine Fisherwomen in India. The changes that have been brought about by the mechanization of fishing industry in terms of income and employment generation and investment on fishing equipments have been discussed. The marine fisherwomen in India, in general are socially and economically backward. Hence, any innovation in marine fisheries including new technologies besides increasing the yield from capture and culture sector should be economically and technically efficient and socially acceptable. Any sort of technological innovation, financial scheme or management practice needs to be analysed to assess its socio-economic, environmental and ecological impact such as family size, age structure, employment potentials, education and living standards of fishermen and this will help identify the constraints obstructing the realisation of full potential of development schemes and adoption of new technologies.

Mock Greg and Steele Paul (2006)[37] analyze the reasons for poverty among fishers. The degradation of open resource in the form of overfishing and the decline of natural system through over exploitation and pollution represent a direct threat to their income. The paper illustrates how the Kayar community of fishers along the coast of Senegal made economics and ecosystem management work hand in hand. The authors

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[36] Narayanakumar. R, Panikkar. K.K.P, Sehara. D.B.S, Sathiadas.R. Pillai. V.N and Menon. N.G, (eds) "Socio-Economic Analysis of Marine Fisherwomen in India", **Marine Fishers Research and Management**, Central Marine Fisheries Research Institute, Kochi, Kerala, 2000, pp.895-906.

[37] Mock. Greg and Steel Paul, "Power to the poor Tapping the wealth of ecosystems", **Environment,** Vol 48, No 1 January- February, 2006.

reinforce the need of ecosystem management, democratic governance and poverty reduction as the essential elements of sustainable economic growth.

Bavinck (2007)[38] based on field work in seven harbour locations, consider the socio-economic consequences of the closed fishing seasons, the most important fisheries regulation measure implemented by the Government of India for trawler fishermen in the state of Tamil Nadu. The study addresses social justice issues in conjunction with resource management. The success of the ban is based on the cooperation between government and local fisher association. By the implementation of the closed fishing season the impact is felt on the lower-class workers and traders lacking opportunities for alternative employment.

Sathyapalan Jyothis and Johnson Derek (2008) [39] explore the livelihood insecurity among the fishing communities of Gujarat, a state in India. Technological externalities and market imperfections have reinforced insecure livelihood options for vulnerable sectors within the fishery. The study reveals that the greatest impact has been felt by poorly capitalized trawler boats. Fishing communities are poorly endowed with fishing assets, household amenities and education. Seasonality, lack of adequate education, low literacy and inadequate health provision hamper their ability to diversify livelihoods. The fishers were exposed to risks like accidents and hardships due to working conditions and long days away from the shore. To provide livelihood security the study calls for organised and controlled products and labour market and protection to workers on the beach and in the sea.

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[38] Bavinck. S.M, "Time - zoning for the safe-guarding of capture fisheries: A closed season in Tamil Nadu", I**ndia Marine Policy** , No.32, 2008, pp. 369-378.

[39] Sathyapalan Jyothis and Johnson Derek, "Livelihood security in the Marine Fisheries Sector of Gujarat State" Chapter 8 of pp. 241-277 in S. Mahendra Dev and K.S Babu (Eds) **India's Development Social and Economic Disparities**, 2008, Manohar Publishers and Distributors, New Delhi.

Ganesh Kumar. B *et al*. (2008)[40] this study has been conducted in all the major coastal states and some selected inland states to understand the domestic marketing of fish in India. The marketing efficiencies for Indian major carps (IMC), sardine and seer fish have been found to vary from 34 per cent to 74 per cent depending on the length of market channel. The marketing efficiency has been found more in the case of marine species than freshwater species, since the latter travel longer distances from the point of production to consumption centre, passing many intermediaries as compared to the former. The fishermen's share in consumer's rupee has shown variations across species, marketing channels and markets. The infrastructure facilities at most of the surveyed landing centres, fishing harbours and wholesale and retail markets have been found grossly inadequate and poorly maintained. The study has highlighted the need for formulating a uniform market policy for fishers for easy operation and regulation, so that the country's fish production is efficiently managed and delivered to the consuming population, ensuring at the same time remunerative prices to the fishers.

Ganesh Kumar. B *et al.* (2008)[41] their study has been conducted with the objective of understanding the process of innovative marketing models in the fishers sector and to draw lessons from the success stories to upscale and replicate in a similar socio-politico-economic scenario in other parts of the country. It has been conducted to provide a better understanding of fish marketing by self-help groups (SHGs), producer associations, fisheries development corporations, fisherman cooperatives and private institutions in the southern states of India, namely Tamil Nadu, Kerala, Karnataka and

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[40] Ganesh Kumar.B, Dattaa. K.K, Joshia. P.K,Katihab. P.K,. Suresh. C.R, Ravisankard. T, Ravindranathe. K and Muktha Menona, "Domestic Fish Marketing in India-Changing Structure conduct performance and policies", **Agricultural Economics Research Review**, Vol.21, 2008, pp.345-354.

[41] Ganesh Kumar. B, Ravisankar. B.T, Suresh. C.R, Ramachandra Bhattad, Deboral Vimalab. D, Kumaran. B.M, Mahalakshmi. B.P and Sivasakthi Devia. T, "Lessons from Innovative Institutions in the Marketing of fish and Fishery Products in India", **Agricultural Economics Research Review,** Vol.23, 2010, pp. 495-504.

Andhra Pradesh with the hypothesis that the institutional arrangements in the marketing of fish and fishery products reduce the transaction cost and improve the market access and its efficiency. The study has reported the primary activities of those institutions in the efficient fish marketing, such as inbound logistics, operations, outbound logistics, marketing and sales promotion and support activities like infrastructural facilities, technological backstopping, price information and procurement. Through these advantages, the fishermen have been found to achieve economies of scale, technological innovations, capacity development, linkage among activities, degree of vertical integration, timing of market entry, product differentiation, market access, credit access, etc. The study has suggested replication of such successful innovative institutions in marketing the fish and fishery products through appropriate policies and programmes. It has also suggested the promoting institutions like SHGs, producer / fishermen associations, cooperatives, etc. and allowing the entry of private agencies with appropriate regulatory mechanism to improve the efficiency of fish marketing in the country.

Korakandy Ramakrishnan (2008) [42] discusses the concept of sustainable development with definition, development of concept over time spanning from classical to neo classical, Marxian, modern and post-modern thinking and with issues, criteria and indicators of sustainability. The author theoretically and empirically raises the sustainable development issues of Indian fisheries and suggests the 'standard' global prescriptions for sustainable development. The Indian fisheries is threatened by a number of factors like ecological, economic, social, cultural, institutional and technological constraints and he came to the conclusion that the solutions are unlikely

[42] Korakandy Ramakrishnan, "Fisheries Development in India", **The Political economy of unsustainable development,** 2008, Kalpaz Publications, Delhi.

to bring about sustainability because of many interactions, interdependencies and externalities in the economy.

Narayanakumar. R *et al*. (2009)[43] analyse the economic performance of marine fishing fleets in India and the study assumes significance from the point of resource allocation - for both the individual and the government to disseminate appropriate supporting policies. The economic performance is an important indicator which decides the operation of the fleet. Data on operating costs and returns from the different fishing craft-gear combinations employed along the east and west coast of India were collected based on random sampling method. The study finds that the important constraints affecting the economic returns from different fishing crafts for fishing operations are the increased cost of fishing per trip, the reduced catch and the subsequent decline in the returns per trip. However the multi-day operations (of about 3-5 days duration) of different fishing methods gave the economic benefits wherever they are operated due to economies of scale. But the fuel consumption accounts for 50-60 per cent of operating cost and is very high.

Human Development Report of Fisher Folk in Kerala prepared by **State Planning Board (2009)**[44] illustrates the deprivation of fishers in basic material amenities and economic facilities. The report says that they are deprived of basic amenities such as quality of housing, sanitation, drinking water and hygiene. The lack of entitlements and poor economic position, risk and vulnerability associated with the occupation lead to chronic deprivation. The study came to the conclusion that the community has to go a long way to attain human development.

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[43] Narayanakumar. R, Sathiadhas. R and Ashwathy. N, "Economics performance of Marine fishing methods in India", **Marine Fisheries Information Service.** No. 200, Central Marine Fisheries Research Institute, Cochin, April-June 2009.

[44] State Planning Board, "**Human Development Reporter of Fisher Folk in Kerala"**, 2009, Government of Kerala.

Nirmal Chandra Sahu *et al.*, (2009)[45] in their articles remarked that the fisherwomen of Gopalpur have a vibrant organization called 'Kalinga Fish Workers Union' that fights for their rights. The women also assert their rights through self-help groups (SHGs) and through participation in the Panchayat. The girl children are now sent to school. The economic contribution of fisherwomen is mainly determined by the amount of time allocated to collection, processing and marketing of fish. The age, body weight, marital, maternity status and education do not significantly influence their income. They spend bulk of their time on fishery and household activities. There is no scope for leisure and pleasure. They are being exploited by the middlemen and traders belonging to their own community and others. The fisherwomen are aware of the conditions of sustainability such as diversity, alternative sources of income, community harmony and familial equilibrium. Their traditional ecological knowledge (tek) needs documentation, recognition and appreciation. The natural fishery capital stock in the sea and land resources in the coast needs protection. The fisher people's council should be recognized as a socio political institution.

Punnoose Jacob *et al*. (2010)[46] put across a multi-pronged strategy ensuring the loyalty of the coastal population. The poorest fraction of the population throngs the coastal belt and unless their social and economic deficiencies are addressed no coastal security architecture would be effective. Communal riots have the highest frequency in coastal area and vulnerability of the population to such anti-social and anti-national elements is the greatest hazard to set up an effective coastal security edifice. The

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[45] Nirmal Chandra Sahu, Aleyamma Issac and Santosh Kumar Balil, "Economy of the Fisherwomen in Ganjam District of Orissa: Conditions for Environmental Governance and Sustainable Development", **Fifth Biennial Conference of the Indian Society for Ecological Economics (INSEE) on Environmental Governance**, Ahmedabad, January 2009.

[46] Punnoose Jacob, "Coastal Security challenges in Kerala, Coastal security needed a new look", **School of International Relations and Politics**, 2010, Mahatma Ghandhi University, Kottayam.

unidentified number of country boats and the large number of mechanized boats will be a threat to the security of state which is well knitted with waterways and back waters.

Vipin Kumar V.P *et al.*, (2013)[47] in this paper an attempt is made to assess the extent of indebtedness among marine fisher folk in mechanized, motorized and traditional fisheries sectors and to assess the impact of Micro finance Institutions (MFI) and Self Help Groups (SHG) on coastal indebtedness in Tamil Nadu. The study was carried out in three coastal districts of the state. Situational analysis was done through PLA in the selected locations and the sample respondents were selected from mechanized, motorized, traditional, secondary and tertiary sectors, Data were collected through personal interview from members of 12 selected MFIs and non-members in these sectors, comprising a total of 600 respondents. The results showed that the level of indebtedness of members of MFIs was less compared to the non-members. In certain cases, even though the indebtedness was more, the level or repayment was found to be significantly high in MFIs. There is an extreme necessity of strengthening the MFI ventures in the traditional fisheries sector in the state. A comparative assessment of the sources of credit also was undertaken to draw valid conclusions. It was found that the MFIs ranked better in most of the attributes in the perception of stakeholders compared to banks and non-institutional credit sources.

Nurul. L. *et al.*, (2013)[48] in this study, the first step is to elaborate and describe the conditions and problems faced by fishermen in the study area. The next step is to evaluate the implementation of development policies and programs to determine whether the policies and programs can help solve the problems faced by the fishermen

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[47] Vipinkumar.V.P, Johnson.B, Swathilekshmi and Ramachandran, "Coastal rural indebtedness and impact of microfinance in marine fisheries sector of Tamil Nadu", **Journal of Marine Biological Association of India, Vol.**55 (1), pp.79-85, January – June 2013.

[48] Nurul L. Hasanuddin, Novesty Noor, and Happy.R.Santosa, "Is it possible to eradicate poverty in the fishermen village", **International Journal of Environmental Sciences**, Vol.4, No.2, 2013.

or not. The result shows that poverty is still a major problem faced by the fishermen in the study area. Poverty is evident in economic life of the fisherman and their housing condition. Basically, the problems faced by the fishermen can be classified into two general problems, namely (1) the problems encountered related to socio-economic life of fishermen and (2) the problems related to the physical condition of housing/ settlement area. In terms of socio-economic sustainability of the profession as fishermen, the problems faced include low income, limited capital and fishing equipment, low education level and lack of skill and technology. While in terms of physical condition of the fishermen settlement area, the problems faced include lack of basic services, lack of water supply and inadequate sanitation, poorly maintained environmental conditions as well as conditions of fisherman housing that looks slum and unhealthy. In an effort to improve the welfare of the fishermen and poverty eradication, local governments have established some policies and development programs. Our study shows that the implementation of the policies and programs has not been able to overcome the problems faced by fishermen and not been able to eradicate fisherman poverty. Government assistance given to fishermen are often not effective and not appropriate with the needs of the fishermen.

Shanmugarajah Srikanthan (2013)[49] The data for this study were collected through informant case studies from fishing village of Pommaiyar Palaiyam located in Coromandel Coast, Tamil Nadu, India during the intensive fieldwork period of doctoral research, and the qualitative approaches are used for analyzing the data. The finding of this study explores the correlation between the unpredictable climate change and multi-dimensional paradigm of poverty of the proposed study village as follows:

[49] Shanmugarajah Srikanthan, "Impact of Climate Change on the Fishermen's Livelihood Development: a case study of village in Coromnadel Coast", **International Organisation of Scientific Research Journal of Humanities and Social Science**, July-August 2013, Vol.12. Issue.6, pp.49-54.

(1) the climate change of the village from the last two years, (2) the impact of unpredictable climate change on fishermen livelihood development activities: occupation uncertainty. Income disorganization, damages, loses of fishing equipments and psycho-social problems, and (3) the suggestions and recommendations from this issue. This study analyzed their social problems especially multi-dimensional poverty with the concept of vicious circle which is a key factor for their prolonged poverty and psycho-social problem which is a barrier for livelihood development activities uplifting of this village and suggests that the measures to be taken to reduce the present scenario of the people.

Ilavarasan. R (2013)[50] This study aims at (i) Portraying the socio-economic status of the fishermen in the Ramanathapuram district in Tamil Nadu, and (ii) examining the methods of fish catching and fish marketing in the study area. Relevant primary data and yearly reports on production and export of fish in India were collected for the period from 1990-91 to 2010-11. Secondary data for the study were also collected from the records of journals, statistical handbooks and year books. Tabular analyses were done to work out the percentages and average values.

The study concluded that most of the fishermen's main problem in raising finance is their inability to give security for the loan. Even for getting financial aids through government banks, security is essential. The study found that food assistance and cash grants from government and non-governmental organizations, as well as donations of boats and fishing gear and boat repair stations were all available to them.

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[50] Illavarasan. R, and Veerachamy.P, "Marine Fish Catching and Fish Marketing of Fishermen in Tamil Nadu and All India", available from:**http://www.languageinindia.com/may2013/marinefishingilavarasanfinal.html,** Issn 1930-2940 Vol. 13:5, May 2013.

Sivanesan. R (2014) [51] The Socio-Economic conditions of the fisherman southern coastal areas of Kanyakumari District are very poor. Almost 66 per cent of the fishermen are engaged in fishing at the age group of above 35. The survey reveals almost 30 per cent of them have completed their upper primary education. From the survey we concluded that 70 per cent of the fishermen go for fishing at the sea and 25 per cent are engaged in fish related activities. The study gives the data of the citizenship of the fishermen as 52 per cent of them are natives and others are migrated. The survey reveals almost 47 per cent of the people abode in concrete houses and 71 per cent dwell in their own houses. The study shows a good majority of the people depend on public water sources to satisfy their needs it is about 66 per cent. It is found that of the houses are electrified. The survey states almost 56 per cent of the fishermen work in mechanized boats. The study clearly states that majority of the sale is through wholesale; it is almost 38 per cent. The survey also highlights that there is no a habit of saving among the fishermen. That is 58 per cent of them do not have any savings for their Future life. It is found from the survey that the major portion of the income of a family comes from fishing and related jobs. It is almost 65 per cent. The remaining 35 per cent of the income comes from various sources such as agriculture, business etc.

Guruprasad and Gaddem Narasimha Rao (2014)[52] (1) the environments are often subjected to degradation at an alarming rate leaving a very gloomy future. Due to increasing coastal population and growth in mechanized boat operations all along the coastline, the socio-economic status of the fishermen community is now in a fragile

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[51] Sivanesan.R, "Problems and Prospects of Fisherfolk in Kanyakumari District of Tamil Nadu", **International Journal of Research in Management and Business Studies**, Vol.1, Issue.1, January-March 2014.

[52] Guruprasad.Ch and Gaddem Narasimha Rao, "Global warming affects on Fishing village in India-A case study on Andra coastal village:Uppada", **International Organisation of Scientific Research Journal of Applied Geology and Geophysics**, Vol.2, Issue 2, Ver. II, Mar – Apr 2014, pp. 50-56.

state. It is time that a thorough understanding of the socio-economic status of the coastal population, their limitations to compete with affluent.

Das Kennady J (2015) [53] the introduction of mechanized fishing had perceptibly improved the levels of living of boat owner households in the Kanyakumari district. The boat owner households have a low dependency ratio and comparatively a higher percentage of aged population. This shows a as rise in average life expectancy. The boat owner households enjoy a high literacy level (80 per cent) and most of the households resides in their own houses are made of concrete, own well is the primary source of drinking water and most of the houses are selected are attached with necessary sanitation facilities.

2.2 REVIEWS RELATING TO IMPACT OF MECHANIZATION

Vattamattam Joseph (1978)[54] seeks to gain insights into the price fixation of fish in terms of technology of fishing, patterns of ownership of fishing equipment and marketing system and few institutional factors. The only mode of sale was auctioning which favors big merchants. A compulsory contribution of the total value of catch to the church called Kuthaka is another practice prevalent. There exists interlocking of output and credit markets. A feudal natural of production and market relation existed during the period.

Kurien. J[55] **(1978)** painted a factual picture of this transformation of the fishery economy of India into an open playing field of international capitalism. It remained, for long, the domain of poor and illiterate fishermen who eked out a livelihood by applying

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[53] Das Kennady. J, "Problems and Prospects of Mechanised Fishing in Kanyakumari District. **Ph.D. Thesis**, M.S. University, Tirunelveli, 2015.

[54] Vattamattam Joseph, "Factors that determine the income of fishermen, A case study of Poonthura village in Trivandrum district", **M.Phil Dissertatio**n , 1978, Centre for Development Studies, Thiruvananthapuram.

[55] Kurien. J, "Entry of Big Business into Fishing-its Impact upon fish economy", **Economic and Political weekly**, 9th September 1978.

their knowledge of fishery environment. By introducing trawler technology, refrigerated transportation of fish and also by promoting shrimp exports to United States of America, Indo-Norwegian project to paved the way for entry of alien capital and big business. These developments had their pressure on the fishery resources.

Bhushan Bharat (1979)[56] examines in detail the nature and implication of technological change in fishing in Kerala. The study revealed that the overall performance of mechanized sector was superior to that of non-mechanised sector. The output of the mechanized sector increased considerably over the period 1969-75, but the output of non-mechanised sector stagnated, mechanization changed the organization of fishing. Technological changes also accentuated the division of labour on boats and a heightening of skill requirements. The pattern of mechanization led to the emergence of conflict between mechanized and non-mechanised sector because of the competition of the limited resources. The lure for profit has given rise to fishing practices, which are potentially harmful for the fish economy as well as the ecology of the sea. The author warned that the introduction of mid water trawling and purse seining in shallow water for pelagic fish totally exhaust the catch in the long run, which will affect the non-mechanised sector and create an ecology imbalance.

Hakims Abdul (1980)[57] examines the factors responsible for disappointing results with regard to mechanization and cooperative form of organization. According to him persons or groups outside the community generated the major share of the benefits of the mechanised sectors. Efforts to promote mechanized fishing through cooperatives put the fishermen under several technological and institutional constraints

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[56] Bhushan Bharat, "Technological Change in Fishing in Kerala", 1979, **Centre for Development Studies**, Thiruvananthapuram.

[57] Hakkim Abdul, "Mechanisation and Co-operative Organisation, their Impact on Traditional Fishermen", M.Phil **Dissertation**, 1980, Jawaherlal Nehru University, New Delhi.

and failed to produce any significant impact among them. The study reveals that proportion of traditional fishermen in the mechanized boats employed as skilled personnel who get a higher proportion of the wage share had also declined over time.

Panikkar. K.K.P and Alagaraja. K (1981)[58] studied the impact of the introduction of mechanised boats on the socio - economic conditions of traditional fishermen when they are supplied with mechanized boats. To study this impact, Calicut region was selected where Agricultural Refinance Development Corporation (ARDC) had supplied 50 mechanised boats of size 36 inches so that each boat was allotted to seven fishermen families, thus involving 350 fishermen families in this venture. The study indicates an improvement in the economic condition of the fishermen families of Puthiangadi (near Calicut) which received credit facilities from ARDC. The introduction of mechanization induced many fishermen to shift from traditional to mechanised fishing which resulted in increased landings and created more employment opportunities in net making, ice-plant and workshop operations, sorting, auctioning, transporting and fish trading. The absence of such economic activities in the neighboring Elathur village is a pointer to the significance of availability of credit facilities to invest in improved fishing techniques.

Durairaj. N (1981)[59] in his study on Marine Fishing Industry in Thanjavur district has discussed the distribution of income, indebtedness and the annual average return per craft of both the mechanised and non-mechanised sectors. The study revealed that the distribution of income in the worker groups in both the sector was more equitable than in the owner -worker groups and also revealed that workers in the

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[58] Panikkar. K.K.P and Alagaraja. K., "Socio-Economic States of fishermen Community of Calicut Area", **Marine Fisheries Information Service,** No.33, 1981, Central Marine Fisheries Research Institute, Kochi, pp.2-12.

[59] Durairaj. N, "A study of Marine Fishing Industry in Thanjavur District", **Unpublished Ph. D. Thesis**, Madurai Kamaraj University, 1981, p.230.

mechanised sector could get a higher income than an owner worker in the catamaran sector. The author stressed the need to improve the efficiency of catamarans by suitably modifying the traditional craft. The study identified that the annual net return per craft in catamaran sector was more than that of the mechanized sector. The low return per craft in the mechanised sector was mainly due to the high cost of diesel and oil.

Srinnivasan. A (1981)[60] in his study worked out on the economics of various types of fishing crafts used in Tamil Nadu. The return per unit investment of non-powered boats was estimated to be twice that of powered boats. The traditional fishing crafts categories, it was suggested that additional income and employment be obtained by making all fishing requisites mainly fishing nets, fish processing, transport, marketing and use of catch to raise the village poultry units.

Kurien. J and Mathew Sebastian. S (1982)[61] have studied an impact of technological changes in fishing on fishermen. According to this study, there are regional variations in the species-mix of the marine resources in the country. The nutritive values of all species of fish are almost the same, but there are different types of market demand and prices for various species. There is direct impact of mechanization of fish production in quantitative as well as qualitative nature.

Balakrishnan. G and Alagaraja. K (1984)[62] examined the reasons for the clashes between the mechanised boat owners and the indigenous craft owners leading to heavy damages in the year 1978 in the coast areas from Jagathapattinam in

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60 Srinnivasan. A, "The Small - scale Marine Fisheries of Tamil Nadu", **Central Marine Fisheries Research Institute, Bulletin,** Vol.30, 1981, pp.34-38.

61 Kurien. J and Mathew Sebastian. S, "Technological Change in Fishing: Its Impact on Fishermen", **Report prepared for Indian Council of Social Science Research**, Centre for Development Studies, New Delhi, 1982.

62 Balakrishnan. G and Alagaraja. K, "Regulated mechanized and traditional fishing in Tamil Nadu - An approach to end clashes", Central Marine Fisheries Research Institute, Kochi, **Marine Fisheries Information Service, Technical and Extension Series**, No.58, 1984, pp.10-13.

Pudukkottai District to Mallipattinam in Thanjavur district. It was suggested that the forming of Peace Council comprising of the local Revenue Divisional Officer as Chairman and representatives from State Fisheries Department, mechanised boat owners and indigenous craft owners as members worked satisfactorily to end the clashes. The Peace Council drew schedule of restricted fishing for mechanised boats for three days in a week and traditional boats for four days were strictly kept up by the respective boat owners without any violation, while all the types of boats operate during day time. Since the system of regulated fishing works satisfactorily, the same may be extended to other regions where the clashes between these two sectors exist.

Kalavathy. M (1985)[63] studied the organisation of fish marketing in Madras Fishing Harbour in 1985. She identified different marketing channels and means of transport for different species of fishes. While studying the role of women in marketing, she has done a case study for each role, i.e. women as auctioneer, retailer, trash fish wholesaler. She concluded that the mechanisation benefited some categories of fish marketing women operating at Madras Fishing Harbour by way of higher incomes or new earning opportunities. It also perhaps aggravated income disparities among fisherwomen. In a small landing centre, the marketing of fish is fairly decentralised and a high percentage of women take to fish marketing. In a large landing centre, marketing is more centralised, offering fewer employment opportunities but higher profits for those women who have managed to stay in the business.

Daniel Viswasam Samuel (1986)[64] in his study estimated costs and returns in different fishing units. The study also included economics efficiency of fishing in the

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[63] Kalavathy.M.H, "The organization of fish marketing in Madras fishing harbor", 1985, **BOBPNVP/39**, pp. 1-10.

[64] Daniel Viswasam Samuel, "An Economic Analysis of Employment, Income and Consumption of Fishermen Households in Tirunelveli District", **Unpublished M.F.Sc., Thesis**, Fisheries College and Research Institute, Thoothukudi, 1986, pp.31-32.

selected fish landing centres of the erstwhile Thoothukudi district. The fitted a linear multiple regression function to find out the determinants of net income in fishing.

Sam Bennet. P and Arumugam, (1988)[65] in their article entitled "New Trends in the Traditional marine fisheries at Tuticorin" had analysed the quick changes taken place in the fishery due to the introduction of mechanization of traditional fishing crafts. The highlights are (i) the fishermen are benefited by increased catch per unit as well as increased price for the catch by arriving earlier. (ii) A significant improvements in the Socio-economic structure of the traditional sector is the creation of mechanization to existing crafts and (iii) Number of persons have been reduced to three from five.

Rao Subbha. N (1988)[66] in his study made a significant contribution towards mechanized modes of production. He conducted his case study within the urban fringe of Vishakapattanam and it is based on in-depth inquiries into several aspects of social and economic life like employment, income, consumption etc. He understood the life and work of the fishermen. The economic implication of traditional mode of production to mechanized mode was also the purview of his enquiry. Entry into the fishing zone of traditional fisher folk by mechanized boats often resulted in violation. The inclusion of non-fishermen from other social groups into the marine fishing sector as owners of mechanized boats resulted in overfishing due to technological advancement and the transformation of the traditional fishermen into mere wage earners.

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[65] Sam Bennet.P and Arumugam, "New Trends in the Traditional Marine Fisheries at Tuticorin", **Central Marine Fisheries Research Institute**, Cochin, **Bulletin,** Vol.44, No.1, 1988, pp.155-158

[66] Rao Subbha. N, "Mechanisation and Marine Fishermen –A Case Study of Visakhapattanam", 1988, Northern Block Centre, New Delhi.

Agarwal. S.C (1990)[67] gives an in-depth study of organizational, scientific, economical, technological, developmental and social aspects of management of fishery resources development in India. According to him the technological development linked with vast natural and human resources bring the modern fisheries a steady growth. However the technological, natural and human resources are interrelated and interact upon one another and become very complex.

Sathiadhas. R and Panikkar. K.K.P (1991) [68] in their article entitled, "Economics of Catamaram Fishing along Madras Coast", they analysed the various marketing methods adopted in the fishery sector. The role of middlemen, price spread, mode of transport, regional imbalances in the distribution, system and other various marketing gaps were properly explained.

South Indian Federation of Fishermen Societies (SIFFS) (1991)[69] conducted a study regarding motorization. It came to the conclusion that motorization has not resulted in enhancing the time spent for fishing. It also revealed that there is no shift to other deeper water for fishing and the motorized and non-motorized units were forced to concentrate in the shallower near-shore waters creating further fishing pressure. Motorisation enhanced the physical productivity of only the ring seine units and there is greater productivity disparities indicating unequal access to the common resources of the coastal waters. Though the landings increased there is no change in the marketing channels. Motorisation has resulted in fishing units becoming less economically sustainable and there is an increase in the level of investment, operating cost and indebtedness.

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67 Agarwal.S.C, "**Fishery Management**", 1990, Ashish Publishing House, New Delhi.

68 Sathiadhas.R and Panikkar.K.K.P, "Economics of catamaram fishing along Madras coast", **Journal of the Marine Biological Association of India**, Vol.33, No.1 and 2, 1991, pp.241- 245.

69 "Motorisation of Fishing Units, Benefits and Burdens" **South Indian Federation of Fishermen Societies**, 1991, SIFFS, Trivandrum.

Sathiadhas. R *et al.* (1992)[70] undertook a study to evaluate the changing pattern of craft - gear combinations, their catch composition and comparative economics of operations at Nagapattinam centre of Tamil Nadu coast during the year 1987-88. They collected primary and secondary data for this study. The primary data were collected through schedules regarding the information pertaining to initial capital investment on hull, engine, nets and other accessories, year of purchase, resale value of the unit, source of finance, sharing pattern of crew wages, annual repairing expenses, operational cost, species-wise catch and revenue. The secondary data pertaining to mechanised and non-mechanised fish landings, crafts and gears etc. were collected from Central Marine Fisheries Research Institute, review of production trend showed that the contribution of mechanised boats in the total marine fish landings of Tamil Nadu steadily increased from about 28 per cent in 1976 to *62* per cent in 1990. The trawl catch forms more than 90 per cent of the mechanised landings and 50 per cent of the total landings of the state. The introduction of single and two boats high opening trawl nets were economically efficient. The pair trawling further provided a new technique to fishermen to harvest the hitherto under exploited valuable resources.

Ibrahim. P (1992)[71] examines the evolution of fish economy in Kerala after the introduction of modern technology. The changes in growth, output, employment, income, consumption and organizational changes were studied with particular reference to distributional justice.

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[70] Sathiadhas.R, Panikkar.K.K.P and Kanakkan.A, "Costs and earnings of trawl operations along Nagapattinam coast of Tamil Nadu", Central Marine Fisheries Research Institute, Kochi, **Marine Fisheries Information Service., Technical and Extension Series**. No.118, 1992, pp.4-11.

[71] Ibrahim. P, "**Fisheries Development on India**", Classical Publishing Company, 1992, New Delhi.

Riordan O Braian (1992)[72] explains how world's fish stocks are in danger from the abuse of modern technology. Increasing world demand and declining resource level caused by over fishing combine to place more and more pressure on the delicately balanced resource base. Predator/prey relationships are being upset and important habitats are destroyed as a result of demersal trawls which harm the sea bed. Modern high technology aquaculture is increasingly being shown to be environmentally damaging, producing high biological loadings and high levels of organic pollution from the excessive use of pesticides. Damaging the mangrove forest for intensive shrimp farms is damaging the ecosystem.

Krishna Iyer. H *et al*. (1993)[73] in their article entitled "The effects of increase in the Number of fishing trips on the economic efficiency of fisher folk", they found the economic efficiency of 9.82 m and 11 m fishing travelers along the Kerala-Coast, concluded that the number of fishing trips per year determines the profit and loss of the traveler with the increase in the number of fishing trip, the profit also proportionately for both types of travelers.

Sekar. C et al. (1993)[74] conducted a study with an objective of analysing the coastal region-wise, craft-wise, gear-wise and month-wise fish production in Tamil Nadu during the year 1992-93. Craft-wise fish production showed that mechanised crafts are contributing around 59 per cent of total catches. Among the gears used for fish production, gill net accounted for 39 per cent followed by trawl net 31per cent of total fish catch. Month-wise analysis showed that July, August and September are the

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[72] Riordan. O Braian, "Fishing out of the gene pool", **Appropriate Technology Journal,** vol 18 no.4 , March 1992, available from:.www.madegood.org/.

[73] Krishna Iyer. H, Unnithan. G.R, Rao. P.S, Panduranga Rao. C.C and Nair. R.C, "The effects of increase in the number of fishing trips on the economic efficiency of fisher folk", **Fishery Technology**, No.20, 1993, pp.9-12

[74] Sekar. C, Senthilnathan. S, and Isabella Rani. S, "Marine fish production in Tamil Nadu", **Department of Agricultural Economics, Tamil Nadu Agricultural University,** 1993, Coimbatore, pp .29-32.

peak period for fishing activity. Region-wise fish production showed that Palk Bay recorded the maximum annual growth rate and the west coast has the lowest. However, production per Kilometer of coastal length was the higher in the west coast.

Cherunilam. F[75] (1993) argued that though fishing had transformed into a dynamic and multifarious industry of fisheries with significant contributions for output, employment, income, foreign exchange etc., in the global economy, the Indian development has been tardy and her progress in the international market has been on the downside. On the basis of a review of the resource potential, fisheries development programmes under the plans, export development performance etc., he argues that India has not fully developed its fishery potential.

Sathiadas. R *et al.* (1994)[76] studied the impact of mechanization on artisanal fishermen in Thanjavur coast of Tamil Nadu. The intensive mechanization programme has even deprived the traditional fishermen of their legitimate claim for fishing in the near shore areas. There are also frequent conflicts between the mechanised and non-mechanised fishermen over their fishing rights. The seasonal nature of fishery and the risk and uncertainties associated with marine fishing work of the fishermen which leads to low-income trap. The poor economic conditions coupled with less availability of finance from the institutional agencies compel them to sustain with less equipped fishing equipments which in turn results in lesser returns. Lack of marketing and infrastructure facilities is another factor responsible for lesser returns to the fishermen.

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[75] Cherunilam.F, "**Fisheries: Global Perspective and Indian Development**, Himalaya Publishing House, 1993.

[76] Sathiadas. R, Panikkar.K.K.P and Kanakkan. A, "Traditional Fishermen in Low Income Trap-A Case Study in Thanjavur Coast of Tamil Nadu", **Marine Fisheries Information Service. No. 135, Central Marine Fisheries Research Institute**, Kochi, 1994, pp.5-10.

Mahadevan Pillai. P.K *et al*. (1994) [77] studied the contribution of the mechanised and artisanal fisheries sectors. They observed that higher returns from the mechanised sector over the non-mechanised sector during the study period. This increase in fish production was possible by the large scale introduction of artisanal gear and motorisation of country crafts. The region 0- 50 meter depth was heavily exploited and the zone beyond 50 meters depth has to be concentrated for future exploitation. The share of pelagic fishes during the study period was 48.8 per cent which 5.8 per cent higher than the preceding five year period. In the district-wise fish landings, Thanjavur and Ramanathapuram dominate which together contribute 38 per cent to the total landings of Tamil Nadu. The fish production by the mechanised and artisanal sector shows that only marginal increase by mechanised sector whereas 18 per cent increase by the non-mechanised sector. The pelagic and demersal constituents of the marine fish landings during the period were 68 per cent and 32per cent respectively.

Kurien John (1994)[78] analyses the technological diffusion of plywood boats along the lower west coast of India by choosing two fishing villages Marianaad (adopted diffusion in 1974) and Purakad (late 1980's). Factors like technical specifics, characteristics of fishers, natural resource conditions, market force, natural motivation, strategy of propagation, nature of subsequent diffusion and factors promoting them were identified and analysed under different variables.

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[77] Mahadevan Pillai. P.K, Balakrishnan. G and Alagaraja. K, "Present status of marine fisheries of Tamil Nadu and Pondicherry", Central Marine Fisheries Research Institute, Kochi, **Marine Fisheries Information Service., Technical and Extension Series**, No.129, 1994, pp. 1-12.

[78] Kurien John, "Technology diffusion in Marine fisheries, The concrete socio-economic and ecological inter-relations-A study on the diffusion of motorized boats along the lower west coast of India", 1994, **Ph.D Thesis, Tata Institute of Social Sciences**, Bombay.

Giriappa. S (1994)[79]conducted a case study of mechanised and non mechanised boats in Dakshina Kannada district of Karnataka and shows the declining share of non mechanised boat both in quantity and in value terms. Considering the operational performance of the boats for different years it is found that per boat trips have come down, whereas per boat catch has slightly improved.

Jacob Jerold Joel and Ebenezer. I.P (1996)[80]made a study on present status of trawl fishery at Colachel for a period of five years from 1990 to 1994. The study indicated that the annual average gross income per fishing trip worked out to a minimum of Rs.8121 in 1990 to a maximum of Rs.22683 in 1994. Therefore, it was found that trawl fishing at Colachel was more productive and profitable.

Mahesh V Joshi (1996)[81] examines the impact of mechanization on fisheries sector. He expressed the view that though this is very important sector in our national economy. We have neglected this sector and to the people connected with it. This sector has two main problems, namely, organizational problems and mechanization problems. Traditional method is not enough for sufficient catchment and fisheries. Most of the fishermen community lives in rural area in coastal areas. They are very poor, uneducated and ignorant. The main findings of the study are as under

1. Mechanised system of fishing is more productive compared to traditional non-mechanised sector.
2. There is an unequal distribution of income among owners of mechanized and non-mechanised boats.

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79 Giriappa.S, "Performance of mechanized and non-mechanised boats: A case Study in Dakshaena Kannada of Karnataka", **Role of Fisheries in Rural Development**, Daya Publishing House, 1994, New Delhi, p.23.

80 Jacob Jerold Joel and Ebenezer. I.P, "Present status of trawl fishery at Colachel, Central Marine Fisheries Research Institute, Kochi, **Marine Fisheries Information Service., Technical and Extension Series**., No.161, 1996, pp.10-17.

81 Mahesh V Joshi, "**Economics of Fisheries**", A P H Publishing Corporation, New Delhi, 1996, p.4.

3. Labour class fishermen families are poor.

4. Traditional fishermen are not able to institutional finance. They are under heavy debt.

Sathiadhas (1997)[82] studied (i) the production trend and variation in catch composition of marine fish over the years, (ii) the economics of different craft - gear combinations in marine fishing operations, (iii) the marine fish marketing problems to determine price spread of different varieties and to assess the share of fishermen and middlemen in consumer's rupee in Tamil Nadu. The author used both primary and secondary data. Data on costs and earnings of different craft - gear combination and price of different varieties of fish including handling and transportation charges at various points of the marketing channel, collected by direct observation at selected centres. The study revealed that (i) both mechanised and non-mechanised sectors are important to increase the fish production, (ii) motorization of country craft helped the fishermen to improve their living condition, (iii) catch per unit effort of trawlers is continuously declining in Tamil Nadu (iv) lesser the number of intermediaries in the fish marketing chain, higher is the share of fishermen in the consumer's rupee.

Maarten Bavinck (1997)[83] explains the change in the structure of fishing in the Coromandel coast in Tamil Nadu. In this region motorization of Kattumarams is taking place and trawler crews disrupt the operation of their artisanal colleagues causing substantial damage to gear and sometimes to lives and affecting the catches.

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[82] Sathiadhas.R, "**Production and Marketing Management of Marine Fisheries in India**", Daya Publishing House, 1997, New Delhi.

[83] Maarten Bavinck, "Changing Balance of Power at Sea, Motorisation of Artisanal Fishing Craft", **Economic and Political weekly**, February 1997.

Hameed. M.S (1998)[84] estimated the exploited and potential fishery resources of the Exclusive Economic Zone of India. 2.02 million sq.km. Exclusive Economic Zone of India has a fishery potential of 3.9 metric tonnes of which 2.21 metric tons are within the 50 metre depth zone and 1.69 metric tonnes beyond it. The demersal stock is about 0.65 metric tonnes, the coastal pelagic about 0.74 metric tonnes and oceanic resources about 0.30 metric tonnes. The depth-wise, region-wise and resource-wise potential yield of demersal, pelagic, oceanic and allied resources are presented and major exploited and underexploited resources offering scope for increased production are outline. The landing patterns of marine fish during 1980-1996 are analysed.

Devaraj. M et *al.* (1998)[85] in their paper reviewed the marine fish production in the state vis-a-vis the potential yield, assessed the economic performance of trawlers and motorised gillnetters, analysed the distribution pattern of marine fish in the internal market and the performance of marine fishery exports, evaluated the capacity utilisation of processing plants and suggested policy measures for improvements in production and marketing of marine fish.

Vijayakumaran. K and Haridas. C (1998)[86] remarked that the marine fish production in India has been more or less stagnant in the recent past. The mean annual production of 2.7 metric tonnes is nearly 70 per cent of the estimated potential of 3.9metric tonnes from the Exclusive Economic Zone Coastal region up to 70 metre depth is the main contributor. In multi-species, multi-gear fisheries catch per unit effort

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84 Hameed. M.S, "Exploited and potential fishery resources of the Exclusive Economic Zone of India", **Society of Fisheries Technologists**, India, 1998, pp.6-12.

85 Devaraj. M, Sathiadhas. R and Reghu. R, "Technoeconomic assessment of marine fish production, marketing and capacity utilization of processing plants in Gujarat", Central Marine Fisheries Research Institute, Kochi, **Marine Fisheries Information Service, Technical and Extension Series**.No.155, 1998, pp.1-9.

86 Vijayakumaran. K. and Haridas.C, "Coastal fisheries management - Problems and Prospects", Central Marine Fisheries Research Institute, Kochi, **Marine Fisheries Information Service**, **Technical and Extension Series,** 1998, pp.473-477.

is a poor indicator of stock or gear efficiency. 0.239 million fishing crafts are being operated along the Indian coast.

D' Cruz Titto (1998)[87] studied the design details of ring seine and its impact on the fish production scenario of the state. He quoted the study conducted on techno-economic feasibility of ring seine units and revealed that capital investment and operational costs had increase substantially resulting in diminishing returns.

Subba Rao. N (1998)[88] has made an in-depth study on the capital intensive nature of the modern fishing technology. According to him mechanization in the fishing industry has resulted in a tremendous increase in the quantum of fish landed annually all over the world. As he has rightly put it, the operational efficiency of the fishing boats is judged primarily by the distance gone into the sea, the trawling time or hours spent in the operation of fishing nets for catching fish and the number of days the boat can be in the sea for fishing purpose.

Gopal *et al*. (2000)[89] investigated the technological gradations among three types of craft used in Artisanal sector (large motorized crafts, small motorized crafts and non-motorised crafts) against capital and labour productivity. The findings reveal that the labour is least productive in non-motorised crafts. Also use of capital in terms of productivity does not occur in fish harvest technologies. The greatest contribution of technology seems to widen the area of operation of fishing.

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87 D'Cruz Titto, "The Ring Seine Evolution and Design Specification", **South Indian Federation of Fishermen Societies**, 1998, Thiruvanathapuram.

88 Subba Rao. N, "**Economics of Fisheries**", 1998, Daya publishing House, New Delhi, pp.1-151.

89 Gopal, Nikita, Menon.J, Sreevalsan, and Annamalai.V, "**Technology Induced Productivity in Fisheries Technology,** Vol.137 (1), 2000, pp.63-68.

Sathiadhas. R and Narayanakumar (2002) [90] focuses on the recent technological exploitation pattern of inshore fisheries and its socio-economic impact on stakeholders with specific emphasis on the assessment of economic loss incurred due to various environmental problems of the coastal ecosystem. The fishing villages were classified into highly degraded, moderately degraded and comparatively undisturbed centers. The study identified the reasons for degradation and found that the excessive fishing pressure caused by the mechanized trawlers, pollution caused by the industrial effluents and sea erosion due to sand mining are the prominent features of the highly degraded centre while the indiscriminate operation of large number of mini trawls and ring seine units leading to the depletion of fishes of commercial importance form the major problems in moderately degraded centers.

Varghese. S. and Somvanshi. V.S (2001)[91] have presented the coastal country-wise finfish, crustacean and cephalopod species/ species-groups contributing to the fish production, as well as the similarities and variation among them in the Arabian sea. The fish landings reported by most of the countries in the region contributed similar set of species with varying abundances. The most common species reported are groupers, threadfins, barracudas, seer fishes and mullets among fin fishes, besides a number of species of shrimps and cephalopods. Barring localised and specialised fishing methods employed for catching pelagic fish resources, trawling has been the single largest technology being practised in the region for harvesting the demersal stocks by almost all the countries. The conservation and management measures emanating from the Food

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[90] Sathiadhas. R and Narayanakumar, "Environmental Economic Analysis of Inshore Fishery Resource Utilisation of Coastal Kerala", 2001, **Central Marine Fisheries Research Institute**, Kochi.

[91] Varghese. S and Somvanshi. V.S, "Marine fish biodiversity and exploited fishery resources in the North West Arabian Sea", **First International Conference on Fisheries, Aquaculture and Environment in the North West Indian Ocean**, Sultan Qaboos University, Muscat, Sultanate of Oman, 2001, pp.91-105.

and Agriculture Organisation Voluntary Code of Conduct for Responsible Fishing could be a common agenda for the coastal nations in the region.

Kartar Singh (2001)[92] is of the opinion that international trade in fish is a major factor that causes depletion of marine fisheries in India. Foreign exchange earnings from export sector encourage many entrepreneurs and private companies to use large scale mechanized trawlers to harvest fish at a rate faster than at which can be generated. The over fishing accelerates the loss of various species, also causes pollution and has threat on the livelihood of these people who extensively depend on fishing.

Ragupathy Venkatachalam (2005)[93] in his article the objective of the paper was examined the threat to the substantially of the fishers in India and in particular in the Gulf of Mannar region. It is widely quoted that the depletion is due to the introduction of trawler fishing techniques, which scrape the bottom of the sea and end up catching juvenile fish. In viewing this problem of over fishing (by the trawlers) as a negative externality to the traditional fishing community, the best way to internalize the social cost inflicted by the people who ever fish is the question that this study attempts to seek the answer for. One of the most commonly practiced techniques to sustain the fishers resource is the blanket ban on fishing during specific months of the year like the one practiced in the coastal regions in India. The researcher has attempted to critically evaluate the effectiveness of this method of resource conservation. The researcher has also proposed an alternative model for sustaining the resources, which would be an effective solution for the problem.

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92 Kartar Singh, "Some environmental impacts of liberalized world trade in agricultural commodities", **Ecological Economics for Sustainable Development**, 2001, C.H.Hanumantha Rao Academic Publications, p. 211.

93 Ragupathy Venkatachalam, "Sustainable Fishers and Community Management Systems", Paper presented in **"Environment and Growth" of the 2nd South Asian Economics Students Meet 2005,** The Lahore University of Management Sciences (LUMS), Lahore, Pakistan.

Unnithan G.R. *et al*. (2005)[94] studied on the fuel utilization pattern in the mechanized sector of Kerala. The study calls for appropriate technological and managerial interventions like development of new-generation, fuel efficient fishing vessels, fuel saving fishing techniques and optimization of the mechanized fishing fleet.

Najmudeen. T.M and Sathiadas. R (2007)[95] made an attempt was to assess the input- output relationship of trawl sector at three major landing centers in Kerala using Cobb-Douglas production function. The functional relationship indicated that there was ample scope to enhance the net profit of trawlers by increasing fishing days and area of operation at the two study sites, Neendakara and Munnambam whereas in Cochin Fisheries harbour, the present operation is almost at the optimum level. The study reveals that the number of days fished in a year is not up to the optimum in all the major centers selected for the study. So there is a provision of increasing the fishing days and the existing conflicts and disputes should be addressed before implementation. Otherwise a further increase may result in a complex socio-economic crisis among the fishermen population of the country.

Berg Marrit Van Den and Lensing Jan Bart (2007)[96] conducted a study on the work sharing in Kerala fisheries. Increased population pressure in the absence of alternative employment may ultimately lead to the breakdown of the work sharing system, when the work sharing premium required guaranteeing employment for everyone becomes insupportably high. But work sharing system as a system of social security for Kerala fishermen is not under there threat as Kerala is renowned for its

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[94] Unnithan. G.R, Nikita Gopal and Radhakrishanan Nair.V, "**Fuel consumption pattern by the Mechanized Fishing sector in Kerala**", Vol 42 (1), 2005, pp. 77-82.

[95] Najmudeen T.M and Sathiadhas. R, "Economic efficiency of input utilization of mechanized trawlers along the Kerala coast", **Journal of the Marine Biological Association of India, Vol.** 49(2), pp.113-117, December, 2007.

[96] Berg Marrit Van Den and Lensing Jan Bart, "Work sharing in Kerala's fisheries" **Marine policy Note. 31,** 2007, pp. 535-539.

relatively slow population growth. The study concluded that the more pressing threat will be the demise of the sector as a whole as a result of modern technological practices which result in depletion of resources.

Gine *et al*. (2008)[97] focused on the diffusion of new technology by looking at the determinants of technology adoption as well as the resulting income and inequality dynamics over the process of technology diffusion within a fishing village in Tamil Nadu. Lack of wealth is a key predictor for delayed adoption, because of credit constraints. During the diffusion process inequality follows Kuznets' well-known inverted U-shaped curve. Initially the technological innovations widen the gap between rich and poor, but after the entire community has completed the technological shift, inequality drops to a lower level and the study experienced a success story of globalization.

Najmudeen. T.M and Sathiadas. R (2008)[98] provide an insight into the economic impact of juvenile fishing in a tropical multi species multi gear fishery where a homogenous management system is ineffective. The study was carried out along the coast of Kerala to analyse the changes in the techno-exploitation pattern of marine fish during 2002-03. The overcrowding of boats and the subsequent pressure has elevated the landings of juveniles which were mainly due to intensive targeted fishing and inter sectoral competition. The study revealed that the economic loss incurred due to juvenile fishing has outweighed the annual average revenue generated by various craft-gear combinations.

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97 Gine, Xavier, Klonner and Stefan, "Credit Contraints as a Barrier to Technology Adoption by Poor: Lessons from South Indian Small-Scale Fisheries", **Globalisation and the poor in Asia: Can Shared growth be sustained**, Pal Grave Macmillan. ed.2008, pp. 221-249

98 NajmudeenT.M and Sathiadhas.R, "Economic impact of juvenile fishing in a tropical multi-gear species fishery", **Fisheries Research, Vol.** 92, 2008, pp. 322-332.

Femeena Hassan and Sathiadhas. R (2009)[99] the ever increasing international demand for cuttle fishes and shrimps induced acute competition, higher investment and continuous up gradation of the trawlers. The technical specifications, capital investment, capital composition and revenue for single and multi-day units have drastic difference. The study indicates that the shift towards the multi day unit is beneficial due to better catch and return. Though they are economically efficient the wastes and discards generated are not advisable for the long term sustainable development of marine fisheries.

Meenakumari. B *et al.* (2009)[100] gave an overview of the capture fishery resources, fishing vessels, structure and operation of gear system with focus on recent developments in fishing technology and the consequences of fishing.

Rathakrishnan (2009)[101] by using a systemic semi structured approach that uses a combination of methods lie focused group discussion elicit the traditional fishing practices followed by fishers of Tamil Nadu. The sustainability of traditional fishing practices is extremely important to protect the naturally occurring sands dunes and mangrove forests along the coastal areas. Local fishermen must be encouraged not to loose their centuries old cultural heritage of fishing by catamaram, which is now rapidly vanishing due to the development of technology. Fishing by catamaran is a traditional way of harvesting marine life without damaging the marine environment and its bio diversity. It is being rowed manually by oar. Apart from that entire structure is made out of wood ensuring zero pollution of sea water and the cost of production is comparatively low. It can be used in near shore water.

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99 Femeena Hassa and Sathiadhas. R, "An appraisal Trawl Fishery of Kerala", **Asian Fisheries Science,** Vol.22, 2009, pp. 277-284.

100 Meenakumari. B, Boopendranath. M.R, Pravin. P, Thomas. S.N and Edwin. L, (eds), "**Handbook of Fishing Technology**", 2009, Central Institute of Fisheries Technology, Cochin.

101 Rathakrishnan, "Traditional Fishing Practices Followed By Fisherfolks of Tamil Nadu", **Indian Journal of Traditional Knowledge,** Vol.8 (4), October 2009, pp. 543-547.

Mahesh. R (2010)[102] attempted to examine the natural resource depletion on the livelihood of the poor in the small scale fishing community in the coastal fishery sector of Kerala. He examined the economic condition of fisher folk in the small scale sector in Pulluvilla, a typical coastal village in Neyyattinkara Taluk of Thiruvananthapuram District in the context of change in access to and depletion of marine resources. There were significant differences in fishing income among the small scale fishers in the village due to the differences in technology. By fitting a production function for the two types of operations motorized plywood and non-motorized Kattamaram, the study suggested that to increase the output more trips have to be carried out. For Kattamaram operations contribution of labour is the main and only output for increasing catch. For motorized operations increase in the labour employed, fuel used and engine power are the major influencing inputs. By using the modern sophisticated engines the operators can go to deeper depths and also reach the fishing ground and return to the landing place quickly.

Aswathy. N.A *et al.* (2011)[103] focus on the economic viability of mechanized fishing units in Kerala and the impact of fishing ban on the livelihood security of workers. The mechanised category included trawlers, purse seiners and gill netters which used mechanisation both for voyage and actual fishing operations. The study suggests that mechanised fishing in Kerala is an economically and financially viable undertaking and trawlers, purse-seiners and single day gill netters generate sufficient funds for reinvestment in fishery. The socio-economics of fish workers during the fishing ban period revealed that nearly one million man days are lost during the period

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[102] Mahesh.R, "**Poverty, Inequality and Natural Resource Degradation: An Investigation Into The Small Scale Fishery Sector of South Kerala**", Himalaya Publishing House, 2010.

[103] Ashwathy.N.A, Shanmugam.T.R and Sthiadhas.R, "Economic viability of mechanized fishing units and socio-economics of fishing ban in Kerala", **Indian Journal of Fisheries**, Vol 58. no.2, 2011,pp.115-120.

accounting for a loss of nearly 50 crores to the labour income and majority of loss occurs in the trawl sector. In Kerala only 10 per cent of the mechanized workers were found employed in fishing in the traditional sector during the ban period. Since fishing is the only source of livelihood the study calls for alternative employment opportunities for protecting the livelihood security of fishers.

Dinesh Babu A.P *et al.*, (2013)[104] this study is based on the data collected from major trawl landing centers along the coast of India during the period 2008-2011. The estimated landing of low value by catch (LVB) in trawl fisheries, increased from 14% in 2008 to 25% in 2011, which is reflected as reduction in discard volume by trawlers. In Chennai, Tamil Nadu, the LVB landing which was 13% in 2008 to 21% in 2011. The landing centre price for LVB showed an increasing trend due to increased demand for trash fish for the production of fish meal and fertilizer. Study on the by catch from different centers along the coast of India showed that as many as 237 species/groups of marine fauna with juveniles of commercially important fishes were landed as LVB. Increase in utilization of LVB (which was discarded earlier) from trawl fishery, a trend which is market driven and its implication of the ecosystem and marine fisheries production of the country.

John. J (2014)[105] in the context of stagnating/depleting catches, sustainable development of fisheries sector and the livelihood of fishers become problems. The concern over the sustainability of fisheries resources and the resulting threat on the livelihood of the traditional fishers in Kerala form the subject matter of the present study. It reveals that technological developments resulted in the stagnation/declining of

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[104] Dineshbabu. A.P, Radhakrishnan E.V, Sujitha Thomas. G, Maheswarudu .P.P, and Gyanaranjan Dash, "An appraisal of trawl fisheries of India with special reference on the changing trends in bycatch utilization", **Journal of Marine Biological Association of India**, Vol. 55(2), pp.69-78, July –December 2013.

[105] John. J, "Technological Changes in Marine Fishing and Livelihood Threats of Fisher Folk". **Journal of Studies in Dynamics and Change,** 2014, Vol l (1), pp. 23-28.

marine landings in Kerala. It also identifies the sustainability issues which are directly or indirectly related to technology. Pollution and human conditions like open access, ecosystem damages and the fishers face livelihood threat and insecurity. Apart from these the fishers are deprived of livelihood assets. The threats faced by the fishers are related to work, environment, financial requirement, marketing difficulties and administration. It concludes that the policies adopted to ameliorate the livelihood conditions of the fishers must be based on the specificity of the need in each particular region.

Geetha. R *et al.* (2014)[106] A study was conducted to analyse the economic efficiency of mechanized fishing in Chennai in Tamil Nadu along the east coast of India. The craft and gear combinations over the years witnessed dramatic changes on account of the huge cost of fishing duration and depth of operations and maintenance. The mechanized gillnetters showed tremendous increase among the fishing fleet in Chennai mainly due to their assured returns and consistent marketing margin. The present study specifically compares the economic efficiency of mechanized gillnet units and trawlers operating from Chennai. Targeted tuna fishing and better price realization in the value chain have contributed to better performance of gillnet units. The higher fuel requirement observed for MD trawlers as compared to MD gillnetters is attributed to long distance travelling and the use of mechanical power for propulsion as well as for fishing.

[106] Geetha. R, Narayanakumar. R, Shyam. S. Salim, Aswathy. N, Chandrasekar. S, Srinivasa Raghavan .V and Indira Divipala, "Economic efficiency of mechanized fishing in Tamil Nadu- a case study in Chennai" , **Indian Journal of Fisheries** , Vol.61, Issue 4 , 2014, pp.31-35.

Christopher. K. Pham *et al*. (2014)[107] Bottom trawl fishing threatens deep-sea ecosystems, modifying the seafloor morphology and its physical properties, with dramatic consequences on benthic communities. In this study deep-sea bottom longline fishing has little impact on vulnerable marine ecosystems, reducing by catch of cold-water corals and limiting additional damage to benthic communities. We found that slow-growing vulnerable species are still common in areas subject to more than 20 years of long lining activity and estimate that one deep-sea bottom trawl will have a similar impact to loglines, depending on the morphological complexity of the impacted species.

2.3 SUMMARY

The reviews collected have enabled the researcher to widen the knowledge on the Indian marine fishing industry, impact of mechanization and the socio-economic status of the traditional marine fishermen. The analysis of the various vital aspects of the marine fishing industry and the impact of mechanization led the researcher to identify the research gap.

[107] Christopher K. Pham, Huo Diogo, Gui Menezes, Fillipe Porterio, Andreia Braga Henriques, Frederic Vandeperre & Telmo Morato, "A study on Deep-Water longline fishing and its impact on Marine Ecosystems", **Scientific Reports, No. 4**, Article no.4837, doi:10.1038/srep04837, 29th April 2014.

Chapter - III

PROFILE OF THE STUDY AREA AND MECHANISATION IN MARINE FISHING

CHAPTER - III

PROFILE OF THE STUDY AREA AND MECHANISATION IN MARINE FISHING

3.1 PROFILE OF THE STUDY AREA

3.1.1 Location

3.1.2 Coastal Environment

3.1.3 Wadge Bank

3.1.4 The Fisher-Folk of the Coast

3.1.5 Population

3.1.6 Occupation

3.1.7 Fishing Crafts and Gears

3.2 MECHANISATION IN MARINE FISHING

3.2.1 Stages of Mechanisation in India

3.2.2 Mechanisation in Tamil Nadu

3.2.3 Mechanisation in Kanyakumari District

3.2.4 Marine Fishing Allied Infrastructure Facilities in Kanyakumari District

3.2.5 Trends in Fish Production in Kanyakumari District

3.3 SUMMARY

CHAPTER - III

PROFILE OF THE STUDY AREA AND MECHANISATION IN MARINE FISHING

3.1 PROFILE OF THE STUDY AREA

3.1.1 Location

Kanyakumari, the smallest district in Tamil Nadu, with a land spread of 1,684 sq. km. has almost all ecosystems; forests, wetlands, freshwater resources, marine, etc. It is one of the 32 districts in Tamil Nadu and located at the southernmost tip of peninsular India and bordered by Thiruvananthapuram district of Kerala state to the west and Tirunelveli District of Tamil Nadu to the north and east. It is also sometimes referred to as "Land's End". The district lies between 77° 15' and 77° 36' of the eastern longitudes and 8° 03' and 8° 35' of the northern Latitudes. The south-eastern boundary (coastal) is the Gulf of Mannar (Bay of Bengal), while on the South and the South West, the boundaries are the Indian Ocean and the Arabian Sea.[1] But the main part of the coast faces the Arabian Sea. The coastal landscape of Kanyakumari District is mainly composed of beach ridges of rocky, sandy and swampy nature in the estuarine regions. On the eastern end of the coast is located Vattakottai (circular fort), a historically important place. On the western end of this village is situated Cape Comorin.

3.1.2 Coastal Environment

Estuaries are part of this natural environment, which is greatly exploited. The estuaries and coastal waters are dynamic and are more productive because of the

[1] **Year Book of Fishing Villages of Kanyakumari District**, Fisheries Department, Government of Tamil Nadu, Nagercoil, 2000.pp.1-4.

monsoon rains and enormous quantities of nutrients transported by floods. Hence several varieties of finfish, prawns, crabs, lobsters, stomatopods, clams, mussels and oysters of commercial significance have been identified from this environment which provides good breeding grounds. The estuaries are thus playing a vital role in the renewing of marine resources.

There are three important riverine ecosystems, which confluence with Arabian Sea. They are:-

1. Thengapattinam estuary formed by the confluence of river Tampirabarani in between Thengapattinam and Eraiummanthurai.
2. Valliyar estuary formed by the river Valloiyar near Kadiapattinam.
3. Manakudy estuary formed by the confluence of river Pazhayar in between East and West Manakudy villages.

Apart from these are two minor estuaries also: they are

1. Pambar estuary near Colachel and
2. Pantri estuary near Rajakkamangalam. These are formed by the drainage canal excess water during monsoon and the water drained from the irrigational fields mixing with sea.[2]

3.1.3 Wadge Bank

Wadge bank is a fertile fishing ground where rich marine biological diversity occurs. Wadge bank may also be defined as a place of marine environment where rich availability of fish food organisms is available. The water depth of this region is low. The physical features of the water like under water current, tides and waves will have

[2] http://www.kanyakumari.tn.nic.in/fish.html-Kanyakumari District, Tamil Nadu.

less impact on the fishes and animals of this region. Fishes select this region for feeding and breeding purposes. Throughout the maritime countries of the world there are about twenty such wadge banks. Of these one is situated near Kanyakumari about 10,000 sq.km in area, 56 km south of Cape Comorine.[3]

3.1.4 The Fisher-Folk of the Coast

The fisher folk of coastal belt belong to two castes namely the 'Paravar' and the 'Mukkuvar'. Both groups are gazetted as most backward community for getting education, employment, housing etc. Both communities in Kanyakumari district belong to Catholicism. They both go for religious pilgrimages to Christian shrines. Most live in communities that are scattered along coastlines and most of their fishing activities take place near their home communities. They generally live very close to the seashore. This nearness to the sea has the advantage of convenient beach landing for their catch. Fishing is the main source of livelihood. They are totally depending on fishery resources for their survival. Fishing is perceived not merely a means of assuring one's livelihood but more broadly as a way of life.[4]

3.1.5 Population

The district itself has on the highest population densities in India-726 per square kilometre. In coastal villages the density is as high as 1000 per square kilometre. The 71.5 km long coast has a heavy concentration of fisher-folk, almost one village per 1.7 km. According to census of 2010, children 0-17 years old are 44,046 (0-5years old are 14009, 6-10 old years are 12046, 11-17 years old are 17991) adults 18 years and above are 99,342 (18-40 years old are 62939, 41-65 years old are 31775, above 65 years old

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[3] Sathiadas. R, "**Production and Marketing Management of Fisheries in India**", Daya Publishing House, Delhi, 1997, pp.38.

[4] Daniel Viswasam Samuel, "An Economic Analysis of Employment, Income and Consumption of Fishermen Households in Tirunelveli District", **Unpublished M.F.Sc., Thesis**, Fisheries College and Research Institute, Thoothukudi, 1986, pp.31-32.

are 4628) , total male population is 73,471, total female population is 69,917 and total 1, 43,388 fisher-folks (total families are 34779 and average family size is 4 persons per house) are distributed in the 42 villages of Kanyakumari coast and constitute about 18.21 percent of the total fishermen of Tamil Nadu.[5] The fishermen live in of the most densely populated areas in the world.

Table 3.1

Kanyakumari District Fishermen Communities Population

Sl. No.	Name of the Village	Children 0-17 years old	Adults 18 years & above	Male Total	Female Total	Total Population
1	Arockiapuram	801	1903	1412	1292	2704
2	Chinnamuttam	863	1584	1253	1194	2447
3	Kanyakumari	2928	6533	4864	4597	9461
4	Kovalam	1186	2714	1968	1932	3900
5	Keezhamanakudi	600	1540	1070	1070	2140
6	Melamanakudi	1151	2849	2044	1956	4000
7	Pallam	789	2005	1398	1396	2794
8	Puthanthurai	316	977	658	635	1293
9	Kesavanputhanthurai	500	1286	902	884	1786
10	Pozhikarai	415	954	694	675	1369
11	Periakadu	221	657	446	432	878
12	Rajakkamangalam	1137	2928	2101	1964	4065
13	Azhikkal	1058	2614	1898	1774	3672
14	Keezhamuttam	104	277	204	177	381
15	Melamuttam	1836	4258	3158	2936	6094
16	Keelakadiapattinam	147	359	269	237	506
17	Melakadiapattinam	1131	2712	1983	1860	3843
18	Chinnavilai	450	965	729	686	1415
19	Periavilai	530	1174	841	863	1704
20	Pudurmandaikadu	885	1962	1411	1436	2847

[5] **Tamil Nadu Marine Fisher Folk Census**, Department of Fisheries, Government of Tamil Nadu, 2010, P.580.

Sl. No.	Name of the Village	Children 0-17 years old	Adults 18 years & above	Male Total	Female Total	Total Population
21	Kottilpadu	692	1602	1184	1110	2294
22	Colachel	2483	5733	4280	3936	8216
23	SimonColony	631	1417	1081	967	2048
24	Kodimunai	1505	2574	2574	2534	5108
25	Vaniyakudi	1090	1854	1854	1709	3563
26	Keezhkurumpanai	846	1284	1284	1253	2537
27	Melakurumpanai	1178	1928	1928	1799	3727
28	Keezhmidalam	380	683	683	647	1330
29	Melmidalam	530	903	903	842	1745
30	Enaiyam	1401	2191	2191	2131	4322
31	Enaiyamchinnathurai	396	693	693	635	1328
32	Enaiyamputhanthurai	1474	2352	2352	2187	4539
33	Ramanthurai	734	1595	1595	1542	3137
34	Mullurthurai	418	915	915	883	1798
35	Eraiyumanthurai	711	1149	1149	1055	2204
36	Poothurai	1135	1915	1915	1743	3658
37	Thoothoor	1991	3237	3237	3219	6456
38	Ezhuthesam Chinna thurai	2040	3229	3229	3336	6565
39	Eraviputhanthurai	1360	2102	2102	1993	4095
40	Vallavilai	2404	3943	3943	3585	7528
41	Marthandamthurai	1545	2276	2276	2212	4488
42	Neerodi	2054	2800	2800	2603	5403
	Total	**44046**	**99342**	**73471**	**69917**	**143388**

Source: Tamil Nadu Marine Fisher Folk Census-2010

3.1.6 Occupation

The fishing community - as people whose traditional occupation of fishing identify themselves with the sea. The people work on the sea. Tied to an occupation, the fishing communities imprison themselves virtually in their own geographical location. This geographical containment is one of the factors to their disadvantage.

His dependence on nature coupled with a constant element of great risk to life makes him superstitious. Superstitious practices are prevalent because they make efforts to overcome the nature and its complexities. They find themselves on the lowest rung of the social ladder. As a community they are isolated and organized.[6]

Table 3.2

Employment Status of Fisherfolk in Kanyakumari District

Sl. No	Name of the Village	Fishing	Fish Trade	Net Making	Allied Activities	Employed in Govt. & Pvt.	Self Employed	Total
1	Arockiapuram	822	27	44	7	38	27	965
2	Chinnamuttam	647	45	1	25	63	17	798
3	Kanyakumari	2222	84	5	32	293	44	2680
4	Kovalam	999	61	0	6	77	74	1217
5	Keezhamanakudi	534	82	1	40	64	8	729
6	Melamanakudi	1047	29	0	11	105	80	1272
7	Pallam	603	70	0	9	162	17	861
8	Puthanthurai	250	24	1	0	122	35	432
9	Kesavanputhanthurai	455	26	0	0	82	0	563
10	Pozhikarai	395	29	0	159	51	9	643
11	Periakadu	225	27	0	29	63	7	351
12	Rajakkamangalam	1057	290	163	564	235	121	2430
13	Azhikkal	902	42	0	25	109	8	1086
14	Keezhamuttam	104	3	0	3	4	1	115
15	Melamuttam	1509	108	1	27	148	18	1811
16	Keelakadiapattinam	135	4	0	0	7	1	147
17	Melakadiapattinam	999	85	2	1	149	17	1253
18	Chinnavilai	352	40	0	11	27	1	431
19	Periavilai	463	107	1	8	43	13	635
20	Pudurmandaikadu	806	78	2	14	19	50	969
21	Kottilpadu	653	238	0	3	239	42	1175
22	Colachel	2416	111	4	6	176	18	2731

[6] **Tamil Nadu Marine Fisher Folk Census**, op.cit, p.593.

Sl. No	Name of the Village	Fishing	Fish Trade	Net Making	Allied Activities	Employed in Govt. & Pvt.	Self Employed	Total
23	Simoncolony	440	39	2	6	58	11	556
24	Kodimunai	1468	98	0	3	87	79	1735
25	Vaniyakudi	1073	82	24	9	109	9	1306
26	Keezhkurumpanai	676	52	2	23	34	6	793
27	Melakurumpanai	1092	71	4	41	132	699	2039
28	Keezhmidalam	325	17	0	0	57	5	404
29	Melmidalam	436	35	0	6	27	7	511
30	Enaiyam	1185	140	8	8	85	26	1452
31	Enaiyamchinnathurai	377	5	0	0	12	15	409
32	Enaiyamputhanthurai	1380	893	18	30	67	14	2402
33	Ramanthurai	937	204	13	60	82	2	1298
34	Mullurthurai	560	61	8	62	32	2	725
35	Eraiyumanthurai	524	48	0	0	93	8	673
36	Poothurai	902	49	0	1	131	23	1106
37	Thoothoor	1577	656	24	66	282	34	2639
38	Ezhuthesam Chinna thurai	1355	314	0	78	339	44	2130
39	Eraviputhanthurai	1020	50	3	51	167	100	1391
40	Vallavilai	1868	237	11	86	235	63	2500
41	Marthandamthurai	1038	203	76	41	247	346	1951
42	Neerodi	1305	48	237	279	66	12	1947
	Total	**37133**	**4912**	**655**	**1830**	**4618**	**2113**	**51261**

Source: Tamil Nadu Marine Fisher Folk Census-2010

3.1.7 Fishing Crafts and Gears

The distribution and the local names of some of the craft and gear vary in different geographical regions of Tamil Nadu coast viz., the Coromandal, the Palk Bay and the Gulf of Mannar. Majority of gear operated along the coastal Kanyakumari district are gill nets. Hooks & lines, boat seines, shore seines and traps are next in Importance. The seasonal shark fishery of the western coast of Kanyakumari district

locally called *mattu* is very popular especially in Thoothoor region. Cattamarans, plankbullt boats and dugout canoes are the main traditional craft. The trawl fishery later paved the way for pair trawling in Mandapam and Tuticorin waters. Outboard engine fitted country craft first introduced along Kanyakumari district in 1981 has become much popular later and spread to other areas also in large numbers.[7]

Table 3.3

Fishing Crafts in Kanyakumari District

Sl. No	Name of the Village	Mechanised boat	Wooden Cattamaram w/ Engine	Wooden Cattamaram w/ o Engine	FRB Cattamaram w/ Engine	FRB Cattamaram w/o Engine	FRB Vallam w/ Engine	FRB Vallam w/ o Engine
1	Arockiapuram	1	0	11	24	192	19	59
2	Chinnamuttam	61	0	150	0	0	9	4
3	Kanyakumari	100	0	302	24	9	177	143
4	Kovalam	1	0	187	14	13	61	17
5	Keezhamanakudi	0	0	202	0	9	57	77
6	Melamanakudi	0	0	180	29	199	87	62
7	Pallam	0	0	388	12	62	8	9
8	Puthanthurai	0	0	64	4	22	0	2
9	Kesavanputhanthurai	0	0	39	0	0	22	7
10	Pozhikarai	0	0	31	1	1	7	2
11	Periakadu	0	0	52	2	4	0	0
12	Rajakkamangalam	2	0	54	2	0	35	10
13	Azhikkal	6	15	20	34	0	19	4
14	Keezhamuttam	0	0	0	20	0	11	0
15	Melamuttam	28	0	0	56	108	146	99
16	Keelakadiapattinam	0	1	60	3	0	6	0
17	Melakadiapattinam	38	0	0	102	106	143	104

[7] Mahadevan Pillai.P.K., Balakrishnan.G, Varughese Phillpose and Rajendran.V, "An appraisal on the marine fishing craft and gear of the Indian coast", Marine **Fisheries Research and Management**, Central Marine Fisheries Research Institute, Cochin, 2000, p.198-199.

Sl. No	Name of the Village	Mechanised boat	Wooden Cattamaram w/ Engine	Wooden Cattamaram w/ o Engine	FRB Cattamaram w/ Engine	FRB Cattamaram w/o Engine	FRB Vallam w/ Engine	FRB Vallam w/ o Engine
18	Chinnavilai	0	0	20	4	16	6	8
19	Periavilai	0	0	0	7	11	11	12
20	Pudurmandaikadu	0	0	0	19	6	42	46
21	Kottilpadu	6	0	20	16	535	17	12
22	Colachel	128	0	0	8	202	121	93
23	Simoncolony	0	0	0	12	65	11	60
24	Kodimunai	4	0	0	8	75	19	63
25	Vaniyakudi	2	0	0	0	0	1	9
26	Keezhkurumpanai	3	0	0	24	0	100	0
27	Melakurumpanai	0	6	0	8	55	135	127
28	Keezhmidalam	2	2	0	1	0	23	23
29	Melmidalam	0	0	0	2	0	93	20
30	Enaiyam	0	2	0	15	0	124	70
31	Enaiyamchinnathurai	0	0	0	37	40	113	13
32	Enaiyamputhanthurai	4	0	0	62	39	298	147
33	Ramanthurai	2	0	0	16	0	122	34
34	Mullurthurai	1	0	0	14	3	34	6
35	Eraiyumanthurai	9	0	0	1	2	44	2
36	Poothurai	52	0	0	1	2	186	20
37	Thoothoor	236	0	0	1	1	66	15
38	Ezhuthesam Chinna thurai	146	0	0	7	0	24	6
39	Eraviputhanthurai	106	0	0	5	0	24	9
40	Vallavilai	107	0	0	2	9	191	35
41	Marthandamthurai	11	0	0	1	0	234	42
42	Neerodi	6	0	0	6	4	301	108
	Total	**1062**	**26**	**1780**	**604**	**1790**	**3147**	**1579**

Source : Tamil Nadu Marine Fisher Folk Census-2010

Table 3.4

Fishing Gears in Kanyakumari District

Sl. No	Name of the Village	Gill Net	Shore Seine	Trawl Net	Long liners	Trap	Cast Net	Others
1	Arockiapuram	34	1	2	123	6	0	0
2	Chinnamuttam	157	4	35	4	0	0	0
3	Kanyakumari	226	4	14	115	0	0	0
4	Kovalam	177	9	3	208	0	0	4
5	Keezhamanakudi	37	0	0	0	0	0	0
6	Melamanakudi	133	3	1	33	1	0	2
7	Pallam	93	4	5	0	0	0	0
8	Puthanthurai	19	3	1	31	0	0	0
9	Kesavanputhanthurai	20	4	0	0	1	0	0
10	Pozhikarai	78	10	0	1	0	0	2
11	Periakadu	20	2	0	1	0	0	0
12	Rajakkamangalam	207	48	7	3	1	1	13
13	Azhikkal	27	0	0	0	0	0	0
14	Keezhamuttam	14	3	1	0	0	0	0
15	Melamuttam	162	10	21	11	1	0	0
16	Keelakadiapattinam	19	0	2	3	0	0	0
17	Melakadiapattinam	103	3	1	40	1	0	5
18	Chinnavilai	34	0	0	0	0	0	0
19	Periavilai	83	17	4	2	1	0	0
20	Pudurmandaikadu	158	2	1	9	0	0	0
21	Kottilpadu	**22**	8	12	4	3	0	3
22	Colachel	93	15	16	17	7	0	0
23	Simoncolony	48	8	5	0	0	0	0
24	Kodimunai	78	5	3	1	1	0	0
25	Vaniyakudi	12	4	15	0	0	0	0
26	Keezhkurumpanai	14	1	4	137	6	0	2
27	Melakurumpanai	46	13	3	11	0	0	0
28	Keezhmidalam	17	14	1	11	0	0	0

Sl. No	Name of the Village	Gill Net	Shore Seine	Trawl Net	Long liners	Trap	Cast Net	Others
29	Melmidalam	97	4	0	2	0	0	0
30	Enaiyam	135	4	6	2	1	0	0
31	Enaiyamchinnathurai	76	0	5	3	0	0	0
32	Enaiyamputhanthurai	97	16	3	10	0	0	0
33	Ramanthurai	164	71	32	487	3	1	2
34	Mullurthurai	39	123	93	207	1	0	0
35	Eraiyumanthurai	4	2	1	17	0	0	8
36	Poothurai	20	8	0	92	0	0	27
37	Thoothoor	174	16	4	131	3	4	3
38	Ezhuthesam Chinna thurai	208	76	4	91	0	1	3
39	Eraviputhanthurai	71	0	0	1	0	0	0
40	Vallavilai	68	57	91	127	2	0	8
41	Marthandamthurai	106	7	3	65	0	6	54
42	Neerodi	203	7	2	52	1	3	39
	Total	**3593**	**586**	**401**	**2052**	**40**	**16**	**175**

Source: Tamil Nadu Marine Fisher Folk Census-2010

3.2 MECHANISATION IN MARINE FISHING

It is not too much to say that water is life. Our planet is the only one in our entire solar system which has been blessed with water and ocean. You may recall that our earth is often called ‘a watery planet’ as 71% of the earth's surface is covered by the oceans with all the adventures and challenges they provide both to man and science. Today, parts of the world ocean are intensively used for recreation, military purposes, commercial shipping, fishing, extraction of gases, oil and other mineral resources.[8] A host of developments, involving all productive endeavours to contrive and design suitable machine driven hydroplanes that skim over water to catch pelagic and demersal

[8] Diwakar.K and Muniyandi.K, “**National Symposium on Eco-friendly Mari-culture Technology”, Central Marine Fisheries Research Institute**, Mandapam, 2010, p.84.

fish, propagation of the outfit especially by the governments in developing countries, espousal and utilization of the technology by the fishers, impact on fishery resources, emergence of shore facilities, economic and social effects on the fishing community etc. comprise the components of history of mechanization of fishing.

A fishing vessel, whether mechanized or non-mechanised, has a unique role in capture of fisheries. The paramount functions of a vessel are navigating the fishermen with their fishing tackle to fishable waters in order to harvest fish and to land the men, tackle and catch. The arrival of fishing vessel of any kind occurred at a relatively later stage of the history of fishing.

Mechanisation of fishing means the use of mechanical device or implements for fishing instead of using human labourer. Each and every operations are carried out by a machine with a mechanical device are considered as mechanized. This refers to transformation from biological sources of energy i.e. human to mechanized source of energy (engine/motor etc.). When machine are used along with tradition implements, mechanization is partial. When all fishing operations are mechanized, human labour is reduced, there is total mechanized.[9]

Mechanised crafts are two types:-

1. Those with engine inside the hull called inboard engine (IBE) boat and
2. Those with detachable (portable) engine fastened to the boat from the outside known as outboard engine (OBE) boat.[10]

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[9] Uma Kapila, "**Understanding problems of Indian economy**", Academic Foundation, Ghaziabad, 2nd edition, 2002, p.245.

[10] Srivastava.U.K, "**Impact of mechanization on small fishermen, Analysis and Village studies**", IIM, Ahamedabad, Concept PublishingCompany, New Delhi, 1982,p.2.

The poor performance (the per capita availability of fish worked out to be 3.4 lbs (1.542kgs) against 16 lbs (7.257 kgs) in Srilanka, 70 lbs (31.75kg) in Myanmar and 90 lbs (40.823kgs) in Japan in 1952) of the marine fishery sector was ascribed to the least efficient capture methods of nearly 70,000 traditional crafts in the country in 1952, which operated within few miles from the seashore and spent much of their time going to and from the fishing grounds.[11]

The first five year plan identified the following as the tasks for the development of marine fisheries:-

1. Mechanisation of country crafts and introduction of new mechanisation.
2. Introduction of mother-ship operations.
3. Charting for deep-sea fishing and development of the located fishing grounds.
4. Provision for training facilities.
5. Creating adequate ground organization.
6. Supply of requisites to fishermen and
7. Efficient Marketing.

The development of marine fisheries thus got hinged on the programme of mechanization of boats. The logic of mechanistion of fishing operations was to enable the fishermen to reach areas outside the range of existing crafts and also to fish for longer hours. The feat was to be accomplished through installation of small inboard or outboard engines in existing crafts, introduction of mother-ship operations and by introducing new types of small powered fishing crafts, scientifically designed and constructed.[12]

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[11] **First Five Year Plan**, Planning Commission of India, Govt. of India, May,1952.

[12] Ibid.

3.2.1 Stages of Mechanisation in India

The mechanization of fishing boats in India followed a step by step approach keeping in view the traditional attitude of the fisher men. Starting from a base (country craft) four stages can be identified in the mechanization programme.

a) First Stage-Mechanization of Country Craft

A few indigenous boats were found suitable for mechanization with a little modification. The fishing boats of Gujarat and Maharastra especially were found ideally suited for mechanization. The boats to be mechanized under the programme were,

- Lodhiyas and machwas of Saurashtra coast
- Versova/Satpati boats of Maharashtra
- Tuticorin boats of Tamil Nadu
- Kakinada Navas of Andhra Pradesh
- Batchari boats of West Bengal

By the end of 1969, about 3,000 indigenous boats were mechanized.

b) Second Stage-Introduction of Simple Small Mechanized Boats

Some of the states like Kerala, Karnataka and Orissa did not have suitable indigenous craft for mechanization. Secondly the country craft which were mechanized in the first stage were found suitable mainly for gill netting and long lining. Moreover, their operational range has not increased considerably beyond inshore water. Under these circumstances it was found necessary to introduce simple small mechanized boats. Under this programme, a few new types were introduced as well as certain stable craft were developed for full mechanization. Both yielded encouraging response, many of the country crafts were redesigned by FAO experts. During 1955-58, about 10 new designs 7.5 m Pablo boat was found to be extremely successful and popular.

c) Third stage - Improvement of Newly Designed Boat and Introduction of Bigger Specialized Boats

Large sized specialized boats were introduced to meet the demand of the industry and to extend the operations in deeper waters. Some of the new designs introduced in the second stage of development were designed on the basis of operational performance to suit local conditions. Large commercial designs of advanced countries were studied carefully by the experts and were modified according to Indian requirements.

During the fifth five year plan the Government of India gave permission to private entrepreneurs to import 30 Mexican double rig shrimp trawlers on the condition that an equal number of craft will be constructed in India. The double rig-Mexican trawlers were found extremely successful for capture of shrimps. The deep-sea fishing fleet has increased after the declaration of EEZ up to 200 miles in August 1976. Industrial fishery surveys were carried out by large imported deep sea vessels. Besides this private entrepreneurs were encouraged to charter and import vessels to carryout commercial operations. Some of the important mechanized and deep sea fishing boats introduced during various stages of mechanization programme in India.

d) Fourth Stage-Broadening into Fishing Fleet

After successful mechanized fishing in inshore, offshore and deep sea waters in EEZ, efforts were made by the Government of India to increase the number of fishing vessels and broaden as fleet to exploit the available marine resources. At the end of the eighth five year plan, the strength of mechanized boats and deep-sea vessels stood at 47,000 and 180 respectively.[13]

[13] http://ecourseonline.iasri.res.in/login/index/php

3.2.2 Mechanisation in Tamil Nadu

Fisheries as a sector is one of the thrust areas in the overall economic development of the State playing a predominant role in its economic activity by its contribution to direct and indirect employment for more than 11 lakh fishers, contributing food security to a considerable portion of population and earning substantial revenue, especially from foreign exchange. Tamil Nadu State, with its second longest coastline in the country covering 1,076 km in 13 coastal Districts consist of 4 coastal Zones viz., Coromandel Coast, Palk Bay, Gulf of Mannar and West Coast. The continental shelf area of the State is 41,412 sq. km (Inshore area-16,058 sq. km., offshore area-7,197 sq.km and deep sea -18,157 sq. km). Tamil Nadu ranks 5th in total fish production of the country and the total fish production of the State during 2014-15 is 6.97 lakh tons (from marine resources-4.57 lakh tons and freshwater and brackish water resources -2.40 lakh tons). Tamil Nadu is one among the leading exporter of sea food with the export of marine products of 93,477 MT (metric tons) and earned a foreign exchange of Rs.5308.17crores during 2014-15. The fisheries sector has contributed 0.7 percent of the total Gross State Domestic Product (GSDP) of the State.[14]

The mechanised boats have been constructed in public and private sector boatyards. The present strength of the mechanised fishing fleet constructed by public sector boatyards are of six size groups viz. 7.6 m,9.1 m, 9.7 m, 11 m, 11.5 m and 13.2 m. The 7.6 m boats were originally designed for gillnetting, but were later modified by fishermen for trawling. The construction of these boats was discontinued from 1974. Similarly, nearly1200 boats of the 9.1 m size originally meant for gillnetting-cum-stern trawling were used by the owners exclusively for stern trawling. Fishermen introduced

[14] **Department of Fisheries, Policy Note 2015-2016,** Government of Tamil Nadu, p.1.

the changes in their boats on their own since shrimp trawling proved more profitable than gillnetting. About 700 mechanised boats of the size range 9.1-9.7 m have been built by the private sector.

In order to distribute these crafts to important fishing centers, the Department revitalized the village Fisheries Cooperative Societies that were started during the colonial period but had become dormant for lack of purpose. These institutions effectively localized the presence of the state, channeling technologies and subsidies to fishing villages. Importantly, the cooperatives also provided loans with a view to "eliminating middlemen."[15]

3.2.3 Mechanisation in Kanyakumari District

In Kanyakumari, fisheries mechanisation was launched as part of the Second Five Year Plan (1956–61) under the leadership of Congress Chief Minister, Shri. K. Kamaraj and coincided with the district's merger with Tamil Nadu.[16] Mrs. Lourdammal Simon, Minister of Fisheries (1957-1962), Government of Tamil Nadu initiated fisheries development in 1958 and set about implementing the mechanisation programme across Tamil Nadu with particular attention to her home district of Kanyakumari. The subsidized gill-netters were channeled mainly to the village of Colachel, a natural harbour in an otherwise turbulent coastline that made it a good test case for the technology. In the first five years of the distribution scheme, over seventy per cent of crafts went to Colachel. In tune with the Community Development agenda, membership in the Fisheries Co-operative Societies was limited to "active fishermen"

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[15] **Administrative Report of the Government of Tamil Nadu, Department of Fisheries,** 1961-62, Government Press, Madras.

[16] Subramanian Narendra, "**Ethnicity and Populist Mobilization: Political Parties, Citizens and Democracy in South India**", 1999, Oxford University Press.

for whom fishing was a subsistence occupation to help them increase their levels of productivity.

The elevation of Colachel as the local success of Tamil Nadu fisheries marked the Kanyakumari coast as a space of uneven development. The concentration of trawlers in a single village disrupted the system of resource and conflict management built on the mutual cooperation of villages. Suddenly, there was a clear advantage of one village over the others that threatened the system of inter-village cooperation. With the new technology came an alternative, state-endorsed system privileging scientific technologies over traditional ones, a formalized, legal code of individual property rights over the existing set of customary rights, and national economic priorities over local ones. Backed by this new framework of rights, Colachel's beneficiaries' defied community-based regulative measures and claimed unlimited access to the resource. Alarmed by the impressive catch volumes of the new crafts, artisanal fishers bypassed by the development program finally attacked Colachel and destroyed several trawlers.[17]

3.2.4 Marine Fishing Allied Infrastructure Facilities in Kanyakumari District

Fishing allied infrastructures are the back born of marine fishing industry. The post-harvest facilities such as fish handling, fish preserving, fish processing and distribution form vital sector in the fishing industry as well. Sufficient infrastructure such as freezing units / ice plants and cold storage units are helpful to store fishes when excess catch are available during seasons. With help of fish processing plants and extraction plants, fishermen can yield more return by exporting to the foreign as well as domestic market. The Marine fishing allied infrastructure facilities are available in the fishing villages of Kanyakumari district are given in the Table 3.9.

[17] Ibid., p.9

Table 3.5

Marine Fishing Allied Infrastructure Facilities in Kanyakumari District

No.	Infrastructure	numbers	Kanyakumari district in numbers	Percentage to the state
1	Boat Yard	64	22	34.38
2	Ice Factories	105	26	24.76
3	Cold Storage	41	6	14.63
4	Freezing Points	6	-	-
5	Curing Yards	45	-	-
6	Peeling Sheds	24	3	12.50
7	Processing Plants	3	-	-
8	Extraction Plants	5	5	100.00
9	Fishing Landing Points*	254	39	15.35

Source: Marine Fisheries Census 2010, Tamil Nadu, Part II (4), Ministry of Agriculture, Govt. of India, New Delhi.

* Animal Husbandry, Dairying and Fisheries (FS-1) Dept., Ministry of Agriculture, Govt. of India, New Delhi, G.O (MS) No.149 dated 08.07.2015.

Table 3.5 shows that Kanyakumari district has 34.38 per cent of boat yards, 24.76 per cent of ice factories only 14.63 per cent of cold storage, there is no freezing points and fish processing plants in this district. These services are underprovided to support the fishing industry of Kanyakumari district and also the fishermen of the Kanyakumari district are compelled to sell their fish catch with less price when more fish are available in the market during peak season rather that storing or processing the fish on higher price when there is low availability of fish during off seasons.

3.2.5 Trends in Fish Production in Kanyakumari District

Kanyakumari coast is endowed with rich potential which remains underexploited. One of the India's richest fishing ground; the Wedge Bank occupies nearly 10000 sq.km in area is 56 km. south cape of Comorin.[18] Fish production depends mainly on monsoons. Kanyakumari district enjoys two monsoons, the south west monsoon and the north east monsoon. The south west monsoon is received between June and September and the north east monsoon season starts on September and ends in December.[19]

The fishermen in Kanyakumari district venture out for fishing using fibre reinforced plastic boats, country boats and trawlers and deploy gears such as Sardine nets, Disco nets, Shore Seine, Mackerel net, Purse Seine, Hooks and Line for capturing fishes. The common species that are captured by the fisher folk in the east coast of Kanyakumari district are Wolf herring, Garfish, Ponyfish, Carangids, Deep Bodied Sardinella, Mackerel, Anchovies, Solefish, Shrimp, Croakers, Skates, Malabar Trevally, Black Pomfret, Indian Goatfish, Ribbonfish, Sawfish, Emperor Bream, Tuna, Cuttlefish and Rayfish. Fishes like Anchovies and Commerson's Anchovies are available as shoals and captured in summer, pre monsoon and monsoon season in this east coast. Croakers and Oil Sardines are available as shoal in pre monsoon season. The juveniles of Wolf herring and Emperor Bream are available in the post monsoon season. The juveniles of Carangids are available in the monsoon season and in post monsoon season. The juveniles of Croakers are available in pre monsoon season, while the juveniles of Barracuda and Sawfishes are available in the monsoon season.

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[18] Sathiadhas R and Benjamin. R.E, "A note on the operational cost and returns of seasonal mixture madi operations along Kanyakumari Coast", **Seafood Export Journal**, January 1991, p.24.

[19] Krishnan.V, *"*An Economic study on migration of fishermen from Kanyakumari District*",* **Ph.D. Thesis,** Manonmaniam Sundranar University, Tirunelveli,Feb.2010, p.71.

The common fish species such as Anchovies, Barracuda, Oil Sardines, Wolf Herring, Carangids, Mackerel, Threadfin Bream, Block Pomfrets, Ribbonfishes, Goatfishes, Croakers are available in the west coast of Kanyakumari district. Fishes like Tuna, Oil Sardines and Anchovies are the dominant shoals available in summer season. Cuttlefishes are found as shoal in the end of pre monsoon and in the beginning of monsoon seasons. In the post monsoon season, Mackerels are available as shoals. During the post monsoon season, the juveniles of Tuna, Garfish and Horse Mackerels are available. The juveniles of Emperor Bream and Barracuda exist in the pre monsoon season. The juveniles of Seerfish, Carangid, Garfish and Horse Mackerels are prevailing during monsoon season.[20]

Table 3.6

Annual Marine Fish Production in Kanyakumari District

Production Trend in Tonnes - Years 1995 to 2015						
Nos.	**Year**	**Landings of Mechanized Crafts**	**Landings of Non-Mechanized Crafts**	**Total Landing**	**Difference**	**Percent gain/decline in overall catch**
1	1995 – 1996	3744	28547	32291	-24803	-3.22
2	1996 – 1997	3437	34303	37740	-30866	-4.01
3	1997 – 1998	5370	41070	46440	-35700	-4.63
4	1998 – 1999	3555	34761	38316	-31206	-4.05
5	1999 – 2000	8384	33268	41652	-24884	-3.23
6	2000 – 2001	9876	39840	49716	-29964	-3.89
7	2001 – 2002	5744	44207	49951	-38463	-4.99
8	2002 – 2003	332	19311	19643	-18979	-2.46
9	2003 – 2004	204	20191	20395	-19987	-2.59
10	2004 – 2005	3262	13046	16308	-9784	-1.27
11	2005 – 2006	2475	42223	44698	-39748	-5.16
12	2006 – 2007	2078	35443	37521	-33365	-4.33
13	2007 – 2008	2245	35164	37409	-32919	-4.27

[20] Indian National Centre for Ocean Information Services and M.S.Swaminathan Research Foundation, 2015, **Season Based Fish Catch Calendar**, MSSRF/RR/11/30, Chennai. p.56.

Nos.	Year	Landings of Mechanized Crafts	Landings of Non-Mechanized Crafts	Total Landing	Difference	Percent gain/decline in overall catch
14	2008 – 2009	26189	13439	39628	12750	1.66
15	2009 – 2010	22436	17628	40064	4808	0.62
16	2010 – 2011	26748	15777	42525	10971	1.42
17	2011 – 2012	26869	15848	42717	11021	1.43
18	2012 – 2013	27517	16160	43677	11357	1.47
19	2013 – 2014	30752	13179	43931	17573	2.28
20	2014 – 2015	38852	6862	45714	31990	4.15
Total		**250069**	**520267**	**770336**		
Average		**12503**	**26013**	**38517**		

Source: Report on survey of fish production and their utilities in Tamil Nadu - 2015, Dept. of Fisheries, Govt. of Tamil Nadu.

The Table 3.6 depicts the annual marine fish production from 1995 – 2015 in Kanyakumari district. There are wide fluctuations in annual marine fish production in last 20 years. The fish production of mechanized sector has shown positive trend from the average in last 7 years, particularly after 2008 and negative trend in 13 years. Likewise, the fish production of non-mechanized sector had shown a positive trend from the average in 13 years and negative changes in 7 years. The total marine fish production exceeded in the average fish production in 12 years and less than the average in 8 years during the last 20 years. The fish production further shows that there is a decrease in non-mechanized sector after year 2008 is due to the gain in the fish production of mechanized sector.

3.3 SUMMARY

The profile of the study area and mechanization in marine fishing highlighted the history of the Kanyakumari district, the population of the fishermen community, the occupation of the fishermen, mechanization in fishing, infrastructure facilities in marine fishing and trends in fish production in the study area. The secondary data regarding mechanization in marine fishing will help the researcher to analyse the primary data collected from the fishermen practicing mechanisation in fishing and to understand their socio-economic status and the empowerment of the mechanized fishermen.

Chapter - IV

SOCIO-ECONOMIC CONDITIONS OF THE TRADITIONAL MARINE FISHERMEN AND THE FACTORS INFLUENCING THE TRADITIONAL MARINE FISHERMEN TO PRACTICE MECHANIZATION IN FISHING

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SOCIO-ECONOMIC CONDITIONS OF THE TRADITIONAL MARINE FISHERMEN AND THE FACTORS INFLUENCING THE TRADITIONAL MARINE FISHERMEN TO PRACTICE MECHANIZATION IN FISHING

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SOCIO-ECONOMIC CONDITIONS OF THE TRADITIONAL MARINE FISHERMEN AND THE FACTORS INFLUENCING THE TRADITIONAL MARINE FISHERMEN TO PRACTICE MECHANIZATION IN FISHING

4.1 INTRODUCTION

This chapter deals with the analysis of the socio-economic conditions of fishermen in Kanyakumari district. For this purpose primary data were collected by the researcher through interview schedule. The researcher has analysed the socio-economic conditions of fishermen such as age, marital status, religion, caste, education, family status, ownership of house, type of housing and monthly income. Further the researcher has analysed the reason for choosing fishing as an occupation, fishing crafts used at the time of entry into fishing, fishing gears used at the time of entry into fishing, average monthly income at the time of entry in this occupation, fishing crafts are using at present, fishing gears are using at present, number of days go for fishing in a month at present, amount spent for fishing in a day at present, average monthly income at present in this occupation, number of fishing crafts are having at present and implements and devices used for fishing.

4.2 SOCIO ECONOMIC CONDITIONS OF RESPONDENTS

4.2.1 Age-Wise Distribution of the Respondents

There is not much information on the importance of age as a factor determining access to fishery resources. The age of entry into the occupation of fishing depends on factors such as the gender of the entrant, level of education desired and the nature of the technology used. Fishermen of different age groups have been involved in fishing. The Table 4.1 shows the age wise distribution of the respondents.

Table 4.1

Age-Wise Distribution of the Respondents

Age	Type of Respondents			Total
	Mechanised Boats	**Motorised vallam**	**Motorised cattamaran**	
Below 25	14(13.2)	7(2.2)	4(6.3)	25(5.2)
26-35	69(65.1)	95(30.2)	15(23.8)	179(36.9)
36-45	22(20.8)	128(40.6)	18(28.6)	168(34.7)
46-55	1(0.9)	64(20.3)	26(41.3)	91(18.9)
Above 55	-	21(6.7)	-	21(4.4)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

It could be inferred from Table 4.1 that out of 484 respondents, majority (36.9 per cent) are in the age group of 26 to 35 years and 34.7 per cent of the respondents are in the age group of 36 to 45 years.

From Table 4.1, it is understood that among the respondents of Mechanised Boats, majority (65.1 per cent) are in the age group of 26 to 35 years, among the respondents of Motorised vallam, about 40.6 per cent of the respondents are in the age group of 36 to 45 years and among the respondents of Motorised cattamaran, majority (41.3 per cent) are in the age group of 46 to 55 years. It is evident that 71.69 per cent of the respondents are in the age group of 26- 45 years.

4.2.2 Marital Status of the Respondents

Marital status of the respondents will expose the social status of an individual. So it is included as one of the profile variable. In this study the marital status includes married and unmarried. The Table 4.2 shows the marital status of the respondents.

Table 4.2

Marital Status of the Respondents

Marital Status	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Unmarried	5(4.7)	34(10.8)	7(11.1)	46(9.5)
Married	101(95.3)	281(89.2)	56(88.9)	438(90.5)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

The survey indicated that out of 484 respondents majority (90.5 per cent) of the respondents are married and the remaining 9.5 per cent of the respondents are unmarried.

Table 4.2 also reveals that among the respondents of Mechanised Boats 95.3 per cent are married whereas among the respondents in Motorised vallam, 89.2 per cent of them are married. In the case of Motorised cattamaran respondents 88.9 per cent of them are married.

4.2.3 Religion-Wise Distribution of Respondents

Religion gives the information about the social status of a person. The religion of the respondents is classified into Hindu, Christian and Muslim. The distribution of respondents based on their religion is illustrated in Table 4.3.

Table 4.3

Religion-Wise Distribution of Respondents

Religion	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised catamaran	
Hindu	-	-	-	-
Muslim	-	-	-	-
Christian	106(100)	315(100)	63(100)	484(100)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Table 4.3 shows that all the respondents of the study area belong to Christians. This shows that those who belong to Christians are involved in fishing and the other religion people like Hindu and Muslim are not involved in fishing.

4.2.4 Caste-Wise Distribution of Respondents

Fishermen belonging to two different castes such as Mukkuvar and Bharavar have been involved in fishing. The following Table 4.4 shows the caste wise classification of sample respondents.

Table 4.4

Caste-Wise Distribution of Respondents

Caste	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Mukkuvar	103(97.2)	284(90.2)	42(66.7)	429(88.6)
Bharavar	3(2.8)	31(9.8)	21(33.3)	55(11.4)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Caste wise analysis reveals that majority (88.6 per cent) of the respondents belongs to Mukkuvar community and only 11.4 per cent of the respondents are from the Bharavar community. Among the respondents of Mechanised Boats, Motorised vallam and Motorised catamaran, Mukkuvar community represents the largest group which comprises of 97.2, 90.2 and 66.7 per cent respectively. This shows that those who belong to Mukkuvar community are mostly involved in fishing in the study area.

4.2.5 Education-Wise Distribution of Respondents

Fishermen with different education have been involved in fishing. The following Table 4.5 shows the education wise classification of the respondents.

Table 4.5

Education-Wise Distribution of Respondents

Education	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Illiterate	29(27.4)	62(19.7)	34(54)	125(25.8)
Primary education	31(29.2)	124(39.4)	22(34.9)	177(36.6)
Middle school	40(37.7)	121(38.4)	5(7.9)	166(34.3)
High school	5(4.7)	8(2.5)	2(3.2)	15(3.1)
Higher secondary	1(0.9)	-	-	1(0.2)
Graduate	-	-	-	-
Post Graduate	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Table 4.5 shows that out of 484 sample respondents, 36.6 per cent have primary education. Among the respondents of Mechanised Boats majority (37.7 per cent) of the respondents have middle school education. Among Motorised vallam, 39.4 per cent of respondents have completed primary education whereas among the respondents of mechanised catamaran, 54 per cent are illiterates.

4.2.6 Respondent's Family System

Fishermen are belonging to two categories of family system such as joint family and nuclear family. The following Table 4.6 shows the family system wise distribution of the sample respondents in the study area.

Table 4.6

Respondent's Family System

Family System	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised catamaran	
Joint family	12(11.3)	72(22.9)	22(34.9)	106(21.9)
Nuclear family	94(88.7)	243(77.1)	41(65.1)	378(78.1)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.6, it is clear that out of the 484 sample respondents, majority (78.1 per cent) of the sample respondents belong to nuclear family system and the remaining 21.9 per cent of the sample respondents belong to joint family system. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the respondents belong to nuclear family system which represents 88.7 per cent, 77.1 per cent and 65.1 per cent respectively. This shows that those who belong to nuclear family are highly involved in fishing in the study area.

4.2.7 Respondent's Ownership of House

Respondent's ownership of the house is confined to owned house, parent's house and rented house in this study. The following Table 4.7 shows the ownership of house of the respondents.

Table 4.7

Respondent's Ownership of House

Ownership of House	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Owned house	93(87.7)	237(75.2)	42(66.7)	372(76.9)
Parental house	11(10.4)	70(22.2)	21(33.3)	102(21.1)
Rented house	2(1.9)	8(2.5)	-	10(2.0)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Table 4.7 shows that out of the 484 sample respondents, majority (76.9 per cent) of the sample respondents reside in owned house and 21.1 per cent of the sample respondents reside in parent's house. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the sample respondents reside in owned house it represents 87.7 per cent, 75.2 per cent and 66.7 per cent respectively.

4.2.8 Type of Housing Used by the Respondents

Fishermen of the study area are using different types of houses such as thatched house, tiled house and concrete house. The following Table 4.8 shows the type of house used by the respondents.

Table 4.8

Type of House Used by the Respondents

Type of Housing	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Thatched	-	-	-	-
Tiled	9(8.5)	65(20.6)	15(23.8)	89(18.4)
Concrete	97(91.5)	250(79.4)	48(76.2)	395(81.6)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Table 4.8 reveals that majority (81.6 per cent) of the sample respondents reside in concrete house and 18.4 per cent of the respondents reside in tiled house. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the respondents reside in concrete house it represents 91.5 per cent, 76.2 per cent and 76.2 per cent respectively.

4.2.9 Electricity Connection in the House

Now a day majority the people have electricity connection in their house. As the electricity connection in the respondent's house will reveal the status of the respondents, the availability of the electricity connection is included as one of the profile variable in the study. Table 4.9 shows the respondents who are having electricity connection in their house.

Table 4.9

Electricity Connection in the House of the Respondents

Electricity connection in the house	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Yes	106(100)	315(100)	63(100)	484(100)
No	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Table 4.9 shows that 100 per cent of the sample respondents have electricity connection their house in the study area.

4.2.10 Sources of Drinking Water

Drinking water is an essential item in any house. As the source of drinking water used by the respondents reveals their status, it is included as one of the profile variable in this study. The sources of water used by the respondents are confined to own tape, public tape, owned well and community well. The following Table 4.10 shows the different sources of drinking water.

Table 4.10

Sources of Drinking Water Used by the Respondents

Source of drinking water	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Own tape	102(96.2)	263(83.5)	50(79.4)	415(85.7)
Public tape	4(3.8)	52(16.5)	13(20.6)	69(14.3)
Owned well	-	-	-	-
Community well	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Table 4.10 shows that majority (85.7 per cent) of the sample respondents is having their own tape water in their house and 14.3 per cent of the sample respondents are getting the water from the public water tape. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the sample respondents are using their own tape water it represents 96.2 per cent, 83.5 per cent and 79.4 per cent respectively.

4.2.11 Availability of Toilet Facilities in the Respondents House

The availability of the toilet facility available in the respondent's house will reveal the status of the respondents. The toilet facility available in the respondent's house is confined to modern toilet, pit, without toilet. The Table 4.11 shows the different type of toilet facilities used by the respondents.

Table 4.11

Toilet Facilities Used by the Respondents

Toilet facilities	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Modern toilet	106(100)	268(85.1)	48(76.2)	422(87.2)
Pit	-	44(14.0)	15(23.8)	59(12.2)
Without toilet	-	3(1.0)	-	3(0.6)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.11, it could be seen that out of the 484 sample respondents, majority (87.2 per cent) of the sample respondents used the modern toilet and 12.2 per cent of the respondents used only pits. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the sample respondents are using the modern toilets it represents 100 per cent, 85.1 per cent and 76.2 per cent respectively.

4.2.12 Assets Owned by the Respondents

As the assets owned by the respondent indicate their economic status, assets owned by the respondent are considered as one of the important variable in this study. Assets such as land, house, jewels, vehicle and livestock are included in the study. The following Table 4.12 shows the different type of assets owned by the respondents.

Table 4.12

Assets Owned by the Respondents

Assets	Type of Respondents						Total	
	Mechanised Boats		Motorised vallam		Motorised catamaran			
	Having	Not having	Having	Not having	Having	Not having	Having	Not having
Land	73 (68.9)	33 (31.1)	202 (64.1)	113 (35.9)	7 (11.1)	56 (88.9)	282 (58.3)	202 (41.7)
House	93 (87.7)	13 (12.3)	237 (75.2)	78 (24.8)	42 (66.7)	21 (33.3)	372 (76.9)	112 (23.1)
Jewels	105 (99.1)	1 (0.9)	314 (99.7)	1 (0.3)	63 (100)	-	482 (99.6)	2 (0.4)
Vehicle	58 (54.7)	48 (45.3)	144 (45.7)	171 (54.3)	23 (36.5)	40 (63.5)	225 (46.5)	259 (53.5)
Livestock	-	106 (100)	2 (0.6)	313 (99.4)	1 (1.6)	62 (98.4)	3 (0.6)	481 (99.4)

Source: Primary data

From Table 4.12, it is clear that out of the 484 sample respondents, majority (99.6 per cent) of the sample respondents is having jewels and 76.9 per cent of the sample respondents are having house. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran majority of the respondents are having jewels it represent 99.1 per cent, 99.7 per cent and 100 per cent respectively.

4.2.13 Respondent Father's Occupation

The respondent father's occupation will reveal the traditionalism of the occupation. The members of most of the fishermen family are directly or indirectly connected with fishing occupation. So it is essential to find out the father's occupation. This is presented in Table 4.13.

Table 4.13

Father's Occupation of the Respondents

Father's Occupation	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Fishermen	106(100)	315(100)	63(100)	484(100)
Non-fishermen	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Table 4.13 shows that all the sample respondent fathers are engaged in fishing occupation. It establishes the influence of the father's occupation on the occupation of the son.

4.2.14 Grand Father's Occupation

The grandfather's occupation gives the information about tradition in the occupation of the family. The following Table 4.14 shows the grandfather's occupation of the sample respondents.

Table 4.14

Grand Father's Occupation of the Respondents

Grand Father's Occupation	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Fishermen	106(100)	315(100)	63(100)	484(100)
Non-fishermen	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Table 4.14 shows that the entire sample respondent grandfather's occupation was fishing. It clearly shows the traditional family occupation.

4.2.15 Respondents Age at the Time of Entry into Fishing Occupation

Fishermen are engaged in fishing even at the early age as the fishing occupation is traditional. The researcher made an attempt to find out the age of fishermen at the time of entry into fishing. The following Table 4.15 shows the age of the fishermen at the time of entry into fishing.

Table 4.15

Respondents Age at the Time of Entry into Fishing Occupation

Age at the time of entry into fishing	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised catamaran	
10	1(0.9)	29(9.2)	18(28.6)	48(9.9)
11	19(17.9)	72(22.9)	17(27.0)	108(22.3)
12	54(50.9)	150(47.6)	23(36.5)	227(46.9)
13	21(19.8)	34(10.8)	1(1.6)	56(11.6)
14	7(6.6)	20(6.3)	3(4.8)	30(6.2)
15	2(1.9)	7(2.2)	1(1.6)	10(2.1)
16	-	3(1.0)	-	3(0.6)
17	1(0.9)	-	-	1(0.2)
18	1(0.9)	-	-	1(0.2)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.15, it is clear that out of the 484 sample respondents, majority (46.9 per cent) of them entered into fishing at the age of 12 years and 22.3 per cent of the respondents entered into fishing at the age of 11 years. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, most of them entered into fishing at the age of 12 years it represent 50.9 per cent, 47.6 per cent and 36.5 per cent respectively.

4.2.16 Years of Experience in Fishing among the Respondents

Fishermen have been involved in fishing from their early years of age. Hence the researcher has attempted to find out the number of years of experience in fishing by the respondents. The following Table 4.16 shows the experience in fishing.

Table 4.16

Years of Experience in Fishing among the Respondents

Number of years	Type of Respondents			Total
	Mechanised Boat	Motorised vallam	Motorised catamaran	
Below 10 years	-	-	-	-
11-15 years	4(3.8)	17(5.4)	5(7.9)	26(5.4)
16-20 years	3(2.8)	53(16.8)	13(20.6)	69(14.3)
21-25 years	11(10.4)	41(13.0)	2(3.2)	54(11.2)
26-30 years	33(31.1)	62(19.7)	3(4.8)	98(20.2)
Above 30 years	55(51.9)	142(45.1)	40(63.5)	237(48.9)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.16, it could be seen that out of the 484 sample respondents, majority (48.9 per cent) of the sample respondents have been involved in fishing for above 30 years and 20.2 per cent of the sample respondents have been involved in fishing between 26 to 30 years. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the respondents have been involved in fishing for more than 30 years it represent 51.9 per cent, 45.1 per cent and 63.5 per cent respectively.

4.3 FISHING CRAFTS USED BY THE RESPONDENTS

4.3.1 Fishing Crafts Used at the Time of Entry into Fishing

Fishermen used different type of fishing crafts such as catamaran, dug-out canoe, plank-built canoe, motorized catamaran, motorized canoe and mechanised boat. Hence the researcher has attempted to find out the type of fishing crafts used by the fishermen at the time of entry into fishing. The following table shows the type of fishing crafts used by the fishermen at the time of entry into fishing.

Table 4.17

Fishing Crafts Used at the Time of Entry into Fishing

Fishing crafts	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Catamaran	95(89.6)	294(93.3)	60(95.2)	449(92.8)
Dug- out Canoe	2(1.9)	16(5.1)	3(4.8)	21(4.3)
Plank-built Canoe	9(8.5)	5(1.6)	-	14(2.9)
Motorised Catamaran	-	-	-	-
Motorised Canoe	-	-	-	-
Mechanised Boat	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.17, it could be seen that out of the 484 sample respondents, majority (92.8 per cent) of the sample respondents used catamaran at the time of entry into fishing, 4.3 per cent of the respondents used dug-out canoe. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the sample respondents used catamaran at the time of entry into fishing it represent 89.6 per cent, 93.3 per cent and 95.2 per cent respectively.

4.3.2 Fishing Gears Used at the Time of Entry into FISHING

Fishermen are using different type of fishing gears such as shore seine, boat seine, hooks and lines, bag net/trap, drift gillnet, set gillnet, mackerel net and prawns net. The study examines the type of fishing gears used by the fishermen at the time of entry into fishing.

Table 4.18

Fishing Gears Used at the Time of Entry into Fishing

Fishing gears	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Shore seine (Karamadi)	9(8.5)	5(1.6)	-	14(2.9)
Boat seine (Thattumadi)	2(1.8)	5(1.6)	-	7(1.4)
Hooks and Lines	92(86.8)	254(80.6)	49(77.8)	395(81.6)
Bag net (Kachal)/ Trap	-	-	-	-
Drift gillnet (Valiavalai)	-	9(2.9)	5(7.9)	14(2.9)
Set gillnet (Thathuvalai)	-	4(1.2)	2(3.2)	6(1.2)
Mackerel Net (Iyilavalai)	-	-	-	-
Prawns Net (Ralvalai)	3(2.8)	38(12.1)	7(11.1)	48(9.9)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.18, it is clear that majority (81.6 per cent) of the sample respondents used hooks and lines at the time of entry into fishing and 9.9 per cent of the sample respondents used prawns net at the time of entry into fishing. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, most of the sample respondents used hooks and lines at the time of entry into fishing it represent 86.8 per cent, 80.6 per cent and 77.8 per cent respectively. The analysis reveals that majority of the sample respondents used hooks and lines at the time of entry into fishing.

4.3.3 Number of Days Goes for Fishing in a Month at the Time of Entry into Fishing

Number of days goes for fishing in a month differs from one fisherman to another fisherman. The following Table 4.19 shows the number of days the fisherman go for fishing in a month at the time of entry into fishing.

Table 4.19

Number of Days Goes for Fishing in a Month at the Time of Entry into Fishing

Number of days in a month	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Below 20	1(0.9)	3(0.9)	-	4(0.8)
21	-	-	-	-
22	-	2(0.6)	-	2(0.4)
23	-	3(1.0)	-	3(0.6)
24	1(0.9)	2(0.6)	-	3(0.6)
25	18(16.9)	30(9.5)	5(7.9)	53(10.9)
26	51(48.1)	269(85.4)	55(87.3)	375(77.6)
27	33(31.1)	1(0.3)	3(4.8)	37(7.7)
28	2(1.9)	5(1.7)	-	7(1.4)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Table 4.19 shows that majority (77.6 per cent) of the sample respondents go for fishing for 26 days in a month at the time of entry into fishing and 10.9 per cent of the sample respondents go for fishing for 25 days in a month at the time of entry into fishing. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the sample respondents go for fishing for 26 days in a month at the time of entry into fishing it represent 48.1 per cent, 85.4 per cent and 87.3 per cent respectively. This shows that majority of the sample respondents go for fishing for 26 days in a month at the time of entry into fishing.

4.3.4 Amount Spent for Fishing in a Day at the Time of Entry into Fishing

Fishermen spent very low amount for fishing in a day at the time of entry into fishing but now the amount spent fishing has increased. The following Table 4.20 shows the amount spent by fishermen for fishing in a day at the time of entry into fishing.

Table 4.20

Amount Spent for Fishing in a Day at the Time of Entry into Fishing

Amount spent for fishing in a day	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised catamaran	
Below Rs. 10	23(21.7)	164(52.1)	43(68.3)	230(47.5)
Rs. 11 to 50	49(46.2)	70(22.2)	4(6.3)	123(25.4)
Rs. 51 to 100	20(18.9)	45(14.3)	6(9.5)	71(14.7)
Rs. 101 to 200	8(7.5)	26(8.2)	10(15.9)	44(9.1)
Rs. 201 to 300	6(5.7)	10(3.2)	-	16(3.3)
Above Rs. 300	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.20, it is clear that majority (47.5 per cent) of the sample respondents spent below Rs.10 for fishing in a day at the time of entry into fishing and 25.4 per cent of the sample respondents spent between Rs.11 to 50 for fishing in a day at the time of entry into fishing. Among the respondents of Mechanised Boats, 46.2 per cent majority of the sample respondents spent between Rs.11 to 50 for fishing in a day at the time of entry into fishing whereas among the Motorised vallam and Motorised cattamaran, majority of the sample respondents spent below Rs.10 for fishing in a day at the time of entry into fishing it represent 52.1 per cent and 68.3 per cent respectively.

4.3.5 Average Monthly Income at the Time of Entry into Fishing During Season

The monthly income of active fishermen comprises only the income from fishing. But it is widely fluctuating due to the seasonal variations in catches. In certain months, their monthly income is almost nil. Table 4.21 shows the average monthly income of the respondents during the season.

Table 4.21

Average Monthly Income at the Time of Entry into Fishing During Season

Average monthly income at the time of entry into fishing during season	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Below Rs.1000	-	-	-	-
Rs.1000-2000	42(39.7)	187(59.4)	43(68.3)	272(56.2)
Rs.2001-3000	24(22.6)	67(21.3)	5(7.9)	96(19.8)
Rs.3001-4000	21(19.8)	8(2.5)	14(22.2)	43(8.9)
Rs.4001-5000	5(4.7)	19(6.0)	-	24(5.0)
Above Rs.5000	14(13.2)	34(10.8)	1(1.6)	49(10.1)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.21, it could be seen that majority (56.2 per cent) of the sample respondents had earned average monthly income between Rs.1000 to 2000 at the time of entry into fishing during season and 19.8 per cent of the sample respondents had earned average monthly income between Rs.2001 to 3000 at the time of entry into fishing during season. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the respondents had earned average monthly income between Rs.1000 to 2000 at the time of entry into fishing during season it represent 39.7 per cent, 59.4 per cent and 68.3 per cent respectively. This shows that majority of the sample respondents had earned average monthly income between Rs.1000 to 2000 at the time of entry into fishing during season.

4.3.6 Average Monthly Income at the Time of Entry into Fishing During Off Season

Fishermen earned low monthly income at the time of entry into fishing during off season. The following Table 4.22 shows the average monthly income earned by the fishermen at the time of entry into fishing during off season.

Table 4.22

Average Monthly Income at the Time of Entry into Fishing During Off Season

Average monthly income at the time of entry into fishing during off season	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Below Rs.1000	69(65.1)	229(72.7)	55(87.3)	353(72.9)
Rs.1000-2000	28(26.4)	60(19)	4(6.3)	92(19.0)
Rs.2001-3000	2(1.9)	7(2.2)	2(3.2)	11(2.3)
Rs.3001-4000	1(0.9)	3(1.0)	2(3.2)	6(1.2)
Rs.4001-5000	1(0.9)	9(2.9)	-	10(2.1)
Above Rs.5000	5(4.7)	7(2.2)	-	12(2.5)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.22, it could be seen that majority (72.9 per cent) of the sample respondents had earned average monthly income of below Rs.1000 at the time of entry into fishing during the off season and 19 per cent of the sample respondents had earned average monthly income between Rs.1000 to 2000 at the time of entry into fishing during off season. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the sample respondents had earned average monthly income of below Rs.1000 at the time of entry into fishing during off season it represent 65.1 per cent, 72.7 per cent and 87.3 per cent respectively. This shows that majority of the sample respondents had earned average monthly income of below Rs.1000 at the time of entry into fishing during off season.

4.3.7 Fishing Crafts Used by the Respondents at Present

At present, fishermen are using different type of fishing crafts such as catamaran motorized, fibre vallam motorized, mechanised boat below 40′, mechanised boat between 40-60′ and mechanised boat above 60′. An attempt has been taken to find out the type of fishing crafts used by the fishermen at present. Table 4.23 presents the fishing crafts used by the fishermen at present.

Table 4.23

Fishing Crafts Used by the Respondents at Present

Fishing crafts using at present	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Catamaran motorized	-	-	63(100)	63(13)
Fibre Vallam motorized	-	315(100)	-	315(65.1)
Mechanised Boat below 40′	-	-	-	-
Mechanised Boat between 40-60′	43(40.6)	-	-	43(8.9)
Mechanised Boat above 60′	63(59.4)	-	-	63(13)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.23, it is clear that majority (65.1 per cent) of the sample respondents are using fibre vallam motorized and 13 per cent of the sample respondents are using motorized catamaran and mechanized boats. Among the respondents of the Mechanised Boats, majority (59.4 per cent) of the sample respondents are using mechanised boat above 60′, whereas among the respondents of Motorised vallam, 100 per cent of the sample respondents are using fibre vallam. Among the respondents of Motorised cattamaran, 100 per cent of the sample respondents are using motorised catamaran.

4.3.8 Fishing Gears Used at Present by the Respondents

Fishermen are using different types of fishing gears such as boat seine, drifts gillnet, set gillnet, purse seine, hooks and lines, trawl net, mackerel net and other nets such as disco / prawn net . The following Table 4.24 shows the different types of fishing gears used by the fishermen at present.

Table 4.24

Fishing Gears Used at Present by the Respondents

Fishing gears using at present	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Boat Seine (Thattumadi)	-	27(8.6)	1(1.6)	28(5.8)
Drifts gillnet (Valiavalai)	10(9.4)	58(18.4)	-	68(14.1)
Set gillnet (Thathuvalai)	-	5(1.5)	1(1.6)	6(1.2)
Purse seine	-	5(1.6)	-	5(1.0)
Hooks and Lines	47(44.4)	89(28.3)	40(63.5)	176(36.4)
Trawl net	49(46.2)	-	-	49(10.1)
Mackerel net (Iyilavalai)	-	110(34.9)	11(17.4)	121(25.0)
Others (Disco net /prawn net)	-	21(6.7)	10(15.9)	31(6.4)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.24, it could be seen that majority (36.4 per cent) of the sample respondents are using hooks and lines and 25.0 per cent of the sample respondents are using mackerel net (iyilavalai) at present. Among the respondents of Mechanised Boats, majority (46.2 per cent) of the samples respondents are using trawl net at present. Among the respondents of Motorised cattamaran and Mechanised boats majority of the sample respondents are using hooks and lines at present it represent 63.5 per cent and 44.4 per cent respectively. Among the respondents of Motorised vallam, 34.9 per cent of the sample respondents are using mackerel net (iyilavalai) at present.

4.3.9 Number of Days Goes for Fishing in a Month at Present during Season

Generally fishermen go for fishing regularly during season. Hence the researcher has attempted to find out the number of days the fishermen go for fishing in a month at present during season. The following Table 4.25 shows the number of days the fishermen go for fishing in a month at present during season.

Table 4.25

Number of Days Goes for Fishing in a Month at Present during Season

Number of days go for fishing in a month at present during season	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised catamaran	
24		3(1.0)	-	3(0.7)
25	-	19(6.0)	-	19(3.9)
26	47(44.3)	263(83.5)	56(88.9)	366(75.6)
27	-	30(9.5)	7(11.1)	37(7.6)
28	-	-	-	-
29	59(55.7)	-	-	59(12.2)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.25, it is clear that majority (75.6 per cent) of the sample respondents go for fishing for 26 days in a month at present during season and 12.2 per cent of the sample respondents go for fishing for 29 days in a month at present during season. Among the respondents of Mechanised Boats, majority (55.7 per cent) of the sample respondents go for fishing for 29 days in a month at present during season. Among the respondents of Motorised vallam and Motorised cattamaran, majority of the sample respondents go for fishing for 26 days in a month at present during season it represent 83.5 per cent and 88.9 per cent respectively.

4.3.10 Number of Days Goes for Fishing in a Month at Present during Off Season

Generally fishermen do not go for fishing daily during off season. Hence the researcher has attempted to find out the number of days the fishermen go for fishing in a month at present during off season. The following Table 4.26 shows the number of days the fishermen go for fishing in a month at present during off season.

Table 4.26

Number of Days Goes for Fishing in a Month at Present during Off Season

Number of days go for fishing in a month at present during off season	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Below 20 days	95(89.6)	228(72.4)	49(77.8)	372(76.9)
21	-	-	-	-
22	11(10.4)	87(27.6)	-	98(20.2)
23	-	-	-	-
24	-	-	-	-
25	-	-	-	-
26	-	-	14(22.2)	14(2.9)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.26, it could be seen that majority (76.9 per cent) of the sample respondents go for fishing below 20 days in a month at present during off season and 20.2 per cent of the sample respondents go for fishing for 22 days in a month at present during off season. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the sample respondents go for fishing below 20 days in a month at present during off season it represent 89.6 per cent, 72.4 per cent and 77.8 per cent respectively. This shows that majority of the sample respondents go for fishing below 20 days in a month at present during off season.

4.3.11 Amount Spent for Fishing in a Day at Present by the Respondents

The amount spent for fishing in a day depends upon the distance of travelling for fishing. The following Table 4.27 shows the amount spent by the fishermen in a day at present.

Table 4.27

Amount Spent for Fishing in a Day at Present by the Respondents

Amount spent for fishing in a day at present	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Below Rs.3000	-	43(13.7)	63(100)	106(21.9)
Rs.3000-6000	-	272(86.3)	-	272(56.2)
Rs.6001-9000	14(13.2)	-	-	14(2.9)
Rs.9001-30000	92(86.8)	-	-	92(19.0)
Above Rs.30000	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.27, it is clear that majority (56.2 per cent) of the sample respondents spent between Rs.3000 to 6000 for fishing in a day at present and 21.9 per cent of the sample respondents spent below Rs.3000 for fishing in a day at present. Among the respondents of Motorised cattamaran, all the sample respondents spent below Rs.3000 for fishing in a day at present. Among the respondents of Mechanised Boats, majority (86.8 per cent) of the sample respondents spent between Rs.9001 to 30000 for fishing in a day at present. Among the respondents of Motorised vallam, majority (86.3 per cent) of the sample respondents spent between Rs.3000 to 6000 for fishing in a day at present.

4.3.12 Average Monthly Income of the Respondents at Present during Season

Generally the fishermen earn more during the season. An attempt has been made to find out the average monthly income during season. The following Table 4.28 shows the average monthly income of the fishermen at present during the season.

Table 4.28

Average Monthly Income of the Respondents at Present during Season

Average monthly income at present during season	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised catamaran	
Below Rs.25000	-	92(29.2)	26(41.3)	118(24.4)
Rs.25000-50000	-	223(70.8)	37(58.7)	260(53.7)
Rs.50001-75000	-	-	-	-
Rs.75001-100000	19(17.9)	-	-	19(3.9)
Above Rs.100000	87(82.1)	-	-	87(18.0)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.28, it is clear that majority (53.7 per cent) of the sample respondents are earning average monthly income between Rs.25000 to 50000 at present during season and 24.4 per cent of the respondents are earning below Rs.25000 at present during season. Among the respondents of Mechanised Boats, 82.1 per cent of the sample respondents are earning average monthly income of above Rs.100000 at present during season whereas among the respondents of Motorised vallam and Motorised cattamaran, the sample respondents are earning between Rs.25000 to 50000 at present during season it represent 70.8 per cent and 58.7 per cent respectively. This shows that majority of the sample respondents are earning average monthly income between Rs.25000 to 50000 at present during season.

4.3.13 Average Monthly Income of the Respondents at Present during Off Season

Generally the fishermen do not earn more income during the off season. The following Table 4.29 shows the average monthly income of fishermen at present during off season.

Table 4.29

Average Monthly Income of the Respondents at Present during Off Season

Average monthly income at present during off season	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Below Rs.5000		131(41.6)	52(82.5)	183(37.8)
Rs.5000-10000		159(50.5)	9(14.3)	168(34.7)
Rs.10001-15000	9(8.5)	25(7.9)	2(3.2)	36(7.4)
Rs.15001-20000	69(65.1)	-	-	69(14.3)
Above Rs.20000	28(26.4)	-	-	28(5.8)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.29, it could be seen that majority (37.8 per cent) of the sample respondents are earning average monthly income of below Rs.5000 at present during off season and 34.7 per cent of the sample respondents are earning between Rs.5000 to 10000 at present during off season. Among the respondents of Mechanised Boats, majority (65.1 per cent) of the sample respondents are earning average monthly income between Rs.15001 to Rs.20000 at present during off season. Among the respondents of Motorised vallam, majority (50.5 per cent) of the sample respondents are earning monthly income between Rs.5000 to Rs.10000 at present during off season. Among the respondents of Mechanised Cattamaram, majority (82.5 per cent) of the sample respondents are earning monthly income of below Rs.5000 at present during off season. This shows that majority of the sample respondents are earning average monthly income of below Rs.5000 at present during off season.

4.3.14 Number of Fishing Crafts Used at Present by the Respondents

Fishing crafts used by the fishermen depends on their economic conditions and the amount invested in the fishing crafts. Table 4.30 shows the number of fishing crafts owned by the respondents.

Table 4.30

Number of Fishing Crafts Used at Present by the Respondents

Number of fishing crafts having at present	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
One	104(98.1)	306(97.2)	62(98.4)	472(97.5)
Two	2(1.9)	9(2.8)	1(1.6)	12(2.5)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.30, it is clear that majority (97.5 per cent) of the sample respondents are having one fishing craft at present and 2.5 per cent of the sample respondents are having two fishing crafts at present. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the sample respondents are having one fishing craft at present it represents 98.1 per cent, 97.2 per cent and 98.4 per cent respectively.

4.3.15 Year in which the Fishing Craft was Acquired

The year of acquisition of fishing craft depends upon the economic condition of the fishermen. Table 4.31 presents the year in which the fishing craft was acquired by the respondents.

Table 4.31

Year in which the Fishing Craft was Acquired

Year of Acquisition	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
2004	11(10.4)	1(0.3)	-	12(2.5)
2005	-	30(9.5)	-	30(6.2)
2006	1(0.9)	1(0.3)	-	2(0.4)
2007	3(2.8)	22(7.0)	7(11.1)	32(6.6)
2008	2(1.9)	18(5.7)	4(6.3)	24(4.9)
2009	15(14.2)	58(18.4)	17(27)	90(18.6)
2010	30(28.3)	75(23.8)	29(46)	134(27.7)
2011	12(11.3)	56(17.8)	2(3.2)	70(14.5)
2012	17(16.0)	29(9.2)	2(3.2)	48(9.9)
2013	13(12.3)	18(5.7)	2(3.2)	33(6.8)
2014	2(1.9)	7(2.0)	-	9(1.9)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.31, it is clear that majority (27.7 per cent) of the sample respondents have acquired the fishing craft during 2010 and 18.6 per cent of the sample respondents have acquired the fishing craft during 2009. Among the respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the sample respondents have acquired the fishing craft during 2010 it represent 28.3 per cent, 23.8 per cent and 46 per cent respectively.

4.3.16 Respondent's Ownership of Fishing Crafts

Ownership of the fishing craft by the respondents reveals their economic status. Table 4.32 presents the ownership of the fishing crafts by the respondents.

Table 4.32

Respondent's Ownership of Fishing Crafts

Ownership of Fishing crafts	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Owned	106(100)	315(100)	63(100)	484(100)
Leased	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.32, it is clear that all the sample respondents own fishing crafts.

4.3.17 Sources of Fund Used for Acquiring the Fishing Crafts

Fishermen used sources of fund for buying the fishing crafts namely owned fund and borrowed fund. The following table shows the sources of fund used by fishermen for buying the fishing crafts.

Table 4.33

Sources of Fund Used for Acquiring the Fishing Crafts

Sources of Fund	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Owned fund	10(9.4)	151(47.9)	49(77.8)	210(43.4)
Borrowed fund	96(90.6)	164(52.1)	14(22.2)	274(56.6)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.33, it is clear that majority (56.6 per cent) of the sample respondents used borrowed fund for acquiring the fishing crafts and 43.4 per cent of the sample respondents used owned fund for acquiring the fishing crafts. Among the respondents of Mechanised Boats and Motorised vallam, majority of the sample respondents used borrowed fund for acquiring the fishing crafts it represent 90.6 per cent and 52.1 per cent respectively whereas among the respondents of Motorised cattamaran, majority (77.8 per cent) of the sample respondents used their own fund for acquiring the fishing crafts.

4.3.18 Sources of Borrowed Fund Used by the Mechanised Boat Fishermen

Fishermen use different sources of borrowed fund such as friends and relatives, local money lenders, borrowed from the bank and advance from wholesale buyer. In order to find out the source of borrowed fund mostly used by the fishermen of mechanised boats, Garret ranking analysis was used. The result of garret ranking analysis is presented in the Table 4.34.

Table 4.34

Sources of Borrowed Fund Used by Mechanised Boats Fishermen

Sl. No	Sources of Borrowed fund	Total Score	Average Score	Rank
1.	Friends and relatives	5009	52.18	III
2.	Local money lenders	6072	63.25	I
3.	Borrowed from the bank	3211	33.45	IV
4.	Advance from wholesale buyer	5526	57.56	II

Source: Computed data

It is clear from the Table 4.34 that majority of the respondents of mechanised boats had given the first rank to ‘local money lenders’ as the main source of borrowed fund. The second rank was given to ‘advance from wholesale buyer’. The third rank was given to ‘friends and relatives’. The respondents of mechanised boats had given the last rank to ‘borrowing from the bank’ as the source of borrowed fund.

4.3.19 Sources of Borrowed Fund Used by the Respondents of Motorised Vallam

Fishermen use different sources of borrowed fund such as friends and relatives, local money lenders, borrowed from the bank and advance from wholesale buyer. In order to find out the source of borrowed fund mostly used by the fishermen of Motorised vallam, Garret ranking analysis was used. The result of garret ranking analysis is presented in the Table 4.35.

Table 4.35

Sources of Borrowed Fund Used by the Respondents of Motorised Vallam

Sl. No	Sources of Borrowed fund	Total Score	Average Score	Rank
1.	Friends and relatives	4861	29.64	IV
2.	Local money lenders	10248	62.49	I
3.	Borrowed from the bank	7141	43.54	III
4.	Advance from wholesale buyer	9673	58.98	II

Source: Computed data

It is clear from the Table 4.35 that majority of the respondents of Motorised vallam had given the first rank to ‘local money lenders’. The second rank was given to ‘advance from wholesale buyer’. The third rank was given to ‘borrowed from the bank’.

4.3.20 Sources of Borrowed Fund Used by Respondents of Motorised Cattamaran

Fishermen use different sources of borrowed fund such as friends and relatives, local money lenders, borrowed from the bank and advance from wholesale buyer. In order to find out the source of borrowed fund mostly used by the fishermen of Motorised cattamaran, Garret ranking analysis was used. The result of garret ranking analysis is presented in the Table 4.36.

Table 4.36

Sources of Borrowed Fund Used by Respondents of Motorised Cattamaran

Sl. No	Sources of Borrowed fund	Total Score	Average Score	Rank
1.	Friends and relatives	859	61.33	I
2.	Local money lenders	694	49.57	III
3.	Borrowed from the bank	450	32.18	IV
4.	Advance from wholesale buyer	779	55.63	II

Source: Computed data

It is clear from the Table 4.36 that majority of the Motorised cattamaran fishermen had given the first rank to borrow from the 'friends and relatives'. The second rank was given to 'advance from wholesale buyer'. The third rank was given to 'local money lenders'. It is further clear the respondents of Motorised cattamaran had given the last rank to 'borrow from the bank'.

4.3.21 Implements and Devices Used for Fishing by the Respondents at Present

Fishermen use different type of implements and devices for fishing. The different type of implements and devices are global positioning system, fish finder, solar panel, cold storage, marine parachute, wireless, laptop, LED lights and cooking devices. The following Table 4.37 shows the implements and devices used by the respondents for fishing.

Table 4.37

Implements and Devices Used for Fishing by the Respondents at Present

Implements and devices	Type of Respondents						Total	
	Mechanised Boats		Motorised vallam		Motorised cattamaran			
	Yes	No	Yes	No	Yes	No	Yes	No
GPS (Global Positioning System)	106 (100)	-	315 (100)	-	55 (87.3)	8 (12.7)	476 (98.4)	8 (1.6)
Fish finder	96 (90.6)	10 (9.4)	96 (30.5)	219 (69.5)	-	63 (100)	192 (39.7)	292 (60.3)
Solar panel	13 (12.3)	93 (87.7)	-	315 (100)	-	63 (100)	13 (2.7)	471 (97.3)
Cold storage	106 (100)	-	-	315 (100)	-	63 (100)	106 (21.9)	378 (78.1)
Marine parachute	104 (98.1)	2 (1.9)	309 (98.1)	6 (1.9)	49 (77.8)	14 (22.2)	462 (95.4)	22 (4.6)
Wireless	96 (90.6)	10 (9.4)	90 (28.6)	225 (71.4)	-	63 (100)	186 (38.4)	298 (61.6)
Laptop	31 (29.2)	75 (70.8)	-	315 (100)	-	63 (100)	31 (6.4)	453 (93.6)
LED lights	103 (97.2)	3 (2.8)	308 (97.8)	7 (2.2)	63 (100)	-	474 (97.9)	10 (2.1)
Cooking devices	106 (100)	-	168 (53.3)	147 (46.7)	-	63 (100)	274 (56.6)	210 (43.4)

Source: Primary data

From Table 4.37, it is clear that majority (98.4 per cent) of the sample respondents used global positioning system, 97.9 per cent of the respondents used LED lights and 95.4 per cent of the respondents used marine parachute. Among the

respondents of Mechanised Boats, Motorised vallam and Motorised cattamaran, majority of the respondents used global positioning system it represent 100 per cent, 100 per cent and 87.3 per cent respectively. This shows that majority of the sample respondents used global positioning system for fishing.

4.3.22 Government Financial Assistance for Acquiring the Fishing Crafts, Gears and Implements

Generally fishermen acquire fishing crafts, gears and implements for fishing. The respondent's opinion as regards the receipt of financial assistance through government schemes for acquiring the fishing crafts, gears and implements are presented in Table 4.38.

Table 4.38

Government Financial Assistance for Acquiring the Fishing Crafts, Gears and Implements

Received any financial assistance	Type of Respondents			Total
	Mechanised Boats	Motorised vallam	Motorised cattamaran	
Yes	-	-	-	-
No	106(100)	315(100)	63(100)	484(100)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

From Table 4.38, it is clear that none the respondents have received any financial assistance through government schemes for acquiring the fishing crafts, gears and implements for fishing.

4.4 REASON FOR CHOOSING FISHING AS AN OCCUPATION

The fishermen may be influenced by number of reasons while choosing fishing as an occupation. Various reasons such as traditional, unemployment, no formal education, poor economic conditions of the family, family members' influence, influence from friends and relatives, self-interest, freedom of work and adventurous are included in the study for further analysis. In order to analyse the reason for choosing fishing as an occupation among the respondents of mechanised boats, Motorised vallam and mechanised catamaran, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference among the respondents of mechanised boats, Motorised vallam and mechanised catamaran for choosing fishing as an occupation in Kanyakumari district". The following Table 4.39 shows the results of 'ANOVA'.

Table 4.39

Reason for Choosing Fishing as an Occupation

Sl. No	Reasons	Type of Respondents				F Statistics
		Mechanised Boats	Motorised vallam	Motorised catamaran	Total	
1.	Traditional	4.0000	4.2532	4.3679	4.2459	6.544*
2.	Unemployment	2.3387	2.7816	3.0189	2.7769	10.582*
3.	No formal education	4.1774	4.2405	3.9811	4.1756	3.931*
4.	Poor conditions of the family	4.3387	4.1741	4.2264	4.2066	0.593
5.	Family members influence	2.0161	2.0854	2.2547	2.1136	5.004*
6.	Influence from friends and relatives	2.6125	2.0981	2.2642	2.1240	4.723*
7.	Self interest	3.4032	3.5127	3.6415	3.5269	2.094
8.	Freedom of work	2.9677	2.8734	2.9906	2.9112	1.887
9.	Adventurous	3.2258	2.9747	3.2547	3.0682	6.348*

Source: Primary Data *Significant at 5 per cent level

Table 4.39 shows the mean score of reason for the choosing fishing as an occupation among the respondents of mechanised boats, motorised vallam and mechanised catamaran along with its respective 'F' statistics. The important reason for choosing fishing as an occupation among the respondents of mechanised boats are 'poor conditions of the family' and 'no formal education' since their respective mean scores are 4.3387 and 4.1774 whereas among the respondents of motorised vallam, the reasons for the choosing fishing are 'traditional' and 'no formal education' since their respective mean scores are 4.2532 and 4.2405. Among the respondents of mechanised catamaran the reasons for the choosing fishing are, 'traditional' and 'poor conditions of the family' since their respective mean scores are 4.3679 and 4.2264. Among the various reasons for choosing fishing as the occupation significant difference exists in six out of nine reasons since their respective 'F' statistics are significant at 5 per cent level.

4.5 INFLUENCE OF TECHNOLOGICAL FACTORS TO PRACTICE MECHANIZED MODE OF FISHING

Fishermen are influenced by different technological factors to practice mechanised mode of fishing. Fourteen technological factors are identified and given in Table 4.40 .In order to find out the significant difference in technological factors which influence to practice mechanised mode of fishing among the respondents of mechanised boats, motorised vallam and mechanised catamaran in Kanyakumari district, 'ANOVA' is attempted with the null hypothesis. The result of 'ANOVA' is presented in the Table 4.40.

Table 4.40

Influence of Technological Factors to Practice Mechanized Mode of Fishing

Sl. No	Technological Factors	Type of Respondents				F Statistics
		Mechanised Boats	Mechanised Vallam	Mechanised Cattamaran	Total	
1.	Mechanized crafts can help to travel to deep sea where more fishes are available	4.9245	4.6139	4.4194	4.6570	8.829*
2.	Modernized fishing nets helps to catch variety of fishes	4.7903	3.4367	3.8302	4.0191	8.871*
3.	Mechanized crafts helps to go for fishing during the period of sea erosion	4.7419	3.7899	1.7925	3.3414	12.413*
4.	Mechanized crafts and modernized nets helps to reduce manual work and save time	4.0968	4.3734	4.6415	4.3967	8.056*
5.	Mechanized methods and technical knowledge creates confidence in fishing	4.0806	4.3291	4.8113	4.4029	8.598*
6.	Fish catching tools helps to find out new fishing grounds	4.7740	4.4051	4.6792	4.6550	6.936*
7.	Cold storage room helps to keep the fish more days	4.6129	1.3323	1.6321	2.5257	14.683*
8.	Wireless contact helps to enquire about the fish rates in different markets and able to sell the fish for better price	4.2911	1.3987	1.0604	2.2584	16.353*
9.	GPS helps to travel straight to fishing grounds	4.2753	4.3259	4.7075	4.4050	7.870*
10.	Wireless phone helps to enquire the availability of fish through friends and relatives who are in another area and to move to there.	4.4484	2.4051	1.6226	3.6260	17.886*
11.	GPS helps to reach seashore during the sea runoff, hurricane, storm, very bad weather and heavy rain	4.0000	4.3386	4.6415	4.3616	2.535*
12.	Facilities available in the modern mechanized craft helps to take rest in the craft	4.8548	2.2785	2.2358	3.1339	15.879*
13.	Marine parachute helps to keep the craft without moving from the fishing ground during sea runoff and storm,	4.0484	4.3133	4.6226	4.3471	9.522*
14.	During the night, Powerful solar power and bright LED light attracts fishes and helps to catch more fish	4.6742	3.9753	4.0006	4.3223	9.708*

Source: Primary Data *Significant at 5 per cent level

Table 4.40 shows the mean score of technological factors which influence the respondents of mechanised boats, mechanized vallam and mechanised catamaran to practice mechanized mode of fishing along with its respective 'F' statistics. The important technological factors which influence the respondents of mechanised boats to practice mechanised mode of fishing are 'mechanized crafts can help to travel to deep sea where more fishes are available' and 'facilities available in the modern mechanized craft helps to take rest in the craft' since their respective mean scores are 4.9245 and 4.8548. Among the respondents of Motorised vallam, the influencing technological factors are 'mechanized crafts can help to travel to deep sea where more fishes are available' and 'fish catching tools helps to find out new fishing grounds' since their respective mean scores are 4.6139 and 4.4051. Among the respondents of mechanised catamaran, the influencing technological factors are 'mechanized methods and technical knowledge creates confidence' and 'GPS helps to travel straight to fishing grounds' since their respective mean scores are 4.8113 and 4.7075.

Regarding the technological factors significant difference among the respondents of mechanised boats, mechanized vallam and mechanised catamaran are identified in the case of all the fourteen variables since their respective 'F' statistics are significant at 5 per cent level.

4.6 INFLUENCE OF SOCIAL FACTORS TO PRACTICE MECHANIZED MODE OF FISHING

Fishermen are influenced by different social factors to practice mechanised mode of fishing. Nine social factors are identified and given in Table 4.41. In order to find out the significant difference in social factors which influence to practice mechanised mode of fishing among the respondents of mechanised boats, motorised vallam and mechanised catamaran in Kanyakumari district, 'ANOVA' is attempted with the null hypothesis. The result of 'ANOVA' is presented in the Table 4.41.

Table 4.41

Influence of Social Factors to Practice Mechanized Mode of Fishing

Sl. No	Social Factors	Type of Respondents				F Statistics
		Mechanised Boats	Motorised vallam	Motorised catamaran	Total	
1.	Good education to the children	4.7581	4.8734	4.9245	4.8698	2.697
2.	Construct a house near the town for the family	4.7742	4.8671	4.8396	4.8492	1.464
3.	After the tsunami, the change of sea which brings big sea waves and high air and old method of fishing materials won't be useful.	4.1129	4.3196	4.3774	4.3058	6.873*
4.	Owner of mechanized craft gives Social status in the community	3.6774	3.9557	4.0943	3.9504	8.462*
5.	Use of mechanized technology gets more respect in other community	1.9839	2.1646	2.6132	2.2397	15.526*
6.	The improved social status helps to get recognition from the political parties	2.0000	2.0665	2.5849	2.1715	16.409*
7.	Able to spend more on nutritious food to the family members	4.8871	4.7975	4.9057	4.8326	2.399
8.	Able to buy decent clothes for the family members	4.7188	4.8544	4.9245	4.8740	1.226
9.	Able to provide better medical treatment to my family members	4.9032	4.8671	4.6072	4.8802	0.709

Source: Primary Data *Significant at 5 per cent level

Table 4.41 shows the mean score of social factors which influence the respondents of mechanised boats, mechanized vallam and mechanised catamaran to practice mechanized mode of fishing along with its respective 'F' statistics. The important social factors which influence the respondents of mechanised mode of fishing among the mechanised boats are 'able to provide better medical treatment to my family members' and 'able to spend more on nutritious food to the family members', since their respective mean scores are 4.9032 and 4.8871. Among the respondents of

motorised vallam the important social factors are ‘good education for the children’ and ‘to construct a house near the town for my family’ since their respective mean scores are 4.8734 and 4.8671. Among the respondents of mechanised catamaran fishermen the important social factors are ‘to give good education for the children’ and ‘able to buy decent clothes for the family members’, since their respective mean scores are 4.9245 and 4.9245.

Regarding the social factors which influence the mechanized mode of fishing, significant difference among the respondents of mechanised boats, motorised vallam and mechanised catamaran are identified in the case of four out of nine variables relating to social factors since their respective ‘F’ statistics are significant at 5 per cent level.

4.7 ECONOMIC FACTORS INFLUENCING THE MECHANIZED MODE OF FISHING

Fishermen are influenced by number of economic factors to practice mechanised mode of fishing. Ten economic factors are identified and given in Table 4.42. In order to find out the significant difference in economic factors which influence the respondents of mechanised boats, motorised vallam and mechanised catamaran to practice mechanised mode of fishing in Kanyakumari district, ‘ANOVA’ is attempted with the null hypothesis. The result of ‘ANOVA’ is presented in the Table 4.42.

Table 4.42

Economic Factors Influencing the Mechanized Mode of Fishing

Sl. No	Economic Factors	Type of Respondents				F Statistics
		Mechanised Boats	Motorised vallam	Motorised cattamaran	Total	
1.	Mechanized mode of fishing able to catch more fish which leads to earn more income	4.7180	4.8829	4.8868	4.8843	0.008
2.	Mechanized fishing method provides more employment opportunities	4.1613	4.3766	4.5849	4.3946	11.115*
3.	Able to invest in land and buildings through increased income	3.8387	4.2785	4.5377	4.2789	22.733*
4.	Savings helps to invest in shares and securities and fixed deposits	1.6129	1.9747	2.4717	2.0372	18.785*
5.	Increased income helps to buy vehicles	1.6935	2.2595	2.7736	2.2996	16.500*
6.	Savings helps to buy gold ornaments for my wife and children	4.4677	4.5506	4.8302	4.6012	11.624*
7.	Able to earn more by selling fish catch through Fisherman Sang am which helps to avoid the exploitation from the middlemen	3.6452	3.7911	3.6226	3.7355	2.218
8.	Government help to buy crafts and nets through the subsidy linked loans	1.3226	1.6519	1.5660	1.5909	5.133*
9.	Government and non-government organization help to buy fishing crafts and nets	2.2232	2.5158	2.5377	2.4959	3.660*
10.	Loan facilities provided by the bank to procure crafts and nets	2.3262	2.5696	2.5660	2.5372	3.805*

Source: Primary Data *Significant at 5 per cent level

Table 4.42 shows the mean score of economic factors which influence the mechanized mode of fishing among the respondents of mechanised boats, motorised vallam and mechanised catamaran along with its respective 'F' statistics. The important economic factors which influence the mechanised mode of fishing among the

respondents of mechanised boats are ‘mechanized mode of fishing able to catch more fish to earn more income’ and ‘savings helps to buy gold ornaments for my wife and children’ since their respective mean scores are 4.7180 and 4.4677. Among the respondents of motorised vallam the important economic factors are, ‘mechanized mode of fishing able to catch more fish to earn more income’ and ‘savings helps to buy gold ornaments for my wife and children’ since their respective mean scores are 4.8829 and 4.5506. Among the respondents of mechanised catamaran the important economic factors are, ‘mechanized mode of fishing able to catch more fish to earn more income’ and ‘savings helps to buy gold ornaments for my wife and children’ since their respective mean scores are 4.8868 and 4.8302.

Regarding the economic factors which influence the mechanized mode of fishing, significant difference among the respondents of mechanised boats, motorised vallam and mechanised catamaran are identified in the case of eight out of ten economic variables since their respective ‘F’ statistics are significant at 5 per cent level.

4.8 RELIABILITY AND VALIDITY OF VARIABLES IN EACH FACTOR AMONG THE RESPONDENTS

The factors influencing the respondents to practice mechanization in fishing are measured with the help of three components. The variables included in each factor vary from 9 to 14. Before summarizing the scores of the variables in each factor, it is essential to examine its reliability and validity. The overall reliability is tested with the help of Cronbach Alpha. The results are given in Table 4.43.

Table 4.43

Reliability and Validity of Variables in each Factor among the Respondents

Sl. No	Factors	No. of Variables	Range of standardized factor loading	Range of 't' statistics	Cronbach Alpha	Composite Reliability	Average variance extracted
1.	Technological factors	14	0.9004-0.8619	0.4652*-0.3626*	0.8899	0.8568	57.37
2.	Social factors	9	0.8976-0.8619	0.4305*-0.3559*	0.8102	0.7921	56.22
3.	Economic factors	10	0.8707-0.8103	0.4299*-0.3345*	0.8050	0.7840	55.36
	Overall	33	0.8879-0.8318	0.4393*-0.3518*	0.8448	0.8177	57.18

*Significant at five per cent level

The standardized factor loading of the variables in each factor are greater than 0.60 which reveals the content validity. The significance of 't' statistics of the standardized factor loading of the variables in each factor shows the convergent validity. It is also confirmed by the composite reliability and average variance extracted since these are greater than its minimum threshold of 0.50 and 50.00 per cent respectively. The Cronbach Alpha of all factors is greater than the standard minimum of 0.60. All these results indicate the reliability and validity of variables in each factor.

4.9 RESPONDENT'S PROFILE VARIABLES AND FACTORS INFLUENCING THE RESPONDENTS TO PRACTICE MECHANISATION IN FISHING

In order to find out the relationship between profile variables of respondents and factors influencing the respondents to practice mechanization in fishing, the null hypothesis is framed as, "There is no significant relationship between the profile variables of respondents and influencing the respondents to practice mechanization in fishing". The result is given in the Table 4.44.

Table 4.44

Respondent's Profile Variables and Factors Influencing the Respondents to Practice Mechanisation in Fishing

Sl. No	Profile Variables	F Statistics		
		Technological Factors	Social Factors	Economic Factors
1.	Age	10.479*	3.405*	5.265*
2.	Marital Status	5.967*	2.663	0.584
3.	Caste	10.678*	6.001*	6.596*
4.	Education	1.898	2.297	1.150
5.	Family System	4.505*	3.760*	0.718
6.	Ownership of House	2.370	8.045*	3.286*
7.	Type of Housing	3.539*	8.082*	3.070*

Source: Primary data *Significant at five per cent level

It is understood from Table 4.44 that there is a significant relationship between technological factors influencing the respondents to practice mechanization in fishing and profile of the respondents namely age, marital status, caste, family system and type of housing since their F statistics are significant at five per cent level. As regards the social factors are concerned the significantly associating profile variables are age, caste, family system, ownership of house and type of housing since their F statistics

are significant at five per cent level. In respect of economic factors the significantly associating profile variables are age, caste, ownership of house and type of housing since their F statistics are significant at five per cent level.

4.10 SUMMARY

The socio-economic conditions of the traditional marine fishermen and the factors influencing the traditional marine fishermen to practice mechanization in fishing highlighted the socio-economic status of the respondents, reasons for choosing fishing as an occupation, the technological, social and economic factors which influences the respondents to practice mechanization in fishing. This chapter also identified the significantly associating profile variables with the factors influencing the respondents to practice mechanization in fishing.

Chapter - V

SOCIO ECONOMIC EMPOWERMENT OF TRADITIONAL MARINE FISHERMEN

CHAPTER - V

SOCIO-ECONOMIC EMPOWERMENT OF TRADITIONAL MARINE FISHERMEN

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CHAPTER - V

SOCIO-ECONOMIC EMPOWERMENT OF TRADITIONAL MARINE FISHERMEN

5.1 INTRODUCTION

This chapter presents the socio-economic empowerment of traditional marine fishermen in Kanyakumari district. The primary data collected through the sampling survey are analysed here with the help of the statistical tools such as ANOVA, t-test and correlation. The results of the data analysis are discussed and presented in this chapter.

5.2 SOCIO-ECONOMIC EMPOWERMENT INDEX

Socio-Economic Empowerment is a qualitative variable which cannot be quantitatively measured because socio-economic empowerment cannot be quantitatively measured. It is a relative term which cannot be relatively measured and compared with one fisherman to other. Hence in quantifying the qualitative variable namely the socio-economic empowerment of the fishermen scaling technique is employed. The qualitative variable namely socio-economic empowerment is assessed through scaling technique. Likert five point scales is employed to collect data related to level of socio-economic empowerment. The socio-economic empowerment scores collected through scaling technique are consolidated in a systematic way through empowerment index. Socio-Economic Empowerment index measures the socio-economic empowerment of respondents. The socio-economic empowerment is assessed at five point scale. The scales used are strongly agree, agree, moderate, disagree and strongly disagree. The scoring pattern of the socio-economic empowerment for the five scales is given in the Table 5.1.

Table 5.1

Socio-Economic Empowerment Scores

Sl. No	Socio-Economic Empowerment	Scores
1	Strongly agree	5
2	Agree	4
3	Moderate	3
4	Disagree	2
5.	Strongly disagree	1

Table 5.1 assigns ’5’ score for strongly agree, ‘4’ score for agree, ‘3’ score for moderate, ‘2’ score for disagree and ‘1’ score for the response strongly disagree. Keeping this scoring pattern as the base for all the 23 variables the Socio-Economic Empowerment Index is constituted.

Socio-Economic Empowerment index is an unstandardized one developed by the researcher used to measure the level of socio-economic empowerment. Since the index is first of its kind and an unstandardized one the reliability of the index is tested through reliability analysis. Cronbach’s alpha validated the reliability of the unstandardized tools. Cronbach’s alpha is calculated as,

$$\alpha = \frac{Kr}{1+(K-1)r}$$

Where,

K = number of variables considered

r = Inter-items correlation

The proposed index comprises of 23 socio-economic empowerment variables falling under five categories in relation to them, the scores of socio-economic empowerment are assigned. In order to include the 23 variables in the index and to measure the internal consistency among them Cronbach’s alpha is used.

The calculated Cronbach's Alpha in this case is 0.8856. The item wise statistics related to 23 variables is presented in Table 5.2.

Table 5.2

Item-Wise Statistics–Cronbach's Alpha

Socio-Economic Empowerment	Scale mean if item deleted	Scale variance if item deleted	Corrected item-Total correlation	Alpha if item deleted
Family considers the advice to take decision	88.5434	67.2507	0.4081	0.8828
Important position is given in the village committee	88.6963	66.7544	0.4024	0.8828
Village people ask advice to take decision	89.0000	63.1429	0.6362	0.8764
Fisherman sangam provides office bearer position	88.8037	65.9717	0.5589	0.8799
Honoured as special guest in the religious and village functions	88.7975	65.3378	0.6398	0.8783
Fisheries department extends invitation to deliver a speech during the fishermen training	89.5455	58.4928	0.7404	0.8716
Become the member/office bearer of the political parties	89.6116	59.0828	0.7625	0.8709
Sharing opinions before the other caste people	89.5620	58.4247	0.7681	0.8705
Constructed the house with all basic facilities	88.7955	66.4653	0.3829	0.8832
Myself and my family members able to get better medical treatment	89.5744	59.0110	0.7657	0.8708
Children are educated through English medium school and got higher education	88.8388	66.0858	0.3953	0.8830
Provides more employment opportunities	89.7665	60.2787	0.7440	0.8720
Increase in income due to increased fish catch	88.8533	67.3180	0.2904	0.8855
Because of more income, savings increased and able to buy own vehicle	88.8781	67.8381	0.3074	0.8847
Increased savings helped to buy land near my village and in town	88.3306	68.6772	0.2369	0.8859
Increased savings helped to deposit money in the bank	88.3512	69.1931	0.1981	0.8864
Increased savings helped to buy gold ornaments and things for my family	88.8946	67.2249	0.4211	0.8826

Socio-Economic Empowerment	Scale mean if item deleted	Scale variance if item deleted	Corrected item-Total correlation	Alpha if item deleted
Increased income helped to avoid borrowings from the local money lenders	89.2500	66.9746	0.3096	0.8851
Increased income helped to provide better nutritious food to my family members	90.9607	65.8763	0.2993	0.8870
Increased income helped to spent more on dress material to my family members	91.0289	66.2973	0.2537	0.8889
Better fish landing facilities improved the market conditions to sell fish at fair price	88.5992	67.4001	0.3072	0.8849
Increased income helps to repair the craft and nets immediately	88.8058	66.5626	0.3927	0.8830
Increased savings helped to buy craft, net and fishing instruments	88.9215	64.9503	0.4810	0.8807

Source: Derived Data

It is clear from Table 5.2 that all the 23 variables identified can be included in the index. No variable included in the empowerment index can be deleted because elimination of any particular variable will reduce the Cronbach Alpha. Hence, the empowerment index comprises of all the 23 variables.

Mathematically Socio-economic empowerment index is presented as

$$SEEI = \sum_{i=1}^{n} SEEV_i$$

Where,

$SEEV_i$ = Socio-Economic Empowerment in $Variable_i$

SEEI = Socio-Economic Empowerment Index

i = 1…n or Number of socio-economic empowerment variable included in the index.

n = 23

Respondents with strongly agree in terms of all 23 socio-economic empowerment variables in terms of any of the 23 variables can get a maximum score of 115 scores and fishermen with strongly disagree with 23 score. Thus by employing the Socio-Economic Empowerment Index (SEEI) the level of socio-economic empowerment of respondents can be assessed. Analysis of socio-economic empowerment through Socio-Economic Empowerment Index among respondents highlights the socio-economic empowerment of the respondents.

5.3 SOCIO-ECONOMIC EMPOWERMENT OF RESPONDENTS

Socio-economic empowerment of respondents is measured through Socio-Economic Empowerment Index (SEEI) and it is presented in Table 5.3.

Table 5.3

Socio-Economic Empowerment of Respondents

Socio-Economic Empowerment (as measured through SEEI in scores)	Number of Respondents	Percentage
Below 65	4	0.8
66-75	124	25.6
76-85	312	64.5
Above 85	44	9.1
Total	**484**	**100**

Source: Primary data

Table 5.3 exhibits the level of socio-economic empowerment of respondents. Out of 484 respondents 64.5 per cent of the respondents are having socio-economic empowerment index (SEEI) of 76 to 85. 25.6 per cent of the respondents are having SEEI of 66-75.

For an in depth analysis on the basis of the level of socio-economic empowerment, the fishermen are categorized into three categories such as,

(i) Respondents with high level of socio-economic empowerment

(ii) Respondents with moderate of level socio-economic empowerment

(iii) Respondents with low level of socio-economic empowerment

In order to categorise the respondents into three categories the mean ($\bar{x}$) and standard deviation (σ) have been used. The mean and standard deviation of the scores of socio-economic empowerment are calculated. The boundaries for three categories are fixed as below $\bar{x} \pm \sigma$. Table 5.4 presents the boundary for categorization of respondents into three categories.

Table 5.4

Boundary for Categorisation of Respondents

Particulars	**Mean $\bar{x}$**	**Standard deviation**	**Level of Scores for Socio-Economic Empowerment**		
			Low $<(\bar{x}-\sigma)$	**Moderate $(\bar{x}-\sigma)$ to $(\bar{x}+\sigma)$**	**High $>(\bar{x}+\sigma)$**
Fishermen	78.91	5.73	<73	73-85	>85

Table 5.4 fixes the boundary levels for three categories of respondents. The respondents are categorized into three categories on the basis of their socio-economic empowerment scores and the details are furnished in Table 5.5.

Table 5.5

Level of Socio-Economic Empowerment of Respondents

Level of Socio-Economic Empowerment	Number of Respondents	Percentage
Low	68	14.0
Moderate	372	76.9
High	44	9.1
Total	**484**	**100**

Source: Primary data

From Table 5.5 it could be understand that 76.9 per cent of the respondents have moderate level of socio-economic empowerment. 14 per cent of the respondents are having low level of socio-economic empowerment and 9.1 per cent of the respondents are having high level of socio-economic empowerment.

5.4 SOCIO-ECONOMIC EMPOWERMENT BEFORE MECHANIZATION

5.4.1 Social Empowerment before Mechanization

In order to find out the significant difference in social empowerment before mechanisation among the respondents of mechanised boats, motorised vallam and motorised catamaran, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in social empowerment before mechanisation among the respondents of mechanised boats, motorised vallam and motorised catamaran in Kanyakumari district". The result of 'ANOVA' is presented in the Table 5.6.

Table 5.6

Social Empowerment before Mechanization

Sl. No	Social Empowerment before Mechanization	Type of Respondents				F Statistics
		Mechanised Boats	Mechanised Vallam	Mechanised Cattamaran	Total	
1.	Family considers the advice to take decision	2.0000	1.8449	1.8396	1.8636	3.329*
2.	Important position is given in the village committee	2.2000	1.8956	1.9683	1.8967	5.528*
3.	Village people ask advice to take decision	1.9032	1.8729	1.7264	1.8264	4.076*
4.	Fisherman sangam provides office bearer position	1.9552	1.8576	1.8302	1.8574	0.707
5.	Honoured as special guest in the religious and village functions	1.8023	1.8165	1.7264	1.8079	3.615*
6.	Fisheries department extends invitation to deliver a speech during the fishermen training	1.7732	1.7170	1.8165	1.8058	4.071*
7.	Become the member/ office bearer of the political parties	1.8548	1.8165	1.8113	1.8202	0.294
8.	Sharing opinions before the other caste people	1.8226	1.8133	1.7264	1.7955	1.134
9.	Constructed the house with all basic facilities	1.1290	1.2595	1.5094	1.2975	14.958*
10.	Myself and my family members able to get better medical treatment	1.1129	1.2437	1.5189	1.2872	19.096*
11.	Children are educated through English medium school and got higher education	1.1613	1.2911	1.5094	1.3223	9.942*
12.	Provides more employment opportunities	1.1452	1.3449	1.5566	1.3657	11.943*

Source: Primary Data *Significant at 5 per cent level

Table 5.6 shows the mean score of social empowerment before mechanisation among the fishermen of mechanised boats, motorised vallam and motorised catamaran along with its respective 'F' statistics. The important social empowerment before mechanisation among the mechanised boats respondents are 'important position is given in the village' and 'family considers the advice to take decision' since their respective mean scores are 2.2000 and 2.0000. Among the motorised vallam respondents the important social empowerment variables are 'important position is given in the village' and 'village people ask advice to take decision' since their respective mean scores are 1.8956 and 1.8729. Among the motorised catamaran respondents the important social empowerment variables are 'important position is given in the village' and 'family considers the advice to take decision' since their respective mean scores are 1.9683 and 1.8396.

Regarding the social empowerment significant difference among the respondents of mechanised boats, motorised vallam and motorised catamaran, are identified in the case nine out of twelve variables since the respective 'F' statistics are significant at 5 per cent level.

5.4.2 Economic Empowerment before Mechanization

In order to find out the significant difference in economic empowerment before mechanisation among the respondents of mechanised boats, motorised vallam and motorised catamaran, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in economic empowerment before mechanisation among the respondents of mechanised boats, motorised vallam and motorised catamaran in Kanyakumari district". The result of 'ANOVA' is presented in the Table 5.7.

Table 5.7

Economic Empowerment before Mechanization

Sl. No	Economic Empowerment Before Mechanization	Type of Respondents				F Statistics
		Mechanised Boats	Mechanised Vallam	Mechanised Cattamaran	Total	
1.	Increase in income due to increased fish catch	2.4677	1.7278	1.6792	1.8120	2.940
2.	Because of more income, savings increased and able to buy own vehicle	1.7903	1.7746	1.6887	1.7578	1.072
3.	Increased savings helped to buy land near my village and in town	1.7419	1.7184	1.7048	1.7184	0.097
4.	Increased savings helped to deposit money in the bank	1.7149	1.7278	1.6604	1.7149	0.763
5.	Increased savings helped to buy gold ornaments and things for my family	1.2742	1.2532	1.5000	1.3099	9.666*
6.	Increased income helped to avoid borrowings from the local money lenders	1.1935	1.5285	1.6981	1.5227	19.570*
7.	Increased income helped to provide better nutritious food to my family members	1.2097	1.2563	2.2453	1.4669	5.946*
8.	Increased income helped to spent more on dress material to my family members	1.1129	1.2595	1.5189	1.2975	15.905*
9.	Better fish landing facilities improved the market conditions to sell fish at fair price	1.4355	1.8544	1.5755	1.7397	0.605
10.	Increased income helps to repair the craft and nets immediately	1.1774	1.5032	1.5283	1.4669	6.678*
11.	Increased savings helped to buy craft, net and fishing instruments	1.8226	1.9331	1.6887	1.8651	3.971*

Source: Primary Data *Significant at 5 per cent level

Table 5.7 shows the mean scores of economic empowerment before mechanisation among the respondents of mechanised boats, motorised vallam and motorised catamaran along with its respective 'F' statistics. The important economic

empowerment before mechanisation among the mechanised boats respondents are ‘increase in income due to increased fish catch’ and ‘increased savings helped to buy craft, net and fishing instruments’ since their respective mean scores are 2.4677 and 1.8226 and among the motorised vallam respondents the important economic empowerment variables are ‘increased savings helped to buy craft, net and fishing instruments’ and ‘better fish landing facilities improved the market conditions to sell fish at fair price’ since their respective mean scores are 1.9331 and 1.8544. Among the motorised catamaran respondents the important economic empowerment variables are ‘increased income helped to provide better nutritious food to my family members’ and ‘increased savings helped to buy land near my village and in town', since their respective mean scores are 2.2453 and 1.7048.

Regarding the economic empowerment before mechanisation significant difference among the respondents of mechanised boats, motorised vallam and motorised catamaran are identified in the case of six out of eleven variables since the respective ‘F’ statistics are significant at 5 per cent level.

5.5 SOCIO-ECONOMIC EMPOWERMENT AFTER MECHANIZATION

5.5.1 Social Empowerment after Mechanization

In order to find out the significant difference in social empowerment after mechanisation among the respondents of mechanised boats, motorised vallam and motorised catamaran in Kanyakumari district, ‘ANOVA’ is attempted with the null hypothesis, “there is no significant difference in social empowerment after mechanisation among the respondents of mechanised boats, motorised vallam and motorised catamaran in Kanyakumari district”. The result of ‘ANOVA’ is presented in the Table 5.8.

Table 5.8

Social Empowerment after Mechanization

Sl. No	Social Empowerment after Mechanization	Type of Respondents				F Statistics
		Mechanised Boats	Motorised Vallam	Motorised Cattamaran	Total	
1.	Family considers the advice to take decision	4.1452	4.1614	4.2170	4.1715	0.880
2.	Important position is given in the village committee	2.7419	2.8449	3.2264	2.9153	5.638*
3.	Village people ask advice to take decision	2.0000	2.0348	1.8019	1.9793	4.979*
4.	Fisherman sangam provides office bearer position	2.9355	2.8070	2.7642	2.8140	0.453
5.	Honoured as special guest in the religious and village functions	1.9032	1.8639	1.7547	1.8450	2.228
6.	Fisheries department extends invitation to deliver a speech during the fishermen training	1.8973	1.9747	1.6981	1.9050	7.317*
7.	Become the member/ office bearer of the political parties	2.9194	3.0918	3.1321	3.0785	0.640
8.	Sharing opinions before the other caste people	2.1452	2.1297	1.8019	2.0599	5.305*
9.	Constructed the house with all basic facilities	4.7903	4.5918	4.4906	4.5950	2.515
10.	Myself and my family members able to get better medical treatment	4.8751	4.7627	4.6792	4.7603	3.172*
11.	Children are educated through English medium school and got higher education	4.7419	4.6677	4.5377	4.6488	1.769
12.	Provides more employment opportunities	4.7258	4.5316	4.4717	4.5434	2.298

Source: Primary Data *Significant at 5 per cent level

Table 5.8 shows the mean score of social empowerment after mechanisation among the respondents of mechanised boats, motorised vallam and motorised catamaran along with its respective 'F' statistics. The important social empowerment after mechanisation among the mechanised boats respondents are 'myself and my

family members are able to get better medical treatment' and 'constructed the house with all basic facilities' since their respective mean scores are 4.8751 and 4.7903 and among the motorised vallam respondents the important empowerment variables are 'myself and my family members are able to get better medical treatment' and 'children are educated through English medium school and got higher education' since their respective mean scores are 4.7627 and 4.6677. Among the motorised catamaran respondents the important empowerment variables are 'myself and my family members are able to get better medical treatment' and 'children are educated through English medium school and got higher education' since their respective mean scores are 4.6792 and 4.5377.

Regarding the social empowerment after mechanisation, the significant difference among the respondents of mechanised boats, motorized vallam and motorised catamaran are identified in the case of five out of twelve empowerment variables since the respective 'F' statistics are significant at 5 per cent level.

5.5.2 Economic Empowerment after Mechanization

In order to find out the significant difference in economic empowerment after mechanisation among the respondents of mechanised boats, motorised vallam and motorised catamaran in Kanyakumari district, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in economic empowerment after mechanisation among the respondents of mechanised boats, motorised vallam and motorised catamaran in Kanyakumari district". The result of 'ANOVA' is presented in the Table 5.9.

Table 5.9

Economic Empowerment after Mechanization

Sl. No	Economic Empowerment after Mechanization	Type of Respondents				F Statistics
		Mechanised Boats	Motorised Vallam	Motorised Cattamaran	Total	
1.	Increase in income due to increased fish catch	4.1452	4.1962	4.3113	4.2149	1.614
2.	Because of more income, savings increased and able to buy own vehicle	3.0323	3.2468	3.1415	3.1963	0.778
3.	Increased savings helped to buy land near my village and in town	2.2903	3.3956	3.5094	3.2789	20.465*
4.	Increased savings helped to deposit money in the bank	1.9355	2.4778	2.0283	2.3099	10.576*
5.	Increased savings helped to buy gold ornaments and things for my family	4.4677	4.5190	4.2830	4.4607	2.386
6.	Increased income helped to avoid borrowings from the local money lenders	4.6774	2.9778	2.5660	3.1054	52.275*
7.	Increased income helped to provide better nutritious food to my family members	4.7581	4.6772	4.5660	4.6632	1.556
8.	Increased income helped to spent more on dress material to my family members	4.8871	4.7025	4.5755	4.6983	5.150*
9.	Better fish landing facilities improved the market conditions to sell fish at fair price	3.8226	3.3639	3.2736	3.4029	2.761
10.	Increased income helps to repair the craft and nets immediately	4.6452	4.1899	4.1698	4.2438	4.733*
11.	Increased savings helped to buy craft, net and fishing instruments	2.3387	2.0411	1.7830	2.0227	6.076*

Source: Primary Data *Significant at 5 per cent level

Table 5.9 shows the mean score of economic empowerment of respondents after mechanisation along with its respective 'F' statistics. The important economic empowerment among the respondents of mechanised boats are 'increased income helped to spent more on dress material to my family members' and 'increased income

helped to provide better nutritious food for my family members, since their respective mean scores are 4.8871 and 4.7581. Among the respondents of motorised vallam, the important economic empowerment variables are 'increased income helped to spent more on dress material to my family members' and 'increased income helped to provide better nutritious food for my family members' since their respective mean scores are 4.7025 and 4.6772. Among the respondents of motorised catamaran, the important economic empowerment variables are 'increased income helped to spent more on dress material to my family members' and 'increased income helped to provide better nutritious food for my family members' since their respective mean scores are 4.5755 and 4.5660.

Regarding the economic empowerment, the significant difference among the respondents of mechanised boats, motorised vallam and motorised catamaran, are identified in the case of six out of eleven variables since the respective 'F' statistics are significant at 5 per cent level, the null hypothesis is rejected.

5.6 SOCIAL EMPOWERMENT AFTER MECHANIZATION AND PROFILE OF THE RESPONDENTS

5.6.1 Social Empowerment after Mechanization among Different Age group of Respondents

In order to find out the significant difference in social empowerment after mechanisation among the different age group of respondents, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in social empowerment after mechanisation among the different age group of respondents in Kanyakumari district". The result of 'ANOVA' for social empowerment after mechanization among different age group of respondents is presented in the Table 5.10.

Table 5.10

Social Empowerment after Mechanization among Different Age group

Sl. No	Social Empowerment after Mechanization	Age					F Statistics
		Below 25	26-35	36-45	46-55	Above 55	
1.	Family considers the advice to take decision	4.0909	4.2177	4.1721	4.1518	4.0455	1.092
2.	Important position is given in the village committee	2.9091	2.8468	2.9767	2.9018	2.7727	0.374
3.	Village people ask advice to take decision	2.1818	2.0161	1.9721	1.9375	1.9545	0.472
4.	Fisherman sangam provides office bearer position	2.9190	2.8387	2.9023	2.6161	2.6727	1.195
5.	Honoured as special guest in the religious and village functions	2.1818	1.8548	1.7767	1.9117	1.9554	2.852*
6.	Fisheries department extends invitation to deliver a speech during the fishermen training	2.2818	2.0152	1.8140	1.9196	1.8975	2.518*
7.	Become the member/ office bearer of the political parties	3.0909	3.2903	3.0744	2.9107	2.7727	1.802
8.	Sharing opinions before the other caste people	2.0599	2.1129	1.9535	2.2143	1.9545	1.697
9.	Constructed the house with all basic facilities	4.2984	4.8182	4.7349	4.6786	4.3636	6.534*
10.	Myself and my family members able to get better medical treatment	4.5722	4.7097	4.8419	4.9091	4.7603	5.389*
11.	Children are educated through English medium school and got higher education	3.2273	4.6048	4.8047	4.7054	4.6488	28.223*
12.	Provides more employment opportunities	4.7581	4.5434	4.6512	4.3661	3.2727	24.524*

Source: Primary Data * Significant at 5 per cent level

From the above Table 5.10, it is understood that the important social empowerment variables among respondents of below 25 years are ‘provides more employment opportunities’ and ‘myself and my family members able to get better medical treatment’ as their mean scores are 4.7581 and 4.5722 respectively.

The important social empowerment variables among respondents of 26 to 35 years are 'constructed the house with all basic facilities' and 'myself and my family members able to get better medical treatment' as their mean scores are 4.8182 and 4.7097. Among the age group of 36 to 45 years the important social empowerment variables are 'myself and my family members able to get better medical treatment' and 'children are educated through English medium school and got higher education as their mean scores are 4.8419 and 4.8047. Among the age group of 46 to 55 years the important social empowerment variables are 'myself and my family members able to get better medical treatment' and 'children are educated through English medium school and got higher education' as their mean scores are 4.9091 and 4.7054. The important social empowerment variables among the age group of above 55 years are 'myself and my family members able to get better medical treatment' and 'children are educated through English medium school and got higher education' as their mean scores are 4.7603 and 4.6488.

Regarding the social empowerment among the different age group of respondents, significant difference exists in six out of twelve variables since the respective "F" statistics were significant at 5 per cent level.

5.6.2 Social Empowerment after Mechanization among Different Marital Status of Respondents

In order to find out the significant difference in social empowerment after mechanisation among the different marital status of respondents in Kanyakumari district, 't' test is attempted with the null hypothesis, "there is no significant difference in social empowerment after mechanisation among the different marital status of respondents in Kanyakumari district". The result of 't' test for social

empowerment after mechanization among different marital status of fishermen is presented in the Table 5.11.

Table 5.11

Social Empowerment after Mechanization among Different Marital Status of Respondents

Sl. No	Social Empowerment after Mechanization	Marital Status		T Statistics
		Unmarried	Married	
1.	Family considers the advice to take decision	4.1087	4.1781	1.095
2.	Important position is given in the village committee	2.8478	2.9224	0.043
3.	Village people ask advice to take decision	2.2391	1.9524	2.804*
4.	Fisherman sangam provides office bearer position	2.9565	2.7991	0.886
5.	Honoured as special guest in the religious and village functions	2.2609	1.8014	5.927*
6.	Fisheries department extends invitation to deliver a speech during the fishermen training	2.9602	1.8676	3.947*
7.	Become the member/ office bearer of the political parties	2.7826	3.1096	1.723
8.	Sharing opinions before the other caste people	2.4565	2.0183	3.061*
9.	Constructed the house with all basic facilities	4.3913	4.6164	1.733
10.	Myself and my family members able to get better medical treatment	4.4783	4.7900	3.931*
11.	Children are educated through English medium school and got higher education	4.4348	4.4612	2.054
12.	Provides more employment opportunities	4.7391	4.5228	1.837

Source: Primary Data *Significant at 5 per cent level

Table 5.11 clearly shows that the important social empowerment variables among the unmarried respondents are ‘provides more employment opportunities’ and ‘myself and my family members able to get better medical treatment’ as the mean scores are 4.7391 and 4.4783 respectively. Among the married respondents the important social empowerment variables are ‘myself and my family members able to

get better medical treatment' and 'constructed the house with all basic facilities' since their mean scores are 4.7900 and 4.6164 respectively.

The analysis reveals that there is a significant difference in the social empowerment among the different marital status of respondents in the five out of twelve social empowerment variables since the respective "t" statistics are significant at 5 per cent level.

5.6.3 Social Empowerment after Mechanization among Different Caste Categories of Respondents

In order to find out the significant difference in social empowerment after mechanisation among the different caste categories of respondents, 't' test is attempted with the null hypothesis, "there is no significant difference in social empowerment after mechanisation among the different caste categories of respondents in Kanyakumari district". The result of 't' test for social empowerment after mechanization among different caste categories of respondents is presented in the Table 5.12.

Table 5.12

Social Empowerment after Mechanization among Different Caste Categories of Respondents

Sl. No	Social Empowerment after Mechanization	Caste		't' Statistics
		Mukkuvar	Bharavar	
1.	Family considers the advice to take decision	4.1888	4.0364	2.619*
2.	Important position is given in the village committee	2.9930	2.3091	4.373*
3.	Village people ask advice to take decision	1.9184	2.4545	5.814*
4.	Fisherman sangam provides office bearer position	2.7995	2.9273	0.777
5.	Honoured as special guest in the religious and village functions	1.8555	1.7636	1.240
6.	Fisheries department extends invitation to deliver a speech during the fishermen training	3.1119	2.8182	1.710
7.	Become the member/ office bearer of the political parties	2.0793	1.9091	1.675
8.	Sharing opinions before the other caste people	4.9091	4.5548	1.276
9.	Constructed the house with all basic facilities	4.9273	4.7389	2.970*
10.	Myself and my family members able to get better medical treatment	4.9123	4.6131	2.547*
11.	Children are educated through English medium school and got higher education	4.8909	4.4988	2.967*
12.	Provides more employment opportunities	4.2075	4.2727	3.640*

Source: Primary Data * Significant at 5 per cent level

Table 5.12 reveals that the important social empowerment variables among the respondents belongs to Mukkuvar community are 'constructed the house with all basic facilities' and 'myself and my family members able to get better medical treatment', since their mean scores are 4.9273 and 4.9123 respectively. Among the Bharavar community respondents the important social empowerment variables are 'constructed the house with all basic facilities' and 'myself and my family members able to get better medical treatment', since their mean scores are 4.7389 and 4.6131 respectively.

The analysis reveals that there exists significant difference among the different caste communities of the respondents as regards seven out of twelve social empowerment variables since their respective "t" statistics are significant at 5 per cent level.

5.6.4 Social Empowerment after Mechanization among the Respondents with Different Educational Qualification

In order to find out the significant difference in social empowerment after mechanisation among the respondents with different educational qualification 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in social empowerment after mechanisation among the respondents with different educational qualification in Kanyakumari district". The result of 'ANOVA' is presented in the Table 5.13.

Table 5.13

Social Empowerment after Mechanization among the Respondents with Different Educational Qualification

Sl. No	Social Empowerment after Mechanization	Educational Qualification					F Statistics
		Illiterate	Primary	Middle	High School	Higher secondary school	
1.	Family considers the advice to take decision	4.0472	4.1977	4.1024	4.2667	4.1715	2.656*
2.	Important position is given in the village committee	3.1927	2.6554	3.1024	2.2667	4.0000	6.202*
3.	Village people ask advice to take decision	1.7798	1.9435	2.1687	1.7333	1.9793	5.401*
4.	Fisherman sangam provides office bearer position	3.4771	2.5480	2.7530	2.2000	2.8140	11.641*
5.	Honoured as special guest in the religious and village functions	1.7156	1.8644	1.9036	1.7334	1.8450	2.314*
6.	Fisheries department extends invitation to deliver a speech during the fishermen training	1.7615	1.9050	1.8644	2.0482	1.7333	3.139*
7.	Become the member/ office bearer of the political parties	3.1284	3.2034	3.0723	3.0785	2.0000	3.688*
8.	Sharing opinions before the other caste people	1.7431	2.1582	2.1747	1.8667	2.0599	3.662*
9.	Constructed the house with all basic facilities	3.6000	4.7514	4.3735	4.8624	4.5950	11.716*
10.	Myself and my family members able to get better medical treatment	4.2667	4.7853	4.7169	4.8991	4.7603	6.292*
11.	Children are educated through English medium school and got higher education	4.1237	4.5876	4.6325	4.8532	4.6488	3.100*
12.	Provides more employment opportunities	3.8667	4.5932	4.5843	4.7523	4.5434	28.321*

Source: Primary Data *Significant at 5 per cent level

From the above Table 5.13, the important social empowerment variables among the respondents who are illiterates are ‘myself and my family members able to get better medical treatment’ and ‘children studied through English medium school and got higher education’ as their mean scores are 4.2667 and 4.1237 respectively.

Among the respondents who have studied up to primary school, the important social empowerment variables are ‘myself and my family members able to get better medical treatment’ and ‘constructed your house with all basic facilities’ as their mean scores are 4.7853 and 4.7514 respectively.

Among the respondents who have studied up to middle school, the important social empowerment variables are ‘myself and my family members able to get better medical treatment’ and ‘children are educated through English medium school and got higher education’ as their mean scores are 4.7169 and 4.6325. Among the respondents who have studied up to high school, the important social empowerment variables are ‘myself and my family members able to get better medical treatment’ and ‘children are educated through English medium school and got higher education’ as their mean scores are 4.8991 and 4.8532 respectively.

Among the respondents who have studied up to higher secondary school, the important social empowerment variables are ‘myself and my family members able to get better medical treatment’ and your children are educated through English medium school and got higher education’ as their mean score are 4.7603 and 4.6488.

The analysis reveals that there exists significant difference among the respondents having different educational qualification as regards all the social empowerment variables since their respective “F” statistics are significant at 5 per cent level.

5.6.5 Social Empowerment after Mechanization among the Respondent's Family System

In order to find out the significant difference in social empowerment after mechanisation among the respondent's family system 't' test is attempted with the null hypothesis, "there is no significant difference in social empowerment after mechanisation among the respondent's family status in Kanyakumari district". The result of the 't' test is presented in the Table 5.14.

Table 5.14

Social Empowerment after Mechanization among the Respondent's Family System

Sl. No	Social Empowerment after Mechanization	Family system		't' Statistics
		Joint family	Nuclear family	
1.	Family considers the advice to take decision	4.1509	4.1782	0.604
2.	Important position is given in the village committee	2.8396	2.9415	0.832
3.	Village people ask advice to take decision	2.1321	1.9362	2.689*
4.	Fisherman sangam provides office bearer position	2.6698	2.8484	1.418
5.	Honoured as special guest in the religious and village functions	2.0472	1.7872	4.655*
6.	Fisheries department extends invitation to deliver a speech during the fishermen training	2.2358	1.8112	6.127*
7.	Become the member/ office bearer of the political parties	2.9811	3.1011	0.888
8.	Sharing opinions before the other caste people	2.2736	2.0000	2.682*
9.	Constructed the house with all basic facilities	4.6064	4.6672	0.640
10.	Myself and my family members able to get better medical treatment	4.7819	4.6492	1.799
11.	Children are educated through English medium school and got higher education	4.6676	4.5755	1.122
12.	Provides more employment opportunities	4.6604	4.5080	1.822

Source: Primary Data *Significant at 5 per cent level

Table 5.14 shows that the important social empowerment variables among the respondents who belong to joint family system are ‘myself and my family members able to get better medical treatment’ and ‘children are educated through English medium school and got higher education’ as their mean scores are 4.7819 and 4.6676 respectively. Among the respondents who belongs to nuclear family system the important social empowerment variables are ‘constructed the house with all basic facilities’ and ‘myself and my family members able to get better medical treatment’ as their mean scores are 4.6672 and 4.6492.

The analysis reveals that there exists significant difference among the different family status of the respondents as regards four out of twelve social empowerment variables since their respective “t” statistics are significant at 5 per cent level.

5.6.6 Social Empowerment after Mechanization among Respondent’s Monthly Income

In order to find out the significant difference in social empowerment after mechanisation among the respondent’s monthly income ‘ANOVA’ is attempted with the null hypothesis, “there is no significant difference in social empowerment after mechanisation among the respondent’s monthly income in Kanyakumari district”. The result of ‘ANOVA’ is presented in the Table 5.15.

Table 5.15

Social Empowerment after Mechanization among Respondent's Monthly Income

Sl. No	Social Empowerment after Mechanization	Average monthly income					'F' Statistics
		Below 25000	25000-50000	50001-75000	75001-100000	Above 100000	
1.	Family considers the advice to take decision	4.2410	4.1675	4.3077	4.1613	4.2410	0.983
2.	Important position is given in the village committee	2.8333	2.8579	3.2308	2.8226	3.0000	0.660
3.	Village people ask advice to take decision	2.0641	2.0152	2.0000	2.0484	1.7229	3.557*
4.	Fisherman sangam provides office bearer position	2.8846	2.8883	3.3846	2.6935	2.6145	1.851
5.	Honoured as special guest in the religious and village functions	2.0385	1.7817	1.8462	1.8548	1.6988	5.098*
6.	Fisheries department extends invitation to deliver a speech during the fishermen training	2.2308	1.8122	1.8542	1.7903	1.8434	6.479*
7.	Become the member/ office bearer of the political parties	2.5513	3.3706	2.9231	2.7742	3.3133	8.402*
8.	Sharing opinions before the other caste people	2.0345	1.9340	1.8468	2.3710	2.1205	2.846*
9.	Constructed the house with all basic facilities	4.1179	4.7614	4.3077	4.6290	4.7349	7.110*
10.	Myself and my family members able to get better medical treatment which helps to maintain the health	4.1205	4.9289	4.6923	4.6774	4.9036	25.564*
11.	Children are educated through English medium school and got higher education	4.1359	4.8731	4.0769	4.5645	4.8072	12.148*
12.	Provides more employment opportunities	4.2051	4.8782	4.1538	4.3548	4.5422	10.915*

Source: Primary Data *Significant at 5 per cent level

Table 5.15 clearly reveals that the important social empowerment variables among the respondents who are earning average monthly income of below Rs.25,000 are 'family considers the advice to take decision' and 'provides more employment opportunities' as their mean scores are 4.2410 and 4.2051 respectively. Among the respondents who are earning monthly income of Rs.25,000-50,000, Rs.50,001-75,000, Rs.75,001-1,00,000 and above Rs.1,00,000 the important social empowerment

variable is ‘myself and my family members able to get better medical treatment which helps to maintain the health’ as the mean score is 4.9289, 4.6923, 4.6774 and 4.9036 respectively.

The analysis reveals that there exists significant difference among the respondent’s monthly income regarding nine out of twelve social empowerment variables since their respective “F” statistics were significant at 5 per cent level.

5.7 ECONOMIC EMPOWERMENT AFTER MECHANIZATION AMONG THE RESPONDENTS

5.7.1 Economic Empowerment after Mechanization among the Respondents of Different Age Group

In order to find out the significant difference in the economic empowerment after mechanisation among the respondents of different age group ‘ANOVA’ is attempted with the null hypothesis, “there is no significant difference in economic empowerment after mechanisation among the respondents of different age group in Kanyakumari district”. The result of ‘ANOVA’ is presented in the Table 5.16.

Table 5.16

Economic Empowerment after Mechanization among the Respondents of Different Age Group

Sl. No	Economic Empowerment after Mechanization	Age					F Statistics
		Below 25	26-35	36-45	46-55	Above 55	
1.	Increase in income due to increased fish catch	4.2149	4.4355	4.2465	3.9464	4.0455	9.205*
2.	Because of more income, savings increased and able to buy own vehicle	3.7273	3.5000	3.0465	3.0714	3.3182	3.038*
3.	Increased savings helped to buy land near my village and in town	3.2789	3.1210	3.2558	3.3929	4.0455	2.713*
4.	Increased savings helped to deposit money in the bank	3.5455	1.9597	2.2186	2.5804	3.1818	12.582*
5.	Increased savings helped to buy gold ornaments and things for my family	3.3636	4.7177	4.5349	4.1696	4.3182	9.332*
6.	Increased income helped to avoid borrowings from the local money lenders	1.9091	2.9919	4.4545	3.3393	3.1023	7.090*
7.	Increased income helped to provide better nutritious food to my family members	4.0000	4.7661	4.6837	4.6339	4.3636	4.083*
8.	Increased income helped to spend more on dress material to the family members	4.6983	4.7984	4.6930	4.6875	4.4654	2.953*
9.	Better fish landing facilities improved the market conditions to sell fish at fair price	2.8182	3.1694	3.6140	3.5625	2.1364	6.328*
10.	Increased income helps to repair the craft and nets immediately	4.2438	4.7500	4.1395	4.1518	3.2727	14.088*
11.	Increased savings helped to buy craft, net and fishing instruments	2.0227	2.1532	1.8558	2.1696	1.9545	3.097*

Source: Primary Data *Significant at 5 per cent level

Table 5.16 clearly reveals that the important economic empowerment among the respondents in the age group of below 25 years are ‘increased income helped to spend more on dress material to the family members’ and ‘increased income helps to repair the crafts and nets’ since their mean scores are 4.6983 and 4.2438 respectively.

Among the respondents in the age group of 26 to 35 years the important economic empowerment variables are ‘increased income helped to spend more on dress material to my family members’ and ‘increased income helped to provide better nutritious food for the family members’ as their mean scores are 4.7984 and 4.7661.

Among the respondents in the age group of 36 to 45 years the important economic empowerment variables are ‘increased income helped to spend more on dress material to the family members’ and ‘increased income helped to provide better nutritious food for the family members’ as their mean scores are 4.6930 and 4.6837. As regards the respondents in the age group of 46 to 55 years the important economic empowerment variables are ‘increased income helped to spend more on dress material to the family members’ and ‘increased income helped to provide better nutritious food for the family members’ as their mean score are 4.6875 and 4.6339. Among the respondents in the age group of above 55 years the important economic empowerment variables are ‘increased income helped to spend more on dress material to the family members’ and ‘increased income helped to provide better nutritious food for the family members’ as their mean scores are 4.4654 and 4.3636.

The analysis reveals that there exists significant difference among the respondents of different age groups as regards all the eleven economic empowerment variables since their respective “F” statistics are significant at 5 per cent level.

5.7.2 Economic Empowerment after Mechanization among Respondents of Different Marital Status

In order to find out the significant difference in economic empowerment after mechanisation among the different marital status of respondents 't' test is attempted with the null hypothesis, "there is no significant difference in economic empowerment after mechanisation among the different marital status of the respondents in Kanyakumari district". The result of 't' test is presented in the Table 5.17.

Table 5.17

Economic Empowerment after Mechanization among Different Marital Status of Respondents

Sl. No	Economic Empowerment after Mechanization	Marital Status		T Statistics
		Unmarried	Married	
1.	Increase in income due to increased fish catch	4.2055	4.3043	0.968
2.	Because of more income, savings increased and able to buy own vehicle	3.1461	3.6739	2.557*
3.	Increased savings helped to buy land near my village and in town	3.3082	3.0000	1.459
4.	Increased savings helped to deposit money in the bank	2.2900	2.5000	1.199
5.	Increased savings helped to buy gold ornaments and things for my family	4.4840	4.2391	1.639
6.	Increased income helped to avoid borrowings from the local money lenders	3.0548	4.7826	4.329*
7.	Increased income helped to provide better nutritious food to my family members	4.6621	4.6739	0.105
8.	Increased income helped to spent more on dress material to my family members	4.6845	4.5870	0.979
9.	Better fish landing facilities improved the market conditions to sell fish at fair price	3.4155	3.2826	0.553
10.	Increased income helps to repair the craft and nets immediately	4.2146	4.5217	1.789
11.	Increased savings helped to buy craft, net and fishing instruments	1.9886	2.3478	2.282*

Source: Primary Data *Significant at 5 per cent level

Table 5.17 shows that the important economic empowerment variables among the unmarried respondents are ‘increased income helped to spent more on dress material to the family members’ and ‘increased income helped to provide better nutritious food for the family members’ as their mean scores are 4.6845 and 4.6621. Among the married respondents the important economic empowerment variables are ‘increased income helped to avoid borrowings from the local money lenders’ and ‘increased income helped to provide better nutritious food for the family members’ as the mean scores are 4.7826 and 4.6739 respectively.

The analysis reveals that there exists significant difference among the different marital status of the respondents as regards three out of eleven economic empowerment variables since their respective “t” statistics were significant at 5 per cent level.

5.7.3 Economic Empowerment after Mechanization among Different Caste Categories of Respondents

In order to find out the significant difference in economic empowerment after mechanisation among the different caste categories of respondents ‘t’ test is attempted with the null hypothesis, “there is no significant difference in economic empowerment after mechanisation among the different caste categories of the respondents in Kanyakumari district”. The result of ‘t’ test is presented in the Table 5.18.

Table 5.18

Economic Empowerment after Mechanization among Different Caste Categories of the Respondents

Sl. No	Economic Empowerment after Mechanization	Caste		t Statistics
		Mukkuvar	Bharavar	
1.	Increase in income due to increased fish catch	3.2914	2.4545	4.447*
2.	Because of more income, savings increased and able to buy own vehicle	3.4056	2.2909	5.900*
3.	Increased savings helped to buy land near my village and in town	2.3660	1.8727	3.072*
4.	Increased savings helped to deposit money in the bank	4.9818	4.3939	4.329*
5.	Increased savings helped to buy gold ornaments and things for my family	3.0929	3.2182	0.600
6.	Increased income helped to avoid borrowings from the local money lenders	4.8364	4.6410	1.893
7.	Increased income helped to provide better nutritious food to my family members	4.7455	4.0667	3.202*
8.	Increased income helped to spent more on dress material to my family members	3.2914	4.2727	4.508*
9.	Better fish landing facilities improved the market conditions to sell fish at fair price	4.2471	4.2182	0.182
10.	Increased income helps to repair the craft and nets immediately	2.0466	1.8364	1.441
11.	Increased savings helped to buy craft, net and fishing instruments	4.2155	3.9566	1.547

Source: Primary Data *Significant at 5 per cent level

Table 5.18 indicates that the important economic empowerment variables among respondents belonging to Mukkuvar community are ‘increased savings helped to deposit money in the bank’ and ‘increased income helped to avoid borrowings from the local money lenders’ as their mean scores are 4.9818 and 4.8364 respectively. Among the respondents belonging to Bharavar community the important economic empowerment variables are ‘increased income helped to avoid borrowings from the local money lenders’ and ‘increased savings helped to deposit money in the bank’ as their mean scores are 4.6410 and 4.3939.

The analysis reveals that there exists significant difference among the different caste communities of respondents regarding six out of eleven economic empowerment variables since their respective “t” statistics were significant at 5 per cent level.

5.7.4 Economic Empowerment after Mechanization among the Respondents of Different Educational Qualifications

In order to find out the significant difference in economic empowerment after mechanisation among the different educational qualification of respondents ‘ANOVA’ is attempted with the null hypothesis, “there is no significant difference in economic empowerment after mechanisation among the different educational qualification of respondents in Kanyakumari district”. The result of ‘ANOVA’ is presented in the Table 5.19.

Table 5.19

Economic Empowerment after Mechanization among Different Educational Qualifications of Respondents

Sl. No	Economic Empowerment after Mechanization	Educational Qualification					'F' Statistics
		Illiterate	Primary	Middle	High School	Higher secondary school	
1.	Increase in income due to increased fish catch	4.2000	4.2349	4.2149	4.5385	4.2542	3.233*
2.	Because of more income, savings increased and able to buy own vehicle	3.0000	3.5060	4.0000	2.7156	3.1412	6.255*
3.	Increased savings helped to buy land near my village and in town	2.8667	3.3735	3.2789	2.7706	3.4520	5.774*
4.	Increased savings helped to deposit money in the bank	2.3735	2.1356	2.3099	3.6250	2.1927	7.554*
5.	Increased savings helped to buy gold ornaments and things for my family	3.6667	4.4819	4.4607	4.4440	4.2994	7.206*
6.	Increased income helped to avoid borrowings from the local money lenders	2.9333	2.8373	3.1054	3.4128	3.2768	4.189*
7.	Increased income helped to provide better nutritious food to my family members	3.6000	4.6205	4.6632	4.2807	4.7175	12.500*
8.	Increased income helped to spent more on dress material to my family members	3.9000	4.6325	4.2438	4.5073	4.7797	5.922*
9.	Better fish landing facilities improved the market conditions to sell fish at fair price	3.3333	3.7651	3.4029	3.6147	3.0169	5.632*
10.	Increased income helps to repair the craft and nets immediately	3.9667	4.1687	4.6983	4.5222	4.2994	3.449*
11.	Increased savings helped to buy craft, net and fishing instruments	2.1627	1.9435	2.9333	2.3750	1.7615	5.261*

Source: Primary Data *Significant at 5 per cent level

From the above Table 5.19, the important economic empowerment variables among the illiterate respondents are 'increase in income due to increased fish catch' and 'increased income helps to repair the craft and nets' as their mean scores are 4.2000 and 3.9667 respectively. Among the respondents having primary school

education the important economic empowerment variables are ‘increased income helped to spent more on dress material to the family members’ and ‘increased income helped to provide better nutritious food for the family members’ as their mean scores are 4.6325 and 4.6205.

Among the respondents having middle school education the important economic empowerment variables are ‘increased income helps to repair the craft and nets’ and ‘increased income helped to provide better nutritious food for the family members’ as their mean score are 4.6983 and 4.6632. As regards the respondents having high school education the important economic empowerment variables are ‘increase in income due to increased fish catch’ and ‘increased income helps to repair the craft and nets’ as their mean scores are 4.5385 and 4.5222 respectively. Among the respondents having higher secondary school education the important economic empowerment variables are ‘increased income helped to spent more on dress material to the family members’ and ‘increased income helped to provide better nutritious food for the family members as the mean scores are 4.7797 and 4.7175.

The analysis reveals that there exists significant difference among the respondents of different educational qualification as regards all the economic empowerment since their respective “F” statistics are significant at 5 per cent level.

5.7.5 Economic Empowerment after Mechanization among Respondents of Different Family Status

In order to find out the significant difference in economic empowerment after mechanisation among the different family status of respondents‘t’ test is attempted with the null hypothesis, “there is no significant difference in economic empowerment after mechanisation among the respondents of different family status in Kanyakumari district”. The result of ‘t’ test is presented in the Table 5.20.

Table 5.20

Economic Empowerment after Mechanization among Different Family System of Respondents

Sl. No	Economic Empowerment after Mechanization	Family system		t Statistics
		Joint family	Nuclear family	
1.	Increase in income due to increased fish catch	4.1516	4.4245	3.823*
2.	Because of more income, savings increased and able to buy own vehicle	3.8774	3.0106	6.100*
3.	Increased savings helped to buy land near my village and in town	3.3113	3.2660	0.302
4.	Increased savings helped to deposit money in the bank	2.2547	2.3271	0.581
5.	Increased savings helped to buy gold ornaments and things for my family	4.1415	4.5189	2.727*
6.	Increased income helped to avoid borrowings from the local money lenders	3.7075	2.9255	4.922*
7.	Increased income helped to provide better nutritious food to my family members	4.2463	4.7170	3.288*
8.	Increased income helped to spent more on dress material to my family members	4.2981	4.4968	0.919
9.	Better fish landing facilities improved the market conditions to sell fish at fair price	3.4057	3.3936	0.071
10.	Increased income helps to repair the craft and nets immediately	4.1968	4.3962	1.635
11.	Increased savings helped to buy craft, net and fishing instruments	2.1509	1.9867	1.463

Source: Primary Data *Significant at 5 per cent level

Table 5.20 shows that the important economic empowerment variables among the respondents belongs to joint family system are ‘increased income helped to spend more on dress material to the family members’ and ‘increased income helped to provide better nutritious food for the family members’ since the mean scores are 4.2981 and 4.2463 respectively. Among the respondents belongs to nuclear family

system the important economic empowerment variables are ‘increased income helped to provide better nutritious food for the family members’ and ‘increased savings helped to buy gold ornaments and things for the family’ since their mean scores are 4.7170 and 4.5189.

The analysis reveals that there exists significant difference among the respondents belonging to different family status as regards five out of eleven economic empowerment variables since their respective “t” statistics are significant at 5 per cent level.

5.7.6 Economic Empowerment after Mechanization among Respondents Having Different Monthly Income

In order to find out the significant difference in economic empowerment after mechanisation among the respondents having different monthly income ‘ANOVA’ is attempted with the null hypothesis, “there is no significant difference in economic empowerment after mechanisation among the respondents having different average monthly income in Kanyakumari district”. The result of ‘ANOVA’ is presented in the Table 5.21

Table 5.21

Economic Empowerment after Mechanization among the Respondents Having Different Monthly Income

Sl. No	Economic Empowerment after Mechanization	Average Monthly Income					F Statistics
		Below 25000	25000-50000	50001-75000	75001-100000	Above 100000	
1.	Increase in income due to increased fish catch	4.2871	4.2308	4.1538	4.1827	4.3373	1.784
2.	Because of more income, savings increased and able to buy own vehicle	3.2903	3.6667	3.0769	2.9188	3.4578	5.547*
3.	Increased savings helped to buy land near my village and in town	4.2097	3.3333	3.1538	2.7107	3.6988	19.987*
4.	Increased savings helped to deposit money in the bank	2.3226	2.8462	2.0000	2.0812	2.1687	7.586*
5.	Increased savings helped to buy gold ornaments and things for my family	4.2710	4.5000	4.3077	4.5279	4.6024	0.672
6.	Increased income helped to avoid borrowings from the local money lenders	2.5968	3.6795	2.3077	3.3350	2.4217	12.339*
7.	Increased income helped to provide better nutritious food to my family members	4.3581	4.6667	4.5385	4.8675	4.8731	14.040*
8.	Increased income helped to spent more on dress material to my family members	4.3387	4.5897	4.4615	4.7711	4.7340	16.566*
9.	Better fish landing facilities improved the market conditions to sell fish at fair price	3.2903	3.3333	2.6154	3.4569	3.8675	2.700*
10.	Increased income helps to repair the craft and nets immediately	4.1290	3.7821	4.0000	4.2530	4.5787	8.525*
11.	Increased savings helped to buy craft, net and fishing instruments	2.0484	2.4872	1.8462	1.9797	1.4940	10.678*

Source: Primary Data *Significant at 5 per cent level

Table 5.21 clearly reveals that the important economic empowerment variable among the respondents who are earning monthly income of below Rs.25,000, Rs.25,000-50,000, Rs.50,001-75,000, Rs.75,001-1,00,000 and above Rs.1,00,000 is ‘increased income helped to provide better nutritious food for the family members’ as the mean score is 4.3581, 4.6667, 4.5385, 4.8675 and 4.8731 respectively.

Among the respondents having different monthly income there exists significant difference as regards nine out of eleven economic empowerment variables since the respective "F" statistics were significant at 5 per cent level.

5.8 SOCIO-ECONOMIC EMPOWERMENT DURING PRE AND POST-MECHANISATION

5.8.1 Respondent's Social Empowerment

In order to find out the significant difference in social empowerment in pre- and post mechanisation paired sample 't' test is attempted with the null hypothesis "there is no significant difference in social empowerment before and after mechanization among the respondents". The result is presented in the Table 5.22.

Table 5.22

Social Empowerment during Pre and Post-Mechanization

Social Empowerment Variables	Mean		Paired Samples Test		
	Pre-Mechanisation	Post-Mechanisation	t Value	Df	p Value
Family considers the advice to take decision	1.8636	4.1715	66.082	483	0.000
Important position is given in the village committee	1.8967	2.9153	20.984	483	0.000
Village people ask advice to take decision	1.8264	1.9793	5.167	483	0.000
Fisherman sangam provides office bearer position	1.8574	2.8140	17.308	483	0.000
Honoured as special guest in the religious and village functions	1.8079	1.8450	2.375	483	0.000
Fisheries department extends invitation to deliver a speech during the fishermen training	1.8058	1.9050	4.813	483	0.000
Become the member/ office bearer of the political parties	1.8202	3.0785	21.690	483	0.000
Sharing opinions before the other caste people	1.7955	2.0599	5.585	483	0.000
Constructed the house with all basic facilities	1.2975	4.5950	62.480	483	0.000
Myself and my family members able to get better medical treatment which helps to maintain the health	1.2872	4.7603	82.867	483	0.000
Children are educated through English medium school and got higher education	1.3223	4.6488	67.459	483	0.000
Provides more employment opportunities	1.3657	4.5434	58.375	483	0.000

Source: Computed data

Since the p value for all the social empowerment variables is less than 0.05, the null hypothesis is rejected. It shows that there exist significant differences in all the social empowerment variables among the respondents. Hence it is concluded that mechanisation has impacted on the social empowerment.

5.8.2 Economic Empowerment during Pre and Post-Mechanization

In order to find out the significant difference in economic empowerment in pre and post-mechanisation, null hypothesis is framed as, "there is no significant difference in economic empowerment before and after mechanization among the respondents". The result is presented in the Table 5.23.

Table 5.23

Economic Empowerment during Pre and Post-Mechanization

Economic Empowerment Variables	Mean		Paired Samples Test		
	Pre-Mechanisation	Post-Mechanisation	t Value	Df	p Value
Increase in income due to increased fish catch	1.8120	4.2149	20.229	483	0.000
Because of more income, savings increased and able to buy own vehicle	1.7578	3.1946	20.261	483	0.000
Increased savings helped to buy land near my village and in town	1.7184	3.2754	21.951	483	0.000
Increased savings helped to deposit money in the bank	1.7149	2.3099	10.732	483	0.000
Increased savings helped to buy gold ornaments and things for my family	1.3099	4.4607	53.071	483	0.000
Increased income helped to avoid borrowings from the local money lenders	1.5227	3.1054	20.616	483	0.000
Increased income helped to provide better nutritious food to my family members	1.4669	4.6632	23.660	483	0.000
Increased income helped to spent more on dress material to my family members	1.2975	4.6983	73.963	483	0.000
Better fish landing facilities improved the market conditions to sell fish at fair price	1.7397	3.4029	9.761	483	0.000
Increased income helps to repair the craft and nets immediately	1.4669	4.2438	37.976	483	0.000
Increased savings helped to buy craft, net and fishing instruments	1.8651	2.0228	2.920	483	0.000

Source: Computed data

Since the p value for all the economic empowerment variables is less than 0.05, the null hypothesis is rejected. It shows that there exists a significant difference in economic empowerment variables among the respondents. Hence it is concluded that mechanisation has impacted on the economic empowerment of the respondents.

5.9 PROFILE VARIABLES OF THE RESPONDENTS AND SOCIO-ECONOMIC EMPOWERMENT

In order to find out the relationship between the profile variables of the respondents and socio-economic empowerment, the null hypothesis is framed as, "there is no significant relationship between the profile variables of the respondents and socio-economic empowerment". The result is given in the Table 5.24.

Table 5.24

Profile Variables of the Respondents and Socio-economic Empowerment

Sl. No	Profile Variables	F Statistics	
		Social Empowerment	Economic Empowerment
1.	Age	6.622*	4.199*
2.	Marital Status	1.360	5.980*
3.	Caste	1.414	1.658
4.	Education	12.009*	3.709*
5.	Family System	1.528	9.660*
6.	Ownership of House	10.130*	15.366*
7.	Type of Housing	1.951	1.715

Source: Primary data *Significant at five per cent level

It is understood from Table 5.24 that there is a significant relationship between social empowerment and profile variables of the respondents as regards age, education and ownership of house. As regards the economic empowerment the significantly associating profile variables are age, marital status, education, family system and ownership of house.

5.10 IMPACT OF SOCIO-ECONOMIC FACTORS ON THE SOCIO-ECONOMIC EMPOWERMENT

The socio-economic factors may influence the socio-economic empowerment. The present study has made an attempt to examine the impact of socio-economic factors on the socio-economic empowerment. The multiple regression analysis has been administered to measure the impact of socio-economic factors on the socio-economic empowerment. The fitted regression model is

$$y = a+b_1x_1+b_2x_2+\ldots\ldots b_6x_6+e$$

Whereas,

y = Socio-Economic Empowerment

x_1 = Score on Socio factors

x_2 = Score on Economic factors

b1, b2,.., b4 = Regression co-efficient of independent variables

a = Intercept and

e = error term

The result of multiple regression analysis is given in Table 5.25.

Table 5.25

Impact of Socio-economic Factors on Socio-economic Empowerment among the Respondents

Sl. No	Variables	Regression co-efficient among the Respondents			
		Mechanised Boats	Motorised Vallam	Motorised Catamaran	Pooled Data
1.	Socio factors	0.3425*	0.3742*	0.3526*	0.3571*
2.	Economic factors	0.4614*	0.4870*	0.4513*	0.4675*
	Constant	0.2473	0.2415	0.2840	0.2560
	R^2	0.7958	0.7819	0.7779	0.7763
	F Statistics	9.7240*	9.1440*	9.2335*	9.3687*

Source: Primary data *Significant at five per cent level

The analysis reveals that the significantly influencing socio-economic factors on the socio- economic empowerment among the respondents of mechanised boats are economic factors and socio factors since their respective regression co-efficient are significant at five per cent level. A unit increase in the above said factors result in an increase in the socio-economic empowerment among the respondents of mechanised boats by 0.4614 and 0.3425 units respectively. The change in the view on factors explains the changes in the socio-economic empowerment to an extent of 79.58 per cent since its R^2 is 0.7958.

In the case of the respondents of motorized vallam, a unit increase in the factors namely economic factors and socio factors result in an increase in the socio-economic empowerment by 0.4870 and 0.3742 units respectively. In the case of the respondents of motorized catamaran, it is increased by 0.4513 and 0.3526 units respectively. The changes in the view on factors explain the changes in the socio-economic empowerment among the respondents of motorized vallam to a higher extent (78.19 per cent) than among the respondents of motorized catamaran (77.79 per cent).

5.11 SUMMARY

The chapter titled 'Socio-economic empowerment of traditional marine fishermen highlighted the socio-economic empowerment index, the significant difference in the socio-economic empowerment before and after mechanization among the respondents, the significantly associating profile variables with the socio-economic empowerment and the impact of socio-economic factors on the socio-economic empowerment of the respondents.

Chapter - VI

PROBLEMS ENCOUNTERED BY THE TRADITIONAL MARINE FISHERMEN PRACTICING MECHANIZATION IN FISHING

CHAPTER - VI

PROBLEMS ENCOUNTERED BY THE TRADITIONAL MARINE FISHERMEN PRACTICING MECHANIZATION IN FISHING

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6.10 SUMMARY

CHAPTER - VI

PROBLEMS ENCOUNTERED BY THE TRADITIONAL MARINE FISHERMEN PRACTICING MECHANIZATION IN FISHING

6.1 INTRODUCTION

This chapter presents the problems encountered by traditional marine fishermen practicing mechanization in fishing. The collected data are analysed with the help of the statistical tools such as ANOVA and t-test. The analysis of different types of problems such as technological, socio-cultural and economic problems of traditional marine fishermen practicing mechanisation is presented in this chapter.

6.2 PROBLEMS ENCOUNTERED BY THE RESPONDENTS

6.2.1 Technological Problems Encountered by the Respondents

Respondents encounter different type of technological problems while practicing mechanised mode of fishing. Ten technological problems are identified and given in Table 6.1. In order to find out the significant difference in technological problems encountered among the respondents of mechanised boats, motorised vallam and motorised catamaran, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in technological problems encountered by the respondents of mechanised boats, motorised vallam and motorised catamaran in Kanyakumari district". The result of 'ANOVA' is presented in the Table 6.1.

Table 6.1

Technological Problems Encountered by the Respondents

Sl. No	Technological Problems	Type of Respondents				F Statistics
		Mechanised Boats	Motorised vallam	Motorised catamaran	Total	
1.	Need more technical knowledge to operate crafts, nets, fish finder and GPS	3.9194	4.3481	4.6698	4.3636	26.264*
2.	Lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea	3.9516	4.2532	4.6981	4.3120	43.186*
3.	Lack of technical knowledge to repair the machine at fault during fishing in deep sea affects fishing and operation of craft	4.0806	4.1930	4.6604	4.2810	48.755*
4.	Lack of technical knowledge to set right the repairs of cold stores affects the storing fish catch which led to decay of the fish catch while fishing in deep sea	3.2581	3.3987	4.4528	3.6116	94.185*
5.	Mechanisation increases the repairs and maintenance expenses	4.0645	4.0854	4.5849	4.1921	39.952*
6.	Lack of technical knowledge to set right repair in fish finder create problem for fishing while in deep sea	3.2258	3.4589	4.4340	3.6426	76.156*
7.	Non availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea	4.7903	4.7595	4.9717	4.8099	9.126*
8.	Highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore	4.1129	4.1361	4.2830	4.1653	5.166*
9.	Operation of more mechanized crafts in the sea increases the pollution through leakage of fuel and throwing plastic waste in the sea	4.0484	4.1329	4.3280	4.1550	10.272*
10.	Usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system	4.2911	4.0886	4.3019	4.1384	8.617*

Source: Primary Data *Significant at 5 per cent level

Table 6.1 shows the mean score of technological problems encountered by the respondents along with its respective 'F' statistics. The important technological problems encountered by the respondents of mechanised boats are 'non-availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea' and 'usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system' since their respective mean scores are 4.7903 and 4.2911. Among the respondents of motorised vallam, the important technological problems are 'non-availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea' and 'need more technical knowledge to operate crafts, nets, fish finder and GPS' since their respective mean scores are 4.7595 and 4.3481. Among the respondents of motorised catamaran, the important technological problems are 'non-availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea' and 'lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea' since their respective mean scores are 4.9717 and 4.6981.

Regarding the technological problems, the significant difference among the respondents of mechanised boats, motorised vallam and motorised catamaran, are identified in the case of all the ten variables since the respective 'F' statistics are significant at 5 per cent level, the null hypothesis is rejected.

6.2.2 Socio-cultural Problems Encountered by the Respondents

Respondents encounter different type of socio-cultural problems in the mechanised mode of fishing. Thirteen socio-cultural problems are identified and given in Table 6.2. In order to find out the significant difference in socio-cultural problems encountered in the mechanised mode of fishing among the respondents of mechanised boats, motorised vallam and motorised catamaran, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in socio-cultural problems encountered in the mechanised mode of fishing among the fishermen of mechanised boats, motorised vallam and motorised catamaran in Kanyakumari district". The result of 'ANOVA' is presented in the Table 6.2.

Table 6.2

Socio-cultural Problems Encountered by the Respondents

Sl. No	Socio-cultural Problems	Type of Respondents				F Statistics
		Mechanised Boats	Motorised vallam	Motorised catamaran	Total	
1.	The deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman	4.4355	4.7247	4.8208	4.7087	14.840*
2.	Due to mechanisation, the fishermen who are in old age are not getting employment	4.5000	3.9304	4.1038	4.0413	17.690*
3.	Due to the lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to keep the efficient fishermen with them	4.0968	4.3544	4.3113	4.3120	6.065*
4.	Catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries	3.9516	4.1867	4.1792	4.1550	9.777*
5.	Attack from terrorists and pirates endanger the life of the fishermen and their crafts during deep sea fishing	3.9355	4.1424	4.1226	4.1116	6.578*
6.	Lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen	4.7581	4.8291	4.8491	4.8244	0.865
7.	Staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco	4.6604	3.5791	3.0000	3.7417	89.820*
8.	Staying more days in the sea continuously affects the family relationship due to their separation from the family	4.5566	3.6076	3.1500	3.7376	104.780*
9.	Children's discipline gets affected due to the long stay by the head of the family during deep sea fishing	3.2604	3.6076	4.5566	3.7376	76.249*
10.	Shortage of fishing workers causes inability to operate fishing crafts and nets	4.6129	4.4051	4.7547	4.5083	12.702*
11.	Invasion of foreign vessels and non-co-operation of systematic fishing affects the Indian territorial marine ecological system. For that reason the fish production decreases	3.7419	4.0665	4.1887	4.0517	18.218*
12.	Long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community	4.7170	3.6519	3.1290	3.8182	86.515*
13.	In this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen	3.6129	3.9525	4.1132	3.9442	10.144*

Source: Primary Data *Significant at 5 per cent level

Table 6.2 shows the mean score of socio-cultural problems encountered by the respondents in the mechanized mode of fishing along with its respective 'F' statistics. The important socio-cultural problems encountered by respondents of mechanised boats are 'lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen' and 'long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community', since their respective mean scores are 4.7581 and 4.7170. Among the respondents of motorised vallam, the important socio-cultural problems are 'lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen' and 'the deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman', since their respective mean scores are 4.8291 and 4.7247. Among the respondents of motorised catamaran, the important socio-cultural problems are 'lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen' and 'the deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman' since their respective mean scores are 4.8491 and 4.8208.

Regarding the socio-cultural problems, the significant difference among the respondents of mechanised boats, motorised vallam and motorised catamaran, are identified in the case of 12 out of 13 variables since the respective 'F' statistics are significant at 5 per cent level, the null hypothesis is rejected.

6.2.3 Economic Problems Encountered by the Respondents

Respondents encounter different type of economic problems in the mechanised mode of fishing. Ten economic problems are identified and given in Table 6.3. In order to find out the significant difference in economic problems encountered among the respondents of mechanised boats, motorised vallam and

motorised catamaran, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in economic problems encountered among the respondents of mechanised boats, motorised vallam and motorised catamaran in Kanyakumari district". The result of 'ANOVA' is presented in the Table 6.3.

Table 6.3

Economic Problems Encountered by the Respondents

Sl. No	Economic Problems	Type of Respondents				F Statistics
		Mechanised Boats	Motorised vallam	Motorised catamaran	Total	
1.	The high operational expenses reduce their income when fish catch is not adequate to meet the cost. This leads to borrowing from local money lenders	4.2925	4.1614	4.1774	4.1921	3.463*
2.	Unable to provide good education for the children due to lack of savings from fishing	4.0806	4.2373	4.5755	4.2913	30.740*
3.	Increased debts lead to disposing of the residential house, property and fishing crafts	4.0323	4.2247	4.4151	4.2417	11.950*
4.	Unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss	4.3868	4.2120	4.0806	4.2335	8.431*
5.	During the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult	4.9194	4.8829	4.9528	4.9029	2.040
6.	Usages of banned fishing nets and instruments in the sea, reduces the fish wealth	3.7742	4.0791	4.1226	4.0496	14.294*
7.	Lack of demand in overseas market reduces the income of the fishermen	3.7097	4.1171	4.1509	4.0723	14.280*
8.	Lack of awareness about savings and investments among the fishermen affects their future plan	4.9839	4.9430	4.9717	4.9545	0.782
9.	Lack of fish markets and landing centers reduces the demand and sale of fish	4.8993	4.9462	4.9434	4.9504	0.849
10.	Lack of price fixation by the government for the fish like agricultural products	4.7839	4.9304	4.9677	4.9463	1.869

Source: Primary Data *Significant at 5 per cent level

Table 6.3 shows the mean score of economic problems encountered by the respondents in the mechanized mode of fishing along with its respective 'F' statistics.

The important economic problems encountered by the respondents of mechanised boats are 'lack of awareness about savings and investments among the fishermen affects their future plan' and 'during the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult', since their respective mean scores are 4.9839 and 4.9194. Among the respondents of motorised vallam, the important economic problems are 'lack of fish markets and landing centers reduces the demand and sale of fish' and 'lack of awareness about savings and investments among the fishermen affects their future plan' since their respective mean scores are 4.9462 and 4.9430. Among the respondents of motorised catamaran, the important economic problems are 'lack of awareness about savings and investments among the fishermen affects their future plan' and 'lack of price fixation by the government for the fish like agricultural products' since their respective mean scores are 4.9717 and 4.9677.

Regarding the economic problems, the significant difference among the respondents of mechanised boats, motorised vallam and motorised catamaran are identified in the case of four out of ten variables since their respective 'F' statistics are significant at 5 per cent level, the null hypothesis is rejected.

6.2.4 Reliability and Validity of Variables Relating to Problem Encountered by the Respondents

The problems among the respondents are measured with the help of three components. The variables included in each problem are varying from 10 to 13. Before summarizing the scores of the variables in each problem, it is essential to examine its reliability and validity. The overall reliability is tested with the help of Cronbach Alpha. The results are given in Table 6.4.

Table 6.4

Reliability and Validity of Variables relating to Problem Encountered by the Respondents

Sl. No	Problems	No. of remarks in	Range of standardized factor loading	Range of 't' statistics	Cronbach Alpha	Composite Reliability	Average variance extracted
1.	Technological Problems	10	0.8451-0.6989	0.4920*-0.3768*	0.8358	0.8012	60.85
2.	Socio-Cultural Problems	13	0.8251-0.6875	0.4854*-0.3687*	0.8210	0.7995	59.73
3.	Economic Problems	10	0.8345-0.7132	0.4956*-0.3850*	0.8445	0.8136	62.61
	Overall	33	0.8394-0.6980	0.4992*-0.3983*	0.8460	0.8076	61.45

*Significant at five per cent level

The standardized factor loading of the variables in each problem are greater than 0.60 which reveals the content validity. The significance of 't' statistics of the standardized factor loading of the variables in each problem shows the convergent validity. It is also confirmed by the composite reliability and average variance extracted since these are greater than its minimum threshold of 0.50 and 50.00 per cent respectively. The Cronbach Alpha of all problems is greater than the standard minimum of 0.60. All these results indicate the reliability and validity of variables in each problem.

6.3 TECHNOLOGICAL PROBLEMS AND PROFILE OF THE RESPONDENTS

6.3.1 Technological Problems and Age of the Respondents

An attempt was made to know the technological problems in relation to age. The age of the respondents was classified as below 25 years, 26-35 years, 36- 45 years, 46-55 years and above 55 years. To test the technological problems based on age of the fishermen, the following null hypothesis was proposed.

H_0 : There is no significant difference in technological problems among different age groups of the respondents.

The non-parametric statistics of Kruskal-Wallis test was used to analyze the technological problems based on age of respondents and to test the proposed null hypothesis. The details of the result of Kruskal-Wallis test is reported in Table 6.5.

Table 6.5

Kruskal-Wallis Test: Technological Problems Based on Age

Technological Problems	Chi-Square χ^2	p value	Mean Rank				
			Below 25	26-35	36-45	46-55	Above 55
Need more technical knowledge to operate crafts, nets, fish finder and GPS	35.214	0.000	250.68	234.70	245.67	271.63	103.07
Lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea	10.055	0.040	226.77	232.26	252.63	248.94	176.27
Lack of technical knowledge to repair the machine at fault during fishing in deep sea affects fishing and operation of craft	14.372	0.006	134.73	235.53	251.51	250.52	206.75
Lack of technical knowledge to set right the repairs of cold stores affects the storing fish catch which led to decay of the fish catch while fishing in deep sea	18.950	0.001	244.45	199.31	258.89	257.25	249.66
Mechanisation increases the repairs and maintenance expenses	36.774	0.000	149.55	237.46	261.65	243.07	127.32
Lack of technical knowledge to set right repair in fish finder create problem for fishing while in deep sea	33.225	0.000	282.45	186.91	260.47	268.13	229.75
Non availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea	49.439	0.000	153.77	253.95	253.96	238.25	131.95
Highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore	46.243	0.000	266.18	256.90	230.86	222.72	363.95
Operation of more mechanized crafts in the sea increases the pollution through leakage of fuel and throwing plastic waste in the sea	11.309	0.023	315.00	242.08	246.65	233.09	216.00
Usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system	11.643	0.020	334.68	243.41	243.30	235.88	217.18

Source: Primary data

The Table 6.5 discloses that the null hypothesis (H_0) is rejected at 5 per cent level of significance with regard to the technological problems since the '*p'* value is less than 0.05. It shows that age wise there is a significant difference in technological problems.

6.3.2 Technological Problems Based on Marital Status

An attempt was made to know the technological problems based on marital status of the respondents. To test the technological problems based on marital status, the following null hypothesis was proposed.

H_0 : There is no significant difference in technological problems as regards the marital status of the respondents.

The non- parametric statistics of Mann-Whitney U test was used to analyze the technological problems based on marital status and to test the proposed null hypothesis. The details of the result of Mann-Whitney U test is illustrated in Table 6.6.

Table 6.6

Mann-Whitney U Test: Technological Problems Based on Marital Status

Technological Problems	*U*-value	Z-value	*p*-value	Mean rank	
				Married	Unmarried
Need more technical knowledge to operate crafts, nets, fish finder and GPS	9016.500	-1.332	0.183	265.49	240.09
Lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea	9620.500	-0.598	0.550	232.64	243.54
Lack of technical knowledge to repair the machine at fault during fishing in deep sea affects fishing and operation of craft	7927.500	-2.914	0.004	195.84	247.40
Lack of technical knowledge to set right the repairs of cold stores affects the storing fish catch which led to decay of the fish catch while fishing in deep sea	7960.000	-2.543	0.011	196.54	247.33
Mechanisation increases the repairs and maintenance expenses	8499.500	-2.162	0.031	208.26	246.10
Lack of technical knowledge to set right repair in fish finder create problem for fishing while in deep sea	8785.000	-1.557	0.120	214.48	245.44
Non availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea	9886.000	-0.323	0.747	246.59	242.07
Highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore	8398.000	-2.696	0.007	278.93	238.67
Operation of more mechanized crafts in the sea increases the pollution through leakage of fuel and throwing plastic waste in the sea	9863.000	-0.373	0.709	247.09	242.02
Usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system	7735.000	-3.684	0.000	237.16	293.35

Source: Primary data

The Table 6.6 discloses that the null hypothesis (H_0) is rejected at the 5% level of significance with regard to the technological problems such as lack of technical knowledge to repair the machine at fault during fishing in deep sea affects fishing and

operation of craft, lack of technical knowledge to set right the repairs of cold stores affects the storing fish catch which led to decay of the fish catch while fishing in deep sea, mechanisation increases the repairs and maintenance expenses, highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore and usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system due to the p value is less than 0.05. It shows that there is a significant difference in technological problems among the marital status of the respondents.

6.3.3 Technological Problems According to Caste Category of the Respondents

An attempt was made to know the technological problems based on caste such as Mukkuvar and Bharavar. To test the technological problems based on caste, the following null hypothesis was proposed.

H_0 : There is no significant difference in technological problems as regards the respondent's caste.

The non- parametric statistics of Mann-Whitney U test was used to analyze the technological problems based on caste and test the proposed null hypothesis. The details of the result of Mann-Whitney U test is illustrated in Table 6.7.

Table 6.7

Mann-Whitney U Test: Technological Problems Based on Caste

Technological Problems	*U*-value	Z-value	*p*-value	Mean rank	
				Mukkuvar	Bharavar
Need more technical knowledge to operate crafts, nets, fish finder and GPS	11782.500	-0.017	0.986	242.53	242.23
Lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea	9032.500	-3.369	0.001	248.95	192.23
Lack of technical knowledge to repair the machine at fault during fishing in deep sea affects fishing and operation of craft	9003.500	-3.505	0.000	249.01	191.70
Lack of technical knowledge to set right the repairs of cold stores affects the storing fish catch which led to decay of the fish catch while fishing in deep sea	8581.500	-3.705	0.000	250.00	184.03
Mechanisation increases the repairs and maintenance expenses	9588.000	-2.802	0.005	247.65	202.33
Lack of technical knowledge to set right repair in fish finder create problem for fishing while in deep sea	6826.500	-5.547	0.000	254.09	152.12
Non availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea	9833.500	-3.120	0.002	237.92	278.21
Highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore	9993.000	-2.682	0.007	246.71	209.69
Operation of more mechanized crafts in the sea increases the pollution through leakage of fuel and throwing plastic waste in the sea	10219.000	-2.579	0.010	246.18	213.80
Usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system	10287.500	-2.198	0.028	246.02	215.05

Source: Primary data

The Table 6.7 discloses that the null hypothesis (H_0) is rejected at the 5% level of significance with regard to the technological problems since the p value is less than 0.05 in all the variables except the first variable. It shows that caste wise there is a significant difference in technological problems.

6.3.4 Technological Problems Based on Education

An attempt was made to know the technological problems based on education. The education of the respondents was classified as illiterate, primary, middle, high school and higher secondary school. To test the technological problems based on education of the respondents, the following null hypothesis was proposed.

H_0 : There is no significant difference in technological problems as regards educational qualification of the respondents.

The non-parametric statistics of Kruskal-Wallis test was used to analyze the technological problems based on education of the respondents and to test the proposed null hypothesis. The details of the result of Kruskal-Wallis test is reported in Table 6.8.

Table 6.8

Kruskal-Wallis Test: Technological Problems Based on Education

Technological Problems	Chi-Square χ^2	p value	Mean Rank				
			Illiterate	Primary	Middle	High school	Higher secondary school
Need more technical knowledge to operate crafts, nets, fish finder and GPS	54.685	0.000	87.34	219.66	233.14	272.23	362.00
Lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea	25.130	0.000	206.53	232.43	246.60	235.94	383.67
Lack of technical knowledge to repair the machine at fault during fishing in deep sea affects fishing and operation of craft	41.312	0.000	228.77	227.95	260.20	395.23	174.50
Lack of technical knowledge to set right the repairs of cold stores affects the storing fish catch which led to decay of the fish catch while fishing in deep sea	10.383	0.065	325.50	237.00	237.18	248.05	189.70
Mechanisation increases the repairs and maintenance expenses	76.974	0.000	228.69	247.05	249.73	407.73	194.00
Lack of technical knowledge to set right repair in fish finder create problem for fishing while in deep sea	9.972	0.076	240.61	227.48	248.97	274.03	320.00
Non availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea	73.838	0.000	258.68	237.17	251.22	282.50	262.50
Highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore	64.783	0.000	225.12	233.22	238.69	360.33	440.00
Operation of more mechanized crafts in the sea increases the pollution through leakage of fuel and throwing plastic waste in the sea	31.825	0.000	236.08	230.98	253.11	350.20	205.00
Usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system	32.435	0.000	238.84	224.92	256.43	347.50	441.50

Source: Primary data

The Table 6.8 discloses that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the technological problems since the '*p*' value is less than 0.05. It shows that education wise there is a significant difference in technological problems.

6.3.5 Technological Problems Based on Family System

An attempt was made to know the technological problems based on family system such as joint family and nuclear family. To test the technological problems based on family system, the following null hypothesis was proposed.

H_0 : There is no significant difference in the technological problems among the respondent's family system.

The non-parametric statistics of Mann-Whitney U test was used to analyze the technological problems based on family system and to test the proposed null hypothesis. The details of the result of Mann-Whitney U test is illustrated in Table 6.9.

Table 6.9

Mann-Whitney U Test: Technological Problems Based on Family System

Technological Problems	*U*-value	Z-value	*p*-value	Mean rank	
				Joint family	Nuclear family
Need more technical knowledge to operate crafts, nets, fish finder and GPS	19419.00	-0.457	0.648	240.15	246.30
Lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea	19548.50	-0.356	0.722	245.08	240.49
Lack of technical knowledge to repair the machine at fault during fishing in deep sea affects fishing and operation of craft	19350.50	-0.558	0.577	236.05	243.04
Lack of technical knowledge to set right the repairs of cold stores affects the storing fish catch which led to decay of the fish catch while fishing in deep sea	17916.50	-1.723	0.085	246.85	222.52
Mechanisation increases the repairs and maintenance expenses	18893.50	-1.010	0.312	251.26	238.75
Lack of technical knowledge to set right repair in fish finder create problem for fishing while in deep sea	18885.00	-0.896	0.370	231.67	244.27
Non availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea	18379.00	-1.913	0.056	256.11	237.38
Highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore	17949.00	-2.283	0.022	260.17	236.24
Operation of more mechanized crafts in the sea increases the pollution through leakage of fuel and throwing plastic waste in the sea	18360.00	-1.972	0.049	256.29	237.33
Usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio-diversity and marine eco system	16618.00	-3.737	0.000	272.73	232.70

The Table 6.9 discloses that the null hypothesis (H_0) is rejected at the 5% level of significance with regard to the technological problems such as highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore, operation of more mechanized crafts in the sea increases the pollution through leakage of fuel and throwing plastic waste in the sea and usage of solar powered LED lights

attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system due to the p value is less than 0.05.It shows that family system wise there is a significant difference in technological problems such as highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore, operation of more mechanized crafts in the sea increases the pollution through leakage of fuel and throwing plastic waste in the sea and usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system.

6.3.6 Technological Problems Based on Monthly Income of the Respondents

An attempt was made to know the technological problems based on average monthly income of respondents. The average monthly income of the respondents was classified as below Rs.25,000, Rs.25,000-50,000, Rs.50,001-75,000, Rs.75,001-1,00,000 and above Rs.1,00,000. To test the technological problems based on average monthly income of the respondents, the following null hypothesis was proposed.

H_0 : There is no significant difference in the technological problems among the respondent's monthly income in Kanyakumari district.

The non-parametric statistics of Kruskal-Wallis test was used to analyze the technological problems based on average monthly income of the respondents and to test the proposed null hypothesis. The details of the result of Kruskal-Wallis test is reported in Table 6.10.

Table 6.10

Kruskal-Wallis Test: Technological Problems Based on the Monthly Income of the Respondents

Technological Problems	Chi-Square χ^2	p value	Mean Rank				
			Below 25000	25000-50000	50001-75000	75001-100000	Above 100000
Need more technical knowledge to operate crafts, nets, fish finder and GPS	36.336	0.000	381.23	326.81	290.77	249.12	182.14
Lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea	25.686	0.000	359.62	310.00	293.01	240.58	193.50
Lack of technical knowledge to repair the machine at fault during fishing in deep sea affects fishing and operation of craft	38.843	0.000	374.62	349.97	271.38	254.91	179.66
Lack of technical knowledge to set right the repairs of cold stores affects the storing fish catch which led to decay of the fish catch while fishing in deep sea	32.345	0.000	282.50	279.66	267.27	233.04	222.60
Mechanisation increases the repairs and maintenance expenses	61.569	0.000	237.40	197.17	271.25	340.54	338.05
Lack of technical knowledge to set right repair in fish finder create problem for fishing while in deep sea	75.716	0.000	371.67	362.89	326.96	206.03	169.43
Non availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea	41.013	0.000	365.72	370.90	350.92	190.40	176.59
Highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore	49.075	0.000	348.08	271.40	268.47	219.20	216.95
Operation of more mechanized crafts in the sea increases the pollution through leakage of fuel and throwing plastic waste in the sea	57.218	0.000	353.92	298.68	240.64	231.24	223.43
Usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system	36.914	0.000	351.12	280.04	253.86	229.15	221.70

Source: Primary data

The Table 6.10 discloses that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the technological problems since the '*p*' value is less than 0.05. It shows that average monthly income wise there is a significant difference in technological problems.

6.4 SOCIO-CULTURAL PROBLEMS AND THE PROFILE OF THE RESPONDENTS

6.4.1 Socio-cultural Problems Based on Age

An attempt was made to know the socio-cultural problems based on age. The age of the respondents was classified as below 25 years, 26-35 years, 36-45 years, 46-55 years and above 55 years. To test the socio-cultural problems based on age of the respondents, the following null hypothesis was proposed.

H_0 : There is no significant difference in socio-cultural problems among the different age group of the respondents in Kanyakumari district.

The non-parametric statistics of Kruskal-Wallis test was used to analyze the socio-cultural problems based on age of respondents and to test the proposed null hypothesis. The details of the result of Kruskal-Wallis test is reported in Table 6.11.

Table 6.11

Kruskal-Wallis Test: Socio-cultural Problems Based on Age

Socio-cultural Problems	Chi-Square χ^2	p value	Mean Rank				
			Below 25	26-35	36-45	46-55	Above 55
The deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman	39.996	0.000	262.51	237.02	249.23	246.27	103.86
Due to mechanisation, the fishermen who are in old age are not getting employment	25.200	0.000	248.18	193.75	258.80	256.84	282.14
Due to the lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to keep the efficient fishermen with them	8.059	0.089	240.22	255.21	272.91	241.89	181.02
Catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries	11.917	0.018	226.73	249.63	252.04	227.01	195.84
Lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen	44.279	0.000	257.09	240.23	243.45	263.78	130.41
Staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco	42.597	0.000	158.36	188.05	260.70	271.01	220.18
Staying more days in the sea continuously affects the family relationship due to their separation from the family	69.066	0.000	167.50	276.92	183.67	268.26	144.00
Children's discipline gets affected due to the long stay by the head of the family during deep sea fishing	69.573	0.000	147.50	185.67	276.99	267.75	147.50
Shortage of fishing workers causes inability to operate fishing crafts and nets	20.309	0.000	210.68	218.81	262.88	247.64	166.59
Invasion of foreign vessels and non-co-operation of systematic fishing affects the Indian territorial marine ecological system. For that reason the fish production decreases	15.095	0.005	249.95	218.16	261.62	234.48	230.00
Long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community	18.683	0.001	212.77	201.27	258.03	263.93	228.86
In this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen	21.438	0.000	254.13	235.23	263.36	247.70	132.93

The Table 6.11 reveals that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the socio-cultural problems since the '*p*' value is less than 0.05. It shows that age wise there is a significant difference in socio-cultural problems.

6.4.2 Socio-cultural Problems Based on Marital Status

An attempt was made to know the socio-cultural problems based on marital status of the respondents. To test the socio-cultural problems based on marital status, the following null hypothesis was proposed.

H_0 : There is no significant difference in the socio-cultural problems among the marital status of the respondents.

The non-parametric statistics of Mann-Whitney U test was used to analyze the socio-cultural problems based on marital status of the respondents and to test the proposed null hypothesis. The details of the result of Mann-Whitney U test is illustrated in Table 6.12.

Table 6.12

Mann-Whitney U Test: Socio-cultural Problems Based on Marital Status

Socio-cultural Problems	*U*-value	Z-value	*p*-value	Mean rank	
				Married	Unmarried
The deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman	9597.500	-0.673	0.501	241.41	252.86
Due to mechanisation, the fishermen who are in old age are not getting employment	9801.500	-0.331	0.741	236.58	243.12
Due to the lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to keep the efficient fishermen with them	9901.000	-0.235	0.822	246.26	242.11
Catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries	9305.000	-1.280	0.201	225.78	244.26
Lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen	9124.500	-1.704	0.088	240.33	263.14
Staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco	6629.000	-4.263	0.000	167.61	250.37
Staying more days in the sea continuously affects the family relationship due to their separation from the family	7052.500	-3.828	0.000	249.40	176.82
Children's discipline gets affected due to the long stay by the head of the family during deep sea fishing	6370.500	-4.712	0.000	250.37	161.99
Shortage of fishing workers causes inability to operate fishing crafts and nets	9476.000	-0.763	0.445	229.50	243.87
Invasion of foreign vessels and non-co-operation of systematic fishing affects the Indian territorial marine ecological system. For that reason the fish production decreases	9990.500	-0.124	0.901	244.32	242.31
Long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community	6957.000	-3.647	0.000	174.74	249.62
In this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen	9977.000	-0.126	0.900	244.61	242.28

The Table 6.12 discloses that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the socio-cultural problems since the variables such as staying more days in the sea continuously creates mental fatigue

among fishermen cause more consumption of alcohol and tobacco, staying more days in the sea continuously affects the family relationship due to their separation from the family, children's discipline gets affected due to the long stay by the head of the family during deep sea fishing and long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community are having the p value less than 0.05. It shows that marital status wise there is a significant difference in socio-cultural problems such as staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco, staying more days in the sea continuously affects the family relationship due to their separation from the family, children's discipline gets affected due to the long stay by the head of the family during deep sea fishing and long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community.

6.4.3 Socio-cultural Problems Based on Caste

An attempt was made to know the socio-cultural problems based on caste such as Mukkuvar and Bharavar. To test the socio-cultural problems based on caste, the following null hypothesis was proposed.

H_0 : There is no significant difference in socio-cultural problems as regards respondent's caste.

The non-parametric statistics of Mann-Whitney U test was used to analyze the socio-cultural problems based on caste and to test the proposed null hypothesis. The details of the result of Mann-Whitney U test is illustrated in Table 6.13.

Table 6.13

Mann-Whitney U Test: Socio-cultural Problems Based on Caste

Socio-cultural Problems	*U*-value	Z-value	*p*-value	Mean rank	
				Mukkuvar	Bharavar
The deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman	7185.000	-6.022	0.000	253.25	158.64
Due to mechanisation, the fishermen who are in old age are not getting employment	11412.500	-0.432	0.665	243.40	235.50
Due to the lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to keep the efficient fishermen with them	5912.500	-7.071	0.000	256.22	135.50
Catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries	9810.000	-3.056	0.002	247.13	206.36
Lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen	10.716	-1.793	0.073	245.02	222.84
Staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco	6771.000	-5.747	0.000	254.22	151.11
Staying more days in the sea continuously affects the family relationship due to their separation from the family	7073.000	-5.531	0.000	253.51	156.60
Children's discipline gets affected due to the long stay by the head of the family during deep sea fishing	7242.000	-5.356	0.000	253.12	159.67
Shortage of fishing workers causes inability to operate fishing crafts and nets	10875.500	-1.087	0.277	244.65	225.74
Invasion of foreign vessels and non-co-operation of systematic fishing affects the Indian territorial marine ecological system. For that reason the fish production decreases	6788.000	-6.898	0.000	254.18	151.42
Long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community	3595.500	-8.868	0.000	261.62	93.37
In this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen	4562.500	-8.651	0.000	259.36	110.95

Source: Primary data

The Table 6.13 discloses that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the socio-cultural problems in the variables 'the deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman, due to the lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to keep the efficient fishermen with them, catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries, staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco, staying more days in the sea continuously affects the family relationship due to their separation from the family, children's discipline gets affected due to the long stay by the head of the family during deep sea fishing, invasion of foreign vessels and non-co-operation of systematic fishing affects the Indian territorial marine ecological system. For that reason the fish production decreases, long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community and in this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen' since the 'p' value is less than 0.05. It shows that caste wise there is a significant difference in socio-cultural problems such as the deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman, due to the lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to keep the efficient fishermen with them, catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries, staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco, staying more days in the sea continuously

affects the family relationship due to their separation from the family, children's discipline gets affected due to the long stay by the head of the family during deep sea fishing, invasion of foreign vessels and non-co-operation of systematic fishing affects the Indian territorial marine ecological system. For that reason the fish production decreases, long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community and in this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen.

6.4.4 Socio-cultural Problems Based on Education

An attempt was made to know the socio-cultural problems based on education. The education of the respondents was classified as illiterate, primary, middle, high school and higher secondary school. To test the socio-cultural problems based on education of the respondents, the following null hypothesis was proposed.

H_0 : There is no significant difference in socio-cultural problems as regards the respondent's education in Kanyakumari district.

The non-parametric statistics of Kruskal-Wallis test was used to analyze the socio-cultural problems based on education of respondents and test the proposed null hypothesis. The details of the result of Kruskal-Wallis test is reported in Table 6.14.

Table 6.14

Kruskal-Wallis Test: Socio-cultural Problems Based on Education

Socio-cultural Problems	Chi-Square χ^2	p value	Mean Rank				
			Illiterate	Primary	Middle	High school	Higher secondary school
The deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman	21.917	0.001	241.25	242.17	252.06	279.87	71.00
Due to mechanisation, the fishermen who are in old age are not getting employment	41.282	0.000	265.22	254.38	203.94	149.60	229.50
Due to the lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to keep the efficient fishermen with them	9.811	0.081	223.27	247.69	253.87	265.23	167.00
Catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries	14.822	0.011	217.00	247.28	252.74	284.67	205.00
Lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen	66.406	0.000	254.73	242.58	252.75	215.70	278.50
Staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco	6.574	0.254	232.97	237.03	247.64	244.40	402.00
Staying more days in the sea continuously affects the family relationship due to their separation from the family	4.734	0.449	239.33	243.51	246.57	251.30	402.50
Children's discipline gets affected due to the long stay by the head of the family during deep sea fishing	4.428	0.490	243.96	246.12	240.48	252.03	399.50
Shortage of fishing workers causes inability to operate fishing crafts and nets	68.839	0.000	282.99	258.64	215.43	266.17	339.50
Invasion of foreign vessels and non-co-operation of systematic fishing affects the Indian territorial marine ecological system. For that reason the fish production decreases	9.963	0.076	231.38	235.27	254.55	274.73	449.50
Long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community	10.010	0.075	227.54	251.72	239.94	294.81	304.70
In this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen	31.379	0.000	247.43	260.46	226.20	297.90	442.00

Source: Primary data

The Table 6.14 discloses that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the socio-cultural problems in the variables 'the deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman, due to mechanisation, the fishermen who are in old age are not getting employment, catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries, lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen, shortage of fishing workers causes inability to operate fishing crafts and nets and in this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen since the '*p'* value is less than 0.05. It shows that education wise there is a significant difference in socio-cultural problems such as the deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman, due to mechanisation, the fishermen who are in old age are not getting employment, catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries, lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen, shortage of fishing workers causes inability to operate fishing crafts and nets and in this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen.

6.4.5 Socio-cultural Problems Based on Family System

An attempt was made to know the socio-cultural problems based on family system. To test the socio-cultural problems based on family system, the following null hypothesis was proposed.

H_0 : There is no significant difference in the socio-cultural problems as regards the family status of the respondents.

The non-parametric statistics of Mann-Whitney U test was used to analyze the socio-cultural problems based on family system and test the proposed null hypothesis. The details of the result of Mann-Whitney U test is illustrated in Table 6.15.

Table 6.15

Mann-Whitney U Test: Socio-cultural Problems Based on Family System

Socio-cultural Problems	*U*-value	Z-value	*p*-value	Mean rank	
				Joint family	Nuclear family
The deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman	18996.00	-0.937	0.349	232.71	243.98
Due to mechanisation, the fishermen who are in old age are not getting employment	19671.50	-0.222	0.824	239.08	242.18
Due to the lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to keep the efficient fishermen with them	18656.50	-1.177	0.239	253.50	238.12
Catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries	18867.50	-1.255	0.209	251.50	238.68
Lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen	19721.50	-0.264	0.792	239.55	242.05
Staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco	17096.00	-2.495	0.013	214.78	249.03
Staying more days in the sea continuously affects the family relationship due to their separation from the family	16554.50	-3.043	0.002	209.67	205.47
Children's discipline gets affected due to the long stay by the head of the family during deep sea fishing	16196.50	-3.380	0.001	206.30	251.42
Shortage of fishing workers causes inability to operate fishing crafts and nets	19776.00	-0.138	0.890	240.07	241.90
Invasion of foreign vessels and non-co-operation of systematic fishing affects the Indian territorial marine ecological system. For that reason the fish production decreases	19161.50	-0.813	0.416	248.73	239.46
Long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community	18065.00	-1.553	0.121	223.92	246.45
In this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen	19182.00	-0.687	0.492	248.54	239.52

Source: Primary data

The Table 6.15 discloses that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the socio-cultural problems variables such as 'staying more days in the sea continuously creates mental fatigue among fishermen

cause more consumption of alcohol and tobacco, staying more days in the sea continuously affects the family relationship due to their separation from the family and children's discipline gets affected due to the long stay by the head of the family during deep sea fishing' since the 'p' value is less than 0.05. It shows that family status wise there is a significant difference in socio-cultural problems such as staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco, staying more days in the sea continuously affects the family relationship due to their separation from the family and children's discipline gets affected due to the long stay by the head of the family during deep sea fishing.

6.4.6 Socio-cultural Problems Based on Average Monthly Income of the Respondents

An attempt was made to know the socio-cultural problems based on average monthly income of respondents. The average monthly income of the respondents was classified as below Rs.25,000, Rs.25,000-50,000, Rs.50,001-75,000, Rs.75,001-1,00,000 and above Rs.1,00,000. To test the socio-cultural problems based on average monthly income of the respondents, the following null hypothesis was proposed.

H_0 : There is no significant difference in socio-cultural problems among different average monthly income of respondents in Kanyakumari district.

The non-parametric statistics of Kruskal-Wallis test was used to analyze the socio-cultural problems based on average monthly income of respondents and to test the proposed null hypothesis. The details of the result of Kruskal-Wallis test is reported in Table 6.16

Table 6.16

Kruskal-Wallis Test: Socio-cultural Problems Based on Monthly Income of the Respondents

Socio-cultural Problems	Chi-Square χ^2	p value	Mean Rank				
			Below 25000	25000-50000	50001-75000	75001-100000	Above 100000
The deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman	57.952	0.000	396.37	369.66	279.42	205.97	159.14
Due to mechanisation, the fishermen who are in old age are not getting employment	20.534	0.000	282.40	267.58	240.30	215.34	170.88
Due to the lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to keep the efficient fishermen with them	28.133	0.000	298.53	274.54	257.74	240.20	206.05
Catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries	26.399	0.000	296.92	286.56	248.19	236.92	220.69
Lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen	33.023	0.000	390.95	380.59	305.54	187.12	168.60
Staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco	20.062	0.000	264.31	253.40	242.27	229.12	218.28
Staying more days in the sea continuously affects the family relationship due to their separation from the family	72.406	0.000	314.97	297.54	274.96	243.81	201.53
Children's discipline gets affected due to the long stay by the head of the family during deep sea fishing	19.812	0.001	218.35	275.63	251.99	240.94	287.19
Shortage of fishing workers causes inability to operate fishing crafts and nets	69.339	0.000	386.34	365.31	303.88	191.00	172.92
Invasion of foreign vessels and non-co-operation of systematic fishing affects the Indian territorial marine ecological system. For that reason the fish production decreases	37.575	0.000	306.00	288.73	270.58	232.99	203.78
Long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community	20.062	0.000	264.31	253.40	242.27	229.12	218.28
In this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen	23.428	0.000	242.03	262.64	252.93	242.03	206.84

Source: Primary data

The Table 6.16 discloses that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the socio-cultural problems relating to all the variables since the '*p*' value is less than 0.05. It shows that average monthly income wise there is a significant difference in socio-cultural problems.

6.5 ECONOMICAL PROBLEMS AND PROFILE OF THE RESPONDENTS

6.5.1 Economic Problems Based on Respondent's Age

An attempt was made to know the economic problems based on age. The age of the respondents was classified as below 25 years, 26-35 years, 36-45 years, 46-55 years and above 55 years. To test the economic problems based on age of the respondents, the following null hypothesis was proposed.

H_0 : There is no significant difference in economic problems among different age groups of respondents in Kanyakumari district.

The non-parametric statistics of Kruskal-Wallis test was used to analyze the economic problems based on age of respondents and to test the proposed null hypothesis. The details of the result of Kruskal-Wallis test is reported in Table 6.17.

Table 6.17

Kruskal-Wallis Test: Economic Problems Based on Age

Economic Problems	Chi-Square χ^2	p value	Mean Rank				
			Below 25	26-35	36-45	46-55	Above 55
The high operational expenses reduce their income when fish catch is not adequate to meet the cost which leads to borrowing from local money lenders	10.870	0.028	238.45	229.29	242.13	265.42	205.86
Unable to provide good education for the children due to lack of savings from fishing	19.769	0.001	193.41	220.67	251.41	266.18	182.45
Increased debts lead to disposing of the residential house, property and fishing crafts	19.772	0.001	202.82	211.51	256.08	260.29	213.73
Unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss	8.600	0.072	205.27	228.85	256.74	239.10	216.16
During the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult	5.499	0.240	264.50	234.88	245.48	238.73	264.50
Usages of banned fishing nets and instruments in the sea, reduces the fish wealth	0.189	0.966	250.36	243.69	240.87	244.00	240.18
Lack of demand in overseas market reduces the income of the fishermen	1.053	0.902	239.82	242.02	247.43	236.31	229.91
Lack of awareness about savings and investments among the fishermen affects their future plan	10.334	0.035	250.50	244.68	235.85	250.50	265.50
Lack of fish markets and landing centers reduces the demand and sale of fish	4.763	0.312	254.50	246.69	242.12	235.05	251.50
Lack of price fixation by the government for the fish like agricultural products	3.812	0.432	211.55	240.97	246.71	237.25	254.50
Attack from terrorists and pirates endanger the life of the fishermen and their crafts during deep sea fishing	7.438	0.114	217.95	244.34	252.64	228.71	215.50

The Table 6.17 discloses that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the economic problems such as 'high operational expenses reduce their income when fish catch is not adequate to meet the

cost. This leads to borrowing from local money lenders, unable to provide good education for the children due to lack of savings from fishing, increased debts lead to disposing of the residential house, property and fishing crafts and lack of awareness about savings and investments among the fishermen affects their future plan' due to the *p* value is less than 0.05. It shows that age wise there is a significant difference in economic problems such as 'high operational expenses reduce their income when fish catch is not adequate to meet the cost which leads to borrowing from local money lenders, unable to provide good education for the children due to lack of savings from fishing, increased debts lead to disposing of the residential house, property and fishing crafts and lack of awareness about savings and investments among the fishermen affects their future plan.

6.5.2 Economic Problems Based on Marital Status

An attempt was made to know the economic problems based on marital status of the respondents. To test the economic problems based on marital status, the following null hypothesis was proposed.

H_0 : There is no significant difference in the economic problems among between marital status and.

The non-parametric statistics of Mann-Whitney U test was used to analyze the economic problems based on marital status and to test the proposed null hypothesis. The details of the result of Mann-Whitney U test is illustrated in Table 6.18.

Table 6.18

Mann-Whitney U Test: Economic Problems Based on Marital Status

Economic Problems	*U*-value	Z-value	*p*-value	Mean rank	
				Married	Unmarried
The high operational expenses reduce their income when fish catch is not adequate to meet the cost which leads to borrowing from local money lenders	9129.000	-1.455	0.146	221.96	244.66
Unable to provide good education for the children due to lack of savings from fishing	8495.000	-2.199	0.028	246.11	208.17
Increased debts lead to disposing of the residential house, property and fishing crafts	8506.000	-2.255	0.024	246.08	208.41
Unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss	8557.500	-2.196	0.028	209.53	245.96
During the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult	9543.000	-1.181	0.237	254.04	241.29
Usages of banned fishing nets and instruments in the sea, reduces the fish wealth	9129.000	-1.502	0.133	221.96	244.66
Lack of demand in overseas market reduces the income of the fishermen	9369.000	-0.979	0.327	227.17	244.11
Lack of awareness about savings and investments among the fishermen affects their future plan	8999.000	-3.847	0.000	219.13	244.95
Lack of fish markets and landing centers reduces the demand and sale of fish	8932.000	-3.366	0.001	217.67	245.11
Lack of price fixation by the government for the fish like agricultural products	9177.000	-2.643	0.008	223.000	244.55
Attack from terrorists and pirates endanger the life of the fishermen and their crafts during deep sea fishing	9325.000	-1.228	0.220	226.22	244.21

The Table 6.18 discloses that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the economic problems such as ‘unable to provide good education for the children due to lack of savings from fishing, increased debts lead to disposing of the residential house, property and fishing crafts, unable to

pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss, lack of awareness about savings and investments among the fishermen affects their future plan, lack of fish markets and landing centers reduces the demand and sale of fish and lack of price fixation by the government for the fish like agricultural products due to the ‘p’ value is less than 0.05. It shows that marital status wise there is a significant difference in economic problems such as unable to provide good education for the children due to lack of savings from fishing, increased debts lead to disposing of the residential house, property and fishing crafts, unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss, lack of awareness about savings and investments among the fishermen affects their future plan, lack of fish markets and landing centers reduces the demand and sale of fish and lack of price fixation by the government for the fish like agricultural products.

6.5.3 Economic Problems Based on Caste

An attempt was made to know the economic problems based on caste such as Mukkuvar and Bharavar. To test the economic problems based on caste, the following null hypothesis was proposed.

H_0 : There is no significant difference in economic problems among the respondent’s caste.

The non-parametric statistics of Mann-Whitney U test was used to analyze the economic problems based on caste and test the proposed null hypothesis. The details of the result of Mann-Whitney U test is illustrated in Table 6.19.

Table 6.19

Mann-Whitney U Test: Economic Problems Based on Caste

Economic Problems	*U*-value	Z-value	*p*-value	Mean rank	
				Mukkuvar	Bharavar
The high operational expenses reduce their income when fish catch is not adequate to meet the cost. This leads to borrowing from local money lenders	10380.000	-2.076	0.044	245.80	216.73
Unable to provide good education for the children due to lack of savings from fishing	11507.500	-0.373	0.709	243.18	237.23
Increased debts lead to disposing of the residential house, property and fishing crafts	11580.000	-0.289	0.773	241.99	246.45
Unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss	8552.500	-4.342	0.000	250.06	183.50
During the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult	11112.500	-1.408	0.159	240.90	254.95
Usages of banned fishing nets and instruments in the sea, reduces the fish wealth	5056.000	-9.890	0.000	258.21	119.93
Lack of demand in overseas market reduces the income of the fishermen	3271.500	-10.943	0.000	87.48	262.37
Lack of awareness about savings and investments among the fishermen affects their future plan	10794.500	-3.316	0.001	244.84	224.26
Lack of fish markets and landing centers reduces the demand and sale of fish	10521.500	-3.475	0.001	245.47	219.30
Lack of price fixation by the government for the fish like agricultural products	11008.500	-2.149	0.032	244.34	228.15
Attack from terrorists and pirates endanger the life of the fishermen and their crafts during deep sea fishing	8100.500	-5.599	0.000	251.12	175.28

Table 6.19 discloses that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the economic problems such as 'high operational expenses reduce their income when fish catch is not adequate to meet the cost. This leads to borrowing from local money lenders, unable to pay the insurance

premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss, usages of banned fishing nets and instruments in the sea, reduces the fish wealth, lack of demand in overseas market reduces the income of the fishermen, lack of awareness about savings and investments among the fishermen affects their future plan, lack of fish markets and landing centers reduces the demand and sale of fish, lack of price fixation by the government for the fish like agricultural products and attack from terrorists and pirates endanger the life of the fishermen and their crafts during deep sea fishing' due to the 'p' value is less than 0.05. It shows that caste wise there is a significant difference in economic problems such as the high operational expenses reduce their income when fish catch is not adequate to meet the cost. This leads to borrowing from local money lenders, unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss, usages of banned fishing nets and instruments in the sea, reduces the fish wealth, lack of demand in overseas market reduces the income of the fishermen, lack of awareness about savings and investments among the fishermen affects their future plan, lack of fish markets and landing centers reduces the demand and sale of fish, lack of price fixation by the government for the fish like agricultural products and attack from terrorists and pirates endanger the life of the fishermen and their crafts during deep sea fishing.

6.5.4 Economic Problems Based on Education

An attempt was made to know the economic problems based on education. The education of the respondents was classified as illiterate, primary, middle, high school and higher secondary school. To test the economic problems based on education of the respondents, the following null hypothesis was proposed.

H_0 : There is no significant difference in economic problems as regards education of the respondents in Kanyakumari district.

The non-parametric statistics of Kruskal-Wallis test was used to analyze the economic problems based on education of respondents and test the proposed null hypothesis. The details of the result of Kruskal-Wallis test is reported in Table 6.20.

Table 6.20

Kruskal-Wallis Test: Economic Problems Based on Education

Economic Problems	Chi-Square χ^2	p value	Mean Rank				
			Illiterate	Primary	Middle	High school	Higher secondary school
The high operational expenses reduce their income when fish catch is not adequate to meet the cost. This leads to borrowing from local money lenders	6.073	0.299	238.85	248.20	240.77	274.67	195.00
Unable to provide good education for the children due to lack of savings from fishing	13.377	0.020	214.16	242.30	259.04	283.97	171.50
Increased debts lead to disposing of the residential house, property and fishing crafts	2.873	0.720	231.64	251.86	239.93	245.00	181.00
Unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss	6.973	0.223	252.16	251.16	231.09	247.33	183.50
During the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult	6.229	0.285	231.40	245.23	242.64	264.50	244.50
Usages of banned fishing nets and instruments in the sea, reduces the fish wealth	7.235	0.204	235.02	245.17	240.23	304.67	230.00
Lack of demand in overseas market reduces the income of the fishermen	3.013	0.698	236.52	247.74	239.92	278.13	220.00
Lack of awareness about savings and investments among the fishermen affects their future plan	4.213	0.519	248.22	239.63	240.26	250.50	220.50
Lack of fish markets and landing centers reduces the demand and sale of fish	3.933	0.559	252.17	244.95	231.22	242.50	217.50
Lack of price fixation by the government for the fish like agricultural products	13.370	0.020	285.62	218.12	127.35	145.36	202.15
Attack from terrorists and pirates endanger the life of the fishermen and their crafts during deep sea fishing	1.267	0.938	239.51	243.75	242.55	263.90	215.50

Source: Primary data

Table 6.20 exhibits that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the economic problems such as 'unable to provide good education for the children due to lack of savings from fishing and lack of price fixation by the government for the fish like agricultural products' due to the '*p'* value is less than 0.05. It shows that education wise there is a significant difference in economic problems such as unable to provide good education for the children due to lack of savings from fishing and lack of price fixation by the government for the fish like agricultural products.

6.5.5 Economic Problems Based on Family System

An attempt was made to know the economic problems based on family system such as joint family and nuclear family. To test the economic problems based on family system, the following null hypothesis was proposed.

H_0 : There is no significant difference in the economic problems as regards the respondent's family status.

The non-parametric statistics of Mann-Whitney U test was used to analyze the economic problems based on family status and test the proposed null hypothesis. The details of the result of Mann-Whitney U test is illustrated in Table 6.21.

Table 6.21

Mann-Whitney U Test: Economic Problems Based on Family Status

Economic Problems	*U*-value	Z-value	*p*-value	Mean rank	
				Joint family	Nuclear family
The high operational expenses reduce their income when fish catch is not adequate to meet the cost. This leads to borrowing from local money lenders	18652.00	-1.397	0.162	229.46	244.89
Unable to provide good education for the children due to lack of savings from fishing	17753.00	-2.155	0.031	220.99	247.28
Increased debts lead to disposing of the residential house, property and fishing crafts	18489.00	-1.472	0.141	227.92	245.33
Unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss	19.398.00	-0.546	0.858	236.50	242.91
During the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult	18576.00	-2.139	0.032	254.25	237.90
Usages of banned fishing nets and instruments in the sea, reduces the fish wealth	19116.00	-0.918	0.359	249.16	239.34
Lack of demand in overseas market reduces the income of the fishermen	18933.50	-0.983	0.326	232.12	244.14
Lack of awareness about savings and investments among the fishermen affects their future plan	19798.50	-0.329	0.742	242.72	241.16
Lack of fish markets and landing centers reduces the demand and sale of fish	19620.00	-0.645	0.519	244.41	240.68
Lack of price fixation by the government for the fish like agricultural products	19618.00	-0.650	0.516	244.42	240.68
Attack from terrorists and pirates endanger the life of the fishermen and their crafts during deep sea fishing	19051.00	-1.022	0.307	249.77	239.17

Source: Primary data

Table 6.21 discloses that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the economic problems such as ‘unable to provide good education for the children due to lack of savings from fishing and during the monsoon season the fishermen were banned to catch fish for 45 days which leads to

no income and makes them to meet their daily life difficult' due to the 'p' value is less than 0.05. It shows that family status wise there is a significant difference in economic problems such as unable to provide good education for the children due to lack of savings from fishing and during the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult.

6.5.6 Economic Problems Based on Monthly Income of the Respondents

An attempt was made to know the economic problems based on average monthly income of respondents. The average monthly income of the respondents was classified as below Rs.25,000, Rs.25,000-50,000, Rs.50,001-75,000, Rs.75,001-1,00,000 and above Rs.1,00,000. To test the economic problems based on average monthly income of the respondents, the following null hypothesis was proposed.

H_0 : There is no significant difference in economic problems among the respondent's monthly income in Kanyakumari district.

The non-parametric statistics of Kruskal-Wallis test was used to analyze the economic problems based on average monthly income of respondents and to test the proposed null hypothesis. The details of the result of Kruskal-Wallis test is reported in Table 6.22

Table 6.22

Kruskal-Wallis Test: Economic Problems Based on Monthly Income of the Respondents

Economic Problems	Chi-Square χ^2	p value	Mean Rank				
			Below 25000	25000-50000	50001-75000	75001-100000	Above 100000
The high operational expenses reduce their income when fish catch is not adequate to meet the cost. This leads to borrowing from local money lenders	46.951	0.000	319.81	311.44	261.51	234.25	213.09
Unable to provide good education for the children due to lack of savings from fishing	35.128	0.000	307.52	272.23	241.69	238.77	222.18
Increased debts lead to disposing of the residential house, property and fishing crafts	46.209	0.000	314.56	253.38	283.60	219.87	214.89
Unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss	28.596	0.000	233.58	272.53	290.37	245.77	219.98
During the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult	26.554	0.000	291.66	270.07	247.62	228.52	224.23
Usages of banned fishing nets and instruments in the sea, reduces the fish wealth	2.233	0.693	264.50	236.64	247.11	242.41	240.26
Lack of demand in overseas market reduces the income of the fishermen	47.042	0.000	298.92	287.81	275.88	240.48	211.78
Lack of awareness about savings and investments among the fishermen affects their future plan	19.011	0.001	289.19	264.65	235.44	279.77	222.98
Lack of fish markets and landing centers reduces the demand and sale of fish	2.592	0.628	250.50	246.71	238.91	240.65	242.74
Lack of price fixation by the government for the fish like agricultural products	4.197	0.380	254.50	246.90	245.75	234.90	237.62
Attack from terrorists and pirates endanger the life of the fishermen and their crafts during deep sea fishing	3.508	0.477	257.50	245.77	244.69	242.81	235.69

Source: Primary data

Table 6.22 exhibits that the null hypothesis (H_0) is rejected at the 5 per cent level of significance with regard to the economic problems such as the 'high

operational expenses reduce their income when fish catch is not adequate to meet the cost. this leads to borrowing from local money lenders, unable to provide good education for the children due to lack of savings from fishing, increased debts lead to disposing of the residential house, property and fishing crafts, unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss, during the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult, lack of demand in overseas market reduces the income of the fishermen and lack of awareness about savings and investments among the fishermen affects their future plan' due to the '*p'* value is less than 0.05. It shows that average monthly income wise there is a significant difference in economic problems such as the high operational expenses reduce their income when fish catch is not adequate to meet the cost. this leads to borrowing from local money lenders, unable to provide good education for the children due to lack of savings from fishing, increased debts lead to disposing of the residential house, property and fishing crafts, unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss, during the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult, lack of demand in overseas market reduces the income of the fishermen and lack of awareness about savings and investments among the fishermen affects their future plan.

6.6 PROBLEMS FACED BY TRADITIONAL MECHANISED MARINE FISHERMEN

In order to find out the significant difference in the problems faced by the traditional mechanised marine fishermen, the null hypothesis is framed as, "There is no significant difference in the problems faced by the traditional mechanised marine fishermen of mechanised boats, motorized vallam and motorised catamaran". The following Table 6.23 shows the results of 'F' test.

Table 6.23

Problems Faced by Traditional Mechanised Marine Fishermen

Sl. No	Problems	Traditional Mechanised Marine Fishermen (Mean Score)			F Statistics
		Mechanised Boats	Motorised Vallam	Motorised Catamaran	
1.	Technological Problems	4.0925	4.1975	4.1671	5.059*
2.	Socio-Cultural Problems	3.9600	4.2051	4.1338	10.028*
3.	Economic Problems	4.4253	4.5050	4.4835	7.567*

Source: Primary data *Significant at five per cent level

Table 6.23 shows the mean score of problems faced by traditional mechanised marine fishermen along with its respective 'F' statistics. The important problems faced by fishermen of mechanised boats are economic and technological problems since their respective mean scores are 4.4253 and 4.0925. Among the fishermen of motorised vallam the important problems faced by fishermen are economical and socio-cultural problems since their respective mean scores are 4.5050 and 4.2051. The important problems faced by fishermen of motorized cattamaran are economic and technological problems since their respective mean scores are 4.4835 and 4.1671. The null hypothesis is rejected for all problems relating to technological problems,

socio-cultural problems and economic problems since their respective 'F' statistics are significant at 5 per cent level.

6.7 SIGNIFICANTLY ASSOCIATING PROFILE VARIABLES WITH THE PROBLEMS FACED BY THE RESPONDENTS

In order to find out the relationship between profile variables of mechanised marine fishermen and their problems, the null hypothesis is framed as, "There is no significant relationship between the profile variables of mechanised marine fishermen and their problems". The result is given in the Table 6.24.

Table 6.24

Significantly Associating Profile Variables with the Problems Faced by the Respondents

Sl. No	Profile Variables	F Statistics		
		Technological Problems	Socio-Cultural Problems	Economic Problems
1.	Age	7.321*	15.806*	1.799
2.	Marital Status	1.388	8.043*	9.600*
3.	Caste	12.711*	15.059*	8.912*
4.	Education	8.885*	2.655*	1.529
5.	Family System	1.895	1.128	1.387
6.	Ownership of House	1.073	2.160	1.545
7.	Type of Housing	3.007*	2.326	9.085*

Source: Primary data *Significant at five per cent level

It is understood from Table 6.24 that there is a significant relationship between technological problems faced by mechanised marine fishermen and profile variables of mechanised marine fishermen namely age, caste, education and type of housing since their 'F' statistics are significant at 5 per cent level. Among the mechanised marine fishermen the significantly associating profile variables with the socio-cultural

problems faced by the mechanized fishermen are age, marital status, caste and education since their 'F' statistics are significant at 5 per cent level. As regards the mechanised marine fishermen the significantly associating profile variables with the economic problems faced by the mechanized fishermen are marital status, caste and type of housing since their 'F' statistics are significant at 5 per cent level.

6.8 EMPOWERMENT OF MECHANISED MARINE FISHERMEN AND THEIR PROBLEMS

In order to find out the relationship between empowerment of mechanised marine fishermen and the problems faced by them, the null hypothesis is framed as, "There is no significant relationship between empowerment of mechanised marine fishermen and the problems faced by them". The result is given in the Table 6.25.

Table 6.25

Empowerment of Mechanised Marine Fishermen and their Problems

Sl. No	Empowerment	F Statistics		
		Technological Problems	Socio-Cultural Problems	Economic Problems
1.	Social Empowerment	6.744*	3.386*	1.743
2.	Economic Empowerment	3.248*	4.172*	4.758*

Source: Primary data *Significant at five per cent level

It is understood from Table 6.25 that there is a significant relationship between technological problems faced by the mechanised marine fishermen and their social and economic empowerment of mechanised marine fishermen since their 'F' statistics are significant at 5 per cent level. It is further understood that there is a significant relationship between socio-cultural problems faced by mechanised marine fishermen and social and economic empowerment of mechanised marine fishermen since their 'F' statistics are significant at 5 per cent level.

Table 6.25 reveals that there is a significant relationship between economic problems faced by mechanised marine fishermen and economic empowerment of mechanised marine fishermen since their 'F' statistics are significant at 5 per cent level.

6.9 FACTORS INFLUENCING THE MARINE FISHERMEN TO PRACTICE MECHANISED MODE OF FISHING AND THEIR PROBLEMS

In order to find out the relationship between factors influencing the marine fishermen to practice mechanised mode of fishing and the problems faced by them, the null hypothesis is framed as, "There is no significant relationship between factors influencing the marine fishermen to practice mechanised mode of fishing and the problems faced by them". The result is given in the Table 6.26.

Table 6.26

Factors Influencing the Marine Fishermen to Practice Mechanised Mode of Fishing and their Problems

Sl. No	Factors	F Statistics		
		Technological Problems	Socio-Cultural Problems	Economic Problems
1.	Technological factors	15.306*	13.679*	9.175*
2.	Social factors	16.635*	11.144*	11.497*
3.	Economic factors	10.179*	10.783*	11.375*

Source: Primary data *Significant at five per cent level

It is understood from Table 6.26 that there is a significant relationship between technological problems faced by mechanised marine fishermen and the factors namely technological factors, social factors and economic factors since their 'F' statistics are significant at 5 per cent level. As regards socio-cultural problems faced by mechanised marine fishermen there is a significant relationship with technological

factors, social factors and economic factors since their ‘F’ statistics are significant at 5 per cent level. In respect of economic problem the significantly associating factors influencing the marine fishermen to practice mechanized mode of fishing are technological factors, social factors and economic factors since their ‘F’ statistics are significant at 5 per cent level.

6.10 SUMMARY

The chapter titled ‘Problems encountered by the traditional fishermen practicing mechanization in fishing’ brings to light the significant technological, socio-cultural and economic problems. It also highlighted the significantly associating profile variables with the problems encountered by the marine fishermen to practice mechanized mode of fishing. This researcher also identified the significantly associating problems faced by the marine fishermen while practicing mechanized mode of fishing with their socio-economic empowerment. The significantly associating factors influencing the fishermen to practice mechanization in fishing with the problems faced by the mechanized fishermen were also identified.

Chapter - VII

SUMMARY OF FINDINGS AND SUGGESTIONS

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CHAPTER - VII

SUMMARY OF FINDINGS AND SUGGESTIONS

7.1 INTRODUCTION

The summary of the important findings and meaningful suggestions drawn on the basis of the inferences drawn in result of the application of the statistical tests have been precisely presented in this chapter. This study was proved to be a valuable and worthwhile one as the inferences drawn throw a good deal of light in understanding and gain meaningful insights in the selected components and aspects pertaining to the socio-economic status of the mechanized fishermen. Accepting that the universe of the study is limited, taking full cognizance of the fact that the study is limited to selected variables and areas and components and finally realising the need and scope for further research of areas covered in this study. However, it must be admitted that a comprehensive attempt to extensive and intensive research covering all the aspects of mechanized marine fishermen.

This study was conducted in Kanyakumari District which is one of the districts in Tamil Nadu. This study aims to analyse the impact of mechanization in marine fishing industry on the socio-economic empowerment of traditional marine fishermen in Kanyakumari district. 106 fishermen of mechanised boats, 315 fishermen of motorised vallam and 63 fishermen of cattamaram were selected as sample respondents for the study. The required data were collected with the help of interview schedule. The statistical analysis like ANOVA, ‘t’ test, Garret rank, Kruskal Wallis test, Mann Whitney U test and regression coefficient were used.

The major findings and suggestions of the study are as follows:

7.2 SUMMARY OF FINDINGS

7.2.1 Findings Relating to the Status of the Respondents

- 36.9 per cent of the respondents are in the age group of 26 to 35 years and 34.7 per cent of them are in the age group of 36 to 45 years.
- 90.5 per cent of the respondents are married and the remaining 9.5 per cent of them are unmarried.
- All the respondents are belonging to Christians. It shows the dominance of the Christians in the fishing occupation in the study area.
- 88.6 per cent of the respondents belongs to Mukkuvar community and 11.4 per cent of the respondents belongs to Bharavar community.
- 36.6 per cent of the respondents are having primary education, 34.3 per cent have studied up to middle school and 25.8 per cent are illiterates.
- 78.1 per cent of the sample respondents belong to nuclear family and the remaining 21.9 per cent of the respondents belong to joint family system. It indicates that the joint family system among the fisher folks of Kanyakumari district is slowly declining.
- 76.9 per cent of the respondents reside in their owned house and 21.1 per cent of the respondents reside in their parent's house.
- 81.6 per cent of the sample respondents reside in the concrete house and 18.4 per cent of the respondents reside in tiled house.
- All the respondent's father's occupation is fishing.
- 100 per cent of the respondent's grand fathers are also fishermen. This confirms that the fishing occupation is a traditional occupation.

- The study reveals that all the sample respondents have electricity connection their house.
- 85.7 per cent of the sample respondents have tape water facility in their own house and 14.3 per cent of the respondents are using public water tap for getting water.
- 87.2 per cent of the sample respondents are using their own modern toilets and only 12.2 per cent of the respondents are using the old form of pit as the toilets. The electricity, water and toilet facilities used by the respondents shows the living conditions of the respondents.
- This study shows that the 58.3 per cent of the respondents are having own land and 41.7 per cent are respondents are not having own land.
- 76.9 per cent of respondents are having their own house and 23.1 per cent of respondents are not having own house.
- 99.4 per cent of respondents are having jewels and 0.6 per cent of the respondents are not having jewels.
- This study indicates that 46.5 per cent of sample respondents are having own vehicle and 53.5 per cent of the sample respondents are not having own vehicle. This reveals that majority of the sample respondents in the study area are using public transportation as their mode of transportation.
- 99.4 per cent of respondents are not having livestock and 0.6 per cent of the respondents are having livestock.

7.2.2 Findings Relating to Entry into Fishing

- 46.9 per cent of the respondents entered into fishing at the age of 12, 22.3 per cent of the respondents entered into fishing at the age of 11 and 11.6 per cent of the respondents entered into fishing at the age of 13.
- 48.9 per cent of the respondents have been involved in fishing for more than 30 years, 20.2 per cent of the respondents have been involved in fishing between 26 to 30 years.
- This study reveals that 92.8 per cent of the respondents are using catamaran at the time of entry into fishing, 4.3 per cent of the respondents are using dug-out canoe and 2.9 per cent of the respondents are using plank -built canoe. Among the respondents of Mechanised boats, Motorised vallam and Motorised cattamaran, majority of the respondents used catamaran at the time of entry into fishing.
- **Fishing gears used at the time of entry into fishing:** 81.6 per cent of the respondents used hooks and lines at the time of entry into fishing and 9.9 per cent of the respondents used prawns net. Majority of the respondents of Mechanised boats, Motorised vallam and Motorised catamaran used hooks and lines at the time of entry into fishing.
- **Frequency of Voyage in a Month at the time of entry into Fishing:** 77.6 per cent of the respondents go for fishing 26 days in a month at the time of entry into fishing.
- **Expenses per voyage at the time of entry into fishing:** Among the respondents of Mechanised boats, 46.2 per cent the respondents spent between Rs.11 to 50 for fishing in a day whereas at the respondents of Motorised

vallam and Motorised cattamaran, spent below Rs.10 which represents 52.1 and 68.3 per cent respectively.

- **Average monthly income at the time of entry into fishing during season:** 56.2 per cent of the respondents had earned average monthly income between Rs.1000 to 2000 at the time of entry into fishing during season. The respondents of Mechanised boats, Motorised vallam and Motorised cattamaran, earned Rs.1000 to 2000 at the time of entry into fishing during season it represent 39.7, 59.4 and 68.3 per cent respectively.

- **Average monthly income at the time of entry into fishing during off season:** 72.9 per cent of the respondents earned average monthly income of below Rs.1000 at the time of entry into fishing during off season. Majority of the respondents of Mechanised boats, Motorised vallam and Motorised cattamaran, earned below Rs.1000 at the time of entry into fishing during off season it represent 65.1, 72.7 and 87.3 per cent respectively.

7.2.3 Findings Relating to Fishing at Present

- **Fishing Crafts used at present:** 65.1 per cent of the respondents are using motorized vallam, 13 per cent and 21.9 per cent of the respondents are using motorized catamaran and mechanized boats respectively.

- **Fishing gears used at present:** 36.4 per cent of the respondents are using hooks and lines at present, 25.0 per cent of them are using mackerel net (iyilavalai) and 14.1 per cent and 10.1 per cent of the sample respondents are using drift gillnet (valiavalai) and trawl net respectively. Among the respondents of Mechanised boats, 46.2 per cent of them are using trawl net and 44.4 per cent of them are using hooks and lines. Among the respondents

of Motorised catamaran, 63.5 per cent of them are using hooks and lines. Among the respondents of Motorised vallam, 34.9 per cent of them are using mackerel net (iyilavalai).

- **Number of days fishing in a month during the season:** 75.6 per cent of the respondents are going for fishing 26 days in a month. 55.7 per cent of the respondents of the Mechanised boats go for fishing 29 days whereas among the Motorised vallam and Motorised cattamaran, 83.5 per cent and 88.9 of the respondents go for fishing 26 days in a month respectively.

- **Number of days fishing in a month at present during off season:** 76.9 per cent of the respondents go for fishing below 20 days in a month and 20.2 per cent of the respondents go for fishing 22 days in a month.

- **Expenses for fishing per day at present:** 56.2 per cent of the respondents spent Rs.3000 to 6000 for fishing per day at present and 21.9 per cent of the respondents spent below Rs.3000 for fishing per day. Respondents of Motorised catamaran are spending below Rs.3000 whereas 86.8 per cent of the respondents of Mechanised boats are spending Rs.9001 to 30000 and 86.3 per cent of the respondents of Motorised vallam are spending Rs.3000 to 6000 for fishing per day at present.

- **Average monthly income at present during season:** 53.7 per cent of the respondents are earning monthly income of Rs.25000 to 50000 during season and 24.4 per cent of the respondents are earning monthly income of below Rs.25000. 82.1 per cent of the respondents of Mechanised boats are earning monthly income of above Rs.1,00,000 whereas among the Motorised vallam

and Motorised cattamaran,70.8 per cent and 58.7 per cent of the respondents are earning monthly income of Rs.25000 to 50000 at present during season.

- **Average monthly income at present off season:** 37.8 per cent of the respondents are earning monthly income of below Rs.5000 during off season and 34.7 per cent of the respondents are earning monthly income of Rs.5000 to 10000. 65.1 per cent of the respondents of Mechanised boats are earning monthly income of Rs.15001 to Rs.20000. 50.5 per cent of the respondents of Motorised vallam are earning monthly income of Rs.5000 to Rs.10000 whereas 82.5 per cent of the respondents of Mechanised Cattamaram are earning monthly income of below Rs.5000 during off season.

- **Number of fishing crafts used at present:** 97.5 per cent of the respondents are having one fishing craft at present and the remaining 2.5 per cent of the respondents are having two fishing crafts. Majority of respondents of Mechanised boats, Motorised vallam and Motorised catamaran are having one fishing craft at present.

- **Year of acquisition of fishing crafts:** 27.7 per cent of the respondents acquired their fishing crafts during 2010 and 18.6 per cent of the respondents bought their fishing crafts during 2009.

- **Ownership of fishing crafts:** 100 per cent of the sample respondents own their own fishing crafts.

- **Sources of fund used for acquiring the fishing crafts:** 56.6 per cent of the respondents have used borrowed funds for acquiring the fishing crafts and 43.4 per cent of the respondents used their own fund for acquiring the fishing crafts. 90.6 and 52.1 per cent of the respondents of Mechanised boats and

Motorised vallam have used the borrowed fund for acquiring the fishing crafts respectively. 77.8 per cent of the respondents of Motorised catamaran have used their owned fund for acquiring the fishing crafts.

- **Sources of borrowed fund used by the mechanized fishermen:** Majority of the mechanised boats and the motorised vallam fishermen have borrowed fund from the local money lenders and the wholesale buyers of fish respectively. Majority of the motorised cattamaran fishermen have borrowed fund from the friends and relatives.

- **Implements and devices used for fishing:** 98.4 per cent of the respondents are using global positioning system, 97.9 per cent of the respondents are using LED bulbs and 95.4 per cent of the respondents are using marine parachute. Among the respondents of Mechanised boats, Motorised vallam and Motorised catamaran majority of them are using global positioning system.

- **Financial assistance received through government schemes for acquiring the fishing crafts, gears and implements:** All the respondents have not received any financial assistance through any government schemes for acquiring the fishing crafts, gears and implements for fishing.

- **Reason for choosing fishing as an occupation:** 'Traditional and no formal education' are the important reasons for choosing fishing as an occupation. Among the respondents of motorised vallam and mechanized catamarn, 'traditional and poor economic conditions of the family' are the reasons for choosing fishing as an occupation.

7.3 FINDINGS RELATING TO FACTORS INFLUENCING THE MECHANIZED MODE OF FISHING

7.3.1 Technological Factors Influencing the Mechanized Mode of Fishing

- **Among the mechanised boat fishermen** the highly viewed technological factors influencing the mechanized mode of fishing are 'ability of the mechanized crafts to travel to deep sea where more fishes are available' and 'able to take rest with the facilities available in the modern mechanized craft' since their respective mean scores are 4.9245 and 4.8548.

- **Among the motorised vallam fishermen** the highly viewed technological factors influencing the mechanized mode of fishing are 'ability of the mechanized crafts to travel to deep sea where more fishes are available' and 'the use of tools to find out new fishing grounds' since their respective mean scores are 4.6139 and 4.4051.

- **Among the motorised cattamaran fishermen** the highly viewed technological factors influencing the mechanized mode of fishing are 'the new technical knowledge which makes the fishermen confident' and 'GPS helps to travel straight to fishing grounds immediately' since their respective mean scores are 4.8113 and 4.7075.

7.3.2 Social factors influencing the mechanized mode of fishing

- **Among the mechanised boat fishermen** the highly viewed social factors influencing the mechanised mode of fishing are 'ability to provide better medical treatment to my family members' and 'ability to spent more on nutritious food to the family members' since their respective mean scores are 4.9032 and 4.8871.

- **Among the motorised vallam fishermen** the highly viewed social factors influencing the mechanised mode of fishing are ‘to give good education for the children’ and ‘ability to construct a house near the town for the family’, since their respective mean scores are 4.8734 and 4.8671.

- **Among the motorised cattamaran fishermen** the highly viewed social factors influencing the mechanised mode of fishing are ‘to give good education for the children’ and ‘ability to buy decent clothes for the family members’, since their respective mean scores are 4.9245 and 4.9245.

7.3.3 Economic Factors Influencing the Mechanized Mode of Fishing

- **Among the mechanised boat fishermen** the highly viewed economic factors influencing the mechanised mode of fishing are ‘ability to catch more fish to earn more income’ and ‘through savings to buy gold ornaments for my wife and children’ since their respective mean scores are 4.7180 and 4.4677.

- **Among the motorised vallam fishermen** the highly viewed economic factors influencing the mechanised mode of fishing are ‘ability to catch more fish to earn more income’ and ‘through savings to buy gold ornaments for my wife and children’, since their respective mean scores are 4.8829 and 4.5506.

- **Among the motorised cattamaran fishermen** the highly viewed economic factors influencing the mechanised mode of fishing are ‘ability to catch more fish to earn more income’ and ‘through savings to buy gold ornaments for my wife and children’ since their respective mean scores are 4.8868 and 4.8302.

7.3.4 Findings Relating to Profile Variables and Factors Influencing the Respondents to Practice Mechanisation in Fishing

- Significantly associating profile variables of the respondents with the technological factors which influence the respondents to practice mechanization in fishing are age, marital status, caste, family system and type of housing since their F statistics are significant at five per cent level.
- As regards the social factors the significantly associating profile variables are age, caste, family system, ownership of house and type of housing since their F statistics are significant at five per cent level.
- In respect of economic factors the significantly associating profile variables are age, caste, ownership of house and type of housing since their F statistics are significant at five per cent level.

7.4 ECONOMIC EMPOWERMENT OF FISHERMEN

7.4.1 Level of Socio-economic Empowerment of Fishermen

- 76.9 per cent of the fishermen have moderate level of socio-economic empowerment and 9.1 per cent have high level of socio-economic empowerment.
- **Social Empowerment before mechanization:-** The highly viewed factors for social empowerment before mechanisation among the mechanised boats fishermen are, ‘to get important position in their village committee’ and ‘their family seek their advice to take decisions when there is important matter in their family’ since their respective mean scores are 2.2000 and 2.0000. Among the motorised vallam fishermen the highly viewed factors are ‘to get important position in their village committee’ and ‘village people asks their

advice when they takes important decision' since their respective mean scores are 1.8956 and 1.8729. Among the motorised cattamaran fishermen the highly viewed factors are 'to get important position in their village committee' and 'their family seek their advice to take decisions when there is important matter in their family' since their respective mean scores are 1.9683 and 1.8396.

7.4.2 Economic Empowerment Before Mechanization

- The highly viewed factors for economic empowerment before mechanisation among the mechanised boats fishermen are, 'have more income due to increased fish catch' and 'more savings helps to buy craft, net and fishing instruments' since their respective mean scores are 2.4677 and 1.8226.
- Among the motorised vallam fishermen the highly viewed factors are 'more savings helps to buy craft, net and fishing instruments' and 'better fish landing facilities improved the market conditions to sell fish at fair price' since their respective mean scores are 1.9331 and 1.8544.
- Among the motorised cattamaran fishermen the highly viewed factors are 'have more income helps to provide better nutritious food for the family members' and 'have more savings helps to buy land near their village and town' since their respective mean scores are 2.2453 and 1.7048.

7.4.3 Social Empowerment After Mechanization

- The highly viewed social empowerment factors after mechanisation among the mechanised boats fishermen are, 'ability to provide better medical treatment for him and his family' and 'ability to construct house with all facilities' since their respective mean scores are 4.8751 and 4.7903.

- Among the motorised vallam fishermen the highly viewed factors are ‘ability to provide better medical treatment for him and his family’and ‘ability to provide education to their children through English medium school and go for higher education’ since their respective mean scores are 4.7627 and 4.6677.

- Among the motorised cattamaran fishermen the highly viewed factors are ‘ability to provide better medical treatment for him and his family’ and ‘ability to provide education to their children through English medium school and go for higher education’ since their respective mean scores are 4.6792 and 4.5377.

7.4.4 Economic Empowerment After Mechanization

- The highly viewed economic empowerment factors after mechanization among mechanised boats fishermen are, ‘increased income helps to buy quality dress material to the family’ and ‘increased income helps to provide better nutritious food for the family’ since their respective mean scores are 4.8871 and 4.7581.

- Among the motorised vallam fishermen the highly viewed factors are ‘increased income helps to buy quality dress material to family’ and ‘increased income helps to provide better nutritious food for the family’ since their respective mean scores are 4.7025 and 4.6772.

- Among the fishermen of motorised catamaran the highly viewed factors are ‘increased income helps to buy quality dress material to the family’, and ‘increased income helps to provide better nutritious food for the family’ since their respective mean scores are 4.5755 and 4.5660.

7.4.5 Association Between Social Empowerment After Mechanization and Profile of the Fishermen

- **Age:** The highly viewed social empowerment factors after mechanisation among the respondents of below 25 years are ‘catching more fish provides more employment opportunities’ and ‘ability to provide better medical treatment for him and his family’ since respective mean score is 4.7581 and 4.5722.
- Among the respondents belongs to 26 to 35 years of age, the highly viewed variables are ‘ability to construct the house with all facilities’ and ‘ability to provide better medical treatment for him and his family’ since their respective mean score is 4.8182 and 4.7097.
- Among the respondents belongs to 36 to 45 years, the highly viewed variables are ‘ability to provide better medical treatment for him and his family’ and ‘ability to provide education to their children through English medium school and go for higher education’ since their respective mean score is 4.8419 and 4.8047.
- **Marital Status:** The highly viewed social empowerment factors after mechanisation among the unmarried mechanized fishermen are, ‘catching more fish provides more employment opportunities’ and ‘ability to provide better medical treatment for him and his family’ since their respective mean score is 4.7391 and 4.4783.
- Among the married respondents he highly viewed variables are ‘ability to provide better medical treatment for him and his family’ and ‘ability to

construct the house with all facilities' since their respective mean score is 4.7900 and 4.6164.

- **Community:** The highly viewed social empowerment factors after mechanisation among the mechanized fishermen belongs to Mukkuvar community are 'ability to construct the house with all facilities' and 'ability to provide better medical treatment for him and his family' since their respective mean score is 4.9273 and 4.9123.

- Among the Bharavar community the highly viewed variables are 'ability to construct the house with all facilities' and 'ability to provide better medical treatment for him and his family' since their respective mean score is 4.7389 and 4.6131.

- **Educational Qualification:** The highly viewed social empowerment factors after mechanisation among illiterate mechanized fishermen are 'ability to provide better medical treatment for him and his family' and 'ability to provide education to their children through English medium school and go for higher education' since their respective mean scores are 4.2667 and 4.1237.

- Among the respondents who have studied up to higher secondary school, the highly viewed variables are 'ability to provide better medical treatment for him and his family' and 'ability to provide education to their children through English medium school and go for higher education' since their respective mean score is 4.7603 and 4.6488.

- **Family System:** The highly viewed social empowerment factors after mechanisation among the mechanized fishermen who lives in the joint family system are 'ability to provide better medical treatment for him and his family'

and ‘ability to provide education to their children through English medium school and go for higher education’ since their respective mean scores are 4.7819 and 4.6676.

- Among the nuclear family system the highly viewed variables are ‘ability to construct the house with all facilities’ and ‘ability to provide better medical treatment for him and his family’ since their respective mean scores are 4.6672 and 4.6492.

- **Income:** The highly viewed social empowerment factors after mechanisation among the mechanized fishermen earning monthly income of below Rs.25,000 are ‘their family seek their advice to take decisions when there is important matter in their family’ and ‘ability to catch more fish helps to get more employment opportunities’ since their respective mean score is 4.2410 and 4.2051.

- Among the mechanized fishermen who are earning average monthly income of Rs.25,000-50,000 and Rs.50,001-75,000, Rs.75,001-1,00,000 and above Rs.1,00,000 the highly viewed variables are ‘ability to provide better medical treatment for him and his family’ since their respective mean score is 4.9289, 4.6923, 4.6774 and 4.9036 respectively.

7.4.6 Association Between Economic Empowerment After Mechanization and Profile of the Fishermen

- **Age:** The highly viewed economic empowerment factors after mechanisation among respondents having below 25 years of age are ‘increased income helps to buy quality dress material to the family’ and increased income helps to

repair the craft and nets immediately' since their respective mean scores are 4.6983 and 4.2438.

- Among the age group of 26 to 35 the highly viewed variables are 'increased income helps to buy quality dress material to the family' and 'increased income helps to provide better nutritious food for the family' since the respective mean score is 4.7984 and 4.7661.

- Among the age group of 36 to 45 years the highly viewed variables are 'increased income helps to buy quality dress material to the family' and 'increased income helps to provide better nutritious food for the family' since the respective mean score is 4.6930 and 4.6837.

- **Marital Status:** The highly viewed economic empowerment factors after mechanisation among the unmarried mechanized fishermen are, 'increased income helps to buy quality dress material to the family' and 'increased income helps to provide better nutritious food for the family' since their respective mean scores are 4.6845 and 4.6621.

- Among the married fishermen the highly viewed variables are 'increased income helped to avoid borrowings from the local money lenders' and 'increased income helps to provide better nutritious food for the family' since their respective mean scores are 4.7826 and 4.6739.

- **Community:** The highly viewed economic empowerment factors after mechanisation among the Mukkuvar community are 'increased savings helps to deposit money in the bank' and 'increased income helps to avoid borrowings from the local money lenders' since their respective mean score is 4.9818 and 4.8364.

- Among the Bharavar community the highly viewed variables are ‘increased income helps to avoid borrowings from the local money lenders’ and ‘increased savings helps to deposit money in the bank’ since the respective mean score is 4.6410 and 4.3939.

- **Educational Qualification:** The highly viewed economic empowerment factors after mechanisation among the illiterate mechanized fishermen are ‘increased fish catch helps to earn more income’ and ‘increased income helps to repair the craft and nets immediately ’since their respective the mean scores are 4.2000 and 3.9667.

- Among the respondents who have studies up to higher secondary school the highly viewed variables are ‘increased income helps to buy quality dress material to the family’ and ‘increased income helps to provide better nutritious food for the family’ since their respective mean score is 4.7797 and 4.7175.

- **Family System:** The highly viewed economic empowerment factors after mechanisation among the mechanized fishermen who lives in joint family system are ‘increased income helps to buy quality dress material to the family’ and ‘increased income helps to provide better nutritious food for the family’ since their respective mean score is 4.2981 and 4.2463.

- The highly viewed economic empowerment factors after mechanisation among the mechanized fishermen who lives in nuclear family system are ‘increased income helps to provide better nutritious food for the family’ and ‘increased savings helps to buy gold ornaments and things for the family’ since the respective mean score is 4.7170 and 4.5189.

- **Income:** The highly viewed economic empowerment factors after mechanization among the mechanized fishermen who are earning monthly income of below Rs.25,000, Rs.25,000-50,000, Rs.50,001-75,000, Rs.75,001-1,00,000 and above Rs.1,00,000 are 'increased income helps to provide better nutritious food for the family' since their respective mean score is 4.3581, 4.6667, 4.5385, 4.8675 and 4.8731.

7.5 SOCIO-ECONOMIC EMPOWERMENT DURING PRE AND POST-MECHANISATION

7.5.1 Social Empowerment during Pre and Post-Mechanization

- Since the p value for all the social empowerment variables is less than 0.05, the null hypothesis is rejected. It shows that there exist significant differences in all the social empowerment variables among the respondents. Hence it is concluded that mechanisation has impacted on the social empowerment.

7.5.2 Economic Empowerment during Pre and Post-Mechanization

- Since the p value for all the economic empowerment variables is less than 0.05, the null hypothesis is rejected. It shows that there exists a significant difference in economic empowerment variables among the respondents. Hence it is concluded that mechanisation has impacted on the economic empowerment of the respondents.

7.5.3 Profile Variables of the Respondents and Socio-economic Empowerment

- There is a significant relationship between social empowerment and profile variables of the respondents as regards age, education and ownership of house. As regards the economic empowerment the significantly associating

profile variables are age, marital status, education, family system and ownership of house.

7.5.4 Impact of Socio-economic Factors on the Socio-economic Empowerment

- The significantly influencing socio-economic factors on the socio- economic empowerment among the respondents of mechanised boats are economic factors and socio factors since their respective regression co-efficient are significant at five per cent level. A unit increase in the above said factors result in an increase in the socio-economic empowerment among the respondents of mechanised boats by 0.4614 and 0.3425 units respectively.
- In the case of the respondents of motorized vallam, a unit increase in the factors namely economic factors and social factors result in an increase in the socio-economic empowerment by 0.4870 and 0.3742 units respectively. In the case of the respondents of motorized catamaran, it is increased by 0.4513 and 0.3526 units respectively. The changes in the view on factors explain the changes in the socio-economic empowerment among the respondents of motorized vallam to a higher extent (78.19 per cent) than among the respondents of motorized catamaran (77.79 per cent).

7.6 PROBLEMS ENCOUNTERED BY THE FISHERMAN IN THE MECHANIZED MODE OF FISHING

7.6.1 Technological Problems Encountered by the Fisherman

- The important technological problems encountered by the respondents of mechanised boats are 'non-availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea' and 'usage of solar powered LED lights attracts small fishes and other marine

lives endanger its survival which affects coastal bio- diversity and marine eco system' since their respective mean scores are 4.7903 and 4.2911.

- ❖ Among the respondents of motorised vallam, the important technological problems are 'non-availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea' and 'need more technical knowledge to operate crafts, nets, fish finder and GPS' since their respective mean scores are 4.7595 and 4.3481.

- ❖ Among the respondents of motorised catamaran, the important technological problems are 'non-availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea' and 'lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea' since their respective mean scores are 4.9717 and 4.6981.

- ❖ Regarding the technological problems, the significant difference among the respondents of mechanised boats, motorised vallam and motorised catamaran, are identified in the case of all the ten variables since the respective 'F' statistics are significant at 5 per cent level, the null hypothesis is rejected.

7.6.2 Socio-cultural Problems Encountered by the Fisherman

- ❖ The important socio-cultural problems encountered by respondents of mechanised boats are 'lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen' and 'long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community', since their respective mean scores are 4.7581 and 4.7170.

- Among the respondents of motorised vallam, the important socio-cultural problems are ‘lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen’ and ‘the deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman’, since their respective mean scores are 4.8291 and 4.7247.

- Among the respondents of motorised catamaran, the important socio-cultural problems are ‘lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen’ and ‘the deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman’ since their respective mean scores are 4.8491 and 4.8208.

7.6.3 Economic Problems Encountered by the Fishermen

- The important economic problems encountered by the respondents of mechanised boats are ‘lack of awareness about savings and investments among the fishermen affects their future plan’ and ‘during the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult’, since their respective mean scores are 4.9839 and 4.9194.

- Among the respondents of motorised vallam, the important economic problems are ‘lack of fish markets and landing centers reduces the demand and sale of fish’ and ‘lack of awareness about savings and investments among the fishermen affects their future plan’ since their respective mean scores are 4.9462 and 4.9430.

- Among the respondents of motorised catamaran, the important economic problems are ‘lack of awareness about savings and investments among the

fishermen affects their future plan' and 'lack of price fixation by the government for the fish like agricultural products' since their respective mean scores are 4.9717 and 4.9677.

7.6.4 Technological Problems and Profile of the Respondents

- **Technological Problems based on Age:** The null hypothesis that 'there is no significant difference in the technological problem faced by the different age group of respondents' is rejected at 5 per cent level of significance since the '*p'* value is less than 0.05. It shows that age wise there is a significant difference in technological problems.

- **Technological Problems based on Marital Status:** The null hypothesis that 'there is no significant difference in technological problems as regards the marital status of the respondents' is rejected at 5 per cent level of significance since the 'p' value is less than 0.05. It shows that there is a significant difference in technological problems among the marital status of the respondents.

- **Technological Problems Based on Respondent's Community:** The null hypothesis that 'there is no significant difference in technological problems as regards the respondent's caste' is rejected at 5 per cent level of significance since the 'p' value is less than 0.05 in all the variables except the first variable. It shows that caste wise there is a significant difference in technological problems.

- **Technological Problems based on Respondent's Education:** The null hypothesis that 'there is no significant difference in technological problems as regards educational qualification of the respondents' is rejected at 5 per cent

level of significance since the ‘p’ value is less than 0.05. It shows that education wise there is a significant difference in technological problems.

- **Technological Problems Based on Family System:** The null hypothesis that ‘there is no significant difference among the respondent’s family system and technological problems’ is rejected at 5 per cent level of significance since the ‘p’ value is less than 0.05. It shows that there is a significant difference in technological problems in relation to respondent’s family system.

- **Technological Problems Based on average monthly income:** The null hypothesis that ‘there is no significant difference in the technological problems among the respondent’s monthly income’ is rejected at 5 per cent level of significance since the ‘p’ value is less than 0.05. It shows that there is a significant difference in technological problems in relation to respondent’s monthly income.

7.6.5 Socio-cultural Problems and Profile of the Respondents

- **Socio-cultural Problems based on Age:** The null hypothesis that ‘there is no significant difference in the socio-cultural problems among the respondent’s age groups’ is rejected at 5 per cent level of significance since the ‘p’ value is less than 0.05. It shows that age wise there is a significant difference in socio-cultural problems.

- **Socio-cultural Problems Based on Marital Status:** The null hypothesis that ‘there is no significant difference in the socio-cultural problems among the respondent’s marital status’ is rejected at 5 per cent level of significance since the ‘p’ value is less than 0.05. It shows that there is a significant difference in socio-cultural problems as regards respondent’s marital status.

- **Socio-cultural Problems Based on Caste:** The null hypothesis that 'there is no significant difference in the socio-cultural problems as regards the caste of the respondents' is rejected at 5 per cent level of significance since the 'p' value is less than 0.05. It shows that there is a significant difference in socio-cultural problems as regards the caste of the respondents.

- **Socio-cultural Problems based on Education:** The null hypothesis that 'there is no significant difference in the socio-cultural problems as regards the respondent's education' is rejected at 5 per cent level of significance since the 'p' value is less than 0.05. It shows that there is a significant difference in socio-cultural problems as regards the respondent's education.

- **Socio-cultural Problems Based on Family System:** The null hypothesis that 'there is no significant difference in the socio-cultural problems as regards the respondent's family system' is rejected at 5 per cent level of significance since the 'p' value is less than 0.05. It shows that there is a significant difference in socio-cultural problems as regards the respondent's family system.

- **Socio-cultural Problems based on Average Monthly Income:** The null hypothesis that 'there is no significant difference in the socio-cultural problems as regards the respondent's monthly income' is rejected at 5 per cent level of significance since the 'p' value is less than 0.05. It shows that there is a significant difference in socio-cultural problems as regards the respondent's monthly income.

7.6.6 Economic Problems and Profile of the Respondents

- **Economic Problems based on Age:** The null hypothesis that 'there is no significant difference in the economic problems as regards the respondent's age' is rejected at 5 per cent level of significance since the 'p' value is less than 0.05. It shows that there is a significant difference in economic problems as regards the respondent's age.

- **Economic Problems Based on Marital Status:** The null hypothesis that 'there is no significant difference in the economic problems as regards respondent's marital status' is rejected at 5 per cent level of significance since the 'p' value is less than 0.05. It shows that there is a significant difference in economic problems as regards the respondent's marital status.

- **Economic Problems Based on Caste:** The null hypothesis that 'there is no significant difference in the economic problems as regards respondent's caste' is rejected at 5 per cent level of significance since the 'p' value is less than 0.05. It shows that there is a significant difference in economic problems as regards the respondent's caste.

- **Economic Problems based on Education:** The null hypothesis that 'there is no significant difference in the economic problems as regards respondent's education' is rejected at 5 per cent level of significance since the 'p' value is less than 0.05. It shows that there is a significant difference in economic problems as regards the respondent's education.

- **Economic Problems Based on Family System:** The null hypothesis that 'there is no significant difference in the economic problems as regards respondent's family system' is rejected at 5 per cent level of significance since

the ‘p’ value is less than 0.05. It shows that there is a significant difference in economic problems as regards the respondent’s family system.

- **Economic Problems based on Average Monthly Income:** The null hypothesis that ‘there is no significant difference in the economic problems as regards respondent’s monthly income’ is rejected at 5 per cent level of significance since the ‘p’ value is less than 0.05. It shows that there is a significant difference in economic problems as regards the respondent’s monthly income.

7.6.7 Problems Faced by Traditional Mechanised Marine Fishermen

- The important problems faced by fishermen of mechanised boats are economic and technological problems since their respective mean scores are 4.4253 and 4.0925.
- Among the fishermen of motorised vallam the important problems faced by fishermen are economical and socio-cultural problems since their respective mean scores are 4.5050 and 4.2051.
- The important problems faced by fishermen of motorized cattamaran are economic and technological problems since their respective mean scores are 4.4835 and 4.1671. The null hypothesis is rejected for all problems relating to technological problems, socio-cultural problems and economic problems since their respective ‘F’ statistics are significant at 5 per cent level.

7.6.8 Significantly Associating Profile Variables with the Problems Faced by the Respondents

- There is a significant relationship between technological problems faced by mechanised marine fishermen and their profile variables namely age, caste, education and type of housing since their 'F' statistics are significant at 5 per cent level.
- Among the mechanised marine fishermen the significantly associating profile variables with the socio-cultural problems faced by the mechanized fishermen are age, marital status, caste and education since their 'F' statistics are significant at 5 per cent level.
- As regards the mechanised marine fishermen the significantly associating profile variables with the economic problems faced by the mechanized fishermen are marital status, caste and type of housing since their 'F' statistics are significant at 5 per cent level.

7.6.9 Empowerment of Mechanised Marine Fishermen and their Problems

- There is a significant relationship between technological problems faced by the mechanised marine fishermen and their social and economic empowerment of mechanised marine fishermen since their 'F' statistics are significant at 5 per cent level.
- There is a significant relationship between socio-cultural problems faced by mechanised marine fishermen and social and economic empowerment of mechanised marine fishermen since their 'F' statistics are significant at 5 per cent level.

7.6.10 Factors Influencing the Marine Fishermen to practice Mechanised mode of Fishing and their Problems

- There is a significant relationship between technological problems faced by mechanised marine fishermen and the technological factors, social factors and economic factors since their 'F' statistics are significant at 5 per cent level.
- As regards socio-cultural problems faced by mechanised marine fishermen there is a significant relationship with technological factors, social factors and economic factors since their 'F' statistics are significant at 5 per cent level.
- In respect of economic problem the significantly associating factors influencing the marine fishermen to practice mechanized mode of fishing are technological factors, social factors and economic factors since their 'F' statistics are significant at 5 per cent level.

7.7 SUGGESTIONS

7.7.1 Suggestions to the Government

- 23.1 per cent of the respondent are not having own house for their residence, therefore, the Government should take steps to construct houses to the economically weaker sections of fishermen under the housing for all scheme namely 'Pradhan Mantri Awas Yojna'.
- Majority of the mechanized fishermen borrowed funds from the local money lenders at high rate of interest for acquiring fishing crafts and gears, therefore, the government should provide necessary loan at a subsidised rate of interest and the Government may create a new fund called 'Fishing Crafts and Gears Development Fund (FCGDF)'.

- Majority of the respondents have chosen fishing as an occupation due to no formal education and poor economic conditions of the family, therefore the Government should introduce special programmes to give formal education taking in to account their nature of work.
- Majority of the respondents feel that lack technical knowledge to operate the engine and GPS affects them. The Government could start a technical training centre to provide technical training as regards mechanization in fishing.
- As the fishing occupation is traditional, the Government could start a marine engineering college in Kanyakumari district so that the children of fishermen could be given an opportunity to study marine engineering. This will help the fishermen children to get higher education. This will ultimately change the economic condition of the fishermen families.
- The fishermen are affected by bad weather, storms and sudden changes in sea current. The Government should provide the latest devices to receive information about the weather condition during the deep sea fishing.
- To identify the fishermen and their fishing crafts during the deep sea fishing as well as when they are in distress, necessary aerial support needs to be given by the Government immediately.
- During the 45 days fishing ban period the Government could provide necessary training to the fishermen about the latest marine fishing mechanism. This ban period could also be used for providing the skill training to the fishermen with the help of technical experts. Moreover, the government must give awareness about marine ecology and the need to protect the marine life and endangered marine species.

- As the period of deep sea fishing ranges from 15 to 30 days, the fish catch needs to be kept in the cold storage for a long period. In order to avoid keeping the fish in the cold storage for a long period, the Government may arrange for selling the fish in the sea itself. For this purpose a mobile market centre in the sea may be arranged by introducing mother ship to buy fish from the fishermen.

- After the Tsunami the sea wealth has come down sharply due to the heavy damage to the marine ecology moreover, the fish availability has also reduced. So the Government must create artificial coral and reef in the sea to provide shelters for fish to breed. The Government must educate the fishermen to use only the allowed fishing nets and other devices.

- The majority of the fishermen feel that they lack participation in the active politics. Since the politics gives power and authority to get their rights from the government, a reserved constituency in the assembly and the parliament for fishermen may be created like Scheduled Caste / Scheduled Tribe.

- As the fishermen are not able to go for fishing after 55 or 60 years of age, the government must arrange social security scheme for the old age fishermen to lead moderate life during their old age.

- The majority of the fishermen are unable to pay the insurance premium for fishing crafts and nets because of the high annual premium, moreover, the low compensation paid by the government for the damage of crafts and nets during the natural calamities. Therefore, the government should arrange the insurance premium for fishermen's net and craft with subsidized premium in government owned insurance company.

- The government must create awareness among the fishermen about the importance of savings during the season and introduce short term attractive savings scheme exclusively for the fishermen with the short maturity period which may help the fishermen to face the financial difficulties during off seasons.
- Like agricultural products, the price may be fixed for the fish by the Government and moreover, the Government can also create 'Meenavar Santhai' like Uzhavar Santhai for the agricultural products. This will help the fishermen to sell their fish at a reasonable price and get more income out of the sale of fish.
- Lack of adequate landing centres along the coast of Kanyakumari district create problem to bring the fish to the shore and to sell the fish at a fair price. Government must avoid the domination of middlemen in the sale of fish.
- As most of the fishermen have borrowed money from the local money lenders and wholesale buyers, they are forced to sell their fish to the wholesale buyers at a low price. Government should come forward to help the fishermen by extending the loan facilities at a reduced rate of interest.
- The government should construct cold storage with international standard in Kanyakumari district near the landing centers to store the fish. This will help the fishermen to store the fish still they get fair price for their fish catch and it can be used for export.
- Government must motivate the fishermen and to give them proper training about the fish processing and export. This will help the fishermen to earn more income and to fetch foreign exchange for the country also.

- Majority of the fishermen feel that the high operational expenses reduce their income which in turn leads to borrowing from local money lenders. The major expense for the fishermen is the fuel cost of running the crafts. The Government should provide fuel at a subsidized rate and arrange the working capital loan at a subsidized rate of interest from the nationalized bank like free electricity and low interest loan to the farmers**.**

7.7.2 Suggestions to the Fishermen Co-operative Societies

- Majority of the respondents are not having patta land in their village therefore, the fishermen co-operative societies should take steps in co-ordination with the government to provide land to the society members.
- The fishermen co-operative societies should lend educational loan to its members to educate their children.
- The fishermen co-operative societies should extend loan to the fishermen to meet the family expenses of its members.

7.7.3 Suggestions to the NGOs

- NGOs are the light house of the social development therefore the NGOs must motivate the fishermen to send their children to the schools.
- As most of the fishermen are having the habit of consuming alcohol, NGOs must organize awareness programme to fishermen about the evil effects of alcoholism and to keep their health conducive for their occupation. Alcohol de-addiction centres can be created to advise the fishermen who are affected by alcoholism.

- NGOs should educate the fishermen to use the allowed methods of fishing without affecting the marine eco system and to keep the wealth of the sea for the future generations.
- NGOs should educate the fishermen regarding the importance of savings from their income at a regular basis to meet the future needs of the family.
- Due to lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to manage the activities which affect their day to day operations. Therefore, the NGOs should organize training programme to provide managerial skills, leadership skills and group skills to the fisher men.
- As most of the fishermen are out of their house at least for a month while they go for deep sea fishing, they are not able to look after their children properly. This creates problem among the children of the fishermen. In order to overcome this problem the NGOs can arrange counseling programme to the children of the fishermen. The children could also be given skill training in different trade in order to make them employable.

7.7.4 Suggestions to the Mechanised Fishermen

- In order to keep the body fit for their occupation the fishermen must pay more attention to their health and try to avoid consuming alcohol.
- Education is spinal cord of the human being's development therefore the fishermen should provide education to their children to come up in their life.
- Fishermen must avoid the use of dangerous method of fishing such as powered LED light fishing and banned gears which endanger the marine wealth.

- ❖ The fishermen must avoid polluting the sea by throwing plastic materials or leakage of oil in the sea. This creates pollution and endangers the eco system.

7.8 CONCLUSION

The mechanisation in marine fishing of the Kanyakumari district fishermen have positively affected in their life. The socio-economic conditions of the fishermen were improved in the post mechanization period than in the pre-mechanisation period. The improvements were reflected in education, nutritional food, housing, health, assets, incomes and saving as well. But at the same time the mechanized fishermen are facing problems this needs to be checked. The government must come forward to overcome the problems faced by the fishermen. The government must provide necessary infrastructure facilities to improve the situation and to enhance the income of the fishermen. By avoiding the use of dangerous methods of fishing and the use of banned gears the government can protect the marine ecology. The Government can also think of empowering the fishermen politically by introducing the reserved seats for the fishermen in Kanyakumari district. The marine engineering college and the skill training centre in the study area will provide lot of opportunities to the fishermen children and can also provide employment for the fishermen children in Central Marine Fisheries Research Institute, Institute of Oceanography etc. Though the marine fishermen are empowered because of the mechanized mode of fishing, it needs to be sustained to lift them up which in turn would lead to economic development.

SCOPE FOR FURTHER RESEARCH

With the observations made and research experiences gained by the researcher during the course of the research work, the researcher identified the following areas for further research.

1. A study on the Impact of Mechanisation on the Export of Marine Fish food in Kanyakumari District.
2. A Study on the Role of Fishermen's Organisation in Fisheries Management of Kanyakumari District.
3. A study on the Impact of Sea Erosion on the Sustainable Development of Marine Fishermen in Kanyakumari District

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APPENDIX

APPENDIX - I

A STUDY ON THE IMPACT OF MECHANISATION IN MARINE FISHING INDUSTRY ON SOCIO-ECONOMIC EMPOWERMENT OF TRADITIONAL MARINE FISHERMEN IN KANYAKUMARI DISTRICT

INTERVIEW SCHEDULE

Research scholar : A.Miruse

Schedule No :

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1. Name of Fishing Village :
2. Age of the respondent :
3. Marital Status : Unmarried/Married/widowed/separated
4. Religion : Hindu/Christian/Muslim/Other (specify)
5. Caste : Mukkuvar/Bharavar/Other (Specify)
6. Education : Illiterate/Primary/Middle/High/Higher/ Graduate/Post Graduate
7. Family Status : Joint family/Nuclear family
8. Details regarding the family members:

Sl.No	Relationship	Education	Occupation
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

9. Ownership of house : Owned/Parental house/Rented house
10. Type of housing : Thatched/Tile/Concrete/other (specify)
11. Do you have electricity connection in your house : Yes/No

12. Source of drinking water : Own tape/Public tape/Owned well/Community well

13. Latrine facilities : Owned modern/Pit/Without latrine

14. Assets :

Sl.No	Assets	Having	Not Having
1	Land		
2	House		
3	Jewels		
4	Vehicle		
5	Livestock		
6	Any other (specify)		

15. Give details about your father's and grandfather's occupation.

Father : Fishermen/Non-fishermen

Grand Father : Fishermen/Non-fishermen

16. Age at the time of your entry into fishing:

17. How many years have you been involving in fishing?

Reason for choosing fishing as an occupation

State whether you agree or disagree for the following reasons.

SA :Strongly Agree, A :Agree, No: No opinion

D : Disagree, SD :Strongly Disagree

18. Why did you choose fishing as an occupation?

Sl.No	Reasons	SA	A	N	D	SD
a	Traditional					
b	Unemployment					
c	No formal education					
d	Poor economic conditions of the family					
e	Family members'influence					
f	Influence from friends and relatives					
h	Self-Interest					
i	Freedom of work					
k	Adventurous					

19. State the fishing crafts used at the time of your entry into fishing.

a) Catamaran ☐
b) Dug- out Canoe ☐
c) Plank-built Canoe ☐
d) Motorised Catamaran ☐
e) Motorised Canoe ☐
f) Mechanised Boat ☐
g) Any other (specify) ☐

20. State the fishing gears used at the time of your entry into fishing.

a) Shore seine (Karamadi) ☐
b) Boat seine (Thattumadi) ☐
c) Hooks and Lines ☐
d) Bag net (Kachal)/ Trap ☐
e) Drift gillnet (Valiavalai) ☐
f) Set gillnet (Thathuvalai) ☐
g) Mackerel Net (Iyila valai) ☐
h) Prawns Net (Ral valai) ☐
i) Any other (specify) ☐

21. How many days you go for fishing in a month at the time of your entry into fishing?

22. State the amount you spent for fishing in a day at the time of your entry into fishing Rs. .....

23. State your average monthly income at the time of your entry in this occupation.

During Season (Average)		During off season (Average)	
Period	Amount (Rs)	Period	Amount (Rs)

24. State your monthly savings at the time of your entry into fishing.

Mode of Saving	**Amount (Rs)**
a) Post office	
b) Bank	
c) Chit fund	
d) Fishermen Sangam	
e) LIC	
f) Any other (specify)	

25. State the fishing crafts you are using at present.

a) Catamaran Motorised ☐
b) FibreVallam motorized ☐
c) Mechanised Boat below 40′ ☐
d) Mechanised Boat between 40-60′ ☐
e) Mechanised Boat above 60′ ☐
f) Any other (specify) ☐

26. State the fishing gears you are using at present.

a) Boat Seine (Thattumadi) ☐
b) Drifts gillnet (Valiavalai) ☐
c) Set gillnet (Thattuvalai) ☐
d) Purse seine ☐
e) Hooks and Lines ☐
f) Trawl net ☐
g) Mackerel net (Iyila valai) ☐
g) Any other (specify) ☐

27. How many days you go for fishing in a month at present.

During Season (Average)		**During off season (Average)**	
Period	**Days**	**Period**	**Days**

28. State the amount you spent for fishing in a day at present Rs. .....

29. State your average monthly income at present in this occupation.

During Season (Average)		**During off Season (Average)**	
Period	**Amount (Rs)**	**Period**	**Amount(Rs)**

30. State your average monthly saving from fishing at present.

Mode of Saving	Amount (Rs)
a) Bank	
b) LIC	
c) Chit-fund	
d) Post office	
e) Shares and Bonds	
f) Fishermen Society	
g) Others (specify)	

31. How many fishing crafts you are having at present?

32 When did you buy the fishing crafts you are having at present?

33. State the ownership of your fishing crafts.

a) Owned ☐

b) Leased ☐

34. If owned, state the source of fund used for buying the fishing crafts.

a) Own fund ☐

b) Borrowed fund ☐

35. If borrowed state the source of fund (rank them).

a) Friends and Relatives ☐

b) Local money lenders ☐

c) Borrowed from the bank ☐

e) Advance from whole sale buyer ☐

f) Others (specify) ☐

36. State the implements and devices used for fishing.

Implements and devices	Yes	No
GPS (Global Positioning System)		
Fish Finder		
Solar Panel		
Cold Storage		
Marine Parachute		
Wireless		
Laptop		
LED bulbs		
Cooking devices		
Other		

37. Have you received any financial assistance through government schemes for acquiring the fishing crafts, gears and implements?

a) Yes ☐

b) No ☐

38. If yes, state the schemes and subsidy received.

Sl. No	Scheme	Agency	Subsidy	Purpose
a				
b				
c				
d				

I. Factors influencing the mechanized mode of fishing.

39. State the factors which influenced for mechanized mode of fishing.

SA = Strongly Agree, A = Agree No = No Opinion

D = Disagree, SD = Strongly Disagree

Sl. No	Factors	SA	A	N	D	SD
	A. TECHNOLOGICAL FACTORS					
a)	Through the help of mechanized craft you can travel to deep sea where more fishes are available.					
b)	Through the help of different kind of modernized fishing nets you can catch variety of fishes.					
c)	Even during the period of sea erosion, you can go for fishing with the help of mechanized crafts.					
d)	New incoming of mechanized crafts and modernized nets which helped you to reduced handmade manual work and save time.					
e)	Mechanized methods brought to you new technical knowledge which made you much confident.					
f)	Fish catching tools helps you to find out new fishing grounds.					
g)	You can able to process the fish more days with the help of cold storage room.					
h)	Even though you are in the sea, through the wireless you can enquire about the fish rates in different markets and able to sell it in high price.					
i)	With the help of GPS you can travel straight to fishing grounds and immediately.					
j)	From the sea itself through the help of wireless phone you can enquire through the friends and relatives who catches fishes in another area where fishes available and immediately you can go there and able to catch fishes.					
k)	With the help of GPS able to reach seashore even there is sea runoff, hurricane, storm, very bad weather and lot of rain.					
l)	Able to take rest due to the facilities available in the modern mechanized craft.					

Sl. No	Factors	SA	A	N	D	SD
m)	Even if there is sea runoff and storm, with the help of marine parachute you can keep your craft without moving from the fishing ground which helps you for catching more fish.					
n)	In the night, with the help of powerful solar power and an LED light brings brightness which fishes were attracted to come near which helps to catch lot of fishing.					
	B. SOCIAL FACTORS					
a)	To give good education for the children.					
b)	To construct a house near the town for my families.					
c)	After the tsunami, the change of sea which brings big sea waves and high wind there will be less catch of fishing. In order to go for catching fish in the deep sea old method of fishing materials won't be useful. For that I prepared to work with modern mechanized methods.					
d)	To get the social status in our community I should become the owner of mechanized craft.					
e)	Those who using the mechanized technology gets more respect in other community which helped me to use fishing through mechanized technology.					
f)	The improved social status helps to get recognition from the political parties.					
g)	Able to spend more on nutritious food to the family members.					
h)	Able to buy decent clothes for the family members.					
i)	Able to provide better medical treatment to my family members.					
	C. ECONOMIC FACTORS					
a)	Through the mechanized method of fishing able to catch more fish. By that able to earn more income.					
b)	Mechanized fishing method provides more employment opportunities.					
c)	Able to invest in land and buildings because of the increased income.					

Sl. No	Factors	SA	A	N	D	SD
d)	Out of our savings we are able to invest in shares and securities and fixed deposits.					
e)	When more income comes able to buy vehicles.					
f)	Through savings, able to buy gold ornaments for my wife and children.					
g)	Able to earn more by selling fish catch through Fisherman Sangam which helps to avoid the exploitation from the middleman.					
h)	The government helped to buy crafts and nets through the subsidy linked loans.					
i)	The government and non-government organization gave tsunami fund to buy fishing crafts and nets.					
k)	Loan facilities provided by the bank to procure crafts and nets.					

II. Reasons for socio-economic empowerment.

40. State whether agree or disagree that mechanized mode of fishing made you socially and economically empowered.

SA – Strongly Agree, A- Agree, NO- No Opinion

D – Disagree SD – Strongly Disagree

Sl. No	Reasons	Pre-Mechanisation					Post-Mechanisation				
		SA	A	NO	D	SD	SA	A	NO	D	SD
	SOCIAL EMPOWERMENT										
a)	Your family asks your advice to take decision when there is important matter in your family.										
b)	In your village committee who gave you important position.										
c)	Village people asks your advice when they takes important decision.										
d)	In your fisherman sangam, they gave you office bearer post.										

Sl. No	Reasons	Pre-Mechanisation					Post-Mechanisation				
		SA	A	NO	D	SD	SA	A	NO	D	SD
e)	They honoured you as special quest in your religious and village function.										
f)	Being an experienced fisherman, the fisheries department invited you to deliver a speech during the fisherman training.										
g)	You are the member of any one of the political parties or office bearer of the parties.										
h)	You shared your social opinions before the other caste people.										
i)	You constructed your house with all basic facilities.										
j)	Myself and my family members able to get better medical treatment which helps to maintain the health.										
k)	Your children studied through English medium school and got higher education.										
l)	By increasing of fishing provides more employment opportunities.										
	ECONOMICAL EMPOWERMENT										
a)	Increase in income due to increased fish catch.										
b)	Because of more income, savings increased and able to buy own vehicle.										
c)	Increased savings helped to buy land near my village and in town.										
d)	Increased savings helped to deposit money in the bank.										

Sl. No	Reasons	Pre-Mechanisation					Post-Mechanisation				
		SA	A	NO	D	SD	SA	A	NO	D	SD
e)	Increased savings helped to buy gold ornaments and things for my family.										
f)	Increased income helped to avoid borrowings from the local money lenders.										
g)	Increased income helped to provide better nutritious food for my family members.										
h)	Increased income helped to spent more on dress material to my family members.										
i)	Better fish landing facilities improved the market conditions to sell fish at fair price.										
j)	Increased income helps to repair the craft and nets immediately, this makes to do fishing and get more fish.										
k)	Increased savings helped to buy craft, net and fishing instruments.										

III. Problems encountered by the fisherman who is going for mechanized mode of fishing.

41. State the problems encountered by the fisherman who is going for mechanized mode of fishing.

SA = Strongly Agree, A = Agree NO = No Opinion

D = Disagree SD = Strongly Disagree

Sl. No	TECHNOLOGICAL PROBLEMS	SA	A	NO	D	SD
a)	Need more technical knowledge to operate crafts, nets, fish finder and GPS.					
b)	Lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea.					

Sl. No	TECHNOLOGICAL PROBLEMS	SA	A	NO	D	SD
c)	Lack of technical knowledge to repair the machine at fault during fishing in deep sea affects fishing and operation of craft.					
d)	Lack of technical knowledge to set right the repairs of cold stores affects the storing fish catch which led to decay of the fish catch while fishing in deep sea.					
e)	Mechanisation increases the repairs and maintenance expenses.					
f)	Lack of technical knowledge to set right repair in fish finder create problem for fishing while in deep sea.					
g)	Non availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea.					
h)	Highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore.					
i)	Operation of more mechanized crafts in the sea increases the pollution through leakage of fuel and throwing plastic waste in the sea.					
j)	Usage of solar powered LED bulbs attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system.					
	SOCIO-CULTURAL PROBLEMS					
a)	The deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman.					
b)	Due to mechanistion, the fishermen who are in old age are not getting employment.					
c)	Due to the lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to keep the efficient fishermen with them.					
d)	Catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries.					

Sl. No	TECHNOLOGICAL PROBLEMS	SA	A	NO	D	SD
e)	Attack from terrorists and pirates endanger the life of the fishermen and their crafts during deep sea fishing.					
f)	Lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen.					
g)	Staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco.					
h)	Staying more days in the sea continuously affects the family relationship due to their separation from the family.					
i)	Children's discipline gets affected due to the long stay by the head of the family during deep sea fishing.					
j)	Shortage of fishing workers causes inability to operate fishing crafts and nets.					
k)	Invasion of foreign vessels and non-co-operation of systematic fishing affects the Indian territorial marine ecological system. For that reason the fish production decreases.					
l)	Long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community.					
m)	In this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen.					
	ECONOMICAL PROBLEMS					
a)	The high operational expenses reduce their income when fish catch is not adequate to meet the cost. This leads to borrowing from local money lenders.					
b)	Unable to provide good education for the children due to lack of savings from fishing.					
c)	Increased debts lead to disposing of the residential house, property and fishing crafts.					

Sl. No	TECHNOLOGICAL PROBLEMS	SA	A	NO	D	SD
d)	Unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss.					
e)	During the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult.					
f)	Usages of banned fishing nets and instruments in the sea, reduces the fish wealth.					
g)	Lack of demand in overseas market reduces the income of the fishermen.					
h)	Lack of awareness about savings and investments among the fishermen affects their future plan.					
i)	Lack of fish markets and landing centers reduces the demand and sale of fish.					
j)	Lack of price fixation by the government for the fish like agricultural products.					

A STUDY ON THE IMPACT OF MECHANISATION IN MARINE FISHING INDUSTRY ON SOCIO-ECONOMIC EMPOWERMENT OF TRADITIONAL MARINE FISHERMEN IN KANYAKUMARI DISTRICT

INTERVIEW SCHEDULE (TAMIL)

Research Scholar : A Miruse

Schedule No :

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1. மீனவக் கிராமத்தின் பெயர் :
2. மீனவரின் வயது :
3. திருமண நிலை : திருமணம் ஆகாதவர் / திருமணம் ஆனவர்/ விவாகரத்தானவர் / பிரிந்து வாழ்பவர்
4. மதம் : இந்து / கிறிஸ்தவர் / இஸ்லாமியர்
5. சாதி : முக்குவர்/ பரவர் / மற்றவர்
6. கல்வி : படிப்பறிவில்லாத / ஆரம்பப்பள்ளி/ நடுநிலைப்பள்ளி / மேல்நிலைப்பள்ளி/ உயர்நிலைப்பள்ளி/இளநிலைப் பட்டதரி/ முதுகலை பட்டதாரி
7. குடும்ப அந்தஸ்து : கூட்டுக் குடும்பம் / தனிக்குடும்பம்
8. குடும்ப அங்கத்தினர்களின் விவரம் :

வ.எ	உறவு	கல்வி	தொழில்
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

9. வீட்டின் உரிமை : சொந்தவீடு / பெற்றோர்வீடு/ வாடகைவீடு

10. வீடமைப்பு வகை : ஓலைவீடு / ஓடுவீடு /கான்கிரீட் வீடு/மற்றவை

11. உங்களுடைய வீட்டில்
மின் இணைப்பு வசதி உள்ளதா : ஆம் / இல்லை

12. குடிநீர் வசதி : சொந்த குழாய் /பொது குழாய் /
சொந்தகிணறு / பொது கிணறு

13. கழிப்பிட வசதி : நவீன கழிப்பிடம் / குழிகளை கழிப்பிடம் /
கழிப்பிடம் இல்லாமல்

14. சொத்துக்கள்

வ எண்	சொத்துக்கள்	உண்டு	இல்லை
1	நிலம்		
2	வீடு		
3	நகைகள்		
4	வாகனம்		
5	கால்நடை		
6	மற்றவை		

15. உங்களுடைய தந்தை / பாட்டனார் ஆகியோரின் தொழில் விவரம்:
தந்தை : மீனவர் / மீனவர் அல்லாத
பாட்டனார் : மீனவர் / மீனவர் அல்லாத

16. நீங்கள் மீன்பிடித் தொழிலில் நுழைந்த போது உங்களின் வயது:

17. எத்தனை வருடமாக மீன்பிடித் தொழில் செய்து வருகிறீர்கள் ?:

18. மீன்பிடிக்கும் தொழிலைத் தேர்ந்தெடுத்தன் காரணங்கள்:
பின்வரும் காரணங்களை நீங்கள் ஒப்புக் கொள்கிறீர்களா? அல்லது உடன்படவில்லையா?
முஏ : முழுமையாக ஏற்கிறேன்
ஏ : ஏற்கிறேன்
கஇ : கருத்து இல்லை
ம : மறுக்கிறேன்
மும : முழுமையாக மறுக்கிறேன்

ஏன் நீங்கள் மீன்பிடிப்பதை ஒரு தொழிலாக தேர்ந்தெடுத்தீர்கள்?

வ. எண்	காரணங்கள்	முஏ	ஏ	கஇ	ம	மும
1	பாரம்பரியமான					
2	வேலையின்மை					
3	முறையான கல்வியின்மை					
4	குடும்பத்தின் மோசமான பொருளாதார நிலைமைகள்					
5	குடும்ப உறுப்பினர்கள்அறிவுறுத்துதலின்					
6	நண்பர்கள் மற்றும் உறவினர்கள்அறிவுறுத்துதலின்					
7	சொந்த விருப்பத்தினால்					
8	வேலை சுதந்திரம்					
9	துணிகரமான தொழில்					

19. நீங்கள் மீன்பிடித் தொழிலில் நுழைந்த போது உபயோகித்த மீன்பிடி படகு

a) கட்டு மரம் ☐
b) ஒத்தத்தடி வள்ளம் ☐
c) கெட்டு வள்ளம் ☐
d) எஞ்சின் மரம் ☐
e) எஞ்சின் வள்ளம் ☐
f) இயந்திர போட் ☐
g) மற்றவை ☐

20. நீங்கள் மீன்பிடித் தொழிலில் நுழைந்த போது உபயோகித்த மீன்பிடி வலைகள்

a) கரமடி ☐
b) தட்டுமடி ☐
c) தூண்டில் மற்றும் மட்டுகள் (Hooks and Lines) ☐
d) கச்சா வலை/ பொறி ☐
e) வலிய வலை ☐
f) தாத்து வலை ☐
g) அயில வலை ☐
h) இராள் வலை ☐
i) மற்றவை ☐

21. நீங்கள் மீன்பிடித் தொழிலில் நுழைந்த போது ஒரு மாதத்தில் எத்தனை நாட்கள் மீன்பிடிக்க செல்வீர்கள்?.....

22. நீங்கள் மீன்பிடித் தொழிலில் நுழைந்தபோது ஒரு நாள் மீன்பிடிக்க ஆகும் செலவு..... ₹

23. நீங்கள் மீன்பிடித் தொழிலில் நுழைந்த போது உங்களுடைய சராசரி மாத வருமானம்.

பருவகாலத்தில் (சராசரி)		**பருவமற்றக்காலத்தில் (சராசரி)**	
காலம்	**தொகை ₹**	**காலம்**	**தொகை ₹**

24. நீங்கள் மீன்பிடித் தொழிலில் நுழைந்த போது உங்களுடைய மாதாந்திர சேமிப்பு

சேமிப்பு முறை	**தொகை**
தபால் அலுவலகம்	
வங்கி	
சீட்டு நிதியம்	
மீனவர் சங்கம்	
ஆயுள் காப்பீடு நிறுவனம்	
மற்றவை	

25. தற்பொழுது நீங்கள் மீன்பிடிக்கப் பயன்படுத்தும் மீன்பிடி படகு

(a) இஞ்சின் கட்டாமரம் ☐
(b) எஞ்சின் .∴பைபர் வள்ளம் ☐
(c) இயந்திர போட் / 40′க்கு குறைவு ☐
(d) இயந்திர போட் / 40′முதல் 60 வரை ☐
(e) இயந்திர போட் / 60′க்கு மேல் ☐
(f) மற்றவை ☐

26. தற்பொழுது நீங்கள் மீன்பிடிக்கப்ப பயன்படுத்தும் மீன்பிடி வலைகள்

(a) தட்டுமடி ☐
(b) வலிய வலை ☐
(c) தாத்து வலை ☐
(d) பர்ஸ் வலை (சுருக்கு மடி) ☐

(e) தூண்டில் மற்றும் மட்டுகள் (Hooks and Lines) ☐

(f) இழுவலை ☐

(g) அயில வலை ☐

(h) மற்றவை ☐

27. தற்போது நீங்கள் ஒரு மாதத்தில் எத்தனை நாட்கள் மீன்பிடிக்க செல்வீர்கள்?

பருவகாலத்தில் (சராசரி)		**பருவமற்றக்காலத்தில் (சராசரி)**	
காலம்	**நாட்கள்**	**காலம்**	**நாட்கள்**

28. தற்போது உங்களுக்கு ஒரு நாள் மீன்பிடிக்க ஆகும் செலவு……₹

29. மீன்பிடித் தொழிலில் தற்போது உங்களுடைய சராசரி மாத வருமானம்:

பருவகாலத்தில் (சராசரி)		**பருவமற்றக்காலத்தில் (சராசரி)**	
காலம்	**தொகை ₹**	**காலம்**	**தொகை ₹**

30. உங்களுடைய மீன்பிடித் தொழில் தற்போது உள்ள மாதாந்திர சேமிப்பு

சேமிப்பு முறை	**தொகை**
வங்கி	
ஆயுள் காப்பீடு நிறுவனம்	
சீட்டு நிதியம்	
தபால் அலுவலகம்	
பங்குகள் / கடன் பத்திரங்கள்	
மீனவர் சங்கம்	
மற்றவை	

31. தற்போது உங்களிடம் எத்தனை மீன்பிடி படகுகள் உள்ளன?……

32. தற்போது உங்களிடம் இருக்கும் மீன்பிடி படகுகள் எப்போது வாங்கினீர்கள்?…….

33. உங்களுடைய மீன்பிடி படகுகளின் உரிமை

(a) சொந்தமாக ☐

(b) குத்தகைக்கு ☐

34. சொந்தமானது என்றால், மீன்பிடி படகுகள் வாங்க பயன்படுத்திய நிதி ஆதாரங்கள்

(a) சொந்த நிதி ☐

(b) கடன் நிதி ☐

35. கடனுக்கு வாங்கியது என்றால் அதற்கான நிதி ஆதாரங்கள் தருக (வரிசைபடி)

(a) நண்பர்கள் மற்றும் உறவினர்கள் ☐

(b) உள்ளூர் வட்டிக்காரர்களிடம் ☐

(c) வங்கிக் கடன் ☐

(d) மொத்த வியாபாரியிடம் முன்கூட்டியே கடன் வாங்கியது ☐

(e) மற்றவை ☐

36. மீன்பிடித் தொழிலுக்குப் பயன்படுத்தப்படும் கருவிகள் மற்றும் சாதனங்களை குறிப்பிடுங்கள்

கருவிகள் மற்றும் சாதனங்கள்	**ஆம்**	**இல்லை**
குளோபல் பொசிஷனிங் சிஸ்டம் (GPS)		
மீன் கண்டுபிடிக்கும் கருவி (Fish finder)		
சூரிய குழு (Solar panel)		
குளிர்பதன சேமிப்பு பெட்டி (Cold storage)		
கடல் பாரசூட் (Marine Parachute)		
சேணொலி (Wireless)		
மடிக்கணினி (Laptop)		
LED விளக்குகள்		
சமையல் சாதனங்கள் (Cooking devices)		
மற்றவை		

37. அரசு திட்டத்தின் கீழ் மீன்பிடி படகுகள் வலைகள் மற்றும் கருவிகள் வாங்க நிதி உதவி பெற்றீர்களா?

(a) ஆம் ☐

(b) இல்லை ☐

38. ஆம் என்றால் அரசு திட்டம் மற்றும் மானியம் குறிப்பிடுங்கள்.

வ. எண்	திட்டம்	நிறுவனம்	மானியம்	நோக்கம்
a				
b				
c				

இயந்திர மயமான முறையில் மீன்பிடித் தொழிலுக்கு தூண்டியகாரணிகள்

39. இயந்திரமயமான முறையில் மீன்பிடித் தொழில் செய்ய தூண்டிய காரணிகளை குறிப்பிடுங்கள்

முஏ - முழுமையாக ஏற்கிறேன்

ஏ - ஏற்கிறேன்

குஇ - கருத்து இல்லை

ம - மறுக்கிறேன்

மும - முழுமையாக மறுக்கிறேன்

வ எண்	காரணிகள்	முஏ	ஏ	க.இ	ம	மும
	A. தொழில் நுட்ப காரணிகள்					
a	இயந்திர மயமான படகுகளின் உதவியால் அதிக மீன் கிடைக்கக் கூடிய ஆழ்கடல் செல்லமுடியும்.					
b	நவீன மீன்பிடி வலைகள் உதவியுடன் பல்வேறு வகையான மீன்களைப் பிடிக்க முடியும்.					
c	கடல் கொந்தளிப்புகாலத்தில் இயந்திர படகுகள் மூலம் மீன்பிடிக்க செல்ல முடியும்.					
d	இயந்திரமயமான படகுகள் மற்றும் நவீன வலைகளின் வரவால் கைகளால் செய்யப்படும் வேலையின் சுமை குறைக்கப்படுவதால் ,நேரத்தை மிச்சப்படுத்த முடியும்.					
e	இயந்திரமயமான முறை காரணமாக புதிய தொழில் நுட்பத்தை கற்பதினால் அது தன்னம்பிக்கையை அளிக்கும்.					
f	மீன் கண்டுபிடிக்கும் கருவியின் உதவியுடன் புதிய மீன்பிடிக்கும் தளங்களை கண்டுபிடிக்க முடியும்.					
g	குளிர்பதன அறையின் உதவியுடன் மீன்களை அநேக நாட்கள் பதப்படுத்தி வைக்க முடியும்.					
h	வயர்லெஸ் போன் உதவியுடன் சந்தைகளின் நிலவரத்தை கடலில் இருக்கும் போதே அறிவதால் அதிக விலை கிடைக்கும் சந்தையில் மீன்களை விற்க முடியும்.					

வ எண்	காரணிகள்	மு‌ஏ	ஏ	க.இ	ம	மும
i	GPS – ன் உதவியுடன் மீன்பிடித் தளங்களுக்கு நேராகவும், உடனடியாகவும் செல்ல முடியும்.					
j	கடலில் இருந்து கொண்டே வயர்லெஸ் போன் மூலமாக இன்னொரு பகுதியில் மீன் பிடித்துக் கொண்டிருக்கும் நண்பர்கள் மற்றும் உறவினர்களிடம் எந்தெந்த மீன்பிடித்தளங்களில் மீன் கிடைக்கிறது என்ற தகவலைத் தெரிந்து கொண்டு அந்த இடத்திற்கு சென்று மீன்பிடிக்க முடியும்.					
k	GPS – ன் உதவியுடன் மோசமான கடலின் நீரோட்டம், சூராவளி புயல், கடினமழை, மேகமூட்டம் ஆகிய சூழ்நிலைகளிலும் கரையை சென்றடையமுடியும்.					
l	நவீன இயந்திர படகில் ஓய்வு எடுக்கும் அறை வசதி இருப்பதால் ஓய்வு எடுக்க முடியும்.					
m	கடல் பாராசூட்டின் (Marine Parachute) உதவியுடன் மோசமான கடலின் நீரோட்டம்,மற்றும் கடினமான காற்று ஆகிய சூழ்நிலைகளிலும் அதிக மீன் கிடைக்கும் தளங்களில் இருந்து படகு திசைமாறி விடாமல் அதே இடத்தில் படகினை தக்கவைப்பதினால் ஏரளமான மீன்களைப் பிடிக்க முடியும்.					
n	இரவு நேரங்களில், சூரிய சக்தி மின்சாரத்தின் உதவியால் மற்றும் LED விளக்குகள் போன்ற அதிக சக்தி வாய்ந்த விளக்குகளின் வெளிச்சத்தினால் மீன்கள் கவரப்பட்டு கடல் நீரின் மேற்பகுதியில் வருவதினால் அதிக மீன்களை பிடிக்க முடியும்.					
B.	**சமூக காரணிகள்**	**மு‌ஏ**	**ஏ**	**க.இ**	**ம**	**மும**
a	குழந்தைகளுக்கு நல்ல கல்வி வழங்குவதற்கு.					
b	அருகில் உள்ள நகரத்தில் என் குடும்பத்திற்கு வீடு வைப்பதற்கு.					
c	சுனாமிக்கு பிறகு கடல் மாற்றத்தினால் பெரிய அலைகள் மற்றும் காற்று அதிகம் ஏற்படும் போது கடற்கரை அருகே மீன்வளம் குறைவாக இருக்கும். இது பாரம்பரிய மீன்பிடித் தொழில்களை வைத்து ஆழ்கடலில் மீன்பிடிக்கப் போக முடியாத காரணத்தினால் வேலையின்மை ஏற்படுகிறது. இதனால் இயந்திர முறையை தேர்ந்தெடுத்தேன்.					
d	இயந்திரமயமான படகு உரிமையாளராக இருப்பதினால் எங்கள் சமூகத்தின் மத்தியில் சமூக அந்தஸ்து பெற					
e	இயந்திரமயமான தொழில்நுட்பத்தை பயன்படுத்துவோர்க்கு மற்ற தொழில் செய்யும் சமூகத்தில் அதிக கௌரவம் கிடைக்கும். இது என்னை இயந்திரமான முறையில் மீன்பிடிக்கத் தூண்டியது.					

வ எண்	காரணிகள்	முஏ	ஏ	க.இ	ம	மும
f	சமூக அந்தஸ்து கிடைக்கும். அரசியல் கட்சிகளின் அங்கீகாரமும் கிடைக்கும்.					
g	என் குடும்பத்திற்கு அதிக ஊட்டச்சத்து உள்ள உணவு சாப்பிட அதிக செலவு செய்ய முடியும்.					
h	என் குடுமபத்திற்கு தரமான ஆடைகள் வாங்க முடியும்.					
i	என் குடும்பத்திற்கு மருத்துவமனையில் நல்ல மருத்துவ சிகிச்சை அளிக்க முடியும்.					
C	**பொருளாதார காரணிகள்**	**முஏ**	**ஏ**	**க.இ**	**ம**	**மும**
a	இயந்திரமான முறையில் மீன்பிடிக்கும் போது ஏராளமான மீன்கள் கிடைக்கிறது அதனால் அதிக வருமானம் ஈட்ட முடியும்.					
b	இயந்திரமயமான மீன்பிடிக்கும் முறை அதிக வேலை வாய்ப்பைக் கொடுக்கும்.					
c	அதிக வருமானம் வரும்போது அருகிலுள்ள நிலம் மற்றும் கட்டிடத்தில் முதலீடு செய்ய முடியும்.					
d	அதிக வருமானம் வரும்போது , பங்குகள், கடன் பத்திரங்கள் மற்றும் வங்கிகளில் முதலீடு செய்ய முடியும்.					
e	அதிக வருமானம் வரும்போது சொந்த வாகனம் வாங்குவதற்கு முடியும்.					
C	**பொருளாதார காரணிகள்**	**முஏ**	**ஏ**	**க.இ**	**ம**	**மும**
f	சேமிப்பு வரும்போது குடும்பத்திற்கு தங்க நகைகள் வாங்க முடியும்.					
g	பிடித்த மீன்களை மீனவர் சங்கங்கள் மூலம் விற்று நல்ல விலை கிடைப்பதற்கு வாய்ப்பு இருப்பதனால் இடைத் தரகர்களின் சுரண்டலைத் தவிர்க்க முடியும்.					
h	மீன்பிடிப் படகுகள் மற்றும் வலைகள் வாங்க அரசாங்கம் மானியம் இணைந்த கடன் அளித்ததால்.					
i	மீன்பிடி படகுகள் மற்றும் வலைகள் வாங்க அரசு மற்றும் அரசு சாரா நிறுவனங்களால் சுனாமி நிதி தந்ததினால்					
j	மீன்பிடி படகுகள் மற்றும் வலைகள் வாங்க வங்கி கடன் வழங்கியதால்					

சமூக – பொருளாதார முன்னேற்றதின் காரணிகள்

40. இயந்திரமயமான முறையில் மீன்பிடித்து சமூக மற்றும் பொருளாதார துறையில் முன்னேற்றம் அடைந்ததை ஏற்றுக் கொள்கிறீர்களா? இல்லையா?

முஏ - முழுமையாக ஏற்றுக்கொள்கிறேன்

ஏ - ஏற்றுக்கொள்கிறேன்

கஇ - கருத்து இல்லை

ம - மறுக்கிறேன்

மும - முழுமையாக மறுக்கிறேன்

வ. எண்	காரணிகள்	இயந்திரமயமாக்கல் முன்					இயந்திர மயமாக்கல் பின்				
		முஏ	ஏ	கஇ	ம	மும	முஏ	ஏ	கஇ	ம	மும
	சமூக முன்னேற்றம்										
a	உங்கள் குடும்பத்தில் முக்கிய முடிவுகளை எடுக்கும் போது உங்களிடம் ஆலோசனை கேட்பாகள்.										
b	உங்கள்ஊர்நிர்வாகக்குழுவில் உங்களுக்கு எதாவது ஒரு முக்கிய பொறுப்பு கொடுப்பார்கள்.										
c	உங்கள் ஊரில் முக்கியமான முடிவுகளை எடுக்கும் போது உங்கள் ஆலோசனை கேட்பார்கள்.										
d	உங்கள் மீனவர் சங்கத்தில் உங்களுக்கு முக்கிய அலுவலக பொறுப்புகள் கிடைத்தது.										
e	உங்களுடைய மதம் மற்றும் கிராம விழாக்களில் உங்களை ஒரு பிரதான விருந்தினராக அழைத்து கவுரவித்தார்கள்.										
f	மீன்பிடித்துறை பயிற்சியின்போது அனுபவம் வாய்ந்த மீனவர் என்ற முறையில் உங்களை ஒரு பேச்சாளராக பேசுவதற்கு அழைத்தார்கள்.										
g	நீங்கள் எதாவது அரசியல் கட்சியில் அங்கத்தினராகவோ பொருப்பாளராகவோ இருக்கிறீர்கள்.										
h	பிற சாதி சமுதாய மக்களின் மத்தியில் உங்கள் சமூகம் சார்ந்த கருத்துக்களை பகிர்ந்து கொண்டீர்.										

வ. எண்	காரணிகள்	இயந்திரமயமாக்கல் முன்					இயந்திர மயமாக்கல் பின்				
		முஏ	ஏ	கஇ	ம	மும	முஏ	ஏ	கஇ	ம	மும
i	நீங்கள் உங்கள் வீட்டை எல்லாவித அடிப்படை வசதிகளுடன் கட்டமைத்து இருக்கிறீர்கள்.										
j	நானும் என்னுடைய குடும்பமும் உய்தர மருத்துவம் பெற்று ஆரோக்கியத்தை பேணி காக்க முடியும்.										
k	உங்கள் குழந்தைகள் ஆங்கில வழி முறை கல்வி கூடத்தில் கல்வி கற்று உயர்கல்வி பெற்றிருக்கிறார்கள்.										
l	மீன் உற்பத்தி அதிகரித்ததால் அதிக வேலை வாய்ப்பு உருவானது.										
	பொருளாதார முன்னேற்றம்										
a	மீன் உற்பத்தி அதிகரித்ததால் அதிக வருமானம் கிடைத்தது.										
b	அதிக வருமானத்தினால் சேமிப்பு பெறுகி சொந்த வாகனம் வாங்க முடிந்தது.										
c	அதிக சேமிப்பு என்னுடைய கிராமம் மற்றும் அருகில் உள்ள நகரத்தில் நிலத்தை வாங்க உதவியது.										
d	அதிக சேமிப்பு வங்கியில் வைப்பு வைக்க எனக்கு உதவியது.										
e	மீன்பிடித் தொழிலிருந்து அதிக வருமானம் கிடைத்ததால் என்னுடைய மனைவி/ பிள்ளைகளுக்கு தங்க நகைகள் மற்றும் பொருட்கள் வாங்க முடிந்தது.										
f	அதிக வருமானம் கிடைத்ததால் உள்ளூர்வட்டிகாரர்களிடம் இருந்து கடன் வாங்குவதை தவிர்க்க முடிந்தது.										
g	அதிக வருமானம் என்னுடைய குடும்பத்திற்கும் நல்ல ஊட்டச்சத்து உள்ள உணவு சாப்பிட உதவியது.										
h	அதிக வருமானம் என்னுடைய குடும்பத்திற்கும் நல்ல தரமான ஆடைகள் வாங்க உதவியது.										

வ. எண்	காரணிகள்	இயந்திரமயமாக்கல் முன்					இயந்திர மயமாக்கல் பின்				
		முஏ	ஏ	கஇ	ம	மும	முஏ	ஏ	கஇ	ம	மும
i	தரமான மீன்பிடித் தளங்களின் வசதியால் சந்தைகள் நிலவரம் உயர்ந்ததினால் மீன்களுக்கு நல்ல விலை கிடைத்தது.										
J	அதிக வருமானம் கிடைப்பதால் படகு மற்றும் வலைகளை உடனுக்குடன் பழுது பார்த்து தொழிலுக்கு சென்று அதிக மீன் கிடைக்க உதவுகிறது.										
k	சேமிப்பு அதிகரித்தால் படகு, வலை மற்றும் மீன்பிடி உபகரணங்கள் வாங்க முடிந்தது.										

இயந்திரமயமான முறையில் மீன்பிடிக்கும் மீனவர்கள் எதிர்கொள்ளும் பிரச்சினைகள்

41. இயந்திரமான முறையில் மீன்பிடிக்கும் மீனவர்கள் எதிர்கொள்ளும் பிரச்சினைகளை குறிப்பிடுங்கள்

முஏ - முழுமையாக ஏற்கிறேன்

ஏ - ஏற்கிறேன்

கஇ - கருத்து இல்லை

ம - மறுக்கிறேன்

மும - முழுமையாக மறுக்கிறேன்

வ. எண்	விபரங்கள்	முஏ	ஏ	கஇ	ம	மும
	தொழில் நுட்ப பிரச்சினைகள்					
a	படகு, வலைகள், மீன் கண்டு பிடிப்பான், ஜிபிஎஸ் முதலியவற்றைச் செயல்படுத்த அதிக தொழில்நுட்ப அறிவு தேவைப்படுகிறது.					
b	ஆழ்கடல் பகுதியில் மீன்பிடிக்கும்போது ஜி.பி.எஸ் - ல் பழுது ஏற்பட்டால்அதை சரிசெய்ய போதிய தொழில் நுட்ப அறிவு இல்லாததால் மீன் பிடி தொழில் மற்றும் படகு இயக்குவதற்கு சிரமம் ஏற்படுகிறது.					
c	ஆழ்கடல் பகுதியில் மீன்பிடிக்கும் போது இயந்திரத்தில் பழுது ஏற்பட்டால் அதை சரிசெய்ய போதிய தொழில் நுட்ப அறிவு இல்லாததால், மீன்பிடி தொழில் மற்றும் படகு இயக்குவதற்கு சிரமம் ஏற்படுகிறது.					
d	ஆழ்கடல் பகுதியில் மீன் பிடிக்கும்போது மீனை சேமித்து வைக்கும் உறைவிப்பான் பழுதடைந்து விட்டால் அதை சரிசெய்ய போதிய தொழில் நுட்ப அறிவு இல்லாததின் காரணமாக மீன்கள் கெட்டுப்போவதற்கு காரணம் ஆகிறது.					

வ. எண்	விபரங்கள்	முஏ	ஏ	கஇ	ம	மு ம
e	அநேக வேலைகள் இயந்திரத்தின் மூலம் இயக்கப்படுவதன் காரணமாக பழுது மற்றும் பராமரிப்பு செலவு அதிகமாகிறது					
f	ஆழ்கடலில் மீன் கண்டுபிடிக்கும் கருவியில் பழுது ஏற்பட்டால், அதை சரிசெய்ய போதிய தொழில் நுட்ப அறிவு இல்லாததினால் மீன் பிடி தொழிலுக்கு பாதிப்பு ஏற்படுகிறது.					
g	வானிலை முன்னறிவிப்பு உரிய நேரத்தில் கிடைக்காததால் ஆழ்கடல் பகுதியில் மீன்பிடிக்கும் போது மனித உயிர்,படகு மற்றும் வலைகளுக்கு இ ஏற்படுகிறது.					
h	ஆழ்கடலில் மீன் பிடிப்பதில் அதிநவீன வெளிச்சம் தரக்கூடிய கருவிகள் பயன்படுத்துவதினால் கரையோர பகுதிகளில் மீன் கிடைப்பது குறைகிறது					
i	கடலில் அநேக இயந்திரமயமான படகுகள் இயக்கப்படுவதால் அதிலிருந்து வரக்கூடிய எரிபொருள் கசிவு, மற்றும் பிளாஸ்டிக் பொருட்கள் எறிவதன் காரணமாக கடல் நீர் மாசுபடுகிறது.					
j	சூரிய சக்தியில் இயங்கும் விளக்குகள் மற்றும் LED விளக்குகள் பயன்படுத்தப்படுவதால் சிறிய மீன்கள் மற்றும் உயிரினங்கள் அந்த வெளிச்சத்தில் கவரப்பட்டு வருவதால் ஆபத்து ஏற்படுகிறது. வருவதால் இந்த ஆபத்து ஏற்படுகிறது. இதன் காரணமாக கடல் சூழல் அமைப்பிற்கு சேதம் வருகிறது.					
	சமூக –பண்பாட்டு பிரச்சினைகள்					
a	கடல் வளம் குறைவதால் மீனவர்களுக்கு வேலையில்லாமை ஏற்படுகிறது.					
b	இயந்திரமயமான மீன்பிடி தொழிலினால் வயதான மீனவர்களுக்கு வேலையில்லாமல் ஏற்படுகிறது.					
c	படகு உரிமையாளர்களுக்கு நிர்வாக மற்றும் மேலாண் திறன் இல்லாமை திறமையுள்ள தொழிலாளர்கள் தக்க வைத்துக் கொள்ள முடியாமல் போகிறது.					
d	கடலில் எல்லை தாண்டி மீன்பிடிக்கும் போது ஏற்படும் பிரச்சினையால் அண்டை நாடுகளின் மத்தியில் உறவு மற்றும் மீனவர்களின் வாழ்வாதாரமும் பாதிக்கப்படுகிறது.					
e	ஆழ்கடலில் மீன்பிடிக்கும் போது, தீவிரவாதிகள் மற்றும் கொள்ளையினரின் தாக்குதலினால் உயிர் மற்றும் மீன்பிடி படகுகளுக்கு ஆபத்து ஏற்படுகிறது.					
f	இயந்திரமயமாக்குதல் காரணமாக மீனவர்களுக்கு தேவையான உடற்பயிற்சி இல்லாமையினால் உடல் பருமன் மற்றும் ஆரோக்கியம் சம்மந்தப்பட்ட பிரச்சனைகள் ஏற்படுகிறது.					

வ. எண்	விபரங்கள்	முஏ	ஏ	கஇ	ம	மு ம
g	கடலில் பல நாட்கள் தொடர்ந்து தங்குவதினால் மீனவர்கள் மத்தியில் மனச் சோர்வு அடைவது, மது மற்றும் புகையிலைப் பொருட்கள் அதிகமாக நுகர்வதற்கு காரணமாகிறது.					
h	கடலில் பல நாட்கள் தொடர்ந்து தங்குவதன் காரணமாக, குடும்பத்தை விட்டு பிரிந்து இருப்பதினால் குடும்ப உறவு பாதிக்கப்படுகிறது.					
i	குடும்பத் தலைவர் கடலில் பல நாட்கள் தொடர்ந்து தங்குவதன் காரணமாக அவர்கள் குழந்தைகள் ஒழுக்க ரீதியில் பின்னடைவதற்கு வழிவகுக்கிறது.					
j	மீன் பிடிப்பதற்கு ஆட்கள் பற்றாக்குறை ஏற்படுவதால் மீன்பிடி படகுகள் மற்றும் வலைகள் இயக்க முடியாத நிலை ஏற்படுகிறது.					
k	வெளிநாட்டு மீன்பிடிப் படகுகளின் ஆக்கிரமிப்பு மற்றும் ஒழுங்கமைக்கப்பட்ட மீன்பிடி தொழில் செய்யாததினால் இந்தியக் கடல் சுற்றுச்சூழல் அமைப்பு பாதிக்கப்படுகிறது இதனால் மீன் வளம் குறைகிறது.					
l	கடலில் பல நாட்கள் தொடர்ந்து தங்குவதன் காரணமாக, பிடிக்கப்படும் மீன்கள் உறைவிப்பான் பெட்டியில் சேமித்து வைக்கப்படுகிறது.இது சுவை மற்றும் மீனின் குணம் குறைகிறது இது மீன்பருகும் சமூகத்தின் ஆரோக்கியம் பாதிக்கப்படுகிறது.					
m	மீன்பிடித் தொழிலில் முதலாளித்துவ ஆதிக்கம் இருப்பதன் காரணமாக, பரம்பரை மீனவர்கள் நலனில் அக்கறை காட்டமாட்டார்கள். இதனால் நாட்டுபடகு மற்றும் இயந்திரபடகு மீனவர்களுக்குள் மோதல் ஏறபடுகிறது.					
	பொருளாதாரப் பிரச்சினைகள்					
a	செயல்பாட்டுச் செலவு அதிகமாக இருந்து வருமானம் குறையும் போது கடன்கள் உருவாகிறது. இதன் காரணமாக உள்ளூர்வட்டிகாரரிடம் அதிக வட்டிக்கு கடன் வாங்கும் நிலை ஏற்படுகிறது.					
b	மீன்பிடி தொழிலில் அதிக சேமிப்பு இல்லாத காரணத்தினால் குழந்தைகளுக்கு நல்ல கல்வியினை தொடர முடிவதில்லை.					
c	அதிக கடன் குடியிருக்கும் வீட்டையும், சொத்து மற்றும் மீன்பிடி படகுகளை விற்பதற்கு வழிவகுக்கிறது.					
d	காப்பீட்டுப் பிரீமியத் தொகை வருடத்திற்கு அதிகமாக இருப்பதால், மீன்பிடி படகுகள் மற்றும் வலைகளுக்கு காப்பீடு செய்ய இயலவில்லை. இயற்கை பேரழிவினால் கடலில் படகுகள் மற்றும் வலைகளுக்கு சேதம் ஏற்படும் போது மிக குறைவான இழப்பீடு கிடைப்பதினால் பெரிய நஷ்டம் ஏற்படுகிறது.					

வ. எண்	விபரங்கள்	முஏ	ஏ	கஇ	ம	மு ம
e	தடைசெய்யப்பட்ட மீன்பிடி உபகரணங்கள் பயன்படுத்துவதால் கடலில் மீன் உற்பத்தி பாதிக்கப்பட்டு மீன்வளம் குறைகிறது.					
f	பருவமழையின் போது மீனவர்கள் 45 நாட்கள் மீன்பிடிக்க மொத்த தடை விதிக்கப்படுகிறது. இது அவர்களுக்கு வருமானம் இல்லாத நிலையை ஏற்படுத்துவதால் அது பட்டினிக்கு வழிவகுக்கிறது.					
g	மீன்களுக்கு வெளிநாட்டு சந்தைகளில் தேவை குறைவாக இருப்பதால், வருமானம் குறைவதற்கு காரணமாகிறது.					
i	அதிக மீன்பிடிக் காலத்தில் சேமிப்பு மற்றும் முதலீடு பற்றிய விழிப்புணர்வு இல்லாதததினால் மீனவர்களின் எதிர்கால திட்டம் பாதிக்கப்படுகிறது.					
j	போதிய மீன் இறங்கும் தளங்களில் மீன் சந்தை அமைக்காததினால் மீன்களின் தேவை மற்றும் விலை குறைகிறது.					
k	விவசாயிகளுக்கு அரசாங்கம் கொள்முதல் விலை கொடுப்பது போல் மீனவர்கள் பிடிக்கும் மீன்களுக்கு கொள்முதல் விலை கொடுக்காதததால்.					

LIST OF PUBLICATION

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S. No.	Title	Name of the Journals
1	Problems Encountered by the Traditional Marine Fishermen Practicing Mechanization in Fishing in Kanniyakumari District of Tamil Nadu	EPRA International Journal of Economics and Business Review, Vol. 4, Issue-11, e-ISSN: 2347-9671, p-ISSN: 2349- 0187, Inno Space Impact Factor (2016) : 6.484
2	Socio-Economic Conditions of the Traditional Marine Fishermen and the Factors Influencing the Fishermen to Practice Mechanization of Fishing in Kanniyakumari District of Tamil Nadu	International Journal in Management and Social Science, Vol.04, Issue-11, ISSN: 2321-1784, Impact Factor (2016) : 6.178

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PROBLEMS ENCOUNTERED BY THE TRADITIONAL MARINE FISHERMEN PRACTICING MECHANIZATION IN FISHING IN KANNIYAKUMARI DISTRICT OF TAMIL NADU

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ABSTRACT

Earth is distinguished from all other known planets by the presence of a warm, salty ocean that covers more than two-thirds of its surface. Its value to our planet is incalculable, but has been brought into sharp focus by the fact that the future of humanity is dependent on the health of the ocean, and the goods and services it provides. Fisheries sector and fisher folk in Kanniyakumari district have drawn attention of many especially the academic community, fishing remained like most other productive activities, undeveloped. The mechanized mode of fishing had invited many problems in marine fishing and its socio-economic impact on fisher folk of Kanniyakumari district. This paper made an attempt to analyse the problems faced by the traditional fishermen practicing the mechanized mode of fishing in Kanniyakumari district with specific emphasis on the technological, socio-cultural and economic problems.

KEYWORDS: *Fisher folk, Problems, Mechanized fishing, marine fishing, Socio-cultural, Economic and Technological problem.*

INTRODUCTION

The technology introduced into the fishing economy of south India since 1950s has brought distinguishable changes in the patterns of ownership and work. The fishing community has been exposed to new forces for change. The new forms of investment in the production process of fishing have brought about an overwhelming transformation in the most intimate facets of life of traditional fishermen practicing mechanized mode of fishing. The Kanniyakumari district mechanized fishermen are not an exemption from the above changes in the technology, socio-cultural, economic and environment (coastal ecosystem). Fishery sector occupies an important place in the socio-economic development of the fishermen in Kanniyakumari district. The continued changes and up-gradation of existing fishing technologies and modernization helped to increase the efficiency of crafts and gears. It also an important sector in Kanniyakumari district from the standpoint of income and employment generation (Das Kennady 2015[3]). The experiences indicate that the growth of the fishing sector

stimulates the development and employment in related industries which contribute significantly to the total economic growth of the district. However, the current operating environment in marine fisheries in Kanniyakumari district is focused on short-term profits and livelihood instead of long-term sustainability and profitability. This 'business' environment is harmful to the oceans, fishermen, traders, consumers, and the coastal communities **(Gopalakrishnan 2016[4])**. Fishermen need predictable and stable access to fisheries and a flexible management regime that allows them to improve their financial security while safeguarding the invaluable marine ecosystems. The contribution of fisheries to nutritional security, economic growth and livelihoods is often ignored. In this regard the paper makes modest attempt to study problems encountered by the traditional fishermen practicing the mechanized mode of fishing in Kanniyakumari district of Tamil Nadu in respect of technological, socio-cultural and economic problems.

REVIEW OF LITERATURE

Christopher K. Pham et al. (2014[5]) Bottom trawl fishing threatens deep-sea ecosystems, modifying the seafloor morphology and its physical properties, with dramatic consequences on benthic communities. Therefore, the future of deep-sea fishing relies on alternative techniques that maintain the health of deep-sea ecosystems and tolerate appropriate human uses of the marine environment. In this study, the author demonstrates that deep-sea bottom long line fishing has little impact on vulnerable marine ecosystems, reducing by catch of cold-water corals and limiting additional damage to benthic communities.

Sivanesan. R (2014[6]) says that the socio economic conditions of the fishermen of southern coastal areas of Kanyakumari district are very poor. The standard of living of the fisher folk in Kanniyakumari district needs to be improved. In this situation it is highly essential to take steps to improve their income and reduces their expenditure to obtain a socio-economic balanced society. The fishier folk should be encouraged to get proper education in order to plan their budget and to flourish in their life. The fisher folk of this district have affected with anti-social elements like alcohol, drugs and pan masalas and exploitation from the middlemen is another problem faced by this district fishermen.

Hoegh-Guldberg O. et al. (2015[7]) With 61.3 per cent of the world's fisheries now fully exploited, and 28.8 per cent over-exploited, depleted or recovering from depletion, there is an urgent need to revise policies to ensure that the over-exploitation and destruction of fisheries does not continue, and to deal with the problem of illegal fishing. Habitat protection and fisheries management must go hand in hand, with the goal being ecologically sustainable fisheries. Goal 14 of the SDGs (Sustainable Development Goals) focuses specifically on the ocean, namely to "conserve and sustainably use the oceans, seas and marine resources for sustainable development."

Das Kennady J (2015[8]) says that the introduction of mechanized fishing had perceptibly improved the levels of living of boat owner households in the Kanniyakumari district but it has invited problems as well. There are two sects of income group emerged such as owners and workers, the former have more financial backup than the later. The education, health and savings needs to be improved. Other problems identified were lack of capital, ignorance, lack of knowledge of potential resources, organizational weakness among the fishermen.

MECHANIZATION IN KANYAKUMARI DISTRICT

In Kanyakumari, fisheries mechanization was launched as part of the Second Five Year Plan (1956–61) under the leadership of Congress chief minister, Shri. K. Kamaraj and coincided with the district's merger with Tamil Nadu **(AjanthaSubramanian[11])**. Mrs. Lourdammal Simon, Minster of Fisheries (1957-1962), Government of Tamil Nadu initiated fisheries development in 1958 and set about implementing the mechanization programme across Tamil Nadu with particular attention to her home district of Kanyakumari. The subsidized gill-netters were channeled mainly to the village of Colachel, a natural harbour in an otherwise turbulent coastline that made it a good test case for the technology. In the first five years of the distribution scheme, over seventy percent of crafts went to Colachel. In tune with the Community Development agenda, membership in the Fisheries Cooperative Societieswas limited to "active fishermen" for whom fishing was a subsistence occupation to helpthem increase their levels of productivity.

STATEMENT OF THE PROBLEM

The increase in number of mechanized and modern crafts and gears leads to increase in fish production, increase in the fisheries population the prosperity, welfare and development of the fisher folk in Kanyakumari District. But still the fishermen in this district are having lack of modern technology, poor socio-economic conditions, lack of safety measures and social security. However, there are few studies have been conducted to analyse the above. There is no detailed study has been conducted for the technological, socio-cultural and

economic problems encountered by the traditional fishermen practicing mechanized mode of fishing in this district. Fishing at sea has been recognized as the most dangerous occupation in the world. These developments throw an insight to the researcher to conduct an empirical study on the technological, socio-cultural and economic problems encountered by the traditional fishermen practicing mechanized mode of fishing in Kanniyakumari district.

OBJECTIVES OF THE STUDY

Following are the objectives of the study.

1. To study the socio-economic background of traditional marine fishermen in Kanyakumari district.
2. To analyze the technical, socio-cultural and economic problems encountered by the traditional marine fishermen who are practicing mechanization in fishing.

METHODOLOGY OF THE STUDY

The researcher selected 484 mechanized fishermen crafts owners from the population of 4839 of the Kanniyakumari district with help of random sampling technique. The primary data were collected with the help of interview schedule. This study covers a period of one year from November 2014 to October 2015. Statistical tools such as ANOVA, t- test and correlation were used for the analysis of data.

SOCIO-ECONOMIC BACK GROUND OF THE TRADITIONAL MARINE FISHERMEN

The researcher has analysed the socio economic back ground of the traditional marine fishermen of Kanniyakumari district such as population, caste, language, habitation pattern, employment, education, religion and community.

Population:-The district itself has on the highest population densities in India-726 per square kilometer. In coastal villages the density is as high as 1000 per square kilometer. The 71.5 km long coast has a heavy concentration of fisher-folk, almost one village per 1.7 km. According to census of 2010, children 0-17 years old are 44,046 (0-5years old are 14009, 6-10 old years are 12046, 11-17 years old are 17991) adults 18 years and above are 99,342 (18-40 years old are 62939, 41-65 years old are 31775, above 65 years old are 4628) , total male population is 73,471, total female population is 69,917 and total 1, 43,388 fisher-folks (total families are 34779 and average family size is 4 persons per house) are distributed in the 42 villages of Kanyakumari coast and constitute about 18.21 percent of the total fishermen of Tamil Nadu.**(Tamil Nadu Fisher Folks Census[12])**

Caste:-The fisher folk of coastal belt belong to two main castes: the Paravar and the Mukkuvar (98.95 per cent) and very minor castes are Nozhyar Hindu (.09 per cent) and Thuluker Muslim (.96 per cent). Most live in communities that are scattered along coastlines and most of their fishing activities take place near their home communities. They generally live very close to the seashore. This nearness to the sea has the advantage of convenient beach landing for their catch.

Habitation Pattern:-The fishermen's habitation is almost at the fringe of the sea. The closely packed dwellings of the community and the poverty of much of the housing give the coastal strip an appearance more like a slum than a series of rural villages. However, there are 2,066 thatched houses, 2,546 lite roofed houses, 8,530 tiled houses, 18,901 concrete houses, and 359 other type of houses out of the total of 32,402 houses. **(Tamil Nadu Fisher Folks Census[13])**

Employment:-The fishing community- as people whose traditional occupation of fishing identify themselves with the sea. However, there are 37133 fishermen are directly involving in fishing, 4912 and 655 are involving in fish trade and net making respectively, 1830 are in allied activities, 4618 are employed in government and private sectors and 2113 are in self-employed in this district.**(Tamil Nadu Fisher Folks Census[14])**

Education:-Education is one of the most indicators of socio-economic status of the coastal communities. Over the last half century, educational level of the coastal communities has risen gradually. In 1960 only 10 percent coastal population had have elementary education. In 1970s, 80s and 90s it has just swelled up to 55 per cent with higher education. According to Tamil Nadu Fisher Folk Census 2010, there 44690 are primary school educated , 29983 are middle school educated, 20302 are high school educated, 12172 are higher secondary educated, 11567 are under graduates, 3738 are other education and 6927 illiterates are in Kanyakumari district.**(Tamil Nadu Fisher Folks Census[15])**

Religion and Community:- Kanyakumari district has a heterogeneous fishing community constituting all the three religions. In Kanyakumari district, among the fishers, the Christian community is dominated in the district. The census reveals that of the total 34779 families, 98.95 per cent are Christians. The Muslims and Hindus constitute .09 per cent and .96 per cent respectively. In Kanyakumari district the fisher folk are belongs to the most backward community

which constitutes 99.59 per cent, backward community is 0.25 per cent, forward community is 0.15 per cent and SC/ SC community is 0.01 per cent. **(Tamil Nadu Fisher Folks Census[16])**

PROBLEMS ENCOUNTERED BY THE TRADITIONAL MARINE FISHERMAN PRACTICING THE MECHANIZED MODE OF FISHING

The primary data collected were analysed with the help of the statistical tools such as ANOVA, t-test and correlation. The results of the data analysis are discussed and presented in this paper. The analysis of technological, socio-cultural and economic problems encountered by the traditional marine fishermen practicing mechanized mode of fishing in Kanniyakumari district are presented below.

TECHNOLOGICAL PROBLEMS ENCOUNTERED BY THE MECHANIZED FISHERMEN

Fishermen encountered different type of technological problems in the mechanized mode of fishing. Ten technological problems are identified and given in Table 1. In order to find out the significant difference in technological problems encountered in the mechanized mode of fishing among the fishermen of mechanized boats, motorized vallam and motorized catamaran in Kanyakumari district, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in technological problems encountered in the mechanized mode of fishing among the fishermen of mechanized boats, motorized vallam and motorized catamaran in Kanyakumari district". The results are presented in Table 1.

Table 1
Technological problems encountered by the fisherman in the mechanized mode of fishing

Sl. No	Technological Problems	Type of Respondents				F Statistics
		Mechanized Boats	Motorized vallam	Motorized catamaran	Total	
1.	Need more technical knowledge to operate crafts, nets, fish finder and GPS	3.9194	4.3481	4.6698	4.3636	26.264*
2.	Lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea	3.9516	4.2532	4.6981	4.3120	43.186*
3.	Lack of technical knowledge to repair the machine at fault during fishing in deep sea affects fishing and operation of craft	4.0806	4.1930	4.6604	4.2810	48.755*
4.	Lack of technical knowledge to set right the repairs of cold stores affects the storing fish catch which led to decay of the fish catch while fishing in deep sea	3.2581	3.3987	4.4528	3.6116	94.185*
5.	Mechanisation increases the repairs and maintenance expenses	4.0645	4.0854	4.5849	4.1921	39.952*
6.	Lack of technical knowledge to set right repair in fish finder create problem for fishing while in deep sea	3.2258	3.4589	4.4340	3.6426	76.156*
7.	Non availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea	4.7903	4.7595	4.9717	4.8099	9.126*
8.	Highly sophisticated lighting devices used in deep sea fishing reduces the fish catches in near the seashore	4.1129	4.1361	4.2830	4.1653	5.166*
9.	Operation of more mechanized crafts in the sea increases the pollution through leakage of fuel and throwing plastic waste in the sea	4.0484	4.1329	4.3280	4.1550	10.272*
10.	Usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system	4.2911	4.0886	4.3019	4.1384	8.617*

Source: Primary Data **-Significant at 5 per cent level*

Table 1shows the mean score of technological problems encountered by the fisherman in the mechanized mode of fishing along with its respective 'F' statistics. The important technological problems encountered by fishermen of mechanized boats are non-availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea and usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco system and their respective mean scores are 4.7903 and 4.2911.

Among the fishermen of motorized vallam, the important technological problems are non-availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea and need more technical knowledge to operate crafts, nets, fish finder and GPS and their respective mean scores are 4.7595 and 4.3481.

Among the fishermen of motorized catamaran, the important technological problems are non-availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea and lack of technical knowledge to set right the repairs in GPS affects fishing and operation of craft while fishing in deep sea and their respective mean scores are 4.9717 and 4.6981.

Regarding the technological problems, the significant difference among the fishermen of mechanized boats, motorized vallam and motorized catamaran, are identified in the case of all the variables since the respective 'F' statistics are significant at 5 per cent level.

SOCIO-CULTURAL PROBLEMS ENCOUNTERED BY THE FISHERMAN IN THE MECHANIZED MODE OF FISHING

Fishermen encountered different type of socio-cultural problems in the mechanized mode of fishing. Thirteen socio-cultural problems are identified and given in Table 2. In order to find out the significant difference in socio-cultural problems encountered in the mechanized mode of fishing among the fishermen of mechanized boats, motorized vallam and motorized catamaran in Kanyakumari district, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in socio-cultural problems encountered in the mechanized mode of fishing among the fishermen of mechanized boats, motorized vallam and motorized catamaran in Kanyakumari district". The results are presented in the Table 2.

Table 2
Socio-Cultural problems faced by the Fishermen in the Mechanized Mode of Fishing

Sl. No	Socio-Cultural problems	Type of Respondents				F Statistics
		Mechanized Boats	Motorizedvallam	Motorized catamaran	Total	
1.	The deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman	4.4355	4.7247	4.8208	4.7087	14.840*
2.	Due to mechanization, the fishermen who are in old age are not getting employment	4.5000	3.9304	4.1038	4.0413	17.690*
3.	Due to the lack of administrative and management skills on the part of the owners of the fishing crafts, they are unable to keep the efficient fishermen with them	4.0968	4.3544	4.3113	4.3120	6.065*
4.	Catching fish beyond the sea boundary creates problem to the fishermen and affect the relationship between the countries	3.9516	4.1867	4.1792	4.1550	9.777*
5.	Attack from terrorists and pirates endanger the life of the fishermen and their crafts during deep sea fishing	3.9355	4.1424	4.1226	4.1116	6.578*
6.	Lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen	4.7581	4.8291	4.8491	4.8244	0.865
7.	Staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco	4.6604	3.5791	3.0000	3.7417	89.820*
8.	Staying more days in the sea continuously affects the family relationship due to their separation from the family	4.5566	3.6076	3.1500	3.7376	104.780*
9.	Children's discipline gets affected due to the long stay by the head of the family during deep sea fishing	3.2604	3.6076	4.5566	3.7376	76.249*
10.	Shortage of fishing workers causes inability to operate fishing crafts and nets	4.6129	4.4051	4.7547	4.5083	12.702*
11.	Invasion of foreign vessels and non-co-operation of systematic fishing affects the Indian territorial marine ecological system. For that reason the fish production decreases	3.7419	4.0665	4.1887	4.0517	18.218*
12.	Long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community	4.7170	3.6519	3.1290	3.8182	86.515*
13.	In this fishing work, no care about the traditional fishermen because of capitalist influence. For that reason there are riots between traditional and mechanized fishermen	3.6129	3.9525	4.1132	3.9442	10.144*

Source: Primary Data **-Significant at 5 per cent level*

Table 2 shows the mean score of socio-cultural problems encountered by the fisherman in the mechanized mode of fishing along with its respective 'F' statistics. The important socio-cultural problems encountered by fishermen of mechanized boats are 'lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen' and 'long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community' since their respective mean scores are 4.7581 and 4.7170.

Among the fishermen of motorized vallam, the important socio-cultural problems are 'lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen' and 'the deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman' since their respective mean scores are 4.8291 and 4.7247.

Among the fishermen of motorized catamaran, the important socio-cultural problems are 'lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen' and 'the deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman' since their respective mean scores are 4.8491 and 4.8208.

Regarding the socio-cultural problems, the significant difference among the fishermen of mechanized boats, motorized vallam and motorized catamaran are identified in the case of the all the variables excepting the variable 'lack of body exercise because of the mechanization creates health related problems and obesity among the fishermen' since the respective 'F' statistics are significant at 5 per cent level.

ECONOMIC PROBLEMS ENCOUNTERED BY THE FISHERMEN IN THE MECHANIZED MODE OF FISHING

Fishermen encountered different type of economic problems in the mechanized mode of fishing. Ten economic problems are identified and given in Table 3. In order to find out the significant difference in economic problems encountered in the mechanized mode of fishing among the fishermen of mechanized boats, motorized vallam and motorized catamaran in Kanyakumari district, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in economic problems encountered in the mechanized mode of fishing among the fishermen of mechanized boats, motorized vallam and motorized catamaran in Kanyakumari district". The results are presented in the Table 3.

Table 3
Economic Problems Encountered by the Fisherman in the Mechanized Mode of Fishing

Sl. No	Economic problems	Type of Respondents				F Statistics
		Mechanized Boats	Motorized vallam	Motorized catamaran	Total	
1.	The high operational expenses reduce their income when fish catch is not adequate to meet the cost. This leads to borrowing from local money lenders	4.2925	4.1614	4.1774	4.1921	3.463*
2.	Unable to provide good education for the children due to lack of savings from fishing	4.0806	4.2373	4.5755	4.2913	30.740*
3.	Increased debts lead to disposing of the residential house, property and fishing crafts	4.0323	4.2247	4.4151	4.2417	11.950*
4.	Unable to pay the insurance premium for fishing crafts and nets because of the high annual premium. Moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss	4.3868	4.2120	4.0806	4.2335	8.431*
5.	During the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult	4.9194	4.8829	4.9528	4.9029	2.040
6.	Usages of banned fishing nets and instruments in the sea, reduces the fish wealth	3.7742	4.0791	4.1226	4.0496	14.294*
7.	Lack of demand in overseas market reduces the income of the fishermen	3.7097	4.1171	4.1509	4.0723	14.280*
8.	Lack of awareness about savings and investments among the fishermen affects their future plan	4.9839	4.9430	4.9717	4.9545	0.782
9.	Lack of fish markets and landing centers reduces the demand and sale of fish	4.8993	4.9462	4.9434	4.9504	0.849
10.	Lack of price fixation by the government for the fish like agricultural products	4.7839	4.9304	4.9677	4.9463	1.869

Source: Primary Data **-Significant at 5 per cent level*

Table 3 shows the mean score of economic problems encountered by the fisherman in the mechanized mode of fishing along with its respective 'F' statistics. The important economic problems encountered by fishermen of mechanized boats are 'lack of awareness about savings and investments among the fishermen affects their future plan' and 'during the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult' since their respective mean scores are 4.9839 and 4.9194.

Among the fishermen of motorized vallam, the important economic problems are 'lack of fish markets and landing centers reduces the demand and sale of fish' and 'lack of awareness about savings and investments among the fishermen affects their future plan' since their respective mean scores are 4.9462 and 4.9430.

Among the fishermen of motorized catamaran, the important economic problems are 'lack of awareness about savings and investments among the fishermen affects their future plan' and 'lack of price fixation by the government for the fish like agricultural products' since their respective mean scores are 4.9717 and 4.9677.

Regarding the economic problems, the significant difference among the fishermen of mechanized boats, motorized vallam and motorized catamaran, are

identified in the case of six out of ten variables since the respective 'F' statistics are significant at 5 per cent level, the null hypothesis is rejected.

Relationship between technological factors influencing the traditional marine fishermen to practice mechanized mode of fishing and technological problems faced by them:-

Traditional marine fishermen influenced by different technological factors to go for practicing mechanized mode of fishing but they face technological problems in the mechanized mode of fishing. Traditional marine fishermen do not influenced by different technological factors to practice mechanized mode of fishing but they do not face technological problems in the mechanized mode of fishing. Hence there is a direct relationship between technological factors influencing the traditional marine fishermen to practice mechanized mode of fishing and technological problems faced by the traditional marine fishermen. The inter-relationship between technological factors influencing the traditional marine fishermen to practice mechanized mode of fishing and technological problems faced by the traditional marine fishermen in the study area is analysed through correlation co-efficient. The null hypothesis as "There is no relationship between technological factors influencing the traditional marine fishermen to practice mechanized mode of fishing and technological problems faced by the traditional marine fishermen in Kanyakumari district". The computed correlation co-efficient between technological factors influencing the traditional marine fishermen to practice mechanized mode of fishing and technological problems faced by the traditional marine fishermen in the study area is presented in Table 4.

Table 4
Relationship between Technological Factors influencing the Traditional Marine Fishermen to practice Mechanized Mode of Fishing and Technological problems faced by them

Particulars	Technological Factors	Technological Problems
Pearson Correlation	1.000	0.744**
Sig. (2-tailed)	.	0.000
N	484	484

Source: Primary data

** Correlation is significant at the 0.01 level (2-tailed).

Table 4 shows the relationship between technological factors influencing the traditional marine fishermen to practice mechanized mode of fishing and technological problems faced by the traditional marine fishermen in Kanyakumari district. The table reveals that technological factors influencing the traditional marine fishermen to practice mechanized mode of fishing is positively related to the technological problems faced by the traditional marine fishermen with a co-efficient correlation of 0.744.It is identified that there is a relationship between technological factors influencing the traditional marine fishermen to practice mechanized mode of fishing and technological problems faced by the traditional marine fishermen in Kanyakumari district.

Relationship between Social Factors influencing the Traditional Marine Fishermen to practice Mechanized mode of Fishing and Social Problems faced by them:-

Traditional marine fishermen influenced by different social factors to practice mechanized mode of fishing but they face social problems in the mechanized mode of fishing. Traditional marine fishermen do not influenced by different social factors to practice mechanized mode of fishing but they do not face social problems in the mechanized mode of fishing. Hence there is a direct relationship between social factors influencing the traditional marine fishermen to practice mechanized mode of fishingand social problems faced by the traditional marine fishermen. The relationship between social factors influencing the traditional marine fishermen to practice mechanized mode of fishing and social problems faced by the traditional marine fishermen in the study area is analysed through correlation co-efficient. The null hypothesis as "There is no relationship between social factors influencing the traditional marine fishermen to practice mechanized mode of fishing and social problems faced by the traditional marine fishermen in Kanyakumari district". The computed correlation co-efficient between social factors influencing the traditional marine fishermen to practice mechanized mode of fishing and social problems faced by the traditional marine fishermen in the study area is presented in Table 5.

Table 5
Relationship between Social Factors influencing the Traditional Marine Fishermen to practice Mechanized mode of Fishing and Social problems faced by them

Particulars	Social Factors	Social Problems
Pearson Correlation	1.000	0.404**
Sig. (2-tailed)	.	0.000
N	484	484

Source: Primary data

** Correlation is significant at the 0.01 level (2-tailed).

Table 5 shows the relationship between social factors influencing the traditional marine fishermen to practice mechanized mode of fishing and social problems faced by them. Table 5 reveals that social factors influencing the traditional marine fishermen to practice mechanized mode of fishing is positively related to the social problems faced by them with a co-efficient correlation of 0.404.It is identified that there is a relationship between social factors influencing the traditional marine fishermen to practice mechanized mode of fishing and social problems faced by them.

Relationship between Economic Factors influencing the Traditional Marine Fishermen to practice Mechanized mode of Fishing and Economic problems faced by them:-

Traditional marine fishermen influenced by different economic factors to practice mechanized mode of fishing but they face economic problems in the mechanized mode of fishing. Traditional marine fishermen do not influenced by different economic factors to practice mechanized mode of fishing but they do not face economic problems in the mechanized mode of fishing. Hence there is a direct relationship between economic factors influencing the traditional marine fishermen to practice mechanized mode of fishing and economic problems faced by them. The relationship between economic factors influencing the traditional marine fishermen to practice mechanized mode of fishing and economic problems faced by them in the study area is analysed through correlation co-efficient. The null hypothesis as "There is no relationship between economic factors influencing the traditional marine fishermen to practice mechanized mode of fishing and economic problems faced by them". The computed correlation co-efficient between economic factors influencing the traditional marine fishermen to practice mechanized mode of fishing and economic problems faced by them in the study area is presented in Table 6.

Table 6
Relationship between Economic factors influencing the Traditional Marine Fishermen to practice Mechanized mode of Fishing and Economic problems faced by them

Particulars	Economic Factors	Economic Problems
Pearson Correlation	1.000	0.331**
Sig. (2-tailed)	.	0.000
N	484	484

Source: Primary data

**-Correlation is significant at the 0.01 level (2-tailed).

Table 6 shows the relationship between economic factors influencing the traditional marine fishermen to practice mechanized mode of fishing and economic problems faced by them. Table 6 reveals that economic factors influencing the traditional marine fishermen to practice mechanized mode of fishing is positively related to the economic problems faced by them with a co-efficient correlation of 0.331. It is identified that there is a relationship between economic factors influencing the traditional marine fishermen to practice mechanized mode of fishing and economic problems faced by them.

FINDINGS OF THE STUDY

1. Major technical problems faced by the mechanized fishermen are 'non-availability of timely weather forecast information endangered fishermen's life, crafts and nets while fishing in the deep sea' and the 'usage of solar powered LED lights attracts small fishes and other marine lives endanger its survival which affects coastal bio- diversity and marine eco-system and lack of technical knowledge to set right the repairs in GPS, machine and fish finder affects fishing and operation of craft while fishing in deep sea'.

2. Socio-cultural problems encountered by the mechanized fishermen are 'lack of body exercise and obesity among the fishermen', 'staying more days in the sea continuously creates mental fatigue among fishermen cause more consumption of alcohol and tobacco', 'the deep sea fishing reduces the fish wealth and in turn it creates unemployment among fisherman', 'children's discipline gets affected due to the long stay by the head of the family during deep sea fishing and 'shortage of fishing workers causes inability to operate fishing crafts and nets' and 'long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community'.
3. The important economic problems encountered by the mechanized fishermen are 'lack of awareness about savings and investments among the fishermen affects their future plan', 'lack of price fixation by the government for the fish like agricultural products', 'during the monsoon season the fishermen were banned to catch fish for 45 days which leads to no income and makes them to meet their daily life difficult', 'lack of fish markets and landing centers reduces the demand and sale of fish' and 'unable to pay the insurance premium for fishing crafts and nets because of the high annual premium', moreover, the low claim settlement for the damage of crafts and nets during the natural calamities increases their loss.

RECOMMENDATIONS

1. To avoid the 'Non-availability of timely weather forecast information while in deep sea fishing endangered fishermen's life, crafts and gears' the government should provide sophisticated devices like NAVTEC or Satellite mobile to know the weather information while in deep sea fishing to alert the fishermen to reach the sore safely and to take precautions.
2. The use of electrical powered LED lights endangers the marine eco-system, therefore the government should create awareness among the fishermen about the dangers of such fishing. NGOs could be used for giving awareness among the fishermen.
3. Lack of physical exercise due to mechanization creates health related problems and obesity among the fishermen, therefore fishermen must keep their body fit by maintaining their body properly. The government should arrange medical camp at the regular interval to educate the fishermen the importance of physical exercise and to provide proper guidance to maintain the health.
4. Staying more days in the sea continuously creates mental fatigue among fishermen because of this fishermen consume more alcohol and tobacco. The government should educate the fishermen about the dangers of these habits through proper counseling and guidance.
5. Lack of technical knowledge to operate and repair the GPS, fish finder, crafts while in fishing in deep sea endangers life of the fishermen, therefore the government should arrange training for the fishermen who operates these machines and devices by the technical experts from the particular field during the fishing ban period of 45 days and to provide toll free number to speak with technical experts to repair the devices while in deep sea like farmers toll free support.
6. The fishermen lack participation in the active politics. Politics gives power and authority to get their rights from the government. The government should take initiative to constitute reserved constituency in the assembly and the parliament for fishermen like forest tribe.
7. Long storage of fish during deep sea fishing reduces the quality and nutritious value of fish which affects the health of fish consuming community therefore the government should buy the fish in the sea itself and bring the same to the land for selling immediately, by this way, the quality as well as the nutritious value of fish will be maintained and save the fuel and maintenance expenses.

CONCLUSION

Mechanization brought changes causing structural shift, creating new employment and income generating opportunities and fishing. Fishing has become commercial venture which results in increasing GDP of India. In spite of all the changes, the mechanized fishermen from the district of Kanniyakumari are living very poor in technology, socio-cultural, politics, economic and marine eco system. Therefore, it is essential to look in to the problems of mechanized fishermen in Kanniyakumari district and to take necessary steps to enhance the mechanized fishermen to improve their livelihood.

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SOCIO-ECONOMIC CONDITIONS OF THE TRADITIONAL MARINE FISHERMEN AND THE FACTORS INFLUENCING THE FISHERMEN TO PRACTICE MECHANIZATION OF FISHING IN KANNIYAKUMARI DISTRICT OF TAMIL NADU

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ABSTRACT

Fishery sector occupies an important place in the socio-economic development of the fishermen in Kanniyakumari district. The continued changes and up-gradation of existing fishing technologies and modernization helped to increase the efficiency of crafts and gears. It also an important sector in Kanniyakumari district from the standpoint of income and employment generation. The experiences indicate that the growth of the fishing sector stimulates the development and employment in related industries which contribute significantly to the total economic growth of the district. Besides providing direct employment, the industry is also an income generator as it supports canneries, processing establishments, gear and equipment manufacturers, boat yards, refrigeration and ice making plants, and transport services in addition to those working in governmental and private fisher based institutions. Fisheries play an important role in augmenting food supply and raising nutritional levels of the population in Kanniyakumari district. This paper attempts to examine the socio-economic conditions of the traditional marine fishermen practicing mechanization and the factors influencing them to practice mechanization in Kanyakumari district of Tamil Nadu.

Key words: Income, Employment, Socio-economic development, Modernization, Food supply and Nutrition.

Introduction

Fishery sector occupies an important place in the socio-economic development of the fishermen in Kanniyakumari district. The continued changes and up-gradation of existing fishing technologies and modernization helped to increase the efficiency of crafts and gears. It also an important sector in Kanniyakumari district from the standpoint of income and employment generation. The experiences indicate that the growth of the fishing sector stimulates the development and employment in related industries which contribute significantly to the total economic growth of the district. Besides providing direct employment, the industry is also an income generator as it supports canneries, processing establishments, gear and equipment manufacturers, boat yards, refrigeration and ice making plants, and transport services in addition to those working in governmental and private fisher based institutions. Fisheries play an important role in augmenting food supply and raising nutritional levels of the population in Kanniyakumari district. Fish also yields several bye- products such as fish oil, fish meal, fish manure, fish leather, and fish glue etc. **(Younus[1]).** In this regard the paper makes modest attempt to study the socio-economic conditions of the traditional marine fishermen and the factors influencing the traditional marine fishermen to practice mechanization of fishing in Kanniyakumari district of Tamil Nadu.

Review of literature

Punnoose Jacob et al. (2010[2]) put across a multi-pronged strategy ensuring the loyalty of the coastal population. The poorest fraction of the population throngs the coastal belt and unless their social and economic deficiencies are addressed no coastal security architecture would be effective.

Vipin Kumar V.P et al., (2013[3]) in this paper an attempt is made to assess the extent of indebtedness among marine fisher folk in mechanized, motorized and traditional fisheries sectors and to assess the impact of Micro finance Institutions (MFI) and Self Help Groups (SHG) on coastal indebtedness in Tamil Nadu. The results showed that the level of indebtedness of members of MFIs was less compared to the non- members.

Nurul. L. et al., (2013[4]) The result shows that poverty is still a major problem faced by the fishermen in the study area. Poverty is evident in economic life of the fisherman and their housing condition. Basically, the problems faced by the fishermen can be classified into two general problems, namely (1) the problems encountered related to socio-economic life of fishermen and (2) the problems related to the physical condition of housing/settlement area. In terms of socio-economic sustainability of the profession as fishermen, the problems faced include low income, limited capital and fishing equipment, low education level and lack of skill and technology.

Ilavarasan. R (2013[5]) observes that most of the fishermen's main problem in raising finance is their inability to give security for the loan. Even for getting financial aids through government banks, security is essential. The study found that food assistance and cash grants from government and non-governmental organizations, as well as donations of boats and fishing gear and boat repair stations were all available to them.

Guruprasad and Gaddem Narasimha Rao (2014[6]) The environments are often subjected to degradation at an alarming rate leaving a very gloomy future. Due to increasing coastal population and growth in mechanized boat operations all along the coastline, the socio-economic status of the fishermen community is now in a fragile state. It is time that a thorough understanding of the socio-economic status of the coastal population, their limitations to compete with affluent.

Sivanesan. R (2014[7]) The socio-economic conditions of the fisherman southern coastal areas of Kanyakumari District are very poor. Almost 66 per cent of the fishermen are engaged in fishing at the age group of above 35.The survey reveals almost 30 per cent of them have completed their upper primary education. From the survey we concluded that 70 percent of the fishermen go for fishing at the sea and 25 percent are engaged in fish related activities. The study gives the data of the citizenship of the fishermen as 52 percent of them are natives and others are migrated.

Profile of the Kanniyakumari District Kanniyakumari, the smallest district in Tamil Nadu, with a land spread of 1,684 sq. km. has almost all ecosystems - forests, wetlands, freshwater resources, marine, etc. It is one of the 32 districts in Tamil Nadu and located at the southernmost tip of peninsular India and bordered by Thiruvananthapuram district of Kerala state to the west and Tirunelveli District of Tamil Nadu to the north and east. It is also sometimes referred to as "Land's End". The district lies between 77° 15' and 77° 36' of the eastern longitudes and 8° 03' and 8° 35' of the northern Latitudes. The south-eastern boundary (coastal) is the Gulf of Mannar (Bay of Bengal), while on the South and the South West, the boundaries are the Indian Ocean and the Arabian Sea **(Year book[8])** But the main part of the coast faces the Arabian Sea. The coastal landscape of Kanniyakumari District is mainly composed of beach ridges of rocky, sandy and swampy nature in the estuarine regions. On the eastern end of the

coast is located Vattakottai (circular fort), a historically important place. On the western end of this village is situated Cape Comorin. The coastal landscape of Kanniyakumari District is mainly composed of beach ridges of rocky, sandy and swampy nature in the estuarine regions. Coastal environment is very important with respect to fish production and fisher folk's employment. The coastal ecosystem of this district comprises 71.5 Km in length and is studded with 42 coastal fishing villages. The fishermen habitation begins from Arocikapuram and extends up to Neerodi, a coastal village. The district is divided into 4 administrative units known as Taluks viz. Vilavancode, Kalkulam, Agasteeswaram and Thovalai.

In 42 coastal villages from Arocikapuram to Neerodi, the density is as high as 1000 per square kilometer. The 71.5 km long coast has a heavy concentration of fisher-folk, almost one village per 1.7 km. According to census of 2010, total male population is 73,471, total female population is 69,917 and total 1, 43,388 fisher-folks. There are 37133 fisher-folks directly involved in fishing, literate fisher-folks are 122452. In Kanniyakumari district, among the fishers, 98.95 per cent are Christians with two major communities such as Mukkuvar and Bharavar.The fishing crafts and gears used by the study area fishermen are 9988 and 6863 respectively**(Tamil Nadu Fisher Folks Census[9])**

Mechanization in Kanyakumari District

In Kanyakumari, fisheries mechanization was launched as part of the Second Five Year Plan (1956–61) under the leadership of Congress chief minister, Shri.K. Kamaraj and coincided with the district's merger with Tamil Nadu **(Subramanian[10])**. Mrs. Lourdammal Simon, Minster of Fisheries (1957-1962), Government of Tamil Nadu initiated fisheries development in 1958 and set about implementing the mechanization programme across Tamil Nadu with particular attention to her home district of Kanyakumari. The subsidized gill-netters were channeled mainly to the village of Colachel, a natural harbour in an otherwise turbulent coastline that made it a good test case for the technology. In the first five years of the distribution scheme, over seventy percent of crafts went to Colachel. In tune with the Community Development agenda, membership in the Fisheries Cooperative Societies was limited to "active fishermen" for whom fishing was a subsistence occupation to help them increase their levels of productivity.

Statement of the Problem

The increase in number of mechanized and modern crafts and gears leads to increase in fish production, increase in the fisheries population the prosperity, welfare and development of the fisher folk in Kanyakumari District. But still the fishermen in this district are having lack of modern technology, pathetic socio-economic conditions, lack of safety measures and social security. There is no detailed study for the impact of mechanization in marine fishing industry on the socio-economic empowerment of traditional marine fishermen in this district. These developments throw an insight to the researcher to conduct an empirical study on the impact of mechanization in marine fishing on the socio-economic conditions of the traditional fishermen and the factors influencing them to practice mechanization in Kanniyakumari district.

Objectives of the study

Following are the major objectives of the study.

1. To study the socio-economic background of traditional marine fishermen in Kanyakumari district.

2. To identify the factors influencing the traditional marine fishermen to practice mechanized means of fishing in Kanyakumari district.

Methodology of the study

The researcher selected 484 mechanized fishermen crafts owners out of the total population of 4839 from 42 fishing villages of the Kanniyakumari district with help of simple random sampling technique. The primary data were collected through interview schedule. This study covers a period of one year from November 2014 to October 2015. Statistical methods used for the analysis of data are ANOVA, Garret Ranking and Correlation.

Socio-economic conditions of the Mechanized Fishermen

The researcher analyzed the socio economic conditions of fishermen such as age, marital status, religion, caste, education, family status, ownership of house, type of housing and monthly income.

Age: -The age of entry into the occupation of fishing depends on factors such as the gender of the entrant, level of education and the nature of the technology used. Fishermen of different age groups have been involved in fishing.

Table 1

Age - Wise Distribution of the Respondents

Age	No of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Below 25	14(13.2)	7(2.2)	4(6.3)	25(5.2)
26-35	69(65.1)	95(30.2)	15(23.8)	179(36.9)
36-45	22(20.8)	128(40.6)	18(28.6)	168(34.7)
46-55	1(0.9)	64(20.3)	26(41.3)	91(18.9)
Above 55	-	21(6.7)	-	21(4.4)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Table 1 show that 71.6 per cent of the mechanized fishermen are involved in fishing at the age group of 26- 45 years.

Marital Status: - Fishermen of different marital status such as married and unmarried have been involved in fishing.

Table 2

Marital Status - Wise Distribution of the Respondents

Marital Status	No of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Unmarried	5(4.7)	34(10.8)	7(11.1)	46(9.5)
Married	101(95.3)	281(89.2)	56(88.9)	438(90.5)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

The survey indicated that majority (90.5 per cent) of the respondents is married and the remaining 9.5 per cent of the respondents are unmarried.

Religion: - Religion wise distribution of respondents is shown in the Table 3.

Table1.3

Religion - Wise Distribution of the Respondents

Religion	Type of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Hindu	-	-	-	-
Christian	106(100)	315(100)	63(100)	484(100)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Fishermen belonging to Christians have been involved in fishing. Roman Catholic Christians (100 per cent) are involved in mechanized fishing.

Caste: -Fishermen belonging to two different castes such as Mukkuvar and Bharavar have been involved in fishing.

Table 4

Caste - Wise Distribution of the Respondents

Caste	Type of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Mukkuvar	103(97.2)	284(90.2)	42(66.7)	429(88.6)
Bharavar	3(2.8)	31(9.8)	21(33.3)	55(11.4)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Castes wise analysis reveals that majority (88.6 per cent) of the respondents are from the Mukkuvar category followed by 11.4 per cent from the Bharavar category.

Education: -Fishermen with different education have been involved in fishing. Table 5 presents the education wise distribution of the respondents.

Table 5

Education wise Distribution of the Respondents

Education	No of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Illiterate	29(27.4)	62(19.7)	34(54)	125(25.8)
Primary education	31(29.2)	124(39.4)	22(34.9)	177(36.6)
Middle school	40(37.7)	121(38.4)	5(7.9)	166(34.3)
High school	5(4.7)	8(2.5)	2(3.2)	15(3.1)
Higher secondary	1(0.9)	-	-	1(0.2)
Graduate	-	-	-	-
Post Graduate	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

Table 5 reveals that 36.6 per cent of the mechanized fishermen have primary education, 34.3 per cent are having middle school education and 25.8 per cent are illiterates.

Family System: -Mechanized fishermen belonging to two type of the family system such as joint family and nuclear family have been involved in fishing. Table 6 presents the family system followed by the respondents.

Table 6

Family System of Respondents

Family System	No of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Joint family	12(11.3)	72(22.9)	22(34.9)	106(21.9)
Nuclear family	94(88.7)	243(77.1)	41(65.1)	378(78.1)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

The study reveals that 78.1 per cent of the mechanized fishermen live in the nuclear family system and the remaining 21.9 per cent lives in joint family system. This reveals that living in joint family system is vanishing among the fishing folks too.

Ownership of House: - Respondents according to the ownership of the house is presented in Table 7. Fishermen reside in different ownership of house such as owned house, parent's house and rented house.

Table 7

Respondents according to Ownership of House

Ownership of House	Type of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Owned house	93(87.7)	237(75.2)	42(66.7)	372(76.9)
Parent's house	11(10.4)	70(22.2)	21(33.3)	102(21.1)
Rented house	2(1.9)	8(2.5)	-	10(2.0)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

The study shows that 76.9 per cent of the mechanized fishermen reside in owned house, 21.1 per cent of the mechanized fishermen reside in parent's house and only 2 per cent are reside in rental house.

Type of Housing: -Fishermen have been residing in different type of housing such as thatched house, tiled house and concrete house. Table 8 presents the type of house used by the respondents.

Table 8

Type of Housing of the Respondents

Type of Housing	Type of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Thatched	-	-	-	-
Tiled	9(8.5)	65(20.6)	15(23.8)	89(18.4)
Concrete	97(91.5)	250(79.4)	48(76.2)	395(81.6)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

The study reveals that 81.6 per cent of the mechanized fishermen reside in concrete house and 18.4 per cent of the mechanized fishermen reside in tiled house.

Electricity connection in the house: - Electricity connection will reveal the economic status of the respondents. The distribution of the respondents according to electricity connection is presented in Table 9.

Table 9

Electricity connection in the houseof the Respondents

Electricity connection in the house	Type of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Yes	106(100)	315(100)	63(100)	484(100)
No	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

The study indicates that 100 per cent of the mechanized fishermen have electricity connection their house. This shows that all the mechanized fishermen have electricity connection in their house in the study area.

Sources of drinking water: - Source of drinking water reveals the standard of living of a person. In this study the sources of drinking water is confined to own tap, public tap, owned well and community well.

Table 10

Source of drinking water of the Respondents

Source of drinking water	Type of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Own tap	102(96.2)	263(83.5)	50(79.4)	415(85.7)
Public tap	4(3.8)	52(16.5)	13(20.6)	69(14.3)
Owned well	-	-	-	-
Community well	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

The study shows that 85.7 per cent of the mechanized fishermen are having own water tap in their house. 14.3 per cent of the mechanized fishermen are using public water tap.

Toilet Facilities: - Toilet facility available in the residential house shows their standard of living. Table 11 shows the toilet facility available in their house. It is confined to modern toilet, pit and no toilet.

Table 11

Toilet Facilities of the Respondents

Toilet facilities	Type of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Modern toilet	106(100)	268(85.1)	48(76.2)	422(87.2)

Pit	-	44(14.0)	15(23.8)	59(12.2)
No toilet	-	3(1.0)	-	3(0.6)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

The study reveals that 87.2 per cent of the mechanized fishermen are having modern toilet, 12.2 per cent of them are using pit and 3 per cent of the mechanized fishermen are not having toilet facilities in their house.

Assets Owned by the Fishermen: Assets owned by the respondents show their economic status. The assets owned by the respondents included for the analysis are land, house, jewels, vehicle and livestock. Table 12 shows the distribution of the respondents according to the assets owned by them.

Table 12

Distribution of the Respondents according to the Assets owned

Assets	Type of Respondents						Total	
	Mechanized Boats		Motorized vallam		Motorized catamaran			
	Having	Not having	Having	Not having	Having	Not having	Having	Not having
Land	73 (68.9)	33 (31.1)	202 (64.1)	113 (35.9)	7 (11.1)	56 (88.9)	282 (58.3)	202 (41.7)
House	93 (87.7)	13 (12.3)	237 (75.2)	78 (24.8)	42 (66.7)	21 (33.3)	372 (76.9)	112 (23.1)
Jewels	105 (99.1)	1 (0.9)	314 (99.7)	1 (0.3)	63 (100)	-	482 (99.6)	2 (0.4)
Vehicle	58 (54.7)	48 (45.3)	144 (45.7)	171 (54.3)	23 (36.5)	40 (63.5)	225 (46.5)	259 (53.5)
Livestock	-	106 (100)	2 (0.6)	313 (99.4)	1 (1.6)	62 (98.4)	3 (0.6)	481 (99.4)

Source: Primary data

Table 12 reveals that 58.3 per cent are having own land, 77 per cent are having own house, 99 per cent are having gold jewels, 47 per cent are having own vehicle and 3 per cent are having livestock.

Father's Occupation of the Respondents: Father's occupation will reveal the occupation of the family. Table 13 presents the occupation of the respondent's father.

Table 13

Father's Occupation of the Respondents

Father's Occupation	Type of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Fishermen	106(100)	315(100)	63(100)	484(100)
Non-fishermen	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

The study reveals that the mechanized fishermen's father is fishermen. It shows the traditional occupation of the fishermen.

Grand Father's Occupation of the Respondents: Grandfather's occupation will reveal the traditional occupation of the family. Table 14 presents the occupation of the respondent's grandfather.

Table 14

Grandfather's Occupation of the Respondents

Grand Father's Occupation	Type of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Fishermen	106(100)	315(100)	63(100)	484(100)
Non-fishermen	-	-	-	-
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

The study reveals that the mechanized fishermen's grandfather is also a fisherman. It shows the traditional occupation of the fishermen family.

Reason for choosing fishing as an occupation: The survey was taken to know the reason for the fishermen choosing fishing as an occupation. Various reasons such as traditional, unemployment, no formal education, poor economic conditions of the family, family members' influence, influence from friends and relatives, self- interest, freedom of work and adventurous are included in the study.

Table 15

Reason for Choosing Fishing as an Occupation

Sl. No	Reasons	Type of Respondents				F Statistics
		Mechanized Boats	Motorized vallam	Motorized catamaran	Total	
1.	Traditional	4.0000	4.2532	4.3679	4.2459	6.544*
2.	Unemployment	2.3387	2.7816	3.0189	2.7769	10.582*
3.	No formal education	4.1774	4.2405	3.9811	4.1756	3.931*
4.	Poor conditions of the family	4.3387	4.1741	4.2264	4.2066	0.593

5.	Family members influence	2.0161	2.0854	2.2547	2.1136	5.004*
6.	Influence from friends and relatives	2.6125	2.0981	2.2642	2.1240	4.723*
7.	Self interest	3.4032	3.5127	3.6415	3.5269	2.094
8.	Freedom of work	2.9677	2.8734	2.9906	2.9112	1.887
9.	Adventurous	3.2258	2.9747	3.2547	3.0682	6.348*

Source: Primary Data *Significant at 5 per cent level

The highly viewed reasons are 'traditional' and 'poor conditions of the family' since their mean values are 4.2459 and 4.2066. Regarding the various reasons for choosing the fishing occupation there is a significant difference exists in 6 out of 9 variables since their F statistics are significant at 5 per cent level.

Sources of fund used for buying the fishing crafts: The sources of fund used for buying the fishing crafts are presented in Table 16. The sources included in the study are owned fund and borrowed fund.

Table 16

Sources of fund used for buying the fishing crafts

Sources of fund	Type of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Owned fund	10(9.4)	151(47.9)	49(77.8)	210(43.4)
Borrowed fund	96(90.6)	164(52.1)	14(22.2)	274(56.6)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

56.6 per cent of the mechanized fishermen are using the borrowed fund for buying the fishing crafts and 43.4 per cent of them are using their own funds for buying the fishing crafts.

Average Monthly Income during Season: The average monthly income during the season is presented in Table 17. The average monthly income during the season will reveal the earnings of the fishermen.

Table 17

Average Monthly Income during Season

Average monthly income during season	No of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Below Rs.25000	-	92(29.2)	26(41.3)	118(24.4)
Rs.25000-50000	-	223(70.8)	37(58.7)	260(53.7)
Rs.50001-75000	-	-	-	-
Rs.75001-100000	19(17.9)	-	-	19(3.9)
Above Rs.100000	87(82.1)	-	-	87(18.0)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

The study shows that 53.7 per cent of the mechanized fishermen are earning average monthly income between Rs.25000 to 50000 during season, 24.4 per cent of the mechanized fishermen are earning average monthly income of below Rs.25000 during the season and 18 per cent of the mechanized fishermen are earning average monthly income of above Rs.100000 during season.

Average Monthly Income During the off season: - Generally the fishermen do not earn high income during off season. Table 18 presents the average income earned by the fishermen during the off season.

Table 18

Average Monthly Income During off season

Average monthly income during off season	Type of Respondents			Total
	Mechanized Boats	Motorized vallam	Motorized catamaran	
Below Rs.5000		131(41.6)	52(82.5)	183(37.8)
Rs.5000-10000		159(50.5)	9(14.3)	168(34.7)
Rs.10001-15000	9(8.5)	25(7.9)	2(3.2)	36(7.4)
Rs.15001-20000	69(65.1)	-	-	69(14.3)
Above Rs.20000	28(26.4)	-	-	28(5.8)
Total	**106(100)**	**315(100)**	**63(100)**	**484(100)**

Source: Primary data

37.8 per cent of the mechanized fishermen are earning average monthly income of below Rs.5000 during off season, 34.7 per cent of the mechanized fishermen are earning average monthly income between Rs.5000 to 10000 during off season and 14 per cent of the mechanized fishermen are earning average monthly income between Rs.15001 to 20000 during off season.

Factors Influencing to go for Mechanized Mode of Fishing

Technological factors:- Fishermen are influenced by different technological factors to go for mechanized mode of fishing. Fourteen technological factors are identified and given in Table 19. In order to find out the significant difference in technological factors influenced for mechanized mode of fishing among the fishermen of mechanized boats, motorized vallam and motorized catamaran in Kanyakumari district, 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in technological factors influenced for mechanized mode of fishing among the fishermen of mechanized boats, motorized vallam and motorized catamaran in Kanyakumari district". The result of 'ANOVA' is presented in the Table 19.

Table 19

Technological Factors to go for Mechanized Mode of Fishing

Sl. No	Technological Factors	Type of Respondents				F Statistics
		Mechanized Boats	Motorized Vallam	Motorized Catamaran	Total	
1.	Through the help of mechanized crafts you can travel to deep sea where more fishes are available	4.9245	4.6139	4.4194	4.6570	8.829*
2.	Through the help of different kind of modernized fishing nets you can catch variety of fishes	4.7903	3.4367	3.8302	4.0191	8.871*
3.	Even during the period of sea erosion, you can go for fishing with the help of mechanized crafts	4.7419	3.7899	1.7925	3.3414	12.413*
4.	New incoming of mechanized crafts and modernized nets which helped you to reduced handmade manual work and save time	4.0968	4.3734	4.6415	4.3967	8.056*
5.	Mechanized methods brought to you new technical knowledge which made you much confident	4.0806	4.3291	4.8113	4.4029	8.598*
6.	Fish catching tools helps you to find out new fishing grounds	4.7740	4.4051	4.6792	4.6550	6.936*
7.	You can able to process the fish more days with the help of cold storage room	4.6129	1.3323	1.6321	2.5257	14.683*
8.	Even though you are in the sea, through the wireless you can enquire about the fish rates in different markets and able to sell it in high price	4.2911	1.3987	1.0604	2.2584	16.353*
9.	With the help of GPS you can travel straight to fishing grounds and immediately	4.2753	4.3259	4.7075	4.4050	7.870*
10.	From the sea itself through the help of wireless phone you can enquire through the friends and relatives who catches fishes in another area where fishes available and immediately you can go there	4.4484	2.4051	1.6226	3.6260	17.886*

	and able to catch fishes					
11.	With the help of GPS able to reach seashore even there is sea runoff, hurricane, storm, very bad weather and lot of rain	4.0000	4.3386	4.6415	4.3616	2.535*
12.	Able to take rest due to the facilities available in the modern mechanized craft	4.8548	2.2785	2.2358	3.1339	15.879*
13.	Even if there is sea runoff and storm, with the help of marine parachute you can keep your craft without moving from the fishing ground which helps you for catching more fish	4.0484	4.3133	4.6226	4.3471	9.522*
14.	In the night, with the help of powerful solar power and an LED light brings brightness which fishes were attracted to come near which helps to catch lot of fish	4.6742	3.9753	4.0006	4.3223	9.708*

Source: Primary Data *Significant at 5 per cent level

The highly viewed technological factors are 'through the help of mechanized crafts you can travel to deep sea where more fishes are available' and 'fish catching tools helps you to find out new fishing grounds' since their mean scores are 4.6570 and 4.6550. Regarding the technological factors which influences the mechanized mode of fishing significant difference among the fishermen of mechanized boats, motorized vallam and motorized catamaran, are noticed in the case of all the technological factors since the respective 'F' statistics are significant at 5 per cent level.

Social factors:- In order to find out the significant difference in social factors which influences the mechanized mode of fishing among the fishermen 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in social factors which influences the mechanized mode of fishing among the fishermen of mechanized boats, motorized vallam and motorized catamaran in Kanyakumari district". The result of 'ANOVA' is presented in the Table 20.

Table 20

Social Factors Influencing Mechanized Mode of Fishing

Sl. No	Social Factors	No of Respondents				F Statistics
		Mechanized Boats	Motorized vallam	Motorizedcatamaran	Total	
1.	To give good education for the children	4.7581	4.8734	4.9245	4.8698	2.697
2.	To construct a house near the town for my families	4.7742	4.8671	4.8396	4.8492	1.464

3.	After the tsunami, the change of sea which brings big sea waves and high air there will be less catch of fishing. In order to go for catching fish in the deep sea old method of fishing materials won't be useful. For that I prepared to work with modern mechanized methods	4.1129	4.3196	4.3774	4.3058	6.873*
4.	To get the social status in our community I should become the owner of mechanized craft	3.6774	3.9557	4.0943	3.9504	8.462*
5.	Those who using the mechanized technology gets more respect in other community which helped me to use fishing through mechanized technology	1.9839	2.1646	2.6132	2.2397	15.526*
6.	The improved social status helps to get recognition from the political parties	2.0000	2.0665	2.5849	2.1715	16.409*
7.	Able to spend more on nutritious food to the family members	4.8871	4.7975	4.9057	4.8326	2.399
8.	Able to buy decent clothes for the family members	4.7188	4.8544	4.9245	4.8740	1.226
9.	Able to provide better medical treatment to my family members	4.9032	4.8671	4.6072	4.8802	0.709

Source: Primary Data *-Significant at 5 per cent level

The highly viewed social factors among the mechanized fishermen are 'able to provide better medical treatment to my family members' and 'able to buy decent clothes for the family members' since their mean scores are 4.8802 and 4.8740. Regarding the social factors influencing the mechanized mode of fishing, significant difference among the fishermen of mechanized boats, mechanized vallam and motorized catamaran are identified in the case of 4 out of 9 variables. Since the respective 'F' statistics are significant at 5 per cent level.

Economic factors:- Thirteen economic factors are identified and given in Table 21. In order to find out the significant difference in economic factors 'ANOVA' is attempted with the null hypothesis, "there is no significant difference in economic factors influenced for mechanized mode of fishing among the

fishermen of mechanized boats, motorized vallam and motorized catamaran in Kanyakumari district". The result of 'ANOVA' is presented in the Table 21.

Table 21

Economic Factors Influencing Mechanized Mode of Fishing

Sl. No	Economic Factors	Type of Respondents				F Statistics
		Mechanized Boats	Motorized vallam	Motorized catamaran	Total	
1.	Through the mechanized method of fishing able to catch more fish. By that able to earn more income	4.7180	4.8829	4.8868	4.8843	0.008
2.	Mechanized fishing method provides more employment opportunities	4.1613	4.3766	4.5849	4.3946	11.115*
3.	Able to invest in land and buildings because of the increased income	3.8387	4.2785	4.5377	4.2789	22.733*
4.	Out of our savings we are able to invest in shares and securities and fixed deposits	1.6129	1.9747	2.4717	2.0372	18.785*
5.	When more income comes able to buy vehicles	1.6935	2.2595	2.7736	2.2996	16.500*
6.	Through savings, able to buy gold ornaments for my wife and children	4.4677	4.5506	4.8302	4.6012	11.624*
7.	Able to earn more by selling fish catch through Fisherman Sangam which helps to avoid the exploitation from the middleman	3.6452	3.7911	3.6226	3.7355	2.218
8.	The government helped to buy crafts and nets through the subsidy linked loans	1.3226	1.6519	1.5660	1.5909	5.133*
9.	The government and non-government organization gave tsunami fund to buy fishing crafts and nets	2.2232	2.5158	2.5377	2.4959	3.660*
10.	Loan facilities provided by the bank to procure crafts and nets	2.3262	2.5696	2.5660	2.5372	3.805*

Source: Primary Data *Significant at 5 per cent level

The highly viewed economic factors among the mechanized fishermen 'through the mechanized method of fishing able to catch more fish' and 'through savings, able to buy gold ornaments for my wife and children' since their mean scores are 4.8843 and 4.6012. Regarding the economic factors influencing the

mechanized mode of fishing significant difference among the mechanized fishermen are identified in the case of 2 out of 10 economic factor variables since the respective 'F' statistics are significant at 5 per cent level.

Findings of the study

1. The study reveals that 71.6 per cent of mechanized fishermen are engaged in fishing at the age group of 26-45 years old.
2. It is found from the survey that 90.5 per cent of the mechanized fishermen are married.
3. The study gives that all the mechanized fishermen are Christians.
4. The study shows that 88.6 per cent of the mechanized fishermen are belong to Mukkuvar caste.
5. From the survey it is found that 36.6 per cent and 34.3 per cent of the mechanized fishermen have completed primary and middle school education respectively.
6. The study shows that 78.1 per cent of mechanized fishermen are from the nuclear family system.
7. The survey reveals that 76.9 per cent of mechanized fishermen are residing in own house and 81.6 per cent are residing in concrete house.
8. The mechanized fishermen are having electricity connection in their house, 85.7 per cent have own tape for drinking water and 87.2 per cent have owned modern toilet facilities.
9. 53.7 per cent of the mechanized fishermen are earning average monthly income between Rs.25000 to 50000 during season.
10. Majority of the mechanized fishermen are using borrowed funds for buying crafts and gears.

Recommendations

To the government:-

1. 23.1 per cent of mechanized fishermen are not having own house, therefore, government should take steps to construct houses to the fishermen with the small contribution from beneficiaries under the scheme of own housing for the citizen of India.
2. Majority of the mechanized fishermen borrowed funds for buying fishing crafts and gears, therefore, the government should take initiative to provide loan at the very minimum interest rate by creating a new fund called Fishing Crafts and Gears Development Fund (FCGDF).

To the Fishermen NGOs:-

NGOs are the light house of the societal development, therefore the NGOs should organize awareness programmes to fishermen about the importance of education.

To the Mechanized Fishermen:-

Education is spinal cord of the human being's development, therefore to make sure that all your children should complete schooling and pursue for higher education with available support from the government and NGOs.

Conclusion: -The mechanization process has positively impacted on the different dimensions of fishing industry and the socio-economic conditions of the mechanized fishermen in the Kanniyakumari district. In spite of growth, the standard of living of the fisher folk all over of this district still needs to be improved. In this scenario it is highly essential to take steps to improve their income by way of providing new technology to encourage deep sea fishing, to provide subsided loan for the mechanized fishermen

and to avoid the exploitation from the local money lenders. The fishier folk should be encouraged to get proper education, hygiene housing to prosper in their life.

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