TECHNOLOGICAL CHANGES AND ITS IMPACT ON FISHERIES SECTOR IN KERALA

Thesis

Submitted to the University of Calicut

for the award of the degree of

DOCTOR OF PHILOSOPHY IN ECONOMICS

By

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OCTOBER 2019

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Certified that this written account on '**TECHNOLOGICAL CHANGES AND ITS IMPACT ON FISHERIES SECTOR IN KERALA** , submitted for the award of the Degree of Doctor of Philosophy of the University of Calicut is a bonafide record of research work done by Mr. **UNNIKRISHNAN N B** under my guidance and supervision. No part of this work has been submitted earlier for the award of any other degree by any other university.

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DECLARATION

I, **UNNIKRISHNAN N B,** do hereby declare that this written account titled **'TECHNOLOGICAL CHANGES AND ITS IMPACT ON FISHERIES SECTOR IN KERALA'** is a bonafide record of research done by me under the guidance of **Dr**. **LAKSHMY DEVI. K. R,** Professor in Economics, University of Calicut.

I also declare that this thesis has not been submitted by me earlier for the award of any degree, diploma, fellowship or any other similar title.

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ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my supervising teacher Prof (Dr) Lakshmy Devi. K. R., Rtd. Professor, Department of Economics, University of Calicut. John Matthai Centre, Aranattukara, Thrissur. She helped me in all the time of my research and writing this thesis. Her scholarly guidance, encouragement, support, mentorship and patience truly supported and inspired me in completing my Ph.D work.

I thank to (Dr). D. Shyjan, Head of the Department, Department of Economics, University of Calicut, John Matthau Centre, for his kind support and encouragement. I also thank my co-guide Dr. Zabeeena Hameed P, Department of Economics, John Matthai Centre, Thrissur, for her valuable support and assistance. I am also thankful to Prof (Dr.) K V Ramachandran, Department of Economics, John Matthai Centre, Thrissur, for his valuable encouragement. I am also thankful to my beloved teachers Rtd. Prof. (Dr.) P P Pillai and Rtd Prof (Dr.) U T Damayanti, who gave motivation for completing this study.

I am also extending my thanks to the Librarian. Smt. Sreeja, Department Library, Department of Economics, Dr. John Matthai Centre, University of Calicut, and other Librarians at Central Marine Fisheries Research Institute, Ernakulam, Cochin University of Science And Technology, Ernakulam and Kerala Institute of Local Administration Thrissur for giving all assistance in my reference and library work. I am thankful to my dearest friends Dr. Jomon Mathew, Asst. prof. Dept. of Economics, University College Thiruvananthapuram and Jins Varkey, Asst. Prof. Dept. of Economics, St. Aloysious College Elthuruth, Thrissur, for their inspiration and kind words. I would also like to remember my friends Mohan Raj P M, Suneer Babu, Neha, Umaiban, Babitha, Sindu Ramachandran, Pradeep Kumar. L , Ganesh, Nelson and Remesh N K, who encouraged me for continuing my studies at the time of my personal distress and pain. Then I remember my beloved parents whose love I feel always from heaven. I also thank my brothers and sisters who always showered their support in my life.

Next I want to remember all those who came to me and supported me in my work and inspired me for completing this study. Lastly I thank the Almighty God for helping me in my endeavors.

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Chapter 1
INTRODUCTION

1.1 Introduction

Fisheries sector plays a very important role the economy. It contributes to the value, exports, food and nutritionary security and in employment generation. This sector is also a principal source of livelihood for a large section of economically under privileged population of the country, especially in the coastal areas. The growing production of fish suggests that the fisheries sector is booming and contributing to the economic growth of the nation. More than six million fisherman and fish farmers are totally dependent on fisheries for their livelihood in India. There has been a considerable increase both in the quantum and value of export of fish and fish products since independence.

Fisheries play a crucial role in the well-being of Kerala's state economy. The state accounts for one tenth of India's coast line of 6000 km. This sector has a prominent place in the economy of Kerala. This coastal line of 590 km and the Exclusive Economic Zone (EEZ) extends up to 200 nautical miles far beyond the continental shelf, which covers an area of 218536 sq. km, provides opportunities in traditional fishing in inshore waters for ages. Fisheries sector contributes about 3 percent of the state domestic product. Estimated 11.43 lakh fishermen depend on fishery for their livelihood. Marine fisheries throughout the world are passing through a critical phase due to the present rate of biodiversity loss and fishing practices. Indian marine fisheries is also passing through a crisis due to it's over capacity and open access nature. Kerala occupies the foremost position in marine fish production. The total number of fisher folk dwelling in the coastal area is estimated at 8.8 lakh. The fish production in Kerala during 2009-10 was 6.87 lakh tonnes. The marine fisheries resource of the state has almost attained the optimum level of production.

The fisheries sector of Kerala had been incorporated to the world markets around early sixties due to the increased demand for processed seafood. This integration, an outcome of a technological revolution in the harvesting, processing and marketing spheres in the rural economy, provided ample opportunities and challenges to the millions of domestic producers, exporters and the government alike. The increase in the volume of marine fish landed by various producers, the increase in the quantities of seafood processed and exported, the volume of foreign exchange earned through exports, the economic opportunities generated through ancillary industrialization and the volume of employment generated by these activities are pointed out as the positive benefits of market integration. It is noted, however, that these economic benefits have accrued only to a few fishermen while majority of the artisanal fisher folk are still at the mercy of nature and world markets. Development initiatives in this sector extending over four decades have led to over capitalization in the harvesting and processing activities. Large numbers of fisher women are displaced from their traditional occupations.

Degradation of various fisheries and the conflicts over the allocation of property rights among artisanal, modern and the deep-sea fishing fleets have also been reported. Kerala fishermen also demanded the eviction of all fleets belonging to other states from their territorial waters, as, such operations are found to be harmful to the interests of domestic producers and fish workers. Careful management of the dynamics of fisheries development hence becomes imperative for ensuring sustainable and equitable distribution of economic benefits to various stakeholders from fishing and fish marketing

1.2 An overview of technology in fisheries sector

Technology has been accepted as an engine for economic growth and development. The availability and application of new technology is of great importance as a determinant of the nature and structure of the society and as a contributor to changes in environmental quality. Since before the industrial revolution economies and societies have relied on resources like wind, water, animal power and wood then on coal and finally on natural gas and petroleum. The ‘scientific temper’

of humanity is behind all scientific and technologic achievement of society. Thus technology was brought into the main stream of development.

Among the foremost important developments that affected the historical evolution of tackle and practices round the world are (i) developments in craft technology and mechanization of propulsion, gear and catch handling (ii) introduction of artificial gear materials (iii) developments in acoustic fish detection and satellite-based remote sensing techniques (iv)advances in electronic navigation and position fixing instrumentation. Kerala has been within the forefront in interesting innovative and new technologies in fishing practices and adoption of those technologies has junction rectifier to marine fisheries to require a fancy structure. A glimpse into the major technological changes that has occurred in Kerala can be made here.

- Introduction and popularization of synthetic fishing gear materials.
- Introduction of trawling in mid1950s
- Continuous expansion in mechanized fleet in terms of numbers, until recent times.
- Improvement in efficiency and diversification of trawls, purse seines, gillnets and lines, for mechanized sector.
- Expansion of fishing grounds for harvesting deep sea fishing for Deeps Sea prawns, lobsters and cephalopods.
- Improvement in size, endurance, installed engine power, fish-hold, freshwater and fuel capacities of mechanized gill-netters/liners to enable multi-day, distant water fishing.
- Adoption of modern technologies such as echo sounder and GPS in a wider scale over the last decade.
- Motorization of traditional fishing crafts and expansion in fishing grounds.
- Improvement of traditional fishing units, in terms of craft modernization, gear materials, gear efficiency and dimensionsIntroduction of ring seines in commercial fishing in 1986.

- Displacement of traditional boat seines by ring seines.
- Rapid expansion of ring seine units in terms of numbers, continuous increase in size of crafts, horsepower of OBM, changes in craft materials, continuous increase in overall dimensions of the ring seines and introduction of mechanized purse line hauling.

During the 1980's the increasing industrialization and internationalization of the fisheries by mechanization and trawling by still large vessels both by Indian companies and by trawlers of other nations posed dangers which threatened to do serious damage to both the fisheries and the artisan fisherman. The technological barriers such as the need to have specific skills for fishing and social barriers like lower caste prevented free entry of capital and labour from outside the fishing community was wiped out. In addition, there was unrestricted access to resources. Hence, by default the technology came under the control of a powerful minority group of non-fishermen enhancing their economic and political cloud. On the other hand in the non –mechanised sector since all the boats used manual propulsion a considerable amount of time and effort was needed for fishing operations. The distance for fishing operations was very much limited and the storage facility was also limited. They could catch only pelagic resources. The lucrative profits by mechanised sector led the traditional sector into dismal and as a result a series of conflicts erupted which led for alternative technology that would allow them to compete more effectively with the mechanized fleet. Mechanization then yielded to motorization and Outboard Motor boats were introduced. For his survival and comfort, he used new technologies, which permitted greater exploitation of the resources. The higher is the efficiency of technology the less will be his dependence on nature.

The state has been a pioneer in introducing several innovative measures in harvest and post-harvest technologies. In the first half of the 1980s, rapid motorization of the indigenous craft with Out Board Motors (OBM's) made the traditional sector more efficient. OBM became an integral part of the indigenous fisheries and the

fishers could extend their activities to more distant and deeper waters. Slowly they started phasing out their dugout canoes with plank-built boats with transformed stern to fix their outboard engines conveniently. In the latter half of the 1980's a new innovative gear called ring seine became very popular in exploiting the pelagic resources and replaced the boat seines largely. Huge size of the new net (450 to 1000 m long) and a large number of crew (30 to 50) needed for its operation necessitated larger boats and use of multiple OBM's.

1.3 Need and Significance of the study

The important role played by the fisheries sector in Kerala is evident from the facts produces in the introductory section. Its relevance in providing employment, livelihood and food security is exceptional. Today, the fishing industry became increasingly polarized between a modern mechanised sector able to make There was an enormous increase in the production, which did not exist for a long time considerable profits from exports and a traditional non mechanized sector which do not having the backing of favourable resources or market conditions. In the 1980's the increasing industrialization and internationalization of the fisheries by mechanization and trawling by still large vessels both by Indian companies and by trawlers of other nations heightened the polarization and posed dangers which threatened to do serious damage to both the fisheries and the artisanal fisherman. The effects were already cleared by the late 1970's and 1980's. A series of conflicts erupted which led for alternative technology that would allow them to compete more effectively with the mechanized fleet.

The intensification of mechanized fishing, perceived as a threat to the sustenance of traditional fisheries sector and resource sustainability, culminated in the regulation of mechanized fishing activities through the Kerala Marine Fisheries Regulation Act 1980, and thereby enforced a ban on bottom trawling during the monsoon season since 1988. The introduction of ban on trawling coincided with introduction of the extremely economical mass harvest gear, namely the ring seine, by the traditional motorised sector, which resulted in a quantum leap in the total pelagic fish production.

The environmental impact and overuse of these resources led to serious consequences. The presence of other unpredictable factors relating to fish catching including natural calamities leads to unavoidable risk in the livelihood of the fishing community. Research and policy has tended to focus on the relationship between poverty and environmental degradation in terms of pointing out that the poor are both victims and agents of environmental degradation.

They are the victims and a lot of seemingly to measure in ecologically vulnerable areas they will haven't any choice however use up the environmental resources therefore contributory to environmental degradation. Due to the inherent nature of work, due to discrimination and deprivation from society fisher folk are excluded from the main stream class. Due to new technologies they are excluded from livelihoods. They lack capabilities and entitlements. In the study areas only those fisher folk who have education, capabilities and entitlements have better way of living. In the phase of declining catches due to destructive technologies, climatic changes and pollution the majority of fisher folk face livelihood threat. Thus it is clear mechanization in the fishing sector has opened a lot of opportunities in this economy. However, the environmental impact of mechanization has serious consequences. In the phase of declining catches due to destructive technologies, climatic changes and pollution the majority of fisher folk face livelihood threat. Thus it is clear the mechanization in the fishing sector has got several positive as well as negative impacts on the living style and employment status of the fishing community. This study therefore, focuses on the impact of introduction of modern technologies on the fishing sector in Kerala.

1.4 Objectives of the study

The present study is based on following specific objectives

1. To examine the socio economic and occupational status of fishing community
2. To analyse the spread of modern technology and its influence on the income and expenditure of the fishing community

3. To identify the impact of implementation of modern technology on the fishing community

1.5 Hypothesis

The hypotheses of this study are:

- Modern technology in fishing has positively influenced the income generation of the fishing community
- The implementation of modern technology has improved the living standards of the fishing community

1.6 Methodology and database

The present study confines to fishing sector of Kerala economy. The study is based both on time series secondary data and primary data. Secondary data related to fishing sector of Kerala and the technology aspects etc are collected and analyzed. In order to make national as well as international comparison, the data supplied by various government departments, organizations like Food and Agricultural Organization, World Trade Organization report etc. are used. The area of study comprises of the coastal areas of Thrissur district in Kerala. Data is collected from 4 villages in Thrissur district namely Valappad, Nattika, Vadanappally and Engandiyur villages. A sample of 300 persons is selected at random from these areas. The data analysis has been done by using tables, diagrams and percentages, etc. The wilcoxon signed rank test and Kruskal Wallis Test, ANOVA regression model etc are applied in the study to evaluate the impact of mechanisation in the fisheries sector.

1.7 Scheme of the study

The present study is arranged in seven chapters.

- The introductory chapter highlights the statement of the problem, objectives of the study, methodology and database and the limitations of the study.

- The second chapter reviews the literature related to the topic of study.
- In the third chapter, an overview of the fisheries sector in Kerala is given.
- The fourth chapter examines the spread and use of modern technology in fishing sector.
- Comparative analysis of income generation and expenditure pattern in period of modern technology is dealt with in the fifth chapter.
- Chapter six makes an assessment of the impact of implementation of modern technology in the fishing community
- The conclusions derived from the study are highlighted in the final chapter.

1.8 Limitations of the study

The following points contribute to the shortcomings of the study.

The study focuses on the four villages of the coastal area of Thrissur District, which is undoubtedly not the representative of the entire population of the fishing community of Kerala in its fuller sense. The study is taken into the consideration of marine fishing only and inland fishing is totally ignored.

Yet it is to be said that in spite of the avoidance of vast area and ignorance of inland fishing which were made with a little bit celebrations as the practicability and time boundness of the study. It is hoped that study fetches the paramount results

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CHAPTER 2

REVIEW OF LITERATURE

2.1 Mechanisation and socio-economic conditions

2.2 Sustainability of fisheries resources

2.3 Mechanisation and traditional fisheries sector

2.4 Government, community and policy initiatives

2.5 The role of women in fishing

2.6 Problems of mechanisation in fisheries Sector

2.7 Research Gap

Chapter 2
REVIEW OF LITERATURE

This chapter attempts to review various reports and studies made by various scholar and institutions on fishery sector. Special focus has been given to mechanisation and technology relates aspects while reviewing the earlier literature. It could be found that the mechanisation process has serious impacts on the life style, socio economic and other aspects of their life. Hence the present chapter has arranged such results in convenient headings. The available literature has been therefore arranged in the following manner.

1. Mechanisation and socio-economic Conditions of Fishermen
2. Sustainability of fisheries resources
3. Mechanisation and traditional fisheries sector
4. Government, community and policy initiatives
5. The role of women in fisheries sector
6. Problems of mechanised fishing

2.1 Mechanisation and socio-economic conditions

Sathiadhas and Venkataraman (1981) studied the influence of mechanisation in the fishery sector on the socio-economic conditions of fishermen community. They have focused their studies in two important coastal areas of Kerala such as of Sakthikulangara and Neendakara. The study has found out that mechanisation in the fishery sector has led to improvement in production, employment, infrastructure, export as well as in the social parameters like housing and education. Similarly, there happened to be an increase in debt liabilities of the fishermen investors and it was mainly due to acquiring the new fishing assets. The study has also indicated that lack of fishing harbour is the major constraint affecting the socio-economic development of the area.

Ibrahim P (1992) studied the impact of the introduction of modern techniques of production into a traditional labour intensive sector. Usually the traditional labour intensive technology depend on certain indigenous technologies. The study could identify several negative effects as there was sudden introduction of modern technology in the field of fishery sector. The study pointed out a fall level of job status and employment days during the post mechanisation period. The ratio of active fishermen to total fishermen population declined in almost all the districts in which the degree of mechanisation was high. As a result of these changes, there has been tremendous fall in the income of the traditional fishermen affecting their economic as well as social wellbeing.

Sathiadhas et. al. (1994) attempted to study the possible impact of technological changes on the life of traditional fishermen group in Tamil Nadu state of India. The study has pointed out that due to the use of motorisation and improvement in fishing methods, there has been significant reduction in the mental stress traditional marine fishing and to a certain extend improved the socio economic living conditions of fishermen in the traditional fishing sector.

Panikkar and Sathiadhas (1993) have studied the influence of changes made in the field of marine fishery of Karnataka on the socio- economic life of fishermen community. The study found that the socio-economic scenario of Karnataka fishery has witnessed a structural change in the mid-seventies. These structural changes took place as a result of the introduction of new technology in the form of mechanised crafts and gears. It was mainly due to the influence of mechanisation, so many other industries like ice factories, processing units, boat building yards and net making factories were set up. These have created more employment opportunities and in turn benefitted several jobless people in coastal as well as in the urban centres.

Joshi (1996) attempted to examine the influencing factors that has resulted from mechanisation of fishing crafts. The study focused on various impacts on marine fish production, household income and the standard of living of fishermen households. He could identify that the changes had brought out significant direct relationship between

mechanisation of fishing crafts and employment levels. It could be identified that earnings of crew members in mechanised crafts were substantially higher than those of crews in non-mechanised crafts. The co-operative sector has failed in providing adequate credit to the fishermen. The variable cost per trip of a trawler is higher than the out board motorised boat. The fuel cost is the main item of variable cost in the case of trawlers. The fishermen unanimously recorded their strong opposition against the government policy on deep sea fishing by foreign vessels. The study further highlighted the short run and long run issues of mechanised fishing. The fish stock would be exhausted which has negative effect on employment income and standard of living of traditional fishermen.

Rajasenan (1999) attempted to examine the changes in the policy paradigm favouring the traditional fishery and conservation resulted in the recuperation of the fishery resources. The problem of conservation measures such as loss of income and employment in the mechanized sector is identified to be only short run. The objective of maintaining high employment and income in the long run can be realized only with regulation.

Selvasmily (2007) in his study attempted a comparative analysis of the welfare conditions of the fishermen community in the traditional sector and mechanised sector in Kanyakumari district of Tamil Nadu. It could be identified that the fishermen community in Kanyakumari district deprived of power to enjoy their basic rights. They happened to be at the bottom and remained ignorant of welfare programmes implemented to uplift their socio-economic status. The study also identified that fuel cost and maintenance cost on craft and gears as significant expenditure items in the mechanised sector. The study also identified that the communal conflicts and group clashes were the main social obstacles to the peaceful co-existence in the fishing villages which has resulted in a decline in the number of fishing trips and fish production.

Aswathy et al., (2011) studied the impact of mechanised fishing. The study identified that there has been increasing cost of fish catching and production due to

mechanisation and increasing fuel cost. This is likely to reduce the profitability from the fishing activities. However, the fishery sector withstand due to the possibilities of continuous increase in the price of fishes that the fishing units.

Rajamani et.al. (2003) analysed fishery activities at Tuticorin in Tamil Nadu during the months of May-June to September-October. During the rest of the months although prawn fishing continues, the number of units operated becomes less and landings were also poor. The exploration of the new ground in the deeper waters and exploitation of the deep sea prawn resources which was unknown to the fishermen of the trawler sector of south east Tuticorin area have opened up a new chapter in the history of trawl fishing in Tamil Nadu. The study could also notice that the venture offered good opportunity for fishermen in the mechanised sector of Tuticorin to utilize their trawlers fully for active fishing even during the lean season.

Thirumilu et.al. (2003) made a study on the financial aspects of trawl fishery in Madras. The study could notice that overall catch rate of the trawl fishery showed a decreasing trend from February to April 2003 for all the four categories of prawns, lobsters, crabs and fin fishes. The catch rate of prawn lowered very significantly during the period of study. The operation of the medium trawlers of Chennai, Pondichery and Nagapattinam has brought to light the new grounds of operation which was up to then unexploited for deep sea resources.

Raju (2002),attempts to analyses the motorization especially based on centrally sponsored scheme .There are increasing polarization between motorized sector and non- motorized sector. It concludes that the most of beneficiary households stated that motorization has improved their fish catch, income and socio-economic conditions.

Kurien (1986) provided a detailed analysis of the impact of Indo Norwegian Project (INP) on the Socio Economic Fabric of Kerala Fishery. The study found out the changes the INP brought to the Kerala fishery and the emerging of trawl fishery in Kerala and how the trawl sector has contributed to the growth as well stagnation in Kerala fishery.

2.2 Sustainability of fisheries resources

Zwaag (2008) provided an introductory overview of the major land based threats to the marine environment, this article focuses up on the specific global and regional efforts to address land- based marine pollution and activities through a four part survey. The main international initiative is first described, namely, the Global programme of action for the protection of the marine Environment from Land-based activities (GPA).The study concludes that the use of modern technology in the fishing sector damages the environment and the marine eco-system

Rebufat (2007)states that the exploitation limit of marine resources has been reached, if not exceeded ,and that this over capacity of fleets, excessive fishing quotas, illegal fishing practices and the generally poor management of most fisheries are to blame. The usage of technology is in a way lead to overexploitation of the marine resources.

Sing(1993),This paper critically examined the role of co-operatives in managing marine fisheries based on the experiences of Kerala and Japan explores the problem and prospects of creating and granting sea tenure to fishermen's co-operatives. It is important to realize in this context that the enforcement of sea tenure is problematic for a number of motorized sector. It concludes that the most of beneficiary households stated that motorization has improved their fish catch, income and socio-economic conditions.

Sarker and Ganguly (2003-04) in their paper on "a study on sustainability and economic efficiency on winter migratory Bag net fishery of Hoogly estuary "had examined the relationship between fishing effort an annual fish yield of winter migratory Bagnet fishery exploitation of six fishing centers in the lower zone of Hoogly estuary during 1992-93 to 1996-97.This article compares it with observed data and shows that the existing yield-effort phases exceeds its maximum sustainable level. Where both the stock and catch decline that adversely affects the long run productivity

of the stock. It concludes that the urgent need of balance between biological and socio-economic aspects in Hoogly estuary.

Kagoo and Rajalakshmi (2002),in their paper on "Environmental and social conflicts of Aquaculture in Tamilnadu and Andrapradesh" had focused that the impact on water quality, coastal ecosystem, surface water and ground water. It discussed various types of social conflicts arising due to aquaculture, and stresses the need to implement fiscal and market based instruments to promote an eco-friendly industry for sustainable development.

Hannesson (2004) discussed three issues of sustainability in Norwegian fisheries. They include,

i. Difficulty to maintain the incomes of fishermen on par with other groups unless the number of fishermen declines
ii. Environmental variations make it difficult to sustain catches from specific stocks at an even level over long periods
iii. Specific and temporary subsidies in controlled fisheries may promote sustainability of incomes and reduce fleet overcapacity.

Pillai, et.al. (2007) studied the impact of the proliferation of the number of mechanized vessels in Kerala Coast. They identified that the existing situation in the fishery sector of Kerala is a free and open access system and consequently there is an intense competition for the resources among the various sectors. They could examine that certain unhealthy fishing practices emerged after1990s that caused stagnation in the marine fisheries production. The increase in the number of mini trawlers and their operation had caused serious concern for the sustenance of the exploited stocks of various categories of fishes.

Panayotou (1985) conducted a study on the socio-economics, cost and earnings, productivity and economic efficiency aspects of small scale fisheries of Asia. The study was supposed to have serious implications that it could bring to the attention of policy makers several crucial findings. They include the following

i. Marginal Productivity of the net used in fishing is negative
ii. There has been over investment in fishing because of the wrong signal given by the rate of return obtained by owners of fishing assets and that the returns were inflated.
iii. In the context of Malasian studies of small scale fishery for the three sample areas compared together revealed that trawl nets brought no statistically significant difference in resources and for driftnets, significant resource difference existed and that the west Malasian Fishery was generally highly exploited
iv. The Gulf of Thailand is heavily fished
v. For the Srilankan fishery, high levels of profit were recorded for every type of mechanized fishing operations.

Rao (1986), in a study on fishery sector identified that excess concentration of mechanized boats in the inshore regions with bottom operated trawl nets resulted in depletion of fish stocks and decrease in fish productivity and income in the context of the state of Andha Pradesh fishery. The existence of trawlers largely depended on the availability of shrimp in large quantities thereby leading to deterioration of fish categories and challenging the sustainability.

Bhatta (2003) observed that there were symptoms of over harvesting such as stagnation of total production, decline in the catch per unit of fishing effort. This has negative socioeconomic implications in terms of lack of fish availability to local community and nutritional insecurity. Therefore, incentives may be given for small scale, selective sustainable harvesting technologies with strong back ward and forward linkages that enhance and maintain employment opportunities within fishing communities and also increased people's participation and de-centralisation of investments and planning will give added impetus.

Devaraj and Paralkar (1988) observed that fishery resources have been over-exploited and the catch per unit effort has been reduced during past few years as a result of increased application of mechanisation in the fishery sector. Such over

exploitation is likely to produce certain devastating impact on the fishery sector and the fishery resources are likely to be disappeared in near future.

Narayanakumar (2012) also studied the impact of mechanisation on the fishery sector. The study could find that exploitation of resources with devastating gears and methods of fishing have caused tremendous pressure on fishery resources, especially within the zone of 50 - 60 m depth creating management and financial problems in fishing sector. Overexploitation has become a must for the fishermen community in order to cover the increasing cost of catching with the introduction of mechanisation. To cover the cost and investment fund, the tendency of exploitation of fishery resources go on without any control in certain areas of coastal India

Bailey (1987) in a study identified significant social consequences of excess fishing. The consequences of excessive fishing is reflected in dissipation of resources rent, gear conflicts leading to broader social conflicts, increased use of destructive fishing techniques, changes in the food supply and distribution channels and concentration of economic power within the fisheries sector.

The study conducted by Willman (1987) identified the economic factors causing economic as well as biological aspects of fishing in Southeast Asian countries. Over fishing has crucial influence of the biological existence of the fish population. A list of scientific and policy issues to be addressed by scientists and policy makers while working together towards a system of governance of coastal areas is provided and argued that a population bomb has already been destroying the world's coast lines.

Panikkar et.al. (1991) found out that the craft gear specifications of the trawler sector in Kerala reveals the increasing trend of capital intensity in an already excess capitalized sector. The study highlighted that the shift towards the multiday trawler units would further increase due to better catch and returns.

Sathiadas and Venkattaraman (1993) examined the impact of mechanization in the field of fishing on the socio–economic conditions of the fishermen of Shakthikulangara and Neendakara. There has been significant influence the

mechanisation had on the life status of the fishermen community in the selected study areas. The study also found out that introduction of trawlers had brought out marked improvements in the socio –economic scenario of the fishermen engaged in trawl fishing.

2.3 Mechanisation and traditional fisheries sector

Srinivasan (1981) attempted to analyse the issues and problems faced by traditional fishermen as a result of introduction of mechanisation. The study could identify that due to the increasing competition from mechanised boatmen. The study has also pointed out the danger of continuing the tempo of trawling in the study area of Tamil Nadu coast as it might experience the diminishing returns which have already set in on the west coast. There has emerged significant suggestions for diversified techniques in maximising production and improving the productivity of artisanal fishermen.

Rajasenan (1987) constructed fishery production function using the data from 1964 to 1984. The study could find that there was thirty six fold increase in the value of output during the period of observation. The trawl net in the mechanized sector and outboard engines in the traditional sector are the two principal gears contributing to the volume and value in the fishery economy and that prawn resource is noted for excess fishing in Cochin – Neendakara – Shakthikulangara belt. The increased earnings from seafood is due to mechanization and modernization of the fishing methods especially shrimp. The study also found out that one third of the total catch value is spent on diesel in the mechanized sector.

Mathew and P. Suresh Kumar,(2009),in their paper on "Ecological Imbalances and changing coastal Environment : challenges of marine fishermen" had focused on some of the specific factors that affect the production and yield which have a burdening effect on the traditional marine fishermen in Kerala. The artisanal fishermen facing challenges due to ecological imbalances and changing coastal

environment. This problem can be solved by effective measure to regulate the number of fishing gifts and promotion of use of proper gears.

Suyambulingam et al (2011),in their study on" Labour conditions of marine fishing workers in Thoothukudi District" tried to analyses labour conditions of fisheries sector in Thoothukudi. It suggests that their families in developing practical techniques in agriculture, animal husbandary, and cottage industries in order to generate additional income.

Sathiadhas and Panikkar (1989) studied the socioeconomic status of marine fishermen along Madras coast. The study concluded that the traditional fishermen have now become wage earners in the mechanised sector. The study admitted that the rise in income of fishermen is due to higher prices for their catch rather than volume of catch.

Another study in the field of mechanisation in marine fisheries was conducted by Thippaiah (1989) in the state of Karnataka. As per the result of the study, the process of mechanisation has brought out occupational changes in the marine fishing industry of Karnataka. Most of traditional fishermen who were self-employed earlier became labourers in the mechanised units for a meagre income.

Bennet and Arumugam (1993) attempted to analyse the impact of motorisation on the traditional fishing in Tuticorin. The study could notice that motorisation in the field of fishing crafts brought out significant changes in the lives of traditional fishermen. He also brought to the light that there is a tendency of increasing and intensified fishing activity as a result of motorisation in the areas where traditional fishing going on. This ultimately contributed negatively as the traditional fishermen without motorised fishing could not withstand the motorisation and their fish catch and profitability significantly declined.

Kurian (1994) made an analysis of the causes and effects of motorisation in the areas of fishing. The author held the view that the modern sector is poised for a perpetual growth at the cost of the traditional sector in the fisheries industry. But the

benefits of technological advancements are misappropriated by a few non-fishermen by marginalising and depriving the majority of the traditional fishermen.

Pinto et.al (1995) analysed the impact of deep sea fishing policy of Government of India. They cited that the introduction of mechanised boats brought forth a number of socio-economic problems. The situation of traditional craft operators is worse due to over fishing by mechanised crafts. In spite of the adverse effects of mechanised crafts on the economy of the traditional craft operators, the government of India has now opened Indian water to foreign fishing vessels, which will have a disastrous impact on the social wellbeing of fisher folk.

Shet (1995) organised a study on the socio-economic conditions of fishermen of Dhakshina Kannada. Study could identify that traditional fishermen and small boat owners have been facing serious challenge as the large mechanised boat owners were making serious influence of their fishery activity and profitability. In terms of fish catching, marketing and all the large units were overcoming the small owners. This has seriously affected their socio economic life and status of life.

A study was conducted by George and Placid (2000) to understand the status of fishermen community in Kerala as a result of mechanisation. The study could identify that the policy of the Government allowing mechanised fishing in the inshore waters of Kerala had contributed negatively to the traditional fishermen community. On the one hand their income level declined significantly due to mechanisation and on the other their economic life status have been very poor. The rapid mechanisation ensures that resourceful entrepreneurs take over the resources that had traditionally belonged to the artisanal fisher folk.

Another important study was conducted by Sathiadhas and Venkateswaran (2000) in the traditional fishery sector of Kerala. The economic implication of the mechanised fishing was very crucial as this practice affected the traditional fishery sector in Tamil Nadu. The study concluded that the introduction of mechanised crafts helped to increase the fish production but it adversely affected the livelihood of

traditional fishermen. The catch per trip was maximum when the traditional crafts operated alone but the mechanised boats have created more employment opportunities. This may lead to a situation where in the traditional craft owners might leave their occupation and turn to work as labourers in mechanised sector.

Rajasenan (2001) attempted to analyse the effects of new technology on the occupational pattern and living conditions of the traditional fishermen. The study expressed the view that the modernising process in fishing industry through the introduction of new technology changed the occupational structure by converting the immediate producers into ultimate wage earners. The traditional fishermen become a deprived and marginalised section in their community.

Henry (2003) conducted a sample study on mechanised boat owners in Sakthikulangara and Neendakara fishing villages of Kerala found a direct correlation between the economic status of the owner and the technical features of the boats. The poor owners possessed second hand boats which were mostly older boats and with inferior technical features and are less competitive. The consideration of profit forced the fishermen to introduce over efficient harvesting vessels to enable them access to the remotest regions of the sea which led them to adopt heavily destructive harvesting techniques like stay-over fishing. The large and over efficient vessels render the existence of the smaller and weaker ones very difficult.

Ibrahim (1992) analysed the various pattern of ownership that seem to be existing among the traditional fishing sector of Kerala. Under collective possession, many people own the fishing equipment together. A fisher will get a share within the investment by contributory any of the fishing instrumentality. It could also be found that each member has to supply labourers to the unit according to the proportion of the amount invested by him. The those that don't own the crew may also operate the crew. They are considered as hired workers and are given advance payments at the beginning season on the basis of the terms and conditions agreed at the beginning of the season. The agreement usually includes the obligation on the part of the employer to maintain

the labourer and his family during the off season and during times of crisis. Failure to follow the rules of the agreement on the part of the employer or the employee is punishable by the caste panchayat, which is the local level organisation of the fishermen. There area unit some fishermen who don't comply with enter into such agreements and receive advance payments. Some additionally value more highly to stay free labourers and settle for work with the leader of their selection. However, labourers are encouraged to be partners in enterprises.

2.4 Government, community and policy initiatives

Behura and Pradan (1998), in their study an attempt to find out whether marine fish markets in Orissa are integrated to bring out efficiency in the marketing system. The poor marketing integration reveals that marine fish markets in the state are quite uncompetitive. It concludes the strong and extensive government intervention designed to improve competitiveness to enhance market efficiency.

Biswas (2011) in her study she points that on women's labor has been mobilized at unprecedented scale and concentrated in the most exploitative jobs to fuel economic growth in fisheries. Even as industrial fisheries thrive on the labor of poor women new analyses new forms of organizing are need to fundamentally challenge this exploitation. Donor aid is, however, driving the non-governmental organization increasingly towards conciliatory, mediatory roles, incapable of seeking solutions outside the framework of capital.

Koli (2008), in his article on "problem of fisheries co-operatives: A Study", highlights the problem of fisheries cooperatives in India in general and in Maharashtra particular. It reveals fisheries cooperatives management prevents women participation in its operation. The study concludes with the report of Dr. M.S Swaminathan who is the head of the National Commission on Agriculture. This provides all the concessions and facilities applicable to fishermen just as

agriculture. It found that overfishing and overcrowded boat must be strictly prohibited.

Ravanan and Muthalagu (2011) in their article on "Study on the perception of exporters 'towards problems of Export of seafood in Tamilnadu" analyzed that India is one among the largest producer of fish in the world. The investment requirement towards expanding domestic as well as export market arena for sea food is the major cause for concern. After the implementation of Globalization and liberalization in India which has been attracting more foreign investments in the fishing processing sector. International institutions and foreign countries decided to provide fund as concessional credit to augment India's deep sea fishing industry.

Kurien and Paul (October 2001), in their paper on "Social security nets for marine fisheries ", attempt to explain the provision of social security in the fisheries sector of Kerala. It enumerates the silent achievements and the problems faced by the state in providing concrete social security measures for fish workers. The study also shows how netting them back into the main stream was not only the result of enlightened state policy but also the result of the collective action by the fish workers themselves. Finally, the paper reflects on what more needs to be done to further improve the standard of living of the fishing communities in Kerala and to streamline the delivery of social security.

Dey and Kanagaratnam (2007) highlighted the need for establishing community organisations for managing fisheries is a promising means of improving the resource condition, particularly for countries with large inland and seasonal floodplains. It is also necessary to set up legal framework for community-based management as to ensure and sustain community participation in fisheries management.

Srinivasan (2005) examines the property rights of the Cochin estuarine fisheries in India, which in spite of having well-defined access and conservation rules

imposed by the state, have failed to ensure proper resource management. Considering the resource characteristics and the causes for state's failure, co-management, which requires a redefinition of management functions by state as well as users, has been proposed as an alternative.

Rajasenan (2005) tried to analyse the impact of the marine fishery development paradigm and its dynamics during the last five decades. The study has also analysed in relation to technology and the resultant over-capitalisation and marginalisation of the traditional fishermen in Kerala.

Korakandy(2008) emphasised the need for a sustainable development of fisheries in India. In the study the author attempted to identify measure and discuss the impact of critical economic, social, institutional and technological factors affecting the sustainability of fisheries and the need for measuring the criteria for sustainable development.

2.5 The role of women in fishing

Sathiadhas et al., (2005) analysed important role played by women in all spheres of fisheries development. The women group from the fishermen community has been playing very important role in post fishing operations. This has improved their socio economic condition. The role of women in handling and management of coastal resources, their understanding of the reasons for environmental degradation and laws and regulations pertaining to use of coastal resources gender issues involved in sustainable development was conducted in Kerala and Tamil Nadu (Krishna, 2002).

Bhatta and Rao (2003) suggested that only 16 per cent of the women are fully involved in decision making although their contribution to the family income and household work is substantial. There is social stigma attached to fish marketing activities. The younger generation is not willing to enter the fisheries business. It also pointed out that Government support in terms of subsidy does not help in improving their social status. Modern marketing facilities are required for improving the status of fisher women.

Gulati (1983), in her study on "Fishing technology and women in Kerala" analyses that the younger generation of fishermen are quite familiar with both traditional as well as mechanized fishing and can be switch from one to the other with perfect ease. A distinct improvement has taken place in the opportunities for employment and income generation due to mechanization in fishing community. New work opportunities have opened up for fisherwomen in trading and processing of marine products and net making

Upare (2002) studied the possibility of empowerment of women in fisheries development and could identify that initiatives for credit availability would be very significant in benefitting the sector. Effective fisheries management through community and development based participation of women in improving standard of living, and nutrition, to be self-reliant. The new initiative would change the existing issues with the traditional fishing practices and the insecurity faced by women in terms of food and nutrition due to poverty, menfolk's addiction to alcohol, poor quality of life, substandard living conditions and the liabilities of the fishing community.

CMFRI (2001) organised a study to review the role played by women in marine fisheries sector of India. Major issues confronting the women in capture fisheries such as social, economic, institutional etc. are discussed in the study. Women empowerment is supposed to be key starting point of community development through combined efforts of men and womenfolk are the holistic approach required to overcome the constrained in the sector.

Nair (1998) organised a study to identify the role of women in fisheries and the emancipation of women through co-operatives by focusing on the programmes of Matsyafed. Institutional approaches in natural resource management in general and in fisheries in particular seldom address cultural aspects as well as social institutional set up. Fisheries management would benefit by broadening the institutional perspective to increase the efficiency of management. The main focus was placed on the regulatory set up to initiate the fisheries management institutions as well as the processes and

organizations that develop and implement management measures. Such changes in the management system would benefit the socio economic status of all those who are in the fishery sector especially the women community.

2.6 Problems of mechanisation in fisheries Sector

Mathur (1977) has made an investigation in Tanur fishing village of northern Kerala and Annie Felix (1980) conducted an enquiry on fishing in the Vypeen Island of central Kerala. The authors pointed out that mechanisation brought out certain structural and organisational changes in the fisheries sector of Kerala. According to them a group of absentee fishermen was emerging and a section of whom came from non-fishing sector.

Hakkim (1980) conducted a study about a few fisheries cooperatives in Quilon district which accounted for the major part of mechanised fishing in Kerala. It could be noticed that majority of the benefits from the mechanised fishing was taken away by the fishery cooperatives. The persons or those who had no connection with the cooperatives gained only a few share of benefits.

Giriappa (1997) made a study on performance of mechanised and non-mechanised boats. The author stated that the mechanised boats account for bulk of the total catch and the value of catch per boat has increased significantly. At the same time, the catch value has come down in non-mechanised boats owing to less catch and their catch mainly consists of less competitive marine species. He could very easily admit that new deep sea fishing policy would be a threat to the survival of local mechanised fishery sector. The study suggested that the mechanised sector need to go for product diversification and long distancing which would help them to stay on fishing.

D'Cruz (2004) assessed the performance of fishery sector in the southwest coast of India. He could identify the problems and prospects of the small-scale fish workers engaged in deep-sea fishing. It indicates sustainable and more people-centred alternatives to exploitation of deep-sea fishery resources.

Sehara and Karbahari (1991) conducted a study on the socio-economics of trawler fishing in Saurastra. The study revealed that the trawler owners were availed credit from National Development Corporation under group financing scheme as well as from nationalised banks for adopting the new technology in fishing. The fishermen cooperative society mainly involved in supplying fuel and fishing gears. Marketing of fish is still a major problem to majority of the trawler owners. The economic parameters which were tested by the study proved that the trawler fishing was profitable and economically efficient.

Panikkar and Salim (1993), conducted a study on economic performance of small and medium trawlers along the Andhra coast. Their study stated found that both medium and small trawl units were earning profits in 1991, but medium trawl units were economically more efficient than small trawl units.

Sen and Das,(1986),in their study pointed out that the significance of inland fisheries and its problems. It revealed constant motivational effect is necessary to make people realize the importance of land fisheries in meeting their nutritional requirement and also amelioration, their socio-economic condition.

Sehara, et al (1994), studied about the economics of trawling on Goan coast, from 1991-1992. On every10 sample days in a month 10 trawl units per day were observed in the study. The variables studied were investment, cost of fishing and income. In their study they found that trawlers were running in profit in 1991-1992.

Selvaraj et al (1994) made a study on Economics of mechanised and non–mechanised marine fishing-some implications‘. The study on 60 motorised and 60 non motorized trawlers in 1991 showed that fishing was major source of income for both motorized and non-motorized categories.

Kemparaju (1994) made a study on the drift gillnet fishery of the Goa state during the period 1985-88. In his study he found out from that the drift gillnet fishery during the period from 1985 to 1988 in major centres showed a steady improvement indicating its continued importance in the exploited fishery of Goa despite the

fluctuations noticed. He also observed that in the small-scale fisheries sector, the drift gillnet fishing was significant as it exploits the higher value fishes such as seer fishes, tunas and sharks. Thus, the drift gillnet fishery has better development prospects in the state units. The seasonal analysis of catch data confirmed that post-monsoon period provides higher quantity of catch and revenue.

Narayanakumar et al (2009), evaluated the economic performance of different fishing methods followed in India along the coast by the mechanized, motorized and non-mechanized sector. Their study states that both the medium and small trawl units were earning profits.

2.7 Research Gap

This chapter attempted to review various previous studies on different aspects of fishery activities. The study has been arranged in separate titles such as Studies related to mechanisation and socio-economic conditions of fishermen, studies related to sustainability of fishery resources, studies related to mechanisation and traditional fisheries sector, studies related to government, community and policy initiatives, studies related to the role of women in fishing, studies related to problems of mechanised fishing etc. The review of previous studies on mechanised fishing revealed that greater attention has been provided on the impact of mechanisation on the socio-economic conditions of fishermen, fishery output and employment, traditional non mechanised sector, motorised crafts and on marine fishery resources. Studies also highlight the socio economic aspects of fishermen community in various parts of India. However, the studies relating to comparative analysis of income generation and expenditure pattern in period of modern technology. Similarly the spread and use of mechanisation in coastal areas of traditional fishing zones are missing. The present study is an attempt to fill this research.

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CHAPTER 3

AN OVERVIEW OF FISHERIES SECTOR IN KERALA

3.1 Fisheries Sector- An Overview
3.2 National scenario
3.3 State Scenario
3.4 Fisheries Sector in Kerala
3.5 Fish Landings
3.6 Trend of Fish Production in Kerala
3.7 Technology Used for Fishing
3.8 Mechanization in Fishing
3.9 Major Schemes and Services of Department of Fisheries
3.10 Concluding Remarks

CHAPTER 3

AN OVERVIEW OF FISHERIES SECTOR IN KERALA

Kerala the state situated between the Arabian Sea to the west and the Western Ghats to the east. Kerala's coast runs some 580 kilometre long, whereas the state itself varies between 35 –120 kilometres wide. The state is divided into three geographical regions such as the highlands, the midlands and the lowlands. The Highlands slope down from the Western Ghats that rise to a mean height of 900m, with a number of peaks well over 1800 m in height. It is 18650 sq.km in area and accounts for 48 percent of the total land area of Kerala. It can be seen that most of the rivers of Kerala originate from the Western Ghats. The Midlands is made up of undulating hills and valleys. It is 16200 sq.km in area. This is an area of intensive cultivation of significant crops of Kerala like cashew, coconut, arecanut, tapioca, banana and vegetables. Lowlands are also known as the Coastal Area. It covers an area of almost 4000 sq.km and generally consists of numerous shallow lagoons known locally as kayels, river deltas, backwaters and shores of the Arabian Sea and is essentially a land of coconuts and rice. This space is extremely fertile and most of the paddy cultivation is on this space. Fishing in Kerala is generally concentrated in this region.

Fishing has been traditionally considered as one of the chief occupations and the source of livelihood of the people living in the lowland or coastal areas of Kerala. The long coastal line of the state and the rich inland waterways provide the facility for fishing in the state. The state is rich in a variety of tropical marine fauna. The fishery sector is very significant as far as the state is concerned. This sector is mainly the contributor of employment, income, foreign exchange earnings and protein intake of the people. In this sense the coastal fishery sector occupies very high position in the state. Before providing an overview of the fishery sector of Kerala, let us try to understand about the overall fishery sector scenario.

3.1 Fisheries sector- An overview

Fishery sector is considered to be very important as far as most of the developed and developing countries of the world are concerned. This is mainly because of its contribution to income and employment generation. The experience of most of the countries indicates 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 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. Besides being an article of protein rich food, fish also yields several bye- products such as fish oil, fish meal, fish manure, fish leather, fish glue and isinglass (Andriamalala, 2013).

The aquatic resources of the world are varied, extensive and rich in potential. They can be broadly divided in to two groups such as marine and inland. With an extensive coastal line extending along the mainland, the world has rich marine resources. The inshore waters forming the marginal ocean in conjunction with the coastal inlets represent Associate in Nursing atmosphere of high productivity, offering great scope for culture of a wide variety of marine organisms. Similarly the inland fishery resources comprises two types of waters namely the fresh water and the brackish, the former including river systems, an extensive network of irrigation canals, reservoirs, lakes, tanks, ponds etc. and the latter, the sprawling estuaries at the confluence of the river system with the sea, a large number of lagoons, brackish water lakes, impoundments and the vast areas of flowering tree swamps containing periodic event waters of unsteady salinity.

As per the world fish production statistics, Japan and Russia are the leading producers of fish in the world. Peru, China and U. S. A are among the first five

fishing countries (*Kurien 1986)*. India is at present holding only the seventh position with the total production of 3.83 million tonnes. This is due to relatively primitive methods of fishing and large areas remaining unexploited. Sea fishing has been an occupation with the coastal people from time immemorial. The fishing industry was developed solely by the fishermen over centuries. A meaningful move was made towards mechanization since independence and the progress achieved raised the status of industry by its recognition as a primary area of growth. In the early Nineteen Sixties, small mechanized vessels were introduced and in the Nineteen Seventies, marine fishing activities rapidly expanded in the continental shelf area. In the Nineteen Eighties, motorization of country crafts became popular and by employing these crafts with new gears, the exploitation of marine fisheries was accelerated. As the fishing fleets increased in number, stagnation in fish catch was felt and the profit from fishing begin to diminish.

3.2 National scenario

It can be admitted that Indian fisheries are an important component of the global fisheries and the sector has been recognized as a powerful income and employment generator. The contribution of this sector to foreign exchange earnings is substantial and forms 1.4 percent of G.D.P. More than half dozen million fishermen within the country depend upon fisheries for his or her sustenance. The country with a long coastal line of 8129 Kms has an Exclusive Economic Zone (EEZ) extending to 2.02 million sq. Kms, and is a major marine fish producer ranking seventh in the world. However, inland fishery resources are equally rich and varied comprising rivers and canals (17,3287 Kms) flood plain lakes (20,2213 hectares), estuaries (28,5000 hectares), mangrove (35,6500 hectares), estuarine impoundments (12,35000 hectares), lagoons (19,0500 hectares), upland- lakes (72,000 hectares), reservoirs (31,53366 hectares) and ponds (22,54000 hectares) (George 2011). According to the CMFRI Census 2010, there are 3,288 marine fishing villages and 1,511 marine fish landing centres in 9 maritime states and 2 union territories. The total marine fisher folk population was concerning four million comprising in 864,550families.

In India, the inland fishery is classified in to fresh water aquaculture and capture fisheries, in rivers, estuaries, lakes, reservoirs etc. The Ganga river system and its tributaries have a combined length of 12,500 kms and Brahmaputra is 4,023 kms long. The Peninsular rivers, Mahanadi, Godavari, Krishna and Cauvery cover 6,437 kms while the west flowing Narmada and Tapti of Western Ghats have a combined length of 3,380 kms. The catch from rivers does not contribute significantly to the total inland fish production in terms of volume, although a large number of traditional, artisanal fishers make a living on it.

3.3 State Scenario

The fishing industry occupies an influential and unique place in Kerala economy. Kerala state is blessed with long coastline of around 590 kms. The coastal sea is one of the most productive areas as far as fishing is concerned. Fisheries contribute about 3 percent of the economy of the State. It can be seen that the current level of annual marine fish production is about 6 lakhs tones/ year. More than a million people belonging to the fishing communities live in 222 fishing villages in the marine sector in the State. About two lakh people depend on ancillary professions like processing of prawn and fish and marketing of fish for a living in Kerala. The general living condition and economic status of the fisher folk in the State is considered not on a par with the living standards of the general population of the State.

3.4 Fisheries sector in Kerala

The fishery economy of Kerala had been traditionally conceptualised as a network of relationships in the realms of production, consumption and exchange (Kurien 1974). Traditional method of fishing practices is followed in the state for long. Production and exchange relations in this rudimentary economy are influenced by the growth in both internal and external consumption. Until early sixties, the fishery economy of Kerala was largely influenced by forces of internal demand mainly from the rural and nearby urban markets. This was mainly due to the non-availability of a reliable modern processing technology. The Blue

Revolution technologies have revolutionised these relationships and started influencing internal relations in many significant ways. Ever since, the external relations became crucial for the domestic producers, traders and consumers. The opening up of village economies to the world markets has significant influence on the fishery sector too. The sector is now exploiting maximum benefits from the globalisation trends.

The total number of population engaged in fishery related activities in Kerala is estimated to be 11.10 lakh. This includes 8.55 lakh in the marine sector and 2.55 lakh in the inland sector. Out of this, the number of active fishermen is 2.28 lakh - 1.90 lakh in marine sector and 0.42 in the inland sector. (As per the population census 2011, the fisher folk population in Kerala is 10.02 lakh covering 7.71 lakh in coastal area and 2.31 lakh in inland sector). It is additionally calculable that regarding 74100 folks area unit engaged in work – allied activities. Among the districts, Alappuzha is estimated to have maximum number of fisher men population in the state. The total fishermen population in Alappuzha district is 1.68 lakh followed by Thiruvananthapuram (1.65 lakh) and Ernakulam (1.33 lakh).

There are 222 fishing villages within the marine and 113 fisheries villages in the inland sector, wherever fishing and connected aspects offer sustenance to a massive majority of the population. Out of the two types of fishermen, the marine and the inland, the concentration of marine fishermen is more in Trivandrum district, followed by Allapuzha, and then by Kollam and Kozhikode districts, while the inland fishermen are concentrated in Ernakulum, Allapuzha and Kollam districts respectively (Department of Fisheries, 2005).

Nearly 12% of the fisher folk depend upon allied activities like marketing/ repairing nets, fish vending, processing and other fishery related activities, for their livelihoods. The state's fisheries sector could be a large one, comprising of 19,173 crafts out of which 7% are mechanised, 44% motorised and the remaining 49% are non-motorised crafts. Although the fish catch from Kerala coast

includes over three hundred completely different species, the commercially important number are about forty and the prominent ones, amongst these are seer fish, pomfret and prawn.

The density of population is extremely high right along the outline as compared to the midlands and therefore the highlands (Asia Development Bank, 2003). A very wealthy marine wealth with an outsized sort of fish and a extremely skilful population of fishermen have created Kerala a number one producer and client of fish (Aerthayil, 2000). The high rainfall and a large number of rivers makes the Kerala coast especially fertile for fish. One speciality of the Kerala coast is that the mudbanks, known in Malayalam as chakara. It is the formation of clay and organic matters on the coast that happens when monsoon with the ocean remaining calm, therefore leading to sensible harvest of fish. Fish is a source of livelihood and of rich protein for the fish workers as well as the people of Kerala and fishing plays an important part in the economy of the state (Kurien 2001)

3.5 Fish landings

India has been a significant contributor to the globe marine fish production and second largest producer ofupcountry fish. The south west comprising Kerala, Karnataka and Goa were the top contributors among regions. Presently fisheries and cultivation contribute zero.78 per cent to the national gross domestic product andfour.47 per cent to agriculture and allied activities. Fisheries sector contributes considerably to the financial system where as providing sustenance to around 14.49 million people in the country. It has been recognized as a robust financial gain and employment generator because it stimulates growth of variety of subsidiary industries and could be a supply of low-cost and alimental food besides being a supply of interchange wage earner. Fishery being one in all the promising sectors of agriculture and allied activities in Asian nation.

Marine fish landings of India during the year 2012 has provisionally been estimated as 3.32 million tones with a decrease of about 0.05 million tonnes

compared to the estimate for the last year. Among the states Gujarat was the highest contributor of Marine fish production followed by Kerala. In total fish production Andhra Pradesh was the highest contributor and Kerala stands 4th position. During 2012-13, 5.31 lakh tonnes of marine fish were landed in Kerala showing a decline of 0.22 lakh tonnes (4.14 per cent) over the previous year. The high value species among the fish catches are still few, prominent among them are Seer fish, Prawn, Ribbon fish and Mackerel. The quality of these high value species in the total catch ultimately decides the income of the fishermen

3.5.1 Species -wise Composition of Fish Landing

The economic zone in Kerala is the sea which is spread upto 200 meters and is adjacent to the coastline. According to the Kerala Marine Fisheries Regulation Act, the sea shore area within the range of 50 meters is demarcated for fishing by the traditional fishermen. Whereas the area beyond the limit in the economic zones can be used by motorized boats and large vessels. But people do not usually follow this rule. Hence, to prevent this, monsoon trawling began to be banned from 1980 onwards. We acquire around three hundred completely different species of fishes from the Kerala coast. Out of which only around 40 are of commercial use. There ar bound high price fishes like Seer fish, pomfret and prawn but their catch is considerably less. And so the share of such high price fishes within the total marine fish catch remains stagnant. Annually the prawn catch is estimated to be 64482 tonnes. The catch of oil sardine which is consumed mainly by the poor sections in the state have increased in the recent years.

3.6 Trend of Fish Production in Kerala

The trend of fish production in Kerala since has been given in this section. Detailed analysis of marine fish production, inland fish production and the total fish production has been done.

Table 3.1

Fish Production in Kerala (in Lakh tones)

Year	Marine	Inland	Total	Percentage Variation
1989-90	6.46	.33	7.79	.93
1990-91	6.78	.36	7.14	-8.4
1991-92	5.40	.40	5.80	-18.2
1992-93	5.53	.42	5.95	2.5
1993-94	5.59	.45	6.04	1.5
1994-95	5.49	0.48	5.97	-1.2
1995-96	5.53	0.50	6.03	1
1996-97	6.61	0.52	7.13	18.2
1997-98	5.11	0.58	5.69	-20.3
1998-99	5.82	0.66	6.48	13.8
1999-00	5.94	0.74	6.68	3.1
2000-01	5.67	0.85	6.52	-2.4
2001- 02	5.94	0.78	6.72	3
2002-03	6.03	0.75	6.78	0.8
2003-04	6.09	0.76	6.85	1
2004-05	6.02	0.76	6.78	-1.3
2005-06	5.59	0.78	6.37	-6.1
2006-07	5.98	0.80	6.78	6.4
2007-08	5.86	0.91	6.77	-0.1
2008-09	5.83	1.03	6.86	1.3
2000-10	5.70	1.17	6.87	0.1
2010-11	5.60	1.21	6.81	-0.8
2011-12	5.53	1.4	6.93	1.7
2012-13	5.31	1.4	6.8	-1.8
2013-14	5.22	1.86	7.08	4.1
2014-15	5.24	2.02	7.26	2.5
2015-1 6	5.17	2.1	7.27	0.13
2016-17	4.8	1.88	6.76	-7.1

Source: Economic Review, Kerala State planning Board, Various issues

Estimates of the fisheries resources assessment shows that among the maritime states in India, Kerala occupies the second position in marine fish production. At national level more than 60 per cent of the total fish production is contributed by the inland sector. Recently the Government have approved a master plan for increasing the inland fish production of the state from the current level of 75000 tonnes to 2 lakh tonnes over a period of 10 years. The current level of Inland fish production is to the quantum of about 1.88 lakh tones. The inland fish production shows a continuous growth for about a decade, though the data for the last two years are not in confined to the common trend which is observed not to be a firm turn the pattern.

. The marine fish production was 6.78 lakh tonnes in 1990-1991, 5.67 in 2000-2001, 5.60 in 2010-2011and 4.8 in 2016-2017. The trend shows that it is unpredictable whether the marine production goes increasing or decreasing. Inland production sustained on increasing trend. The inland fish production was 0.36 lakh tonnes in 1990-91, 0.85 in 2000-01, 1.21 in 2010-11 and 1.88 in 2016-17. The movement is showing a tremendous increase unlike in the case of marine production. Inland production sustained on increasing trend. During 2012-13, the share of inland fish production to the total fish production of the state was 22 per cent. The inland production too is estimated to be 2.1 lakh tonnes during 2015-16. The total fish production including both marine and inland has been estimated to be 6.76 lakh tonnes during the year 2016-17.

Figure 3.1

Fish Production in Kerala

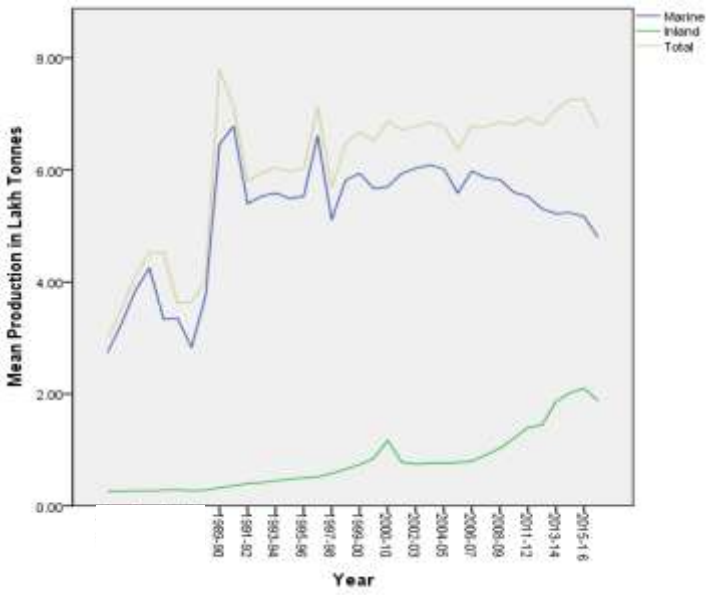


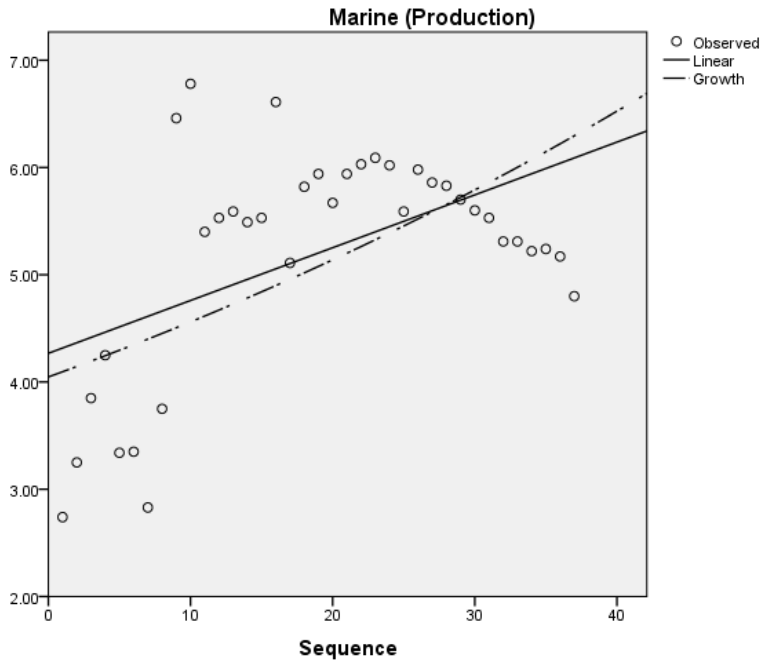
Figure 3.2

Marine

Model Summary and Parameter Estimates

Dependent Variable: Marine

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	Constant	b1
Linear	.256	12.054	1	35	.001	4.268	.049
Growth	.300	15.034	1	35	.000	1.398	.012



- India is the second largest fish producing nation in the world, with a share of 5.4 per cent of global fish production. India is also a major producer of Fish through aquaculture and ranks second in the world after China (Kerala Economic Review 2016).

- Diagram shows that since 1981 the total fish production in Kerala has experienced a steep increase during 1989-90 periods. In 1989, 7.79 lakh tones fish were produced and it was the highest ever quantity produced from Kerala. In 1981 the production of the total fish was 3 lakh tone in which the major share contributed by marine sector. Since 1981 a sustained increase has experienced in the production of fish both from marine and inland till 1986.from very beginning to the end the highest contribution to the total production of fish was done by marine sector. But it is interesting to note that since 2003 the contribution of marine sector to the total production is showing a sustained decrease where as in inland sector shows a sustained since 1981with an exception in 2002.

The longitudal analysis of marine production shows that it has experienced a slow growth with lot of bumps and downs. The linear line is falttened with a slope of .49. the observed values are scattered around linear line with few outliers on both negative and positive directions. Marine production has experienced an aggregate .012 times growth over the period of time. Thus the trend and growth line depict a positive slow pace change in marine fish production.

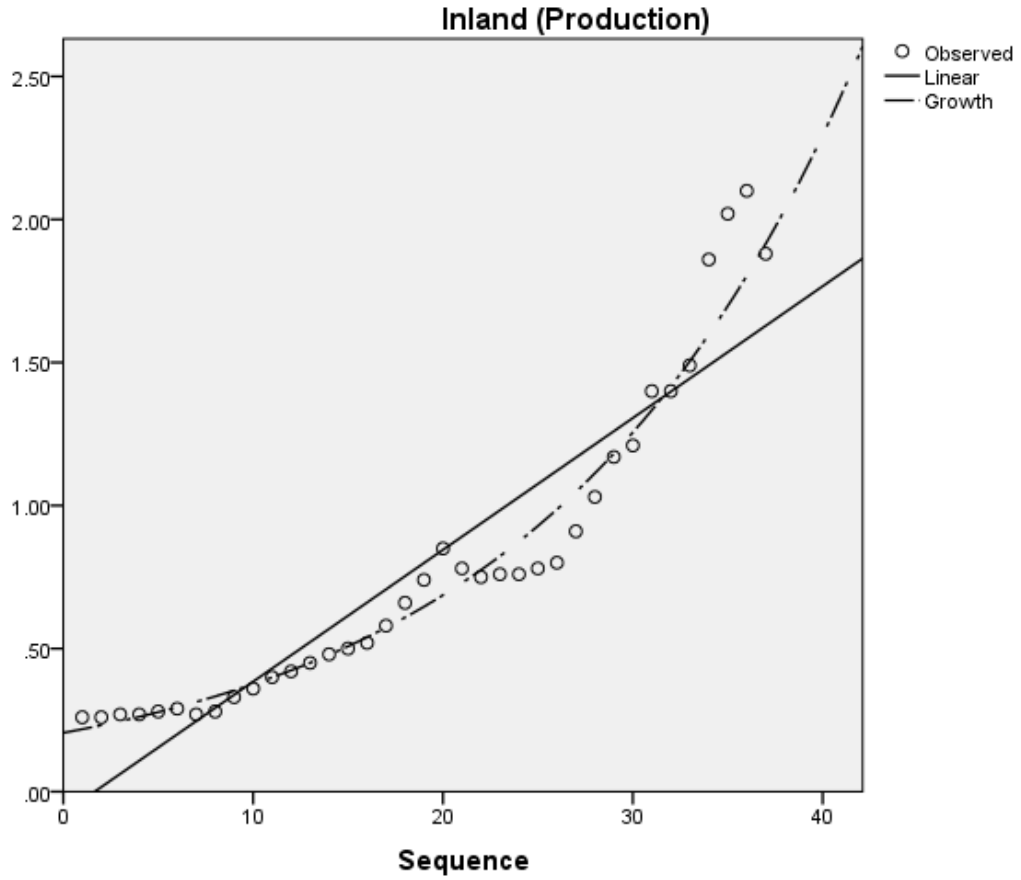
Figure 3.3

Inland

Model Summary and Parameter Estimates

Dependent Variable: Inland

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	Constant	b1
Linear	.856	208.619	1	35	.000	-.076	.046
Growth	.975	1352.713	1	35	.000	-1.582	.060



The longitudal analysis of inland fish production shows sustained increase eventhough the quntom of change is small. The observed values are distributed around the trend and growth line. It shows a sustained growth of inland fish production with a measure of .060 times. There are no outliers, means inland fish production is not subject to cyclical or abnormal changes as we seen in marine fish production.

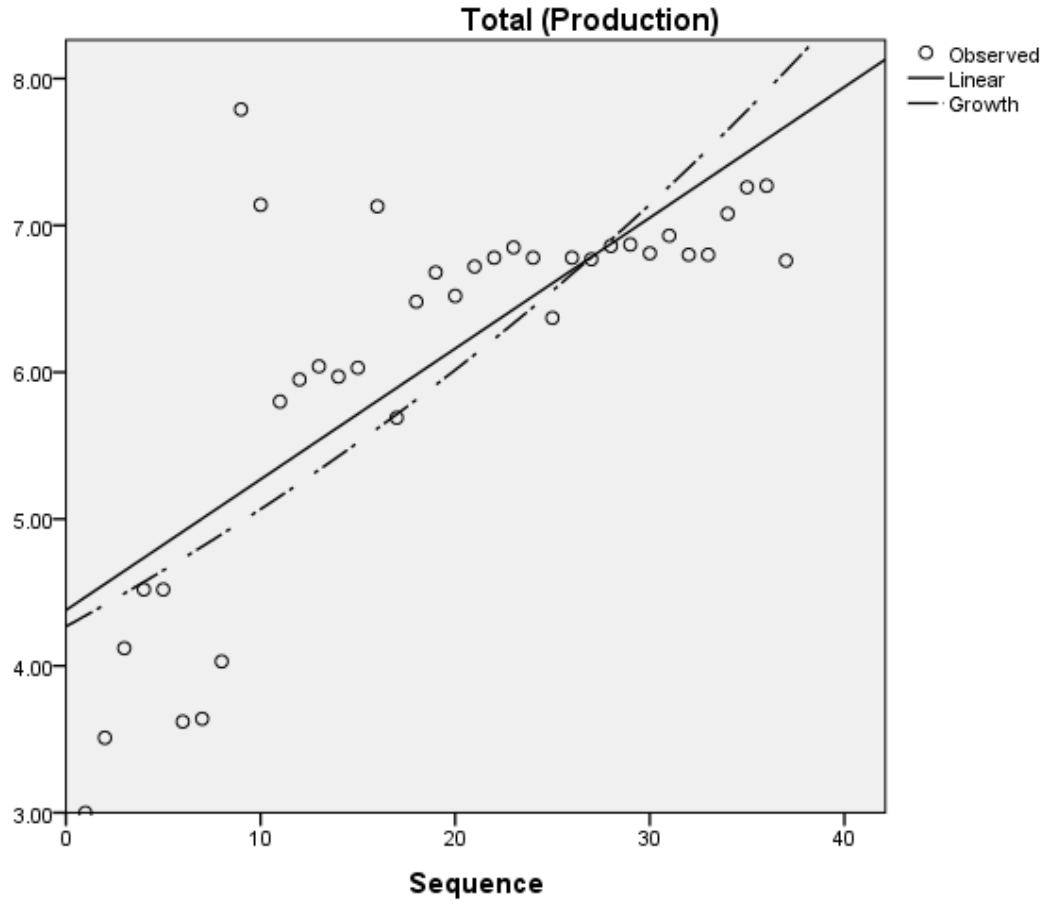
Figure 3.4

Total Production

Model Summary and Parameter Estimates

Dependent Variable: Total

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	Constant	b1
Linear	.578	47.853	1	35	.000	4.380	.089
Growth	.566	45.682	1	35	.000	1.451	.017



The total fish production consists of both inland and marine spanning from 1981 to 2016 , realised a positive growth with some fluctions in the begnning and mid-periods of analysis. The observed values are showing a positive linear association with time . but the trend is as much not smooth as in inland fish production.total fish production realised aggregate .017 times growth, in a slow pace during the period of time.

3.7 Technology used for fishing

The technology used among the standard fisherfolk of Kerala for catching fish like the fishing craft and therefore the gear area unit historically evolved and take issue in line with the requirements of the specific local fishing conditions. For example, the south has multi specified and dispersed fishery, which requires multiple gears. The fishermen in this area mainly use the traditional boat called as the Catamaram while going out individually, in pairs or in groups of three (Houtart and Nayak, 1988).

3.7.1 The Catamaram

The *Catamaram* is made up of two or three logs of wood tied together with coir ropes. The rope is tied around a cross piece of wood in the shape of stumped bull horns placed at the end of the logs. Small gaps area unit purposefully left intermediate the logs to permit the water to empty so reducing the impact of waves (Ram, 1991). There are two types of *Catamarams*. One is smaller with a crew size of 2 and is employed for hook and line fishing like anchovy, sardine and the prawn nets. Hook and line fishing is more common in the south because of multispecied and dispersed fishing (Ram, 1991).

In the hook and line fishing, the gear is made of a hook with a line attached to it. The bait lures the fish. The fish gets caught in the barb while attempting to eat the bait and cannot free itself. The gear is extremely selective in action in catching totally different completely different species and different sizes of fish. The hook is very important and the size of the hook, the type of the hook used, the type of bait used determines the selectivity of the catch (Shrivastava, 1985).

The larger *Catamarams* can accommodate 3 to 4 persons and are used in pairs with bell shaped nets (boat seine nets or Tattamadi) having ropes on either side. Two crafts pull the ropes at equidistant angles. On seeing a shoal of fish, the 2 crafts begin occupation the direction of the shoal propulsion the ropes and sandwiching the shoal between the 2 crafts (Iyengar, 1985; Ram, 1991).

3.7.2 The Vallam

Another style of low boat or plank canoe known as Vallam is additionally used for fishing from the shore. It is created up by seaming along many planks of jungle jack by fibre ropes. The inside of the boat is coated with pitch to create it watertight (Ram, 1991). There are two types of Vallam. Kettu Vallam is the smaller one and is owned jointly by 6 to 12 fishermen. It is popularly used for hook and line fishing in Trivandrum and Alleppey districts (Iyengar, 1985).

Ottathadi Vallam is a dugout canoe between 10 to 15 metres long, carrying upto 15 members. It is created by scooping out massive logs of softwood like jungle jack or mango. These are owned collectively. Houtart and Nayak (1988) inform that majority of the fishermen in the South are thus self employed, but there are a few fishermen who remain coolies or labourers all throughout their lives.

The fishermen within the central region of Kerala use larger crafts and gears thanks to the presence of sand banks and made fishing grounds. The fishermen here work together in groups. The north has single specied fishing and the craft and the gears used are larger. Houtart and Nayak (1988) write that this has LED to polarisation between the massive and also artisenal fish workers, wherever the tiny fish workers resort to hook and line fishing while others survive as labourers.

3.7.3 The activity of fishing

An observation of the activities happening on the coast of Trivandrum town, whereas the fishermen come into being for fishing so returning with their catch from the ocean is very exciting and attention-grabbing indicating a flurry of activity. The traditional fishermen along the coastal areas of Trivandrum use the Catamaram, which is either used individually or in pairs. The Vallam is also used by groups of fishermen along the coast. At a time around twelve to fifteen fishermen will leave into the ocean within the Vallam. The activity along the coast suddenly increases when the fishing boats return one

by one with their catch on the coast. The beach suddenly gets crowded with the fishermen pulling their nets out of the sea and sorting out their catch for the day.

Petty traders, fisherwomen, mostly older ones are seen scurrying around with their aluminium vessels near the fresh catch to buy their share of fresh fish from the fishermen. These girls typically sell the fish within the near market areas. Many fishermen are often seen sorting and removing the fish from their nets. Some conjointly resort to activities like mending nets, and folding the nets on the shore. The negotiation for the fish is often seen to be happening right the shore.

Traders can be seen carrying headloads of fresh fish for selling in the nearby markets. Each of the fishermen can be seen having their own share of fish for the day in handfuls or in small plastic bags.

3.7.4 Patterns of ownership of fishing equipment

Ibrahim (1992) writes of six completely different patterns of possession in ancient fishing supported 3aspects, nature of possession, standing of the owner and also the standing of the non-owner.

1. Individual ownership
    - Owner worker: where the owner is also a worker
    - Non-owner partner: the other person is not the owner, but a partner.
2. Individual ownership
    - Owner worker: where owner is also the worker
    - Non-owner labourer: the other person is not an owner, but a labourer
3. Individual Ownership
    - Owner non-worker: the owner is not the worker
    - Non owner labourer: the other person is a labourer
4. Collective ownership
    - Owner workers: where the owner is also a worker
    - Non- owner partners where the other person is not the owner, but a partner

5. Collective ownership
    - Owner workers: where the owner is also a worker
    - Non owner labourers: the other person is a labourer
6. Collective ownership
    - Owner non-workers: the owner is not the worker
    - Non-owner labourers: the other person is a labourer

3.7.5. The system of distribution of the catch

Ibrahim (1992) offers a close image of the system of distribution among the fisher people of Kerala. He informs that the distribution of earnings is done on a share basis in case of all types of fishing. The norms for this system of distribution have been evolved historically and differ according to the participant's relationship with each other, with the type of crafts and gear used and the type of fishing.

Thus, in case of the individual ownership and with canoe and net fishing, the total catch from a particular unit is divided into 'n+1' shares where 'n' is the crew size. Thus, one share also goes to the owner of the craft. In case the owner works on the craft, he gets two shares. There is no share for the ownership of the gear. However, just in case of the hook and line fishing, the fishing gear is very expensive and the total catch is divided by 'n+2' shares. The owner gets two shares, one for the craft and one for the gear. One will see that within the individual ownerships, the owner gets an additional share of the catch.

In case of the collective ownership however, the share each individual receives of the catch is determined by his contribution to the total investment. In case of combined fishing, wherever completely different units work along on one fishing expedition, the catch is equally divided among completely different units. Each of the units then distributes the catch among its crew. However, in spite of the status of the fishermen, type of fishing, the area as well as the type of activity, all the members are entitled to a small quantity of fish i.e. 3 to 4 Kgs for home

consumption. In some cases, units who fail to catch fish for the day also borrow from another unit (Ibrahim, 1992). Thus, in this traditional pattern of sharing, all the fishermen are assured of a daily supply of fish for their families.

3.8 Mechanization in the fishing

From the early fifties Government started introducing development measures in the fisheries sector. Mechanization of fishing vessels and use of synthetic gear materials brought in drastic changes in the coastal area. With the help of Norway, mechanized trawlers were introduced in Kerala waters and by sixties this mechanized fishing started developing in an industrial footing. Though the mechanization was first started aiming at the development of the conditions of fishermen, it attracted the business group to fishing because the catch from the trawlers consisted mainly the shrimp selection that was gaining market demand throughout the globe. This resulted the extension of fishing operations into the deeper waters in the shelf, and further increase in fishing effort and fish production. The availability of an export market for shrimp and allied products encouraged more fishing activities, especially the bottom trawling.

The trawl fishing was so efficient for shrimp exploitation which helped fetching high value for the catch. Naturally this attracted more investment into the field and the number of trawlers increased. The introduction of purse seiners in the late seventies further increased the pressure on fishing. Altogether this led to the development of fishing sector into a well organized industry of the State.\

Parallel to this development in the production of fish, there was another social problem brewing up. Till the introduction of trawlers, fishing was done by those belonging to fishermen community. But because of their economic backwardness, they could not compete with the rich industrialists who started investing in this new area. Thus the mechanization did not solve the socio-economic problems of fishing community, though it was aimed at that.

The fishing intensity by the trawlers affected the fish stocks in the inshore waters which eventually led to an overall decline in fish landings of the State. Growing conflicts may be seen among the mechanized and ancient fishermen throughout late seventies and there existed severe competition between them for fishing time, space and resources. Traditional fishermen were of the read that the depletion within the landing was caused by the operation of dragnet, purse seine and ring seine. They demanded a complete ban of those styles of damaging gears a minimum of throughout the monsoon amount that coincides with the spawning of the many species of fishes and shrimps. The boat owners and the workers were fully against this view. These contradictions between the two groups led even to clashes and very often created law and order problems in the Kerala coasts. By fully conceptualizing the situation and also realising the importance of conservation of the fishery resources and also for sustainable development and management of the fishery along the coast the Government of Kerala enacted the Kerala Marine Fisheries Regulation Act (1980).

This Act empowers the State Government to restrict or prohibit:

- Fishing within a specified area in the territorial waters of the sea using specified craft and gear
- The number of fishing vessels which may be used for fishing in any specified area in the territorial waters.
- The catching of such species of fish and for such periods in any specified area
- Fishing by unlicensed vessels
- Registration and licensing of fishing vessels and cancellation, suspension and amendment of license already issued.

3.9 Major schemes and services of department of fisheries

The department of fisheries has been implementing various schemes for the fisheries development in the state. Some of the important schemes are being discussed below.

3.9.1 Conservation and Management of Fish Resources

The parts of the theme embody social control of KMFR Act and Resource conservation with concentrate on conservation of piscary resources. The parts of the theme provided beneath social control of KMFR Act area unit meeting the expenses of social control of KMFR Act, communication expenses in 5 fisheries stations, maintenance of wireless communication network, Matsya Vingyan Kendras and registration and licensing of Fishing vessels. Under Resource Conservation, due to over fishing there is scarcity in the commercially important varieties of fishes and prawns. Hence, ocean husbandry is wide accepted to be a good methodology for filling of depleting stock of commercially necessary species of shrimp. It is projected to unleash quality seeds within the elite water bodies of coastal districts of Kerala. The programme will be implemented with the active participation of LSGIs. It includes production of quality seeds, cathartic of seeds in correct places, documentation, observation etc.

3.9.2 Marine Fishing Implements

Modernization of crafts and sum of money to fishing implements area unit enclosed during this theme. The objective of the element improvement of craft is to help replacement of outboard motors of already motorized crafts. The premium is met by Government and also the beneficiary within the magnitude relation of 75:25. The beneficiaries of the project area unit registered fishermen and also the theme is enforced through Matsyafed.

3.9.3 Integrated Fisheries development

Matysafed is the implementing agency. The integrated theme on inland fish production is projected to extend production from 1.5 hundred thousand tonnes to three hundred thousand tonnes in 12th setup by merging the continuing schemes on integrated scampi / fish farming, fish seed farms and hatcheries and Matysa Samrudhi project. The Agency for Development of cultivation, Kerala (ADAK) will implement the scheme with the support of LSGIs. This is a credit coupled theme and money help are going to be routed through bank as backside grant.

Matsya Samrudhi is a new component for an integrated development of inland fisheries and aquaculture, ensuring the support of LSGIs.

Major components of the project are:-

1. Diversification of fresh water aquaculture in inland sector
2. Diversification of fresh water aquaculture.
3. Increasing the productivity and production
4. Development of extension and Training
5. Strengthening fish farmers clubs
6. Augmenting Karimeen production

3.9.4 Investigation of new fishing harbours and landing centres

New harbours/ fish landing centres square measure concerned solely once conducting elaborate investigation and correct analysis on the socio economic, techno-economic impacts and supported elaborate setting studies. The outlay provided is for investigation works, model studies, EIA studies for the event of workplace Harbour and landing centres and to channelize applicable funding from GOI and monetary institutions for implementation. It is conjointly provided to continue the continuing investigation studies and to

require up investigation at freshly projected sites and for the procurance of survey and research laboratory equipments.

3.9.5 Management of Fishery Harbour

Most of the finished workplace Harbours and Fish landing centres need periodic maintenance dredging for maintaining the desired draft within the harbour basis and approach channels. Also the finished and partly commissioned harbours would like a amendment within the hygienically commonplace of operation within the harbour. This was necessitated because of the demanding clause issued by the EEV for fish and allied merchandise. The detailed project proposal for dredging works at Neendakara, Thottappally, Kayamkulam, Munambam, Azheekkal, Beypore and Chombalhas been prepared for approval of Government. The outlay provided is for the dredging activities and management for the right maintenance and maintenance of harbour facilities for the graceful and effective operation of the harbour.

3.9.6 RIDF

NABARD is giving money help for the development of recent fishing harbours, coastal bridges and roads undertaken by Harbour Engineering Department on loan basis with compensation condition. Construction of Thalai and Koyilandy fishing harbour sanctioned below NABARD area unit progressing. NABARD below RIDF XV sanctioned the comes viz, piscary harbour at Chellanam, Perumathura, hazampally Bridge etc area unit in progressing. The outlay provided are going to be utilised for implementing comes approved by NABARD moreover as for implementing in progress NABARD assisted comes.

3.9.7 Modernisation of fish markets and value addition

During the year 2012-13, it is provided to establish 50 modern hygienic fish marketing centres with 90% NFDB assistance in a phase manner. The proposed market places can ensure hygienic environment for dealing with fish and fish products. The provision is also meant for meeting the state share of the schemes

approved by NFDB regarding the development of fish marketing centres. The provision will also be utilized for quality upgradation, value addition and diversification to utilize the potential. The outlay provided is also to establish common facility centres for the production of value added fish products.

3.9.8 Coastal social infrastructure

The amount provided is for the event of coastal areas covering construction of dispensaries, guide lights etc. The existing workplace dispensaries square measure meager to fulfill the health care needs of the fishermen.

3.9.9 Theeramythri and Micro enterprises

There are 60 projects undertaken under the TEAP/TRP rehabilitation package. The major components of the stabilization package will be implemented in the initial phase and during the second phase expansion of the livelihoods.

The objectives of the scheme are

1. Integrated development of sustainable livelihoods for the fisherfolks of Kerala.
2. Promote livelihood diversifications and alternate livelihood to improve in income level of fishermen families
3. Improve the skills and provide new livelihood skills through capacity development programme.
4. Facilitate technology up gradation to reduce drudgery and improve efficiency and quality
5. Instil quality consciousness both in production process and in living condition.
6. Develop management and leadership skills through training.
7. Promote common production centres.
8. Provide marketing support for products and services.

3.9.10 Education

There are 10 Fisheries Technical High Schools in the state. These are boarding schools and the students are given free mess and other facilities by the department through local Government. Construction of school and hostel buildings and the repairs

of capital nature are also carried out by the Department. It is provided to restructure the functioning of these schools to make them viable.

3.9.11 Other schemes

There are also many other schemes meant for fishermen community's prosperity. They are

1. Saving Cum Relief Scheme to Fishermen
2. National Fishermen Welfare Fund Assisted Housing Scheme
3. Group Insurance Scheme for Fishermen
4. Group Insurance Scheme for Allied Workers in Fishery Sector
5. Extension and Training

3.10 Concluding remarks

It can be concluded from the above analysis that the fishery sector plays very significant role in Kerala. It is evident not only in terms of employment generation, but also in terms of many other supporting services it provides. The coastal area and a large percentage of population in the state depend on this sector for their livelihood and subsistence. The government also makes huge expenditure on this sector. The new trends in technology advancement is seen in fishery sector which need to be evaluated with due care.

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CHAPTER 4

SOCIO ECONOMIC AND OCCUPATIONAL STATUS OF FISHING COMMUNITY

4.1 Demographic and Educational Status of Fishermen
4.2 Economic status
4.3 Socio- cultural status
4.4 Occupational status
4.5 Role of Women in Fishing
4.6 Youth in Fishing
4.7 Health status
4.8 Difficulties encountered in fishing
4.9 Concluding remarks

CHAPTER 4

SOCIO ECONOMIC AND OCCUPATIONAL STATUS OF FISHING COMMUNITY

The socio - economic and occupational status of the fishing community has very significant role because it tells us the real living status of this community. The fishing community in Kerala lead a comparatively poor life and therefore their status has to be analysed. In the study area, the coastal community spend similar life and their condition has been so evaluated. According to Mohandas Karamchand Gandhi "millions of poor in our hamlets understand what state suggests that. Give them access to economic activities and access to power and self confidence to which they hither to have been strangers."It is accepted that only when poor are in the main stream of progress, will any economic and social development be substantive. Fishermen's participation in economic activities is to a great extent determined by their socio economic background. The data has been collected from 300 households. The area of the study has been confined to Thrissur district.

For the purpose of analysis this chapter has been sub divided into three parts such as Demographic and educational status of fishermen, economic status of fishermen community and socio- cultural status of fishing community. The detailed analysis follows.

4.1 Demographic and Educational Status

This section deals with the basic demographic and education related information about the fishermen community in the study area. This analysis seems to be very important as it provides basic information about the selected group of households. In this analysis, attention is given to understand number of members in fishermen households, Religion wise distribution of fishermen, Age structure and sex wise distribution of fishermen, dependency ratio, Gender wise distribution, literacy rates.

4.1.1Number of members in fishermen households

Number of members in fishermen households has been analysed. It can be seen that out of 300 fishermen households, majority of them are having 5 members in the households. This comes around 60 percent of the respondents. 13 percent households are having 6 members and another 12 percent have more than 6 members in the family. From the analysis of size of fishermen households, it can be summarised that the average size of the households is comparatively very large.

Table 4.1

Number of Members in Fishermen Households

Sl No	**Number of members**	**Number of respondents**	**Percentage**
1.	Below 3	3	1
2.	3	15	5
3.	4	27	9
4.	5	180	60
5.	6	39	13
6.	Above 6	36	12
Total		300	100

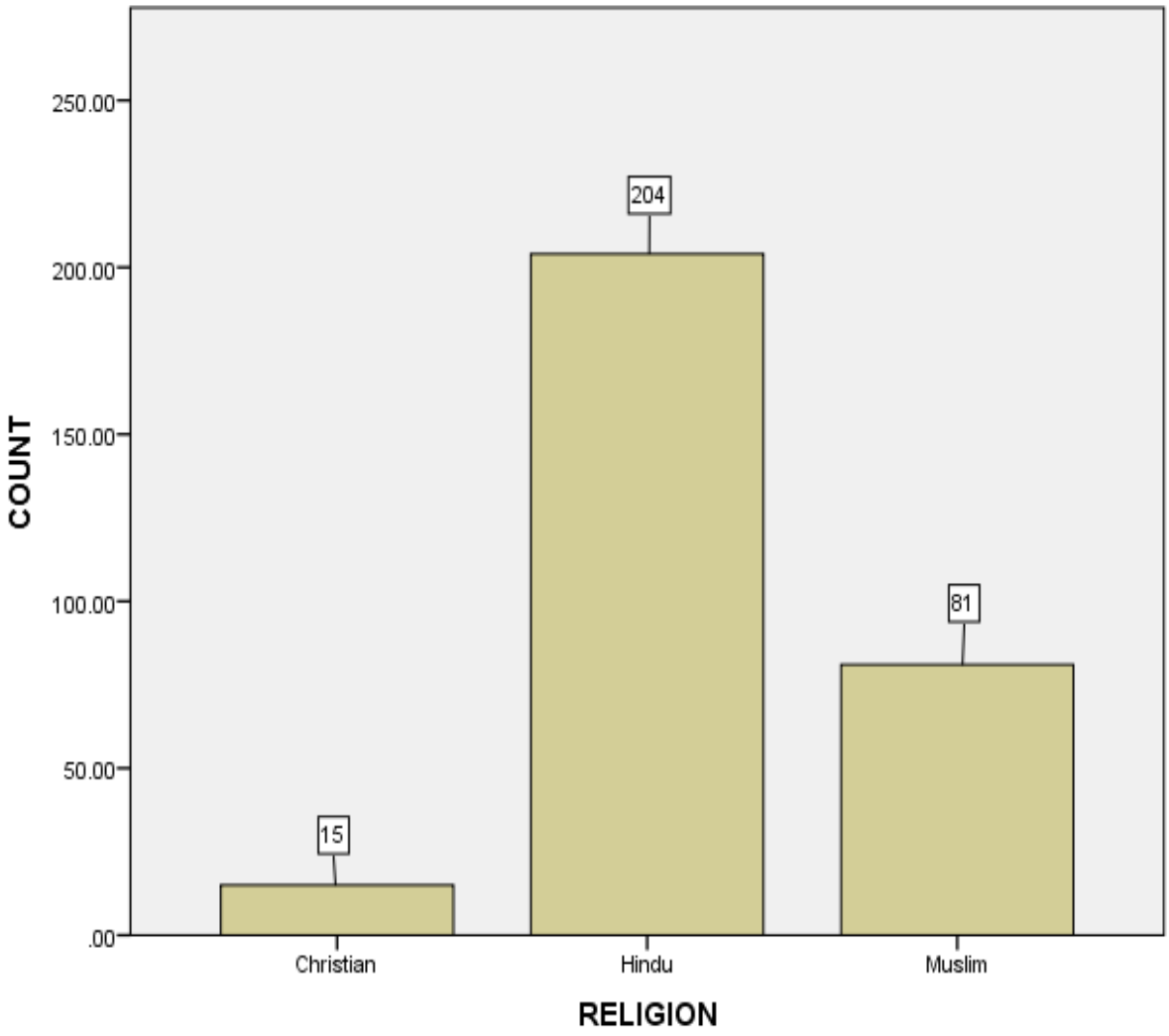
Source: Primary survey

4.1.2 Religion wise distribution of fishermen

Fishermen community's religion wise classification has been made and the results are shown in figure 4.1. It can be noted that majority of the respondents are belonging to Hindu community. They account for 68 percent of the total respondents. Similarly 27 percent of the. respondents are Muslims. Only 5 percent of the respondents are from Christian community. it can be thus seen that the religion wise classification of the people in the state does not seem to be according to the fishermen community in the selected study area

Figure 4.1

Religion Wise Distribution of Fishermen



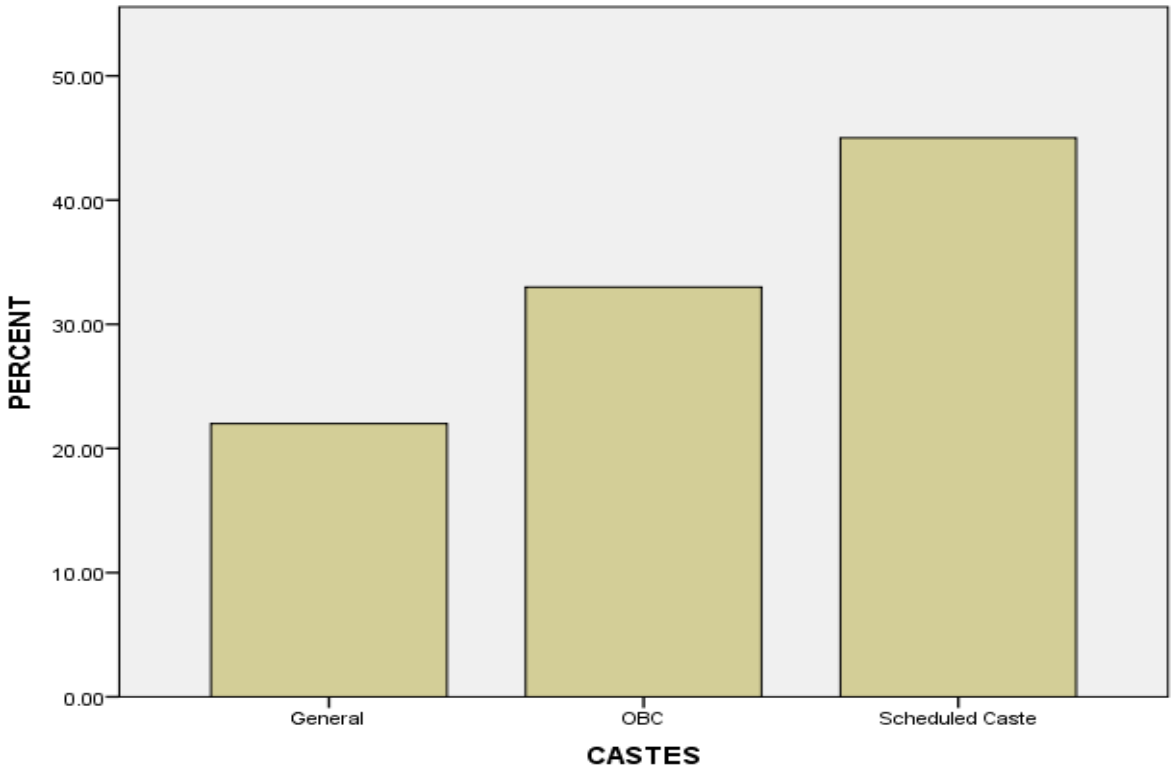
Source: Primary survey

4.1.3 Caste Wise Distribution of Fishermen

Castes wise classification reveals that around 45 % are scheduled castes.135 respondents are included in this. The number of members from scheduled tribes is zero. Figure 4.2 shows OBC constitutes 33% and the general category 22%.From this it is clear that the majority of the workers who actively involved in fishing is from scheduled caste.

Figure 4.2

Caste Wise Distribution of Fishermen



Source: Primary survey

4.1.4 Age of fishermen

Age is a chief determinant of proclivity and employability of labour. Potential of human resource of an economy actually depends on the age category of its work force. A work force with the youngest members is the potential of an economy. Skilled and young talented youth.

Active involvement of youth in any sector is a signal of good future. Fishing is a traditional and risky sector of employment which usually not attracted by all. The above table shows the age group of fishermen in the study area. A sample population of 300 members are taken and the age group starting from 21 years are included .In the age group 50-60 ,128 members are included which constitutes 42.5% of the total sample size. From this, it is clear that almost half of the total percentage is contributed by this age group.83 members are included in age group 30-40 which constitutes 27.5%.in the age group 40-50 only 22 members are involved which contributes

hardly 7.5%.in the age group 20-30, 30 members are included i.e., 10%.in the age group of above 60 years 37 members are involved which constitutes 12.5%.from this table it is clear that the workers who falls in the age group of 50-60 are actively participated in fishing activities and the least participation is by the age group 20-30.the age and socio economic activities are interrelated. It is alarming that the youngsters are not actively participate in fishing and allied activities in the study area.

Table 4.2

Age Group

Sl.No	Age Group	Frequency	Percentage (%)
1	20-30	30	10
2	30-40	83	27.5
3	40-50	22	7.5
4	50-60	128	42.5
5	Above 60	37	12.5
Total		300	100

Source: Primary survey

4.1.5 Gender wise distribution

Fishery activities are assumed to be joint effort by household families. This activity is not only done by male population but also the efforts of female households too are involved in it. In case of our study the gender wise distribution is very interesting to note. This is because out of the total sample size, 234 persons are male and the rest 66 are female. Thus 78 percent of male participation in the fishery sector is found in the study area. The participation of 22 percent female population is not so bad as far as this sector is concerned.

Table 4.3

Gender Wise Distribution

Sl No	Gender	Number of Respondents	Percentage
1	Male	234	78
2	Female	66	22
Total		300	100

Source: Primary survey

4.1.6 Educational status of fishermen

This section analyses the educational status of the fishermen community in the study area. For this purpose, the literacy rate has been evaluated. Along with this, the educational qualification of the male and female population has been taken for evaluation.

4.1.6.1 Literacy rate in Kerala as per 2011 census

Kerala state has made significant contribution to the educational attainment of its population. Male as well as female population has made tremendous improvement in the educational achievements.

Table 4.4

Literacy rate in Kerala

Sl No	Male/female	Literacy rate
1	Male	96.11
2	Female	92.07
Overall		93.91

Source: Census report, 2011

The given table shows the literacy level achievements of population in Kerala as per 2011 census. This figures showing male and female literacy rate in Kerala has

been used for making comparison of literacy rate among the fishermen community in Kerala.

4.1.6.2 Literacy rate in fishermen community

It is very interesting to note that the literacy rate of the fishermen community in the selected study area. It can be seen that the male literacy rate among the fishermen is estimated to be 94 percent. This is 96 percent min Kerala. Similarly the female literacy rate among the fishermen community is 89.3 percent while the same is 92 percent among the overall population in Kerala. Thus it can be seen that in case of both male and female fishermen population in the study area, the rate of literacy is comparatively lower in the study area.

Table 4.5

Literacy Rate of Fishermen Community

Sl No	Sex	Literate		Illiterate	
		Number	%	Number	%
1	Male	220	94	14	6
2	Female	59	89.3	7	10.6

Source: Primary survey

Another point to be noted here is the lower rate of literacy among female members of fishermen households. Compared to men they are having low level of education. Male fishermen are having better educational achievements in terms of literacy.

4.1.6.3 Education status

It is important to analyse the education status of the fishermen community in the study area. Among the total sample size of 300 respondents, 279 are found to be literate. Thus the level of education they attained is evaluated in this session. For analysis the level of literacy has been sub divided into many levels such as Literate to SSLC, +2 – degree, PG and above, Professional degree, Technical degree, employed etc.

Table 4.6

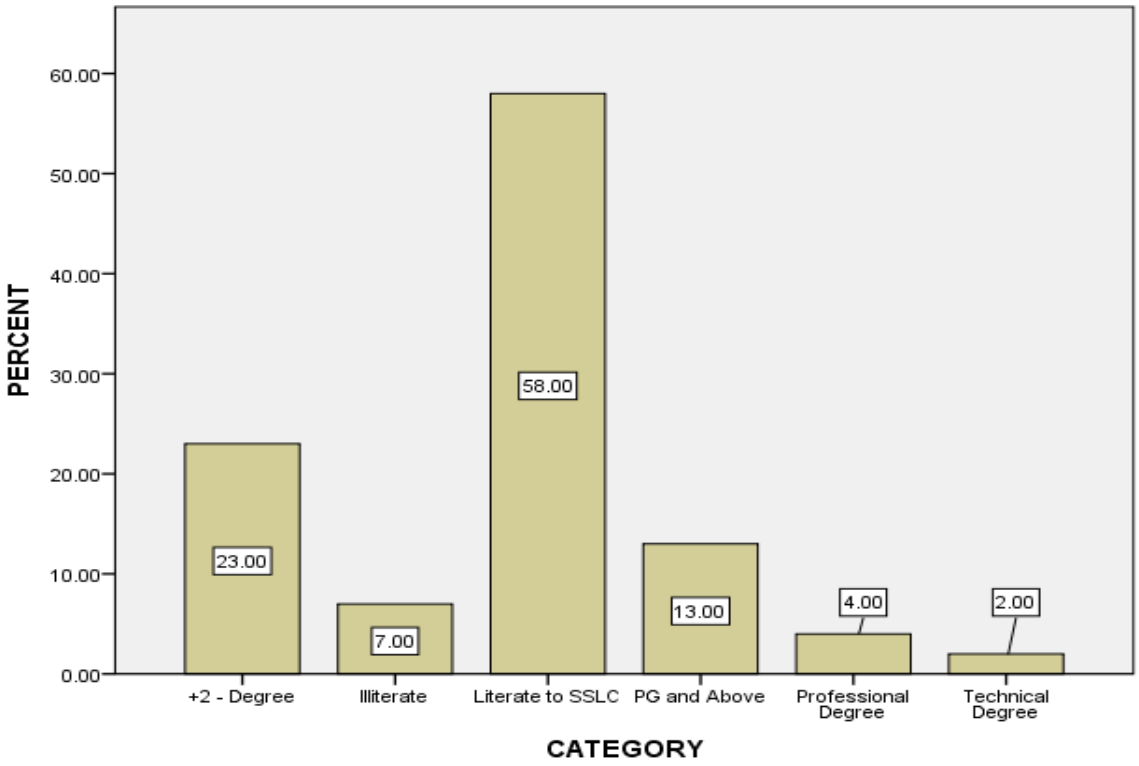
Educational Status

Sl No	Education Status	Number of Respondents
1	Illiterate	21
2	Literate to SSLC	174
3	+2 - degree	69
4	PG and above	19
5	Professional degree	12
6	Technical degree	6
	Total	300

Source: Primary survey

Figure 4.3

Educational Status



Three percent of educated fishermen (about 9 respondents) among the selected sample are employed in some firms though not in government regular service. They go for fishery related activities Three percent of educated fishermen (about 9 respondents) among the selected sample are employed in some firms though not in

government regular service. They go for fishery related activities In free times. Maximum number of fishermen is having educational qualification below SSLC. Nearly 23 percent are having +2 to degree education. 13 percent have PG and above level of education. 4 percent are having professional degree and another 2 percent are holders of technical qualification.

4.2 Economic status

Fishermen community lead not financially well life. This is because of their uncertain fish collection; marketing risk etc. the case is not different in the present study area too. The economic status of fishermen community has been analysed. in order to analyse the economic status various factors are taken for consideration such as housing situations of fishermen community, Details regarding the ownership of land holding of fishermen, Availability of drinking water and other basic amenities, latrine facilities, Nature of ownership of boats, annual income, expenditure details, debt position etc.

4.2.1 **Distribution of fishermen households by type of houses**

Housing situation in Kerala is very good compared to other Indian states. Majority of households have pucca houses. However, the density of population in coastal areas is very high. Thus the scope for well equipped pucca houses is not possible in fishery sector. This peculiar situation has been analysed here. The nature of houses of fishermen community in the study are is shown below. For purpose of analysis, the common classification of houses such as pucca houses, semi pucca houses and the kutcha houses has been utilised.

Table 4.7 shows that majority of fishermen community in the study area is having semi pucca houses. This accounts for nearly 60 percent of the respondents. Only 27.3 percent households are having pucca houses. At the same time 13.3 percent are living in kutcha houses. Thus it can be summarised that the nature of housing is average in case of fishermen.

Table 4.7

Housing Condition of Fishermen Community

Sl No	Types of houses	number	percentage
1	Pucca houses	82	27.3
2	Semi pucca houses	178	59.3
3	kutcha houses	40	13.3
	Total	300	100

Source: Primary survey

4.2.2 Details Regarding the Ownership of Land Holding Of Fishermen

The economic status of the fishermen community is analysed using details regarding the ownership of land holding of fishermen. Usually the coastal areas are thickly populated and hence the area of land available for the fishermen is very less compared to other areas of Kerala.

Table 4.8

Details Regarding the Ownership of Land Holding of Fishermen

Sl No	**Size of land (in cents)**	**Number**	**Percentage**
1	0-5	75	25
2	5-10	93	31
3	10-15	39	13
4	15-20	33	11
5	20-25	24	8
6	25-30	18	6
7	30-35	9	3
8	35-40	6	2
9	Above 40	3	1

Source: Primary survey

It can be seen that majority of fishermen households have less than 10 cents of land area. That is 25 percent have only less than 5 cents of land. Another 31 percent have between 5 and 10 cent land. Very less number of households have more than 20 cents of land. It can be calculated that only 20 percent respondents have more than 20 cents of land area.

4.2.3. Availability of drinking water and other basic amenities

Accessibility of drinking water is a serious issue in the coastal areas. It has very much importance in determining the health status of the fishermen community in the coastal areas.

Hence the enquiry was made for knowing the accessibility in terms of drinking water in premises, drinking water near premises and away from premises. It can be noted that 45 percent of the households in the study area do have drinking water in premises. At the same time 39.3 percent have drinking water near premises while 15.6 percent households take water from distant places.

Table 4.9

Availability of Drinking Water

Sl No	Availability of drinking water	Number of respondents	Percentage
1	Drinking water in premises	135	45
2	Drinking water near premises	118	39.3
3	Away from premises	47	15.6
	Total	300	100

Source: Primary survey

4.2.4 Source of Drinking Water

The source of drinking water in the coastal area is very important. This is because of the density of population and the salinity of drinking water issues. In the sample area query is made to understand the source of drinking water.

Table 4.10

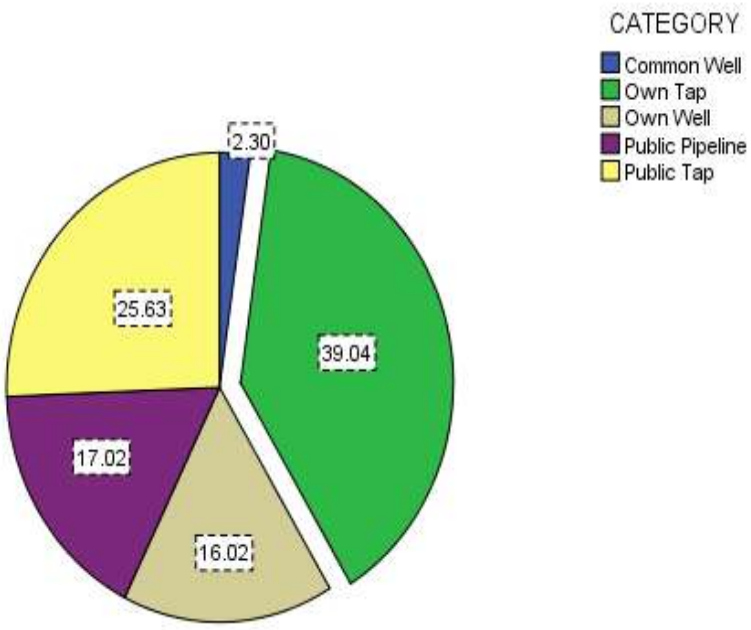
Source of drinking water

Sl No	Source of drinking water	number
1	Own tap	117
2	Public tap	77
3	Own well	48
4	common well	7
5	Public pipeline	51

Source: Primary survey

Figure 4.4 depicts that around 39.04 percent Respondents (the highest category) depend on own tap for availing drinking water. One fourth of the respondents depend on public tap. Only 16 percent are having own well for safe drinking water.

Figure 4.4
Source of Drinking Water



4.2.5 Distribution of households by latrine facilities

It is an interesting fact to be noted that almost 72 percent respondents are having modern latrine facilities. At the same time 24 percent of them use pits near houses. Since open defecation and other non hygienic bathrooms habits have a correlation with health issues, use of open pits could be addressed as a serious issue among fisher folk. The special focus is reiterated by 4 percent of respondents those who have no toilets. None of the respondents have access to common latrines, which means that the public toilets are neither built nor accessible to them.

Table 4.11

Distribution of Households by Latrine Facilities

Sl No	Nature of toilet	Number	Percentage
1	Modern latrine	216	72
2	Pit near houses	72	24
3	Common latrine	0	0
4	Without latrine	12	4
Total		300	100

Source: Primary survey

4.2.6 Other Basic Amenities of Fishermen Households

Basic Amenities of Fishermen Households are shown below. The economic status of the fishermen community can be measured using various indicators. One such criterion used in the present study is to identify the average number of amenities for the fishermen households. The ownership of household amenities like chairs, tables, coats, almirah, TV, radio, fridge, car, two wheeler etc. are considered for analysis. It can be thus seen that majority are having basic amenities like chairs, coats, tables, mixie etc. It is also noticed that 75 percent fishermen families in the study are have TV. Only 2.3 percent of the total sample have car. However, 38 percent have two wheelers. It is interesting to notice that almost all the households have mobile phones;

even many are having more than one phone in their families. Table 4.12 shows that all of the respondents have mobile phones unlike other factors. Thus it is clear from this analysis that the fishermen community is holding many of the requirements at home. However, their accessibility of transportation facilities especially four wheelers is very less.

Table 4.12

Amenities of Fishermen Households

Sl No	Amenities	Percentage of Respondents Owning the Amenities
1	Chairs	96
2	Tables	89
3	Coats	87
4	Almirah	60
5	TV	75
6	Radio	35
7	Two wheeler	38
8	Car	2.3
9	Fridge	56
10	Mixie	70
11	Mobile phones	100

Source: Primary survey

4.2.7 Nature of Ownership of Boats

Ownership of boat is an issue of existence for the fishermen community. In that sense it determines their economic status too. Hence query is made about the nature of ownership of boats. It can be learn that 53 percent of the total respondents have their own boats for fishing. The rest 26.3 percent do not own boats. It is interesting to note that 62 respondents that are 20.6 percent fishermen in the selected are hiring boats for fishery activities.

Table 4. 13

Nature of Ownership of Boats

Sl No	Ownership of Boats	Number	Percentage
1	Have own boat	159	53
2	Hire boat	62	20.6
3	No boat	79	26.4
Total		300	100

Source: Primary survey

4.2.8 Primary Source of Income

Source of income of the fishing community is also very important. It has been analysed to get an idea about their main source of income.

Table 4.14

Primary Source of Income

Sl No	Source of Annual Income	Number	Percentage
1	Fishing	202	67.3
2	Business (fishing secondary)	69	23
3	Service (fishing secondary)	9	3
4	others	20	6.6
Total		300	100

Source: Primary survey

It can be thus seen that majority i.e. 67 percent household depend on direct fishing activities for their living. In case of 23 percent households, business is the primary source of income, but carries on fishery activities as a secondary source of income earning activity. Similarly 3 percent consider service sector activities as significant source of their income. Thus it is clear that fishing and allied activities are

the significant/ primary source of source of income for two third households in the study area. But it is quite interesting to see that a third of respondents are not relying on fishing and allied activities as a primary source of their income.

4.2.9 Distribution of Fishermen Households by Monthly Income

Apart from the main source of income, the distribution of fishermen households on monthly income has been made in the study. The results of the categorised data has been given in table 4.15

Table 4.15

Distribution of Fishermen Households by Monthly Income

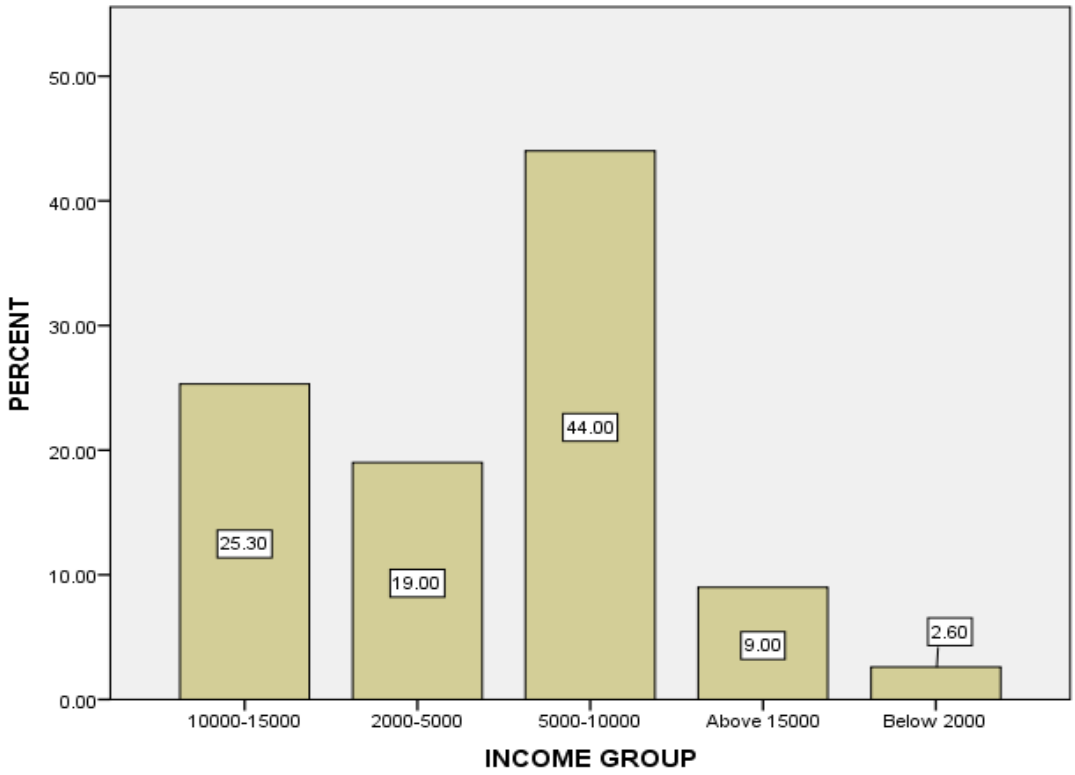
Sl No	Distribution of Fishermen Households by Monthly Income	Number
1	Below 2000	8
2	2000-5000	57
3	5000-10000	132
4	10000-15000	76
5	Above 15000	27
Total		300

Source: Primary survey

It can be seen from the table that the monthly income of the fishermen community in the study area varies significantly. There are only 8 respondents having less than 2000 rupees as monthly income. 57 persons have an income between 2000 and 5000. Majority of them i.e. 132 respondents are having income between 5000 and 10000. There are also 76 persons earning income between 10000 and15000. Only 27 respondents earn more than 15000 per month.

Figure 4.5

Distribution of Respondents by Income



4.2.10 Details of Debt

It is an interesting fact to be noted that huge majority of the fishermen community are under debt. It can be noticed that 94.3 percent of them in the study area are having debt. The results are given in table 4.16.

Table 4.16

Details of Debt

Sl no	Debt Position	Number	Percentage
1	Having Debt	283	94.3
2	Not Having Debt	17	5.6
Total		300	100

Source: Primary survey

Even though the majority are using the facility of credit for financing their needs, about 5.6 percent (17 in absolute terms) respondents is neither borrowed nor access to the credit. Since the fishermen community are not well fit with their income

to meet expenditures for maintaining both their fishing crafts and daily life, access to the credit should be assured.

Table 4.17

Fishermen Accessibility to Credit and Its Predictors: Discriminate Analysis

Group Statistics			
Accessibility To Credit		Mean	Std. Deviation
Yes	Gender	.78	.146
	Fishing as Primary Employment	.88	.493
	Income	4335.65	2089.44
	Level of Education	.61	.406
No	Gender	.43	.317
	Fishing as Primary Employment	.96	.111
	Income	2244.12	1018.714
	Level of Education	.41	.481
Total	Gender	.39	.488
	Fishing as Primary Employment	.96	.204
	Income	2991.28	2158.8
	Level of Education	.44	.455

Source: SPSS output on analysis of Primary Data

Table 4.17 depicts the descriptive statistics of respondents' credit behaviour and its probable predictors. The accessibility to credit is taken as categorical variable. The response yes represents the availability or accessibility of credit to the respondents. Whereas no represents non availability or inaccessibility of credit to the respondents. For running the discriminate function four probable predictors are chosen. They are gender, employment (Fishing as Primary), income and level of education.

Table 4.18

Canonical Discriminant Function Coefficient

	Function 1
Gender	-1.698
Fishing as Primary Employment	-2.023
Income	0.04520
Level of Education	.078
(Constant)	-2.888
Un standardized coefficients	

Source: SPSS output on analysis of Primary Data

4.2.11 Discriminate Function

The impact of all probable predictors is represented in table 4.18. Table 4.18 shows that gender and employment have negative impact on the group membership of fishermen as having accessibility to credit. As far as the model is concerned, a fisher folk with gender as female and employment as fishing respectively has 1.698 times and 2.023 times lesser probability being the member of credit accessible group. The income and level of education have positive on the group membership of fishermen as having accessibility to credit. Discriminate function shows that, fishermen with higher income and level of education respectively has 0.04520times and .078 times probability being the member of credit accessible group.

Based on the unstandardized coefficients, discriminate function is given as;

D = -2.888-1.698(G) - 2.023(F) +0.04520 (Y) +077(E)

Where,

D = Discriminate function of credit

G = Gender

F = Employment (Fishing as Primary)

Y = Income

E = Level of education

Table 4.19

Credit and Predicted Group Membership

Classification Results[a,c] (Credit)					
		Accessibility of Credit	Predicted Group Membership		Total
			No	Yes	
Original	Count	Yes	80	34	114
		No	53	245	298
	Percent	Yes	74.3	31.7	106
		No	20.1	85.9	106
Cross-Validated[b]	Count	Yes	80	34	114
		No	53	245	298
	Percent	Yes	74.3	31.7	106
		No	20.1	85.9	106
a. 80.9% of original grouped cases correctly classified.					
b. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.					
c. 80.9% of cross-validated grouped cases correctly classified.					
Source: SPSS output on analysis of Primary Data					

The given table 4.19 shows how the predictor model is able to predict the actual group membership of fishermen's being the member of credit group or not. As far as credit members are concerned, it is able to correctly predict about 74.3 percent of group membership using our four discriminating predictors. As far as fishermen being not the member of credit group are concerned four predictors are good discriminators as they are able to predict about 85.9 percent of group membership.

Table 4.20

Tests of Equality of Group Means (Credit)

	Wilks' Lambda	**F**	**df1**	**df2**	**Sig.**
Gender	0.826	104.713	298	0	0.826
Fishing as Primary Employment	0.912	55.521	298	0	0.912
Income	0.844	93.647	298	0	0.844
Level of Education	0.923	70.187	298	0.001	0.923

Source: SPSS output on analysis of Primary Data

The table 4.20 show that the given variables are good predictors of group membership. Gender, employment (Fishing as Primary), income and level of education are significantly different among two groups of fishermen even at one percent level of significance. The variables are discriminating the given function with high statistical significance. These predictors can be used as good discriminators for determining the group membership of fishermen as having credit or not having credit. Women those who are involved in fishing don't have much access to the credit. Similarly respondents those who do fishing as their primary occupation also don't have much access to credit. Whereas individual with better education and income has better access to the credit as detailed in the discriminate function.

4.2.11 Sources of Debt/Borrowing

The source of debt/borrowing of the fishermen community is shown in the table given below.

Table 4.21

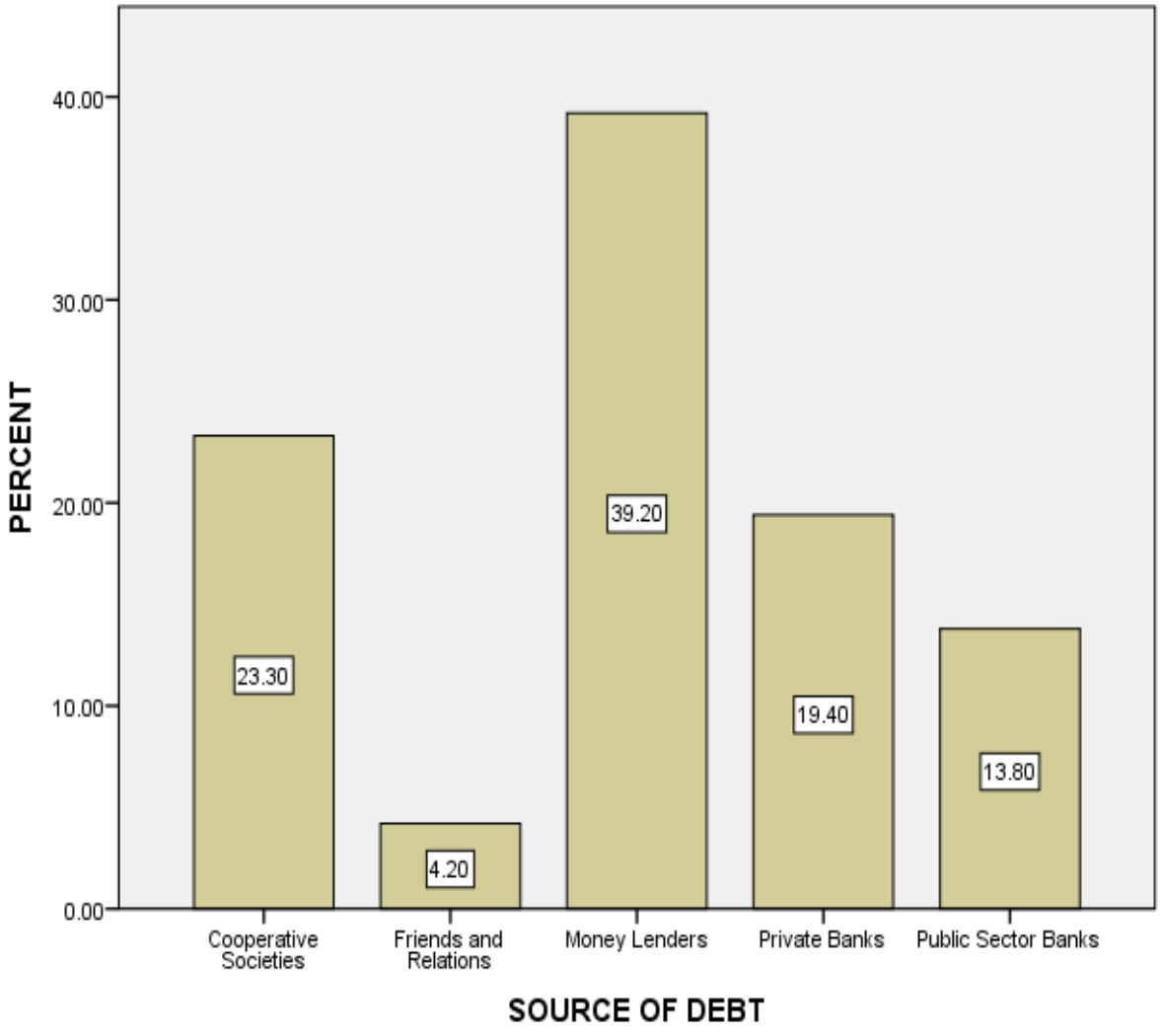
Source of Debt/Borrowing

Sl No	Source of Debt/Borrowing	Number	percentage
1	Public sector banks	39	13.8
2	Private banks	55	19.4
3	Money lenders	111	39.2
4	Cooperative societies	66	23.3
5	Friends and relatives	12	4.2
Total		283	100

Source: Primary survey

Figure 4.6

Source of Debt/Borrowing



It can be seen that the fishermen community depend on various sources for funds such as public sector banks, private sector banks, Private individuals/money lenders, cooperative societies and so on. Out of 283 respondents having credit about 39.2 percent depend on sector banks for their financial requirements. This figure concludes that either respondents or public sector banks are reluctant to have mutual banking relations. Most probably the attitude of formal credit sources will be villain in financial credit habit of fishermen. The delay in getting finance, formalities and terms and conditions usually keep respondents away from the public sector banks as it is in other marginalised sectors.

Money lenders and friend's relations together satisfy the credit needs of about 43.4 of respondents. This rate is alarming, which shows the dirty hands of money lenders plays a crucial role in fishing sector in Kerala like other unorganised sectors. Figure 4.6 shows about 23 percent respondents depend on cooperative banks and 19.4 percent depend on private sector banks. Only 13.8 percent respondents depend on public private money lenders. Again about 4.2 percent of respondents are depending on friends.

During the survey certain qualitative information are collected regarding the purpose of their borrowing. It is found that Most of them are officially borrowing (from formal source like public sector banks and cooperative banks) money for fishery related activities, but unfortunately a major chunk of credit is using for other purposes than fishing and allied activities. Their credit requirements (officially and unofficially recorded) include maintenance of fishery equipments, nets, boats, education of children, marriage, day to day expenses as well as hospital related needs.

4.3 Socio- Cultural Status

It can be noted that fishermen community in the study area do participate in various organisations like political parties, trade unions, NGOs etc. Around half of them are participants in the political parties. Nearly 28 percent participate in trade unions and 3 percent fishermen participate in NGOs. It is also noted that 19.6 percent respondents do not participate in any of the organisations. Thus it is clear from the

analysis that around 80 percent fishermen in the study area have participation in different organisations showing their interdependence and involvement in the social activities.

4.3.1 Participation of Fishermen in Different Organizations

It can be noted that fishermen community in the study area do participate in various organisations like political parties, trade unions, NGOs etc. Around half of them are participants in the political parties. Nearly 28 percent participate in trade unions and 3 percent fishermen participate in NGOs. It is also noted that 19.6 percent respondents do not participate in any of the organisations. Thus it is clear from the analysis that around 80 percent fishermen in the study area have participation in different organisations showing their interdependence and involvement in the social activities.

Table 4.22

Participation of Fishermen in Different Organizations

Sl No	Participation in Organizations	Number	Percentage
1	Political parties	147	49
2	Trade unions	85	28.3
3	NGOs	9	3
4	No participation	56	19.6
Total		300	100

Source: Primary survey

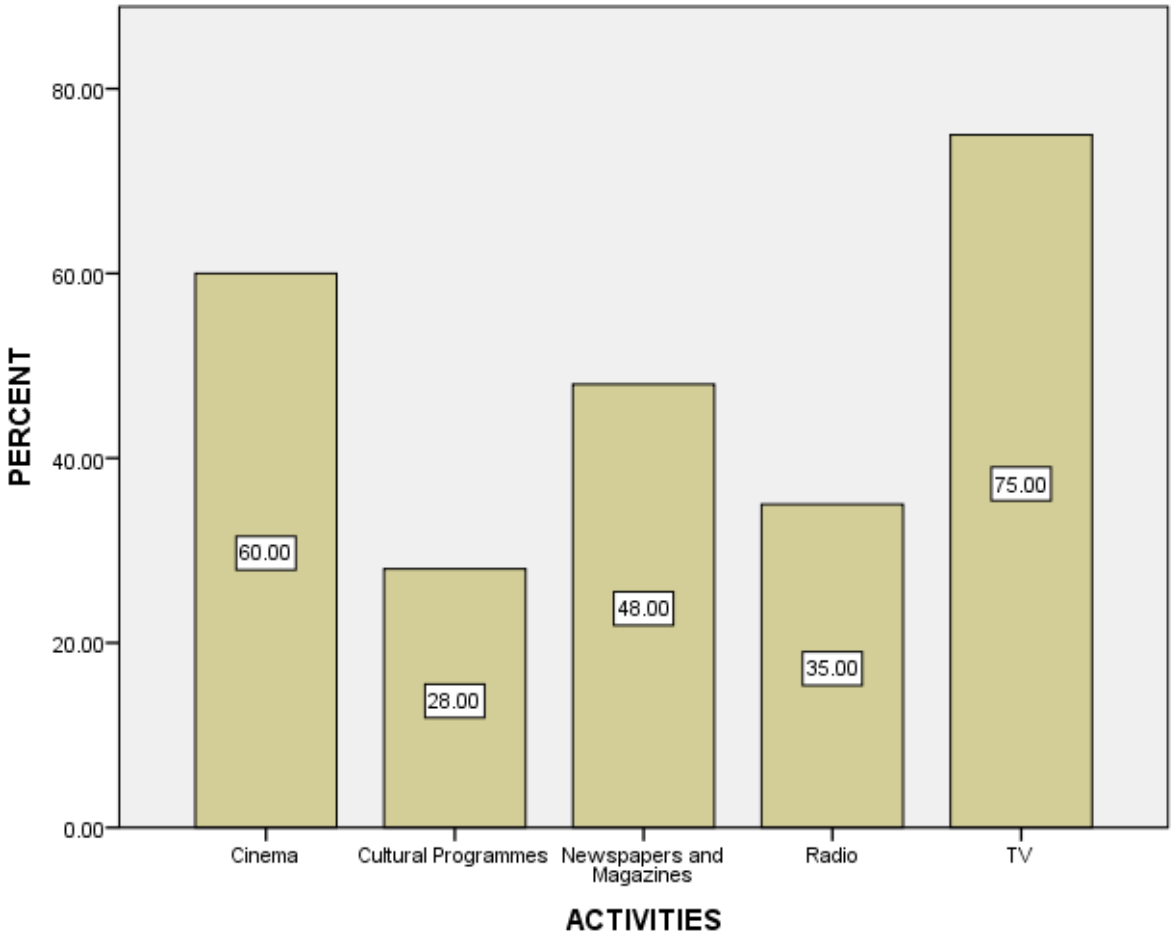
4.3.2 Participation of Fishermen in Cultural and Other Related Activities

Attitude of fishermen towards cultural activities has been analysed. This is measured in terms of their accessibility and use of various cultural activities. The results are depicted in the figure 4.7. It can be seen that 48 percent respondents used to

read newspapers and magazines in the selected study area. Most of them are viewers of TV that is 75 percent used to watch TV and 35 percent used to enjoy radio programmes. Around 60 percent respondents used to go for cinema in theatre. However, only 28 percent have interest in other cultural programmes.

Figure 4.7

Participation of Fishermen in Cultural Activities



Source: Primary survey

4.4 Occupational Status

Occupation status of the fishermen community is analysed and the results are discussed in this section. In order to analyse their occupation details the areas considered include current major occupation of the fishermen community, distribution of fishermen on the basis of fishing days, occupational profile of coastal fisher folk,

experience in fishing occupation, use of modern technology in fishing, women involvement in fishing, children involvement in fishing etc.

4.4.1 Major/Primary Occupational Sectors of Respondents

Fishing is supposed to be the major occupation of the people in the study area. In order to verify this, respondents were asked about their major occupation. It can be thus seen that majority i.e. 67 percent household depend on fishery activities for their living. In case of 23 percent households, business is the main occupation, but carries on fishery activities as a secondary source of income earning activity. Similarly 3 percent consider service sector activities as significant source of their income. Thus it is clear that fishing is the significant source of income for two third households in the study area.

Table 4.23
Major/Primary Occupational Sectors

Sl No	Occupational Sectors	Number	Percentage
1	Fishing	202	67.3
2	Secondary sector	69	23
3	Service sector	9	3
4	others	20	6.6
Total		300	100

Source: Primary survey

4.4.2 Distribution of Fishermen on the Basis of Weekly Fishing Days

Another important area of occupational analysis is the distribution of fishermen on the basis of fishing days. Fishermen used to undertake their traditional fishing activities in several days in a week. This was enquired and the results are summarised in the following table and figure. It can be seen that majority of fishermen in the study area go for fishing activities in 6 days in a week. They include 31.6 percent. Next comes 28.3 percent undertake fishing activities in 5 days in a week. It is also interesting to note that 27.3 percent respondents do fishing in all 7 days in the week. It can also be noted that very few percentage of respondents work less than 3 days in a week.

Table 4.24

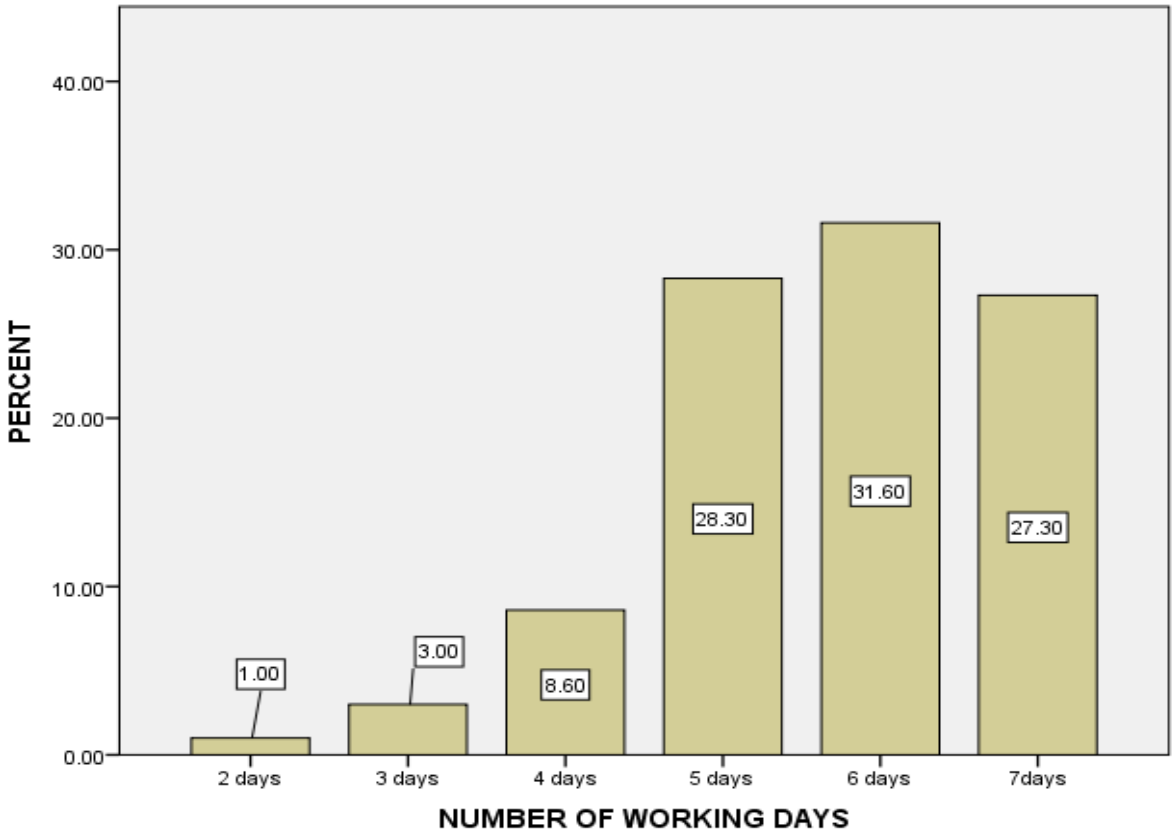
Distribution of Fishermen on the Basis of Weekly Fishing Days

Sl no	Weekly Fishing Days	Number
1	1 day	0
2	2 days	3
3	3 days	9
4	4 days	26
5	5 days	85
6	6 days	95
7	7days	82
Total		300

Source: Primary survey

Figure 4.8

Distribution of Fishermen on the Basis of Weekly Fishing Days



Source: Primary survey

4.4.3 Experience in Fishing

Majority of fishermen in the study area have fishing experience of more than 10 years. They comprise of 34 percent of the total respondents. Another 30 percent are having experience between 5 and 10 years. Similarly 29.3 percent fishermen have less than 5 years of fishing experience. But only 6 percent have less than 1 year experience in the fishery occupation. Thus this analysis reveal that majority of fishermen in the study area do have very good experience in the fishery related activities. One third of them are traditionally fishermen

Table 4.25

Experience in Fishing

Sl. no	Experience in fishing occupation	Number	Percentage
1	Less than one year	18	6
2	1-5 years	88	29.3
3	5-10 years	92	30.6
4	More than 10 years	102	34
Total		300	100

Source: Primary survey

4.4.4 Modern technology in fishing

The fishing occupation is related to technology. The advent of modern technology in fishing sector is a question of discussion in the present study. Majority of fishermen engaged in fishery activities for more than 10 years face reluctant to adopt modern technology. However, it is interesting to note that majority of the respondents that is 60 percent adopt modern technology. Only 21 percent respondents in the study area do not adopt modern technology. It is also interesting to note that 18.6 percent fishermen are not aware of modern technologies. Thus it can be summarised that fishermen are not fully against modern technologies. They are ready to adopt changed in the technology side.

Table 4.26

Modern Technology in Fishing

Sl no	**Modern technology in fishing**	**Number**	**Percentage**
1	Adopt modern technology	180	60
2	Do not adopt modern technology	64	21.3
3	No idea about modern technology	56	18.6
Total		300	100

Source: Primary survey

4.4.5 Children taking up fishing as an occupation

Fisheries sector is a traditional occupation sector. The involvement of family members in the fishery activities is traditional. However, the new generation's involvement in the sector is a question of debate. Hence the respondents are asked about whether their children are involved or interested in the fishery activities. Almost 88 respondents replied that their children are not taking up fishing activities because of their lack of interest. Only 12 percent respondents say their children prefer fishing activities.

Table 4.27

Children Taking up Fishing as an Occupation

Sl no	Children taking up fishing	Number	Percentage
1	Yes	36	12
2	No	264	88
	Total	300	100

Source: Primary survey

4.4.6 Women Folk Involvement in Fisheries sector

Fishing activities are traditionally done by family members together. Involvement of women also is seen in this occupation. Women are usually involved in post fishing activities like processing, selling etc. Hence the respondents are asked about women involvement in fishing occupation. It can be seen that among the 300 respondents 111 admit that there is women involvement in fishing related occupation. This figure includes the number of women respondents also.

Table 4.28

Women folk Involvement in Fisheries Sector

Sl No	Women folk involvement	number	percentage
1	Yes	111	37
2	No	189	63
	Total	300	100

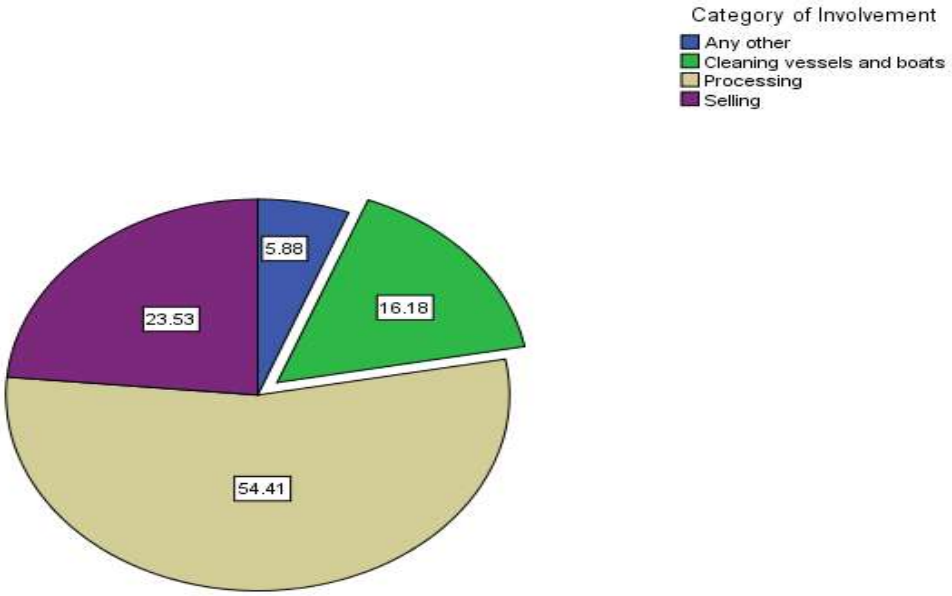
Source: Primary survey

4.4.7 Nature of womenfolk Involvement

Women are involved in various types of fisheries related occupation in the coastal areas. Their activities include selling the final product, processing, cleaning vessels and boats etc. there is also overlapping of these activities. Many women are engaged in more than one of the above occupation. However, 74 percent are involved in processing of fish products. 32 percent are used to go for selling activities. Cleaning related works are also assisted by women. Hence the active involvement of women is found in the fisheries occupation.

Figure 4.9

Women folk Involvement in Fisheries



Source: Primary survey

4.5 Role of Women in Fishing

Women play an important role in fisheries sector. They are engaged in a wide range of activities in the fishing and in fishing communities all around the world.

- As workers (paid and unpaid) within the fisheries, in pre- and post-harvest activities, including liaison work with institutions and agencies.
- In several countries, it is mostly women who are engaged in inland fishing and aquaculture.
- As workers in seafood processing plants.
- As caregivers of the family and in maintaining social networks and the culture of the community
- As members of fishworker movements and fishers' organizations

  There are about 0.5 million fisher households located all along the Indian coast and a total of 3 million fisherfolk inhabiting the coastal villages.

The average variety of ocean going fishermen is 282 during a coastal village. Out of the 1.2million fisher folk in post harvest sector, women occupy a considerable proportion of more than 0.5 million (Sathiadhas et al., 1998). They play a big role within the pre and post- harvest operations in capture fisheries whereas their presence is conspicuous altogether the stages of culture fisheries. Their role in social unit management is much beyond the ladies of alternative sectors. Majority of the labour force within the pre-processing and process plants of shrimp area unit girls. Women conjointly occupy a really sensible proportion of the force in export oriented process of cuttle, lobsters, and finfish varieties.

Traditionally, fishing was the subsistence occupation of certain communities in Kerala. These fishing communities operated with conventional technology in their occupation. By the mid sixties, however, modern technology based on western models was superimposed upon the existing technology by the state, ignoring the possible impact of such a change on the socio-economics of the fishing communities. Predictably this modernisation model did not in any way bring the artisanal fishermen any benefit. On the contrary, their share of the returns declined. This paper looks at some of the effects of this modernisation on the womenfolk of the fishing communities and the efforts made by them to overcome their problems. Women have always played an important role in the fishing industry by way of taking care of many of the shore-based activities, after the fish is landed. These include handling of the fish, salting, drying and marketing, apart from hand braiding of nets.

The marketing of fish by female vendors in Kerala is generally done in the following ways:

a) **House to house sale:**

Many small scale vendors go from house to house to sell fish, mainly in urban areas. Since visits are made to the same area every day, the vendors get to know consumer preferences and can make purchases accordingly. A cordial relationship usually exists between the vendor and the families, with the vendor

gutting and cleaning the fish for them and occasionally receiving gifts, apart from payment for the fish.

b) **Licenced markets:**

These markets, managed by *panchayats*, municipalities or corporations, accommodate a number of small sellers who are charged a certain amount for the privilege of a place in the market. The atmosphere in such markets is highly competitive.

c) Unlicenced markets/Hawking:

Some women sell fish at road sides and junctions where they can attract crowds. They are often harassed by the police for hawking at open places.

In a fisher's family, the responsibility of household management-food, childcare, education, health, sanitation, financial management and the responsibility of getting and repaying debts will be mostly on the women's shoulders. The burden of her responsibilities doubles in the off-season. After mechanization intensification of multi-day fishing, the household responsibility of fisher women has increased to a greater extent. Besides, in many places women are running petty shops, selling different inputs needed for fishing and other household articles. In Vizhinjam landing centre of Kerala the diesel supply units for boats are the monopoly of women. Mobile food selling units run by women in landing centres serve the purpose of supplying breakfast and snacks to fishermen. Women's role as a homemaker, though supportive, is indispensable for the men to go for fishing. Activities like cooking, childcare, children's education, family health and sanitation are almost exclusively looked after by women. The indirect role women play are concerning decision making, financial management, family welfare, net making, running petty shops and mobile food supply for the workers at the landing centres and fish markets. The more direct involvement of women are in post-harvest related activities *viz.* peeling, fish trading, export oriented works, making value - added products, small scale entrepreneurship, fish curing, etc.

The much-acclaimed social progress in Kerala, also indicated by surplus females, has found to be lacking among fishing communities. The well being of

fisherwomen measured on the basis of capabilities like morbidity, longevity, nutrition and education has been found to be low (Pushpangadan and Murugan, 2000). Even though neo- natal death is more among male children, the high population growth rate among fisherfolk is not reflected in the proportion of girl children. It leads to the assumption that higher rate of mortality is among girl children.

4.5.1 Women folk Involvement in Fisheries Activates

Fishing activities are traditionally done by family members together. Involvement of women also is seen in this occupation. Women are usually involved in post fishing activities like processing, selling etc. Hence the respondents are asked about women involvement in fishing occupation. It can be seen that among the 300 respondents 111 admit that there is women involvement in fishing related occupation. This figure includes the number of women respondents also.

Table 4.29

Women folk Involvement in Post fishing Activities

Sl No	Woman folk involvement	number	percentage
1	Yes	111	37
2	No	189	63
	Total	300	100

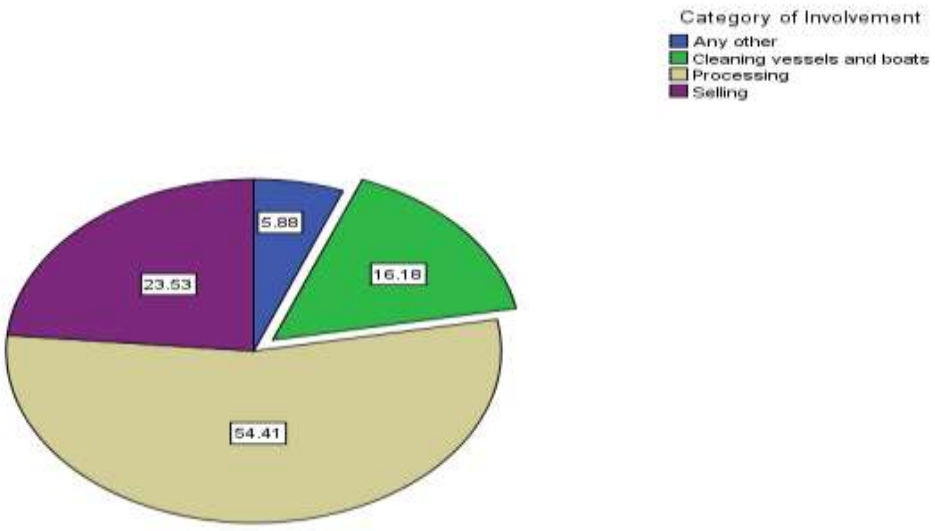
Source: Primary survey

4.5.2 Nature of Womenfolk Involvement

Women are involved in various types of fishing related occupation in the coastal areas. Their activities include selling the final product, processing, cleaning vessels and boats etc. there is also overlapping of these activities. Many women are engaged in more than one of the above occupation. However, 74 percent are involved in processing of fish products. 32 percent are used to go for selling activities. Cleaning related works are also assisted by women. Hence the active involvement of women is found in the fishery occupation.

Figure 4.10

Nature of woman folk involvement



In most food production systems technological changes, like mechanisation, have usually resulted within the displacement of ladies from their ancient roles. This paper appearance at 3 totally different fisheries within the ancient sector within the central a part of the state of Kerala, Asian country and tries to analyse the changes in gender roles. The ring seine workplace that was ab initio little scale, has currently remodeled into a capital intensive, high supercharged, labour intensive workplace with landings shifting from the beaches to the harbours. With the landings shifting to the harbours and changing into connected to the worth incentives of the market, girls have slowly been marginalised from promoting activity. The stake internet workplace is mostly practiced by the Dheevara community. Women square measure fully excluded from fishing operations and are available into the image solely once the catch is landed. In the localised clam fishery, women were once actively involved in handpicking for the clams. But motorised canoes gave more scope for men and hence women were displaced. These changes, would like fishery-specific interventions to grant girls bigger access to the advantages of the fisheries.

An improvement in the fisher's economy alone cannot be taken as the symbol of development. Empowerment of the individuals, both male and female members should be assured which gains significance in the context of ever changing technological options in marine fisheries. There are many areas in capture fisheries sector with ample scope for employing fisher women. Women *empowerment and thereby the community development through combined efforts of men and womenfolk requires a holistic approach. As Amartya Sen (2001) has rightly observed "there are no good reasons to abandon the understanding that the impact of women empowerment in enhancing the voice and influence of women does help to reduce gender inequality of many different kinds, and can also reduce the indirect penalty that men suffer from the ubjugation of women ".*

4.6 Youth in Fishing

An emerging trend found in the fishery sector of Kerala is the reluctance of the young generation to take up the fishery activities. Education is considered as the determining factor leading the new generation into the fishery sector or not. As it is noted the coastal community facing the problem in all basic sectors including housing, education, sanitation, hygienic issues, drinking water issues etc. Many children have the same complaint of their parents have no time to listen them, and they were always engaged in work and work related activities. This is common in all parts of Kerala. The educated youth in the fishery sector do not like to take fishery as their occupation Nazy P. (2007).

The primary data collected reveal the common recent trend as observed the age composition of fishermen and the arrival of children into this sector

4.6.1 Age of Fishermen

Age is a chief determinant of proclivity and employability of labour. Potential of human resource of an economy actually depends on the age category of its work force. A work force with the youngest members is the potential of an economy. Active involvement of youth in any sector is a signal of good future. Fishing is a traditional and risky sector of employment which usually not attracted by all. The above table

shows the age group of fishermen in the study area. A sample population of 300 members are taken and the age group starting from 21 years are included. In the age group 50-60, 128 members are included which constitutes 42.5% of the total sample size. From this, it is clear that almost half of the total percentage is contributed by this age group.83 members are included in age group 30-40 which constitutes 27.5%.in the age group 40-50 only 22 members are involved which contributes hardly 7.5%.in the age group 20-30, 30 members are included i.e., 10%.in the age group of above 60 years 37 members are involved which constitutes 12.5%.from this table it is clear that the workers who falls in the age group of 50-60 are actively participated in fishing activities and the least participation is by the age group 20-30.the age and socio economic activities are interrelated. It is alarming that the youngsters are not actively participate in fishing and allied activities in the study area.

Table 4.30

Age wise Composition of Fishermen

Sl.No	Age Group	Frequency	Percentage (%)
1	20-30	30	10
2	30-40	83	27.5
3	40-50	22	7.5
4	50-60	128	42.5
5	Above 60	37	12.5
Total		300	100

Source: Primary survey

4.6.2 Young Generation in the Fisheries Sector

Fisheries sector is a traditional occupation sector. The involvement of family members in the fishery activities is traditional. However, the new generation's involvement in the sector is a question of debate. Hence the respondents are asked about whether their children are involved or interested in the fishery activities. Almost 88 respondents replied that their children are not taking up fishing activities because of their lack of interest. Only 12 percent respondents say their children prefer fishing activities.

Table 4.31

Children Taking up Fishing as an Occupation

Sl no	Children taking up fishing	Number	Percentage
1	Yes	36	12
2	No	264	88
	Total	300	100

Source: Primary survey

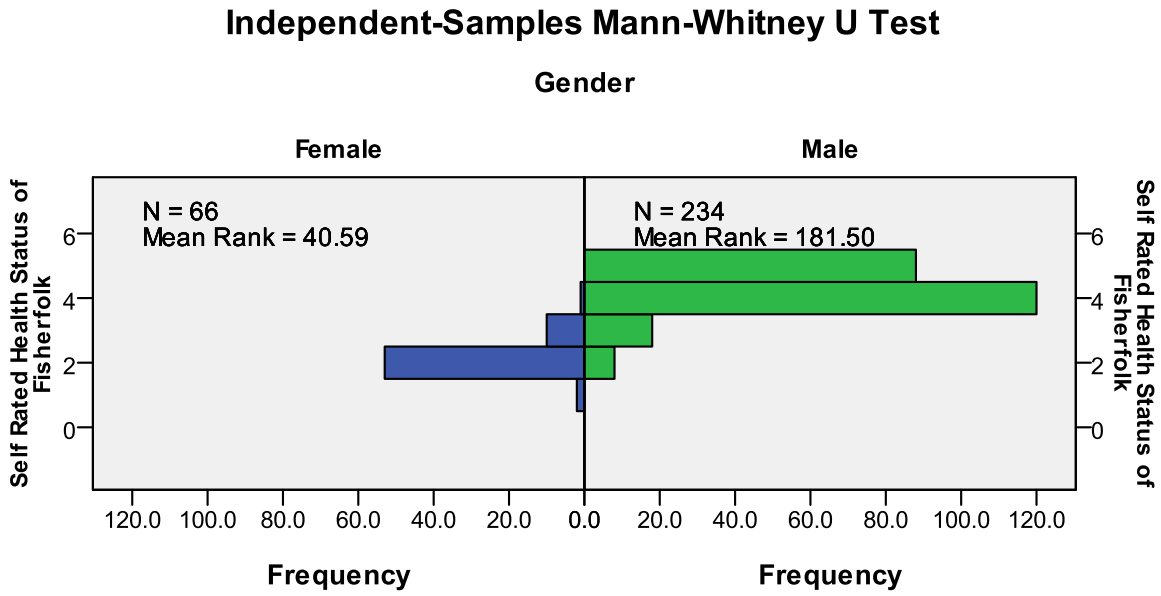
Thus it can be seen that the new generation is not active in the fishery sector. Even though modernization opens new opportunities in this sector, the fishing parents do not bring their children into this occupation. There are various reasons for this like better jobs in other sector, government jobs etc. It appeared that the parents didn't want their children to face the same hardship they faced in the fishing profession.

4.7 Health Status

Nobel Laureate Amartya subunit postulates that health (like education) is among the essential capabilities that provides worth to human life .Health is crucial in deciding the economic process and development of an economy. Healthier and educated work force is the driving force of any economy or sector. During the survey data on health status of fishermen were collected. Data represents the self rating of fishermen regarding their health in a 5 scale likert. The analysis is done for finding the role of gender in the health status of fisher folk. Figure 4.9 represents the results of independent Mann-Whitney U Test. It reveals that the distribution of self rated health status of fisher folk is not the same across categories of Gender. I.e. there are significant differences among the male and female workers. The direction of difference is little bit problematic that the female are unhealthier than the male counterparts even at one percent significance. The mean rank of 66 female workers is only 40.59 in compared to 181.50 of 244 male fishermen.

Figure 4.11

Self Rated Health Status Fishermen: Gender Wise



Total N	300
Mann-Whitney U	14,976.000
Wilcoxon W	42,471.000
Test Statistic	14,976.000
Standard Error	590.444
Standardized Test Statistic	12.286
Asymptotic Sig. (2-sided test)	.000

Source: SPSS output on analysis of Primary Data

4.8. Difficulties Encountered in Fishing

Fishery activities are not so smooth and easy. They are involved several difficulties. The respondents are asked about the difficulties involved in the fishing occupation. The problems suggested are summarised as in table 4.33

Table 4.32

Difficulties Encountered in Fishing Sector

Sl. No	Problems	Percent
1	Cleaning vessels and boats	44
2	Damage caused to the fishing net due to rocks and dolphins	35
4	Shortage of kerosene	100
5	Lack of fish	92
7	Fisher men face unemployment due to seasonal fishing	100
8	Problems due to lack of nearby harbour	67
9	Banned on trawling	62

Source: Primary survey

Shortage of kerosene and seasonal fishing are the major difficulties faced by fisher folk in the study area. All respondents are facing the above said difficulties in their work. 92 percent of respondents are facing the difficulty of lack fish. About 67 percent of respondents are facing the problem of lack of nearby harbour. Only 35 percent respondents are facing the problem damage caused to the fishing net due to rocks and dolphins.

4.9 Concluding remarks

This chapter analysed the socio - economic and occupational status of the fishermen community For the purpose of analysis this chapter has been sub divided into four parts such as demographic and educational status of fishermen, economic status of fishermen community, Socio- cultural status of fishermen community and Occupation status of the fishermen community. Important findings of the data analysis are pointed out below

- The average size of the households is comparatively very large.

- It can be noted that majority of the respondents are belonging to Hindu community
- The participation of 22 percent female population is found in fishery sector
- It can be seen that the male literacy rate among the fishermen is estimated to be 94 percent and female literacy rate among the fishermen community is 89.3 percent
- Maximum number of fishermen is having educational qualification below SSLC. Nearly 23 percent are having +2 to degree education. 13 percent have PG and above level of education
- It can be noticed that majority of fishermen community in the study is having semi pucca houses. This accounts for nearly 60 percent of the respondents
- It can be seen that majority of fishermen households have less than 10 cents of land area.
- Fishermen community is holding many of the requirements at home.
- 53 percent of the total respondents have their own boats for fishing.
- Majority i.e. 67 percent household depend on fishery activities for their living
- 132 respondents are having income between 5000 and 10000
- It is an interesting fact to be noted that huge majority (94.3 percent) of the fishermen community are under debt.
- Most of the respondents i.e. 39.2 percent depend on private individuals/money lenders.
- It can be noted that fishermen community in the study area do participate in various organisations like political parties, trade unions, NGOs etc
- It can be found that 48 percent respondents used to read newspapers and magazines in the selected study area. Most of them are viewers of TV that is 75 percent used to watch TV and 35 percent used to enjoy radio programmes.
- It can be thus seen that majority i.e. 67 percent household depend on fishery activities for their living

- Majority of fishermen in the study area go for fishing activities in 6 days in a week. They include 31.6 percent. Next comes 28.3 percent undertake fishing activities in 5 days in a week
- Majority of fishermen in the study area have fishing experience of more than 10 years. They comprise of 34 percent of the total respondents
- it is interesting to note that majority of the respondents that is 60 percent adopt modern technology
- Almost 88 respondents replied that their children are not taking up fishing activities because of their lack of interest. Only 12 percent respondents say their children prefer fishing activities.
- among the 300 respondents 111 admit that there is women involvement in fishing related occupation
- Women are involved in various types of fishing related occupation in the coastal areas. Their activities include selling the final product, processing, cleaning vessels and boats etc.

CHAPTER 5

THE SPREAD OF MODERN TECHNOLOGY AND ITS INFLUENCE ON THE INCOME AND EXPENDITURE OF THE FISHING COMMUNITY

5.1 Spread of Modern Technology in Kerala
5.2 Job Satisfaction and Technology
5.3 Comparison of new Technology and Traditional Methods
5.4 Effectiveness of Technology
5.5 Extent of Technology
5.6. Modern technology and its Influence on the income and expenditure of the fishing community
5.7 Clash of Technology on livelihoods and other economic indicators of Fishing Community
5.8 Impact on Expenditure
5.9Technology and Expenditure (maintenance of equipments)
5.10 Financing of Technology
5.11. Concluding remarks

Chapter 5

THE SPREAD OF MODERN TECHNOLOGY AND ITS INFLUENCE ON THE INCOME AND EXPENDITURE OF THE FISHING COMMUNITY

Fisheries sector holds an important position in the development of a nation. The modernisation and constant changes and up gradation of existing fishing technologies helped to increase the efficiency of fishing and allied activities. At the same time it has made some sort of negative impact on those who are unable or reluctant to keep up with the changes that happened in the fishing technology. The motorized and non motorized fishing become a hot thought for the scholars since it is connected to the sustainability in fishing. The mechanised fishing obviously did well in the economics of fisher folk those who adopted technology, but did worse in the case of fisher folk those who didn't adopt technology.

5.1 Spread of Modern Technology in Kerala

Technology is an inevitable factor of development. Introduction of any kind of advanced technology in any fields of economic activity generates incomparable differences in the returns from the fields where it has implemented is an unveiled truth. Implementation of new technology is the only way to reap the unexploited coastal resource. The table 5.1 reveals that the fishing sector of Kerala is not reluctant to adopt any type of modern technology in order compete with the fishing people of abroad. Here 60 percent of people are using advanced technology for the results beyond their expectations, or the fishing sector is transforming technologically like anything and the result will be their economic and social development and finally the nation's economic growth since the

Table 5.1

Application of technology in the fishing sector

Sl. No	Application of technology	Number of respondents	Percentage
1	Use modern technology	180	60
2	Do not use modern technology	64	21.33
3	No idea about modern technology	56	18.67
	Total	300	100

Source: Primary Survey

Coastal resources have high international markets. But the reality that can't be ignored is that 21.33% of the population is pessimistic as they are avoiding modernisation. Another fact that has same importance is the unawareness of people regarding the modern technologies available to them even we are far ahead in every fields compared to other states of India. About 18.67% of total population belongs to this category. That is the pessimistic and ignorant people together make 40% of the population.

Table 5.2

Type of Fishing Gear Owned

Sl. No	Types of Fishing Gear	Number of respondents	Percentage
1	Traditional Fishing	90	30
2	Motorized Fishing	74	24.67
3	Mechanized Fishing	136	45.33
	Total	300	100

Source: Primary Survey

Fishing gear refers to the equipments used by fishermen. This includes bag nets, scoop nets, traps, plunge baskets, seines, drift grill nets, Chinese dip nets, fishing crafts etc. The fishing gears may be traditional or modernised. About 70% of the

population own modern fishing gears such as motorised boats, mechanised crafts and other equipments. Among this, 45 % prefer mechanised fishing methods and the remaining 25% use motorised fishing techniques. It will be noted that even in this age of technological explosion 30% are using or preferring the outdated fishing techniques which have been existing for several years or follows the methods of ancient times. In fact a major portion of the population is ignorant about modern facilities and technologies that are to be used in fishing; here these people may not alone be blamed. The inefficient governing bodies also have to bear the responsibility of this.

The table 5.3 incontrovertibly states that Kerala has an advanced group of fishermen. The large percentages in terms of application of technology in fishing, preserving and marketing the products substantiate this.

Table 5.3

Nature of technology

Sl. No	Nature of technology	Number of respondents	Percentage
1	Technology applied in fishing	224	74.67
2	Technology applied in terms of preserving	190	63.33
3	Technology applied in terms of marketing	144	48

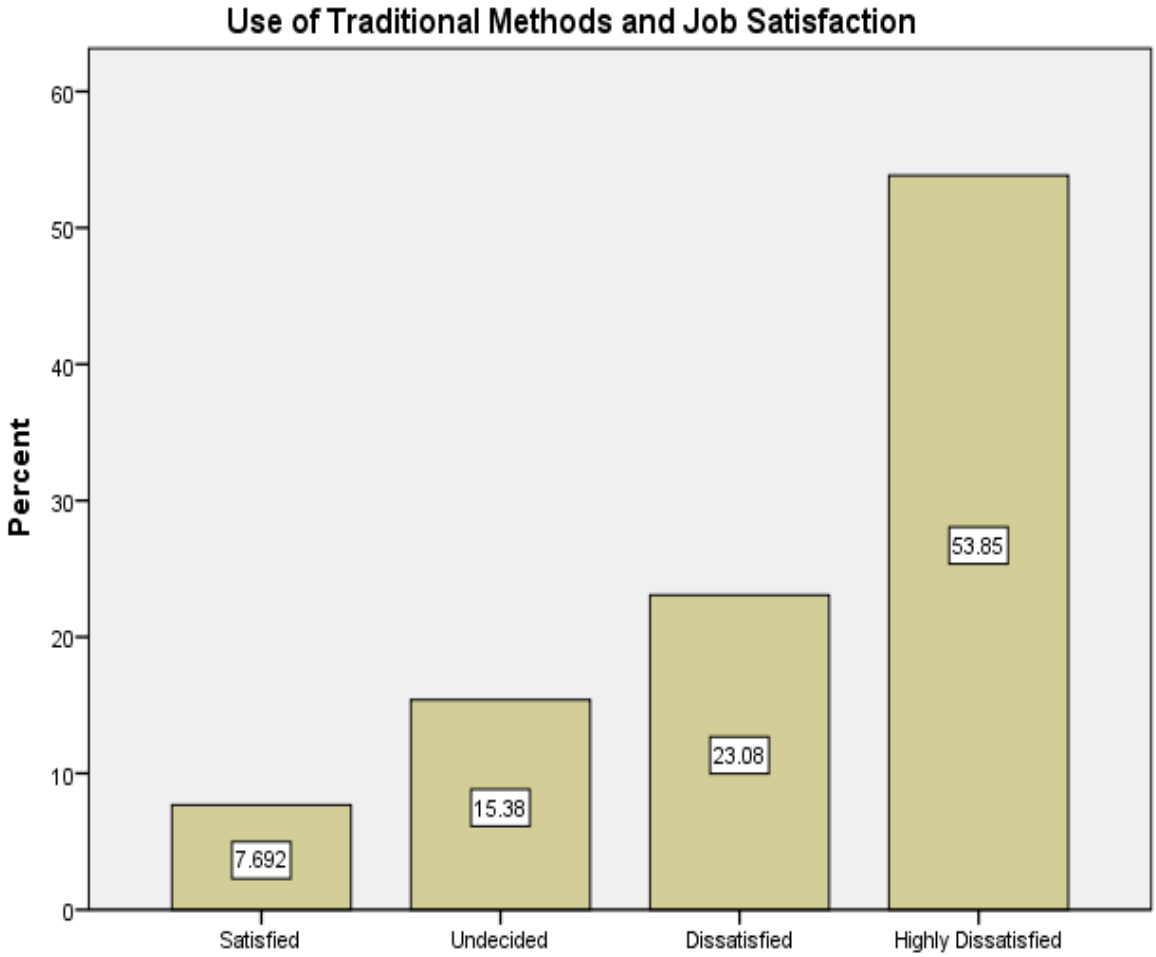
Source: Primary Survey

Different methods or ways applied for catching fish is simply known as fishing technology. Hand gathering, angling, netting, trapping are some methods commonly used in fishing. 224 respondents out of 300 have applied technology in fishing and this constitutes approximately 75 % of the total population.

The preservation of seafood also includes processing and storage. It is for the prevention of growth of microbial loads in fisheries by controlling temperature and water content to reduce the magnitude of spoilage. The ancient preserving methods of drying, salting, smoking, pickling have been supplanted by the modernised methods of

freezing, chilling, canning etc. More than 63 percent among the fishermen apply preservation technologies in the state. This is a good sign of modernisation of the fisheries sector.

Figure 5.1



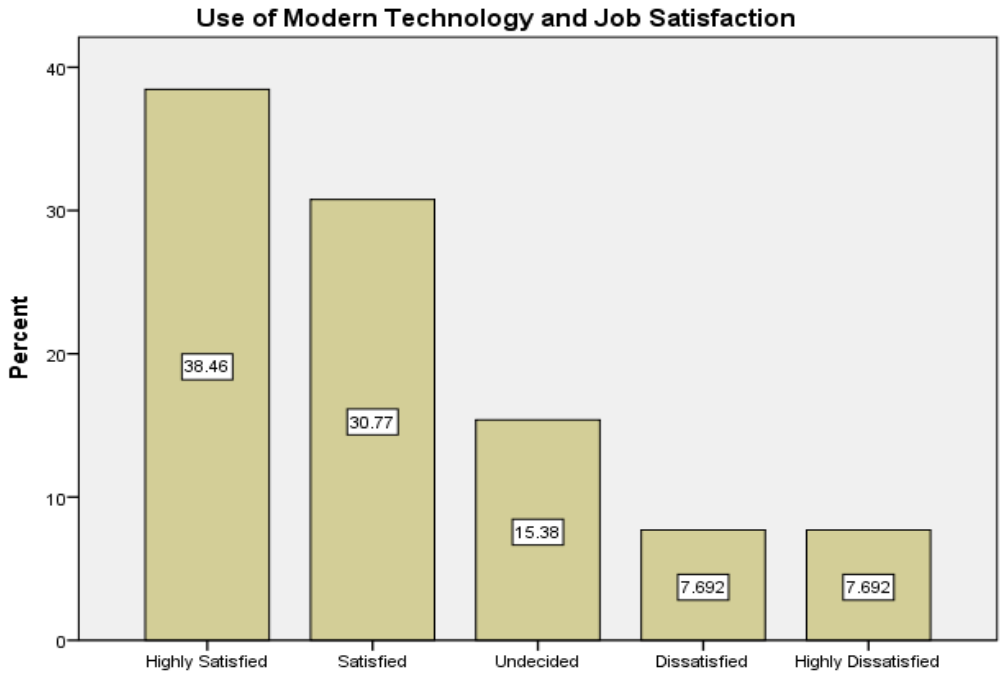
Source: Primary Survey

Good marketing facility is important to the development of fisheries sector. Then only the fishermen can ensure sufficient income and the employment opportunities can be raised. Marketing facilities minimises the intensity of post harvest lost. In the state of Kerala the caught fish are marketed trough wholesalers, major and minor retailers and unhygienic road side marketing. The table 2.3 shows the fact that only 48% have adopted modernised marketing technologies and residual 52% follow the obsolete marketing methods.

5.2 Job Satisfaction and Technology

Job satisfaction refers to the feelings of a person to his or her job. It is the rate of satisfaction or pleasure of a man while doing a job. Andrew states that job satisfaction is the amount of pleasure or contentment of person associated with a job. Satisfaction in job depends on many factors such as wage, attitude of superiors and co workers, other returns from the job, security in the working place, etc. When the fishing group is taken into account, it is seen from the diagram 2.1; job satisfaction among the fishermen using traditional technology is very poor. Only 7.69% is satisfied with the outdated technologies and a large portion of people those who are using old technological devices in fishing, marketing and preserving are highly dissatisfied with their methods. 53.85% constitute this group. Another fact to be noted here is the dissatisfied and highly dissatisfied people of using traditional technology together makes more than 76% and the inability of the people for modernising their job is the reason.

Figure 5.2



Technologies always create a positive impact on the job satisfaction among most of the people even it has many drawbacks. The technological advancement which is highly worker friendly increases the pleasure of the working force by reducing their work loads and it will raise the production and productivity in total.

The case is not different among the fishing community. Figure 5.2 shows that 38.46 % of respondents owning modernized equipments are highly satisfied or contented with their job and this symbolize the high rate of earnings, easiness of works, co-operation among the people etc. 30.77% belong to the group of satisfied people in implementing modern facilities. These two compartments-highly satisfied and satisfied orbit to more than 69%. Dissatisfaction is common in any changes occurred in any fields. Here 7.69% respondents are dissatisfied with the adoption and implementation of most modern technologies in their job. The same percentage is also found in the case of highly dissatisfied people and 15.38% respondents do not have any clear cut opinion about the impact of technologies on job satisfaction.

Table 5.4

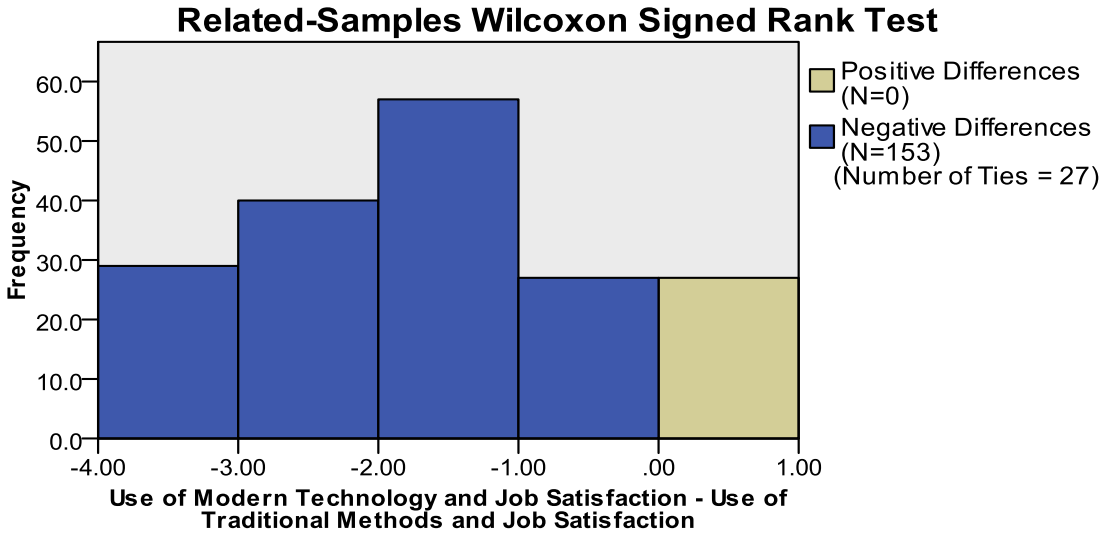
Hypothesis Test Summary				
	Null Hypothesis	**Test**	**Sig.**	**Decision**
1	The median of differences between Use of Traditional Methods and Job Satisfaction and Use of Modern Technology and Job Satisfaction equals 0.	Related-Samples Wilcoxon Signed Rank Test	.000	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is .05.				

Descriptive statistics on job satisfaction level among fisher folk shows that the technology has significant impact on the attitude of fisher folk towards their work. The method of personal insight gives evidence for a linear positive association between modernization of fishing and job satisfaction. On contrary basic descriptive statistics depicts a negative linear association between traditional

methods/conventional methods and job satisfaction of fisher folks. The observed behaviors are tested and validated by the tool of wilcoxon signed rank test.

The test results and statistics are represented by table 5.4 and diagram 5.3 respectively. The hypothesis of no difference is rejected by the observed significance. It means that there is significant difference in job satisfaction among fisher folk those who are using traditional and modern technology. Thus the observed behaviors in diagram 5.1 and 5.2 are corroborated by the Related-Samples Wilcoxon Signed Rank Test. Test statistics of Wilcoxon Signed Rank and median rank differences are shown in the figure 5.3

Figure 5.3



Total N	180
Test Statistic	.000
Standard Error	543.407
Standardized Test Statistic	-10.840
Asymptotic Sig. (2-sided test)	.000

Modernisation and mechanisation of crafts and gears are essential for the growth of fisheries sector. It raises the productivity and profitability of fishermen. So technology can be considered as potential source of benefits to the fishing community.68.66% of population strongly believe technology is always helpful to them. But 20.66% opined that technological changes did not make any benefits to their economic or social conditions. There are also people with no opinion regarding the introduction and implementation of modern technology in methods of fishing, preservation or marketing. This group of people are about 32 among the 300 respondents or it surrounds to the percentage of 10.66.

Table 5.5

Helpfulness of new Technology

Sl. No	Helpfulness new of technology	Number of respondents	Percentage
1	Technology is helpful	206	68.67
2	Technology is not helpful	62	20.67
3	No opinion	32	10.66
	Total	300	100

Source: Primary Survey

5.3 Comparison of new technology and traditional methods

If a comparison is made between the modern and traditional technologies and its usefulness, it can be found that every person who has implemented new technology in methods of fishing, preservation and marketing is sure about its usefulness and advantages. These people are about 60% of the total population. 28% people still stand for the traditional methods as they are comfort with it. The inconvenience in using advanced technologies may be the root cause for the non adoption of it. A number of 36 persons or 12% of the population do not have any opinion about the

advantages and disadvantages of both new and traditional technologies even though they are engaged in fishing activities using the old methods.

Table 5.6

Comparison of new technology and traditional methods

Sl.No	Type of Technology	Number of respondents	Percentage
•	Respondents of new technology	180	60
•	Respondents of traditional methods	84	28
•	No opinion	36	12
	Total	300	100

Source: Primary Survey

5.4 Effectiveness of Technology

The modernisation and up gradation of any field become worthless, if the adopted changes are ineffective. As per our primary survey, 180 respondents were adopted modern technology in their fishing whereas 84 respondents are still using traditional methods. The effectiveness of technology is assessed by taking responses of uses in a five scale likert of effectiveness. Recorded responses are tested and validated by Mann-Whitney U Test.

Total 264 fishermen are recorded their responses at five scale likert. 180 responses are marked from the users of modern technology, whereas 84 responses are marked from the users of traditional technology. The mean rank of responses marked against modern technology is 156.75 and it is 80.54 in traditional technology. The observed behaviour is statistically validated by the rejection of null hypothesis even at 1 percent level of significance

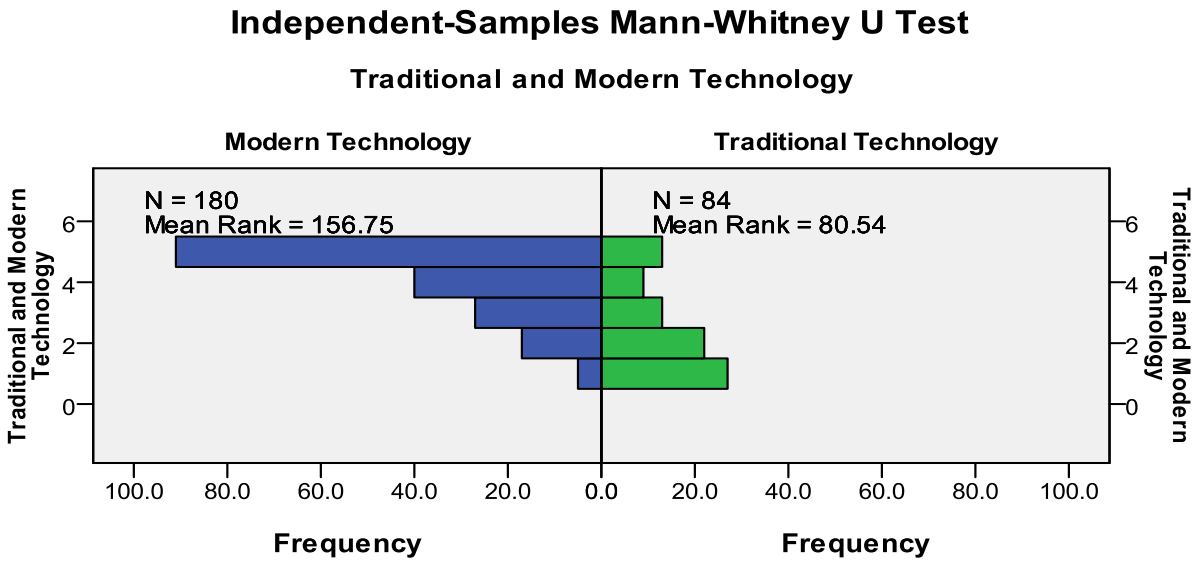
Table 5.7

Effectiveness of Technology

Hypothesis Test Summary				
	Null Hypothesis	**Test**	**Sig.**	**Decision**
1	The distribution of effectiveness is the same across categories of Traditional and Modern Technology.	Independent-Samples Mann-Whitney U Test	.000	Reject the null hypothesis.
Asymptotic significances are displayed. The significance level is .05.				
Note: 5 scale likert. 5= Highly Effective, 4= Effective, 3= Undecided, 2= Ineffective, 1= Totally Ineffective				

The test statistics of 3195.5 at .001 significance corroborate that the the distribution of effectiveness is not same across categories of Traditional and Modern Technology. The direction of difference is found by mean ranks. Fisher men those who are using modern technology feel the technology are more effective than the older ones. Fisher men those who are using traditional methods feel the technology are not effective.

Figure 5.4



Total N	264
Mann-Whitney U	3,195.500
Wilcoxon W	6,765.500
Test Statistic	3,195.500
Standard Error	555.449
Standardized Test Statistic	-7.858
Asymptotic Sig. (2-sided test)	.000

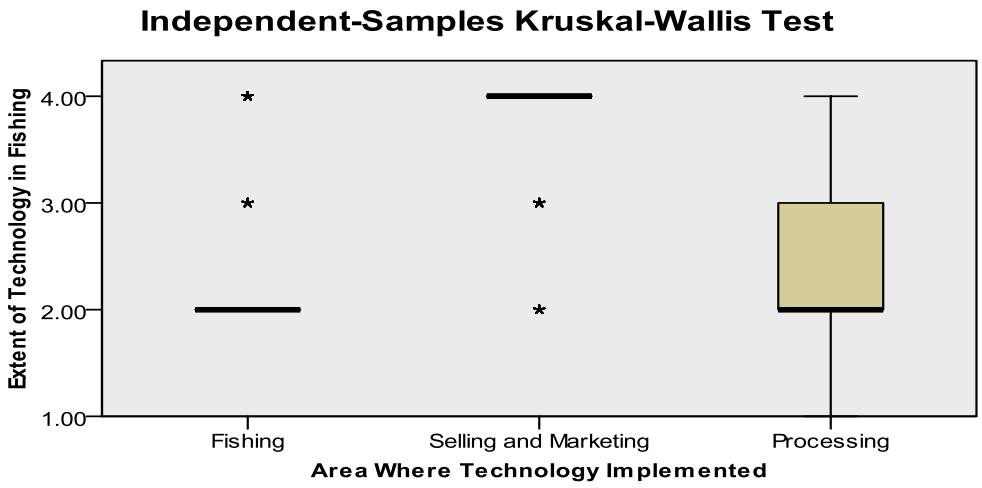
5.5 Extent of Technology

Application of technology is crucial for improving productivity and efficiency of any activity. An economic sector with most modern technology will definitely make huge jump in its growth and development. The fishery sector is not an exception to this. This study give insight to the extent of mechanisation in fishing and allied activities, where the area of activities are classified in to three i.e. Direct fishing, processing and

selling and marketing. In each category the respondents were asked to rate the implementation of technology as great extent, somewhat, very little and not at all. The difference in the implementation of technology in each category is tested by independent samples Kruskal Wallis Test.

Figure 5.5

Extent of Technology in Fishing



Total N	540
Test Statistic	330.083
Degrees of Freedom	2
Asymptotic Sig. (2-sided test)	.000

1. The test statistic is adjusted for ties.

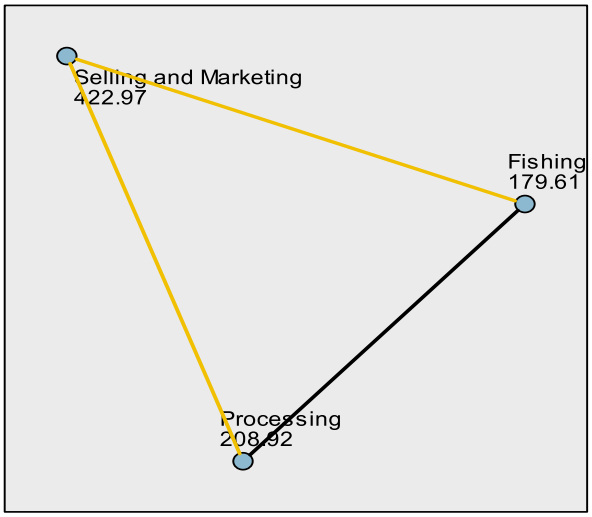
Source: SPSS output on analysis of Primary Data

The output shown in figure 5.5makes sure that the 'Extent of Technology' applied in Fishing, selling and processing is not same. But it doesn't mean the difference is valid across all categories. The pair wise comparison depicted in diagram5.6 reveals that the technology implemented in fishing and processing are very poor. Mean rank of fishing and processing are 179.61 and 208.92 respectively. Statistically those differences are insignificant as it is depicted in the first pair of

comparison. Technology is well implemented in selling and marketing as it occupies the highest mean rank among three categories. Implementation of technology selling and marketing is significantly different fishing and processing as it is depicted in the second and third pair of comparison.

Figure 5.6

Pairwise Comparisons of Area Where Technology Implemented



Each node shows the sample average rank of Area Where Technology Implemented.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Fishing-Processing	-29.311	14.625	-2.004	.045	.135
Fishing-Selling and Marketing	-243.356	14.625	-16.640	.000	.000
Processing-Selling and Marketing	214.044	14.625	14.636	.000	.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

Source: SPSS output on analysis of Primary Data

Table 5.8

Interest payments per month

Sl. No	Interest payments per month	Number of respondents	Percentage
4	Below 2 %	0	0
5	2-4 %	20	12.98
6	4-10 %	112	72.72
7	Above 10%	22	14.28
	Total	154	100

Source: Primary Survey

Rate of interest charged from the debtors varies according to the nature of borrowing and the type of institutions. When the monthly rates of interest paid by community are taken for analysis, the undisputable reality is that for a large folk the rates are not affordable in relation to their income. Here no one is paying interest lower than 2%. Otherwise it can be read as no institutions lend money at very low rate.

5.6. Modern technology and its Influence on the income and expenditure of the fishing community

The given ANOVA regression model shows the mean difference of income among fisher folk those who are using technology and traditional methods in fishing. Where the dependent variable is income which is measured at scale (rupees).

Table 5.9

Technology Applied in Fishing and Its Impact on Income

ANOVA Regression Model

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10925.0	507.298		21.536	.000
	Fisher men using technology in fishing	6788.83	587.083	.557	11.564	.000

1. Dependent Variable: Income
2. Excluded Category: Users of traditional fishing

$$\mathbf{Y = \beta_1 + \beta_2 D_2 + \mu}$$

Where,

Y = Income

β_1 = Reference category or intercept value

β_2 = slope coefficient

D_2 = Dummy variable of fisher men using technology in fishing

μ = Stochastic error term

Users of technology and users of traditional methods in fishing are taken as independent variable, which are represented as dummies (categorical or dichotomous) in the model. The estimated model proves that there are significant mean differences in income among fisher men using technology in fishing and not using technology in fishing. As predication equation represents the mean income of fisher men not using technology in fishing is rupees 10925.0 (it's the value of reference or excluded category). The coefficient value fisher men using technology in fishing is 6788.83 with positive sign. As these regression results show, the mean income of fisher men using technology in fishing is rupees 17713.8, which is higher by about rupees

6788.83 in compared to mean income of fisher men not using any technology in fishing. These results are validated by observed significance at given level of significance. (5%). Based on the results the reliable prediction equation is,

$Y = 10925.0 + 6788.83\, D_2 + \mu$

5.7 Clash of Technology on Livelihoods and Other Economic Indicators of Fishing Community

Technology has immense impact on the progress and development of human life. Now days in every walk of life, we see technology assist human to do their activity more precisely and productive manner. Person who doesn't adaptive to the technology has no more existence in coming years whether it is in the field of entertainment or employment. This part of analysis tries to explain the clash of technology means traditional and modern on the livelihoods and other economic indicators of fishermen the study area.

Table 5.10

Descriptive Statistics of Monthly Income (in Rupees) among Fishermen Using Traditional and Modern Technology

Variables	Number	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Use modern technology	180	3665.37	7557.863	623.362	1250	45000
Do not use modern technology	64	2599.58	2244.157	204.863	800	38000
No idea about modern technology	56	2459.40	4289.889	371.981	950	32000

Source: Primary Survey

Table 5.10 shows the distribution of income among the fishermen in the study area. On the basis of use of technology in fishing they have been divided in to three categories as fishermen using modern technology, fishermen do not use modern technology and fishermen with no idea about technology respectively. Out of 300

samples 180 fishermen are actively using modern technology and they have rupees 3665.37 as mean income. The range of income of Fishermen using modern technology is rupees1250 to 45000. The mean income of fishermen who do not use technology is rupees 2599.58 with range of rupees 800 to 38000. The men income of fishermen who indifferent about the use of technology is 2459.40 with range of 950 to 3200. It clearly shows that fishermen having access to technology are able to earn more income than that of fishermen using traditional methods. In between these two category the mean difference rupees 1065.79. It shows the positive impact of technology on the livelihoods of fishermen. Another interesting fact to be noted that, even the mean income of fishermen using technology is higher but it is not consistent or not stable among each individual fishermen. Standard deviation income of fishermen using technology is three times higher than that of fishermen using traditional methods confirm the fact that fishermen using technology faces fluctuations in earning their income. But it is somehow stable and consistent among traditional fishermen.

Table 5.11

Descriptive Statistics of Saving of Last Six Months (in Rupees) among Fishermen Using Traditional and Modern Technology

Variables	Number	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Use modern technology	180	1647.96	212.525	17.529	500	8000
Do not use modern technology	64	670.00	163.342	14.911	500	2850
No idea about modern technology	56	600.38	217.466	18.857	500	2250

Source: Primary Survey

Saving is an indicator of financial wellbeing and discipline. As Keynesian theory of consumptions says as income increases consumptions also increases but less than proportionately. It shows the positive association of income and saving since the increased income is not fully used consumption. Keynes says that the portion of increased income will be used for saving; therefore marginal propensity to save (MPS) always has a value in consumption function. This well celebrated theory in economics

is Cleary depicted in the above table 5.11, which shows the statistics of saving of fishermen using modern and traditional technology. As we saw in table 5.10 fishermen having access to modern technology generates more income since they are able to have more income they also able to more saving as stated in Keynesian theory. The average saving of fishermen using technology is rupees 1647.96 which is 2.5 times bigger than that of fishermen using traditional technology. The mean saving of fisher men using traditional technology is rupees 670. Its rupees 600 among fishermen those who don't have any idea about technology. The range of saving among fishermen using technology is rupees 500 to 8000. It is rupees 500 to 2850 among fishermen using traditional technology. The mean difference of saving between fishermen using traditional and modern technology is rupees 977.96, stands as a point of positive impact of technology on livelihoods. The standard deviation of saving of three categories is consistent with lowest value among fishermen using traditional methods.

Table 5.12
Descriptive Statistics of Existing Loan (in Rupees)from Formal Sources among Fishermen Using Traditional and Modern Technology

Variables	Number	17490.82	Std. Deviation	Std. Error	Minimum	Maximum
Use modern technology	180	7802.08	40529.888	3342.849	0	750000
Do not use modern technology	64	8800.75	68329.173	6237.572	0	350000
No idea about modern technology	56		66483.983	5764.892	0	350000

Source: Primary Survey

Amount of cash that's borrowed, usually from a bank, and needs to be paid back, typically along with an additional quantity of cash that you simply got to pay as a charge for borrowing is (Cambridge Dictionary of English)known as loan. So the person those who avail the loan should have the ability to repay. Person with consistent income and good credit records will have much higher accessibility to formal sources of loans like banks and other non-banking financial companies. Person those who don't have stable income and good credit score

usually depends informal credit sources like moneylenders and other unorganised rural bankers to meeting their consumption and production needs. Table 5.12 depicts the descriptive statistics of loan (in rupees) from formal sources among fishermen using traditional and modern technology. As we seen in previous discussions access to formal sources to loan is higher among fishermen having technology. Their mean loan amount is rupees 17490.82 in compared to rupees 7802.08 of traditional fishermen. It clearly shows traditional fishermen still lack access to the formal source for their credit needs, moreover those who have access to the source have denied loan as much as extended to the fishermen using modern technology in fishing. For that formal credit sources may have justifications like loan is advanced in proportion to the income. It is interesting to note that somebody is still not availed or not have access to formal credit sources as since the minimum value column remains vacant. In this context, Inclusion especially financial should be a matter of question.

Table 5.13

Descriptive Statistics of Existing Loan (in Rupees)from Informal Sources among Fishermen Using Traditional and Modern Technology

Variables	Number	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Use modern technology	180	1228.40	1204.576	1016.873	0	10000
Do not use modern technology	64	1245.63	1206.813	1018.879	0	10000
No idea about modern technology	56	1215.79	1186.978	1016.213	0	10000

Source: Primary Survey

Person those who doesn't have access or denied access to formal credit sources usually depends informal sources like money lenders, friends and relations, private financial companies to meet their urgent financial needs in the form of loans and advances. Those who avail such loans or advances have to pay higher interest usually four to five times higher than that of formal sources. Table 5.13 shows descriptive

statistics of loan from informal sources among fishermen using traditional and modern technology. It shows fishermen using traditional technology avail average rupees 1245.63 as loan from informal sources which is higher than the average loan availibility of fishermen using technology. Fishermen using technology avail average 1228.40 which is less by rupees 15.23 compared to fishermen using technology. In all three categories maximum amount of loan availed are 10000 which shows informal sources are not ready to extend higher amounts as loan to fishermen in any category. Again it shows that irrespective of source of income or any criteria they are ready to extend the loan to the fishermen. Zero value in the minimum column shows some of the fishermen are not availing loan from informal sources as seen in the formal sources

Table 5.14

Descriptive Statistics of Active Working Hours (Per day) among Fishermen Using Traditional and Modern Technology

Variables	Number	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Use modern technology	180	9.80	1.520	.125	5	15
Do not use modern technology	64	9.85	1.766	.161	4	14
No idea about modern technology	56	9.88	1.778	.152	6	14

Source: Primary Survey

Table 5.14 shows the statistics of average per day working hours of fisher men in all three categories. It's interesting to see that active working hours of all three categories of fishermen are more or less same. It means irrespective of technology they have to spend a minimum time in sea to finish their work. Average working hours of fishermen using technology is 9.80 and it is 9.85 among fishermen using traditional technology. Range of each category shows maximum hours of active working is 15 (using technology) and minimum time of active working is 4(traditional). It is to be

noted that technology has immense impact on the earning of fishermen even though their active working hours are same. In table 5.10 we saw that average monthly income of fishermen using technology is 3665.37 which is higher by rupees 1065.79 than of traditional fishermen. It means even though the active working hours are same the productivity and earning is much higher among fishermen using technology. It is evident to say that technology has positive higher impact on both productivity and earning of fishermen. Means mechanisation or use of technology will bring better changes in the socio economic conditions of fishermen.

5.8 Impact on Expenditure

Technology in fishing sector mainly includes mechanised and motorised fishing gears, methods in gathering, marketing facilities, and new conservation and preservation methods to reduce post harvesting loss. Smart weighing machines, GPS facilities to identify the moving fish fleet, weather predicting technologies in boats etc are some other forms of modern technologies that can be implemented in the fishing sector. These implementation demands high monetary expenses from the side of the fishing folk. There are only 180 respondents have implemented modernised technologies and if their yearly expenditure for the purpose is considered, it would be noted that 25.56% people spend less than 5000 rupees and 34.44% have spending pattern between 5000 and 10000. These expenditure patterns are insufficient and inadequate for the modernisation of the fishing sector in any manner. Among those who have implemented modern technologies, 40% people have a spending pattern more than 10000 rupees in a year. The reason for the low expenses by the 60% people can be traced to the low income of the people.

Table 5.15

Yearly expenditure on implementation of technology

Sl. No	Maintenance of craft	Number of respondents	Percentage
•	Below 5000	46	25.56
•	5000-10000	62	34.44
•	Above 10000	72	40
	Total	180	100

Source: Primary Survey

5.9 Technology and Expenditure (maintenance of equipments)

Application of technology in any field requires maintenance. Maintenance is the deliberate employment of resources in the form of service rendered by labors, components which are used as spare parts, other equipments and materials to keep the operative nature of a technology or capital. To do such maintenance a sufficient amount of monetary resource is to be devoted (expenditure). The size of maintenance expenditure definitely affects the sustainability of fishing more over the living status of fisher folks.

Table 5.16

Yearly expenditure on Maintenance of equipment

Sl.No	Maintenance of craft	Number of respondents	Percentage
•	Below 5000	46	25.56
•	5000-10000	62	34.44
•	Above 10000	72	40
	Total	180	100

Source: Primary Survey

Implementation of technology alone can't make a job profitable. The implemented machineries have to be frequently maintained for its long life and good working conditions. Then only the equipments will be efficient and the fishermen can

ensure the expected return at the time of implementation. The expenditure can be incurred monthly, trimester, quarterly, half yearly or even yearly. Here, the yearly spending by the fishermen for the maintenance is taken into account and it is evident that there is a same pattern of expenditure on both implementation and maintenance of equipments by the fishing folk. 46 respondents among those who have introduced modern technologies pay out less than 5000 rupees in a year and it constitutes 25.56% and about 34.44 %(62 in number) people spends an amount between rupees 5000 and 10000. Seventy two people who own modernised and mechanised machineries spend some what high amount for maintaining the equipments and surrounds to 40%. The comparatively huge amount is spent out of their high income or they belong to the creamy layer among the fishing community.

Table 5.16 shows that the fisher men those who are using technology need an average rupees 10513.83 monthly to maintain their given technology. Fishermen those who are using traditional methods have to spend merely rupees 3725.00 per year in an average.

Table 5.17

Expenditure for maintenance

Group Statistics					
	Use of Technology	N	Mean	Std. Deviation	Std. Error Mean
Expenditure for maintaining fishing equipments(yearly)	Modern Technology	224	10513.83	4917.39	328.55
	Traditional Methods	76	3725.00	2411.59	276.62

Source: Primary Survey

Table 5.18

Independent Samples Test of Expenditure

Independent Samples Test									
Expenditure for maintaining fishing equipments	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	40.86	.000	11.56	298	.000	6788.83	587.08	5633.48	7944.19
Equal variances not assumed			15.80	261.10	.000	6788.83	429.50	5943.10	7634.57

Source: Primary Survey

The differences which are shown in table 2.8 are statistically tested and its results are shown in the table 2.9. The results of parametric independent sample t test shows that mean difference of rupees 6788.83 is highly significant. Even at one percent level of significance. Thus the hypothesis of significant mean difference in expenditure among users of modern and traditional methods is accepted and validated by the t test.

5.10 Financing of Technology

Advancement of fishing sector demands huge financing as the other sectors of the economy. The major reason for this is the large amount of money that has to be rendered mainly on fishing crafts. Fishermen can never meet these expenses with their very low income. They find it from banks, private financial institutions, the government and other sources or it is to be said that financing of technological changes is done mainly through borrowing. Here the table shows 57.77 % or 104 people find finance for modernisation by seeking assistance from banks and government. If these two are again analysed, among the 180 people having

modernised crafts and gears only 24.44% depend banks and the other fragment of 33.33% receive governmental support.

Table 5. 19
Mode of financing technology changes

Sl.No	Mode of financing technology changes	Number of respondents	Percentage
1.	Banks	44	24.44
2.	Private borrowing	54	30
3.	Government support	60	33.33
4.	Any other	22	12.22
	Total	180	100

Source: Primary Survey

Private lending institutions also have a major role in giving financial support to the fishermen community. About 30% of people maintain their expenses by the support of these private borrowings. Kerala is a state with high financial literacy and many nationalised and scheduled banks are running here to support the common people. The reality exposed here is that more than 12% people receive aids from other sources of finance. This source can be village money lenders or money lent by friends and relatives. If this trend is rising, it will cause the collapse of the fishing community.

Table 5.20

Money borrowed by respondents

Sl. No	Money borrowed by respondents	Number of respondents	Percentage
1.	Borrowed	154	85.56
2.	Not borrowed	26	14.44
	Total	180	100

Source: Primary Survey

Imbalance between income and expenditure makes borrowing a necessity. Thus borrowing has become a part of the day to day life of lay men. The case of fishermen is not different at all. More than 51% of the fisheries community approach banking

and non banking financial institutions for the sole purpose of borrowing is an undeniable fact here. While analysing the table above, it is evident that borrowing is high among fishermen who own modernised equipments. There are 180 people with modern facilities among the respondents. Out of this, 154 have borrowed money from different sources and it comprises nearly 86% of the corresponding group. The 14% of people in the fishing sector with most modern technologies do not have any sort of financial liabilities. This shows, there is only a minute percentage of people have good financial back up. If it is explained by considering the whole population, this percentage shrinks to 8.66% community plays a very important role in the development of the country. The sector contributes to both export earning and food security by providing nutritional food in a large scale. It also creates employment opportunities to the young population of India. Introduction and implementation of new technologies haven't made much impact on the socio economic status of the fishing folk. They still remain very backward in every aspect of life and also regarded as degraded community. The table shows among the 300 respondents, 154 are indebted to different sources. In this, 96 people have purchased loan to meet their occupational needs or it is to be read as the percentages of 20.78 and 41.56 have taken loan for purchasing boats and equipment maintenance respectively.15.58% of borrowing is for non fishing purposes and the 34 respondents or the 22.07% can also be added to this category because the loans for other purposes can be taken as loans for non fishing purposes.

Table 5.21

Purpose of borrowing

Sl. No	Purpose of borrowing	Number of respondents	Percentage
a.	Non fishing purpose	24	15.58
b.	Purchase of boats	32	20.78
c.	Maintenance of equipment	64	41.55
d.	Any others	34	22.07
	Total	154	100

Source: Primary Survey

Table 5.22
Government support for technology implementation

Sl.No	Government support	Number of respondents	Percentage
1.	Receive support	108	70.1299
2.	Do not receive support	46	29.8701
	Total	154	100

Source: Primary Survey

As far as the fishing population is concerned, the governmental assistance in implementing advanced technologies or facilities in the fields of fishing, preservation and marketing is crucial, because these people do not have a sound financial background to transform their occupation into a highly modernised one. It will also keep the people away from the indebtedness budding out of the exploitative interest rates of private financial institutions and the village money lenders. The facts we realise from the study that only a small group of people is receiving government aids or for many people still it remains as an unachievable dream. Only 70% of the population receive any kind of financial support by the government and the remaining 30% are out of reach of the government. This tendency should be changed.

5.11 Concluding remarks

This chapter analysed the spread of modern technology and its influence on the income and expenditure of the fishing community. Technology is an inevitable factor of development. Introduction of any kind of advanced technology in any fields of economic activity generates incomparable differences in the returns from the fields where it has implemented is an unveiled truth. Implementation of new technology is the only way to reap the unexploited coastal resource. Major findings of the analysis are mentioned below

- Coastal resources have high international markets. But the reality that can't be ignored is that 21.33% of the population is pessimistic as they are avoiding modernisation. That is the pessimistic and ignorant people together make 40% of the population.

- More than 63 percent among the fishermen apply preservation technologies in the state. This is a good sign of modernisation of the fisheries sector.
- Only 48% have adopted modernised marketing technologies and residual 52% follow the obsolete marketing methods.
- 38.46 % of respondents owning modernized equipments are highly satisfied or contented with their job and this symbolizes the high rate of earnings, easiness of works, co-operation among the people etc.
- Descriptive statistics on job satisfaction level among fisher folk shows that the technology has significant impact on the attitude of fisher folk towards their work. The method of personal insight gives evidence for a linear positive association between modernization of fishing and job satisfaction. The observed behaviors are tested and validated by the tool of wilcoxon signed rank test.
- There is significant difference in job satisfaction among fisher folk those who are using traditional and modern technology. The effectiveness of technology is assessed by taking responses of uses in a five scale likert of effectiveness. Recorded responses are tested and validated by Mann-Whitney U Test.
- Fisher men those who are using modern technology feel the technology are more effective than the older ones. Fisher men those who are using traditional methods feel the technology are not effective.
- Statistically those differences are insignificant as it is depicted in the first pair of comparison. Technology is well implemented in selling and marketing as it occupies the highest mean rank among three categories. Implementation of technology selling and marketing is significantly different fishing and processing as it is depicted in the second and third pair of comparison. Rate of interest charged from the debtors varies according to the nature of borrowing and the type of institutions. When the monthly rates of interest paid by community are taken for analysis, the undisputable reality is that for a large folk the rates are not affordable in relation to their income.
- The estimated model proves that there are significant mean differences in income among fisher men using technology in fishing and not using technology in fishing.

- Implementation of technology alone can’t make a job profitable. The implemented machineries have to be frequently maintained for its long life and good working conditions. Then only the equipments will be efficient and the fishermen can ensure the expected return at the time of implementation
- The hypothesis of significant mean difference in expenditure among users of modern and traditional methods is accepted and validated by the t test.

CHAPTER 6

SUMMARY, FINDINGS AND CONCLUSION

6.1 Introduction

6.2 Summary and findings of the study

6.3 Suggestions

6.4 Concluding remarks

CHAPTER 6
SUMMARY, FINDINGS AND CONCLUSION

6.1 Introduction

The present study dealt with the significance of fisheries sector. It contributes to the value, exports, food and nutritional security and in employment generation. This sector is also a principal source of livelihood for a large section of economically under privileged population of the country, especially in the coastal areas. The growing production of fish suggests that the fisheries sector is booming and contributing to the economic growth of the nation. More than six million fisherman and fish farmers are totally dependent on fisheries for their livelihood in India. There has been a considerable increase both in the quantum and value of export of fish and fish products since independence. Fisheries sector plays a crucial role in the well-being of Kerala's state economy. The state accounts for one tenth of India's coast line of 6000 km. This sector has a prominent place in the economy of Kerala.

Technology has been accepted as an engine for economic growth and development. The availability and application of new technology is of great importance as a determinant of the nature and structure of the society and as a contributor to changes in environmental quality. Since before the industrial revolution economies and societies have relied on resources like wind, water, animal power and wood then on coal and finally on natural gas and petroleum. The 'scientific temper' of humanity is behind all scientific and technologic achievement of society. Thus technology was brought into the main stream of development.

Among the foremost vital developments that affected the historical evolution of paraphernalia and practices round the world are (i) Developments in craft technology and mechanization of propulsion, gear and catch handling (ii) Introduction of artificial gear materials (iii) Developments in acoustic fish

detection and satellite-based remote sensing techniques. (iv) Advances in electronic navigation and position fixing instrumentation. Kerala has been within the forefront in riveting innovative and new technologies in fishing practices and adoption of those technologies has light-emitting diode to marine fisheries to require a fancy structure. The state has been a pioneer in introducing several innovative measures in harvest and post-harvest technologies. In the first half of the 1980s, rapid motorization of the indigenous craft with Out Board Motors (OBM's) made the traditional sector more efficient. OBM became an integral part of the indigenous fisheries and the fishers could extend their activities to more distant and deeper waters. Slowly they started phasing out their dugout canoes with plank-built boats with transformed stern to fix their outboard engines conveniently. In the latter half of the 1980's a new innovative gear called ring seine became very popular in exploiting the pelagic resources and replaced the boat seines largely.

The important role played by the fisheries sector in Kerala is evident from the facts produces in the introductory section. Its relevance in providing employment, livelihood and food security is exceptional. The intensification of mechanized fishing, perceived as a threat to the sustenance of traditional fisheries sector and resource sustainability, culminated in the regulation of mechanized fishing activities through the Kerala Marine Fisheries Regulation Act 1980, and thereby enforced a ban on bottom trawling during the monsoon season since 1988.

The introduction of ban on trawling coincided with introduction of the extremely economical mass harvest gear, specifically the ring seine, by the standard motored sector, that resulted in a very quantum leap in the total pelagic fish production. Thus it is clear the mechanization in the fishing sector has got several positive as well as negative impacts on the living style and employment status of the fishing community. This study therefore, focuses on the impact of introduction of modern technologies on the fishing sector in Kerala.

The current study has been based on the following specific objectives

- *To examine the socio economic and occupational status of fishing community*
- *To analyse the spread of modern technology and its influence on the income and expenditure of the fishing community*
- *To identify the impact of implementation of modern technology on the fishing community*

The following Hypothesis contribute the basis for the study

- Modern technology in fishing has positively influenced the income generation of the fishing community
- The implementation of modern technology has improved the living standards of the fishing community

The present study confines to fishing sector of Kerala economy. The study is based both on time series secondary data and primary data. Secondary data related to fishing sector of Kerala and the technology aspects etc is collected and analyzed. In order to make national as well as international comparison, the data supplied by various government departments, organizations like Food and Agricultural Organization, World Trade Organization report etc. is used. The area of study is coastal areas of Thrissur district in Kerala. Data is collected from 4 villages in Thrissur district namely Valappad, Nattika, Vadanappally and Engandyur villages. A sample of 300 persons is selected at random from these areas for the purpose of analysis various statistical tools is used in course of the study.

6.2 Summary and findings of the study

The first objective of the study i.e., to examine the socio economic and occupational status of fishing community has been analysed in the fourth chapter. For the purpose of analysis the discussion has been arranged in four parts such as demographic and educational status of fishermen, economic status of fishermen community, Socio- cultural status of fishermen community and Occupation status of the fishermen community. Important findings of the data analysis are pointed out below

- The average size of the households is comparatively very large.
- It can be noted that majority of the respondents are belonging to Hindu community
- The participation of 22 percent female population is found in fishery sector
- It can be seen that the male literacy rate among the fishermen is estimated to be 94 percent and female literacy rate among the fishermen community is 89.3 percent
- Maximum number of fishermen is having educational qualification below SSLC. Nearly 23 percent are having +2 to degree education. 13 percent have PG and above level of education
- It can be noticed that majority of fishermen community in the study is having semi pucca houses. This accounts for nearly 60 percent of the respondents
- It can be seen that majority of fishermen households have less than 10 cents of land area.
- Fishermen community is holding many of the requirements at home.
- 53 percent of the total respondents have their own boats for fishing.
- Majority i.e. 67 percent household depend on fishery activities for their living
- 132 respondents are having income between 5000 and 10000
- It is an interesting fact to be noted that huge majority (94.3 percent) of the fishermen community are under debt.

- Most of the respondents i.e. 39.2 percent depend on private individuals/money lenders.
- It can be noted that fishermen community in the study area do participate in various organisations like political parties, trade unions, NGOs etc
- It can be found that 48 percent respondents used to read newspapers and magazines in the selected study area. Most of them are viewers of TV that is 75 percent used to watch TV and 35 percent used to enjoy radio programmes.
- It can be thus seen that majority i.e. 67 percent household depend on fishery activities for their living
- Majority of fishermen in the study area go for fishing activities in 6 days in a week. They include 31.6 percent. Next comes 28.3 percent undertake fishing activities in 5 days in a week
- Majority of fishermen in the study area have fishing experience of more than 10 years. They comprise of 34 percent of the total respondents
- It is interesting to note that majority of the respondents that is 60 percent adopt modern technology
- Almost 88 respondents replied that their children are not taking up fishing activities because of their lack of interest. Only 12 percent respondents say their children prefer fishing activities.
- Among the 300 respondents, 111 admit that there is women involvement in fishing related occupation
- Women are involved in various types of fishing related occupation in the coastal areas. Their activities include selling the final product, processing, cleaning vessels and boats etc.

The second and third objectives of the study i.e., to analyse the spread of modern technology and its influence on the income and expenditure of the fishing community and to identify the impact of implementation of modern technology on the fishing community are analysed in the fifth chapter. Major findings of the analysis are mentioned below

- Coastal resources have high international markets. But the reality that can't be ignored is that 21.33% of the population is pessimistic as they are avoiding modernisation. That is the pessimistic and ignorant people together make 40% of the population.
- More than 63 percent among the fishermen apply preservation technologies in the state. This is a good sign of modernisation of the fisheries sector.
- Only 48% have adopted modernised marketing technologies and residual 52% follow the obsolete marketing methods.
- 38.46 % of respondents owning modernized equipments are highly satisfied or contented with their job and this symbolizes the high rate of earnings, easiness of works, co-operation among the people etc.
- Descriptive statistics on job satisfaction level among fisher folk shows that the technology has significant impact on the attitude of fisher folk towards their work. The method of personal insight gives evidence for a linear positive association between modernization of fishing and job satisfaction. The observed behaviors are tested and validated by the tool of wilcoxon signed rank test.
- There is significant difference in job satisfaction among fisher folk those who are using traditional and modern technology. The effectiveness of technology is assessed by taking responses of uses in a five scale likert of effectiveness. Collected responses are tested and validated by Mann-Whitney U Test.
- Fisher men those who are using modern technology feel the technology are more effective than the older ones. Fisher men those who are using traditional methods feel the technology are not effective.
- Statistically those differences are insignificant as it is depicted in the first pair of comparison. Technology is well implemented in selling and marketing as it occupies the highest mean rank among three categories. Implementation of technology selling and marketing is significantly different fishing and processing as it is depicted in the second and third pair of comparison. Rate of interest charged from the debtors varies according to the nature of borrowing and the type of institutions. When the monthly rates of interest paid by

community are taken for analysis, the undisputable reality is that for a large folk the rates are not affordable in relation to their income.

- The estimated model proves that there are significant mean differences in income among fisher men using technology in fishing and not using technology in fishing.
- The hypothesis of significant mean difference in expenditure among users of modern and traditional methods is accepted and validated by the t test.

6.3 Suggestions

Based on the findings of the study, the following suggestions are made for policy implementation.

- The living standard of fishing community is not satisfactory. Hence there should be initiatives to improve the housing facilities of fishing community.
- It is an interesting fact to be noted that huge majority (94.3 percent) of the fishing community are under debt. As most of the respondents i.e. 39.2 percent depend on private individuals/money lenders, provisions should be made to provide financial support and borrowing facilities at low interest rates
- It can be found that 48 percent respondents used to read newspapers and magazines in the selected study area. Most of them are viewers of TV that is 75 percent used to watch TV and 35 percent used to enjoy radio programmes. Hence common cultural facilities or cultural centres should be started at each fishing village.
- Only 12 percent respondents say their children prefer fishing activities. Among the 300 respondents, 111 admit that there is women involvement in fishing related occupation. Hence advanced and diversified fishery related activities should be introduced in each fishing village. so that women and children from this community can engage in the relevant field with enthusiasm
- The awareness about mechanisation is limited among the traditional fishermen. Hence proper awareness programmes should be conducted

- Only 48% have adopted modernised marketing technologies and residual 52% follow the obsolete marketing methods. Gradual and trained groups should be formed keeping complete mechanisation as the target
- Fisher men those who are using modern technology feel the technology are more effective than the older ones. Fisher men those who are using traditional methods feel the technology are not effective. Hence government efforts to spread modern technology among the entire fishing community and in almost all fields should be made.
- Implementation of technology alone can't make a job profitable. The implemented machineries have to be frequently maintained for its long life and good working conditions. Then only the equipments will be efficient and the fishermen can ensure the expected return at the time of implementation

6.4 Concluding Remarks

The present study dealt with evaluating the technological changes and its impact on fishing community in Kerala. This evaluation is made understanding the growing significance of fishery sector in the economy of the state. The study observed the socio-economic status of the fishing community and examined the e spread of modern technology and its influence on the income and expenditure of the fishing community. The analysis based on primary survey validates the hypothesis that modern technology in fishing has positively influenced the income generation of the fishing community. However, the current economic status of this community is not satisfactory. Majority of the traditional fishermen hesitate to undertake modern technology as there is lack of proper understanding of its positive influence. Financial burden of undertaking mechanisation and over dependence on private money lenders prevent them from complete mechanisation. Hence government efforts in many aspects of fishermen life, improvement of economic status, socio- cultural improvement, use of modern technology, spread of advanced technology in all relevant fields of fishery activities etc should be ensured to bring this sector to the attractive stream of economic activity.

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APPENDIX

Appendix 1

Interview schedule

I. General information

1. Name :
2. Age :
3. Sex : Male / female
4. Religion : Hindu/muslim/Christian/ /others
5. Marital status : married/single/divorced/widowed/separated
6. Number of family members:
7. Name of village :
8. Education status : no schooling/primary/ secondary/higher secondary/degree and above

II. Economic background

9. Economic status of the family : APL / BPL
10. Main occupation(a/b/c/d) (put ✔ mark)
    a) Fishing operator
    b) Fishing owner
    c) Fishing labour
    d) Non-Fishing labour
11. Land possession and housing pattern
    a. Is the house you presently living in (✔) (Your own house, your relative's house)
    b. Number of cents of land :
    c. Number of rooms :
    d. Is your crop area :
    e. If yes, mention the crop details :
12. Physical amenities
    a. What is the main source of drinking water in house hold? (put ✔ mark)

(Canal/river, Public well/ public pond, own well, Public taps, house connection)

b. Source of light in the house hold? (put ✔ mark)
(Electricity, Oil lamps, kerosene lamps, others)

c. What is main source of outside general information? (put ✔ mark)

d. (News paper, Radio, Magazines, Government officials, Public leaders, neighbors, Friends)

13. Earning pattern of the house hold.

Type of occupation	Earnings from fishing	Earnings from Non-Fishing	Labour family/hired	The Seasonal, month engaged in fishing and Non-Fishing

Assets.

a. Fishing asset

Type O	Present value	Economic life	Owner ship pattern A/B/C/D	Remarks
w				
n				
e				

Ownership pattern

A: Owner operated,

B: Co-Operative Owner ship,

C: Absentee Owner,

D: Company Owner

b) Non Fishing asset (put ✔ mark)
{Land/ Farm and Machinery/ Transportation, Live stock, Other consumer durables (Mention if any)}

III. Savings and expenditure

14. Do your family save? : Yes / No
15. If yes, how often do you save? (put ✔ mark)
    i. Daily :
    ii. Weekly :
    iii. Monthly :
16. For what purpose do you save (put ✔ mark)
    (input purchase , education of the children, marriage of daughter, earning interest, to do business)
17. Where do you save? (put ✔ mark)
    (Bank, Post office, Chit fund, co-operatives, others)
18. Have you borrowed money/are in debt? Yes/No
    a) If yes, how much and for what purpose?
    b) From whom have you borrowed?
19. House hold expenditure

Items	Annual expense	Monthly expense	Home production
Food			
Cloths			
Household durables			
Medicine			
education			
Bills (electricity, water etc)			
House repairing			
Festival/social events			
recreations			
Others			

20. Is your expenditure related to application of technologies :

21. How much expenditure do you incur for adopting modern technology? :
22. Has adoption of new technology affected your financial position badly? :
23. Do you think that modern technology would improve your income? :

IV. Investment & indebtedness

24. Have you made any investment : Yes/ No
25. Nature of investment in the fishing sector :
    a. Amount invested :
    b. Purpose of investment :
    c. Source of amount :
    d. Amount of return :
26. Nature of investment in non fishing sector
    a. Amount invested :
    b. Purpose of investment :
    c. Source of amount :
    d. Amount of return :
27. Have you got any debt : Yes/No

    If yes,
    a. Amount :
    b. Agency :
    c. Rate of interest :
    d. Amount repaid :
    e. Outstanding balance :
28. Are you able to repay the loan amount with the existing source of revenue :Yes/No
29. Do you get any subsidy from the government : Yes/ No
30. Do you expect any help from the government :Yes/No
31. Nature of government help required :

V. Occupation

32. Currently engaged in which occupation? :
33. Experience in fishing occupation? :

34. Engaged in other occupation, if any? :
35. Attempted to change, If yes, give reason? :

    If not why?
36. Did you move away from the village last year? :

    If yes, Why…….

    If no, why……..
37. What kind of job do you think you can take in addition to fishing :
38. Whether inside/ Outside the village? :
39. Income from fishing and Non-Fishing Income? :
40. Do you know the wage rate town :
41. Do you use modern technology in fishing? :
42. Do you prefer modern technology? :

    a. Why?
43. Does the application of technology improved your earnings?:
44. In future do you think your occupation in fishing will be better/ worse/No change? Reason……
45. Do you think your children should take up fishing as a occupation? why?.....
46. Is woman folk in the house hold involved in any fishing activity, rather than market?
47. Number of working days /hour/monthly/annual?.....
48. Remuneration received by them…….
49. Difficulties encountered by them in sector? (put ✔ mark)
    - Health facilities,
    - Water,
    - Drinking water,
    - sewage disposal,
    - crowded condition,
    - Technical Education facilities,
    - fishing,
    - land for cultivation,

- Natural Calamities,
- housing,
- land and transportation.

VI. Technological changes

50. Have you applied any technology in the fishing sector: Yes/ No
51. Nature of technology applied in terms of going to sea
    a. Catamaran
    b. Fibre boat
    c. Any other
52. Do you consider that new technology is helpful: Yes/No
53. Has it made fishing profitable : Yes/ No
54. Nature of technology applied in terms of catching fish
    a. Specify
55. Is the new technology is better than traditional methods: Yes. No
56. Are you satisfied with the new technology : Yes/ No
57. Do you get more fish with new technology : Yes/ No
58. Nature of technology applied in terms of keeping the fish
    a. Procurement
    b. Application of ice
    c. Any other
59. Is the new technology widely applied : yes/No
60. Is it profitable :Yes/ No
61. Nature of technology applied in terms of marketing
    a. Transportation
    b. Distribution
    c. Procurement
    d. any other
62. Has it improved the marketability : yes/No
63. Has it got any problems : yes/ No
64. Has the new technology improved your profits : Yes/ No
65. Has the new technology put you in indebtedness : Yes/ No

66. Do you have any suggestion for improvement

VII. Trawling

67. Over the last 25 years have you noticed depletion of any fish species?
    If yes, is it any particular season/ month or in the whole year?
68. Type of species which are in the depletion stage?
69. Is depletion more prominent in the territorial waters, inshore area or any other areas.
70. What are the reasons for the resources depletion and remedies which you can forward?
71. Do you think that the seasonal trawl ban has been effective In the conservation of depleting species? :Yes/no.
    a. Why? :
72. Do you think seasonal trawl ban is a necessary measure? :Yes/no.
    a. Why?
73. Does modern technology affect the fishing resources:

VIII. Perceptions about fishing as a profession

74. Are you satisfied with the resent job : Yes/ No
75. Do you consider fishing as a decent job : Yes/ No
76. Are you doing this job due to compulsion : Yes/ No
77. Are you doing it as it is a caste/ traditional occupation : Yes/ No
78. Do you prefer any other job : Yes/ No
79. Are you trying to secure a better job : Yes/ No
80. Are you interested to keep heredity through children by fishing profession: Yes/ No
81. Do you give fishing practices to your children : Yes/ No
82. Are your children interested in doing fishing jobs : Yes/ No

83. Do you think that fishing should be given more academic importance : Yes/ No

84. Do you expect more support from the government : Yes/ No

85. Any other suggestions:

Appendix 2

KC Rekha becomes India's first and only licensed Fisher woman

It was during his research the researcher has come to know about K C Rekha, first lady from India to get a license in the marine fishing. Her native place is Engandiyur in Thrissur district, one of the four villages taken for sampling for the present study. The Researcher visited her to know more about her fishing activities and experience. Information collected in that meeting is given below.

KC Rekha may have become a fisherwoman out of necessity, but she's come to love her profession, despite the odds and uncertainty, despite her life being as complex as the tangled net in her vessel. KC Rekha, a 45-year-old mother of four sits alone on an isolated beach of a Kerala fishing village at the crack of dawn, untangling a mess of nylon fishing nets on which her family's livelihood depends. Rekha's seawater-creased, sun-baked fingers finish the task before husband P Karthikeyan arrives for the couple's voyage into the deep blue Arabian Sea on a small and old single-engine boat.

Her faith stems from the struggle that began more than 10 years ago when she decided to be the deckhand for her husband after his two workers quit; the couple just couldn't afford them. People in the fishing hamlets of Chettuva in Thrissur, 300km north of the state capital, frowned upon her decision. The community said it was taboo for women to venture into the sea for a living. Women should be on the shore, praying for their husbands and brothers till they returned, the belief went.

The Central Marine Fisheries Research Institute (CMFRI), the country's premier marine research agency, felicitated Rekha at a function attended by Union minister of state for agriculture Sudarshan Bhagat this April. It also

helped her get a fisherwoman licence, a first in the country. It wasn't easy for the marine institute to locate Rekha among the millions of fisherfolk dotting the coastal landscape.

"It was a tedious search. There are many women engaged in fishing in backwaters and rivers but no record on a woman's presence in fishing along our coastline was available. We have done an extensive search and finally spotted her and recognised her feat," CMFRI director A Gopalakrishnan said.

Apart from everything else, Rekha is really good at her work. She can sniff the presence of a shoal of fish, swim against the current and lay her net quickly, Karthikeyan said. "*She is better than me in doing that. She can give you lessons on the habits and paths of fish such as sardine, tuna, mackerel and sea bass."*

The country's lone deep sea fisherwoman loves her profession, despite the odds and uncertainty. Her life is as complex as the tangled net in her small vessel, but she believes time and tide wait for no one and is happy to make toe most of the moment.