COMMUNICATION PARAMETERS IN THE MARINE FISHERIES SECTOR OF KERALA – A STUDY OF KOLLAM COASTAL VILLAGES

Thesis Submitted in Fulfillment of the Requirements of
DOCTOR OF PHILOSOPHY
(SOCIAL SCIENCE)

By

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CERTIFICATE

This is to certify that the thesis "**COMMUNICATION PARAMETERS IN THE MARINE FISHERIES SECTOR OF KERALA – A STUDY OF KOLLAM COASTAL VILLAGES**" submitted to Cochin University of Science and Technology by **MARY ANTONY** for the award of the degree of Doctor of Philosophy is a record of bonafide research carried out by her under my supervision. No part of this thesis has been submitted for the award of any degree or diploma from any other University.

Dr. S. ANIL KUMAR

DECLARATION

The materials embodied in the thesis "**COMMUNICATION PARAMETERS IN THE MARINE FISHERIES SECTOR OF KERALA – A STUDY OF KOLLAM COASTAL VILLAGES**" are original and have not been submitted in part or full for any other degree or diploma of any other University. The works of authors wherever they have been made use of in this study have been duly acknowledged.

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CHAPTER – I

INTRODUCTION

Technology from its pristine form to its highest and sophisticated materials is the guiding light of human civilization. Human ingenuity has no limits and so the innovation in technology will continue its dynamic march till the extinction of civilization. From the very early beginnings of mankind, man has experimented with technology in its crude form. As years and centuries pass on, technological expansion also has been keeping its pace in all human endeavour. From the discovery of igniting fire to man's moon landing feat and more are classic examples for mankind's insatiable march towards conquering the unknown boundaries and mysteries of nature.

One of the most spectacular features which have swept the world since 1990's has been the Information and communication technology (ICT) revolution (Lim Jerome, 2003). According to FAO (2007), Information and Communication Technologies can be defined as "technologies that facilitate communication and processing and transmission of information by electronic means". This broad definition of ICT includes technologies like radio, television (TV), video, Digital Versatile Disk (DVD), telephone (both fixed line and mobile phones), satellite systems, computer and network hardware and software; as well as the equipment and services associated with these technologies like video conferencing, e-mail, blogs etc. In short, ICT is a comprehensive term that covers all advanced

technologies in manipulating and communicating information (Ingale Shraddha, 2010).

The tremendous changes in development process through Information and Communication Technologies have its repercussions on socio-economic, political, cultural, environmental, ethical and behavioural dimensions of an economy (NSO, 2010). The contribution of Information and Communication Technology to Gross Domestic Product (GDP), employment generation, market diversification, operation of free markets, foreign exchange earnings, poverty reduction, environmental development, economic globalization and liberalization, women's empowerment and gender equity are testimonies to what extent it influences the economy (NSO, 2010).

Information and Communication Technology, now a global feature comprises the following key elements.

- Technological breakthroughs and economic externalities.
- Linking information and network connectivity.
- Impact of Information and Communication Technology on internal politics and global relations.
- Transformations in the socio-economic and cultural arena.

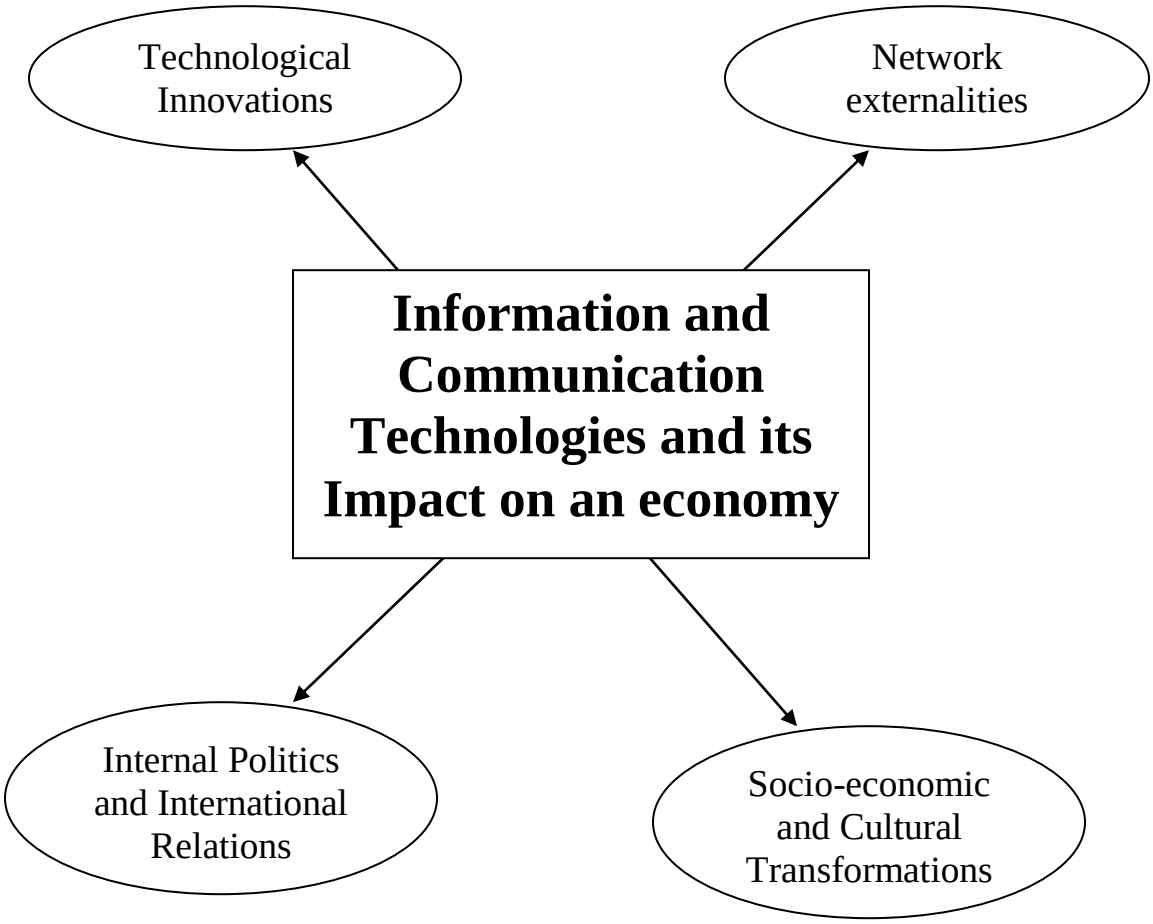
This crucial element includes the contribution of ICT to cover all economic development of nations, new information linkages of societies through diffusion of

ICT, the correlation between human capital and innovation and the ultimate impact of ICT on the social and political arena.

The figure 1.1 showcases a simple framework of Information and Communication Technologies and its repercussions in an economy.

Figure 1.1

Core elements in the impact of Information and Communication Technologies in an economy



Source: Compiled from Lim, Jamus Jerome (2003)

Clearly, the ongoing ICT revolution has asserted the belief that through the facilitation of information and knowledge, growing economies like India has unprecedented opportunities to make changes in production sectors. It has also made possible to improve national policy formulation and execution and above all expansion of range of opportunities for income and employment generation and social transformation among the most vulnerable communities.

Information and Communication Technologies and Economic Development:

Information and Communication Technologies as an engine of economic development is the slogan of modern information societies. The direction and pace of development in ICT have led practically economies all over the world to recognize the improvement of ICT in catalyzing economic activity, efficiency in governance, empowerment of society and bringing about major socio-economic transformation in societies (Bist Rajender, 2007).

Development in its intrinsic form must promote all round progress of humanity in all sectors viz. better health, opportunities for knowledge and empowerment, broad economic activity and above all personal liberty and freedom for enhancing human capabilities. Development in this context depends upon the spread of scientific knowledge and the adoption of scientific knowledge into traditional knowledge system and vice versa. This is a process that is evolutionary, intricate and dynamic in nature.

From an analytic point of view, the contribution of ICT can be viewed at two different but inter related levels.

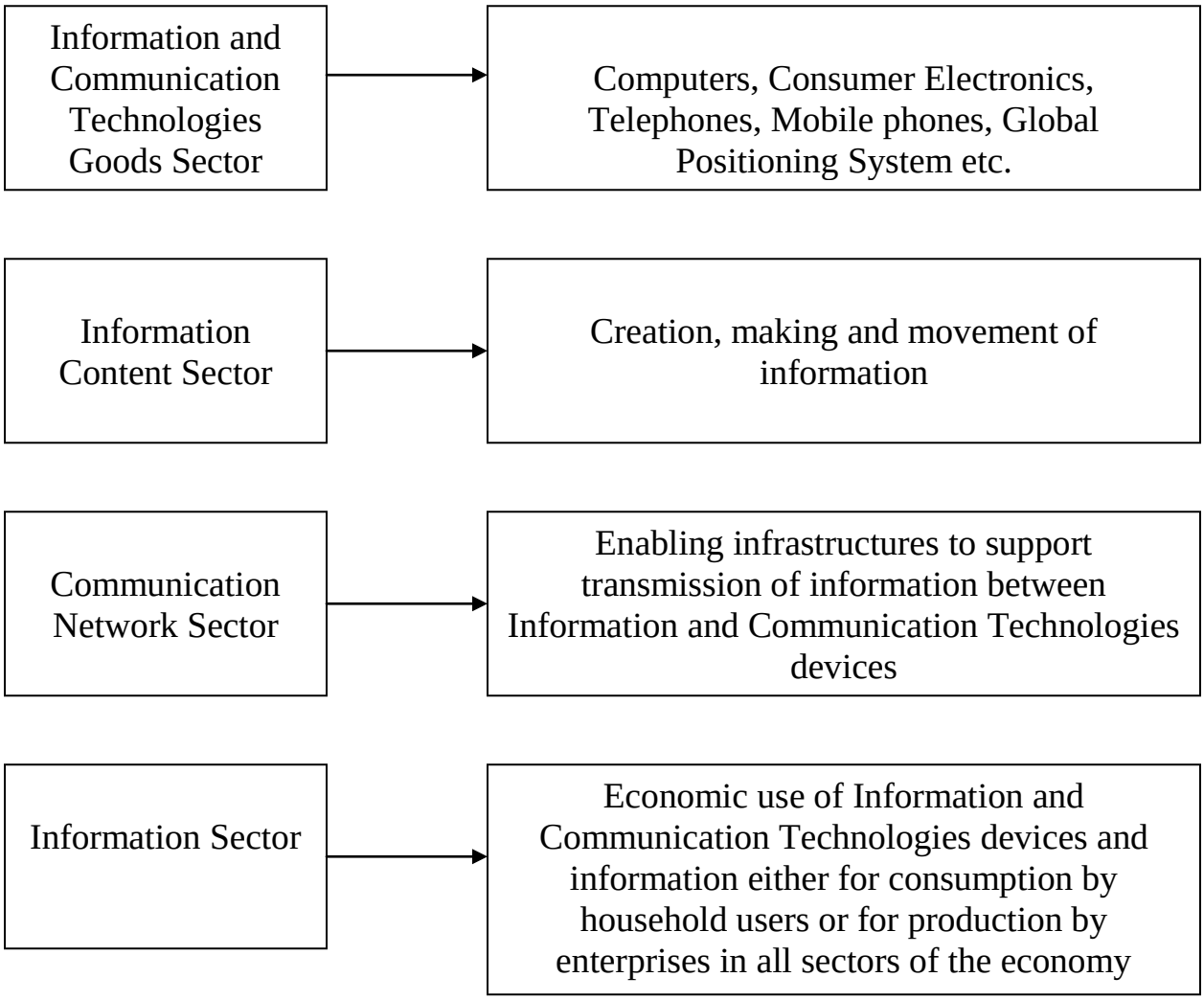
● In terms of growth, ICT sector refers to output, employment, export earnings etc. These goods and services emanating from ICT products are more visible than those from items used in the past.

● The extent of ICT diffusion and use which refers to ICT development are enhanced productivity, competitiveness, growth and human welfare which has direct bearing arising from the use of this technology in different sectors of the economy and society.

ICT in an economy can be conceptualized in terms of four main sectors.

Figure 1.2

Conceptual Framework of ICT in an economy



Source: Compiled from Poh-Kam Wang and Amy Annette (2003)

This Conceptual Framework of Information and Communication Technologies integrates its demand and supply side with policy towards production versus diffusion for economic development. National economic development with Information and Communication Technologies can be achieved through these four

sectors. On the one side a dynamic ICT goods sector provides economic development in larger scale, on the other, information content sectors enhance productivity and global competitiveness. While communication network sectors rapidly shift knowledge based industries for more production and efficiency, information sector is the core which enables and facilitates all the above related activities and process.

The leverage of Information and Communication Technologies revolution for economic development requires integration of government policies affecting every one of the four sectors. At a macro level, the technology revolution in general and ICT revolution in particular has been the chief driving force in the rapid industrialization in developed economies like USA, UK, Japan etc. as well as the growing economies like India over the last two decades.

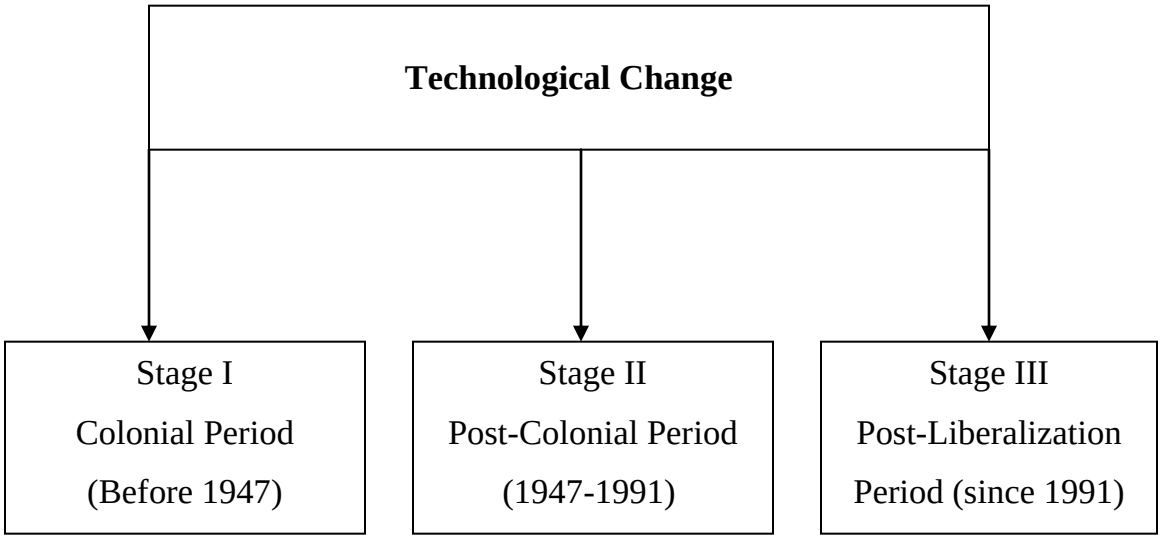
Information and Communication Technologies and the Indian context

A systematic technological development in India passes through various stages in different periods of time. In all the distinctive stages, technological development and its impact upon various sectors of the economy also witnessed upswings and downswings.

The figure 1.3 shows technological development in Indian economy with respect to three distinctive time periods.

Figure 1.3

Technological Time Chart



In the first stage i.e. during the colonial period, there developed industrial and technical skills which centered on imperial factories. But during this stage, it failed to create a sufficient basis for launching a successful path of industrialization.

The post independence (post colonial) stage is characterized by the import substitution[1] industrialization strategies. Although, the second stage witnessed emergence and expansion of indigenous technical skill and industries, it has its short comings too. The policy of 'protection'[2], which was the highlight during this period, carefully delineated sophisticated foreign scientific and technological transfers.

[1] Import substitution refers to the domestic production of goods that were previously imported largely for the sale in the domestic market. Implementing an import substitution policy is relatively easy because it can be done by imposing import quotas and raising tariffs (Dictionary of Economics,2003)

[2] Protection means adoption by the state of special measures to protect an industry from competition (Dictionary of Economics, 1997)

In fact, a dramatic but a systematic technological change in India began to arise in the third stage i.e. since 1991. This transformation takes the form of the recent, ongoing ICT 'revolution'. Since the inception of New Economic Policy in 1991, there are several positive backwash effects[3] for India with ICT. There is hardly any field in which the repercussions of ICT are not being felt with. These include not only the service oriented sectors like banking, insurance, communication, transportation etc. or the secondary sector like manufacturing sector but also primary sector like agriculture, fishing, forestry etc.

Clearly, Information and Communication Technologies, as the new aspirant to the status of leading sector, wield considerable transformation on productive sectors as well as the lives of various communities. The great potentialities of ICT can be well exploited in Indian economy by creating surroundings with appropriate knowledge and organizational support. In general, Information and Communication Technologies are rapidly transforming various aspects of India's basic social and economic structure. This in turn, moves the economy into the age of information.

Today, information and knowledge are paramount factors in achieving development oriented goals in Indian economy. Expansion of capabilities through the infusion of knowledge with the help of Information and Communication Technologies is quite evident in India today. Experiences from various ICT related

[3] Backwash effects are considered to operate where the economic growth in one region of an economy possess adverse effects on the growth of other regions. These effects are said to have principally of flows of factors of production (Labour and Capital) from slow growing to fast growing regions (Dictionary of Economics, 1997).

activities suggest that it amplifies citizen's voices, promotes quality in health and education services and broadens livelihood bases of the poor and the marginalized sections (Nanda, 2006).

Information and Communication Technologies and the Marine Fisheries Sector

The marine fisheries sector plays a critical role in the socio economic development of Indian economy. This sunrise sector has been accepted not only as a powerful income and employment generator but also as a stimulant behind the growth of number of subsidiary industries, as a source of cheap and nutritious food as well as a chief livelihood option for majority of coastal population.

The marine fisheries sector, which began as a subsistence operation by employing exclusively traditional crafts during the pre independence days has today attained the status of a capital intensive industry (Neogy, 2010).

As far as Kerala is concerned, marine fishing industry is the pride of Kerala economy with its spectacular potential of marine bio diversity. Kerala has major fisheries of shrimps, cuttle fish, sardines, mackerels, sharks etc. which favourably contributes to 25% of the country's total marine fish production (Hari Kumar and Rajendran, 2007)

Modern technological equipments have made a significant contribution in changing the status of marine fisheries sector in our economy into a vibrant one. In technology terms, marine fishing industry in the past, in every part of the world

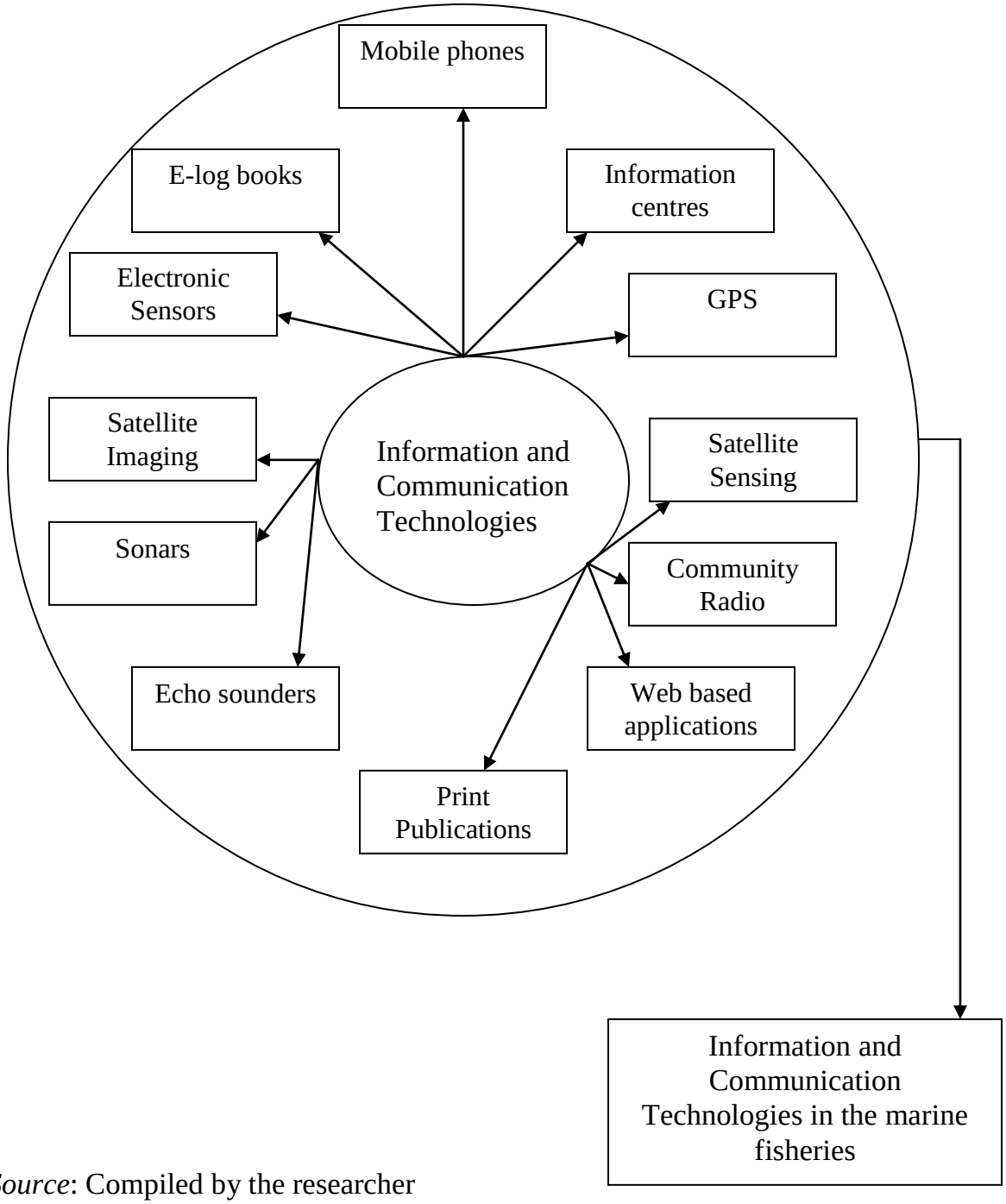
was entirely different from the present scenario. Apart from using trawling techniques and other technical equipments, information and communication in fisheries sector was limited to radios.

Latest technological externalities like Information and Communication Technologies in the marine fisheries have brought about a great transformation of fisher folk population both in their personal life styles as well as in their livelihood activities. In fact, expansion and development of marine fisheries sector through Information and Communication Technologies like GPS navigation, satellite communication and wireless connectivity etc. are quite significant. It is interesting to note the significant change brought about by the high profile Information and Communication Technologies in the field of marine fisheries sector throughout the world.

The Figure 1.4 shows the wide range of Information and Communication Technologies adopted by the marine fishing industry in general.

Figure 1.4

Technologies (Communication and Information) adopted by the fishing industry



Source: Compiled by the researcher

The figure 1.4 illustrates the new Information and Communication Technologies used across the fisheries sector, from resource assessment, capture or culture to processing and commercialization. Some are specialist applications like sonar for finding the vicinity of fish, GPS for navigation and finding location, mobiles phones for trading, exchanging information and emergencies and radio programming with fishing communities etc.(FAO, 2007).

The positive externalities of Information and Communication Technologies in marine fisheries sector definitely enhance livelihood activities of marine fisher folk which is purely economic oriented. The social externalities arising with Information and Communication Technologies are equally important as it reduces people's vulnerability, paving the way for social equality and ultimately bringing the fisher folk in to the mainstream society for over all development.

On a larger canvas, given this general outlook this study primarily concentrates on the coastal villages of Kollam district. Undoubtedly fish workers especially in the artisanal sector i.e. the marine fisher folk forms the central part in all the coastal villages of Kollam. On a larger perspective fishing economy at Kollam comprises three related chain of operations: harvesting, processing and marketing of fish. The advent of Information and Communication technologies make revolutionary changes in all the economic operations by coastal marine fishing community.

The maritime map of India bordering the Arabian sea coast with its vast and varied fishing villages remains the backbone of marine fishery sector. Among these

fishing villages the prime spot belongs to Kerala fishery sector especially Kollam fishing belt.

The emergence of Kollam as the vanguard of the fishing industry is no accident. From time immemorial, the Kollam coast has been the major hub of activity for travelers and commercial entrepreneurs. From the travelogue of Ibn Batua and others we have definite accounts of commercial transactions between Kollam and the Phoenicians and the Romans.

The dominance of Kollam is due to several factors, mainly because of its geographical features. Once known as Desinganad, Kollam is the oldest sea port town situated in the Arabian coast. Kollam district is the gateway to the backwaters of the State as 30% of the district is surrounded by the Ashtamudi Lake.

A peep into the diverse geographical features of Kollam exhibits unique segments. Other than the sea kissed beaches it has lakes, plains, forests, green fields engulfed by coconut palm trees. It is also the store house of every type of food crops and cash crops.

Within the Kerala State, Kollam coastline enjoys a pivotal position as it has the length of 37.3 kilometers which includes 27 fishing villages. Fishing and allied activities of Kollam comprises an estimated number of 1,34,973 persons (official website of Kollam). Kollam occupies third place in marine food production with the contribution of 12.3%. It is in the forefront of fish production as one-third of the total fish captured is supplied by Kollam. Also 60% of the prized prawn catch

is the contribution of Kollam district. The marine industry statistics of Kollam shows that there are more than 3000 mechanized fishing vessels operates from the Neendakara harbour and the adjacent Sakthikulangara fishing area. In the district, there are 99 fishing co-operatives and 324 domestic fish markets.

Thus from any angle Kollam district occupies a pride of place in the marine industry of Kerala.

This study illustrates the impact of modern Communication parameters on coastal community, keeping along with the major roles played by the socio-economic conditions shaping the lives of these most vulnerable sections in the society. Fishery expansion took a great leap forward with the coming of Indo Norwegian Project in 1953. The fishing villages viz. Sakthikulangara and Neendakara were chosen to transform the face of marine fishery sector of Kerala. Since then modernization with technology became the 'manthra' of this sector.

But at the same time this sector witnessed unprecedented ups and downs which have its echoes found on the economic, social and political spectrum of Kerala. In view of these circumstances this study concentrates on the marine fisher folk of Kollam district.

The paramount question that arises here are:

(1) How fishery expansion was transformed by the intervention of new technologies like the ICT devices.

(2) How this community responds to the entry of various new communication technologies like mobile phones and other electronic equipments like Global Positioning System (GPS).

(3) Finally, how the ICT can create a sustainable fishing industry in Kerala.

Among the various Information and Communication Technologies used in marine fishing industry, communication technologies stands apart and Kerala coast too is adopting the new communication equipments like mobile phones. Mobile communication is revolutionizing economic and social life in the nook and corner of Kerala state. Mobile ownership in India as well as in Kerala is growing rapidly. Mobile telecommunication system in India is the second largest in the World with a subscriber base of more than 791 million (Highlights of Telecom Subscription data as on 20th Feb 2011). While the same in Kerala shows more than 30 million subscribers.

Marginalized and vulnerable communities like fisher folk forms the 'new generation of mobile users' in India. Basically coastal populations are alienated from mainstream arena due to high illiteracy, lack of infrastructure facilities and aversion to technological devices.

The study looks at how their new mobility could be used to bridge the growing economic and social digital divide between the fisher folk and the mainstream sectors of the Kerala society through modern methods of communication and technology.

HYPOTHESES

1) Modern communication parameters especially mobile phones are widely used by the coastal community in the fishing villages of Kollam.
2) Electronic communication equipments help the fisher folk to transfer and exchange information onshore and thereby arranging their business terms.
3) Remote sensing equipments like Global Positioning System (GPS) enables the marine fisher folk to locate fishing grounds.
4) New technological inputs viz., Information and Communication Technologies in the marine fisheries sector increase productivity and thereby increase the profit margin.
5) The coastal communities in Kollam still lag behind in using E-log books or On-Board Data Integrator in fishing activities.
6) The impact of ICT gadgets increase the marketing potentiality of fish products by the fishermen community.
7) Literacy among the coastal community play a significant role in adopting ICT instruments in their livelihood activities.
8) The coastal fisher folk using ICT have better leverage in socio-economic matters.

OBJECTIVES

1. To carve out a new development paradigm for sustainable growth with ICT devices on the basis of existing socio-economic structure of the marine coastal community.
2. To analyse the role of education and the use of communication devices in the promotion of livelihood aspects of fish labourers.
3. To assess the future implication of ICT devices in coastal area with special reference to the age composition of population concerned.
4. To explore future prospects of modern communication tools in the marine fishermen households for income generating activities.
5. To examine the existing socio-economic frame work of the marine fishing economy of Kollam in the presence of the ongoing Communication and Information technologies in the sector.
6. To know the changes in the fishing technology from the traditional fishing crafts and gears to modern equipments and the present communication technologies.
7. To understand how modern communication and information technologies came into Kerala coast.

LITERATURE REVIEW

The marine sea waters and the community associated with this sector in Kerala have shaped its history and will continue to play a major part in determining the future course of its development. Despite the importance of the fisheries sector to national welfare, most fishers are small-scale producers and who are classified as poor in Kerala's society. Combining the various elements related to marine fisheries sector of Kerala and Information and Communication Technologies especially communication parameters, it is appropriate to critically evaluate the empirical studies and stipulate the specific problem or area under the present study.

Literature reviewed in this study can be put into various themes which finally make a clear indication towards research problem under study. The various literature reviewed can be put into three major areas.

1) A general picture of marine fisheries sector in Kerala with special reference to technology.
2) Information and Communication Technologies and economic development and
3) Communication and Information parameters in the marine fisheries sector.

Literature review on marine fisheries sector of Kerala

In fact, studies on the various aspects of marine fisheries of Kerala began to pour with the introduction of Indo Norwegian Project (INP) in 1953. Major studies

conducted during 1950's and 1960's focus on the impact of new technological changes in the marine fisheries sector of Kerala.

Sandevan (1959), examines the various aspects of Indo Norwegian Project (INP) with details on the evolution of mechanization of fishing crafts on the one hand and the whole structural changes followed after using them in fishing activities on the other hand in the INP area. A crucial draw back of his study was that it mainly focuses on the impact of technological change on two regions only viz. Sakthikulangara and Neendakara.

Another in-depth study by Achari and Menon (1963), point out that mechanical technology in fishing led to a commendable increase in the number of mechanized boats that led to increase in assets as well as liabilities of boat owner households. But it fails to point out how the induction of new technological devices transformed the marine fishing community in general in Kerala coast

In another study, Achari (1969), successfully illustrates the positive externalities emerged from the mechanization process which ultimately led to the growth and development of Indian fisheries. His analysis shows how institutionalized projects can make a change in the quality of the life of the people like fishermen in backward regions.

But a major defect of the studies conducted during 1960's was that it checked only the impact of mechanization in selected regions like Neendakara and Sakthikulangara and did not evaluate technological impact at the macro level.

Studies of a comprehensive analysis of marine fisheries of Kerala emerged during 1970's. Qasim (1972), shows the need for the exploitation of fishery resource with a suitable fishing technology. His analysis urges in reducing the cost element associated with the fishing technology.

Valsala (1976), traces the structures and backward linkages of marine products export in Kerala. The study analyses the different stages of fish production and its conversion into an export product. But the study fails to point out the role played by the non fishermen group in marine export industry.

Vattamattom (1978), study shows in spite of the mechanization process, fisher men in Poonthura Village remains more or less as a feudal community. The study also analyses the pattern of ownership of fishing equipments as a factor in determining their income generation.

Hakkim (1977), examines the impact of mechanization process in the formation of co-operatives. The study also evaluates the various constraints in group organizations like co-operatives in making a real impact on the lives of fisher men.

Kurien (1978), analyses in detail the fish economy of Kerala with respect to certain variables. The study is significant in two ways. Firstly, it gives a comprehensive analysis of fish production and its distribution. Secondly, technology prevailed in the fishing industry at a crucial period of time in Kerala's marine fishery history.

Bhushan (1979), study, the period from 1953-1977, shows the unprecedented changes in the fisheries sector of the state due to the technological initiations in

1953. The study gives a detailed account of new fishing crafts and gears and its impact on the structure of fishing as a whole and the unregulated fish practices that followed.

Scientific analysis of the various key elements in the marine fisheries sector of Kerala is the focus of many studies arising since 1980's. Krishnakumar (1980), study concentrates on specific strategies to make fisheries sector sustainable and steps needed to change the living conditions of fisher men community. Although the study is significant, it fails to provide a target action plan focusing each region of the Kerala coast.

Kalwar (1985), investigates the need to make capital investments in marine fishery sector to make it a profit making industry. His findings show that Government initiative in this sector is comparatively low irrespective of the sector's great potentialities. But the study is generalized in many ways not given target solutions with respect to the marine fisheries in Kerala.

Platteau, et.al. (1985), study shows a critical evaluation of the changes in the economic structure of fishermen community as a result of technological expansion in the marine fisheries. The analytical importance of the study is that it systematically links fishermen with debt trap as a result of credit availability which is the outcome of mechanization. But the study is not a comprehensive investigation as it covers only selected coastal regions of Kerala.

Ibrahim (1986), analysis shows the deterioration in the marine fishing sector of Kerala with the advent of mechanization process. Taking the traditional fisher folk

in the state as the target group, the study focuses on the problems of employment diversification and income generation. But the study could not analyse the factors like big investment that results to a transition in fishing industry.

Meynen (1989), presents the development strategies in the marine fisheries sector in Kerala with details on the cause- effect aspects that changed the fishing industry in the state. The study in particular analyses the problem of resource depletion in marine waters of the Kerala coast. But the study cannot point out the technical solutions to a problem that arise from the over utilization of technology.

Balan et.al. (1989), study on the impact of motorization of country crafts in Kerala. The study analyses in general the positive implications of such changes to the fishermen community. But the study is not critically evaluating the negative consequences on production process and labour process.

Korakkandy (1994), examines the transitional phase of marine fishery sector of Kerala with technological change. His study critically evaluates the pros and cons of technological change in the fishing industry during that period. But the study fails to point out the reasons for the intrusion of non-fisher group in the industry which led to severe problems during the transitional period.

Kurien (1994), studies the impact of technological change among the traditional fish workers and their consequent marginalization. But he fails to provide a theoretical frame work to solve their problems as well as the specific measures to re structure the fishing industry in general.

Vijayan et.al. (2000), examines the methods and strategies to protect the marine fishery resources of Kerala from over exploitation. The study signifies the importance of Government in educating the fishers for resource conservation by citing the example of Chili. But the study is does not make any comparative analysis of the problems faced by two regions in educating the fish workers.

Sureshkumar (2001), illustrates the changing phase of Kerala marine fishery sector with the advent of modernization into the sector. The study focuses on transformation of traditional fish workers and the fishing sector in general during the motorization period. But it fails to present its total impact on the foreign exchange earnings through exports.

Rajasenan (2001), finds out the impact of technology on labour process in the marine industry of Kerala. The investigation shows the marginalization of real fishermen through the modernization process. It also analyses the impact of technology on output trends. The findings of the study try to focus on protecting the industry with a policy shift favoring the traditional fishermen, but it fails to analyze the future implications of such change on the fishing industry as a whole.

Koriya (2005), analyses how the short sighted policies by the Government and the fisher folk itself led to the virtual breakdown of the marine fishery sector of Kerala. He points out the measures like information, action and feedback to rejuvenate the sector in future. Although, the study is an in depth analysis of the transition of marine fisheries sector of Kerala, he fails to give details of measures to be taken in the future.

Balasubramanian et.al. (2005), presents a comparative socio-economic analysis of marine fishermen in Veeraval (Gujarat) and Quilon (Kerala) by clearly pointing out the differences between the two regions regarding fish production. The study finds out that crafts and gears used by the two regions do not vary significantly. But the study fails to project how the two regions are different in adapting new technical devices in fishing.

Ramesan and Ramachandran (2005), study evaluates the economic impact of mini-trawl nets on fish catches and production in the Kasargod district. The study also suggests measures to be taken to improve fish production with the adoption of new technologies in mini-trawl nets. But a major defect of the study is that it is covering a limited area to evaluate the change.

Pillai (2006), analyses the marine fisheries of Kerala with focus on marine fish production and makes a comparison of growth rates in the past years. The study also makes a practical approach in addressing the problems in fisheries management with right strategies. But the study is not making an attempt in formulating strategies with information and communication devices in fishing.

Sathiadhas (2006), examines the socio-economic status of marine fisher folk of Kerala. He analyses the structural change that happened in their socio-economic set up with the series of changes in fish technology. But the study fails to point out an alternate approach in addressing their socio-economic problems.

Immanual Sheila et.al. (2006), analyses the scientific linkage activities between the fishermen communities and the extension personal for the promotion of fishing

activities. The findings point out the need to formulate the right strategy to enhance the scientific linkages. The failure to connect new information devices with scientific linkages is a major draw back of the study.

Berg and Lensing (2007), studies shows work sharing pattern among artisanal fishermen of Kerala. But the study has not critically evaluated the possible change in work sharing pattern in the future due to communication and information equipments.

Pillai et.al. (2007), critically evaluates the marine fisheries of Kerala with special focus on marine fish landings in the State. The study gives a detailed account of different fishery groups in landings due to the adoption of innovative technologies in fishing practices. But the paper fails to point out the role of information and communication devices in creating healthy fishing practices in the state.

CMFRI (2009), gives a detailed account of marine fisheries sector of Kerala with the recent challenges on its sustainability. But a major defect of the study is that it is not investigating into the potentialities of Information and Communication Technologies in the fishing industry of the state.

Literature review on Information and Communication Technologies and economic development

There has been a flow of studies and literature on the role of Information and Communication Technologies in economic development since the last decade of 20^{th} century.

Miller and Mansell (1999), study shows that the application of Information and Communication Technologies in poverty reduction in nations like India depends not on the ICT devices itself. A systematic ICT strategy should frame along with the general policy measures to spread its effectiveness at its desired level. Although, the study is general in its approach it fails in focusing the various aspects in community development apart from poverty.

NOIC (2002), presents the contribution of Information and Communication Technologies to economic growth. Taking many empirical studies conducted in several nations, the impact of ICT investment on GDP growth and labour productivity is measured. But it fails to give a comprehensive picture of economic growth with ICT investment

Samiullah and Rao (2002), highlight the benefits of ICT to the rural population in expanding their economic activities through variety ICT infusion measures. But their study is not focusing on the measure to eliminate illiteracy which acts as a major block behind expansion of ICT activities in a comprehensive manner.

Keller-Viitanen (2003), examines contribution of ICT in poverty reduction. By citing the impact of Information and Communication Technologies in many areas like education, health, fisheries etc, she focused on the tools and applications of Information and Communication Technologies in poverty reduction in economies. Although, she focus on the examples in many countries, the findings does not provide any detail analysis of ICT in poverty reduction.

Lake (2004), analyses the usage of ICT in expanding physical infrastructure in an economy and thereby leads to economic growth. But the study centres only on the potentialities of Information and Communication Technologies with mobility, the other aspects of positive linkages with new devices is not made a matter in the study.

Bongo (2005), critically evaluates the studies conducted in many European and OECD countries. His analysis shows that all the selected nations where studies are made, there has been a quantum jump in Gross Domestic Product due to ICT. But his evaluation focuses on the need for a vibrant institutionalization of ICT activities.

Souter et.al. (2005), study on economic impact of telecommunications on rural livelihoods and poverty reduction in selected economies shows that communication technological equipments especially phones play a lead role in the marketability and product diversification with respect to less privileged sections societies like fishers and farmers. Even though the study focuses on the positive impact of phones in rural markets the study does not take in to account individual competitive advantage of labourers resulting from positive technological change.

Joseph and Abraham (2005), investigate the technological competence in India's ICT sector. The study analyses in detail the various conceptual and measurement issues with respect to ICT in India. Though, the study is good at the empirical level, it fails to provide the critical problems faced by the Indian ICT sector.

Torero et.al. (2005), analyses the changes in the economic performance of Indian economy with ICT adoption. Although the empirical data on the impact of telecommunications infrastructure on growth has been constructed with strong theoretical back ground, the study is not giving any specific measure to solve the problems related to the industry.

Info Dev (2008), multi-country study of Poland, Russia and the Boltic nations show that ICT lead to competitiveness in industries which ultimately enlarges production and thereby economic growth. But the study also recognizes the institutional economic framework for the application of Information and Communication Technologies in a variety of sectors. But the study is not making any attempt in addressing the issues in each region for the systematic implementation of ICT strategies.

Fong (2009), makes a critical assessment of ICT devices on Gross National Income per capita in developing nations. With strong empirical data and analysis, the study also searches the requisites needed for ICT adoption in those nations. But a major defect of the study is that of selecting few ICT devices (like internet, mobile phone, pager, personal computer and telephone) in assessing economic development.

Mishra and Chandra (2010), study shows the positive implications of Information and Communication Technologies in making a commercial growth in the rural economy of India. By taking e-commerce as an ICT weapon the study analyses its

overall impact in rural development. But the structural transformation of rural economy with ICT devices has been neglected in the analysis.

WEF (2010), study analyses Information and Communication Technologies direct impact on India's economic growth in the way of expanding production in different sectors of the economy and providing opportunities for citizens in all sections of the society. But at the same time the study also highlights the need for network competitiveness for ICT penetration. But the defect of the paper is that it presents only the case of Indian Information Technology industry only.

Literature review on Information and Communication Technologies in the marine fisheries sector

The studies on the influence of ICT in the fisheries sector of Kerala are limited. Here an attempt is made to focus on reviewing Information and Communication Technologies in fishing activities in general.

Verghese (1998), study examines satellite and electronic devices for finding exact location of fish by the fish workers of Gujarat. The study is an early attempt in evaluating the impact of electronic instruments in increasing fish production. But the findings could not make a complete assessment of the change as it lacks a comprehensive empirical data.

EMCC (2003), makes a brilliant study on the impact of Information and Communication Technologies in the European fishing waters. The study covered

almost every aspect of changes in fishing activities with ICT tools. But the study fails to point out its repercussions in the coastal regions of Africa and Asia.

Lowrey (2004), presents the role of Information and Communication Technologies in rescuing a small fishermen community on Guinea, in the form of global positioning system (GPS) to combat foreign trawlers poaching in their fishing grounds. But he is not making an assessment of Information and Communication Technologies on their livelihood activities.

Naveen (2006), points out the usefulness of community radio in providing vital information like weather conditions, availability of catch along with other entertainment programmes. By taking Kerala's, Alakal FM, he also notices the obstacles like Government's indifference in sanctioning initiatives like this in enlarging its scope among fishermen community in Kerala. But his analysis is limited since his focus is only on community radio.

A notable investigation in this field has been given by Abraham (2007). His study throws light on the positive correlation between investments in telecommunications and economic development. By taking mobile phone as a component of telecommunication he investigates how fishermen community of Kerala is benefiting from it. His study points out that functional illiteracy of fisher folk is a major impediment in the diversification of fishing activities with Information and Communication Technologies. But his study does not analyze the dynamics of other communication devices in fisheries.

Jenson (2007), studies show how with the adoption of mobile phones by the fishermen led to the elimination of price fluctuation in marketing fish products in Kerala. But the analysis fails to give the real life situations in the marketing arena of fishing in Kerala.

Das (2007), examines ISRO's remote sensing satellites in helping the fisher folk of Lakshadweep in their livelihood activities. His analysis shows that advance applicability like remote sensing technology has turned out to be a great boom in all areas of fisheries sector of Lakshadweep. But he is not making an attempt in assessing remote technologies application in other coastal states.

FAO (2007), evaluates the role of Information and Communication Technologies in the fisheries development. By analyzing the experiences of fish workers with the adoption of a wide range of ICT tools, the study takes the cases of fishing communities in different parts of the world. But a serious draw back of the study is that it lacks empirical data.

Velayudhan (2009), finds out the specific measures and schemes to be carried out to help mechanized fishermen in Kerala. He focuses on sophisticated communication and navigational equipments on board which includes GPS and mobile phones. But his suggestions are general in nature and is not concentrated on taking any specific fishing village in Kerala

Maddox and Overa (2009), take the case of fishing communities in Bangladesh and Ghana to demonstrate the use of mobile phone technology in creating new opportunities. The study also presents the demands for higher literacy rate and

technical knowledge in imparting new the technological know how to the fishing communities. But the study is not focusing on other communication and information devices in fishing applications.

Ifejika et.al. (2009), studies the impact of mobile phones as the communication agent in fish marketing in western Nigeria. The study shows that within a short span of time mobile phones made the supply chain transparent. But the study is not analyzing the usage of other information and communication devices in the region for fishing purposes.

Sathiadas and Sangeetha (2009), analyze labour migration in marine fisheries in search of high economic returns. The study points out those modern satellite gadgets like mobile phones and GPS are responsible for this trend. But a major defect of the study is that it is not evaluating in detail the impact of satellite facilities in fisheries.

UNESCO (2010), makes an analysis about changing livelihoods of the poor with mobile phones and other ICT devices. The paper critically evaluates the studies made with respect to the fishing community. Although, it presents a general approach to the livelihood aspects of the poor, it des not point out the specific measures needed in the case of coastal poor.

Chassot et.al. (2011), reviews satellite remote sensing technologies in fishery sector in general. The study investigates the implications of satellite remote sensing data in the proper management of marine resources. But the analysis fails

in formulating specific management strategies with respect to different coastal regions.

The literature reviewed throws light on two major aspects in this study. Firstly, marine fishing industry in its totality in the Kerala context is extolled for the economic clout it holds. Secondly, it also observes in detail great bearing that ICT has on the fisheries and fish related activities.

METHODOLOGY

The study is both descriptive and analytical in nature. It is descriptive with respect to the socio-economic features of marine fishers and the impact of Information and Communication Technologies on marine fisheries. The analytical part of the study is that it interprets and analyses the primary data to reach conclusions. The basic approach followed in this investigation highlights the transformation of coastal economy in the wake of Information and Communication Technologies in Kerala.

Both primary and secondary data are extensively used in this investigation. The primary data collected in this study focus on two areas.

1. Impact of Communication and Information Technologies in the fishing villages (sample fishing villages).
2. A general profile of the socio-economic status of marine fishermen in the coastal villages (sample fishing villages).

The primary data tends to focus exclusively on the fishermen community of the coastal belt of fishing villages of the district of Kollam. Generally, these fishermen

are backward in nature as caste and communal equations still operate to a great extent. Hence their position in the socio-economic ladder ends at the bottom.

Selection of Sample Villages

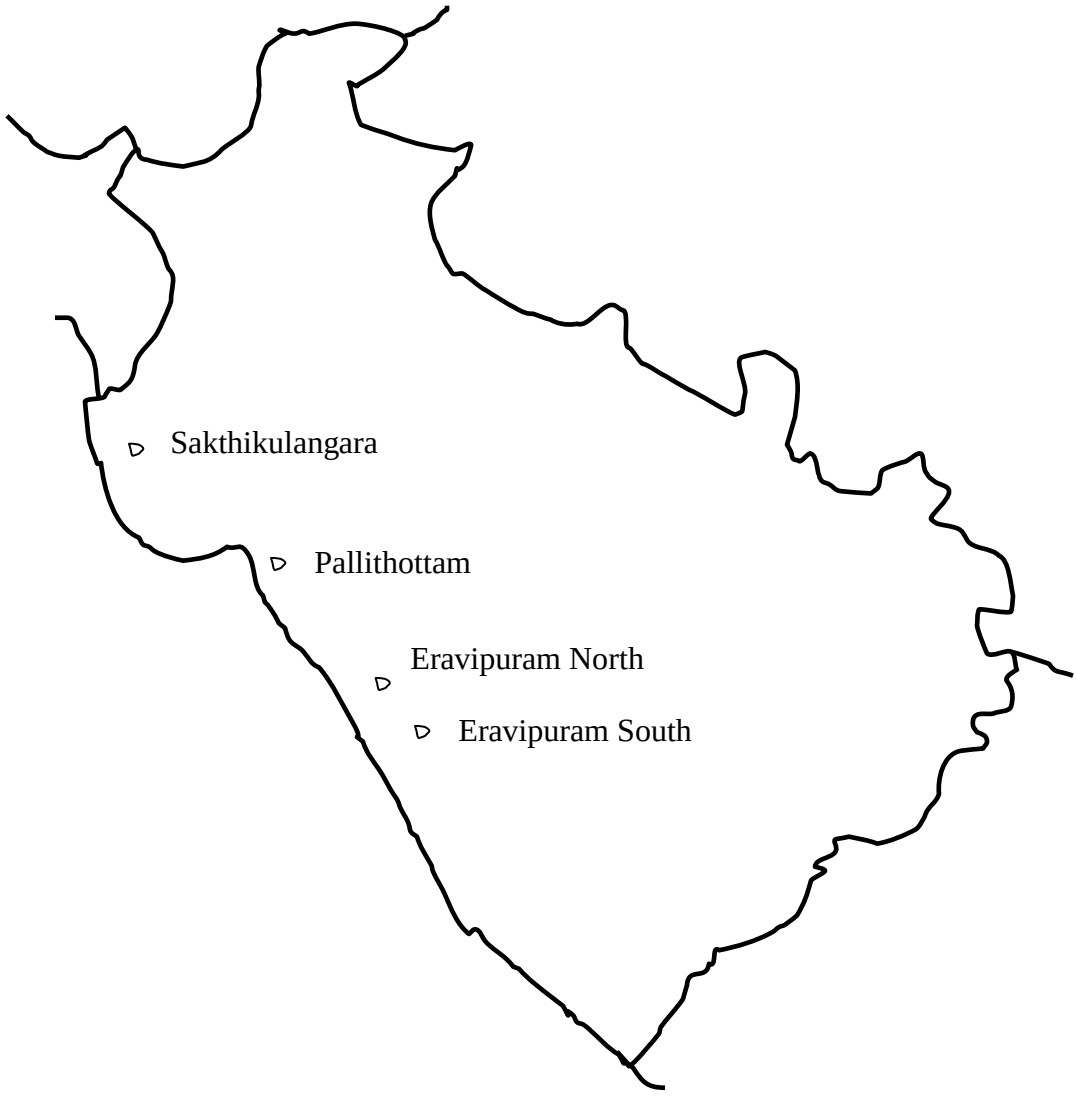
In order to collect primary data, complete information regarding marine fishermen population has been obtained from District Fisheries Department, Kollam. The marine fisher folk of the Kollam district constitutes the target in the study. Coastal belt of Kollam which comprises 27 fishing villages from which four sample villages are chosen. The four fishing villages selected are

1. Eravipuram South
2. Eravipuram North
3. Pallithottam
4. Sakthikulangara

The geographical location of sample fishing villages taken is presented in fig.1.5

Figure 1.5

Map of Kollam Taluk with sample fishing villages



The geographical significance of the sample villages selected represents its rich and varied bio-diversity.

The selection of the sampling villages is based on three major criteria.

1. The predominance of both motorized and artisanal crafts particularly motorized marine plywood boats and non-motorized wooden canoes.

2. These villages have mechanized fish landing centres and have a sizeable number of Kattamarams. Thus small crafts as well as deep sea trawlers operate from these centres. These two aspects are relevant because a sizable mix of traditional and modern crafts enable the use of ICT devices in fishing.

3. Another crucial factor regarding selection of these villages is the pattern of their socio-communal composition which comprises a mix of Latic Catholics, Arayans, Mukkuvas, Tamil immigrants, Muslims and Scheduled Castes.

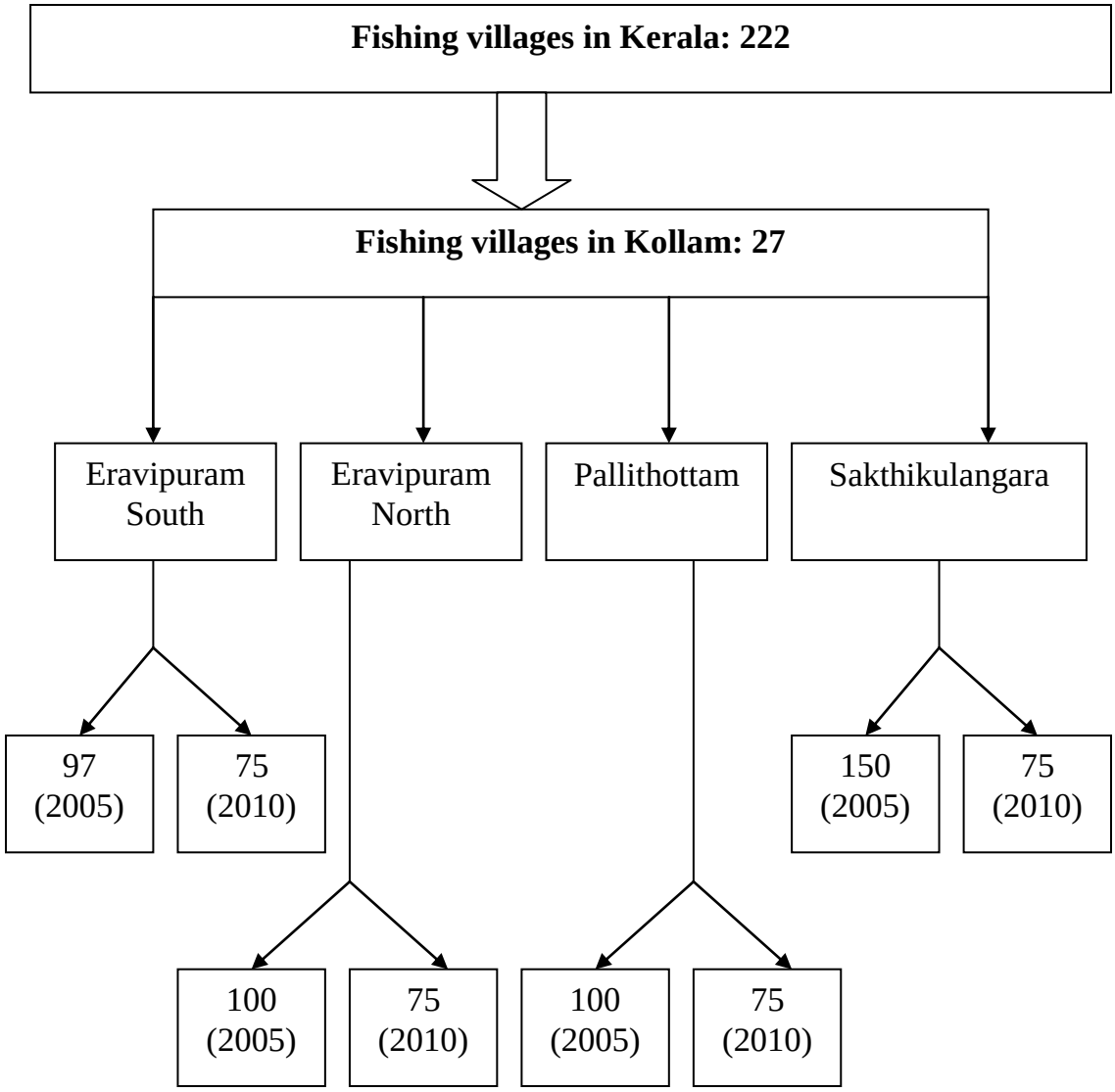
Total numbers of registered fishermen in each village was acquired from the records of the Deputy Directorate of Fisheries, Kollam for two time periods the year 2005 and the year 2010. In the year 2010, information from respondents have been collected with respect to analyze the crucial aspect of the study; the impact of Information and Communication on the coastal population of sample villages. The total populations in four sample villages are 5667 and 6164 for the year 2005 and the year 2010 respectively.

In both the years 2005 and 2010, the respondents (fisher folk) from the four sample fishing villages are selected by random technique.

Sample Design

Figure 1.6

Sampling Framework



The most important aspect of the framework of the sample design in figure 1.6 is the information on the total number of respondents (fisher folk) selected in two periods of time in data collection. In the year 2005, the total numbers of

respondents in the sample villages are 97 in Eravipuram South, 100 in Eravipuram North, 100 in Pallithottam and 150 in Sakthikulangara. So a total of 447 respondents are selected during that period. While for the year 2010, a total number of 300 respondents are being selected, a total of 75 each from the four sample fishing villages.

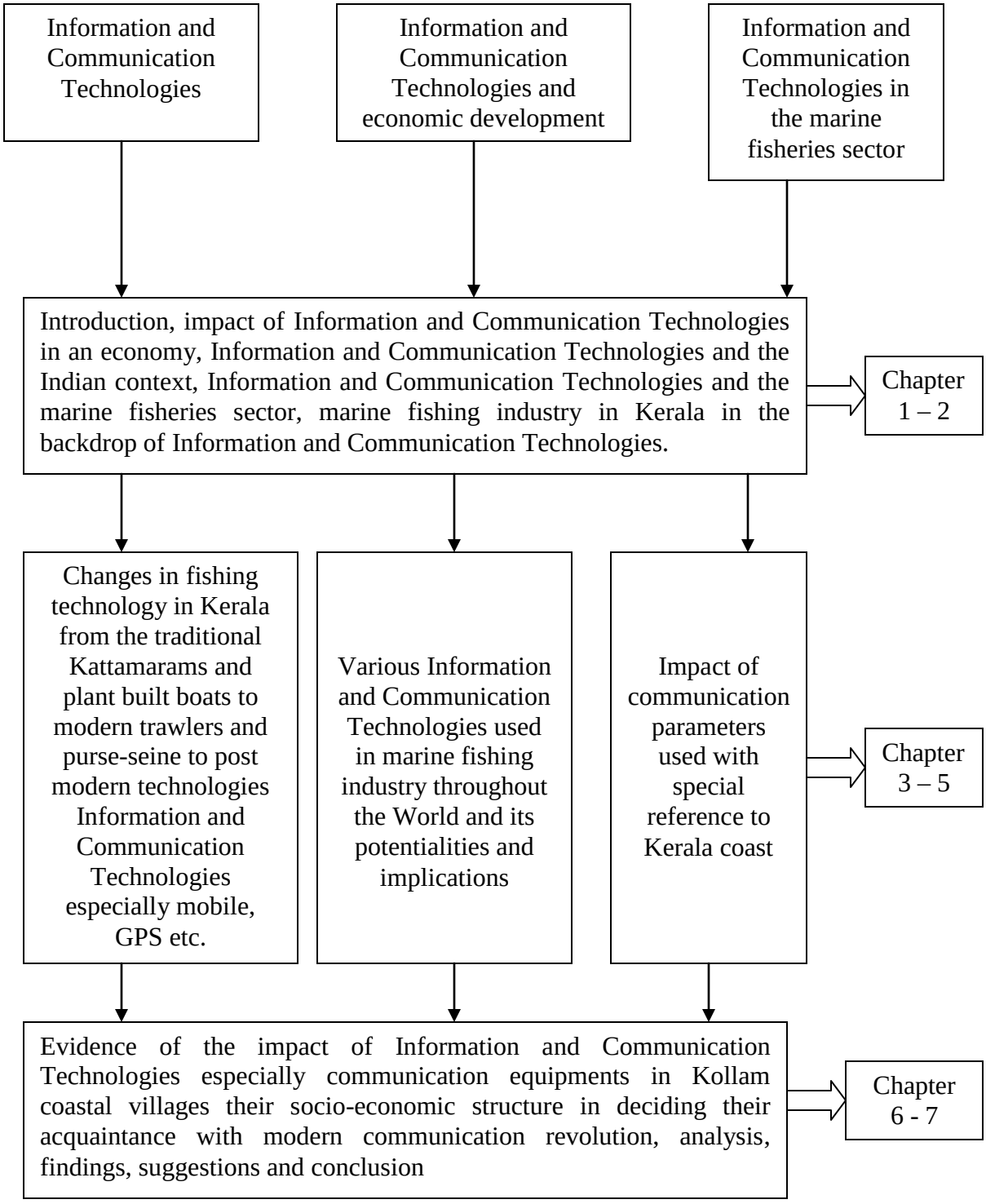
Primary data was collected with the help of a structured schedule. The schedule was administered to the respondents by personal interview method. Analysis, explanation and interpretation of the data are mainly done on the basis of percentages and Pearson's Chi-square test.

Secondary data have also been extensively used in the study. It is being mainly collected from State Department of Fisheries, Kerala, Central Marine Fisheries Research Institute, Centre for Development Studies, news papers, magazines, journals, various websites etc.

Theoretical framework

<table>
<tr><td rowspan="2">Technological Innovations and Economic development</td><td>Emergence of Information and Communication Technologies and its applications in various sectors of the economy</td><td rowspan="2">Transformation of marine fishing industries with Communication and Information parameters</td></tr>
<tr><td>Information and Communication Technologies in the Marine Fisheries sector</td></tr>
</table>

Research framework



Major variables in the study

1. Information and Communication Technologies 2. Communication parameters 3. Technology 4. Socio-economic composition 5. Fisher folk

Need of the study

The role of ICT technologies in providing multiple benefits to the marine fisher folk who belong to the marginalized section in the society, has been quite phenomenal. Their lives, their working habits, their economic advantage due to increased production, their socio-political relationship, thus their whole lifestyle has been beneficially affected for their own good and their community.

No part of their livelihood has been untouched by this phenomenon viz. the Information and Communication Technologies. Though initially, the ICT invasion has its doubters, but in course of time it succeeded in revolutionizing the fishing industry.

This study is an analytical and historical interpretation of facts confronted by the fishing industry through the intervention of Information and Communication Technologies. In one sense there is a pioneering effort as there are few in-depth study and analysis of the usage of ICT instruments in the Kerala fishing industry. So this study is quite timely as it explores in detail the impact of ICT.

Limitations of the Study

The Arabian coastal belt of Kerala State is inhabited by the marine fisher folk and the Kollam sea coast is no exception. Most of these fisher folk belong to the

marginalized section of the society. The general perception is that they are stationed in their lower ladder of socio-economic strata but to compartmentalize the entire fisher folk into that column is far from reality. According to the economic clout they hold, it will be safe to bifurcate this community into three groups. The top order has mechanized boats to shipping vessels at their command for fish procurement. The second order is middlemen engaged in distribution and market activity. It is the third group which forms the majority who are actively engaged in the fishing industry from catch to marketing.

This study and its survey have the opportunity to cover these three segments of fisher folk. The main thrust of the investigation centres on the third group as they form the majority. It is this third group who are actively interacting with the modern communication equipments.

From the collection of primary data onwards various kinds of difficulties were encountered. Hence there are limitations in the study of these four fishing villages which can be enumerated and categorized in the following manner.

a) The Government has official records of the registered fisher folk. But these records have double entry and are incomplete in data entry. There is all the possibility that the wrong information has crept into.
b) It has been found that fisher folk are not in the habit of keeping vital statistics and information regarding the socio-economic status. So a full proof enquiry is not a possibility in the area.
c) The fisher folk do not have detailed account of employment related matters.

d) The fisher folk are reluctant and in some cases opposed the use of modern means of communication instruments for fishing related activities.

e) The fisher folk in general are suspicious in survey related matters. This is because they might have already provided wrong information for receiving Government grants and subsidies. So they will not reveal any other information even if it is true for fear of loosing Government sponsored perks.

f) Most of the time men fisher folk will not be at home. Female at home will not provide information without the prior approval of their male members.

Organization of the thesis

The thesis is organized into seven chapters. Chapter I provides an introduction to the study. It deals with a brief discussion of Information and Communication Technologies and its role in economic development and marine fisheries sector. The hypotheses, objectives, literature review, methodology, theoretical and research framework, need and limitations of the study are pointed out in this chapter.

The Chapter II contains the detailed account of the present status of marine environment of Kerala by taking into account the economic, social and political conditions.

In Chapter III, the technology used in the marine fisheries sector of Kerala has been discussed and analyzed covering the traditional, modern and post modern period.

The emergence of Information and Communication Technologies in the marine fisheries sector and its dynamic role has been discussed in Chapter IV.

The Chapter V examines the communication and information technologies and its relevance in the fishing economy of Kerala.

The empirical evidence to the impact of communication and information technologies and the socio-economic condition of fishermen community in the coastal villages of Kollam has been discussed in Chapter VI.

The final Chapter (Chapter VII) deals with findings, suggestions and conclusions of the study.

CHAPTER – II

KERALA MARINE ENVIRONMENT: AN OVERVIEW

The previous chapter has outlined the basic structure of this study through hypotheses and specific objectives. Based on this the present chapter gives a general overview of marine environment existing in Kerala. This is being done by considering the social, political and economic aspects related to this sector. It is essential to get a picture of marine environment in Kerala to know how Information and Communication Technologies especially communication parameters are adapted into it.

Kerala, the only 'paradoxical' state of the Indian Federation has attracted world wide attention through its peculiar development process. With cent percent literacy rate, exceptional sex ratio and commendable progress in the health scenario, the wonderful 'Kerala model' was glorified by too many from various walks of life across the globe.

Kerala's unique development has three characteristic features viz. (1) the attainment of better quality of life as compared to other underdeveloped states in India (2) low rate of growth and backwardness of productive sectors viz. agriculture and industry and (3) a very high incidence of out-migration and heavy reliance on migrant remittances (Prakash B.A, 2004). To be more precise, the hard realities of, Kerala economy show that it achieved a better quality of life with underdeveloped productive sectors, low levels of technology, inadequate infrastructure, slow pace of structural transformation and high incidence of poverty and unemployment. (Prakash B.A, 2004).

The table 2.1 shows the selected indicators of Kerala's Human Development.

Table 2.1

Kerala's selected Human development Indicators and HDI

Real per capita income (PPP $) 2001-02	Life Expectancy	Literacy rate(7+) 2001	Gross enrolment ratio 2001	Income Index	Health index	Education index	HDI
2895	74.6	90.9	97.3	0.562	0.827	0.930	0.773
Coefficient of variation in %							
14.52	1.70	4.14	3.93	4.70	2.510	3.370	2.380

Source: HDR (2005), Government of Kerala

In fact, it is the socio-economic, political and geographical factors enable the State of Kerala to show its sizzling status in various human development indicators.

The table 2.2 shows the ranking of Indian States by human development index

Table 2.2

List of Indian States by HDI

Rank	State / Union Territory	HDI (2005 data)
	High Human Development	
1	Chandigarh	0.860
2	Kerala	0.814
	Medium Human Development	
3.	Lakshadweep	0.796
4	Mizoram	0.790
5	Delhi	0.789
6	Goa	0.779
7	Nagaland	0.770
8	Andaman and Nicobar Islands	0.766
9	Daman and Diu	0.754
10	Puducherry	0.748
11	Manipur	0.707
12	Maharashtra	0.689
13	Sikkim	0.684
14	Himachal Pradesh	0.681
15	Punjab	0.679
16	Tamil Nadu	0.675
17	Haryana	0.644

18	Uttarakhand	0.628
19	West Bengal	0.625
20	Gujarat	0.621
21	Dadra and Nagar Haveli	0.618
22	Arunachal Pradesh	0.617
	All India	**0.612**
23	Tripura	0.608
24	Jammu and Kashmir	0.601
25	Karnataka	0.600
26	Meghalaya	0.585
27	Andhra Pradesh	0.572
28	Rajasthan	0.537
29	Assam	0.534
30	Chhattisgarh	0.516
31	Jharkhand	0.513
	Low Human Development	
32	Uttar Pradesh	0.490
33	Madhya Pradesh	0.488
34	Orissa	0.452
35	Bihar	0.449

Source: Wikipedia

The table 2.2 shows Kerala's commendable position in human development indicators among the States of India.

However, it can be categorically pointed out that the outstanding achievement of Kerala economy is evident only when we take the 'central tendency' of the indicators of social development for the population as a whole (Kurien,1994). They tend to hide the adverse conditions of certain 'outlier' communities in the state in a well fashioned manner. The marine fisher folk of Kerala provide a classic example of this dichotomy. They stood far behind the all Kerala averages. Despite the richness of the natural resource that they harvested, the marine fisher folk are being left out of the development process and confined to poverty[1].

The possible reasons behind this anomaly may be due to:

1. The open access mode of the resource use and the lack of awareness among the fisher folk about the exploitation done by the merchants.
2. The particular pattern of export oriented, capital intensive fisheries development fostered by the state resulting in technological dualism.
3. Social and physical conditions were unfavourable for acquiring a proper standard of education[2].

A change in the lives of marine fisher folk is undoubtedly possible if the marine fisheries sector adopts a holistic approach. This perspective includes improvements in human development indices, wide spread employment

[1 & 2] Kerala Development Report, Planning Commission, 2008

assistance under government's National Rural Employment Programmes, inclusion of more ICT oriented equipments in their livelihood activities etc.

So if due attention is paid on this neglected sector with the adoption of ICT, it can play a tremendous role in bringing down Kerala's backwardness and under development. It is widely believed and true that marine fishing industry of Kerala is one of the premier natural resource industries of the State which provides income and employment to the most vulnerable section of the society. It is in this context, a close and detailed look at the marine environment scenario in Kerala is made.

I Marine Fishing Scenario: A historical perspective

Fishing as a means of livelihood is an age old occupation. There are references to fish and fishing in the ancient religious texts and historical works of the past. In the epic BRAHMANAS, VISHNU took the form of a fish (Malsya Avatar) to save Manu from danger[*]. During the Rig Vedic period mention is made about a fishing caste called "Kaivarta" which belonged to the lower ladder in society. In biblical times the religiosity of Christianity has been interwoven with the tales of fisher folk of those times.

History points out that, in Kerala fish and fish life existed for centuries going back to almost 2000 years. Life in this coastal belt had been comparatively friction free, prosperous and peaceful. In those days, fishermen were fishing

[*] Quoted in The Wonder that was India by A L Bhasha (Page 102)

with the simplest, cost effective and hand or sail driven craft. With these traditional devices, the fishing community created trade relations with far-flung countries like ancient Greece, Rome and Arabian countries.

Traditionally fishing communities have got their own religious and cultural differences. But it never created a negative part on maintaining social structure and economy of the fishing communities because they believed in the principle of what is called 'common property resource' (Gordon, 1954). A variety of social institutions developed by the communities itself with the support of political and religious organizations played an effective role in eliminating disputes. These institutions which continued to flourish for generations have been facing severe pressures in recent times, due to the crucial social and economic changes happened in Kerala society during the post-independence years.

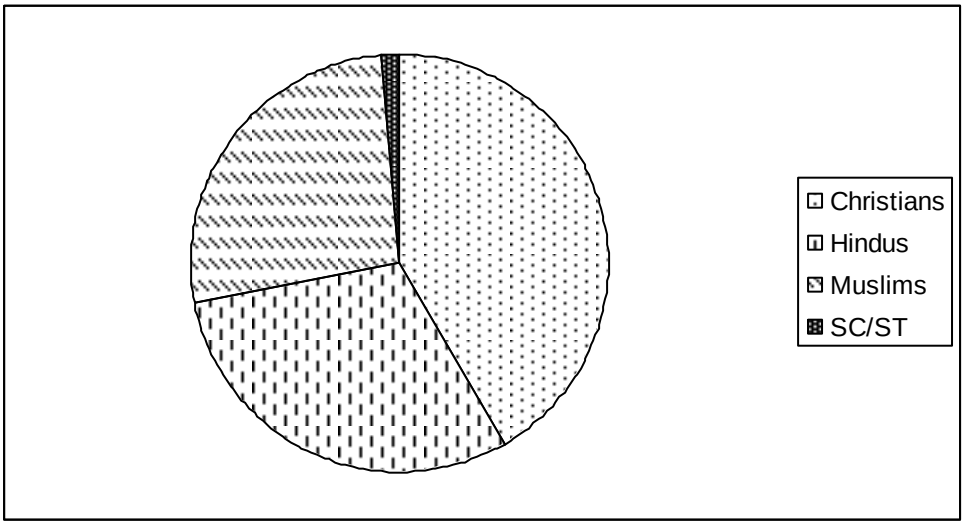
The socio-economic life of marine fisher folk of Kerala society took a radical U-turn after the advent of mechanized fishing. In fact, traditional skills dominated the marine fishing operations till about the beginning of 1960s. These artisans developed various types of crafts and gears, based on rural technology, and which was adapted for various types of fishing operations. Economic liberalization and globalization of the 1990's are the other factors which drastically changed the foundation of marine fishing industry in Kerala.

II Religious Composition

Given the multi-religious nature of this coast, Kerala is the only maritime state in India, where the Muslim, Hindu and Christian fishing communities have a significant presence. The state of Kerala was formed in 1956 from the former princely States of Travancore, Cochin, the Madras district of Malabar and the South Kanara taluk of Kasargod. In the newly formed state the artisanal marine fishers are Hindu and Muslim in the northern and central coastal villages and Latin Catholic in the southern coastal districts. The figure 2.1 and table 2.3 show the religious composition of marine fisher folk in various coastal villages of Kerala.

Fig 2.1

Religious composition of marine fisher folk in Kerala



Source: Marine Fishery Census (2005)

Table 2.3

Religion and Community wise Fishermen Families in Kerala

District	Religion				Community
	Hindu	Muslim	Christian	Total	SC/ST
Thiruvananthapuram	254	6193	27681	34128	155
Kollam	4936	645	6318	11899	110
Alappuzha	8766	1082	11911	21759	144
Ernakulam	4084	271	4521	8876	562
Thrissur	4287	2262	49	6598	254
Malappuram	294	10166	2	10462	167
Kozhikode	8176	7847	35	16058	57
Kannur	2603	2848	478	5929	337
Kasargod	3622	1086	69	4777	47
Total	**37022**	**32400**	**51064**	**120486**	**1833**

Source: Marine Fisheries Statistics, Department of Fisheries (2007)

The figure 2.1 and table 2.3 point out that about 42% of the fisher folk families were Christians, 31% Hindus and 27% Islam. More than 1.5% of the families belonged to either Scheduled Caste or Scheduled Tribe. In fact, the figures indicate the caste equations prevailing in the coastal regions of the state.

III Politics of the Coastal Area

"There is a certain intermingling of class and caste in a pre-capitalist society such as ours, caste is the main form through which class manifests itself." This observation of E.M.S. Namboothiripad[1] is quite a relevant factor made as regards the coastal area politics is concerned.

The marine fisher folk are more or less at the bottom of ladder economically, socially and culturally. This segment of the population has always been exploited by the politicians and political parties for the creation of "vote banks". This was effectively utilized by the Marxist ideologists who have used caste inequalities as a vehicle mobilizing members belonging to different communal groups who are socially and economically backward in their respective group.

The Latin Catholics who are heavily concentrated in the coastal areas have their main occupation as fishing have been all along backward in every sense. The Latin Catholics as well as the Dheevaras (Hindus at large) and Muslims who are engaged in fishing in the marine sector are deprived economically and socially are more or less equal in these terms. Thus a good number of them have allegiance to the Marxist oriented ideology due to their working class status.

[1] Interviewed by Antony L Fernandez and reproduced by Dr. Anil Bhatt in 'Class, Caste and Politics' (1991).

IV The Economy of Marine fishing Industry

The marine fishing industry occupies an unquestionable place in the economic activities of the Kerala State. Its contribution to NDP of the State is about 3% (The Economic Review, 2010). The industry is having great relevance with respect to generation of income, fish production, consumption, exports and foreign exchange earnings. But, in reality in recent times this industry after an initial phenomenal growth has failed to gather momentum and has come down to the status of a struggling industry. To assesses the economic foundation of the fishing industry in Kerala, an attempt is made to focus on the various elements connected to this industry like the magic of Indo-Norwegian Project (INP), the resource base, income from fisheries sector, the trends in fish production, fishing crafts, fish marketing, export trends and fish consumption in Kerala.

1. The Magic of Indo-Norwegian Project and its aftermath

The phenomenal growth of fisheries, not only in Kerala, but through out South India happened mainly due to the miracle of Indo-Norwegian Project (INP), which came out as a tripartite agreement in 1953, signed in New Delhi by United Nations, the Government of India and Government of Norway. It was agreed that the Government of Kerala would assist the Government of India to carry out a programme of developmental projects to contribute to the furtherance of the economic and social welfare of the people of India.

The Supplementary Agreement signed on 24th January, 1953 gave shape to an INDO-NORWEGIAN PROJECT for fisheries and fishermen community

development at Neendakara in the then Travancore-Cochin State. The activities of the INP at Neendakara were subsequently extended to Cochin with the establishment of a fishing centre in 1957.

INP had taken up in a block of 3 traditional fishing villages in Kerala, with a view to introducing modern technologies of fishing and fish preservation. Mechanized boats and improved gear were introduced to modernize fishing and the use of ice and freezing were introduced to improve the preservation of the fish caught. The aim of the project was to increase productivity in fishing and fish preservation. But the project also envisaged providing better health and sanitation facilities in the selected project area.

Undoubtedly, INP led to the transformation of Kerala marine fisheries from its traditionality, which was indeed a turning point in the history of Kerala fisheries. In the initial years, rising catches were supposed to enhance the protein supplies for consumers within the state which ultimately changes towards an export-oriented approach in the 1960s. INP effectively paved the way for the intrusion of capitalism by providing technology for more sophisticated harvesting and processing.

However, it was the INP which introduced a conflict between tradition and modernity in the fisheries in Kerala. This in turn led to the polarization and marginalization of the bulk of fishermen in the State (Kurian, 1985). The effects of this polarization marked a drastic decline in the over all catch, low and stagnating fish production but rise in marine exports from Kerala. On the

whole, INP and subsequent periods witnessed artisanal fishermen working harder, their numbers increasing, their investment and craft increasing, producing more but receiving less income and becoming more and more poor.

2. Resource Base

'God's own Country', the Kerala State is blessed with all the requisite natural endorsements for creating and shaping up a strong and dynamic fisheries economy that goes hand in hand with the national strategy. Kerala's coastal belt extending over 590 km which is 10% of India's mainland coastline and EEZ (sea spread up to 200 meters) lying adjacent to Kerala coast is spread over 36,000 sq. km which is almost equivalent to the land area of the State, tells the story of the most productive area in the country. The concentration of marine fisher folk in Kerala is due to this high productivity.

The plenty of marine resources in Kerala coast with the predominance of oil sardines, mackerel, and prawns makes this maritime state to lead a prominent position among other coastal states. The table 2.4 shows the potential of marine fishery resource of the state.

Table 2.4

Marine Resource Potential of Kerala

Depth Zone	Area (sq.km)	Potential resources (tonnes)		
		Pelagic	Demersal	Total
0 – 50 m	15993	342000	229000	571000
50 – 200 m	23146	124000	56000	180000
0 – 200 m	39139	466000	285000	751000

Source: Mahesh (2006)

The table 2.4 indicates the richness of marine wealth of the Kerala coast, which is one reason for the predominant role of fisheries in the Kerala economy. In fact, the potentiality of the state contributes 20-25% of India's total marine fish production and over 36% of marine exports (Economic Review, 2010). However, the enormous increase in the number of fishing crafts since the advent of modernization process started during 1960's and '70's led to over fishing and the depletion of marine resources.

The estimated 11.43 lakh marine fisher folk population of Kerala plays an outstanding role in the socio-political arena of the Kerala society (Economic Review, 2010). The full time, part time and occasional marine fishermen at sea numbers 1,24,103, 10,488 and 5,631 respectively (Marine Fisheries Census, 2005). The active marine fishermen at sea numbered 1.90 lakh forms a fifth of the Indian total. The 222 marine fishing villages at a time showcase the high dependence of fishing population on fishing and allied activities for

their livelihood on the one hand and the various economic, social, cultural, ethical, religious, political and of course technological issues confronting this community on the other hand.

Among the nine maritime districts of Kerala, Thiruvananthapuram district is in the 1st place in number of marine fisher folk population with a 1,86,518 while Kasargod comes last with 48,389.

The district wise details of marine fisher folk population are given in the table 2.5

Table 2.5

District wise Distribution of Marine Fishermen Population in Kerala

(2009-2010)

Sl. No.	District	Marine			
		Male	Female	Children	Total
1	2	3	4	5	6
1.	Thiruvananthapuram	69883	61743	54892	186518
2.	Kollam	43588	36864	21605	102057
3.	Alappuzha	48312	44100	29880	122292
4.	Pathanamthitta	0	0	0	0
5.	Kottayam	0	0	0	0
6.	Idukki	0	0	0	0
7.	Ernakulam	32084	30077	18780	80941
8.	Thrissur	31359	31596	17987	80942
9.	Palakkad	0	0	0	0
10.	Malappuram	34761	28265	25834	88860
11.	Wayanad	0	0	0	0
12.	Kozhikode	42601	37160	28454	108215
13.	Kannur	22933	20840	17813	61586
14.	Kasargod	19142	18073	11174	48389
	State	**344666**	**308722**	**226424**	**879806**

Source: Economic Review (2010)

The table 2.5 presents the composition of marine fishermen population in the nine maritime district of Kerala. The coastal districts of Kerala, though have common features, each of them have special characteristic and local issues confronting them. The marine fishing villages in Kerala sea coast is no exception with its different climatic conditions, these fishing villages display certain common traits. The marine fishing community is concentrated in the coastal region due to easy accessibility to the sea for fishing. This concentration has resulted in the huge population density in the marine fishing villages. This huge population density in the marine fishing villages with 2652 persons per sq. km in strong comparison with the state figure of 742 per sq. km which is also the highest in India (ICSF, 2006).

3. Income from the fisheries sector

The importance of fisheries sector in Kerala and its advantageous position make this maritime state to provide employment and income to more than one million people either directly or indirectly. One characteristic feature of the period from 2004-05 to 2009-10, when Indian economy was passing through a crucial economic phase, the Gross State Domestic Product (GSDP) of the state has increased about 93%. But the share of fisheries sector in the state domestic product has declined from 1.52% to 1.17% in the same period (The Economic Review, 2010). The table 2.6 shows the contribution of fisheries sector to GSDP.

Table 2.6

Contribution of Fisheries sector to Gross State Domestic Product

(2004-05 prices)

Current Price	**Period**					
Category	**2004-05**	**2005-06**	**2006-07**	**2007-08**	**2008-09 (Provisional)**	**2009-10 (Quick)**
Gross State Domestic Product (Rs. lakhs)	119264	136841.76	153784.88	175141.08	201019.75	230315.55
Fishing (Rs.lakhs)	1814.22	2481.96	264409	2634.31	2684.13	2704.55
Share of fisheries sector in GSDP	1.52	1.81	1.72	1.50	1.34	1.17
Share of Primary sector in GSDP	17.86	18.05	17.15	16.46	15.79	15.36

Source: Economic Review (2010)

From a caste cum communal bound activity of the past, the fishing industry of today is a big business. Using hi-tech modern methods of fishing the marine sector has turned out to be an industry with immense commercial potential. But at the same time the declining trend of fisheries sector and primary in GSDP is indeed a matter of grave concern to the industrially backward Kerala State.

The reasons which led to the emergence of this situation may be numerous. There are various scientific and analytical explanations for the critical phase of marine fisheries sector today. The ideal rationale is that 'sustainable maritime state', but here the matter is getting out of control, a participatory approach on the basis of modern information and communication parametres through the

co-ordination of the state and NGOs is the need of the hour to rejuvenate the fishing industry as a whole.

4. Trends in Fish Production

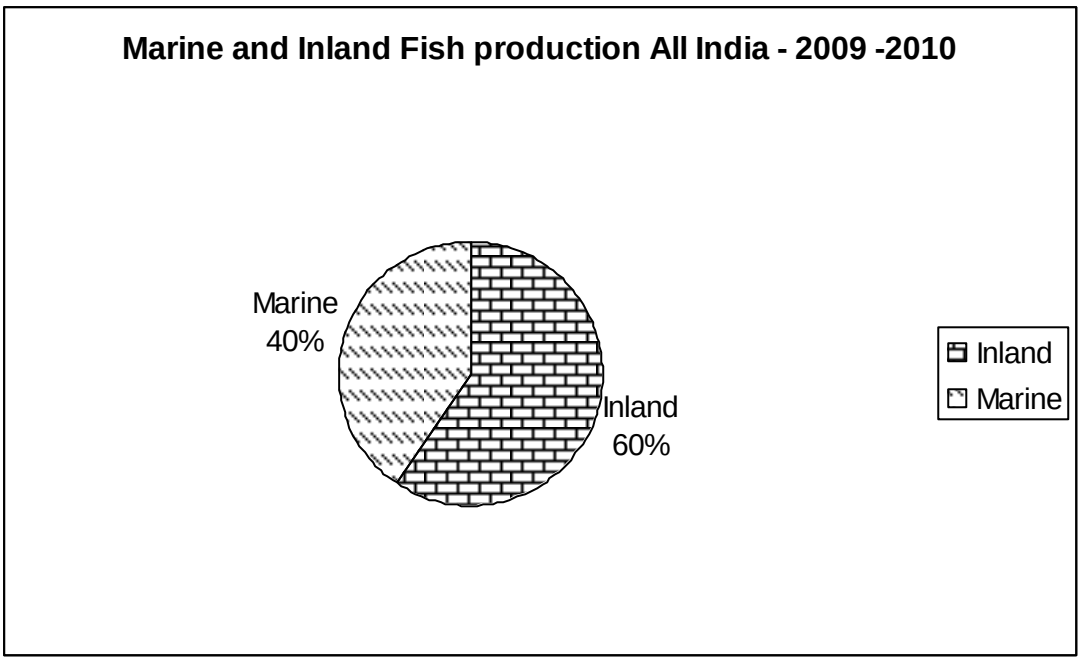
The fisheries sector has a pride of place in the economy of Kerala. The marine wealth combined with the enterprising fishing community account for Kerala's continued eminence as the leading producer of marine fish in India. One noteworthy feature of fisheries in Kerala is that marine fisheries dominate the total fish production. The average marine fish production from Kerala is about 25% of India. But at the same time various statistical data shows that fish production in marine sector over the last 10 years presents more or less a stagnant trend with an average production of 5.88 tones.

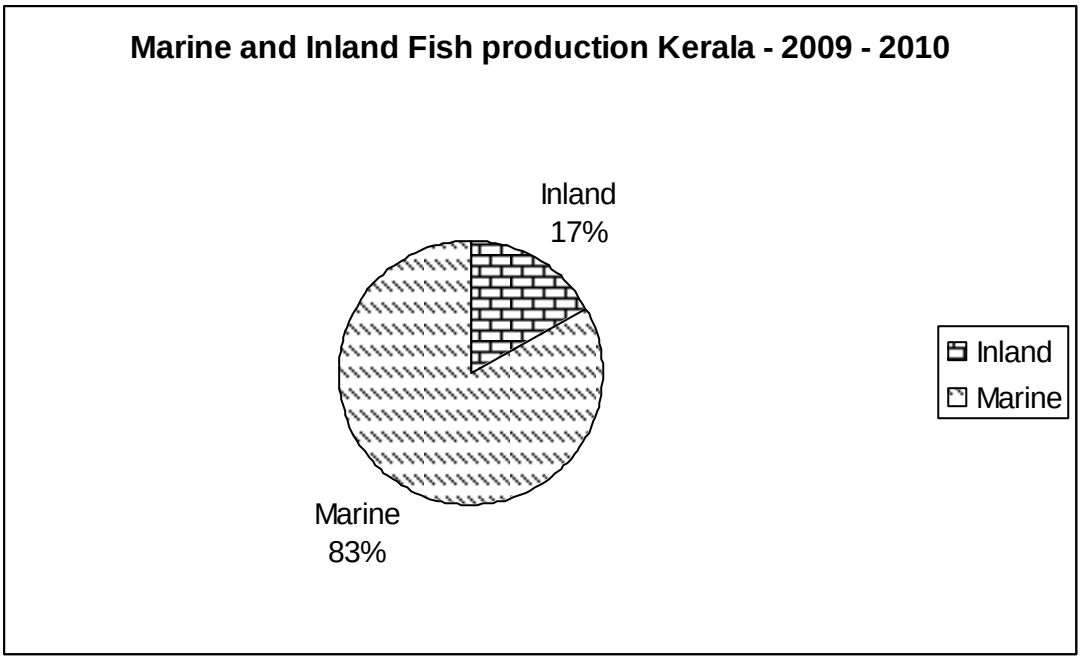
There are various theories behind this crucial aspect. One of the explanations is that the marine fishery resource of the State has almost attained the optimum level of production. So there is no scope for further increase in fish production for inshore marine capture fisheries. But this cannot be taken up as the ultimate explanation and so also it does not mean that there is no solution for it. In this dynamic world, technology is making its impact on each and every part of human life, by utilizing techniques various under exploited fields in this sector can be found.

The figure 2.2 makes a comparison of fish production in Kerala with the all India averages.

Figure 2.2

Comparison of Fish Production in Kerala with the all India Level





Source: Economic Review (2010)

The figure 2.2 indicates a comparative status of inland and marine fish production. The all India average shows that it is the inland fish production that leads the total fish production in the country. While in Kerala, the matter is entirely different, the marine fish production is making big contribution with 82.97 % of total fish production. The marine fish production trends indicate nothing, but the need to protect the industry with well structured policies.

The table 2.7 and figure 2.3 present fish production in Kerala in the last five years.

Table 2.7

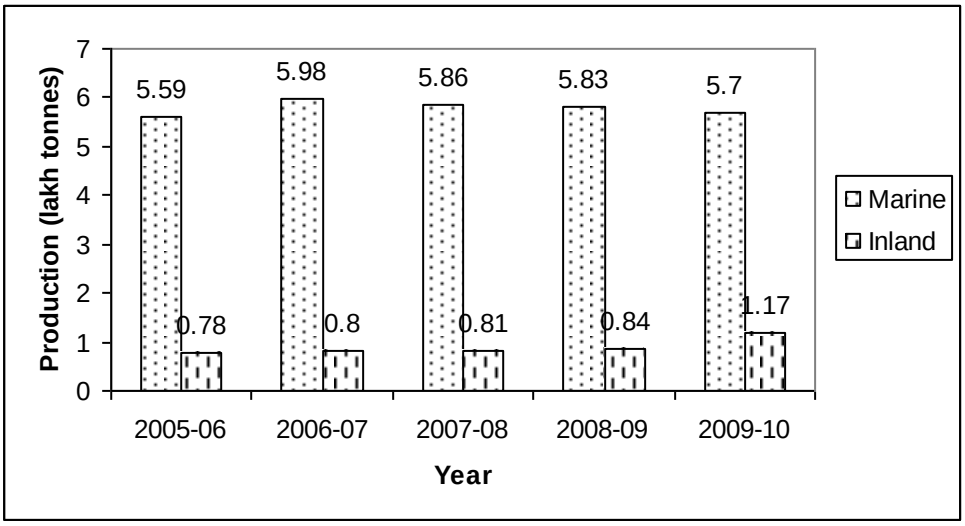
Fish production in Kerala during the last five years (lakh tones)

Year	Marine	Inland	Total
2005 – 06	5.59	0.78	6.37
2006 – 07	5.98	0.80	6.78
2007 – 08	5.86	0.81	6.67
2008 – 09	5.83	0.84	6.67
2009 – 10	5.70	1.17	6.87

Source: Economic Review (2010)

Figure 2.3

Total Fish production in Kerala (2005 – 06 to 2009 – 10)



Source: Economic Review (2010)

It is indeed a fact that marine fish production illustrates that the State has gone in an upward movement. This is evident from the table 2.7 and figure 2.8. Modern fishing crafts and gears play a major role in making changes in fish production. But a critical economic analysis points out that the coastal community especially traditional fisher folk has gone through a deteriorating phase in the midst of rise in fish production.

5. Fishing Crafts

Kerala marine fishing industry witnessed unprecedented increase in the number of fishing crafts during the last decade. The fishing craft is a plat form

on which the fishermen sail to and from the fishing ground, haul his gear, keep the catch and process them. In fact, a starting point in this direction has been the initiation of INP in 1953. According to the Marine Fisheries Census (2005), the total number of crafts in operation is 29177 of which 5504 crafts are mechanized and 14151 crafts are motorized and the rest non-motorized. Out of the 5504 mechanized crafts 3982 are trawlers and 428 are gill netters. This indeed shows the production and resource potentialities of the Kerala fishing economy.

The district wise details of fishing crafts are given in the table 2.8

Table 2.8

District wise details of Fishing Crafts

Sl. No	Districts	Trawlers	Purse seiners	Gill netters	Liners	Ring seiners	Others	Total mechanized	Motorized	Non-motorized	Total
1.	Trivandrum	0	0	41	6	0	8	55	3063	5005	8123
2.	Kollam	1259	0	0	2	11	0	1272	605	425	2302
3.	Alappuzha	0	0	1	0	62	73	136	3947	1010	5093
4.	Ernakulam	1403	50	320	0	67	58	1898	1104	1190	4192
5.	Thrissur	47	0	2	0	92	118	259	456	306	1021
6.	Malappuram	219	0	16	1	105	100	441	1607	361	2409
7.	Calicut	663	4	46	1	101	219	1034	1976	641	3651
8.	Kannur	208	0	2	0	5	11	226	530	290	1019
9.	Kasargod	183	0	0	0	0	0	183	890	294	1367
	Total	**3982**	**54**	**428**	**10**	**443**	**587**	**5504**	**14151**	**9522**	**29177**

Source: Marine Fisheries census (2005), CMFRI

The table 2.8 shows the capacity of nine maritime districts with respect to fishing crafts. In fact, the progress in fish production in each coastal district depends on this fishing crafts. The changes in fishing crafts from the use of nylon nets and the gill net boats in 1953 to the present trawlers for tuna long lining, shows the structural transformation in Kerala ‘s marine fishery sector.

6. Marine fish marketing in Kerala

From the year 2000 onwards marine fish marketing in Kerala has been rapidly transforming into a major allied activity connected with this sector. This has been facilitated by modern information and communication facilities, expansion of transportation services, the rise of Self Help Groups and institutional arrangements like the MATSYAFED and fish co-operative societies. The many favourable conditions in the marketing of fish and fishery products reduce the transaction cost and improve market accessibility and efficiency.

Even after the inception of mechanization process during 1950’s, the marine fish marketing in Kerala has been highly unorganized, till recently. In this context, it is important to mention that the demand for marine fish and fishery products began to grow in a consistent manner through out Kerala. While on the other equal side of marketing shows that the supply of fish is highly seasonal and it comes from diverse production environment. It is the prime

cause in the volatility of prices of marine fish which ultimately led to the deteriorating condition of traditional fisher folk.

The price trend of fish is mainly characterized by wide fluctuations at all stages of transactions in the marketing chain. This is mainly contributed by the perishable nature of fish and high variations in its short term supply (Panikkar and Sathiadhas, 1989).

A well organized marine fish marketing strategy in Kerala evolved gradually, but in a steady manner, thanks to the efforts done by the state government. With the governmental support, marketing co-operatives emerged to provide reasonable revenue for the fish catches to the fisher folk. The fish marketing co-operatives in Kerala which are well organized pleaded and thus gained subsidies for the fishers.

In some remote regions in Kerala, where there are poor or no marketing facilities, middle men and private merchants took advantage of the situation and it severely affected the economic returns of the fishing class. But today the situation has changed a lot; activities became more transparent and efficient. The arrival of modern communication devices like mobile phones has become a comparative advantage for the fisher clan to attain their crucial objective of earning economic revenue.

7. Export Trend

One of the most integral part of India's foreign trade is the export of marine products. Marine products exports touched 2.028 billion dollars during April-December 2010, registering a growth of 6.60% in quantity terms, 18.92% in value and 24.70% in dollar realizations (Business line, 2011)[1]. Kerala is the second largest player in the export of marine products from India next only to Andhra Pradesh. Kerala's share in total marine products exports is indeed commendable in the past.

The state's share in all India exports has been declining in recent years. The share declined from 20% in quantity terms in 2000 – 2001 to 15.79% in 2009 – 10 and the share in value increased to 16.6% (Economic Review, 2010). Though the quantity exported during 2005-06 was increased by 11.37%, the share of Kerala remains more or less the same compared to that of the previous year.

The table 2.9 shows export of marine products from Kerala and India during 2009 – 10.

[1] Against odds, India's Marine Exports surge, Business line (23rd Feb. 2011) by CJ Punnathara

Table 2.9

Export of Marine products from India and Kerala

(Q: Quantity in Metric Tones V: Value in Crore)

Year		India	Kerala	Share of Kerala (%)
2004-05	Q	461329	87378	19
	V	6647	1158	17
2005-06	Q	512164	97311	19
	V	7245	1258	17
2006-07	Q	612643	108616	18
	V	8364	1524	18
2007-08	Q	541701	100318	19
	V	7621	1431	19
2008-09	Q	602835	101000	17
	V	8608	1569.82	18
2009-10	Q	678436	107183	15.79
	V	10048.53	1668.49	16.6

Source: Economic Review (2010)

A quite significant fact arises from the table 2.9 is that Kerala's share in quantity terms and value terms in marine fish export shows a volatility. Certainly changes in fish production is a factor which have its echoes in the export factor. If the situation persists for too long, it is a matter of concern for the foreign exchange potentiality related with marine products.

The strong foundation of India's sea food industries is constituted by the State of Kerala. Kerala leads in every matter related with marine products exports from the country. This is evident from the table 2.10.

Table 2.10

Built up capacity of the Indian Sea Food Industry

Sl. No.	Name of the States	No. of Exporters	No. of Process plants	Freezing capacity (Ton.p/d)	No. of cold storages	Storage capacity	No. of fishing vessels
1	Kerala	287	124	1585.77	169	23086.50	2963
2	Tamilnadu	286	48	524.55	67	5900.00	1562
3	Karnataka	43	14	186.40	26	3540.00	3226
4	Andhra Pradesh	95	52	779.50	53	7200.00	717
5	Goa	09	07	104.00	09	1275.00	420
6	Gujarat	64	55	2216.03	57	22925.00	426
7	Orissa	30	21	220.00	20	2460.00	414
8	Maharashtra	268	41	1327.11	39	19372.00	2932
9	West Bengal	99	37	340.00	30	3500.00	0
10	Delhi (UT)	92	-	0.00	01	15.00	0

Source: Sciencetech (2010)

Marine products exported from India to foreign countries have exhibited an almost steady increase in the past eight years. In fact, it is the strong built up capacity of Indian sea food industry facilitates this trend. Among the maritime states, Kerala has been branded as the leading maritime region within the nation. No other state of India comes even close to the grade of Kerala.

8. Fish Consumption

The basic reason behind the relevance of marine fisheries sector in Kerala is that it provides a stabilizing role in balancing food supply and nutritional standard. Fish as a health food, is now getting wide recognition through out the world. Generally, fish consumption per person, per year increased from an average 9.9 kg in the 1960s to 16.4 kg in 2005 (Green facts, 2009). The sole reason for the rise in fish consumption is that it well synthesizes all nutritional elements.

In Kerala, the level of fish consumption is four times higher than the national average (Gulati Leela, 1984). A notable aspect regarding food consumption in Kerala is that fish in requisites quantities is beyond the reach of poor despite 77% of the population in the State consumes fish (Manu, Bindhu and Padmakumar, 2008). It is an indication towards food insecurity among poor masses in spite of Kerala's sparkling achievements in human development indicators.

V. Five Year Plans and the Fisheries Sector

Fisheries sector got a tremendous impetus in the various five year plans of the Government because Government thought planning is the grand panacea to remove all the hurdles facing the fisheries sector. Five Year Plan has its structural foundation in the socio-political ideology of its times. USSR was the first nation to embark upon a Five Year Plan with the aim for economic growth and development, thereby converting a backward agricultural country into modern industrialized nation. As such this was engraved into the socialist and communist ideology.

In India, Prime Minister Jawaharlal Nehru was an ardent supporter and admirer of this ideology and sincerely believed that only through Five Year Plans can lay the economic salvation of the country. The Indian National Congress in its annual conferences used to proclaim in no unmistakable terms that the socialistic pattern of society through major five year plans will be the goal of the country for its economic regeneration.

To realize this economic dream the Five Year Plans in India foresaw ambitious programmes for the industrialization of the country. For this the plan was programmed in such a way for inclusive economic growth covering all sectors of the economy. The fishery sector received a pivotal place in its development strategy. The detailed account of Five Year Plans for the fisheries sector clearly demonstrates the need for developing this sector into totality.

In the First Five Year Plan (1951 – 56), the main goal was to introduce mechanize boats to increase fish production. Also it aimed at improving ground facilities and infrastructure.

In the Second Five Year Plan (1956 – 61), the aim was to create better facilities for preservation, processing, storage and transportation of fish materials. Also to expand mechanization through the introduction of new vessels and new gear materials. Another important step was to organize multi-purpose co-operative societies to encourage development of the fisheries.

While in the Third Five Year Plan (1961 – 66), it was decided to install adequate equipments and facilities for preserving fish and their marketing. Also it was decided to construct educational institutions and research institutes to improve the condition of fishers.

Due to the economic conditions during the third Five Year Plan, five year plans were shelved temporarily and in its place came the Annual Plans (1966 – 69). The main agenda of fisheries sector during this period was to expand its export rate.

Then came the Fourth Five Year Plan (1969 – 74), its aim was to construct fishing harbours and minor ports. It also pointed out the need for deep sea fishing vessels and usage of trawling techniques to increase production and competition.

The Fifth Five Year Plan (1974 – 79), envisaged the motorization of artisanal crafts and introduction of purse-seine nets. Also there was the declaration of Exclusive Economic Zone (EEZ) in 1977.

Then there was a still break in floating Five Year Plan and in its place came the rolling plan. The main programme during this period was development of diversified fisheries products.

The Sixth Five Year Plan (1980 – 85), saw the promulgation of Marine Zone of India Act in 1981. Also in this plan it was decided to encourage deep sea fishing, through licensing, chartering and joint venture vessels.

The Seventh Five Year Plan (1985 – 90), adopted a new chartering policy (1989) and to install new development techniques for better catch and processing.

Then came two consecutive annual plans from 1990 – 92. The annual plans during this period encourage development of deep sea fishing. It also envisioned substantial growth in motorized artisanal fleet of ring seins.

Five Year Plans were re-introduced through the Eighth Five Year Plan (1992 – 97). It was decided deep sea fishing through joint ventures and also there was the development of coastal aqua culture.

The Ninth Five Year Plan (1997 – 2002) wanted further diversification of fishery products. Also to increase production of fisheries to receive help from aqua culture and offshore fisheries. Along with this research oriented activities were encouraged.

The Tenth Five Year Plan (2002 – 2007) witnessed introduction of social safety units. Also to improve quality of production, there was need for upgrading facilities in processing and marketing.

The Eleventh Five Year Plan (2007 – 2012) decided to place fisheries under scanner in order to critically evaluate fishery industry on its past performance. It wants to takes into account the plans past achievements and problems. It also wanted to extend fishermen welfare programme and suggests measures for the development of infrastructure for the export of fish products under World Trade Organization (WTO) regime.

The table 2.11 shows various Five Year Plan outlay on fisheries

Table 2.11

Plan outlay for fisheries

Plan period	Outlay fisheries (Rs. in crores)
I	5.13
II	12.26
III	28.27
IV	82.68
V	151.24
VI	371.14
VII	546.54
VIII	1238.82
IX	2070.00
X	765.00
XI	1254.65

Source: Various Planning documents, Planning Commission

The table 2.7 displays the importance given in the Five Year Plans to the fisheries sector. The plan outlay has increased in various Five Year Plan periods to promote the overall development connected with this sector.

Fisheries development in the Five Year Plans is part of the general strategy of the Indian economy. The priorities and objectives outlined in the plans for fishery development transform all the maritime states to achieve grater heights in fisheries expansion.

CHAPTER – III

FISHING TECHNOLOGY: FROM TRADITION, MODERNITY TO POST MODERN ERA

The major characteristic features prevailing in the marine fisheries sector of Kerala has been the focus of the previous chapter. The analysis of socio, religious, economic and political realities of marine environment demonstrates the strength and weakness of marine fishing economy. This kind of analysis is essential to link the course of events that follows in the research study. Taking into consideration these circumstances, the present chapter depicts how changes in fishing technology ultimately transformed the marine fisheries sector in Kerala. This enables to understand the changes in fishing technology from traditional Kattamarams and dug out canoes to post modern era with Information and Communication Technologies in the marine fisheries sector.

Technology is the most important and viable component in Kerala's marine fishing industry. Advances in technology for fishing have been amazing over the past several years. Technological advancements have increased the efficiency parameter of fishing. It also made significance in widening the environments that may be fished. In fact, changes in fishing vessels and gears as well as electronic equipments targeting the fish are all the best examples of technological advancements in fishing. It passed through several phases before reaching its current form. A noteworthy feature of Kerala fisheries is the penetration of foreign technology even during the Sangham Age (1^{st} to 4^{th}

century AD). During this age Kerala fishermen has a high position in the society. They were open to influences from abroad. The assimilative character of Indian culture created an atmosphere by which foreign influence in the catching of fish and equipments were made possible. The middle-east entrepreneurs during the 6th century AD introduced the use of short vessels for fishing. Then came the Egyptians and they contributed the Kattumaram which was quite ideal to the coastal conditions here. It was then the turn of Germany and Denmark who introduced the 'Kuttivala'. Then came China with the 'Chinese Net' (Ghosh, 1998). Contact with these foreigners, fishermen in Kerala became a storehouse of knowledge about fish and the sea.

Technology of the Traditional Sector

Technology in the traditional sector consists of different crafts and gears to catch various species of fish in different grounds during different seasons of the year. A striking characteristic feature of traditional fishing crafts is that its distribution is not uniform in the state. This is particularly due to the concentration of particular type of production technique in a particular area and to some extent is because of the inequalities in the possession of capital for investment and local references (Rajasenan, 2005).

The major types of crafts used in traditional coastal Kerala are:

1) Kattamarams:

Kattamaram is one of the oldest fishing craft widely used by the marine fisher folk of Kollam area. This primitive type of fishing mode can be easily assembled by joining two or three wooden planks by steel ropes. If needed, it can be powered by propelling engine.

Table 3.1 shows classification of Kattamarams in Kerala coast.

Table 3.1

General Classification of Kattamaram

Type	Overall length		Engine (HP)	Gear	Crew size
	Range	Mode			
Kattamaram (4 log)	12' - 25'	18'	Non motorized 2HP	Gillnets, hook & line, trammel net, boat seine	1 – 3
Kattamaram (3log)	10' - 25'	12'	Non motorized 2HP	Small gillnets	1 - 2

Source: Dhanuraj (2004)

The table 3.1 classifies two types of Kattamarams but of different sizes sailing from the Kollam sea shore. The one which is 8 m to 9 m in length can accommodate four persons. The other is 5 m length and .60 m width can carry only two persons. The cost of such Kattamarams vary according to the nature of the wood used. At present a Kattamaram will cost from Rs. 13,000 to Rs. 20,000.

2) Dug-out Canoes:

The dug-out canoes are another type of traditional craft of marine catch. But it is rarely seen in the Kollam coast. It is conspicuous in the Northern districts of Kerala especially in Malappuram and Kozhikode.

The table 3.2 shows a general classification of dug-out canoes.

Table 3.2

Classification of Dug-out canoes

Type	Overall length				
	Range	**Mode**	**Engine (HP)**	**Gear**	**Crew size**
Dug-out (Large)	30' – 35'	32'	25+15/9.9 HP	Ring seine (rani vala) Gillnets	8 – 9
Dug-out (Medium)	25' – 30'	26'	8/9.9 HP	Gillnets, Mini trawl, also carrier for wing seine	4 – 5
Dug-out (Small)	18' – 25'	20'	Non motorized; at times 2 HP	Small Gillnets	2 – 3
Dug-out (Very Small)	<18'	15'	Non motorized	Small Gillnets; also for mussel fishing	1 – 2

Source: Dhanuraj (2004)

Dug-out canoes are made from a single large size wood. The inner portion of the wood is carved out to accommodate fishermen and their fishing gears. A large dug-out canoe can carry about 12 men.

3) Plank-built boats:

This is a different type of dug-out canoe seldom used in the marine sector. It is used in the rivers where there are strong currents and in lakes, backwaters for operating long nets. This is also built up bringing wooden planks together using coir ropes and copper nails. This type of craft can accommodate crews as per the size of the type.

The table 3.3 shows classification of plank canoes

Table 3.3

Classification of Plank Canoes

Type	Overall length				
	Range	Mode	Engine (HP)	Gear	Crew size
Plank (Very Large)	58' – 70'	65'	25x2/40+25/40x2 40+25+25/40+40+25/ 40x3	Ring seine > 500 kg	25 – 35
Plank (Large)	40' – 58'	55'	25+25/40+15 HP	Ring seine < 500 kg	15 – 20
			25+15 HP	Carrier of Thanguvallam	8 – 10
Plank (Medium)	25' – 40'	33'	25/15/9.9 HP	Gillnets, Hook & line	4 – 6
			25+9.9 HP	Ring seine (seasonal)	6 – 8
			Non motorized	Shore seine	35 – 45
Plank (Small)	15' – 25'	20'	Non motorized: occasionally 2 HP motors	Small Gillnets	2
Plank (Transom)	25' – 30'		8/9.9 HP: occasionally 15 HP motors	Gillnets, Mini trawl net	4 – 5

Source: Dhanuraj (2004)

The table 3.3 shows the different categories of plank canoes using in Kerala coast. In Kerala its main use lies in boat seines and other fishing activities.

A note worthy aspect in this context is that production process in the traditional sector involves independent existence by production units (Kurien, 1978). The real motive of production in traditional fishing sector is to ensure subsistence.

Gears

Fishing gears are vast and varied which has specific application depending upon the type of fish to be captured. Along with the modern type of fishing gears there are also traditional fishing gears which are in wide use. Commercially valued species like prawns and shrimps have specifically designed nets and gears for maximum output.

Gears which are widely used for fishing different type of marine species are classified at present are

Gillnets: These are used both inshore and offshore which have large rectangular mesh nets. These are generally kept close to the shore. To catch a desired fish type, the shapes of the nets keep changing. A front portion of the net is kept open and fish swims into the net and are tangled by the mesh. The type of fish caught by this gear are cod, tuna, salmon, sword fish etc.

Boat seines: These are made of nylon strings and cotton filaments, come in various shapes. Most important size and shapes are bell, conical and bag shaped. The major feature of the boat seines is that it is equipped with a

central bag and fish which gets in cannot escape from the net. The craft which carries the boat seine gear can be operated by 4-25 persons depending on the size of the craft. The main catch provided by this net is pelagic and mid-water shoaling species. The type of nets is in use through out the coastal belt and Kollam coast is no exception.

Shore seines: This is one of the oldest and traditional modes of fishing. Of late they are not widely used mainly because these nets require the assistance of about 50 persons. It has different stages of operation. The shore net with 2 coir wings of great length is operated from the shore itself. The net is placed in a particular spot in the ocean with the help of canoe or boat which carry 6 – 8 persons. Then about 30 – 40 fishermen are needed to pull back the net from the sea. Pelagic and shoaling fishes are caught in this types of nets.

Hooks and lines: This is also the traditional method of fishing and has its use in places where other methods of fishing become difficult. This is quite ideal when the waters are deep and the grounds are uneven. The size of the hooks depends on the depth which the line can be sunk.

At present there are types of lines which are in use. One is the **Hand Line** which is the simple method of fishing quite usable from anchored canoes in shallow or deep waters of the sea.

Long Line: It is also commonly used. This consists of a master line with several branches and a number of hooks could be adjusted depending upon the length of the line and its branches.

Chain Lines: The hooks in the chain lines are made from strong metal material as it is exclusively used to capture sharks.

Stake Nets, Cast Nets and Chinese Nets – these are the other types of traditional nets mainly operated in the back water fisheries of the State. Its use is very meager in the Kollam area.

These traditional methods of fishing have been improved due to the influence of several factors. These are being designed to optimize the catch. Also fishers have to adjust with different geographical regions. These and other correlated factors like Government policies and Foreign collaboration have made the transition from tradition to modern times.

Even though, the traditional fishing crafts and gears adopted by the fisher folk could be called the 'traditional', but they are not fully indigenous, rather absorbed from distant geographical regions and then integrated in to the traditional knowledge system (Thaddeus, 2005).

The traditional fishery sector witnessed a radical transformation due to several factors. They are marine ecological conditions, geographical outlay, government policies and skills of different fisher groups. Also contributed to this is the changing tastes of the global and sea food markets (Thaddeus, 2005).

Technology in the Modern Sector

One of the major drawbacks of technology in the traditional sector is that it can lead to extreme drudgery of labour. The raft has severe space constraints thereby putting limits to the amount of gear and fish that it can carry. This was one of the important causes for the low physical productivity of the fishers and consequently their low income even after gaining control over their sea.

Technology begins to sophisticate and transform the marine fishing industry of Kerala with the advent of 'Globalization' and mechanization process. The Kerala marine fisheries passes through several phases with a deep impact on the society, to make modernization attempts a reality. The modernization, globalization and mechanization process in the marine sector with new technology starts in Kerala in 1953.

The new initiative heralded an era as it is the right system to modernize the fishery sector and there by giving required push for growth and development in the sector (Achari, 1969). The mechanization process in Kerala fishery with new technology can be broadly classified in to three.

1. Phase 1 – Slow modernization (Period 1953-'66. Use of nylon nets and gill net boats.)
2. Phase 2 – Rapid modernization (Period 1966-1980. Use of trawlers, trawl nets and purse seiners.)
3. Phase 3 – Motorization – (Period from 1981-88. Introduction of out board crafts and the seasonal ban period from 1989 onwards, introduction of multi-day voyage fishing in 1996, conversion of small trawlers for deep sea prawn fishing in 1999, introduction of in board ring seines in 2003 and conversion of shrimp trawlers for tuna long lining in 2007)[1]

The significance of 1953 – 1963 period is that here modernization attempt is made with the help of foreign participation and foreign financial assistance.

[1] Marine Fisheries Policy brief – 1 KERALA, CMFRI special publication no. 100, 2009

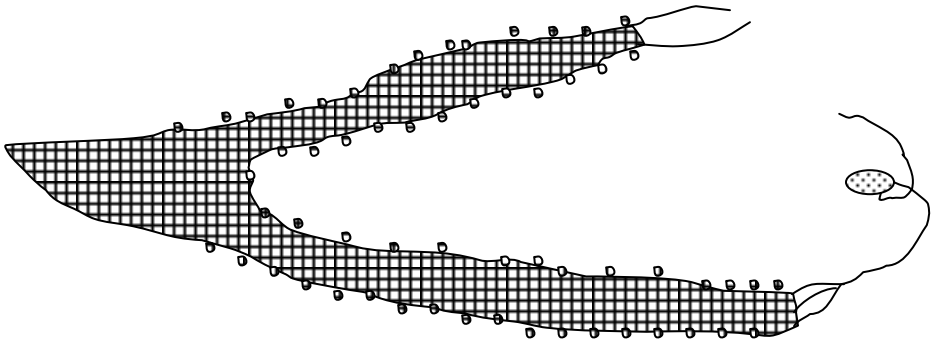
The typical example for this attempt is the introduction Indo-Norwegian Project in 1953 for the development of fisheries in two selected fishing villages of Kollam district viz. Sakthikulangara and Neendakara. The major goal of this project is to make improvements in methods of fishing with change on crafts. It led to the importing of boats designs from Norway and various sizes of mechanized boats were constructed at Neendakara. Significantly, a number of small mechanized crafts like 22 ft, 23½ ft, 25 ft and 28 ft are issued to local fisher folk of Sakthikulangara and Neendakara (Bhusan, 1979)

But a major technical improvement which have got its repercussions in Kerala fishery industry through Indo-Norwegian Project is the introduction of trawlers designed by INP and powered by a 48 H.P engine which is 36 ft (10.8 metres) stern trawler exclusively for shrimp trawling.

The figure 3.1 presents trawl net composition and the assembly of trawl nets is shown in the figure 3.2

Figure 3.1

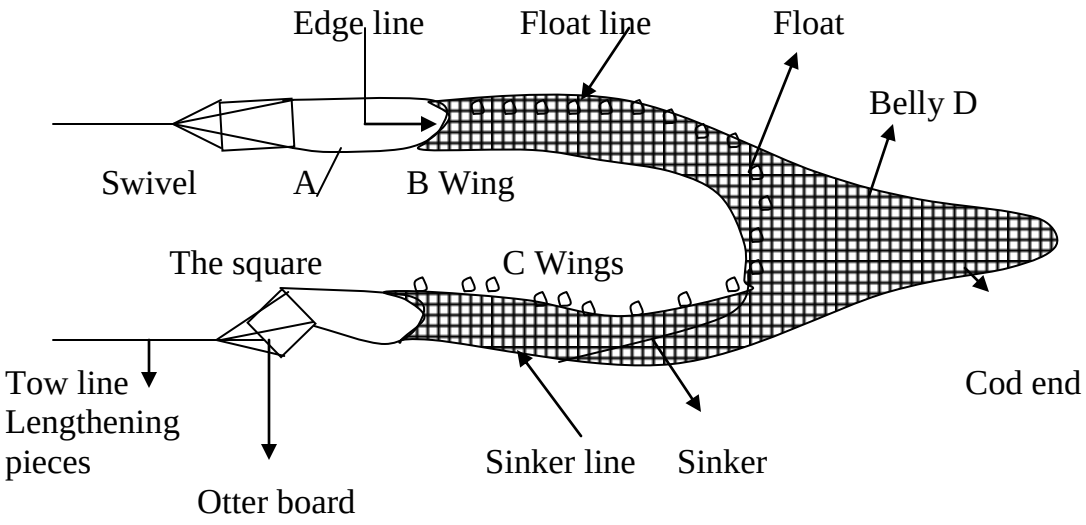
Trawl Net Composition



Source: CMFRI (Aquatic Resources)

Figure 3.2

Assembly of Trawl Nets



Source: CMFRI (Aquatic Resources)

The composition of the trawl net shows that it s a large net with a wide opening, dragged along the bottom of the sea by a boat. There are hundreds of variable trawl net designs to suit each particular class of vessel. Since the past twenty years a good deal of original thought has been put in designing trawl net to suit different size of stern trawlers.

But progress in marine fisheries sector of Kerala during the second phase was not uniform in nature. The very lucrative nature of mechanized fishing and the sky high value of shrimp in foreign countries at once made the fisheries sector the cynosure of the capitalist class. There is an unprecedented rush for this gold in the form of prawn and shrimps. So the competition for prawn between

the traditional sector and the mechanized trawlers led to increasing pressure and serious conflicts regarding fishing rights.

But slowly, it ended in a massive reduction in catch, income and employment of traditional fishermen, which finally paved the way for the collapse of traditional sector (Rajasenan, 2005). The coming years the marine fisheries sector in kerala witnessed over fishing, resource depletion and inadequate income generating opportunities (Kurien, 1994).

In fact, introduction of trawlers and purse seiners during the rapid modernization period led to an increase in the mechanized sector by about 67%. On the other hand the over all average fish production declined from 380,000 tonnes to 332,000 tonnes (Rajasenan, 2005).

The critics of this modernization describe the process as the one which devastated the plenty of coastal shrimp, which resulted in the further marginalization and pauperization of fish workers and the destruction of coastal habitats. But the technical improvements and the consequent productive capacity of the fishing sector is quite commendable in two major ways. Firstly, fishermen begin to reach fishing grounds early by using the machine power which raised the fishing time. Most importantly, in capturing the bottom dwelling or crustacean species like prawns, crabs, lobsters etc with new technology adds a new dimension in the commercial potentialities of Kerala marine resources.

The rapid motorization phase of 1980's was necessitated by the negative consequences of modernization process in the traditional sector. The decade 1980's witnessed a dramatic change in the form of introduction of outboard motors in the traditional fishing units. In this effort, state plays the crucial role as the first effective attempt to innovate the fishing technology of traditional fishermen. It was introduced at a time when fish catches in the artisanal sector declined and reached its lowest bottom (Kurien and Achari, 1988)

From the economic point of view, motorization led to wide spread fishing operations through out the Kerala coast. It has made possible the traditional craft to exploit the available resources fully in a time bound manner. During 1981-'88 the outboard has become the major production unit in Kerala fishery with its average contribution being 38.4% more than the mechanized or other traditional sector (Rajasenan, 2005). In fact, in the motorization period with the introduction of out board motors onto the artisanal fleet had the effect of introducing new craft designs; reducing gear diversity and the induction of more active, perennial fishing gear such as ring seines in to the artisanal fishery.

Emergence of Indigenous and Intermediate technology

The technological inputs delivered through the INP were the signal for using more technology materials in the marine fisheries sector of Kerala. The hyper activity was the result to increase the fish produce, especially the prawns of

different variety which have a huge potential for export earnings. To realize this objective large capital investment became necessary to purchase motorized boats and advanced out board engines.

The different varieties of motorized boats for the Kerala marine waters were trawler boats and fishing vessels operated by heavy duty engines. This could be used in all seasons. The induction of new types of motorized fishing boats has a corresponding change in fishing methods. Among the new types of fishing methods included were gill netting, boat seining and bottom trawling. The bottom type of trawling has its main aim for the purpose of prawn harvest. Purse-seining was another type of water trawling to trap pelagic fish variety. But this method has severe after effect as it captured even very small varieties of fish species. This may pave the way to the extinction of some fish species.

All these technological changes i.e. changes with respect to crafts, gear and new method of fishing slowly begins to take the control of marine industry. Intermediate technology also enters in the marine fishing industry almost in the same pace as that of indigenous techniques of production. This is by the way of introducing and massive spreading of plywood boats and use of outboard motors both in plywood boats and adapted traditional canoes.

Post modern era with 'new type' of technologies

Generally speaking, post modern era in fisheries sector starts with the Structural Adjustment Programmes initiated by the Government of India since

1991. The radical policy reforms targeting the whole sectors of the economy in a comprehensive way, begins to create its wave in the fisheries with the information and communication technologies.

Marine fisheries sector in Kerala too, embraces this revolutionary change and begins to reap its positive benefits. The characteristic features of post modern era in marine fisheries in Kerala with 'new type' of technologies include two aspects. 1). Unlike, the previous technological advancements in crafts and gears in the form of mechanization, the new type of technologies with Information and Communication Technologies facilitates fish finding devices like echo sounder and Global Positioning System (GPS) and communication equipments like mobile phones to facilitate market intelligence.

2) The new technologies in marine fisheries sector of Kerala enter the scene as part of a large package aiming at the economy as a whole.

Major ICT devices serving the fisheries sector have its initial applicability in the European marine waters. Information and Communication Technologies helped the European fishing industry to attain high degree of development in all aspects from the increase of produce to its processing and marketing.

The tremendous success enjoyed by European fishing industry was an eye opener to the rest of the world. The Information and Communication Technologies were adopted almost with a religious fervor by several maritime countries. Along with other coastal countries, India also jumped into the fray and started experimenting with the ICT gadgets. The States of Tamilnadu,

Andhra Pradesh and Maharashtra came to the forefront of the adoption of ICT instrument.

The success of these states prompts the Kerala fishing industry to utilize all the communication equipments for the regeneration of an all round development of the sector.

The Equipments which proved its worth can be enumerated in the following way.

a) Global Positioning System (GPS)
b) Remote Sensing Technology
c) Advanced Sounders and Sonars
d) Vessel Monitoring System
e) Remote Imaging Satellite
f) Electronic Fishing Gear
g) Mobile phones

Global Positioning System: The technology in this satellite configuration helps in monitoring fishing vessels and leads them to locate better fishing grounds and in turn can avoid fishing in protected areas. This could result in protecting those species which face extinction due to over fishing.

Remote Sensing Technology: The efficiency of this satellite technology is that fishermen can have their catch without much difficulty. The Indian Space Research Organization (ISRO) has developed this method for fishermen to increase their catches and make fishing an important occupation. So the

scientific angle is to improve fish landing and also identify the feeding grounds and making the job of fishermen quite easy.

Advanced Sounders and Sonars: This electronic device has the ability to point the correct depth of the sea along with the type of fish migrated to the specific spot. This in turn makes fishing of quality based product much easier. This also helps to lessen the problem of getting rid of the unwanted fish which has no consumer value. The efficiency of total catch includes considerably and there will be a substantial profit increase.

Vessel Monitoring System (VMS): This satellite tool is used for ship to shore communication. This system was widely used in various Common Wealth countries. Recently, the Kerala fisheries sector has been using the device increasingly. It helps the position of vessels to be determined for better catch prospects. The operation of VMS needs the help from GPS. As such vessels with GPS fitting can accrue much benefit for a wide spectrum of sea fishing activity which increases produce and profit.

Remote Imaging Satellites: This system carries a wide range of biological information which has potential for advanced research on different aspects of the fishing industry. It points out the ocean temperature which is used by tuna long line fleets for higher rate of catch. Thus it accrues benefits for fishing fleets operating in seas. Thus the primary productivity of ocean surface can be easily measured.

This system has its utility for research organizations. The Indian Space Research Organization, the Department of Fisheries Research Institute, Mumbai and several premier Research organizations in the country has decided to utilize this system for various studies in fisheries and Oceanography related subjects.

Electronic Fishing Gear: This system helps the industry to select fishing gear quite suitable for certain type of fish species. The improvement in the quality of fish caught is the prime attraction of this device. By identifying the nature of fish the particular type of gear will be used to tap the maximum amount of produce.

Mobile Phones: The most versatile communication equipment device by mankind has become a household item from the rich to the lower level. Its applicability has no limit.

In the fishery sector also its encroachment at all levels of the industry is nothing less than phenomenal and spectacular. The fishers can communicate among themselves from offshore to inshore and vice-versa. At sea, sometimes it can be monotonous for the fishers. This equipment can readily relieve their condition by talking to family and friends onshore who must have this instrument ready. Mobile Phones are a ready reckoner in the marketing arena from catch to processing.

At times of distress at sea, mobile phones play a vital part in saving lives. Thus in times of disasters mobile phones can solve several problems by

alerting the concerned authorities or relatives regarding the emergency situation. In the fish vending segment there is constant correspondence with the fish owners and the people distributing fish to the customers. Thereby monitoring demand-supply situation prices can be accommodated accordingly. This makes the marketing process quite competitive and sustains higher profit levels.

Technology has been serving the marine fisheries industry at all ages from tradition to post modern era. In traditional times technology was crude and almost indigenous. In the modern period applications of technology became more wider and intense. The trawler technique gave a great impetus to the industry. In the post modern age ICT became the standard bearer for all the segments in the fisheries sector.

The ICT equipments now in usage are being continually up dated. The instruments used in the fishing segments also are undergoing the same type of revision. Research institutes world wide are making modification of the existing gadgets and are making attempts to create new models. These new models will have better facilities along with the attachments specific for the fishing industry. So the future prospect looks quite promising for the fisheries sector for its progress and expansion.

CHAPTER – IV
ICT – AN EMERGING DYNAMIC FORCE IN THE FISHING INDUSTRY

The changing pattern of fishing industry with the new technological methods and its consequent impact on coastal economy of Kerala has been dealt with in the third Chapter. The previous section ends with the emergence of ICT equipments in the State's fishing scenario. The present Chapter deals with the various Information and Communication Technologies used in the marine fishing industries and how its application has contributed to the Kerala fishing sector.

The discovery of ICT has turned out to be an important milestone in the history of mankind. Industries and commercial activities made a giant leap forward and the all round progress was astounding in every sense. From this period onwards, the ICT has emerged as the most valuable companion in all the activities of mankind.

The European experiment

But the fishing industry was slow in accepting and integrating the ICT in its affairs. It was in the ocean waters of Europe that ICT made its debut. From the year 1990 onwards major European countries were the testing ground for the ICT components. Through the method of trial and error, the European countries managed to identify those gadgets which are beneficial and most

suited to the marine industry. The main European countries which involved in this process were France, Italy, Poland, Belgium, Ireland, Spain, Portugal, Sweden, UK, Greece, Germany, Denmark and the European Union.

Impact of ICT

In these countries by the ICT inputs the marine fishing industry gained innumerable advantage and benefits. Fish production increased by leaps and bounds. Marketing activities gained increased momentum. Fish processing units using the new technological inputs not only increased the employment levels, but also guaranteed quality fish production. The result was increase in fish consumption internally and also it increased exports.

In the European context the fishing industry is poised for change and the mechanism for this change is clearly on the shoulders of ICT. Very large fishing units installed sophisticated ICT instruments for their manifold growth in terms of output and profit.

Impact on the small scale fishers

The marginal and small scale fishers witnessing the impact of ICT in big fishing units followed the same pattern. But they were forced to purchase low priced gadgets, but still there was greater increase in productivity than what they had from their previous home made tools.

Impact on fleet and vessel movement

At this juncture, there were large fishing ships, medium level fishing vessels and boats of different sizes. All these were motor operated vessels. For the smooth operation of these fishing fleets it became obvious that they needed the maximum help from ICT. The navigational gadgets from ICT helped the fishing vessels to steer away from troubled waters. Still, if it encountered difficulty in seas due to various reasons the ICT could signal for emergency help either to the vessels near by or to the shore directly. Also the sudden eruption of rough sea waves which occasionally cause distress to fish workers could be mitigated by the ICT warning system.

Thus ICT instruments in the vessels ensure clear navigational route and facilitate smooth sailing. It also indicates clearly the fishing grounds and helps to avoid over fishing and there by overcome the extinction of certain endangered species.

Aftermath of the European experiment

The ICT methods and models successfully adopted by the European fishing industry was an eye opener to all the other marine fishing nations. By the usage of these inputs, there occurred handsome returns for those nations involved in this exercise. The great advancement and development that occurred could be witnessed in the realm of quality produce, processing and marketing methods.

The statistical data put forth by these nations on the tremendous increase in fishing and fishing related activities can be seen in the table 4.1

Table 4.1

Nations with data on Fishery related variables

	Value of landings	**Employment**	**Vol. of landings (kilo tonne)**	**Fleet-number of vessels**	**Fleet – total GRT/GT**
Belgium	89	700	27	124	23000
Denmark	431	4600	1523	1528	98000
Finland	22	2700	103	3701	21000
France	1135	14990	605	5669	166000
Germany	182	2800	226	2261	65000
Greece	250	36273	93	19644	102000
Ireland	219	6000	318	1331	59000
Italy	1558	46938	392	18390	207000
Netherlands	400	2400	467	420	177000
Portugal	299	25021	166	10750	112000
Spain	2072	66100	1110	17187	536000
Sweden	113	20	332	1955	47000
UK	908	13700	748	7242	247000
EU	7678	224722	6110	90202	1860000

Source: EMCC (2003)

The methods and models of ICT adopted by these European nations suited to their requirements. But nations with different geographical outlays and other economic and socio-political conditions have to choose the ICT gadgets suited to their specific needs and interests.

ICT products in the Kerala Context

Within the Indian union, Kerala being one of the premier maritime states was the first one to adopt the wide spread use of ICT equipments. Deliberately choosing the correct instrument which suit the peculiar make up of Kerala was indeed a challenging task. Through the method of an on going trial, the industry made the final assessment of those ICT equipments suited and needed in the Kerala context.

The choice of instruments clearly demonstrates its utility in all the segments of the fishing industry. Kerala with its vast coastal region and marine products was the centre of attraction of several countries. Thus the foreign intervention in the Kerala's fisheries sector through the medium of ICT became a reality.

The Kerala marine industry is quite unique in the sense that the confluence of tradition and modernity exist side by side. On the one hand there are Kattamarams, offshore and inshore nets in use and individual angling – all of which have manual labour in application. On the other hand there are deep sea fishing vessels, trawler boats and engine operated by country boats. The ICT

which are applicable to these vessels have proved their mettle. The marine products especially quality based fish items have increased.

The quality marine products have a very lucrative market in India and especially over seas. Lobsters, shrimps and shell fishes of all hues and Kanavas (cuttle fish) are in the forefront in gaining precious foreign exchange earnings for the Indian and Kerala economies.

Technology initiation

Even before the advent of ICT, Kerala had its brush with foreign technology in terms of the trawler technique. Hence technological products which led to the modernization process of the fisheries sector is not a new development in the marine industry. This modernization process in Kerala was initially unleashed by the Indo – Norwegian project in the year 1953 at the Neendakara region of the Kollam district.

The pioneering pace of Indo – Norwegian project was the method of trawling technique for motorized boat operation for fishing in the marine sector. Without doubt, there was a quantum jump in fish production. But it had its serious drawbacks causing grave concern to the fishing industry.

The main concern was that though the introduction of trawling technique in Kerala had helped to increase production, it also had resulted in over fishing and had caused serious damage to the marine habitats. To counteract this situation the ICT has come forward with its technological inputs. The ICT can now provide fishing operators with information on every aspect of their

activities from catch to the market place and can readily communicate this information from sea to shore and even to distant market places.

Initially, though, Kerala was slow in adopting Information and Communication Technologies its manifold benefits forced this sector in embracing revolutionary ICT products. These technologies have benefited the fisheries by increasing the output and thereby gaining the sizeable amount as profit.

Apart from the profit motive, the marine sector gained considerable insights in to the behavioral pattern of several fish species. This in turn forced the fishers to locate new fishing grounds and spare those types of fish which faces extinction.

So without the intervention of ICT, many fish species could have resulted in its extinction. Thus the ICT has helped the fishers in addressing various problems that they are facing like depletion of resources and marketing of their products. Thus they are forced not to indulge in over fishing.

But over fishing is not a problem for Kerala alone. The fishing industry world wide is facing the same situation. Fish stocks in many marine areas are now dwindling quite fast, causing real concerns about some species which might not recover. The Kerala coast, especially the Kollam area is witnessing the decrease of certain fish species like tiger prawns which was quite abundant during the 1960's.

Clearly, ICT has become the main and anchoring operating force and has definitely proved to be the Emerging Dynamic Force in the Kerala fisheries sector. The ICT inputs are in use in all commercial activities and have special application in all types of fishing units.

The improvement and modernization of fishing vessels, largely due to the impact of ICT, have helped to increase productivity and efficiency. As a result, working and living conditions of fishers, while at sea or shore have improved. Technical developments have also occurred in the fish handling and processing areas of the industry, with large shipping vessels being able to process the catch on board today.

The pace of technology from the later 1960's has been considerable and particularly quite beneficial for the Kerala fisher folk. Technological progress in the fishing industry is connected to the introduction and adoption of innovations from a broad range of technical products. There has always been a demand in the fishing industry for new technologies that make vessel operation and the fishing process more efficient. In general the fishing industry aims to increase profitability of its operation to remain competitive and technology has facilitated this.

The fishing industry in Kerala is facing a gloomy future with the depletion of marine resources. To overcome these and other concerns, modernization process is taking place at several levels. In this modernization process and

operations, Information and Communication Technologies have played a truly significant role.

For the fishing industry the impact and influence of communication technology have been gradual. But more recently it has been evolving into a valuable tool for the industry.

Developments in mobile communication have had a greater impact on the marine industry by its practicability. But it has to be admitted that a significant part of the industry is resistant to change. There are still some who have reservations in these developments. New developments always have initial protest which is quite common. New revolutionary methods at all times and all places have resistance due to the psychological nature of mankind. Changes for good or bad are not welcomed as they would like to continue in the pattern that they are accustomed to.

In essence, the fishing sector of Kerala remains a community based industry which is steeped in tradition. The recent past has brought about changes to the industry. The various communication equipments now in use in many parts of the fishing industry are analyzed in table 4.2.

Table 4.2

Technologies adopted by the fishing industry

Technology	Application	Implication
Satellite positioning	●Targetting boat's position (GPS) ●Monitoring fishing vessels	●Supports sustainable fisheries management ●Transparent regulation
Satellite Communication	●Send catch data to the shore ●Vessel location to help in times of distress	●Increases health and safety levels ●Improves supply chain efficiency
Satellite remote sensing	●Information used to locate fishing grounds	●Scientific monitoring and easy to find catch
Electronics- Echo sounder, Sonar and Sensors	●Information on the depth of sea bed and species of fish	●Increases catch efficiency and quality
IT Systems	●Data management and communication ●Computer Aided Design(CAD)- vessel, engine and fishing gear design ●E commerce including mobile telephony	●Improves supply chain and efficiency ●Increased production and reduction in functional costs ●Transparent marketing activities and more accessibility

Source: EMCC (2003)

All the above technologies applied either individually or in combination can potentially add value through out the supply chain. So the use of information technology enables to categorize the fishing industry in to two areas.

1. In a larger perspective, covering satellite systems provide detailed information of the weather, environment and the opportunity to monitor and manage fishing ground and fleet.
2. At the individual level, the technologies on information support the supply chain and marketing.

Thus the motives behind the use of technologies by the fishing industry are as follows.

1. Increasing productivity and reducing operational costs.
2. Improving products quality.
3. Enhancing safe working condition of the fishers.

Impact

The main impact of the use of communication technologies had been realized only a few years ago. Fishers now can send detailed catch information ashore in advance of landing, there by making marketing and commercial activity at an optimum level.

Another important impact of the communication technology is that it provides opportunities for developing co-operative activities. Many fishers experience problems of environmental, economic and political issues which are common to all in their daily operations. This could be resolved, to some extent, by

sharing information and knowledge in a non-competitive fashion i.e. through co-operative activities.

Employment is another area which may be affected by the communication technology, with its devices. As tasks become automated, the industry will need less number of crew members and this increases the profit margin of fishing operations. The table 4.3 gives a general impact of technology in marine fisheries.

Table 4.3

Impact of Technology on Marine Fisheries Industry

A – Reducing functional costs
1. Man power – Smaller crew 2. Fuel – Improved navigation and better engine reduce Fuel consumption 3. Fishing effort – saving time and effort by the use of technology which in effect will reduce time at sea
B – Market access
1. Communication of catch information to market makes selling process more efficient. 2. Produce can be sold more widely. 3. Greater price competition 4. Better quality fish would attract premium price

Source: EMCC (2003)

From table 4.3, now it is quite obvious that from a regulatory level, all information services can be pulled together electronically. Thus electronic commerce offers the fishing industry a powerful tool to raise competitiveness of the industry. However in one aspect the industry has to be cautious and watchful i.e. technology is changing rapidly and any advantage may be short lived unless there is investment for updating the instruments.

Another perceived drawback is that technological progress has made recruitment to the industry more complicated. Traditionally, fishers learned their trade from their forefathers. This situation has changed. Mouldering fishing techniques require a minimum level of training in the use of these systems. So an increase in commercial knowledge is required to ensure that operating techniques are utilized at an optimum level for all fishing activities and allied tasks.

Another issue is that safety on board has to be addressed because still a number of accidents occur each year in the Kerala coast. In this matter the ICT models can be quite beneficial in saving lives. Thus the communication revolution has played a significant role in the modernization process of the Kerala marine fishing industry.

Without doubt Information technologies have gradually evolved as a valuable tool in this industry. So communication technology has provided a base to streamline the supply chain and there by introduced efficiency as well as to explore new markets and commercial opportunities. The fishing industry which

is steeped in tradition is now forced to open itself to new technologies, but not wholeheartedly.

Communication technology has been adopted for a number of reasons. But most important among them is that it has a direct commercial benefit. However, there are a number of barriers in the adoption of information and communication technology due to the following reasons.

1. Lack of proper knowledge to use the new system.
2. Cultural barriers existing in various coastal regions.
3. Lack of co-ordination among various related process in fishing activities.
4. Lack of adequate public investment.

Communication technology has been able to exploit the marketing potential of the resources in many ways. On the one hand it can provide details of fish sales. While on the other hand it has been able to supply local needs with direct contact to customer base. It also has been able to bring savings for both the processors and retailers.

In this context, the most versatile and useful gadget for fisher folks is the mobile phone. The use of mobile telephony has revolutionized many industrial sectors and fishing industry has also been able to exploit them. The mobile phones have helped merchants to check the prices and also the availability of fish at more than one location. Mobile telephony can send small messaging services (SMS) which help the enterprises in off shore and in shore positions.

Over all there has been a significant change in the use of communication equipments and this have had great impact on the fishing industry in a number of ways as outlined above.

The dynamic nature of ICT is quite evident in the over all operations of the fishing industry, thereby making it profitable and making it more efficient. Technologies adopted in gaining such a momentum is at the one end are satellite based exercise and the other end the communication gadgets.

The table 4.4 shows ICT gadgets in its wider application level with respect to deep sea fishing.

Table 4.4

Applicability of ICT gadgets in Deep Sea Fishing

Name of the product	Usage	Results
Satellite schemes and structures	Deep sea fishing vessels and heavy engine operated boats	• Increase in efficiency • Scientific monitoring of fish stocks • Easy catch finding identification of the nature of fish

Source: Compiled from EMCC, 2003

The table 4.4 clearly shows the ICT gadget, viz. satellites in marine fisheries. The satellite modes of different varieties frequently used in deep sea fishing vessels have specific application of identifying fish stocks in a scientific way. This also helps to discover new fishing grounds. The net is an increase in fish

production, marketing activity becomes more lively and the consumer is presented with varieties of fish which they can choose according to their taste.

The other variety of ICT gadget is communication equipments for different application. The table 4.5 presents the communication equipments used in fishing activities

Table 4.5

Communication equipments in fisheries

Name of the product	Usage	Results
Mobile Phones	Total Applicability	• Improvement and efficiency in supply chain • Communication with family • Need of few crews • Reduces cost
Monitoring Control Surveillance	Inshore and Offshore	• Data collection on fish output • Vessel location • Disastrous managing • Market identification

Source: Compiled from EMCC, 2003

The table 4.5 illustrates that the lead instrument in communication device is mobile phones. Making its presence in all the fishing activities, it is termed to be the most valuable tool for this industry. Close to the heels of the mobile phones are the monitoring systems. These are solely used for fishery and also can signal emergencies confronted by the fishing fleets and vessels.

The end result from the outcome of the inputs of the various hues of communication technology in the fishing sector will make the industry quite sustainable.

Thus ICT has made an indelible mark not only in the over all operations of the fishing sector, but also has created opportunities for the betterment of livelihoods for the fisher folk in general. Along with specialized applications of gadgets for fishing which has been described above, there are general purpose application such as mobile phone for trading and tackling emergency situations, whether at sea or inshore and making fishing communities on the right track of development.

Also access to exchange of key information can contribute constructively for the betterment of livelihoods of the fishing communities. So ICT can assist fishing communities in making the right decisions not only in specific fishing operation but also to improve the opportunity of fisher folk in the diversification of their activities to gain more money and power. It will also enable them for knowledge sharing and increase their awareness in the socio-political process.

The most potential weapon of Information and Communication Technologies is the mobile phones. It is available to all except some very remote communities. This communication tool is a fundamental development for the fisher folk as it provides information sharing, collaboration which leads to

increased participation of fishing communities which will then result in catering the needs of the poor. There by making making them more responsible fishers.

Taking the Information and Communication Technologies as a whole there is no boundary for its use in the fishing sector. The industry is always on the look out for improved and advanced mechanism to increase production in order for local consumption and explore markets nationally and internationally. Fishing and trading activities are bound to increase. Market and price information will be at the finger tips.

Thus ICT has turned out to be the greatest boom to the fisheries sector in its march towards a comprehensive and equitable development of the lives and livelihood of the vulnerable section of the society. In Kerala ICT has turned out to be a veritable dynamic force in the marine fishing segment, economically, politically and socially. The economic benefits have been outlined here. The political clout of these vulnerable sections have increased due to the sharing of new knowledge and the assimilation of new ideas. The majority of the fisher folk are placed in the bracket of the working class. If the Marxist maxim and division of labour is adopted, this seems to be true. The ICT models have made the political and social emancipation of fisher folk a stark reality.

Thus from any angle, the ICT is the emerging dynamic force now to arise in the fishing horizon of Kerala.

CHAPTER – V

COMMUNICATION PARAMETRES – THE PROPELLING FORCE IN THE MARINE FISHING INDUSTRY OF KERALA

The previous chapter focuses on how Information and Communication Technologies emerged as a dynamic force in the fishing industries with special reference to the State of Kerala. In continuation of the factors outlined above, the present one, addresses the total role of communication and information equipments in the livelihood activities of the fisher folk.

Fishing industry in its totality comprises different facets of operation in its technological inputs and skill. On the one hand there is the lone angler operating in the coastal waters and river beds, who needs minimal support from Information and Communication Technologies. On the other end of the scale we come across deep sea fishing vessels using sophisticated and latest technologies in its fishing operations.

Clearly, the fishing industry in India and particularly in Kerala has undergone major changes during the past few years due to the continuing influence and impact of modern communication equipments. So far the ICT has provided the mechanism to ensure that fishing activities are engaged efficiently and effectively.

The role of ICT in the changing fishing industry has been important. Obviously, responsible use of Information and Communication Technologies

can indeed contribute constructively both to the livelihood enhancement and poverty reduction among fishing communities. It has become valuable to the fishing process from catch to counter. Technology has been used to manage change in terms of fisheries and catch management as well as to anticipate change by re-modelling the way in which the industry operates.

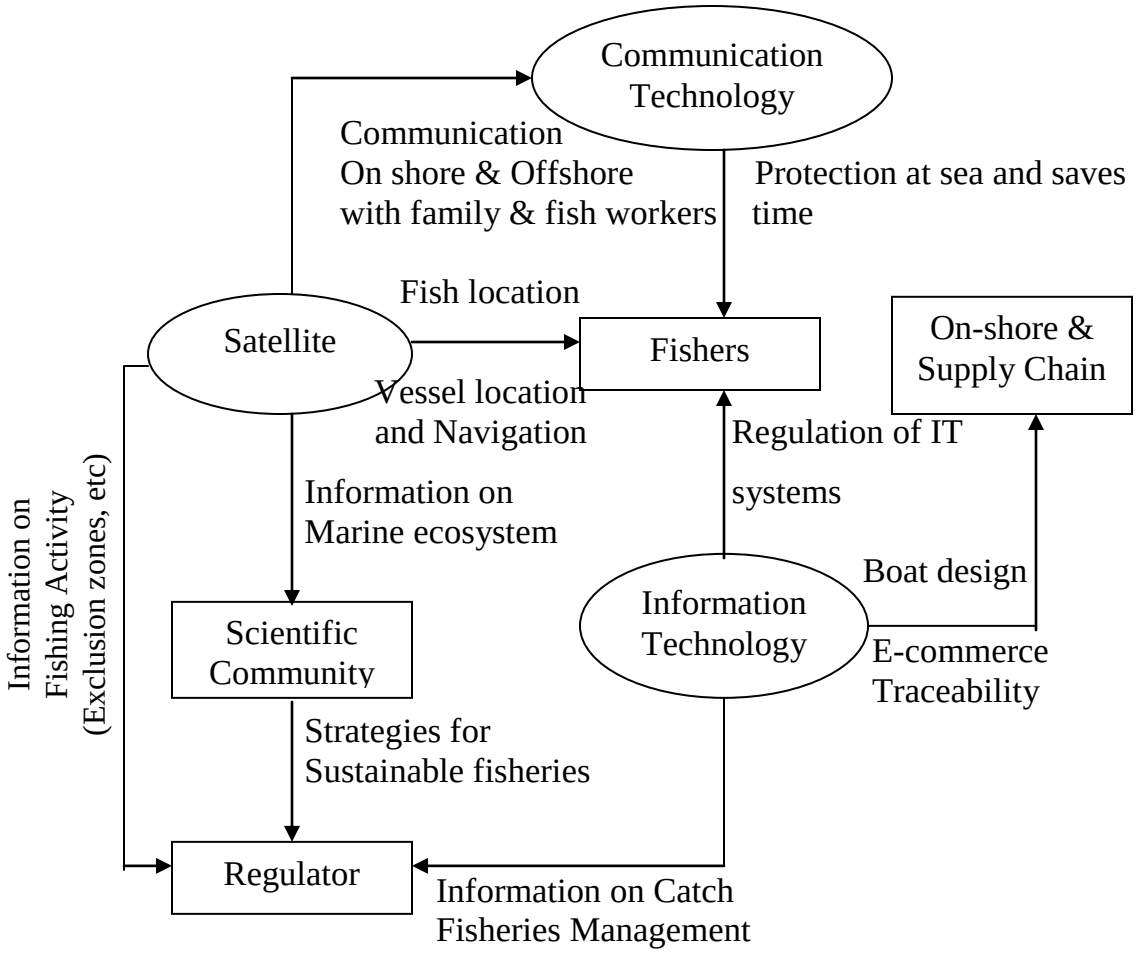
The complete picture of the study points out the positive aspects related to ICT implications, but one cannot discard the negative side of Information and Communication Technologies applications in the fisheries sector.

Fishing sector, a community based industry is deeply rooted in tradition. The recent radical changes in the industry like the entry of Information and Communication Technologies compelled it to re-examine the whole operational approach. The functional literates in the community welcomed the change and its practicability. But a key section in the community are reluctant to follow the modern footsteps as it is a threat to their livelihood activities.

The figure 5.1 illustrates the linking up of various chains of actions that arise from the creation of a solid communication system with the marine fishing industry in general.

Figure 5.1

A Framework of Applicability of Communication System in Fishing



Source: EMCC (2003)

The figure 5.1 shows a conceptual framework of practical applicability of communication and information technologies in the fishing industry. It is indeed a complex but a systematic process which emerges gradually and

steadily, when communication and information technologies functions in the fisheries in a smooth manner.

During the last four decades, in many parts of the world, the fishing industry has used Communication and Information technologies in a number of operational areas. For a long time communication technologies provide as the ultimate source of contact between fishers and the shore and other vessels for the transfer of information. With technological know how, fishers began to reap the potential benefits of communication technologies in their economic operational activities. A major drawback of Communication and Information technologies in fishing industries across the globe is that its adoption is not unique. The peculiar characteristic feature of the fishing sector creates problems as it adopts new technologies.

Of late fishing industry began to embrace the new wave in accordance with the changing climate in the economy. A notable point in this context is that Information and Communication Technologies especially the communication equipments can transform the vulnerable position of the fishing industry into a dynamic sector with greater income and employment generation.

For the fishing industry, various equipments in the Communication and Information systems have opened up opportunities to control all its activities in a systematic way.

Even in underdeveloped region, a sustainable marine fishing sector can be created with the proper synthesis between the modern fishing crafts and gears and Communication and Information Technologies.

A sustainable marine fishing sector certainly increases operational efficiency and market transparency. In a wider perspective, a sustainable marine fisheries sector has certain features with respect to Communication and Information Technologies which is outlined in the Table 5.1

Table 5.1

Communication and Information Devices for Sustainable Fisheries

Communication and Information Devices	Implications
Satellite Communication	Communicating catch and operational data to the shore
Information Technology	Proper regulation of fish caught
E-auctions	Selling the product to buyers
Mobile Communications	Wide spread transmission of information about the catch
Software	Transparency and traceability of the product

Source: Compiled from EMCC (2003)

A notable observation from table 5.1 is that the whole process of fish catch and its selling becomes well organized with the adoption of Communication and

Information devices. Another important act is that the competitive position of the fishing industry becomes more compact with the application of these technologies.

The use of Communication and Information Technologies has been concentrating on three dimensions. The table 5.2 shows the application of Communication and Information Technologies at three levels.

Table 5.2

Three Dimensional Applications of Communication and Information Technologies in the fishing industry

Type of Technologies	Area and Application
Satellite Technologies	Information about weather, fishing grounds and fleets
Target Technologies	Information about fish location, catch information and communication
Marketing Technologies	Quick information about pricing, supply chain and marketability

Source: Compiled from EMCC (2003)

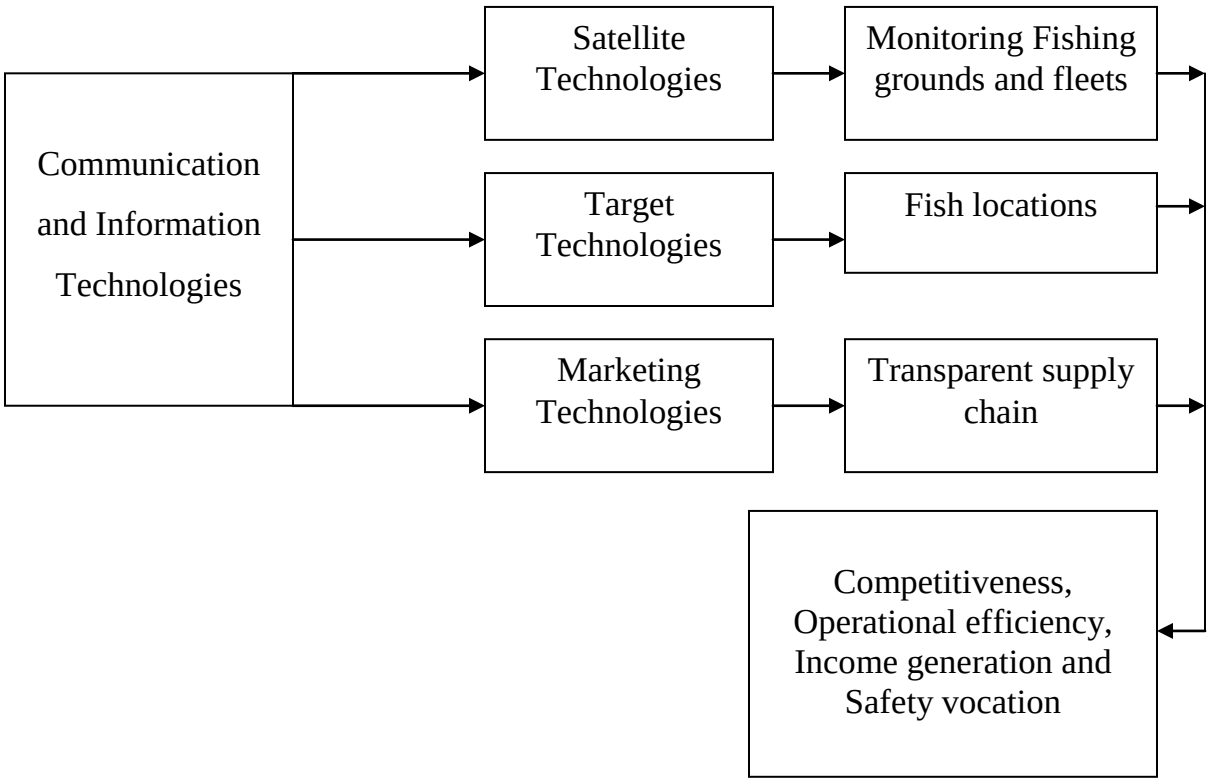
The table 5.2 presents a three dimensional approach to the application of Communication and Information techniques in fishing purposes. The ultimate

end of the three types of communication technologies competitiveness, operational efficiency, income generation and safety at sea.

The figure 5.2 shows a conceptual framework of how Communication and Information Technologies have enabled this change in the fishing industry.

Figure 5.2

Conceptual framework of change in fishing industry with Communication and Information Technologies



Source: Compiled from EMCC (2003)

In a broader perspective apart from 'Profit Motive Criteria', Communication and Information Technologies targets can be briefed as

(a) Increasing the operational capacity and thereby increasing production.

(b) Making the product in the competitive market by improving the quality and

(c) Proving better and safe working conditions for fish workers.

Satellite Technologies: Today Satellite Remote Sensing Technologies has become a key weapon in environment monitoring, impact assessment and conservation issues (Chassot, 2011). This enables the systematic transmission of electronic data to fishers irrespective of the fact that whether they are at sea or port. All relevant information can be collected electronically in near real time and send back to the port management of the fleet or to the respective authorities for fish stock monitoring (EMCC, 2003).

From an economic point of view the radical change with the satellite technologies lead to the integration of demand and supply chains. In Kerala coast this can create a positive impact upon over fishing and the consequent depletion of marine resources. In general terms the long term sustainability of marine fisheries relates to Satellite Technologies.

Target Technologies on board: In fact, target technologies concentrates on giving information to vessels, fish location, catch management etc. Fish location gadgets suitable to marine fish industry are echo-sounders and sonars.

Commercial fishing activities in any economy now depend on fish location gadgets. Fishing sonars or echo-sounders display complete information about the marine eco-system. With the modern fish finding gadgets, several coastal economies are experiencing greater fish production in commercial activities.

Advances in electronic technology and its application in sectors like fishing bring to notice its commercial potentialities. However, a certain group in the sector highlights the dark side of using the Target Technologies as there is a possibility of misinterpreting the data. In many coastal economies, Target Technologies provide all its targets to fishers. In coastal regions like Kerala, a systematic effort is needed on the part of Government and scientific community to convince fishers its need.

Vessel fleet movement with Electronic Technologies in Fishing

Commercial as well as subsistence fishing activities in Asian, European and African fisheries have gone through a transition with the adoption of electronic technologies and fish vessel movement. Electronic Technologies in vessel fleet movement enables the fish labourers to carry out fishing activities as per a pre-planned strategy. These navigational technologies also guide vessels along precise routes avoiding easily known obstacles.

The table 5.3 demonstrates vessel fleet movement technologies in modern fisheries.

Table 5.3

Electronic Technologies in Vessel Fleet Movement

Electronic equipment used in Vessel Fleet movement	Implications
Gyro compass	Giving the direction and replacing traditional magnetic compass
Electronic systems	Speed control
Echo-sounders	Information on vegetation, structure and fish
Radar	Locating surface obstacles in poor weather conditions
GPS	Supports navigation

Source: Compiled from EMCC (2003)

In many advanced coastal economies all these equipments are being used in a larger scale. It has its consequence on the overall marine production and the well-being of fish workers. But the hard reality in Kerala is that these equipments are not being used in a larger scale. But in some areas these equipments have a wider acceptance.

Communication Technologies

Among the various electronic technologies adopted in the fisheries activities, communication instrument makes the whole process transparent to move in a special direction. From navigational activities to safety purposes

Communication Technologies play a central part. The wide spread coverage of Communication Technologies actually enlarge the scope of fishing activities further.

In Kerala, Kerala Independent Fish Workers Federation has trained the people in the use of computer based applications, internet, e-mail, GPS, mobile phones and hand radios (FAO, 2006). Though Kerala is a highly literate State the coastal communities are still far behind in the adoption of modern gadgets. Among the Communication Technologies used in the fisheries sector of Kerala instruments like the mobile phones offer greatest applicability in their day-to-day life. Fish workers need skill and training to use computer, internet etc.

In Kerala, of late there was a joint effort by the Government, scientific community, NGOs and other private organizations to focus on the commercial applications of Communication Technologies in the livelihood related matters of the fisher folk. The specific objectives and aims of using each Communication and Information equipments in Kerala coast is shown in the table 5.4.

Table 5.4

Communication and Information Technologies in Kerala

Communication Equipments	Objectives
Mobile phones	Sharing information on catch, transparency in supply chain, fish marketing etc.
Broadcast media like TV, Radio and Video	For awareness creation, information sharing and information education
Web based applications	Data management and linking the community internationally
GPS	Navigation and sharing information
Print publications	An extensive information of fisheries with special reference to local conditions
Information centres	Information on fishing and commerce
Community radio	Information on weather, sea conditions, disaster warning

The table 5.4 presents an account of various communication gadgets in vogue throughout Kerala coast. Among the various communication devices used in the Kerala coast the case of mobile phones need special mention. Along with the main stream sections in the Kerala society, the fisher clan too use mobile phones as the most important instrument in their livelihood options. For many fish workers, mobile phones have become the ultimate weapon connecting all

their personal and professional activities. A point to remember in the changing scenario is that the real impact of Communication and Information Technologies in Kerala covering all maritime districts is yet to investigate in a broader manner.

But perhaps the greatest revolution in Kerala coast in recent times is of course the communication and information phenomena. No one, connected with this sector can deny the fruitfulness of the new communication and information technologies. The technological correlation among fish workers in Kerala as a result of new technologies is quite noteworthy. It has become a real platform in making the activity a viable one.

However, in spreading the use of Information and Communication Technology among fish workers in Kerala needs the formation of special strategies and plans. The problem is to equip the backward community with new trends and technologies.

CHAPTER – VI

AN EMPIRICAL ANALYSIS OF THE IMPACT OF COMMUNICATION PARAMETERS AND THE SOCIO-ECONOMIC STATUS OF MARINE FISHING COMMUNITY IN THE DISTRICT OF KOLLAM

The Communication and Information Technologies adopted by the marine fishing industry in Kerala has been discussed in the last chapter. On the basis of the facts provided in the previous chapters, this section is an attempt to present and analyze the results of the survey done, as part of the investigation process.

The coastal villages of Kollam form the investigation for the presentation of data and its consequent analysis. With four fishing villages as samples and fisher folk as respondents, the presentation and analysis of data are being done on two broad categories.

The first point of investigation is the impact of modern information and communication parameters in the livelihood activities of marine fisher folk of Kollam district. The second part is interwoven with the socio-economic profile of the marine fishing community in the district.

1. Impact of Information and Communication Parameters

In Kerala, the impact of Communication and Information Technologies are growing in a phenomenal manner. Its greatest advantage in the fisheries sector is its capacity to widen the economic activities through knowledge and information sharing.

The coastal villages in Kollam are peculiar in many ways in the matter of fishing activities. The sample fishing village, Sakthikulangara in Kollam comes in the upward ladder of all the coastal villages in Kerala. The other sample villages, Eravipuram South, Eravipuram North and Pallithottam show a mixed picture of tradition and modernity. The impact of Communication and Information Technologies in the sample coastal villages of Kollam displays interesting characteristic features.

1. Mobile Phone Users

The tremendous advantageous potential of ‘mobile phones’ stand apart among the various communication parameters in fishing activities. The table 6.1 and figure 6.1 shows users of mobile phones in the selected sample villages in Kollam district.

Table 6.1

Users and Non Users of Mobile phones in Fishing activities

Place	Non Users		Users		Total	
	Count	%	Count	%	Count	%
Eravipuram South	23	30.67	52	69.33	75	100
Eravipuram North	14	18.67	61	81.33	75	100
Pallithottam	15	20.00	60	80.00	75	100
Sakthikulangara	4	5.33	71	94.67	75	100
Total (out of 300)	**56**	**18.67**	**244**	**81.33**	**300**	**100**

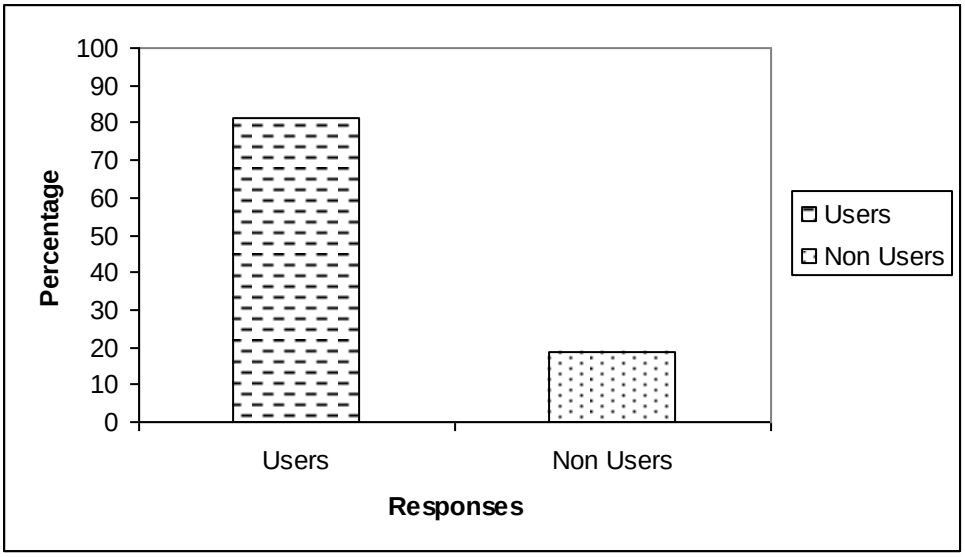
Source: Survey Data

Pearson Chi-Square : 15.98

Significance : 0.001142794

Figure 6.1

Users and Non Users (%) of Mobile Phones in Fishing Activities



The huge applicability of mobile phones in fishing activities are shown in the table 6.1 and figure 6.1 It clearly indicate the fact that a commendable 81.33%

of the marine fisher folk have access to mobile phones in their day to day economic activities.

Within the four fishing villages too, fish workers using mobiles exhibit a similar pattern. It is 69.33% in Eravipuram South, 81.33% in Eravipuram North and 80% and 94.67% in Pallithottam and Sakthikulangara.

A notable point in this context is that, fishermen who used mobile phones in these four fishing villages during the period 2005-06 (done by the researcher during that time) were only 12.30%. The significant majority of 87.70% during that period did not have any access to mobile phones in enhancing their application. For the period 2005-06 data, the Pearson chi-square value figures 36.492 and the significance 0.000 for the response rate in mobile phones among the fishers. Among the users of mobile phones during that period, it provides as a device for resource identification, safety at sea, profit maximization and to arrange the trade. During the same period, the survey also shows that various communication devices like mobile phones, land phones and e-mail users in Sakthikulangara alone stands 69.39%.

The increase in mobile phone users among fishing communities in Kollam from 12.30% in 2005-06 to 81.33% in the year 2010 is quite remarkable. The ground reality from this survey results points out the enormous significance of this communication parameter in enlarging the economic potentialities of fish workers in Kollam.

2. Economic benefits from using mobile phones in fishing activities

In fact, the perishable nature of fish products makes mobile phones vital. The economic benefit accrues to fishermen population in the sample fishing villages of Kollam, from cell phones for innumerable fishing purposes.

The table 6.2 and figure 6.2 displays the benefits of using mobile phones in fishing activities.

Table 6.2

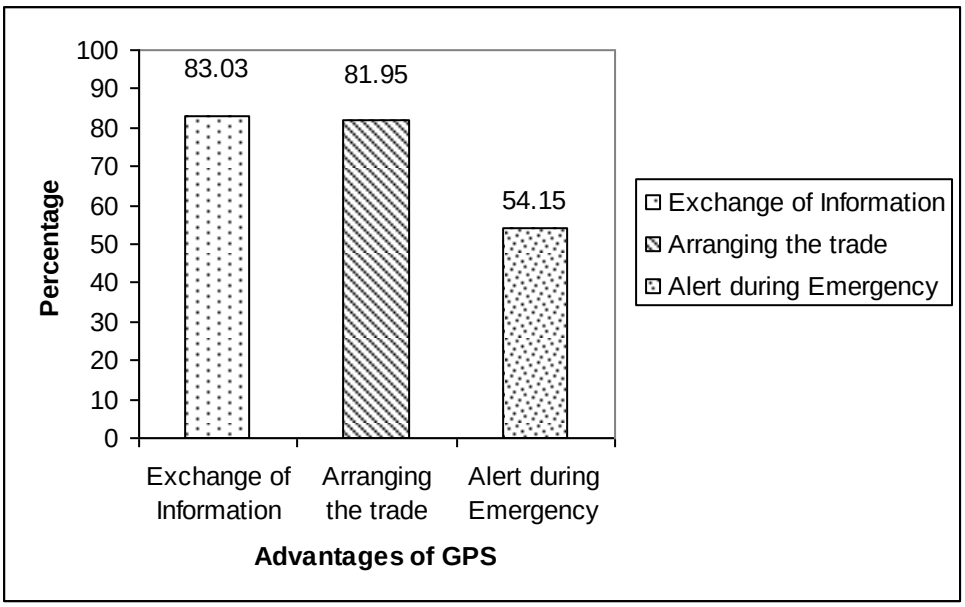
Economic Benefits from Mobile Phones in Fishing Activities (Among Users)

Place	Exchange of Information		Arranging the Trade		Alert during Emergency	
	Count	**%**	**Count**	**%**	**Count**	**%**
Eravipuram South	45	86.54	48	92.31	22	42.31
Eravipuram North	56	74.67	56	74.67	18	24.00
Pallithottam	58	77.33	52	69.33	39	52.00
Sakthikulangara	71	94.67	71	94.67	71	94.67
Total	**230**	**83.03**	**227**	**81.95**	**150**	**54.15**
Pearson Chi-square	**13.1140469**		**22.73085842**		**80.126781**	
Significance	**0.00439635**		**0.0000**		**0.0000**	

Source: Survey Data

Figure 6.2

Economic Benefits from Mobile Phones in Fishing Activities



The survey results in table 6.2 and figure 6.2 show that the biggest advantage of mobile phones in sample villages relates to exchange of information and arranging the trade of the product.

The exchange of information among fisher folk is a crucial link that enables them to fix the price of the fish and its trading. In the four fishing villages, there is possibility of high volatility of fish price. In order to over come this problem, 83.03% of the fish workers use this communication parameter to exchange information and there by arranging the trade. The response rate for arranging the trade with mobile phones is 81.95%. These two aspects of the usage of mobile phones are synonymous with the responses in all the sample villages. A significant 54.15% of the respondents use this communication parameter as an instrument to alert during emergencies.

So the over all coverage level of mobile phones among the fisher folk in Kollam are expanding beyond all expectations. The cheap cost element related to this device is a major factor in its wide spread coverage among the fisher folk in Kollam.

3. Users and Non Users of Global Positioning System (GPS) in fishing activities

Fishing activities in many coastal villages of Kollam witness a diversification in recent times. Satellite communications like GPS, plays a role in this crucial change. Something unimaginable in the past in the coastal villages of Kollam, the use of GPS has now become a reality.

The table 6.3 and figure 6.3 illustrate the users and Non Users of GPS in the sample villages.

Table 6.3

Users and Non Users of GPS in Fishing activities

Place	Non Users		Users		Total	
	Count	%	Count	%	Count	%
Eravipuram South	60	80	15	20.00	75	100
Eravipuram North	50	66.67	25	33.33	75	100
Pallithottam	27	36	48	64	75	100
Sakthikulangara	11	14.67	64	85.33	75	100
Total (out of 300)	**148**	**49.33**	**152**	**50.67**	**300**	**100**

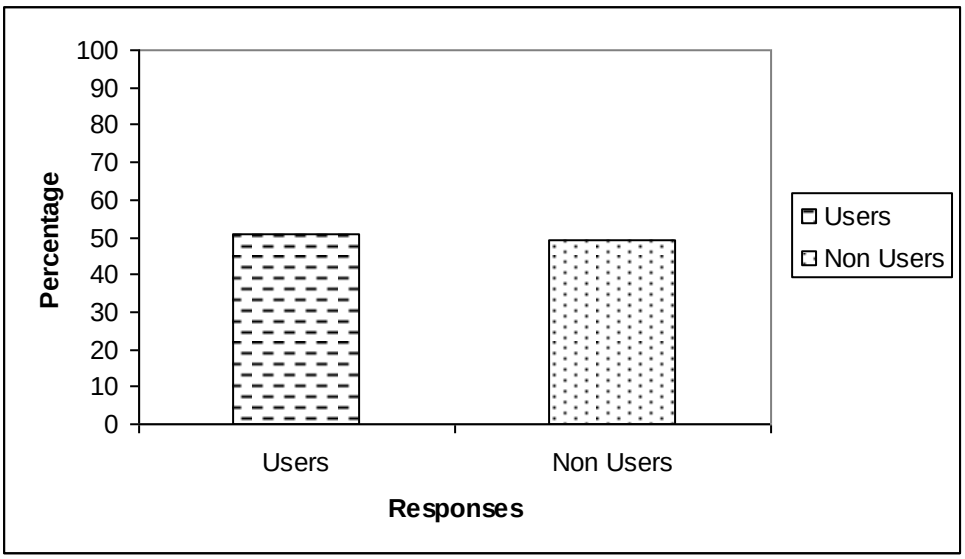
Source: Survey Data

Pearson Chi-Square : 78.62731152

Significance : 0.0000

Figure 6.3

Users and Non Users (%) of GPS in Fishing Activities



The survey results show that a margin of 50.67% of the respondents use GPS for the purposes of fishing activities. In Sakthikulangara fishing village alone 85.33% fishers utilize GPS technology. The result is indeed another indication of the impact of Communication and Information technologies in changing the livelihood aspects of fish workers in the district.

4. Advantages of using GPS in fishing activities

The greatest advantage of fisher folk in using GPS lies in finding out the exact location of the fish. Among those who use GPS, the result shows that all the respondents utilize GPS as a fish finding equipment. From an economic point of view, this is a big achievement because a technological device benefits the target group at its desired level.

The table 6.4 and figure 6.4 show the benefits of using GPS in fisheries.

Table 6.4

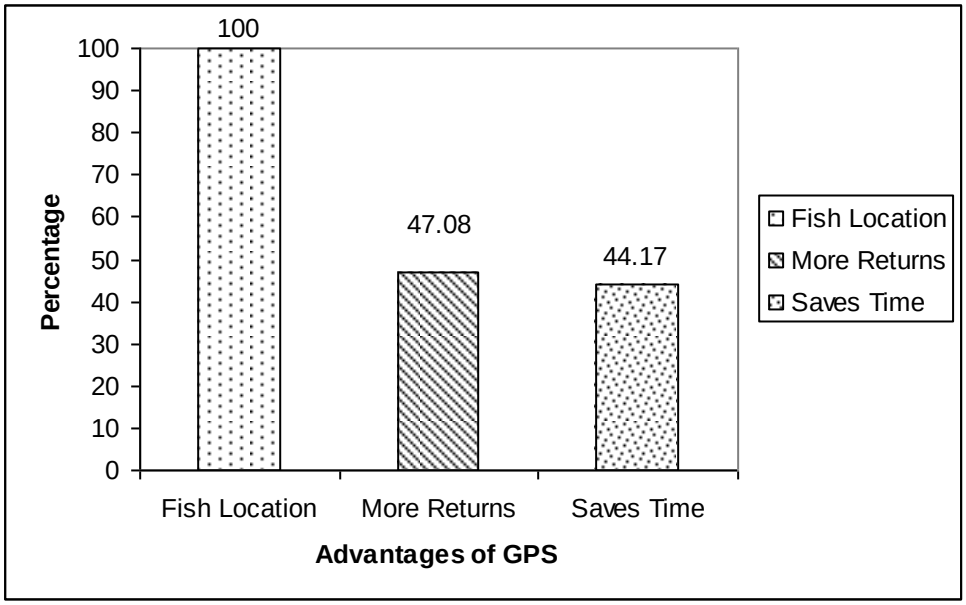
Advantages of Using GPS in Fishing Activities

Place	To find out fish location		To get more returns		Saves time at sea	
	Count	%	Count	%	Count	%
Eravipuram South	15	100	7	46.67	9	60.00
Eravipuram North	25	100	19	25.33	17	22.67
Pallithottam	48	100	33	44.00	31	41.33
Sakthikulangara	64	100	54	72.00	49	65.33
Total	**152**	**100**	**113**	**47.08**	**106**	**44.17**
Pearson Chi-square	**53.3971292**		**33.21636123**		**29.454238**	
Significance	**0.0000**		**0.0000**		**0.0000**	

Source: Survey Data

Figure 6.4

Advantages of Using GPS in Fishing Activities



The survey shows that a significant 47.08% uses GPS as an instrument in getting more revenue from fishing activities. Another 44.17% respondents point out its utility to reduce spending more time at sea. It is a critical aspect because after all fishing is always a dangerous vocation.

5. Users of Sonars and Echo sounders in fishing activities

From a sustainable marine environment point of view, the major advantage of using sonars or echo sounders in marine waters is to protect the ocean from unwanted fishing. But the fish workers use this device more as an instrument for locating the fish ground.

The table 6.5 and figure 6.5 give information about the total number of users of echo sounders and sonars in fishing in the sample villages.

Table 6.5

Users and Non Users of Sonars and Echo Sounders in Fishing activities

Place	Non Users		Users		Total	
	Count	%	Count	%	Count	%
Eravipuram South	75	100	0	0.00	75	100
Eravipuram North	74	98.67	1	1.33	75	100
Pallithottam	69	92.00	6	8.00	75	100
Sakthikulangara	60	80.00	15	20.00	75	100
Total (out of 300)	**278**	**92.67**	**22**	**7.33**	**300**	**100**

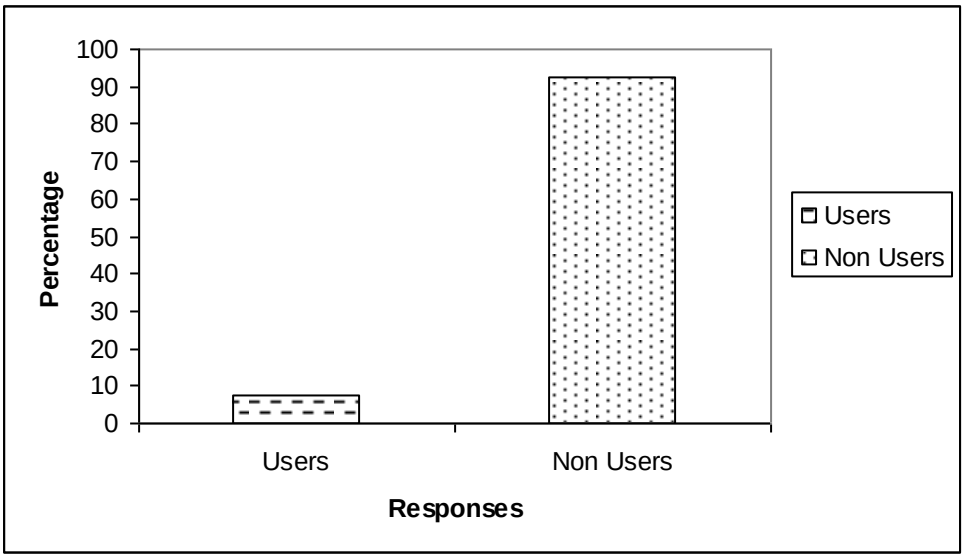
Source: Survey Data

Pearson Chi-Square : 27.66514061

Significance : 0.0000

Figure 6.5

Users and Non Users (%) of Sonars and Echo Sounders in Fishing Activities



The table 6.5 and figure 6.5 show the negative response on the part of fisher folk in using devices like echo sounders and sonars. The result indicates that a significant majority of 92.67% of the fish workers are not compatible with such devices. From the general observation of the survey, the problem may not be with the functional illiteracy among the fishers. Because they are using other devices like mobile phones and GPS in a wider manner.

The need of the present situation demands a joint effort on the part of community organizations and the government as well to enhance the scope of fishing activities with these devices.

6. Impact of new Communication and Information Technologies on production

From the economic point of view, the end result of using any new method of production as a result of technological change is to increase a quantitative

change in production. It is an obvious fact that when fishing crafts and gears changed at crucial time, it definitely leads to increase in fish production. On the basis of these facts, it is interesting to examine the changes in fish production in the sample villages due to the application of mobile phones and GPS.

The table 6.6 and figure 6.6 shows impact of new Communication and Information Technologies on Fish Production.

Table 6.6

Impact of Technological Inputs (Mobile Phones and GPS) on Marine Fish Production

Place	Respondents (Disagrees)		Respondents (Agrees)		Total	
	Count	%	Count	%	Count	%
Eravipuram South	36	48.00	39	52.00	75	100
Eravipuram North	32	42.67	43	57.33	75	100
Pallithottam	28	37.33	47	62.67	75	100
Sakthikulangara	10	13.33	65	86.67	75	100
Total (out of 300)	**106**	**35.33**	**194**	**64.67**	**300**	**100**

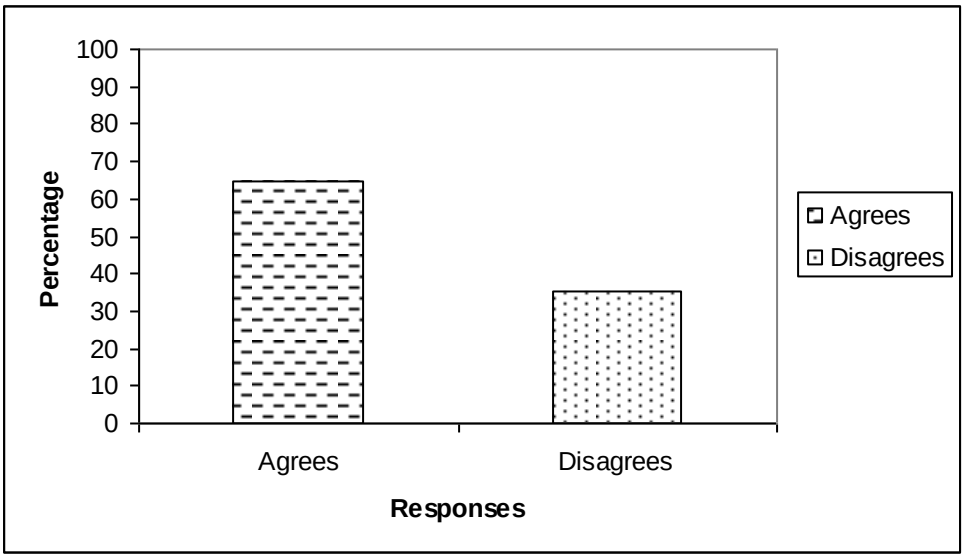
Source: Survey Data

Pearson Chi-Square : 23.0499903

Significance : 0.0000

Figure 6.6

Impact of Technological Inputs (Mobile Phones and GPS) on Marine Fish Production (Response rate)



The results show another success story of the impact of Communication and Information technologies on the 'production' side of the coastal villages in Kollam. The response rate from the survey points out that 64.67% considers an increase of fish production is due to their active usage of new communication parameters.

From the table 6.6 and figure 6.6, it is clear that in the four sample villages the results show uniqueness. But Sakthikulangara needs a special mention. In Sakthikulangara alone an 86.37% responds positively with respect to the correlation between usage of ICT devices and marine fish production. But in all the sample villages, 35.33% of the respondents states that Communication and Information technologies are not contributing to make positive changes in fish production.

7. Impact of communication technologies in changing profit margin

In the case of modern commercial activities, there are numerous objectives of firms in business apart from the traditional profit motive criteria. But earning maximum profits from business activity still remains the ultimate objective of firms and industries in general. Marine fisheries, as an industrial sector is exception with respect to profit motive. Adoption of new technological devices, always add greater productivity and the consequent increase in profit.

The table 6.7 and figure 6.7 display the impact of Communication and Information parameters on the profitability of fishing activities of the fish workers.

Table 6.7

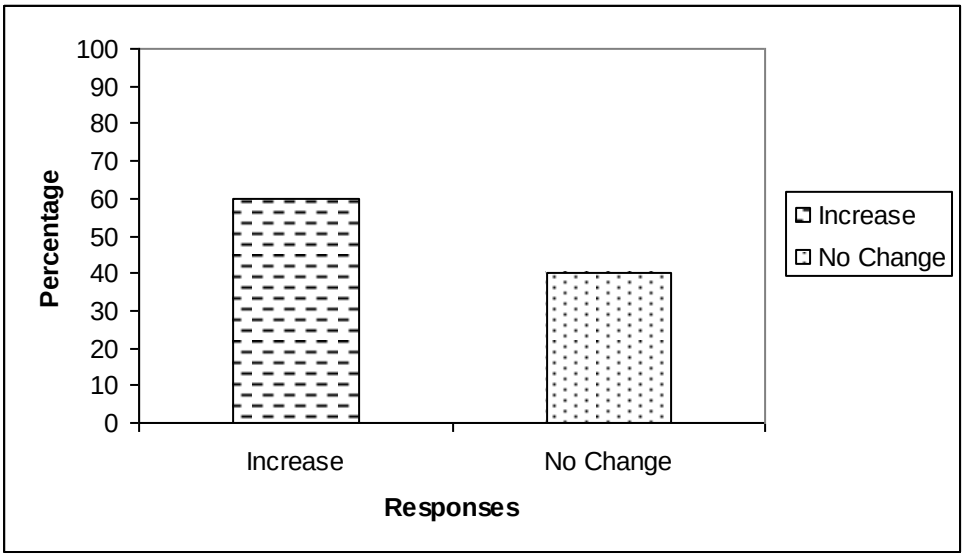
Impact of Information and Communication Technologies on Profit Margin

	Rating of Profit Margin					
Place	**Increase**		**Decrease**		**No Change**	
	Count	**%**	**Count**	**%**	**Count**	**%**
Eravipuram South	38	50.67	0	0	37	49.33
Eravipuram North	45	60.00	0	0	30	40.00
Pallithottam	36	48.00	0	0	39	52.00
Sakthikulangara	60	80.00	0	0	15	20.00
Total	**179**	**59.67**	0	0	**121**	**40.33**
Pearson Chi-square	**19.654647**					
Significance	**0.000**					

Source: Survey Data

Figure 6.7

Impact of Information and Communication Technologies on Profit Margin



The table 6.7 and figure 6.7 reveal that 59.67% fisher folk responds positively as they rate their profit margin with the adoption of Communication and Information gadgets. An obvious feature from the table 6.7 is that no one among the respondents believes that using the modern devices in fishing has reduced their profit margin. It is another piece of indication towards positive impact of new devices on fisheries in Kollam.

But a 40.33% of the fisher folk could not find a change in profit with the usage of new equipments. This response should address in a serious manner as there is a wider need to co-ordinate the chain of fishing activities with the right and proper adoption of Communication and Information devices among the fish workers in Kollam.

8. Impact of ICT gadgets on fish marketing

Marketing, another critical component of commercial fishing industry, can change the entire functioning of the system with proper price information and transparent supply chain. In the sample villages, the 60% of the respondents agree with the fact that use of Communication and Information gadgets led to a positive change in the marketing potentiality of the fish produce.

The table 6.8 and figure 6.8 show the impact of Communication and Information technologies on fish marketing.

Table 6.8

Impact of ICT gadgets in Fish Marketing (Response rate)

Place	Disagrees		Agrees		Total	
	Count	%	Count	%	Count	%
Eravipuram South	33	44.00	42	56.00	75	100
Eravipuram North	39	52.00	36	48.00	75	100
Pallithottam	36	48.00	39	52.00	75	100
Sakthikulangara	12	16.00	63	84.00	75	100
Total (out of 300)	**120**	**40.00**	**180**	**60.00**	**300**	**100**

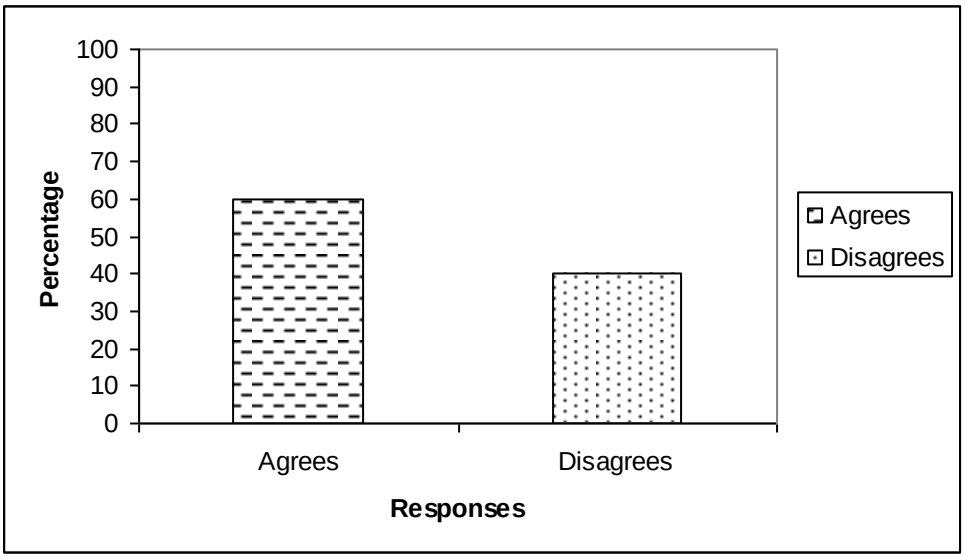
Source: Survey Data

Pearson Chi-Square : 25

Significance : 0.000

Figure 6.8

Impact of ICT gadgets in Fish Marketing (Response rate)



Unlike the marketing of other food products, fish marketing needs quicker, transparent and efficient mechanisms. The positive response in the survey regarding the impact of Information and Communication Technologies on fish marketing could be connected as the one vital cause of increase in profit margin of the fisher folk with the adoption of new devices.

But however, there should be ways and means to look into the negative response in the survey as the 40% of the respondents are opposed to the fact that new gadgets led to better potentialities of fish marketing. The suitable strategy lies in educating the fisher folk about the proper utilization of Information and Communication instruments in the marketing arena. It is the ideal rationale, as a majority response shows a positive impact of Information and Communication Technologies on fish production and profit margin. This could be connected with the marketing strategies too.

9. Use of IT systems in fishing activities

In making fisheries a sustainable economic unit, it should be always supported by a critical and better quality data of the complete fishing activities. Major IT systems like E-log books, On Board Data Integrator and E-commerce have its own valuable share in changing the complete fishing activities of a coastal region.

Expansion of fishing activities in the coastal villages of Kollam with Communication and Information technologies like E-log books or E-commerce still have to get its acceptance from the fisher clan. This is evident from the table 6.9.

Table 6.9

IT Systems in Fishing Activities

Place	IT Systems					
	E-log book		E-commerce		On Board Data Integrator	
	Count	%	Count	%	Count	%
Eravipuram South	0	0	0	0	0	0
Eravipuram North	0	0	0	0	0	0
Pallithottam	0	0	0	0	0	0
Sakthikulangara	4	5.3	4	5.3	4	5.3

Source: Survey Data

In the survey that, 100% of the fisher folk of the three sample villages of Eravipuram South and North and Pallithottam responded in a negative way

with respect to E-commerce, E-log books and On Board data Integrator. While in Sakthikulangara alone, there is a slight change in this direction.

The suitable strategy is to change the situation with computer literacy programmes to the fisher folk. In a cent percentage literate state like Kerala, it is not at all a big task. But the difficult part is changing the life pattern of a vulnerable section even though they are accustomed to GPS and other devices. The main challenge lies in getting support from communities in accessing technologies in livelihood measures.

10. Impact of Communication and Information technologies on the social status of fish community

The digital divide in the economy of Kerala, as a result of the revolution in Communication and Information technologies produce a class section in the society with the Marxian terminology of the 'Haves' and the 'Have nots" . Access with new technological utensils is always marked as an improvement in social status in every part of the world. With the new servers in economic activities, fisher folk in the coastal villages of Kollam become a new section in the existing class bifurcation.

The rise in social status of a community due to economic factors is quite a note worthy aspect of socio-economic development.

The table 6.10 and figure 6.9 showcase the impact of Information and Communication Technology devices on the social position of the coastal fisher folk in Kollam.

Table 6.10

Impact of Information and Communication Technology devices on Social status of fishermen

Place	Disagrees		Agrees		Total	
	Count	%	Count	%	Count	%
Eravipuram South	42	56.00	33	44.00	75	100
Eravipuram North	38	50.67	37	49.33	75	100
Pallithottam	34	45.33	41	54.67	75	100
Sakthikulangara	8	10.67	67	89.33	75	100
Total (out of 300)	**122**	**40.67**	**178**	**59.33**	**300**	**100**

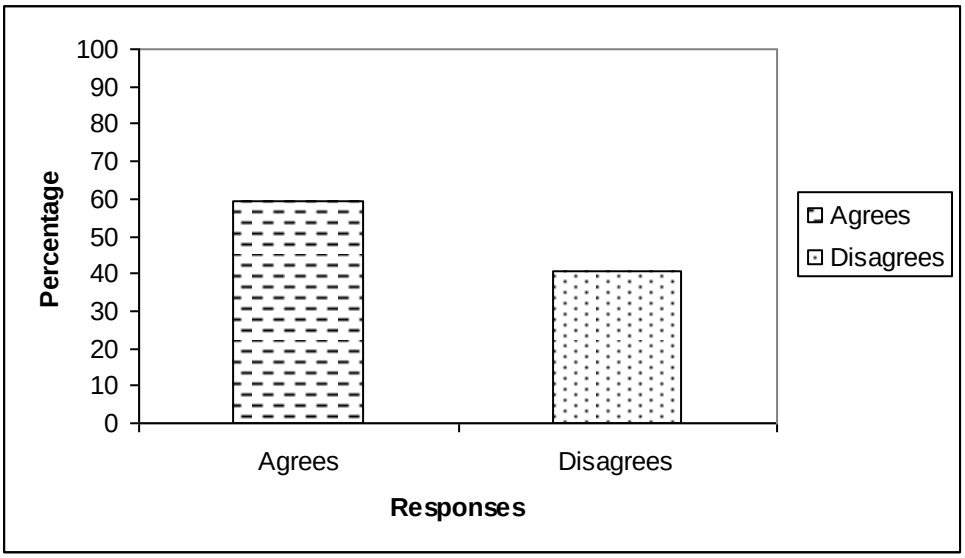
Source: Survey Data

Pearson Chi-Square : 39.0679683

Significance : 0.000

Figure 6.9

Impact of Information and Communication Technology devices on Social status of fishermen



It is evident from the table 6.10 and figure 6.9 that a 59.33 % in the survey feels better off in their social status by the use of new devices in fishing

activities. Although, a 40.67% of the respondents do not agree with this view, the positive response is significant in many ways.

Finally, the new development is bringing forward the fishing community into lime light along with future prospects of making fishing industry in Kollam a sustainable fishing unit.

II Socio- Economic profile of fisher folk in the coastal villages of Kollam

The second part of the analysis of the data on the coastal villages of Kollam centers on its socio-economic set up. This section is important in the sense; it provides a valuable tool to formulate strategies for the future expansion of Information and Communication Technologies in fisheries.

The profile of the socio-economic status of the fishing communities in the nine maritime districts of the coastal belt of Kerala depicts a picture of diversity. In a nut shell the general picture of fishing communities in Kerala, exhibits their extreme pathetic living conditions. They always come in the lowest ladder of Kerala society with poor educational status and lack of basic livelihood facilities. The fisher folk are alienated from the mainstream society due to the low level of literacy and undignified mannerisms. Climatic changes and the lack of employment opportunities add more severity to their problems.

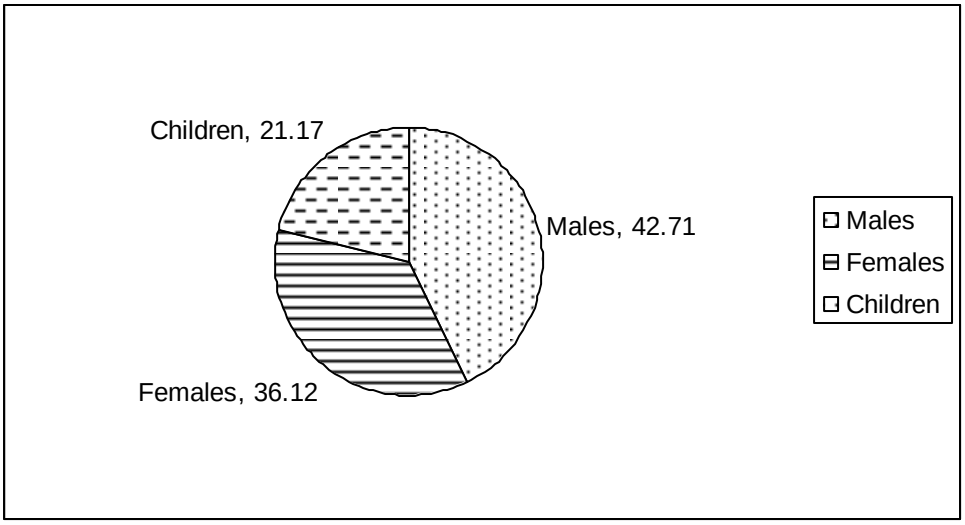
But there are certain peculiar similarities, which are distinctive in nature in the fishing villages, throughout the Kollam belt. It is indeed interesting, at the same time a difficult task to bring into central stage the socio-economic characteristic features existing in the coastal region of the district.

Fishing is a keen livelihood activity in the economy of Kollam. The inter play of several factors like geographical, cultural and economic factors has its own share in making this activity to turn on as contributor in the nation's foreign exchange earnings. The coastal villages of Kollam carries a total of 10, 2057 marine fishing population which comprises 43,588 males, 36,864 females and 21,605 children (Economic Review, 2010)

The figure 6.10 shows the total composition of marine fisher folk in the coastal villages of the district.

Figure 6.10

Marine fisher folk composition in Kollam



Source: Economic Review (2010)

By presenting the composition of coastal population in figure 6.10, the story here unfolds around by investigating the socio-economic condition existing in the four sample fishing villages.

1. AGE COMPOSITION

Broadly speaking, age composition of a population is an important indicator to understand the future of an economy and at the same time one could analyze the characteristic features of a nation in a more particular manner. Usually, on the basis of age, the population is divided into three groups. They are:

(1) Children belonging to the age group 1 – 14

(2) Adults in the age group15 – 55

(3) Elderly people aged 55 and above

If children are more in the population, it implies that the productive capacity in the economy is low. On the other hand more adults in the population could result in the high productive capacity of the economy. At the same time there has been twin contrasting opinions regarding the aged population. One positive opinion is that it is an indication of higher life expectancy. The pessimistic view is that more aged population is really a burden because just like children they are simple consumers. Also they have less productive capacity and have various emotional and social problems connected with advancing age.

With this economic interpretation table 6.11 and figure 6.11 show age composition of respondents in sample villages.

Table 6.11

Age Composition (in %)

Age Group	Eravi-puram South	Eravi-puram North	Palli-thottam	Sakthi-kulangara	Total
0 – 4	1.4	6.7	1.4	3.3	**2.4**
5 – 9	5.4	7	5.2	8.0	**6.2**
10 - 14	8.3	9	7.1	10.2	**8.6**
15 – 19	7.9	11	9.0	8.1	**8.3**
20 – 54	65.8	63.0	64.0	60.8	**63.5**
55+	6.1	10.4	13.1	9.6	**11.0**

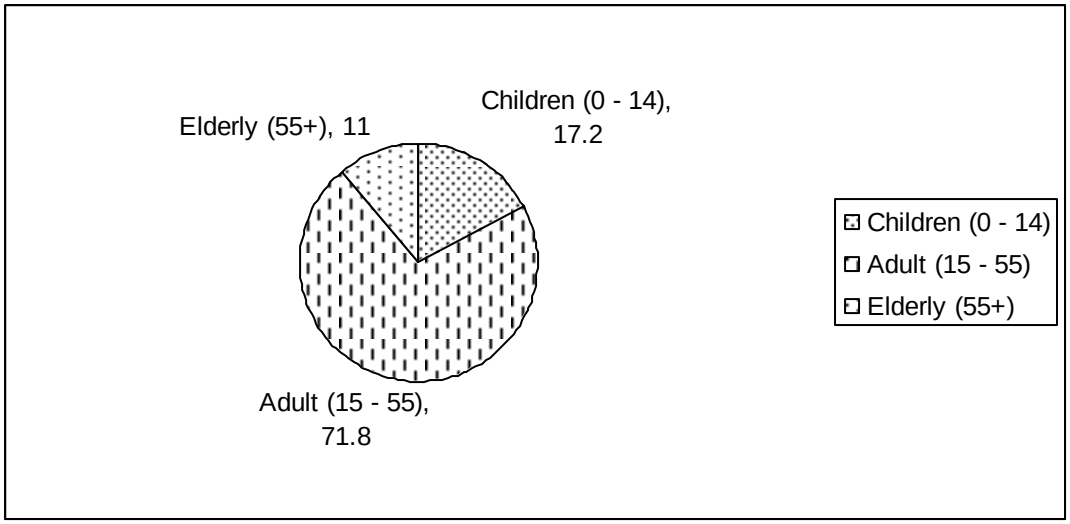
Source: Surveyed data

Pearsons Chi square : 29.824

Significance : 0.013

Figure 6.11

Pie Diagram showing Age Composition of Marine Fishing families



The table 6.11 and figure 6.11 reveal clearly some of the characteristic traits of age composition of marine population.

The dependency burden of the marine fisher folk is rather low as far as Kollam district is concerned. Children belonging to the age group 0 – 14 is 17.2% and the next extreme category that is the aged population constitutes 11.0%. The so-called productive age group 'the adults' dominate the households which comprises 71.8%. This huge labor force in the marine coastal villages is an asset to the economy and could indeed contribute to fish production and diversification of economic activities.

2. EDUCATIONAL STATUS

Literacy and education

Literacy and education are the shining stars in Kerala's great path towards social development. Literacy is a valuable component of human development because it enlarges people's livelihoods and positive actions, there by influences the ability to gain access into Communication and Information parameters to manage change. As far as fishing communities are concerned literacy, is an integral to the livelihood of many small scale fishing communities. It's positive leverages can be felt in every aspect of fishing, whether on shore or off shore activities.

Kerala occupies an outstanding position among Indian states with respect to literacy rates of 91.98% (Census, 2011)[1]. Marine Fisheries Census (2005) indicates that 27.2% of the fishermen population has no formal education which includes the illiterates also.

The survey data provides a good comparison with the literacy rates in all the coastal villages of Kerala. Compared to the macro level, where 78 % literacy in 222 coastal villages of Kerala, the sample villages show the sparking side of the social development that came out as a result of social and religious factors. The surveyed data indicates that illiteracy prevailing among coastal communities is 8.8%. To be more precise, it is 10.3% in Eravipuram south, 8.9% in Eravipuram north and 8.3% and 7.3% in Pallithottam respectively.

From a social point of view, literacy promotes effective social participation, there by influences people's rights to embrace the positive changes that come in the way. Ultimately, this march towards reducing the social marginalization and vulnerability of the total communities (FAO, 2006).

Education is an important yardstick to measure the social progress of any community. It has done wonders to Kerala state, which later became the corner stone of the so called Kerala Model of Development. A general perception as well as a hard reality is that fishing communities often suffer from educational disadvantages due to geographical and social

[1] Provisional Population tables – Census, 2011

marginalization. Neglect by the community organizations and government at various times in the past caused serious educational disadvantages among the coastal population in Kerala.

The table 6.12 and figure 6.12 presents the educational status of marine fishermen population in the sample villages.

Table 6.12

Educational status of marine fisher folk in Kollam (%)

Education	Eravipuram South	Eravipuram North	Pallithottam	Sakthikulangara	Total
Illiterates	10.3	8.9	8.3	7.3	**8.8**
Primary	44.4	45.9	51.7	35.0	**43.0**
High School	32.5	33.3	31.4	43.2	**35.7**
College	12.7	11.9	8.6	14.5	**12.3**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

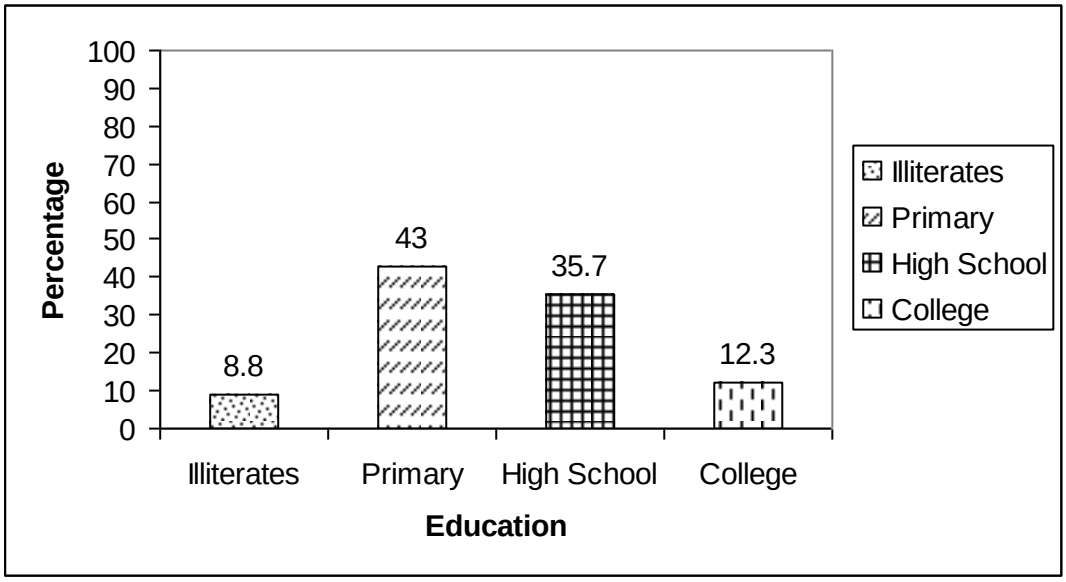
Source: Surveyed data

Pearsons Chi square : 42.074

Significance : 0.000

Figure 6.12

Educational status of marine fisher folk in Kollam (%)



The result indicates the educational status of fishermen in primary, secondary and college levels. It is evident from the table 6.12 that, those who have primary education is 43% and a 35.7% of the population went further with high school education. A small minority of 12.3% gets the opportunity to enlarge their educational status with university education. If all the fishing villages of Kerala coast are taken for analysis the trend shows those who have primary education is 39.08%, fisher folk with secondary educational status is 49.85% and those who come above the secondary level shows 11.05%.

The aggregate percentage in the survey is synonymous, as the separate assessment of the four fishing villages are displaying similarities in the level of education. Although majority of respondents in the survey have only primary level of education, the over all situations is not disappointing. As literacy is the

most important connectivity factor for the adoption of communication and information technologies.

Literacy and Educational levels with the age of 15+ populations

From a broader point of view, economically productive age group (15 – 55 years) creates wealth in an economy. In this regard, education is an accelerating component in economic activities of productive age group in the population. This general observation is applicable in the field of fisheries too.

The study reveals various aspects of education among 15 + age group in the coastal community in the sample villages which are represented in tables 6.13, 6.14 and 6.15 and figure 6.13.

Even in backward communities like the fishing clan, economically active age group (15+ age population) with good educational status can make the whole operational activities more productive and efficient. The table 6.13 represents the educational status among the 15+ age group of fishing communities in sample villages.

Table 6.13

Educational status of 15 + age group population in sample villages

Education	Percentage
Illiterates	8.56
Primary	37.83
High School	39.36
College	14.25

Source: Surveyed data

The findings reveal that the number of illiterates among 15 + age group population is less with a percentage of 8.5, significant majority in the survey have high school and primary level education with 39.36% and 37.83% respectively. Among this target group, those who have college education are only 14.25%.

The table 6.14 show the educational position among various groups in 15+ age group population.

Table 6.14

Educational position of 15 + age group population in the sample villages

Age group	Illiterates	Primary	High School	College	Total
15-19	0.0	1.9	62.8	35.3	100.0
20-54	5.7	39.3	41.1	41.1	100.0
55+	31.3	56.3	11.5	1.0	100.0
Total	**8.5**	**37.83**	**39.36**	**14.25**	**100.0**

Source: Surveyed data

The observation from the table 6.14 reveals that among the 15 – 19 age group, they are 100% literates. Illiteracy is more prevalent among 55+ age group. The younger generation in the survey has got better educational standard compared to the 55+ age group.

The relevance of better educational standard among the 15+ age group of fishermen community can interpret in two ways.

1. They can become leading agents to promote higher economic growth.

2. They can easily follow and introduce new Communication and Information technologies in their operational activities.

In this context, it is imperative to make an analysis of the causes that led to the abstinence from school among 15+ age group respondents. The table 6.15 and figure 6.13 illustrate this point.

Table 6.15

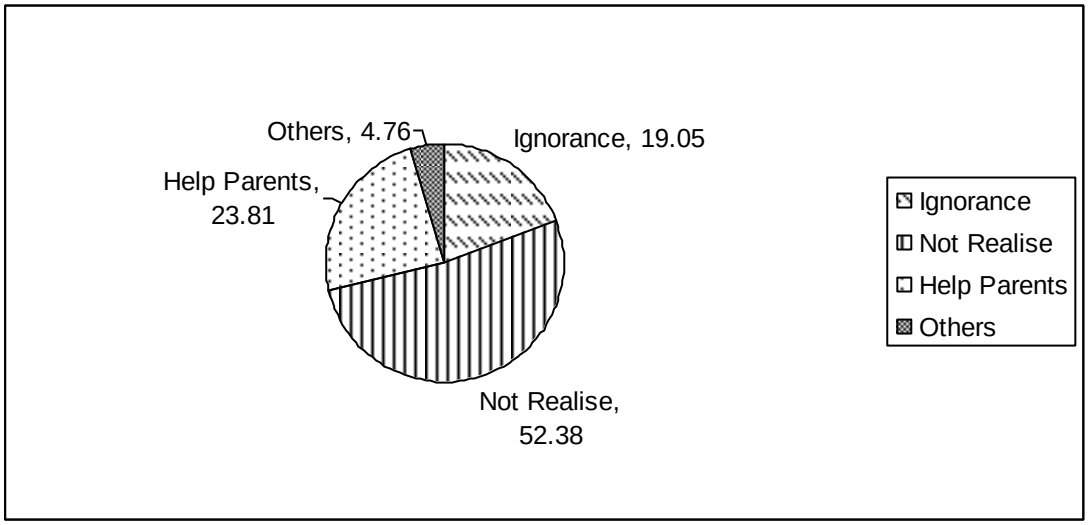
Reasons for not joining the school by the respondents of 15 years of age

Reason	Eravipuram South	Eravipuram North	Pallithottam	Sakthikulangara	Total
Ignorance	16.67	0.0	100.0	0.0	19.05
Not Realize	75.0	0.0	0.0	28.57	52.38
Earn living	0.0	0.0	0.0	0.0	0.0
Help Parents	8.3	0.0	0.0	57.14	23.81
Care Younger	0.0	0.0	0.0	0.0	0.0
Others	0.0	0.0	0.0	14.29	4.76

Source: Survey Data

Figure 6.13

Reasons for not joining the school by the respondents of 15 years of age



The table 6.15 and figure 6.13 illustrate the typical traits of a vulnerable group. A crucial 52.38% of the respondents cannot realize the significance of joining school and continuing their studies. Although the reasons for not joining the school vary in the four fishing villages, factors like ignorance and to help parents are the prime reasons.

Problem of drop outs

The problem of drop out is a menace in the development of school education. Students enrolled in the primary level of education, leave the school before completing that level, is generally termed as drop out. The general factors which contribute to this situation are poverty, gender discrimination, seasonality of jobs etc. In Kerala the problem of drop outs has been reduced

considerably, thanks to the pioneering efforts of many religious and social organizations.

In the sample villages, among the respondents 43% of them are primary drop outs. In the 15 + age group it is 37.83%. Financial difficulties and illiteracy among the parents are regarded as the major factors which compelled them to discontinue the studies and leave their school.

The table 6.16 and figure 6.14 show the causes that led to leave the school and discontinue the studies among the drop outs.

Table 6.16

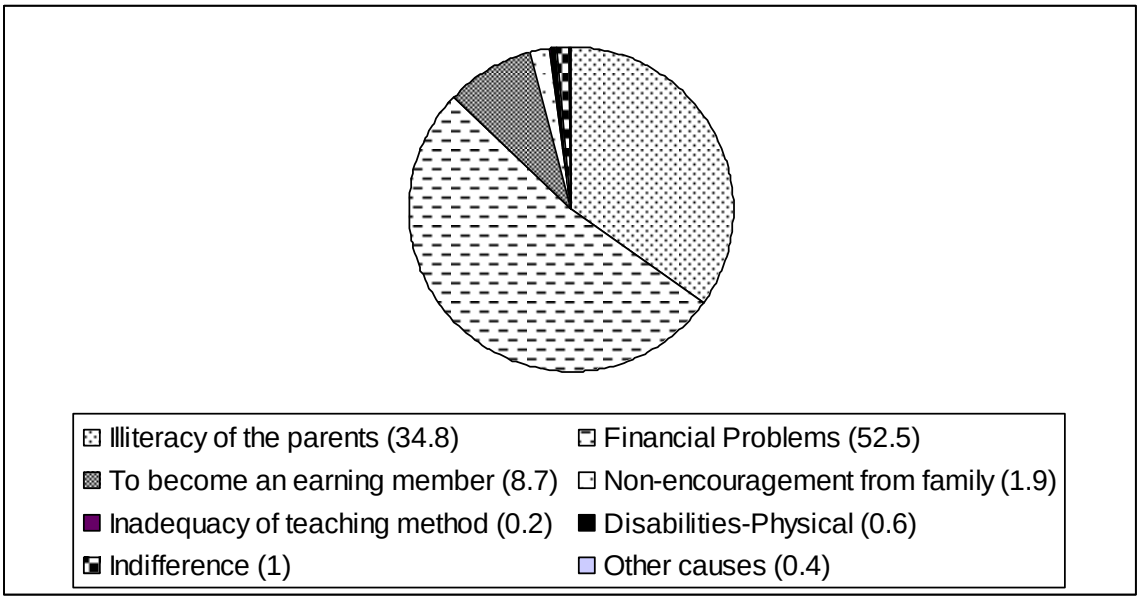
Reasons for School Drop outs (%)

Reasons	Eravi-puram North	Eravi-puram South	Palli-thottam	Sakthi-kulangara	Total
Illiteracy of the parents	26.3	24.1	48.7	43.7	34.8
Financial Problems	54.4	56.6	50.0	44.8	52.5
To become an earning member	14.0	15.4	0	3.4	8.7
Non-encouragement from family	0	1.3	0	8.0	1.9
Inadequacy of teaching method	1.8	0	0	0	0.2
Disabilities-Physical	0	0.4	1.3	0	0.6
Indifference	3.5	1.3	0	0	1.0
Other causes	0	0.9	0	0	0.4
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

Figure 6.14

Pie diagram showing reasons for school drop outs



Evident from the table 6.16 and figure 6.14 that in all the fishing villages financial burden in the families stands in the way of continuing education. But the findings also show that even after discontinuing the studies only 8.7% become earning members. Proper rehabilitation of the drop outs and the measures to avoid this trend are essential to over come this problem.

3. OCCUPATIONAL PROFILE

Fishing is one of the serious and sometimes the 'risk' involved occupation. Despite this fact, younger generations in many fisher men house holds follow this as their main occupation. The expansion of service sector in Kerala in the past two decades open the way for new jobs and the younger clan in fisher men communities too embrace the fresh opportunities.

The table 6.17 shows the occupational profile fishermen in the sample villages.

Table 6.17

Occupational Profile (%)

Type of occupation	Eravipuram North	Eravipuram South	Palli-thottam	Sakthi-kulangara	Total
Fishing	88.6	95.2	89.7	85.6	92.6
Fish Vending	6.3	0.5	4.9	6.3	3.8
Head load worker	0	0	0	0	0
Small business	0	0	0	0	0
Domestic servant	3.8	1.0	0.4	0	0.8
Govt. Servant	0.6	0	0	0	0.1
Automobile worker	0	0.4	0.4	0	0.3
Private non Govt. worker	0.6	2.2	0.2	0.2	1.0
Self employed	0	0.3	1.8	0.3	0.6
Agriculture	0	0	0	0	0
Others	0	0.3	2	0.3	0.6
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

The most noteworthy factor from the table 6.17 is the great dependency of the fisher men community on active fishing as their prime occupation. The 92.6% of the fisher folk depends on fishing alone. It is a matter of great significance with respect to the selected sample villages. Another notable aspect of the

study is that for the majority 98.02 %, fishing is their permanent occupation. The table 6.18 and figure 6.15 illustrate the nature of occupation in the sample fishing villages.

Table 6.18

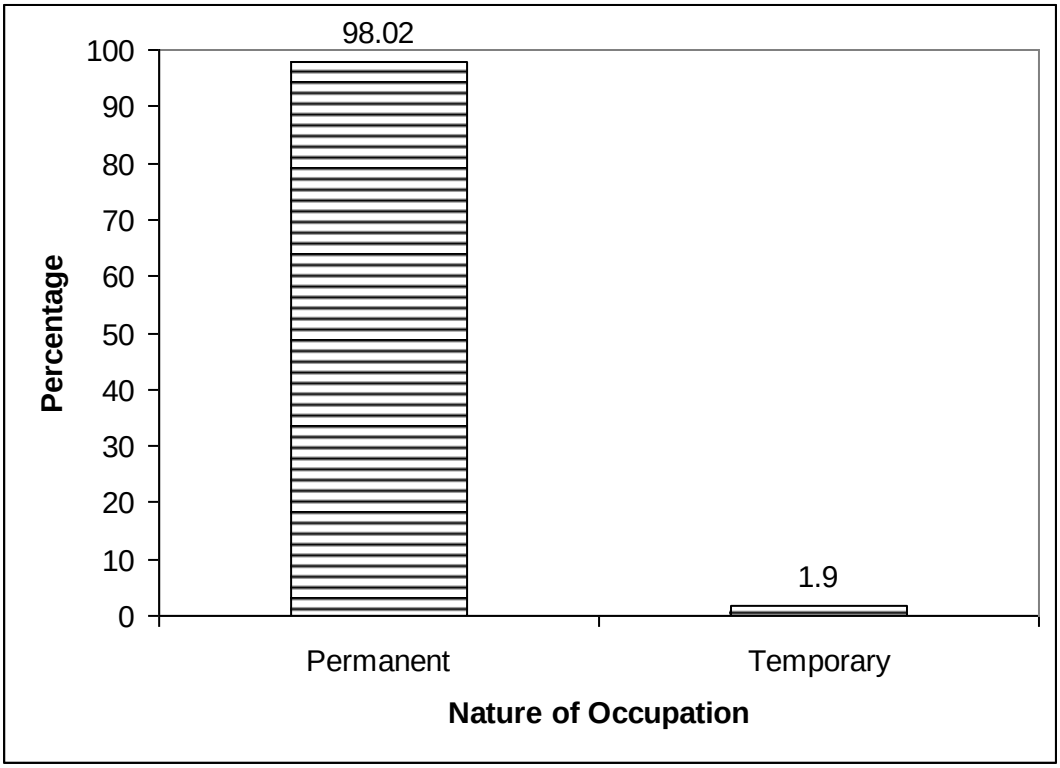
Nature of Occupation (in %)

Nature of occupation	Eravipuram North	Eravipuram South	Palli-thottam	Sakthi-kulangara	Total
Permanent	100	100	96.8	96.08	**98.02**
Temporary	0	0	3.1	3.9	**1.9**
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

Figure 6.15

Nature of Occupation



The solid establishment of fishing as a permanent occupation of the fish workers can be identified from the table 6.18 and figure 6.15. The dependency of fish workers to fishing as their prime vocation force the need to focus on the long term strategies for sustainable fisheries.

(a) Employment Status

The employment potentiality in the marine fisheries sector both at the national and state levels depend on hiring more fish workers to the field. In the Kerala scenario, it is possible only with the expansion of fisheries and allied activities. The character of fish employment in the coastal villages of Kollam is shown in the table 6.19 and figure 6.17.

Table 6.19

Employment Status

Employment Status	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Doing Self	12.73	12.12	38.0	60.4	**34.23**
Employ people	78.79	84.85	58.0	15.44	**53.47**
NR	8.48	3.03	4.0	24.16	**12.30**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Surveyed data

Figure 6.16

Bar Diagram showing Employment Status

The table 6.19 and figure 6.16 reveal the fact that among the marine fisher folk, 34.23% are engaged in their activities by their own efforts. On the other hand, 53.47% employs or hires other workers (fisher folk) in order to carry out different duties related to fishing occupation. It is really an indication of the extra income the marine fisher folk are earning by employing more labor force and at the same time it also shows development which has taken place in this sector for several years.

(b) Fishing Status

For the coastal population in general, fishing happens to be the ultimate livelihood provider. From a macro pint of view, fishing as a means of livelihood can be interpreted in many ways. The general linking of fishing as a livelihood option is that it leads to economic growth of Kerala economy. At the same time any livelihood activities (here it is fishing) can lead to generation of

more income and gives an opportunity for labourers working in the sector to move upward in the socio-economic ladder.

The table 6.20 and figure 6.17 show the status of fishing in the sample coastal villages of Kollam.

Table 6.20

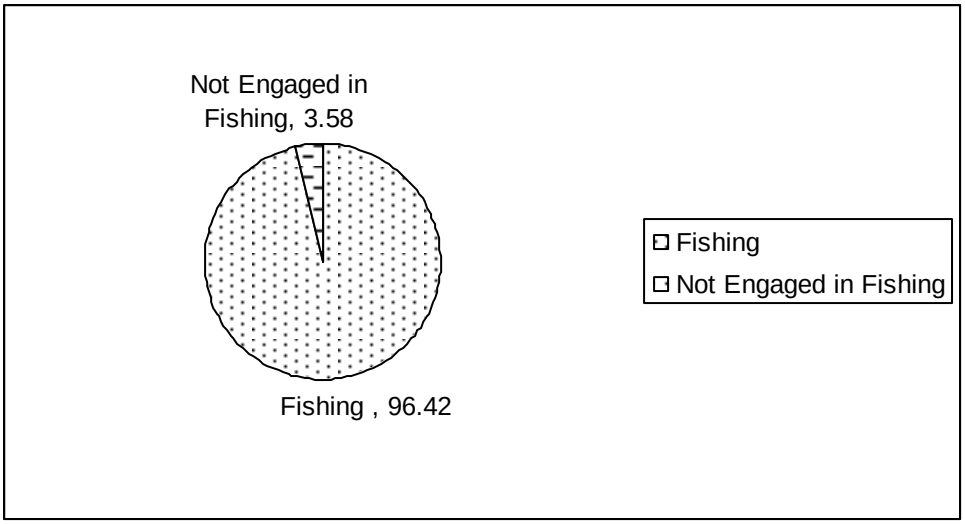
Fishing Status (in %)

Fishing Status	Eravipuram South	Eravipuram North	Pallithottam	Sakthi-kulangara	Total
Fishing	92.73	100	99.0	97.89	**96.42**
Not Engaged in Fishing	7.27	0.00	1.0	2.01	**3.58**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Surveyed data

Figure 6.17

Pie Diagram showing Fishing Status



The table 6.20 and figure 6.17 clearly point out that the major occupation of marine fishermen households is active fishing in all fishing villages. In fact the standard of living and employment opportunities of fishermen depend on their occupation. About 96.42% of the marine fishermen of the Kollam coastal villages depend upon fishing and allied activities for their livelihood and survival. Although fisher folk not engaged in fishing in this area is only a meager 3.58%, it tells a growing inclination of marine fisher folk towards other areas of working.

(c) Ownership of Fishing Equipments

The fish workers who possess fishing equipments engaged in fishing lead a comfortable and better style of living. With the radical mechanization process in the marine fishing industry of Kerala, there has been a change in the ownership of fishing equipments. On the one side, fishers became the owners of modern crafts, gears and other vessels, while on the other hand, vulnerable community began to depend on others to hire fishing equipments to make possible their chief occupation a day to day one.

The table 6.21 shows the ownership of fishing equipments in the sample coastal villages of Kollam.

Table 6.21

Ownership of fishing equipments (in %)

Status of Ownership	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Owners	12.0	9.9	11.0	14.1	**12.3**
Others	88.0	90.1	89.0	85.9	**87.7**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Survey data

The surveyed data indicates that a 12.3 % of the fisher folk in Kollam own fishing equipments. A significant 87.3 % hires the fishing equipments to carry out their livelihood activities. The coastal fisher folk in Kerala, even after the tremendous transformations in their livelihood matters, still shows its peripheral nature.

(d) Fish Vending

For the coastal villages through out Kerala, fish vending is supposed to be a traditional activity. Generally fish vendors can be broadly classified in to three (ICSF, 2010). This division is done on the basis of the traits of vendors and the vending process.

They are:

1. Stationary vendors who vend on a regular basis at specific locations*.
2. Peripatetic vendors who walk from place to place to sell their fish**.
3. Mobile vendors who move around on bicycles or motorized vehicles***.

A particular aspect related to fish vending in Kerala is that women constitute the major section of fish vendors in Kerala. Another crucial feature of fish vending activities in Kerala coast is that modern communication parameters like mobile phones added a new dimension in vend profit.

The table 6.22 and figure 6.18 show the fish vending status prevailing in the selected villages.

Table 6.22

Fish Vending status (in %)

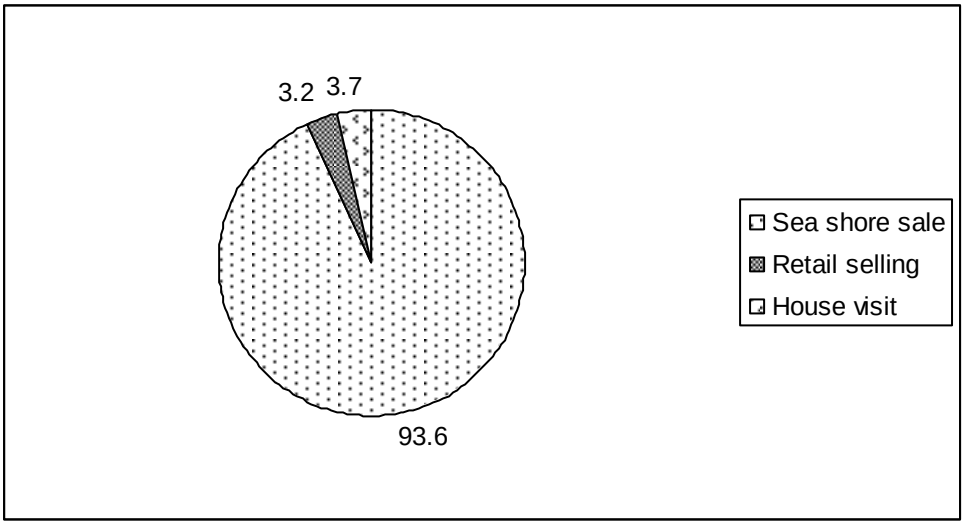
Fish vending areas	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Sea shore sale	98.6	100.0	42.9	79.2	**93.6**
Retail selling	1.3	0.0	14.2	12.5	**3.2**
House visit	0.0	0.0	42.9	8.3	**3.7**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Survey data

*,**,*** Women fish vendors in India: An information booklet ICSF (2010)

Figure 6.18

Pie diagram showing Fish vending status



The survey shows that a 93.6 % of the fish vending takes place at the sea shore. It is almost uniform in the fishing villages Eravipuram South and North where they represent 98.6% and 100% respectively. In Sakthikulangara and Pallithottam fishing villages, fish vending measures include sea shore selling, retail selling and house visit.

The basic objective in fish vending activities is certainly to acquire maximum profit. The findings show that in selected fishing villages 81.5% of the fish vendors gets profit. But the results also indicate that in Pallithottam and Sakthikulangara fishing villages the fish vending profits are less compared to the other two sample villages. The table 6.23 and figure 6.19 show the profit from fish vending activities.

Table 6.23

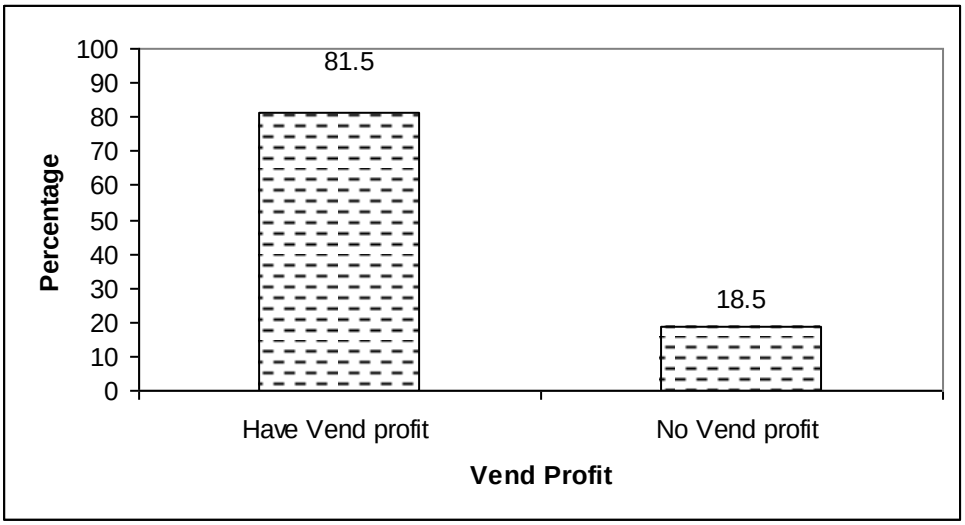
Vend Profit

Vend Profit	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Have Vend profit	92.5	87.1	50.0	25.0	**81.5**
No Vend profit	7.5	12.9	50.0	75.0	**18.5**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Survey data

Figure 6.19

Bar diagram showing Vend Profit



The results show a good number in the survey responds positive about getting vend profit. In many other regions of Kerala coast, fish vendors face severe problem which affects the profitability of fish trade. The factors resulted in the sizeable profit from fish vending points out that there is market mechanism in the sample villages.

(e) Alternate Employment Status

There are several constraints which stand in the way of becoming fishing as a sustainable occupation. In the Kerala domain, organizations as well as policy makers stress the need for alternate employment opportunities in marine fisheries. The question of alternate employment arises due to monsoon trawl ban, volatility in income from fishing and above all the seasonal nature of job. The table 6.24 and figure 6.20 show the alternate employment status in the selected coastal villages

Table 6.24

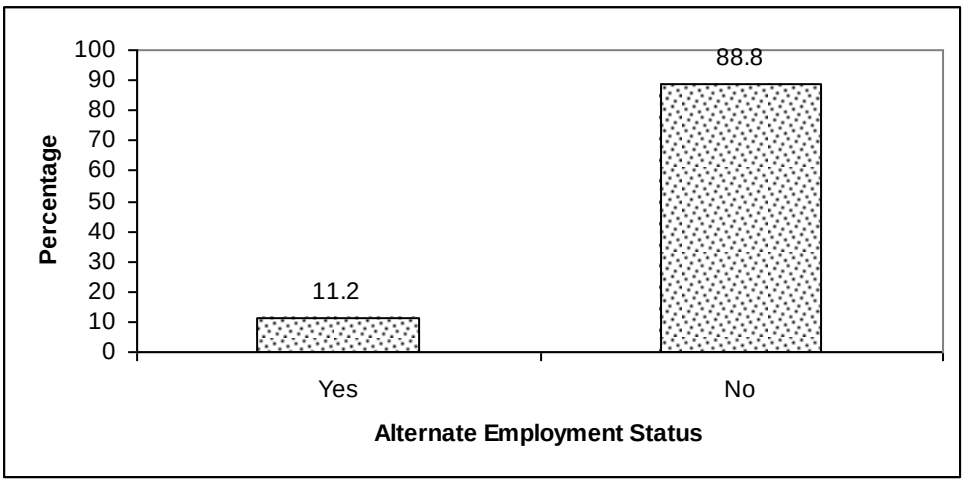
Alternate Employment Status (in %)

Alternate Employment Status (Response rate)	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Yes	15.2	9.1	0.0	14.8	**11.2**
No	84.8	90.9	100.0	85.2	**88.8**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Survey data

Figure 6.20

Bar diagram showing Alternate Employment Status



The results show that a huge 88.8% of the respondents have no alternate employment at all in all seasons. Those who are having alternate employment during off season is 11.2%. As one cannot change the seasonality element involved in this occupation, results from the sample villages show a matter of serious concern.

The survey also made enquires regarding the opinion of the fisher folk about alternate employment opportunities to be provided. A 54.0% responds positively about alternate employment opportunities for sustainable income generation from their occupation. An 18.0% of the respondents are of view of doing part time jobs along with their main occupation, fishing. Another fact which emerges from the result is that a 28.0% agrees for enlarging female employment opportunities.

The table 6.25 shows the opinion of the respondents in the sample villages about alternate employment.

Table 6.25

Response rate of the opinion on Alternate Employment Opportunities (in %)

Alternate employment Status	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Alt. Employment (supports)	80.0	66.7	0.0	22.7	**54.0**
Part time jobs	20.0	33.3	0.0	13.6	**18.0**
Female employment	0.0	0.0	0.0	63.7	**28.0**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Survey data

The result is an indication towards the need for brining alternate employment opportunities. New communication and informative technologies can utilize in its full potential to find ways and means to go for alternate employment opportunities in the district.

(f) Daily wages status

Fishing is a livelihood activity among the seasonal jobs in the primary sector. Fish workers can earn money by engaging themselves on a daily basis. From a social point of view, earning income on a daily basis is highly unstable for a secured living in future, which affects the quality of life of the people. But from the economic point of view, daily earnings reduce the capacity to save. The fact remains is that fish workers have no other option, but to depend on

their daily wages. The daily wages status of dish workers in Kollam is shown in the table 6.26.

Table 6.26

Daily wages status

Daily wages(Rs.)	Eravipuram South	Eravipuram North	Pallithottam	Sakthikulangara
<=250	59.3	56.4	52.8	19.2
250-500	35.9	37.2	40.7	57.1
>500	4.8	6.4	6.5	23.7

Source: Survey Data

The table 6.26 shows that majority of the respondents in the three sample villages of Eravipuram South, Eravipuram North and Pallithottam have daily wages less than or equal to Rs.250. Another notable fact from the survey is that in Sakthikulangara a 57.1% of the respondents have Rs.250 – 500 per day as their earnings. But the most important aspect here is that figures may be the same all through the year due to seasonality, ban on trawling etc.

(g) Income from 'other sources' to fisher men households

In the four sample villages, the survey finds that most of the fishermen families have no other sources of income. The biggest income generator activity is definitely fishing and fish related works. It is evident from the table 6.27.

Table 6.27

Other sources of Income (in %)

Other sources of Income	Eravipuram North	Eravipuram South	Palli-thottam	Sakthi-kulangara	Total
NO	100	99.4	97.0	98.7	**98.7**
YES	0	0.6	3.0	1.8	**1.3**
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

The evidence from the table 6.27 shows that 98.7 % of the families have no other sources of income while only 1.3 % of the respondents state that they have other sources of income apart from their occupation. The other sources of income include income provided by children, pension, educational concessions and charity.

All the occupation related facts evolved from the survey result stress the need to formulate a systematic and sustainable development strategy for the coastal community in Kollam. Despite the various challenges in their employment scenario, the fish workers make a sincere effort in generating reasonable returns for their survival.

4. EXPENDITURE PROFILE

The economy of Kerala since the latter part of the 20th century especially after 1990's is witnessing the display of typical consumer patterns of spending. In many advanced economies when a nation grows economically, consumer's

share of money spend on food and non-food items changes. This is obvious in the case of a society like Kerala.

In fact, in the coastal villages of Kerala, daily earnings of the fish workers determine their expenditure patterns on food and non food items. But apart from income other factors like total persons in the households, tastes and preferences too influence the spending and consumption patterns.

The table 6.28 and figure 6.21 illustrate the monthly expenditure on food items in the sample villages.

Table 6.28

Monthly expenditure for food items

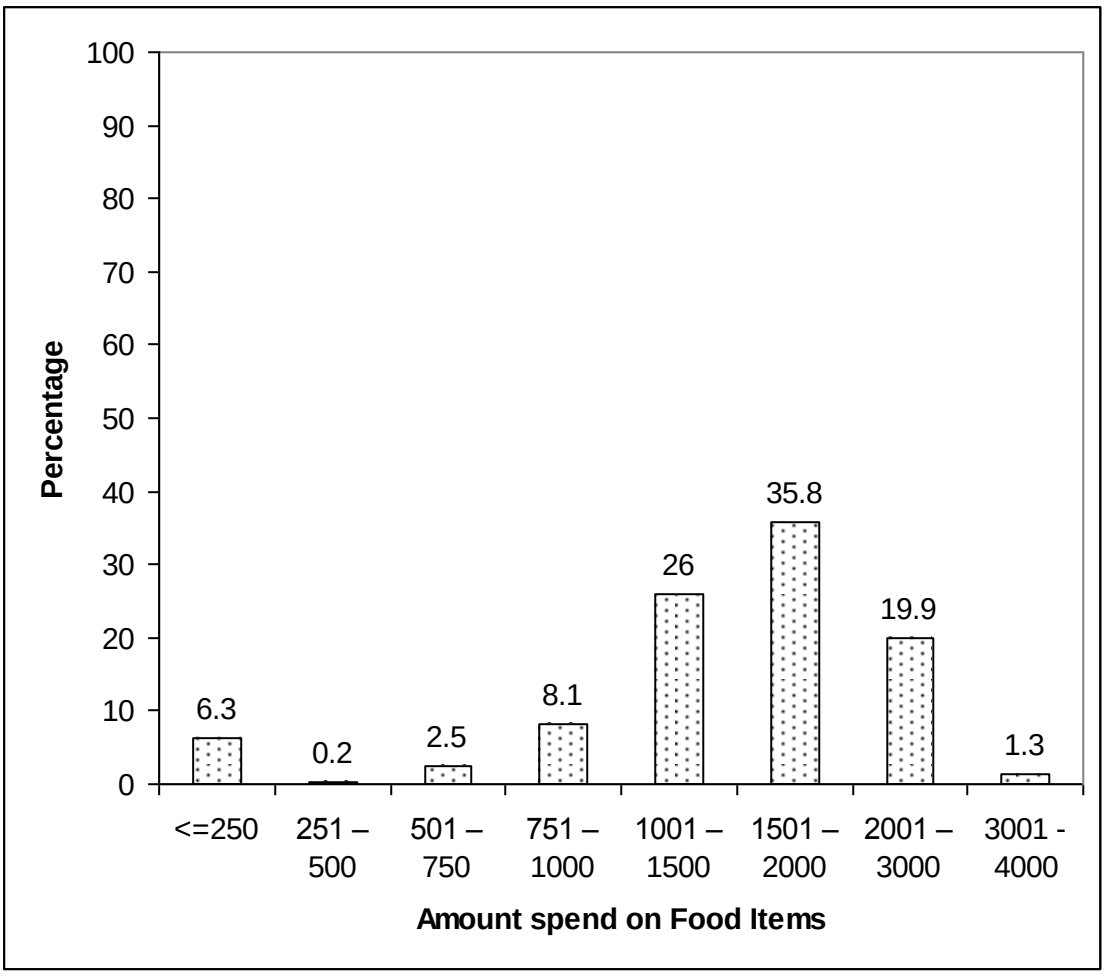
Monthly expenditure for food items (in Rs.)	Eravipuram North	Eravipuram South	Palli-thottam	Sakthi-kulangara	Total
<=250	0	15.8	1.0	0.7	**6.3**
251 – 500	0	0	1.0	0	**0.2**
501 – 750	0	0.6	6.0	2.7	**2.5**
751 – 1000	3.0	1.2	17.0	10.7	**8.1**
1001 – 1500	18.2	15.8	40.0	29.5	**26.0**
1501 – 2000	39.4	38.8	27.0	37.6	**35.8**
2001 – 3000	33.3	27.3	6.0	18.1	**19.9**
3001 - 4000	6.1	0.6	2.0	0.7	**1.3**
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

Pearson Chi square : 114.216

Figure 6.21

Monthly expenditure for food items



The survey shows that a 35.8% of the respondents spend an amount worth Rs.1501 – 2000 per month on food items in the sample villages. But the notable point is that the monthly expenditure on food items changes during off seasons and other critical periods of time.

A comparison between expenditure on food items and non-food items shows that the money spend on both appears to be in a similar pattern. This is revealed from the table 6.29 and figure 6.22.

Table 6.29

Monthly expenditure for non food items (in %)

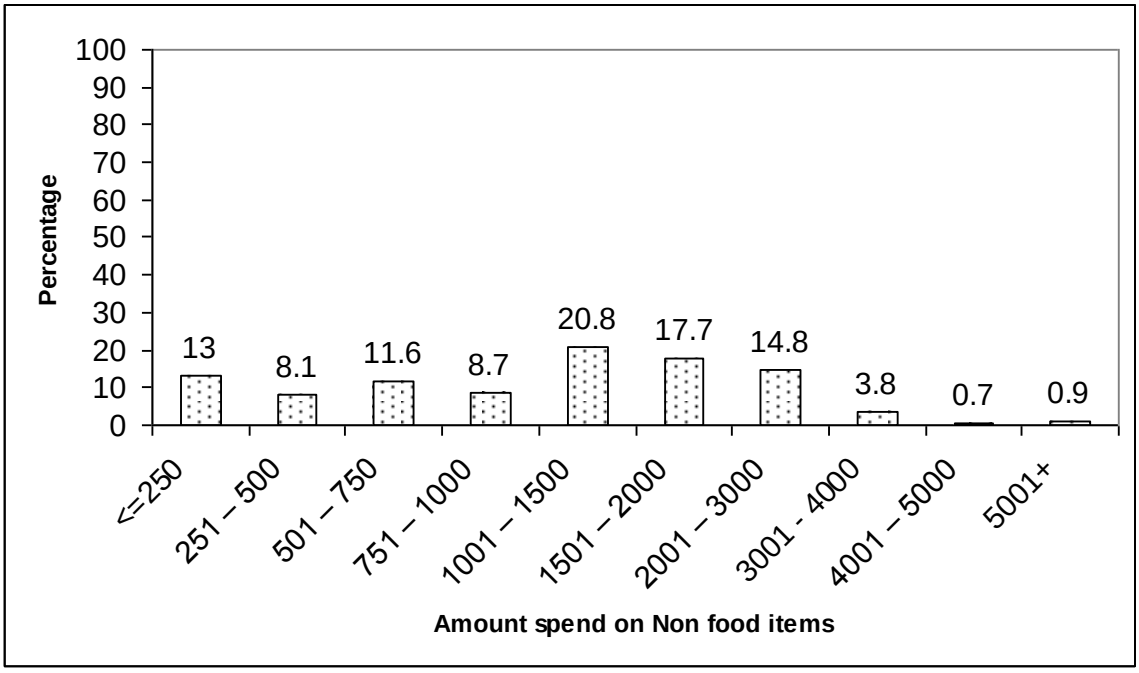
Monthly expenditure for non food items (in Rs.)	**Eravipuram North**	**Eravipuram South**	**Palli-thottam**	**Sakthi-kulangara**	**Total**
<=250	0	15.8	9.0	15.4	**13.0**
251 – 500	3.0	0.6	13.0	14.1	**8.1**
501 – 750	0	0	22.0	20.1	**11.6**
751 – 1000	0	1.8	17.0	12.8	**8.7**
1001 – 1500	12.1	21.8	28.0	16.8	**20.8**
1501 – 2000	12.1	37.0	2.0	8.1	**17.7**
2001 – 3000	57.6	18.8	6.0	6.7	**14.8**
3001 - 4000	15.2	3.0	1.0	4.0	**3.8**
4001 – 5000	0	1.2	1.0	0	**0.7**
5001+	0	0	1.0	2.0	**0.9**
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

Pearson Chi square : 229.387

Figure 6.22

Monthly expenditure for non food items



The comparison shows, even though the amount spend on both the items are not wide, it is surprising in the case of fishing communities that they have a tendency to spend more on non-food items. It is an indication towards the change in the trend pattern of spending by the fishing community in Kollam.

5. DEBT PROFILE

Most of the socio-economic studies conducted in the fishing villages across India illustrate that the momentum of economic activities of fishing villages depends mostly on the availability of credit on reasonable terms and conditions resulting in increased production and income. But generally it is believed that indebtedness is a sign of underdevelopment and 'debt trap' of fisher folk as

their common feature. But there is another twist in this argument. The magnitude and high quantum of indebtedness at reasonable rate of interest obtained from any centralized agencies is always an indication towards higher development activities.

The table 6.30 and figure 6.23 show the debt profile of respondents in sample villages.

Table 6.30

Debt profile of the respondents (in %)

Debt (response rate)	**Eravipuram South**	**Eravipuram North**	**Pallithottam**	**Sakthikulangara**	**Total**
Having loan	94.5	75.8	84.0	47.0	**74.9**
Having no loans	5.5	24.2	16.0	53.0	**25.1**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

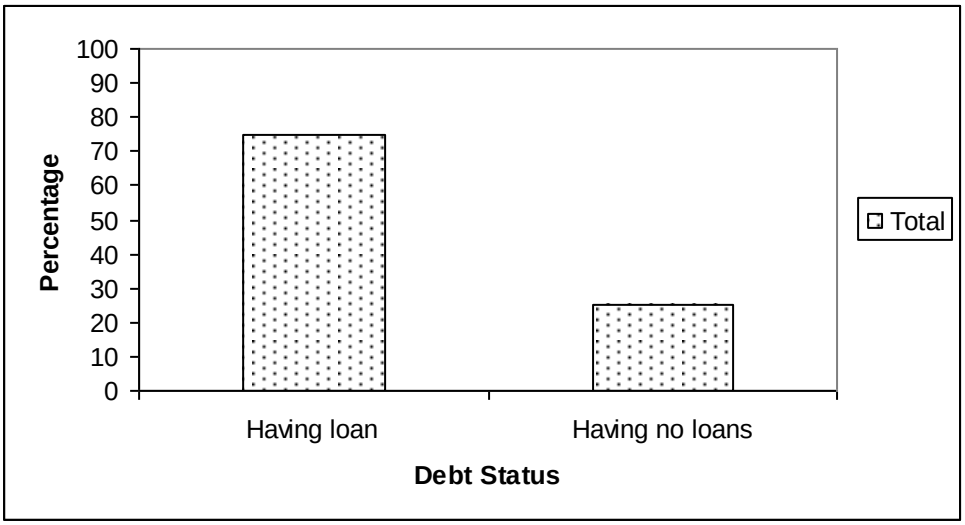
Source: Survey Data

Pearson chi square : 113.627

Significance : 0.000

Figure 6.23

Debt profile of the respondents



The surveyed data shows that 74.9% of the fishermen households are in debt. It is the highest in Eravipuram South with 94.5% and the lowest in Sakthikulangara with 47%. In Eravipuram North 75.8% of the households are having loan from various agencies while in Pallithottam debt constitutes 84% of the total marine fisher folk population.

The high percentage of indebtedness is mainly due to the availability of credit facilities to the fishermen. Commercial banks play a great role in providing credit facilities to marine fishermen households in Kollam district.

The table 6.31 and figure 6.24 shows the loan providing agencies in the sample villages.

Table 6.31

Loan providing agencies

Agency	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Commercial bank	86.5	72	82.1	52.9	**77.3**
Land Mortgage bank	0.6	0	0	0	**0.3**
Money lender	10.9	28	1.2	1.4	**7.8**
Friends / relatives	0.6	0	7.1	10	**4.2**
Govt. welfare scheme / Provident fund	0	0	5.9	31.4	**8.1**
Other private agencies	1.3	0	2.4	1.4	**1.5**
Others	0	0	1.2	2.9	**0.9**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

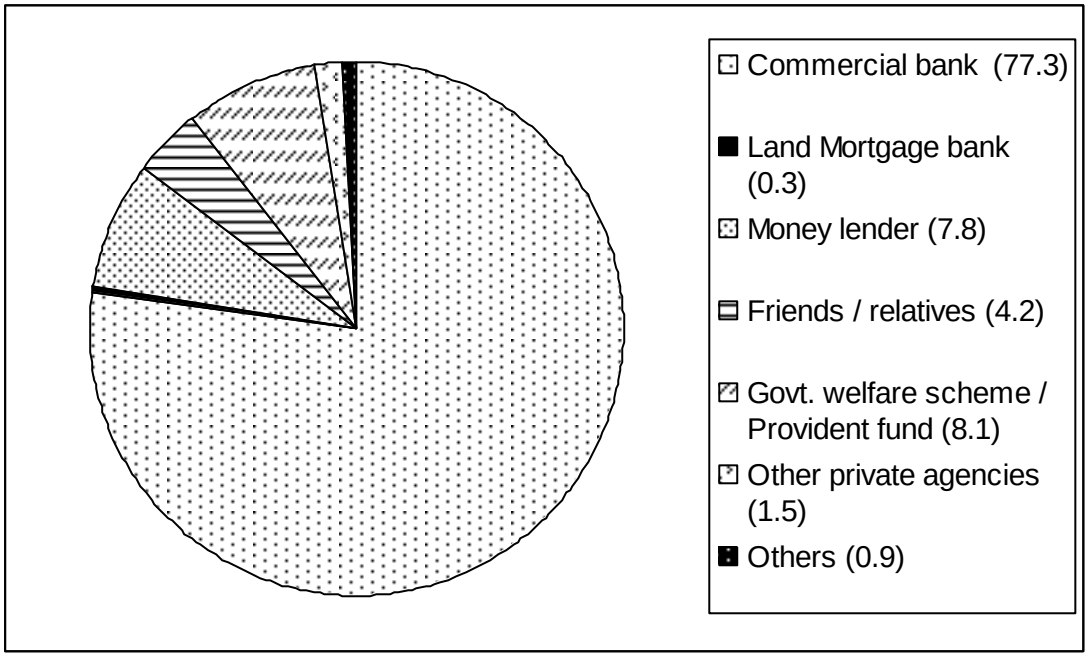
Source: Survey Data

Pearson chi square : 196.262

Significance : 0.000

Figure 6.24

Pie diagram showing various agencies which provide credit in coastal areas



The survey brings to notice several facts about debt and the agencies providing loans. The biggest supplier of credit in coastal villages is the Commercial Bank. A 77% of the fisher folk avails loan from the Commercial Banks. One major factor of this huge indebtedness is the reasonable rate of interest on loan by the commercial banks. Another finding from the survey is that the Government welfare schemes and provident funds of the fisher folk provide loans to 8.1% and a 7.8% avails loan from money lenders.

Combining these elements, the next part of analysis deals with the purpose of taking loan by the fisher folk. The table 6.32 shows the reasons for taking loan by this group.

Table 6.32

Reasons for taking loans (in %)

Reasons	Eravi-puram South	Eravi-puram North	Palli-thottam	Sakthi-kulangara	Total
To purchase fishing material	9.6	4	21.4	8.6	**11.9**
Household item	12.2	28	9.5	4.3	**11.0**
Ornaments	0	0	1.2	0	**0.3**
Children education	1.3	0	0	1.4	**0.9**
Religious festivals	0.6	0	0	0	**0.3**
For marriages	25.6	24	11.9	1.4	**17.0**
To purchase food items	0	0	0	0	**0**
Construction or purchase house	23.7	20	25	15.7	**22.1**
Purchase own land	5.8	0	0	2.9	**3.3**
Others	21.2	24	30.9	65.7	**33.1**
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

Pearson chi square : 229.118

Significance : 0.000

The investigation shows that a 33.1 % of the respondents do not disclose the exact reasons for which they are taking loan. A 22.1 % of the responses show that they are taking credit for the purchase of houses and a 17.0 % for marriage purposes.

The survey indicates another interesting but welcome development. None of the respondents are in need of loans to purchase food materials. So the conclusion that can be drawn is that self-sufficiency in the matter of food has been achieved by fishermen households. A close scrutiny of the table 6.32 reveals that only 11.9% of the fish workers avail credit to purchase fishing equipments. This amount is meager and quite inadequate for the growth and expansion of fishery development. The industry needs heavy investment for the purchase of fishing equipments. So low level of investment will retard the growth of this sector in the fishing villages that has been year marked from the survey.

6. HOUSING CONDITIONS

A typical characteristic feature of fishing communities through out Kerala is that they are living in extremely poor housing conditions. Housing is a crucial factor in determining the standard of living of coastal families. Their lives are always in danger since their houses are located too close to the sea.

Unlike the popular notions about the pathetic housing conditions of fishermen households, the survey presents a vivid picture of the housing conditions of the fisher folk. The findings show that an 87.0% of the respondents have their own houses and 35.4% of the fisher folk are living in pucca houses. While a 32.13% of the families have concrete roof type houses and 48.33% have the walls of their houses made with bricks. The housing facilities available in the coastal villages are shown in the tables 6.33, 6.34, 6.35, 6.36, 6.37, 6.38 and figures 6.25, 6.26 and 6.27.

Table 6.33

Housing Status (%)

Housing Status (Response rate)	Eravipuram North	Eravipuram South	Palli-thottam	Sakthi-kulangara	Total
No Own House	24.2	9.7	12.0	14.8	**13.0**
Have own House	75.8	90.3	88.0	85.2	**87.0**
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

Figure 6.25

Housing Status (%)

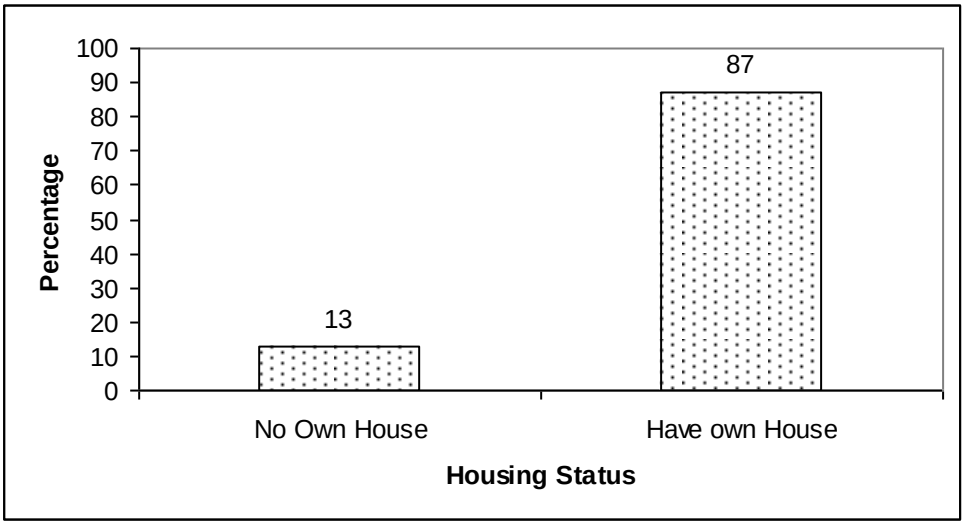


Table 6.34

Location of the Houses (%)

Location of the Houses	Eravipuram North	Eravipuram South	Palli-thottam	Sakthi-kulangara	Total
City limits	11.3	2.5	5.5	37.5	**15.7**
Purampoke Area	8.3	6.7	68.5	11.3	**22.4**
Sea shore Area	8.3	83.7	17.5	34.8	**47.2**
Outside	71.9	6.7	6.5	16.0	**14.8**
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

Figure 6.26

Location of the Houses (%)

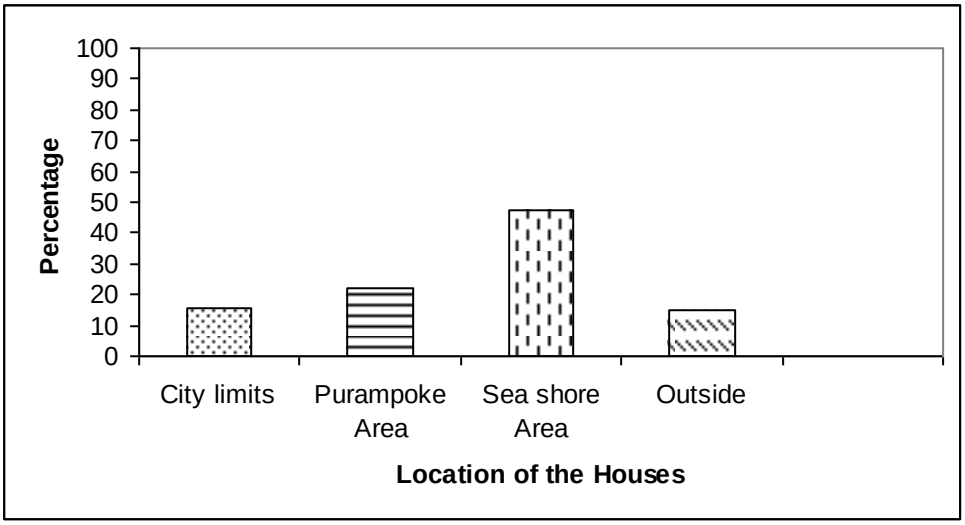


Table 6.35

House Type

House type	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Hut	35.57	24	15.9	13.3	**23.1**
Cement	36.24	60	44.3	11.8	**31.6**
Upgraded	27.52	12	39.7	46.4	**35.4**
No response	.67	4	0	28.3	**9.76**
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

Figure 6.27

House Type

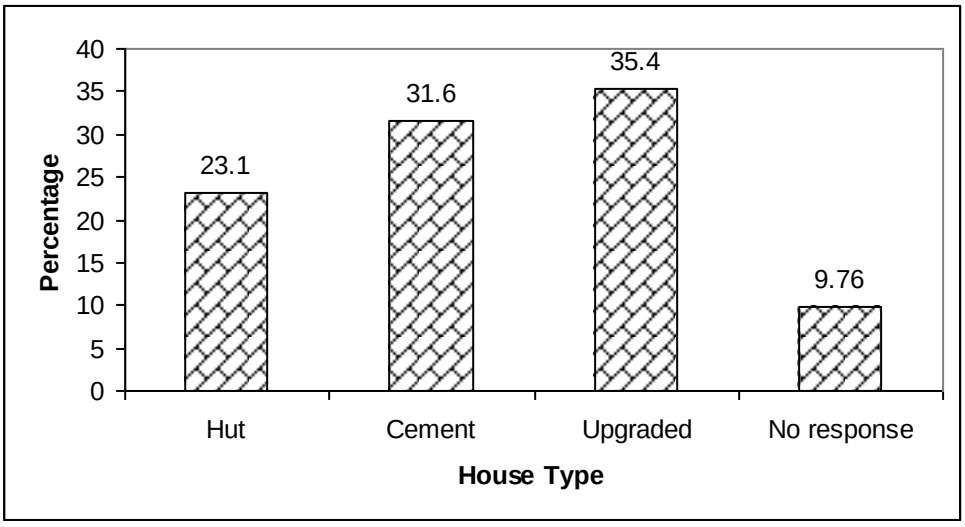


Table 6.36

Roof Type

Roof Type	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Coconut	36.9	28.0	10.23	3.94	**18.77**
Tile	34.9	50.0	35.23	7.09	**27.51**
Concrete	24.16	8.0	31.82	46.46	**32.13**
Asbestos	2.01	0.0	21.59	14.96	**10.54**
No response	4.03	4.0	1.14	27.56	**11.05**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Survey data

Table 6.37

Wall Type

Wall Type	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Coconut	20.13	8.0	28.51	5.51	**16.45**
Wood	22.82	20.0	4.55	14.96	**15.94**
Lime Stone	6.04	0.0	1.14	0.79	**2.83**
Bricks	46.98	68.0	42.05	50.39	**48.33**
Burned	0.0	0.0	1.14	1.57	**0.77**
No Response	4.03	4.0	22.73	26.77	**15.68**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Survey data

Table 6.38

Floor Type

Floor Type	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Not Cemented	5.37	0.0	1.14	1.57	**2.83**
Cemented	85.91	96.0	85.23	38.58	**70.95**
Tiles	4.03	0.0	11.36	13.39	**8.48**
Mosaic	0.67	0.0	1.14	19.69	**6.94**
No response	4.03	4	1.14	26.77	**10.80**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Survey data

The great margin of house owners among fisher folk is remarkable as far as Kollam district is concerned. But elsewhere and every where housing is one of the major problems confronted by the coastal fishing communities.

Housing stock and its related constituents like roof type, wall type and floor type are important indicators used to assess the economic well-being of any community. Among the various housing stocks, roof and walls made of pucca materials are considered the most desirable ones. The results obviously points out that 18.77% of the population lives in coconut roof type houses and 27.51% have houses with tile roof type. Those who have houses with pucca materials like concrete as roof type is 32.13% and 10.54% of the population lives under asbestose roof. With respect to wall type of the housing stock of the coastal community is concerned, a total of 35.22% of the household are made

up of kutcha materials like coconut, wood and lime stone. On the other hand an astonishing 48.33% household is made up of bricks. With 70.95% of the households have cemented floor type adds another dimension to strong housing stock of the coastal community of the Kollam district.

7. MATERIALISTIC FACILITIES

The possession of material amenities make a difference in social status and well being of persons in society. Consumerism, in Kerala has grown in leaps and bounds in the past 20 years. But many backward communities have little access to modern amenities and sometimes they struggle even for a bare survival. The material facilities available in the four fishing villages has been analyzed for understanding the socio-economic status of the fisher folk. The table 6.39 show the response level of fisher folk about their possessions and facilities they have.

Table 6.39

Material possessions of the Fisher folk (in %)

Other facilities	Response rate	
	Yes	**No**
Own land	87.9	12.1
Television	56.82	43.18
Radio	9.4	90.60
Electricity	93.29	6.71
Latrine facilities	92.17	7.83

Source: Survey Data

The results show that the three important variables which have a high incidence of possession are land ownership, electricity and latrine facilities. The results also show that 42.06% uses LPG for cooking. This augurs well and has a definite implication which points to the forward march of the fisher folk and gaining a status on par with other forward communities socially and economically.

The other material ingredient which has a low possession rate is the Radio. At present the usage of this device is negligible in all the segments of society. It's place in the household has been taken over by the TV. So this is not peculiar to the fishing communities.

8. HEALTH PROFILE

World wide admiration to Kerala model of development, owes largely to the exceptional changes in the health indicators of the state. The phenomenal growth of medical care units through out the state became a blessing to the whole sections in the state to utilize the facilities in an unbound manner. Basically fishers are prone to diseases due to unhygienic conditions. Lack of access to medical care facilities worsens the situation, some times fatal to their lives.

The health profile of the sample villages shows a picture that mainly goes in line with the general situation in the state. The table 6.40 shows the diseases common in the four fishing villages.

Table 6.40

Disease condition in the sample villages (in %)

Diseases	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Cancer	3.85	-	7.5	6.25	**5.5**
TB	-	-	7.5	-	**3.3**
Asthma	-	11.11	12.5	-	**6.59**
Blind	-	-	-	6.25	**1.1**
Tooth	-	-	2.5	-	**1.1**
Cabbies	-	-	5.0	-	**1.1**
Diabetes	-	-	5.0	12.5	**4.4**
Hands/legs	-	-	12.5	-	**5.5**
Polio	-	-	2.5	6.25	**2.2**
Others	92.31	66.67	47.5	68.75	**65.93**
Not respond	3.85	22.22	-	0	**3.3**
Total	**100**	**100**	**100**	**100**	**100**

In the coastal villages, a significant majority are free from diseases. In all the coastal villages, there has been no out break of contagious diseases.

The tables 6.41 and 6.42 shows the ill health status among children and elderly.

Table 6.41

Common illness among children (in %)

Child ill	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Dysentery	9.42	3.13	-	-	**5.34**
Fever	88.41	96.88	50	100	**93.13**
Worms	2.17	-	50	-	**1.53**
Cold & Cough	-	-	-	-	-
Influenza	-	-	-	-	-
Others	-	-	-	-	-
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

Table 6.42

Common illness among elderly people (in %)

Elder ill	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Fever	0.72	-	50	-	**1.14**
Diabetes	13.67	12.5	-	-	**13.07**
Blood pressure	56.12	59.38	50	100	**57.39**
Asthma	29.5	28.13	-	-	**28.41**
Others	-	-	-	-	-
Total	**100**	**100**	**100**	**-**	**100**

Source: Survey Data

Among the children, a common morbidity prevails is fever, and Blood Pressure and asthma are the main troubles for the elderly people.

Regarding the treatment of the diseases, they have hospitals in their area and they do go for treatment. The table 6.43 shows the medical facilities availed by the community.

Table 6.43

Treatment Status (in %)

Treatment	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Govt. Hosp	90.79	100	66.67	57.04	**74.59**
Private	7.89	-	32.32	39.44	**23.53**
Ayurveda	-	-	-	-	**-**
Homeo	0.66	-	1.01	2.11	**1.18**
Not respond	0.66	-	-	1.41	**0.71**
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

A clear fact arises from the table 6.43 is that a majority of 74.59% of the population depends on government hospitals for treatment. The clear message is that the expansion of medical units in the state benefits the coastal families in a greater manner. The over all picture of health profile in the sample villages proves to be quite satisfactory.

9. SOCIAL PROBLEMS PROFILE

Caste and communal equations play a major role in shaping the destiny of the lives in the coastal areas. The coastal villages in Kollam basically comprise Latin catholic population. But Hindu and Muslim populations have a powerful share in all the coastal villages.

To test a sensitive part of social aspect i.e., whether there are any communal clashes in the sample villages, the responses show disappointing. Because a margin of 63.76 % of the population are not responding. When there is non-response to a sensitive aspect, it would be difficult to analyse the situation in a comprehensive manner.

The table 6.44 show the social problem profile of the coastal villages with respect to communal clash.

Table 6.44

Reasons of Social Problems (in %)

Communal clash	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Fight between children	0	0	0	0	**0**
Break Rules in society	1.21	0	3.0	0	**1.12**
Defeat in sports	67.88	21.21	0	0	**26.62**
Political	0	0	0	0	**0**
Illicit sale of liquor	0.61	72.73	0	0	**5.59**
Excess liquor	0	0	13.0	0	**2.91**
Eve teasing	0	0	0	0	**0**
Others	0	0	0	0	**0**
Not respond	30.3	6.06	84.0	100.0	**63.76**
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Survey Data

An emerging fact from the table 6.44 is that when communal clashes arise, it is mainly due to defeat in sports. Alcoholism among the male fisher folk is

another reason that leads communal clash. The over all situation in the fishing villages is calm and peaceful.

10. STANDARD OF LIVING INDEX

Standard of Living refers to "the level of wealth, comfort and material goods and necessities available to certain socio-economic class in a certain geographical area"[*]. The Standard of Living in coastal belt has always been a hot topic of discussion for social scientists. Many studies conducted in the past indicate the lower standard of living among the coastal community, not only in the case of Kerala, but also this condition match with many maritime regions in the world. Poverty has been identified as the root cause for the poor quality of life with the fishing communities.

In Kerala, it has always been the agenda of the government to improve the quality of the life of the people in the coastal areas. This has been addressed by the state government through specific policy measures. Five Year Plans of the Central government too, take a keen interest in this issue.

While the general trend of the Standards of Living in coastal communities shows similarities, an attempt is made to construct a Standard of Living Index for the four sample villages viz. Eravipuram South and North, Pallithottam and Sakthikulangara with the collected data. The major variables taken to construct

[*] Investopedia Financial Dictionary

this index includes possession of materials, house type, electrification and communication devices etc.

The table 6.45 and figure 6.28 demonstrate a Standard of Living Index prepared for the coastal villages.

Table 6.45

Standard of Living Index (in %)[1]

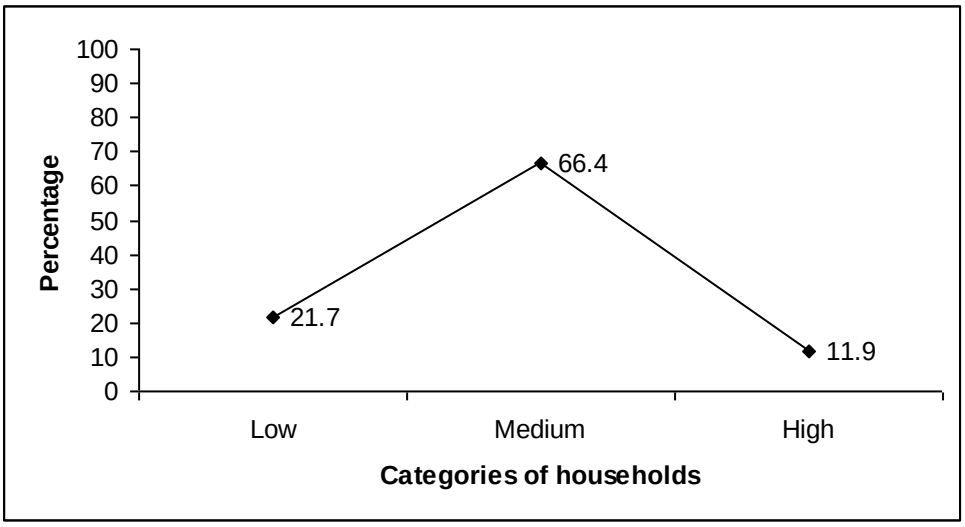
Category	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara	Total
Low	16.4	3.0	36.0	22.1	**21.7**
Medium	64.2	72.7	58.0	73.2	**66.4**
High	19.4	24.2	6.0	4.7	**11.9**
Total	**100**	**100**	**100**	**100**	**100**

Source: Survey Data

[1] The scores were added for each family. The families were grouped into three categories of low, medium and high, according to the total score obtained, using the following method. Mean and Standard Deviation of the total scores of the families were calculated. Families having scores up to 'mean-SD' were categorized as having 'low SLI'. Families having scores between 'mean-SD' to 'mean + SD' were categorized as having 'medium SLI'. Families having scores above 'Mean + SD' were categorized as having 'high SLI'.

Figure 6.28

Standard of Living Index



The results point out that a huge 66.4% of the coastal population in Kollam hovers around the medium category of Standard of Living. When this is compared with other coastal villages in general, the fisher folk in the coastal villages of Kollam cannot be treated as the lowest vulnerable group in fishing communities. In spite of the many efforts to modernize the sector and the people, the 'high' category is only 11.9 %. The 21.7 % in the 'low' is also a matter of great concern which typifies the traits of general coastal fisher folk.

A higher Standard of Living is always taken as a criterion for assessing the economic well being of a society. The ultimate objective of all the development process made in the coastal belt of Kollam aims to achieve this target. In order to expand the number of people in the 'high' category of Standard of Living Index, more radical measures like modern Communication and other Information devices are needed.

CHAPTER – VII

MAJOR FINDINGS, RECOMMENDATIONS AND CONCLUSION

MAJOR FINDINGS OF THE STUDY

Hypothesis I: Modern communication parameters especially mobile phones are widely used by the coastal community in the fishing villages of Kollam.

The study shows that modern communication parameters especially mobile phones are being used in an exceptionally wider manner in the coastal villages of Kollam. A huge 81.33% of the populations are using mobile phones in fishing activities. But an 18.67% of the respondents are not using mobile phones for their job purposes.

Hypothesis II: Electronic communication equipments help the fisher folk to transfer and exchange information onshore and thereby arranging their business terms.

The results clearly point out that mobile phones, the vital electronic communications equipment do benefits the fisher folk in exchanging information on shore and off shore and thereby making arrangements for the business. In the survey 83.03% utilize this equipment to exchange information and 81.95% of the respondents arrange the business with this device. To

54.15% of the population mobile phones are an instrument which alerts during emergency.

Hypothesis III: Remote sensing equipments like GPS enables the marine fisher folk to locate fishing grounds.

The survey points out that 50.67% of the marine fishing workers use GPS in their economic activities. All the respondents in the survey agree that GPS helps them to find exact fishing location. For the 47.08% of the fishers it helps in getting more economic returns. A 44.17% of the marine fish workers are saved from spending more time at sea. But 49.33% are not utilizing this component either for fish location or getting more profit.

Hypothesis IV: New technological inputs (Information and Communication Technologies) in the marine fisheries sector increase productivity and thereby increase the profit margin.

The findings show that for the 64.67% of the marine fish workers use new technological inputs like Communication and Information Technologies that helps them to increase fish production. Apart from the increase in production, 59.67% of the respondents agree on getting more economic returns. At the same time 35.33% of the respondents are doubtful and responds negatively. They do not believe that the rise in fish production is due to the use of communication devices.

Hypothesis V: The coastal community in Kollam still lag behind in using E-log books or On-Board Data Integrator in fishing activities.

The fish workers in Kollam are not using instruments like On-board Data Integrator or E-log books for the fishing activities. In the case of E-commerce too, response rate is the same. In the selected sample villages, in Sakthikulangara alone the findings show its usage. The overall rate of using E-log books or on board data integrator shows only 1.3%.

Hypothesis VI: The impact of ICT gadgets increase the marketing potentiality of fish products by the fishermen community.

The investigation reveals that the impact of communication and technological gadgets have been felt in the marketing area of fishing. A 60 % of the respondents agrees that new gadgets have widened the marketing potentialities. On the other hand, 40 % of the respondents do not agree with this argument.

Hypothesis VII: Literacy among the coastal community plays a significant role in adopting ICT instruments in their livelihood activities.

The over all literacy rates prevailing in the sample villages figures 91.2 %. Among the 15+ age group the literacy level stands at 91.4 %. This could be linked with the possible rise in the usage of mobile phones and GPS in the livelihood options of the fisher folk.

Hypothesis VIII: The coastal fisher folk using ICT have better leverage in socio-economic matters.

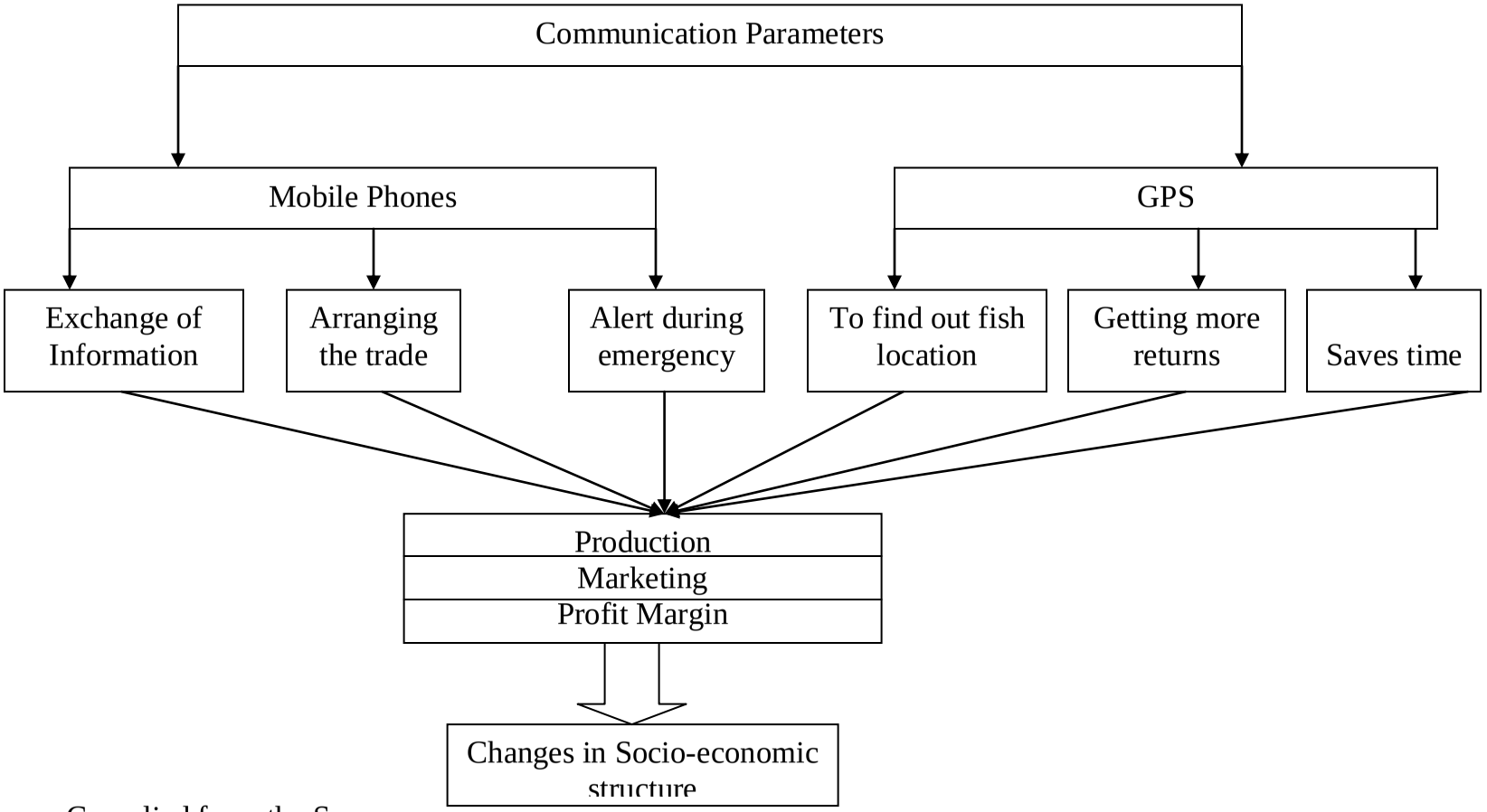
The survey finds that 59.33 % of the respondents feel that communication and information devices contribute in increasing their socio-economic status. While 40.67 % disagree with this argument.

Objective I: To carve out a new development paradigm for sustainable growth with ICT devices on the basis of existing socio-economic structure of the marine coastal community.

The findings of the survey can be used to carve out a new development paradigm for sustainable growth of fisheries with new communication tools. A simple frame work is out lined in figure 7.1, which is evolved from the survey results.

Figure 7.1

A Framework of Development Strategy from the Study



Source: Complied from the Survey

Objective II: To analyze the link between the education and using up of communication devices in the promotion of livelihood aspects of fish labourers.

One of the leading variables in the socio-economic status of fish workers in Kollam, is the education level. As per the result, the respondents who have primary education are 43.0%, high school 35.7% and 12.3% have college level of education. The high response rates of fishermen using mobile phones (81.33%) and GPS (50.67%) in the promotion of livelihood activities is mainly attributed by the educational status of the people in the surveyed area.

Objective III: To assess the future implication of ICT devices in coastal area with special reference to the age composition of population concerned.

The long run implication of using modern Communication and Information devices in coastal area from the result of the survey looks very promising with respect to the age composition of fisher population. In the selected villages, a 25.5% of the persons come in the age group 0-19 years. While 63.5 % of the persons come in the age group 20-54 years. A total 89 % of the people are children and adults. This trend is an indication of the potentialities of using new Communication and Information devices in the future. Because younger people and adults have the higher capacity to adapt with any new technical change.

Objective IV: To explore future prospects of modern communication tools in the marine fishermen households for income generating activities.

Another aspect of the study is to evaluate the future prospects of modern Communication and Information tools in the marine fishermen households for income generating activities. In the long run, there is no doubt that Information and Communication Technological devices in general will occupy the centre stage of the marine fishing activities. This observation is derived from the survey itself. Because only with the usage of mobile phones and GPS, the fish workers are able to exchange information on shore and off shore (83.03%), to settle the business (81.95%), to find out exact fish location (100%), getting more returns (47.08%), increase in profit margin (59.67%) and of course a rise in social status (59.33%). With the adoption of all major Information and Communication Technology devices in fisheries like Web based applications, Community Radio, Information centres, E-log books, Electronic Sensors, Echo sounders, Print Publication etc., the greatest income generating potentiality of fisheries sector is yet to come.

Objective V: To examine the existing socio-economic framework of the marine fishing economy of Kollam in the presence of ongoing communication and Information technologies in the sector.

Regarding the existing socio-economic frame work of the coastal villages, the survey made the following observations.

1. The survey reveals that a 92.6% of the fisher folk depends on fishing alone as their prime occupation. The study also shows that for a 98.02% of the fish workers, fishing is their permanent activity.
2. Fisher folks in the coastal villages of Kollam hire or employ other people in their livelihood activities. They are 53.47 %.
3. Only 12.3 % of the fisher folk possess fishing equipments. While a majority of (87.7 %) have taken it on rent.
4. An 88.8 % have no alternate employment at all. But 54% of the fisher folk think positively about the need for alternate employment.
5. Majority of the fish vendors (93.6%) vends fish on sea shore and an 81.5% have vend profit.
6. It is evident from the survey that 98.7% of the fishermen families have no other sources of income. While a 1.3% of the fisher men households get income from pension, educational concessions and charity.
7. Regarding the expenditure profile of the fishermen households, a 35.8% of the respondents spend an amount worth Rs.1501-2000 per month on food items. When monthly expenditure on food and non-food items is compared, it appears that both are almost alike. But among some there is a tendency to spend more on non-food items.
8. The debt profile of the fishermen show a 74.9% of the families have loan from various credit supplying agencies. On the other hand a 25.1% have no debt at all. The Commercial banks are the largest providers of credit in coastal areas and 77.3% of the respondents take loan from

there. The various purposes for availing credit include marriages (17%), construction and purchase of houses (22.1%), purchasing of fishing materials (11.9%), buying of household items (11%) etc.

9. The study also reveals that an 87.9% of the population possess own land while a 12. 1% is landless.
10. Another significant result is 87% of the families have their own houses while a 13% of the households does not have their own houses. In the case of housing stocks, a 35.4% are living in pucca houses and 23.1% are residing at kutcha houses. A 32.13% of the household have concrete roof type and 48.33% of the households walls are constructed with bricks. Another crucial aspect evolved from the survey is that 70.95% of the households have cemented floor.
11. The survey shows that a 93.29% of the populations live in electrified houses.
12. A 56.82% possess television but only 9.4% have radio. For cooking purposes 42.06% of fisher folk families use LPG. The latrine facilites are available to 92.17 % of the households.
13. A majority (74.59%) of the coastal population depends on government hospitals for medical aid.
14. A Standard of living is made for the sample coastal villages shows that 66.4% comes in the medium category and a 21.7% and 11.9 % come in the low and higher standard of living category respectively.

Objective VI: To know the changes in the fishing technology from the traditional fishing crafts and gears to modern equipments and the present communication technologies.

Another focus of the study is to know the changes in the fishing technology from the traditional fishing crafts and gears to modern equipments and the present day communication technologies. A notable fact emerges from the study is that it is the technology that enables the marine sector in Kerala to transform in all areas with its far reaching effects on production trends, income levels, export trends etc. The vital difference in the transition of technology from tradition to the modern fishing crafts and gears is that it evolves due to certain specific policy measures. These policy measures aiming at the development of marine fisheries sector of Kerala. While the post-modern technologies like new Communication and Information devices in fisheries sector emerge as part of the structural adjustment programmes in the Indian economy.

Objective VII: To understand how modern communication and information technologies came into Kerala coast.

The study has also made an attempt to evaluate the back ground of the use of modern communication and information devices in the marine waters of other nations. Use of modern communication and information equipments in the European fishing waters and its success there become an integral part of this study. Although, there is difference between Kerala coast and European marine waters, the use and potentiality of Information and Communication Technology devices in the fisheries sector remains the same in every part of coastal region.

RECOMMENDATIONS

1. Create training centres in the fishing villages to train fishers in the usage of Information and Communication Technology instruments.

2. Conduct study classes for imparting the technical know how to the fishers in handling and operating Information and Communication Technology equipments.

3. The impact of communication and information devices in the increase of fish products need the development of infrastructure facilities like permanent storage rooms for auctioning and dispersing the fresh fish catch.

4. Each fishing village should have a fish landing mini harbour for the easy dissemination of product increase due to Information and Communication Technology intervention.

5. To handle the product increase due to ICT influence the fish vending service must be extended.

6. Three wheelers equipped with mobile phones and similar gadgets will be the most congenial transportation mode for fish vendors to target very interior village spots.

7. Strengthen the existing co-operative sector with a special division for the exclusive purchase and distribution of Information and Communication Technology equipments covering all fishing villages.

8. Creation of a nodal agency to over see the purchase of Information and Communication Technology equipments and ancillary facilities in a cost effective manner.

9. Create a technical institute with trained technicians for repairing and servicing sophisticated ICT equipments.

10. Create a monitoring cell to watch and study the making of ultra new gadgets by Information and Communication Technology engineers world wide and its feasibility and applicability for the fisheries sector of Kerala.

11. Install a signal tower system along with ICT equipped radar facility for tackling emergency situations on the seas.

CONCLUSION

Communication parameters with its vast technological devices have transformed the Kerala fisheries sector from top to bottom. The reverberations from the application of these equipments can be felt in almost all areas of the fishery segment. The vast positive changes that have occurred in the socio-economic front is quite noteworthy. The livelihood pattern of the coastal fisher folk has been radically altered. They are now better fed, better clothed and better housed with better sanitary facilities. Technology has alerted the youngsters on the need for acquiring the intricacies of technical know how for operating the sophisticated equipments handed over to them. This has widened their education and knowledge level in all areas. The once alienated, marginalized community is now fast moving towards entering the main stream society. The cultural inhibitions are in the process of disappearing.

Thus this study has probed into the multi dimensional socio-economic aspects of the coastal fisher folk of the four fishing villages in the Kollam district. But the main focus has been the Information and Communication Technologies and the influence it has on the fishing community of the four fishing villages in the Kollam district.

The statistical data compiled from the sample fishing villages, though puzzling in some aspects, have a deep and wider research orientation for further study. The fishing industry in Kerala from the data derived from the survey and its scrutiny points towards in unmistakable terms that the Kerala fishery sector is poised towards a sustainable growth. The marine fishing industry is in the

threshold of becoming a major player in the industrial and commercial activities of not only Kerala, but also to some extent nationally.

Post Script

The vibrant nature of this industry, as this study through its methodological formula, indicates the handsome economic returns that accrue in making valuable contribution to the coffers of the Exchequer. This is borne out from the latest bulletin published by the Marine Products Export Development Authority (MPEDA).

The increase in export earnings is a clear indication of the rising trend in fish production. There may be several reasons for this increase. But without doubt, the technological devices and inputs have played a dynamic role in this jump in out put. The major export oriented markets for the Indian produce have been the European Union, USA, South East Asia, China, Japan, West Asia and others (The Hindu, 2011).

The European Union was the largest market with a share of 26% in dollar realization. The shrimp export to USA is 10,000 tonnes. This recorded a growth of 13% in quantity, 35% in rupee value and 41% in dollar value. Frozen shrimps are a major item in this regard. The South East Asian countries register a growth of 44% and 35% in dollar terms. The export to china shows only an increase of 5 % in quantity and 9% in dollar terms. The exports to Japan are 11% in quantity and 33% in dollar terms. The export to West Asia has an increase of 21% in quantity and 21 % in dollar value[11].

[11] Marine products exports growth (The Hindu, 24th April 2011)

Thus there is an all round export oriented growth, in quantity, dollar value and in rupee terms. It is a clear indication of the veracity of the study and attest to the projections detailed on the basis of survey results. In short, this thesis may have the potential for being a bench mark for any future investigation of the marine fisheries sector.

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APPENDIX

SCHEDULE

PREPARED AS PART OF THE PH.D. THESIS WORK

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SCHDEULE

COMMUNICATION PARAMETERS IN THE MARINE FISHERIES SECTOR OF KERALA – A STUDY OF KOLLAM COASTAL VILLAGES*

1. Name and Full address of the Head of Family :

2. Name and No. of the ward :

3. House number :

4. Date of Interview :

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* Survey conducted in the Kollam fishing village encompassing of fish landing centres of Eravipuram South, Eravipuram North, Pallithottam and Sakthikulangara.

I. Family and Educational Profile

Sl. No.	Name	Family Relationship (Code)	M / F (Code)	Educational Qualification (Code)	Age	Married / Unmarried (Code)	Other details
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							

Family Relationship	Code	Educational	Code
Family Head	0	Illiterate	1
Father	1	Those who can read and write	2
Mother	2	Lower Primary 1 – 4	3
Wife	3	Upper Primary 5 – 7	4
Son / Daughter	4	High School 8 – 10	5
Son in law / daughter in law	5	Pre-degree	6
Grandson / Grand Daughter	6	Degree holders	7
Others	7	Post Graduate Degree	8
		Professional Course	9

II. Those who have not completed the VII Std. and those who have not entered School till 15 years of age.

1. (a) Are they drop outs who have not completed the VII Std. : ☐

(b) If yes, give the following details :

Sl. No.	Name (as in first page)	Other causes for the drop out
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

Reason for the drop out	Code
Illiteracy of parents	1
Financial problems	2
Became an earning member	3
Non-encouragement from family	4
Inadequacy of teaching method	5
Disabilities – Physical	6
Indifference	7
Other causes	8

2. (a) Persons below 15 years of age who have not joined school : Yes ☐ No ☐

(b) If yes, give the following details :

Sl. No.	Name (as in first page)	Reason for not joining (Code)	Other Reasons
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

Reason for not joining school	Code
Ignorance	1
Did not realize the need of education	2
Wanted to earn living	3
To help the parents in their occupation	4
Taking care of younger ones	5
Others	6

III. Occupation – Income Profile

Sl. No.	Main occupation (Code)	Part time occupation (Code)	Nature of occupation (Code)	Daily Wage (in Rs.)	How many days of work per month	In a year how many months of work
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						

Nature of Occupation	Code
Permanent	1
Temporary	2

Occupation	Code
Agriculturist	1
Agriculture workers	2
Rearing cattle	3
Fishing	4
Fish vending	5

Occupation	Code
Head load worker	6
Small business	7
Domestic servant	8
Collection of disposable items	9
Automobile worker	10
Government servant	11
Private non-government workers	12
Self-employment	13
Other	14

IV. Income for family from other sources

1. Are there any other sources of income for this family? : ☐

2. If yes, what are the other sources? :

Other sources	Monthly income	Yearly income

Other sources	Code
Children providing regularly	1
Married or other children providing not regularly	2
Relations providing	3
From Agriculture	4
From Rent	5
From Interest	6
From Pension and other educational concessions	7
Other (Elaborate)	8

V. Communication Profile

1. Do you use mobile phones in your fishing activities?

2. If yes, how does mobile phone help in your fishing activities?

Sample villages	Exchange of information	Arranging the trade	Alert during emergencies
Eravipuram South			
Eravipuram North			
Pallithottam			
Sakthikulangara			

3. Do you use GPS in your fishing activities?

Sample villages	Yes	No
Eravipuram South		
Eravipuram North		
Pallithottam		
Sakthikulangara		

4. If yes, the purpose of using GPS

Sample villages	To find out fish location	Advantage in getting more returns	Saves time at sea
Eravipuram South			
Eravipuram North			
Pallithottam			
Sakthikulangara			

5. Do you use Sonar or echo sounders in your fishing activities?

Sample villages	Yes	No
Eravipuram South		
Eravipuram North		
Pallithottam		
Sakthikulangara		

6. Do the new technological inputs like mobile phones and GPS increased fish production?

Sample villages	Yes	No
Eravipuram South		
Eravipuram North		
Pallithottam		
Sakthikulangara		

7. How do you rate your profit margin by using the ICT instruments?

Sample villages	Increase	Decrease	No change
Eravipuram South			
Eravipuram North			
Pallithottam			
Sakthikulangara			

8. Have the impact of ICT gadgets increased marketing potential of fish products?

Sample villages	Yes	No
Eravipuram South		
Eravipuram North		
Pallithottam		
Sakthikulangara		

hfhgfhghghghghghghg

9. Do you use any of the following IT systems in your fishing activities?

Sample villages	IT systems		
	E- log books	On board data integrator	E-Commerce
Eravipuram South			
Eravipuram North			
Pallithottam			
Sakthikulangara			

10. Have the use of ICT equipments increased your social status among the fisher folk?

Sample villages	**Yes**	**No**
Eravipuram North		
Eravipuram South		
Pallithottam		
Sakthikulangara		

Area	Mobile Phone (Code 1)	Land Phone (Code 2)	E-mail/ Fax (Code 3)	Internet (Code 4)
Eravipuram South				
Eravipuram North				
Pallithottam				
Sakthikulangara				

VI. Mobile Phone Utility Profile

Utility	Eravipuram South	Eravipuram North	Palli-thottam	Sakthi-kulangara
Resource Identification (Code 1)				
Profit Maximization (Code 2)				
Weather Alert (Code 3)				
Personal Calamities help (Code 4)				
Natural Disaster warning (Code 5)				
Assisting Fellow fisherman (Code 6)				
Fixing trade while fishing in the sea (Code 7)				
Encountering signal problem (Code 8)				

VII. Expenditure Profile

Sl. No.	Food items	Expenditure of one day	For one month	For one year
1.	Rice			
2.	Wheat			
3.	Tapioca			
4.	Vegetables			
5.	Meat			
6.	Egg			
7.	Fish			
8.	Milk & Milk products			
9.	Tea, Coffee, Sugar			
10.	Oil			
11.	Other			
	Non-food items			
12.	Kerosene, gas			
13.	Electricity			
14.	Clothing			
15.	House Rent			
16.	Education			
17.	Medicine			
18.	Soap, Powder			
19.	Daily paper – Magazine			
20.	Beedi – Cigarette, Alcohol			
21.	Religious festivals			
22.	Cinema, Drama			
23.	Marriage gifts			
24.	Others			

N.B: One day means average for one day

VIII. Expenditure Profile

1. (a) Do you save from your income?

Yes ☐ No ☐

If yes, answer the following

1. Your monthly deposit (Rs.) ☐
2. Where do you deposit? ☐
3. What do you do with your savings or withdrawals? ☐

Where do you deposit	Code
Private chitty	1
Govt. chitty	2
Commercial bank	3
Co-operative bank	4
Post Office	5
Others	6

Withdrawal from savings	Code
To purchase fishing materials	1
To purchase household items	2
To purchase ornaments	3
Children education	4
Religious festivals	5
For marriages	6
To purchase food items	7
For constructing house or to purchase house	8
To purchase own land	9
Others	10

IX. Debt Profile

1. (a) During 2000 – 01 any financial committees ☐

   (b) If yes, give following details

   (1) What is your total debt in Rs.? ☐

   (2) Which year did you take loan ? ☐

   (3) Form which **Agency*?** ☐**(Code)**

   (4) Rate of Interest ☐

   (5) For what purpose ☐**(Code)**

   (6) Amount refunded ☐

   (7) Balance Amount ☐

Agency	Code
Commercial bank	1
Land Mortgage bank	2
Money lender	3
Friends / Relatives	4
Govt. Welfare scheme / Provident fund	5
Private chit	6
Government chit	7
Other private agencies	8
Others	9

Purpose	Code
To purchase fishing material	1
Household item	2
Ornaments	3
Children education	4
Religious festivals	5
For marriages	6
To purchase food items	7
Construction or purchase house	8
Purchase own land	9
Others	10

X. Details regarding house and land

1. Do you own land? ☐

   If yes,

   a) How many cents of land? ☐

   b) How did you acquire the land? ☐

2. Do you own house? ☐

   If yes,

   a) Where did you get the money from? ☐

   b) Location of your house ☐

   c) How many yards from road frontage? ☐

   d) What type of house? ☐

   e) No. of rooms ☐

   f) Area ☐

   g) Roof ☐

   h) Floor ☐

   i) Walls ☐

Land ownership	Code
Family share	1
Cash purchase	2
Free Govt. land	3
Purampoke	4
Got as gift	5
Others	6

House construction cost	Code
Own savings	1
Took loan	2
Welfare agencies	3
From Govt. Funds	4
From family share	5

Location of house	Code
City limits	1
Purampoke land	2
Sea shore area	3
Outside	4

What type of house	Code
Hut (floor not cemented) Walls – Wooden planks or coconut leaves Roof – with coco leaves	1
House (Cement floor) Walls – Bricks Roof – Tiles or coco leaves	2
Upgraded house (Cement or Mosaic floor) Walls – Bricks Roof – Tiles or Concrete	3

Roof	Code
Coconut leaves	1
Tiles	2
Concrete	3
Asbestos	4

Walls	Code
Coconut leaves	1
Wooden planks	2
Lime stone	3
Bricks	4
Burned bricks	5

Floor	Code
Not cemented	1
Cemented	2
Floor tiles	3
Mosaic	4

3. If don't own a house where do you stay? ☐
4. Does the place where you stay have drainage system? ☐
5. Drainage problem ☐
6. House electrified ☐
7. Do you own a Radio? ☐
8. Do you own a T.V.? ☐
9. What type of Oven? ☐
10. Where do you get drinking water? ☐
11. a) Do your house have a latrine? ☐
    b) If yes, what type? ☐
    c) No. ☐
12. Is there bathroom? ☐

Where do you stay if not own a house?

		Code		
Rent	- 1	Yes	-	1
With family	- 2	No	-	2

Drainage problem	**Code**
Clogging of drainage system	1
Drainage not covered	2
Mosquito	3
Environmental	4

Oven	**Code**
Fire wood	1
Gas	2
Kerosene stove	3
Others	4

Water	**Code**
Own well	1
Others well	2
Common well	3
Common pipe	4
Owns pipe	5

Latrine	Code
Septic tank	1
Hole	2

No latrine	Code
Common latrine	1
Sea shore	2

XI. Details regarding family property

Sl. No.	Items	Probable amount (in Rs.)
1.	Land	
2.	House	
3.	Latrine, bathroom, cattle shed	
4.	Livestock cattle	
5.	Movable properties (furniture, fridge, TV, Radio, Scooter, Car, Cycle, etc.)	
6.	Gold ornaments	
7.	Total earning	
8.	Others	
9.	Fishing equipments	
	Total	

XII. Health Profile

1. a) Any members in the house who are seriously ill ☐
   b) If yes, the name of the disease ☐
   c) The serial No. of the patient (as in page 1) ☐
   d) Present condition ☐
2. a) Has there been any outbreak of contagious disease in your place? ☐
   b) If yes, what type of contagious disease? ☐
   c) Has that disease effected any of your member? ☐
   d) Do you know the reason for the outbreak of the disease? ☐
   e) If yes, what? ☐
   f) Step taken to halt the spread of the disease ☐
   g) To prevent the contagious disease what kind of vaccine do you take? ☐
3. a) The common type of illness that affect the children ☐
   b) The common type of illness that affect the elders ☐
4. a) Do you have hospitals in your area? ☐
   b) If yes, where do you go for treatment? ☐

Contagious disease	Code
Cholera	1
Dysentery	2
Others	3

Vaccines	Code
BCG	1
Oral Polio vaccine	2
DPT vaccine	3
Vaccine for typhoid	4
Cholera vaccine	5

Illness	Code
Cancer	1
TB	2
Asthma	3
Leprosy	4
Blindness	5
Tooth infection	6
Cabbies	7
Diabetes	8
Hands or legs deformal	9
Polio	10
Rheumatism	11
Tetanus	12
Others	13

Steps to prevent			
Contagious disease	**Code**	**Present condition**	**Code**
Practiced cleanliness	1	Complete cure	1
Have not do anything	2	On the way to recovery	2
Took preventive vaccine	3	Illness is getting worse	3
		No improvement	4

Reasons for contagious disease	Code
Water pollution	1
Environmental pollution	2
Lack of space for nature's call	3

Common sickness for elders	Code
Fever	1
Diabetes	2
Blood pressure	3
Asthma	4

Common sickness for children	Code
Dysentery	1
Fever	2
Worms	3
Cola and cough	4
Influenza	5
Others	6

Hospitals	Code
Govt. hospital	1
Private hospital	2
Ayurveda clinic	3
Homeo clinic	4

XIII. Details regarding fishing

	Yes	No
1. a) Any one from your family engaged in fishing	☐	☐

If yes,

	Code
b) If yes, Do you do the fishing alone or employ someone?	☐
c) Are you owner of fishing equipment?	☐
d) If yes, the total price	☐
e) Have you purchased the equipments on rent / loan?	☐

f) Where do you go for fishing? ☐

g) Do you buy fish and resell it? ☐

h) Steps taken for fish vending? ☐

i) Is fish catching and vending profitable? ☐

j) Does your children help you with fish business? ☐

k) If yes, in what way? ☐

l) Where do you get money during times of non-fishing season? ☐

The character of fish employment	**Code**
Doing it by self	1
Employing people	2

Purchase of fish equipment	**Code**
Out right purchase	1
Took it by loan	2

Where do you go for fishing?	**Code**
Ocean	1
Lake	2
Still waters	3

Methods of fish vending	**Code**
Sale in shore itself	1
Take it to the market for retail selling	2
House visit	3

Receiving money during off seasons time	Code
Sub-employment	1
Availing loan	2
Withdrawal from savings	3
Others	4

How do the children help?	Code
Constantly	1
Part-time	2

XIV. Alternate Employment Profile

(Answer Yes or No)

1. a) During the period of travel ban do workers of the fish industry take up alternate employment?

   b) If yes, what kind of employment? Explain briefly.

   ……..

2. In future do you think that children of the fish workers should take up occupations other than fishing?

   Yes ☐ No ☐

   If yes, what type of employment you would recommend?

   ……..

3. Even during the fishing season do you think that fish industry workers should be given other part-time additional occupation?

   Yes ☐ No ☐

   If yes, what type?

   ……

4. Should the female fisher folk be given additional employment or other income generating methods?

   Yes ☐ No ☐

   If yes, what type of employment?

   …….

XV. Social Problems Profile

1. Do Communal clashes takes place in this area?

   Yes ☐ No ☐

   If yes, the reasons for the communal clash.

	Code
2. a) In your area are there enough markets and shops to procure essentials?	☐
b) If not should they be started?	☐
3. a) Do you have access to public telephone booth?	☐
b) If not should it be started?	☐
4. a) Do you have reading rooms?	☐
b) If not do you like to have it?	☐
5. a) Do you have travel facilities in your area?	☐
b) should the travel facilities be increased?	☐

Reasons for communal clash	Code
Fight between children	1
Breaking question rules in society	2
Defeat during sports or art festivals	3
Political	4
Illicit sale of liquor	5
Consuming excess liquor	6
Eve teasing	7
Others	8