INTRODUCTION
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Fishing has been a part of human life since the early stages of human evolution. Before the introduction of agriculture, fishing and hunting were the sources to satisfy their need of sustenance. Even after agriculture becomes the main nourishment for human, resources from forest and sea supplements his daily requirements. When the traditional hunting become lesser and is replaced by modern animal husbandry, fishing becomes more accepted as the best way for getting protein rich food. In addition to serving as food, fishing satisfies a wide range of human wants and needs, both physical and spiritual. The capture, preparation, and consumption of food have so many social aspects. We cannot imagine a worthwhile human society that does not include such cultural enrichment (Kirkegaard, 1999).

Now Fishing becomes the main profession for the people of coastal areas. The fishing sector is an inimitable source of animal protein to the people. It can act as a major source of income and generate lots of employment opportunities for rural poor.

India is one of the major producers of fish and ranks second in the world after China, contributing 5.68% of the global fish production. Fisheries sector plays a significant role in the Socio Economic Development of India. Indian fisheries sector has an important role in providing food security, and offers job opportunities for 14.49 millions of people and help them to sustaining in their economic levels. India having the coastline of over 8000 kilometer and Exclusive Economic Zone of over 2000 square Kilometer. During the post independent period of India, the fishing sector was in its emerging stage. This sector never considered as an area of trade. Fishing was mainly to meet the daily requirements of food. It was provided as cheap and caloric item in the food menu (Dhanuraj, 2004). After that fish production in India is coming through a revolutionary growth since 1950, the total

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fish production was increased from 534000 ton to 3375000 ton, in 2013. Table 1 shows the marine fish production of India from the year 1950 to 2013. There has been steady growth in the export of fish and fish products over the period. During 2013-2014 the volume of fish and fish products exported was 9,83,756 tonne worth Rs. 30213.26 crores (Handbook on Fisheries Statistics, 2014)\(^4\).

Table 1 Marine Fish Production in India (‘000 tones)

<table>
<thead>
<tr>
<th>Year</th>
<th>Fish Production in India (‘000 tones)</th>
<th>Year</th>
<th>Fish Production in India (‘000 tones)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1955-1956</td>
<td>596</td>
<td>1996-1997</td>
<td>2696</td>
</tr>
<tr>
<td>1979-1980</td>
<td>1427</td>
<td>2002-2003</td>
<td>2779</td>
</tr>
<tr>
<td>1985-1986</td>
<td>1658</td>
<td>2004-2005</td>
<td>3024</td>
</tr>
</tbody>
</table>

Introduction

<table>
<thead>
<tr>
<th>Year</th>
<th>Fish Production in India (‘000 tones)</th>
<th>Year</th>
<th>Fish Production in India (‘000 tones)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990-1991</td>
<td>2576</td>
<td>2009-2010</td>
<td>3104</td>
</tr>
<tr>
<td>1993-1994</td>
<td>2707</td>
<td>2012-2013</td>
<td>3375</td>
</tr>
<tr>
<td>1994-1995</td>
<td>2967</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Kerala played a significant role in the contribution of fisheries production. Kerala having the coastline of around 590 km, which is approximately 10 percentage of India’s coastline. Kerala having the Exclusive Economic Zone (EEZ) extends up to 200 nautical miles which covers an area of 218536 Sq.Km. The entire coastline is divided in 222 marine fishing villages. Kerala’s coastline spread over nine districts, that are Thiruvananthapuram, Kollam, Alappuzha, Ernakulum, Trissur, Malappuram, Kozhikode, Kannur and Kasaragod.

The fishermen population of the state in 2014-15 is estimated as 10.18 lakh, Including 7.83 lakh are from marine fisheries sector and 2.34 lakh are from inland fisheries sector. Alappuzha has 1.89 lakh population which is the largest fishermen populated district in Kerala, followed by Thiruvananthapuram (1.69 lakh) and Cochin (1.35 lakh). The district wise details of marine fishermen population are given in the table 2

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>District</th>
<th>Male</th>
<th>Female</th>
<th>Children</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Trivandrum</td>
<td>62857</td>
<td>55527</td>
<td>49370</td>
<td>167754</td>
</tr>
<tr>
<td>2</td>
<td>Kollam</td>
<td>39498</td>
<td>33393</td>
<td>19609</td>
<td>92500</td>
</tr>
<tr>
<td>3</td>
<td>Alappuzha</td>
<td>50472</td>
<td>46127</td>
<td>31177</td>
<td>127776</td>
</tr>
<tr>
<td>4</td>
<td>Cochin</td>
<td>28559</td>
<td>26756</td>
<td>16804</td>
<td>72119</td>
</tr>
</tbody>
</table>
The fish landings in Kerala during the year 2014-2015 was 5.24 Lakh tones and the Export of marine products from Kerala was 1, 66,754 Metric tonnes of export of marine fish products with the value of 5166.08 crores were done in the year 2014-2015. Table 3 shows the marine fish export from Kerala from the year 2009- 2015. Kerala’s share was 15.45 percentage of overall exports from India. (Marine Fisheries Statistics, 2015).

Table 3 Marine fish Export from Kerala 2009-2015

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Year</th>
<th>Quantity (Metric Tonnes)</th>
<th>Value (Rs. In Crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2009-10</td>
<td>107293</td>
<td>1670.02</td>
</tr>
<tr>
<td>2</td>
<td>2010-11</td>
<td>124615</td>
<td>2002.10</td>
</tr>
<tr>
<td>3</td>
<td>2011-12</td>
<td>155714</td>
<td>2988.33</td>
</tr>
<tr>
<td>4</td>
<td>2012-13</td>
<td>166399</td>
<td>3435.85</td>
</tr>
<tr>
<td>5</td>
<td>2013-14</td>
<td>165698</td>
<td>4706.36</td>
</tr>
<tr>
<td>6</td>
<td>2014-15</td>
<td>166754</td>
<td>5166.08</td>
</tr>
</tbody>
</table>

Source: Economic Review 2015

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1. Statement of the Problem

Mechanization in fishing sector mainly starts as a part of the Indo-Norwegian Project in the State of Travancore–Cochin in January 1953, before the formation of Kerala State. The main objectives of the project were the development of fishermen community through high return to fishermen activities, improvement in health and sanitary conditions of the fishing populations and finally achieve better living standard for the community. It was initially implemented in three coastal areas of Quilon which are Sakthikulangara, Neendakara, and Putthenthura. Now mechanization becomes very common and majority of the fishermen in Kerala are utilizing it for fishing and fishing related activities. A detailed study is required for finding the realistic effects of mechanization in the socio economic conditions of fishermen community.

The operation of mechanized crafts in the fishing sector of Kerala is increased the number of boat landing in a huge margin compared to the number of landing of traditional boats. By which large amount of export of marine fish products of high value is happening. Still the socio economic conditions of the people who are the real force behind the production of marine fishing sector of Kerala is very pathetic. The social stigma attached with fishing community is continuing in Kerala.

Since fishing is a male oriented activity and done by unorganized group including relatives and friends with different age, income and caste were involved. The satisfaction of the fishermen from each trip is strongly related to the amount of catch they got from that trip. The open access nature in regulations results over fishing, and damage in the natural eco system of sea leads to socio economic paralysis. One of the aim of this study is to understand the impact of mechanization in the availability of fish resources.

The indebtedness is the underlying scourge of the fishermen from time immemorial. The local chit agents and middle financiers plays a major role in their indebtedness through high interest rates on loans. They make use of unawareness of traditional fishermen community. There is a need of studying the role of nationalized and cooperative banks for the development of fishermen community.
This study was an attempt to analyze the present socio economic conditions of fishermen in Kerala and understand the impact of mechanization in the socio economic conditions of fishermen. The study try to find out the impact of mechanization in different religion, region and different type of crafts the fishermen works with. The study try to evaluate the Gains and effects of mechanization of crafts to the Job profile of fishermen and examine the Impact of Mechanization in the availability of Resources. It also makes an attempt to access the role of nationalized and cooperative banks to the socio economic development of fishermen.

2. Review of literature

An extensive search conducted to recognize existing literature in the area of study. The researcher broadly reviewed the previous studies related to the mechanization of fishing industry of Kerala, social and economic status of fishermen in Kerala, impact of mechanization in the job profile of fishermen, sustainability of fish resources, Indebtedness of fishermen in Kerala. The literature review give a strong theoretical back ground for the study, and clarity and focus of the research problem.

Ziener (1958)\(^6\) define that mechanization of fishing boats means the installation of Engines for the propulsion and mechanical devices for handling of fishing gears.

Hamlisch (1967)\(^7\) studied that the social and economic status of fishermen affected the technological developments in variety of ways such as attitude towards work, availability of labour, self esteem from labour, productivity of labour, Recruitment prospects for the future etc. To complete successfully in the labour market an industry must aim to improve the safety, increase comfort, lesser human excretion and pay better wages. The technological improvements helps to meet these requirements. The job of the fishermen’s profession was hard and fatiguing. Hours

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of the work and days off. The fishermen has virtually no family life, he has limited opportunity to participate in community or political life.

Arne (1968)\(^8\) analyzed the reaction of a few local communities to the various technological economical stimuli happened in Kerala, This study explain mechanization means the geographical extension of fishing grounds, greater security and new capacity to overcome the obstacle of the monsoon breakers. The chief advantage of mechanized fishing was, in shorten time span one could go further out from land than in the canoes and that way reach new fishing grounds. It helps to reduce the number of crew members and that may increase the profit per man, increase in fish caught, and safety on the fishing ground. The study explained that the Latin Catholics have the growth potential even before the introduction of Indo Norwegian project. Because of the reason that their system has no clear cut barriers. And they have the possibility of social mobility both inside and outside of the community. While ‘Arayas’ characterize themselves as a weak people compared to ‘Catholics’. Catholics expressed the view of unsuccessful mechanization among ‘Arayas’. ‘Catholiocs’ consider themselves as economically and culturally ‘superior’ to the ‘Arayas’.

John Kurian (1978)\(^9\) studied that the professional capacity of traditional fishermen is to be marvelled at. There are no references in the form of books, charts, research papers for that. They didn’t even teach their profession to the younger ones of their community. It was learned by experience. The greatest asset of fishermen in Kerala was there accumulated knowledge about fish, fish habits, waves, currents and stars.

Paul (1978)\(^10\) studied the socio economic conditions of the fishermen in Poonthura, Kerala. In this study reveals the health and hygiene facilities of

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fishermen families, Employment, Income, Expenditure, indebtedness, basic facilities such as income, expenditure and clothing and social custom. The study suggest the rebuilding of the life of the fishermen group should taken as a national challenge.

Leela Gulati (1984)\textsuperscript{11} explained the result of changes that have occurred in the technology of fishing. The people engaged in fisheries come under three distinct groups which are: those engaged in the actual catching of fish, those engaged in processing, those engaged in marketing of fishing equipment’s such as crafts and gears. There was some overlap between these groups but when usually talks of fishermen, one is referring to people falling in the first group.

Jose (1985)\textsuperscript{12} reveals that the cultural life and activities of fishermen are unique but limits, His interactions are almost with same type of people with similar experience ideas and culture. They have the tendency to reside high density of population living in a square kilometre which is very nearer to sea. This study also point out that the high rate of unemployment among educated children among fishermen has negative influence on the educational development.

Appukuttan K. et al, (1987)\textsuperscript{13} Explained that Kerala state has one of the state which have lowest percapita income, Yet it has become a world model of high quality of life with high level of female and overall literacy, lower infant motality, lower death rates, high life expectancy, high nutritional levels, good housing and access of purified drinking water and medical facilities are above the all India average. At that time the overall literacy of fishermen was 62 percent and only 2 percentage had reached to S.S.L.C and above. 48 percentage were living in shabby huts and only 16 percentage have pucca houses. Only 33 percentage have drinking water facility in their wards and only 5 percentage have separate latrine facility. Electric connections were available in only 10 percentage houses. This was found in the survey conducted by government of Kerala in 1979. But at the same time the

\textsuperscript{12} Jose, F. P. (1985). The Theology of the fishermen- In the context of fishermen strugles in Kerala. Quilon, Kerala: Department of Psychology, F.M.N. College.
quality of life of fishermen lives in Quilon region have a better quality of life that may be because of Indo Norwegio project implemented in those place.

Gupta (1991)\textsuperscript{14} quoted from Muthayya (1979) that ‘a major behavioural factor that affects adoption and development is the level of aspiration. The level of aspiration is a decisive determinant for raising the productivity as when as standard of living’.

Ashaletha, C.S, & Sheela (1998)\textsuperscript{15} discussed the social issues concerned by fisherwomen including poor social status, poor social acceptance, Lack of representation in the local bodies, Heavy dowry system, restriction to go for work, Men do not take supportive role, less interactions with development agencies, division of labour and wage discrimination. The study reveals that in a traditional fisher society, women social status is often referred with respect to that of her husband. When the women go for any job shows the inability of her husband.

J B Rajan, (2002)\textsuperscript{16} observes that the labour in the traditional fishing sector moves towards modern fishing technologies, that movement results labour losses its traditional skills and knowledge systems and that sector is integrated with global economy. The women among the community from fishermen losses their jobs due to the introduction of Nylon nets. After the advent of motorisation the sector witnessed series of technological changes such as the introduction of plywood boats in 1982, introduction of mono filament gillnet, mini trawl net, ring seine in the mid of 1980’s. But the changes during 1980’s were drastic and rapid.

Ramachandra, (2003)\textsuperscript{17} stated that the marine fishing crafts are classified into three different categories depending on their scale of operation namely traditional, motorized and mechanized. Each category could be further classified into different


classes. The mechanized boats capable of doing fishing in deeper waters of 500 m depth and above and for 10-15 days are called as multi-day fishing vessels. They generally have all electronic fish finding devices and on-board ice storage facilities. The mechanized boats fishing in near shore waters 50-100 meter depth and normally return in the evening after the catch they called as single day trawlers. But they are gradually converting themselves into multi-day vessels. The main difference between the mechanized and motorized boats is that the motorized boats use the power of motor only for reaching the fishing grounds. The motors only help in reducing the risks and time required to reach the fishing grounds. The motorized fishing units with size ranges between 40-50 feet in length, fitted with engines of 25-40 BHP. The traditional fishing units normally restrict the fishing to inshore and estuaries and they are competed out by the motorized units.

A study done my MCITRA(2002)\textsuperscript{18} Revealed that the independent variables, teacher-student relationship, parental perception towards education, social participation, Mass media participation, cosmopolitans, parental education, parental occupation and income of the family are positively and significantly related with the extent of dropout in the descending order. While the variables such as syllabus, midday meal and debt of the family did not have any significant relationship with the education of their kids.

Rajan (2002)\textsuperscript{19} highlighted that so many structural changes took place in the Kerala fishing sector with globalization. Before mechanization almost all activities in the fisheries sector had been carried out by the individuals from traditional fishermen community themselves. They are familiar with all activities related to fishing and have versatile skills and knowledge. Now the situation is different. Craft engineering, textile engineering, navigational skills, oceanography, astronomy, engineering, transportation, processing, marketing etc. are played a larger role in the


fisheries sector. The commercialization has given an open space for the entry of large scale traders and industry into the sector.

Sherry, (2003)\textsuperscript{20} observes that there was significant difference in the literacy rate among fishermen but still the housing status were poor. The participation in the insurance schemes of crafts and houses were less that may be because of they were not convinced about the need of getting insurance coverage.

Pillai, Joseph Modayil, & U, (2003)\textsuperscript{21} The Government of India introduced the Deep Sea Fishing Policy in 1991 to increase fisheries production. Which allowed for leased vessels and joint ventures with foreign fishing vessels to operate in the Indian EEZ. But, due to complaints from the fishery sector, this policy was scrapped and has adversely affected the exploitation of offshore resources. Among gears, gillnets, drift nets and bag nets with varied mesh sizes are widely employed by traditional fishermen along the coasts, while purse seines, ring seines and mechanized gillnets are confined to the southwest coast. Bottom trawls up to 13 m OAL are operated along the entire Indian coast, while the second generation large trawlers 13-17m are operated from selected harbors along both the east and west coasts. The marine fisheries exploit a large number of species by using different crafts and gear combinations and is characteristically an open access one with free and common property rights. The multispecies fishery of India comprise over 200 commercially imported species. Fishing practices are vary between region to regions, depending on the nature of the fishing grounds and the distribution of the fisheries resources. Pelagic stocks like sardines, mackerel, whitebaits, ribbonfish, seerfishes, carangids, coastal and oceanic tunas; demersal groups like threadfin breams, croakers, catfish, silver bellies, lizard fish and goatfish; crustaceans like penaeid prawns, lobsters and stomatopods and cephalopods like squids and cuttlefish are common.


Aggarwal et al. (2005)\textsuperscript{22} Proposed a new way of measuring the socio economic condition. This study explained that the rural areas the socio economic status is measured by the classification based on nine characteristics namely caste, occupation of family head, housing, level of social participation of family head, education of family head, landholding, farm power, material possessions and type of family. The present instrument is proposed to measure the socio-economic status of the family and is neither based on the individual nor on the head of the family.

Gupta (2005)\textsuperscript{23} explained that the development of a sensitive as well as valid and reliable measurement scale for measuring socio-economic development is a serious and demanding work where expertise in diverse fields like socio-metric and psycho-metric or econometric. Because of that small scale or micro level investigation or a large scale surveys cannot be overemphasized the development, standardization and use. Since a specific behaviour originates from a particular circumstance or combination of circumstances. That has a definite social context with a number of variables. Some of these have direct association while other indirect relationship with the phenomenon or behaviour.

Tiwari, Kumar, & Kumar (2005)\textsuperscript{24}Socio-economic status of a family means the ranking of the family in the milieu to which the family in respect of variables such as physical assets, economic status, occupation, education, social position, caste, social participation, muscle power, political influence, etc. and some among the elements of the above variables have a tendency to go together. The social profile of individuals can divided into two sub category, that are social understanding and participation. The alternatives for understanding sub-profile were defined according to the knowledge of social issues while the participation can understand through their involvement in social activities


Ambili, (2007)\textsuperscript{25} examines the influence of education on the standard of living of fishing community and identified the major factors that act as impediment to the educational development of fisher folk the performance of traditional fishermen. The study reveals that the income of the family have a major impact on the education of children, majority dropout their education due to financial problems of the family. This study define the fishermen is the person who engaged mainly in fishing and fishing related activities for their livelihood. This study also make an attempt for understanding the social conditions including Family size, age, marital status, basic amenities, and supplementary facilities of houses, Health status, and social understanding of fishermen.

Najmudeen & Sathiadhas, (2007)\textsuperscript{26} quoted from Alverson et al., (1994) that ‘increase in commercial fish production of India in the last five decades is mainly attributed to the introduction of mechanized trawling in the mid-1960s. Although the mechanized trawling is considered as the most destructive type of mobile fishing activity’.

Pillai, Vivekanandan, Ganga, & Ramachandran, (2009)\textsuperscript{27} observed that he present trends in production of marine fish resources indicate that the fishery as a whole has reached an asymptotic level. While some individual resources are exhibiting declining trends. The present marine fisheries access is a free and open system and consequently there is strong competition for the resources among various sectors. Protecting the interest of artisanal fishers from unequal competition with mechanized vessels and thereby ensuring their socio-economic security is important.

Antony & S (2011)\textsuperscript{28} explained that the technology begins to sophisticate and transform the Kerala marine fishing industry with the introduction of ‘Globalization’ and mechanization process. Marine fisheries sector in Kerala


\textsuperscript{26} Najmudeen, T. M., & Sathiadhas, R. (2007). Economic efficiency of input utilisation of mechanised trawlers along the Kerala coast. Cochin, Kerala: CMFRI


embraces this revolutionary change and begins to earn its positive benefits. The characteristic features of postmodern period of marine Kerala fisheries sector with new type of technologies include two aspects which includes the new type of technologies with Information and Communication Technologies facilitates fish finding devices like echo sounder and Global Positioning System and communication equipment's like mobile phones to facilitate market intelligence.

Bindu, (2011)\textsuperscript{29} studied the changes, gains, effects of mechanization. Gains includes Income increased, Reduction in work load Production increased Increase in exports, Creation of increased job opportunities, Enables fishing into newer areas, More varieties of fish can be caught, Consumption increased, Reduction in time for fishing operations, and more youngsters are attracted to this sector. Major effects includes Effects reduction in labour days, fall in the price of products, entry of foreigners, entry of more boat owners as well as over exploitation of sea resources were assigned to be the prime results of mechanization by the respondents, huge destruction of sea resources. The entry of foreigners, exploitation by middlemen, lack of opportunity for old generation, knowledge of technical skill, increased debt were attributed as the effects of mechanization, and changes includes Reduction in work load Increase in income, More job opportunities are generated Able to go fishing into newer areas Able catch more and different species Experience & skill not much needed Possibility for improve employment Work hours made light and Gets working knowledge in modern technology.

Tiwari & Kumar (2012)\textsuperscript{30} proposed a scale has seven domains to access the socio economic status namely House, Material procession, education, occupation, land, social participation and understanding, and monthly income .The study reveals that the consumer price index in India was increased by 56% in the last five years and the per capita income of India is doubled in the last five years.


Mahesh, V. et al. (2014)\textsuperscript{31} studied about the trawl fishery of the Eastern Arabian Sea. This study explains that the catch from trawlers is showing an increasing trend in Indian coast, it is the major mechanized gear used widely along the coast of India. According to Marine Fisheries Census of 2010, around 35,228 trawler units are operating in India. Which is contributing highly to the Indian economy. The new interventions in fishing technologies, usage of high speed engines, and the issue of by catch are very much discussed.

Gaur (2013)\textsuperscript{32} Proposed a scale having seven variables to assess the socio-economic status namely education, occupation, expenditure, condition, living, income, and debt to assets ratio. Occupation is means to earn livelihood. Education is the highest standard class studied and income refers to wages, salaries, rents, profits and any flow of earnings received. Income is linked with All India Consumer Price Index (AICPI) to make it compatible in measuring the SES over the years with fast growing economy.

Surapa Raju (2013)\textsuperscript{33} studied the Marine fisheries and its effects on Development of fisheries especially for Motorization of Traditional Crafts and HSD Oil Schemes. This study observed that the Motorization have positive and negative impact among the fishermen community of India. the positive impacts includes: motorization has helped the fishermen to reduce their physical strain in fishing operations, Improvement in quality and quantity of fish catch, Improved incomes, Distance in fishing area increased, Fishing days increased, Less spoilage of fish catch due to quickly return to the landing, Easy to carry engines, Consumption of alcohol reduces, More catch & more employment for women, More ancillary units established, Wage rates increased, Improvement in children education There are also negative impacts of motorization of fishing sector of India which includes


Overfishing, Investment required for oil so most of them approach the merchants, Clashes between fishermen in fishing area, Uneven income distribution, and Depletion of fish stocks.

Shajumon C S & Sabu M (2014)\(^{34}\) observes that technology and technological change are the two major components for economic growth and development. Innovation and Invention make the technological change that leads to operation. Study reveals that with the help of GPS, Fish remote sensing, Sonar, Wireless set, Mobile phone, and Computer fishermen can make a significant impact on productivity, safety and security and cost efficiency. The fishermen in deep-sea fishing face a higher risk than other fishermen, for they lack updated information about weather forecasting at sea because of lack of active participation of fishery industry for updating new technology.

Shilpa S et al. (2015)\(^{35}\) Kuppuswamy classification is used to consider the education of the head of family, occupation of head of the family and per capita monthly income. While considering the Uday Pareekh classification for measuring the socio economic development for rural areas which takes into account following characteristics namely caste, occupation of family head, education of family head, and level of social participation of family head, landholding, housing, farm power, material possessions and type of family were studied.

In the literature review the researcher presented the concepts about the socio economic conditions of fishermen in Kerala. The review has helped the researcher to identify the important variables relevant to the research problem. This review of literature became the basis of the development of conceptual framework of the research study.


3. **Operational Definitions**

1. **Traditional Fishermen families:** Traditional fishermen families are the families, which having present generation and just ancestors engaged mainly in fishing and related activities for their livelihood.

2. **Dropout Of Education:** A dropout is defined as a child who after having enrolled into a primary school left it before completing the full term of seven years of education” In this particular context of the study it is taken that the children who dropped out before completing the full term of ten years of education.

3. **Mechanization** is defined as the installation of Engines for the propulsion or in addition to that mechanical devices for handling of fishing gears. In this particular context of study the crafts with outboard engines are also come under the category of mechanization.

4. **Significance of the Study**

   The quality of life of people among in Kerala is much higher than the rest part of India, despite the fact that the per capita income of the state is far lower than the country as a whole. As Mechanization of fishing crafts was implemented in India for overall development of living conditions of fishermen community. But still they considered as a backward class and hesitant to mingle free with them. Social stigma in fishing profession is still continuous in Kerala. Fishermen as a whole are looked down by other communities with contempt and disdain. They are the real backbone of earning high value through export of marine fish products to our nation. The development of weaker section of society is one of the major aim of India, and the fishing community hold more than 3.01 percent of the state population. They were unable to achieve the least minimum standard of living. In such a situation it is important to have an in depth analysis of impact of mechanization in the socio economic conditions of fishermen community in Kerala.

5. **Scope of the study**

   The scope of the study is limited to understand the present socio economic development of fishermen community in Kerala and analyze the impact of
mechanization in the socio economic development including land, House and Household martials, Health and sanitation facilities, Attitude of parents towards education, Occupational profile, Lifestyle, Social understanding and participation, and Financial status of fishermen community. The study evaluate the impact of mechanization in different religion, region and different type of crafts the fishermen works with and understand the Gains and effects of mechanization of crafts to the Job profile of fishermen. An attempt was made for examine the Impact of Mechanization in the availability of Resources and access the role of nationalized and cooperative banks to the socio economic development of fishermen community in Kerala.

6. Objectives of the study

The objectives of the study are:

1. To study the present Socio Economic Conditions of Fishermen Community in Kerala.

2. To analyze the impact of mechanization in the Socio Economic conditions of fishermen Community.

3. To understand impact of mechanization in different religion, region and different type of crafts the fishermen works with

4. To evaluate the Gains and effects of mechanization of crafts to the nature of job of fishermen.

5. To examine the Impact of Mechanization in the sustainability of marine wealth.

6. To understand the role of nationalized and cooperative banks to avail loans for the socio economic development fishermen.

7. Hypothesis of the study

The major hypotheses formulated for the study are:

1. There is no significant difference in the socio economic conditions of fishermen before and after mechanization
2. There is no significant difference in the impact of mechanization in the socio economic development of fishermen from different region.

3. There is no significant difference in impact of mechanization in the socio economic conditions of fishermen from different religion.

4. There is no significant difference in impact of mechanization in the socio economic conditions of fishermen who works with different type of crafts.

5. There is no significant difference in the sustainability of marine wealth before and after mechanization.

6. There no significant role by nationalized and cooperative banks to avail loans for the socio economic development of fishermen.

8. **Research Methodology**

   Research is indeed civilization and determines the economic, social and political development of a nation. Research methodology is a systematic way to solve a problem. It is a science of Studying how research is to be carried out. Essentially, the procedures by which researchers go about their work of describing, explaining and predicting phenomena are called research methodology (Rajasekar & P. Philominathan, 2013)\(^{36}\). Research is considered as a movement from the known to the unknown. It is actually a voyage of discovery. Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them (Kothari, 2004)\(^{37}\). The following sections explain and justify the methodology used for conducting this study.

9. **Research Design**

   Research design is a plan for doing the research and which describes how, when, and where the data are to be collected and analyzed. Kothari suggested that a flexible research design which provides opportunity for considering many different


aspects of a problem is considered appropriate if the purpose of the research study is that of exploration. But when the purpose happens to be an accurate description of a situation or of an association between variables, the suitable design will be one that minimizes bias and maximizes the reliability of the data collected and analyzed.

10. Pilot study

A pilot study was conducted through schedules, for that the Performa is developed by series of questions. Here the researcher is also act as in the role of enumerator too. The researcher go to respondents with these schedules. Data are collected by filling up the schedules by researcher on the basis of replies given by respondents. This method is used for the study because the fishermen community is lagging the culture of education and majority of the families having illiterates and there is a need of explaining each question in the Performa. The pilot study is very much helped the researcher to familiarize and understand the real situation of population of study. The pilot study was conducted among 75 respondents by using convenience sampling method. Three different coastal areas were identified for the purpose of pilot study that are Panikkarukadavu from Kollam district, Thrikkunnappuzha from Alappuzha district and Chavakkadu from Trissur District and collecting the responses from Twenty five respondents from each different places. The pilot study helped the researcher to detect the strengths and weakness of the Performa and helped to take necessary steps towards the insufficiencies of the schedule. The irrelevant questions were completely removed and give importance for relevant questions and add some more relevant questions. Some questions are re arranged with more proper and simple wordings that helps to avoid complication and confusions. The experiences from the field helps the researcher to more familiar and confidence for the future path.

11. Structure of the Schedule

The schedule is designed to capture the information required to answer the objectives of the research study and empirically test the hypothesis. The schedule is divided in to 12 sections. The first section is developed to capture the details of fishermen families including name of the respondent, Village, district, Religion, Number of adults and children in the fishermen family. The first section comprises
the questions to know about the land, house and household materials of fishermen and there is a scale for measuring their satisfaction with basic and supplementary facilities of houses of fishermen families. In the third section there is a multiple item scale to measure the health and hygienic facilities of fishermen families. In the fourth section comprises of questions related to the education of fishermen including the eldest members and children’s in the family. In this section have a scale to measure the attitude of parents towards education. The fifth section is formulated by the questions related to the details of occupation of members of fishermen families and multiple item scales for measuring the gains and effects of mechanization in the job profile of fishermen community. The sixth section is consolidated by the questions to measure the lifestyle of fishermen community including males and females. The seventh section having a scale used to measure the social understanding and participation of members of the fishermen families. The seventh section is designed to capture the data related to the financial position of fishermen families including income, savings and debt. In the Eighth section having the questions for measuring the role of nationalized banks for the socio economic development of fishermen community. The same scales are used to measure the responses on each variables before and after mechanization.

All variables used in the study are measured by using Likert scale with five anchor points, Specifically Strongly Agree, Agree, Neutral Disagree and Strongly Disagree. The researcher assured the confidentiality of the data to the respondents and promised to use the data for academic purpose only. The copy of questionnaire is given in the Appendix-I.

12. Collection of data

Primary data: The primary data for the study were collected through schedules informal personal discussions with respondents and by observation. The researcher also played the role of the enumerator for the purpose of collection of data. The data was collected through schedule because of the lack of educational background of fishermen community.

Secondary data: The secondary data for this research study were collected from various resources like journals, Books, articles, publications, press releases from
Government of Kerala, Malsyafed, Fisheries Department, Fishermen welfare fund board, Fishermen welfare society, Statistical department of government of Kerala, previous study reports, working papers, University e-resources using search engines through internet and valid discussions with experts of swathandra malsya thozhilali federation, Authorities of department of fisheries government of Kerala and authorities of fishermen welfare societies, Researchers and Social workers.

**Sampling design:** The active fishermen families in the marine sector of Kerala are considered as the population for the study. Multistage sampling technique is used to select the samples for primary data collection. Multi stage sampling technique is combining the sample techniques to create more efficient and effective sampling method. There are 9 coastal districts are in Kerala- Trivandrum, Kollam, Alappuzha, Cochin, Trissur, Malappuram, Kozhikkode, Kannur and Kasargode. In the initial stage the entire population is divided in to three zones, namely South zone, Central zone, and North zone. South zone including Trivandrum, Kollam and Alappuzha, Central zone including Cochin, Trissur and Malappuram, and North Zone including kozhikkode, Kannur and Kasargode. In the second stage from each zone randomly selected two districts. From south zone Trivandrum and Kollam, from Central zone Cochin and Malappuram, and from North zone Kozhikkode and Kannur were selected randomly. In the third stage five villages were selected from each districts.

**13. Sample size**

The population of the study is the entire active fishermen families in marine sector of Kerala. The table 4 gives the district wise breakup entire population of active marine fishermen families. The total number of the population is 1, 50,432. The most populated district is Trivandrum followed by Alappuzha, Cochin, Kollam, Malappuram, Kozhikode, Kannur, Trissur and Kasargode. The sample size of the present study is fixed as 400 based on Solvin’s formula Which is fixed with 95% confidence level, error value of 0.05 and size of the population is 1,50,432 (Punzalan, 2012)\(^{38}\).

Table 4  *District wise break up of active fishermen families in marine sector during 2009-2010 (Marine)*

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>District</th>
<th>Total Active fishermen family in numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Trivandrum</td>
<td>39766</td>
</tr>
<tr>
<td>2</td>
<td>Kollam</td>
<td>17222</td>
</tr>
<tr>
<td>3</td>
<td>Alappuzha</td>
<td>21926</td>
</tr>
<tr>
<td>4</td>
<td>Cochin</td>
<td>19318</td>
</tr>
<tr>
<td>5</td>
<td>Trissur</td>
<td>5131</td>
</tr>
<tr>
<td>6</td>
<td>Malappuram</td>
<td>15482</td>
</tr>
<tr>
<td>7</td>
<td>Kozhikode</td>
<td>15313</td>
</tr>
<tr>
<td>8</td>
<td>Kannur</td>
<td>11604</td>
</tr>
<tr>
<td>9</td>
<td>Kasragod</td>
<td>4670</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>150432</strong></td>
</tr>
</tbody>
</table>

Source: Kerala Fisheries Statistics, 2012

Proportionate sampling technique is used to fix the size of samples from each district, Kulshresta, (2013)\(^1\) explains that the proportionate sampling technique is appropriate to fix the sample size selected from each stratum. It made proportionate to the population size of the stratum. In proportionate stratification nh/Nh is specified to be the same for each stratum. This implies the overall sampling fraction is n/N that is nh/Nh=n/N and the number of elements taken from h\(^{th}\) stratum is nh=(Nh)n/N. As the population of each districts are vary from one to another, that is Trivandrum having 39, 766, Kollam having 17,222, Cochin having 19, 318, Malappuram having 15,482, Kozhikode having 15,313, and Kannur having 11, 604 here applies proportionate sampling technique and that results 134 respondents from Trivandrum, 58 respondents from Kollam, 65 from Cochin, 52 from Malappuram, 51 from Kozhikode and 40 from Kannur. Randomly selecting 5 marine fishing villages from each coastal district and divide the sample size of each district in to equal proportions in to 5 marine fishing villages and fix the sample size of each village. From Trivandrum district the villages Poovar, Pulluvila, Vizhinjam south,
Vettukadu, Edava were selected, From Kollam district Eravipuram south, Vadi, Thankasseri, Neendakara, Alappad, From Cochin districts Chellanam, Nayarambalam, Edavanakkadu, Cherayi, Munambm, From Malappuram district Puduponnnani, Meentheruv, Puthiyakadappuram, Parappnangadi, and Kdalundi beach from Kozhikode Beypore, Puthiyappa South, Elathur, Quilandi, Eringal and from Kannur Kurichiyil, Pallisseri, Edakkad, Azhikodkadappuram, and Puthiyangadi were selected for the study. From Trivandrum district 27 samples from each village, from Kollam district 12 samples from each village, From Cochin 13 samples from each village, From Malappuram and Kozhikode 10 samples from each village and from Kannur 8 samples from each village were selected for the study.

14. Reliability and validity

The schedule contains multi-item scales for measuring different variables. The measurement accuracy of a multi item scale mainly depends on its reliability and validity. The consistency and stability of the schedule was determines by its reliability. Drost (2011) explains that the reliability is the degree at which measurements are repeatable when different persons perform the measurements, on different occasions, under different conditions, with supposedly alternative instruments which measure the same thing.

Mohsen Tavakol, Reg Dennick (2011) explains that Alpha was developed by Lee Cronbach in 1951 to provide a measure of the internal consistency of a test or scale; it is expressed as a number between 0 and 1. Internal consistency describes the extent to which all the items in a test measure the same concept or construct and hence it is connected to the inter-relatedness of the items within the test. Internal consistency should be determined before a test can be employed for research or examination purposes to ensure validity. There are different reports about the acceptable values of alpha, ranging from 0.70 to 0.95. A low value of alpha could be due to a low number of questions, poor interrelatedness between items or heterogeneous constructs.

Cronbach’s, alpha coefficient is considered for all the multi item scales used in the Performa for data collection and the alpha values obtained between 0.7 and
Introduction

0.9. This approves the reliability of the schedule. Validity of the schedule means the ability of a measuring instrument to measure what it is designed to measure. While designing the Performa all aspects of validity especially: (i) face validity, content validity and construct validity. The validity of the schedule was assessed in stage of pilot study and Suitable modifications were made in the schedule wherever necessary.

15. Data analysis

The primary data collected through schedules were statistically processed, classified and tabulated using suitable methods. The Statistical Package for Social Sciences (SPSS 21.0) was used for data analysis. Appropriate statistical assessments and tests were applied for data analysis and hypotheses testing. The results are presented in tables. The statistical techniques and tools used in the study are:

1. Frequency descriptive analysis.
2. Pearson's chi-square test ($\chi^2$)
3. Contingency table / Cross tabulation
4. Kolmogorov-Smirnov test
5. Shapiro-Wilk test
6. Levene’s test
7. Correlation analysis
8. Kruskal-Wallis test
9. Mann-Whitney U test
10. Paired sample T Test
11. Wilcoxon signed rank test

Frequency descriptive analysis

It is a way of presenting data that shows the number of cases having each of the attributes of a particular variable. Frequency descriptive analysis converts large sets of data to more meaningful, easier to interpret, values. It also summarizes the
data with useful statistical measures such as mean, median, mode, variance, standard deviation and range etc.

**Pearson’s chi-square test (χ²)**

The chi-square tests for relatedness or independence applies to the analysis for the relationship between two categorical variables\(^1\). The calculated value of \(\chi^2\) is compared with its critical value at a particular level of significance and degrees of freedom. A small chi-square statistic indicates that the null hypothesis is correct and that the two variables are independent of each other. The larger the observed (or actual) frequency is in comparison with the expected (or hypothesized) frequency, the larger the chi-square statistic. This indicates that the difference is statistically significant.

**Contingency table / Cross tabulation**

The cross-tabulation analysis, also known as contingency table analysis, is most often used to analyze categorical (nominal measurement scale) data. A cross tabulation is a two (or more) dimensional table that records the number (frequency) of respondents that have the specific characteristics described in the cells of the table. Cross-tabulation tables provide useful information about the relationship between the variables which leads to meaningful inferences.

**Kolmogorov-Smirnov test and Shapiro-Wilk test**

The Kolmogorov-Smirnov test and Shapiro-Wilk test is used for testing the normality of distribution. These tests compare the scores in the sample to a normally distributed set of scores with the same mean and standard deviation. If the test is non-significant (p>0.05), it tell us that the distribution of the sample is not significantly differ from a normal distribution (i.e. it is probably normal). If however, the test is significant (p<0.05) then the distribution in question is significantly differ from a normal distribution (i.e. it is non-normal). Andy Field explains that the Shapiro-Wilk is more accurate than the Kolmogorov-Smirnov test. He added that, if the analysis involves comparing groups, then what is important in testing normality is consider the distribution in each group not the overall distribution.
Levene’s test

The Levene’s (Levene, 1960) test is used to assess the homogeneity of variance of a sample distribution. It tests the null hypothesis that the variances in different groups are equal. If the Levene’s test is significant at $p \leq 0.05$ then we can conclude that the null hypothesis is incorrect and the variances are significantly different - therefore, the assumption of homogeneity of variance has been violated.

Kruskal-Wallis test

The Kruskal-Wallis test is a non-parametric test of statistical significance used when testing more than two independent samples. Kruskal-Wallis is one-way analysis of variance. It is used for rank order data and based on medians rather than means. It is an extension of the Mann-Whitney U test to three or more groups. If the Kruskal-Wallis test leads to significant results, then at least one of the samples is different from the others. The Kruskal-Wallis test does not identify where the differences occur or how many differences actually occur. Therefore the Mann-Whitney test is applied to analyze post hoc procedures. The Mann-Whitney test would help analyze the specific sample pairs for significant differences.

Mann-Whitney U test

Mann-Whitney U test is a test of statistical significance to find difference between two groups. It is used when the data for two samples are measured on ordinal scale. It is a non-parametric test equivalent to t-test. Although ordinal scales of measurements are used with the Mann-Whitney test, an underlying continuous distribution is assumed. This test is also used instead of the t-test with interval level data when researchers do not assume that the populations are normal.

Correlation analysis

Correlation is the extent to which two or more things are related to one another. This is usually expressed as number called correlation coefficient, which varies from -1.0 to +1.0. The correlation coefficient -1.0 indicates a perfect negative correlation and +1.0 indicates a perfect positive correlation. A correlation coefficient zero means there is no relationship between the variables. If there were a relationship between these two variables, then as one variable deviates from its
mean, the other variable should deviate from its mean in the same or the directly opposite way. There are numerous ways to compute correlation coefficients depending on the kinds of variables being studied. Among the most common are Pearson product moment, Spearman’s rho, and Kendall’s tau.

**One way ANOVA**

ANOVA is a data analysis method effective method available for analyzing experimental data in which several factors are represented. ANOVA assumes the populations involved follow a normal distribution, it falls into a category of hypothesis tests known as parametric tests. The one-way analysis of variance (ANOVA) is used to determine whether there is any significant differences between the means of two or more independent groups. Normally it is used to compare the equality of three or more means. Thus, Analysis of Variance is a hypothesis-testing method used to test the equality of two or more population means by examining the variances of samples.

**Turkey’s Test**

Turkey’s test calculates a new critical value that can be used to evaluate whether differences between any two pairs of means are significant. The critical value is a little different because it involves the mean difference that has to be exceeded to achieve significance. Each difference is then compared to the Turkey critical value. If the difference is larger than the Turkey value, the comparison is significant.

**Paired sample T Test**

A paired t-test is a parametric test used to compare two population means with two samples in which observations in one sample can be paired with observations in the other sample. It is suitable for Before-and-after observations on the same subjects and comparison of two different methods of measurement or two different treatments on the same subjects.

**Wilcoxon signed rank test**

The Wilcoxon signed rank test is a non-parametric test and It is used is used to test the null hypothesis that the median of a distribution is equal to some value. It
can be used in place of a paired t-test but where it is possible to rank the observations.

16. Period of Study

The period of study limited to 2005-2010.

17. Chapterisation

The whole study is presented in five chapters.

- Introduction
- Chapter - I
  Mechanization Fisheries Sector - An Overview
- Chapter - II
  Socio Economic conditions of Fishermen
- Chapter - III
  Impact of Mechanization in the socio economic conditions of fishermen - Analysis
- Chapter - IV
  The Findings of the Study
- Chapter – V
  Suggestions, Recommendations and Conclusion

18. Limitations of the study

- It has been found that fisher folk are not in the habit of keeping the data for information regarding their socio-economic status. Even the monthly income, expenditure and savings.
- The unorganized nature, lack of education and literacy and the special nature of fishermen community are the major limitation to the collection of data
- There was a chance for overstate the problem of the fishermen because they have the feeling of this data is for got support from government.
Considering the scope and specific objectives of the study, these limitations, however, do not seriously affect the quality of the research work. A sincere attempt has been made by the researcher to arrive at meaningful conclusions through systematic analysis of data.