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
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

![Diagram showing the core elements in the impact of Information and Communication Technologies in an economy.](Diagram)

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 interrelated 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.
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.
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\textsuperscript{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’\textsuperscript{2}, which was the highlight during this period, carefully delineated sophisticated foreign scientific and technological transfers.

\textsuperscript{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)

\textsuperscript{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 overall 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

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.

Immanuel 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 drawback of the study.

Berg and Lensing (2007), studies show 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 20th 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 background, 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 Botic 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 does 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
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.
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>
<thead>
<tr>
<th>Technological Innovations and Economic development</th>
<th>Emergence of Information and Communication Technologies and its applications in various sectors of the economy</th>
<th>Transformation of marine fishing industries with Communication and Information parameters</th>
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<tr>
<td>Information and Communication Technologies in the Marine Fisheries sector</td>
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Research framework

Introduction, impact of Information and Communication Technologies in an economy, Information and Communication Technologies and the Indian context, Information and Communication Technologies and the marine fisheries sector, marine fishing industry in Kerala in the backdrop of Information and Communication Technologies.

Changes in fishing technology in Kerala from the traditional Kattamarams and plant built boats to modern trawlers and purse-seine to post modern technologies Information and Communication Technologies especially mobile, GPS etc.

Various Information and Communication Technologies used in marine fishing industry throughout the World and its potentialities and implications

Impact of communication parameters used with special reference to Kerala coast

Evidence of the impact of Information and Communication Technologies especially communication equipments in Kollam coastal villages their socio-economic structure in deciding their acquaintance with modern communication revolution, analysis, findings, suggestions and conclusion

Chapter 1 – 2

Chapter 3 – 5

Chapter 6 – 7
Major variables in the study

1. Information and Communication Technologies    2. Communication parameters

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.