1.1 Introduction

Communication is a process of sharing or exchange of ideas, information, knowledge, attitude or feeling among two or more persons verbally or through certain signs and symbols. Communication is a vital element of our societal interaction and net of social relations are weaved by the thread of communication only. The process of communication takes place with the help of tools and means and thus technology plays a very significant role in this process. Due to this technological factor, communication has become a dynamic discipline and a catalyst of change and development. Upgrading and updating is a common phenomenon in this process. And the rate of orientation and accommodation of the stakeholders or communicator and receiver is very high, which increases the adoptability and uses of communication that takes place with the help of latest technology.

Today, as a part of Information and Communication Technologies (ICTs) the adoptability and uses of mobile phone is very high as a means of communication and developmental purposes. As of April 2015, there are 973.35 million mobile phone users in India. The mobile phone can be used for texting messages and verbal communication, as well as to send and receive both still and video format of the picture, thereby serving as a two way communication, hence, providing more flexibility than radio and television. Through a mobile application such as m-banking, m-education, m-governance, m-health, m-agriculture, m-commercial, etc. accelerated the speed of the development process, especially in rural area. Thus, mobile phone is playing an instrumental role in bringing about empowerment to all strata of society by their delivery of numerous services. With mobile phone becoming cheaper, easier to procure and the network charges becoming more affordable, an increasing number of rural audiences are adopting the technology.

With the introduction of mobile phones in rural areas, the speed of development has accelerated. It plays a very crucial role in socio-economic development and transformation of rural areas. With the help of mobile communication, the communication gap between rural and urban has considerably narrowed down. This factor brings forth mobile phone as the most effective tool of communication in rural areas next to the radio. Moreover, mobile phones are the only multi-media tool that can be easily handled and more accessible in rural areas. During the last two decades, mobile phone has provided a variety of services in the transmission and presentation of information and knowledge in multiple formats to meet the diverse requirements and skills of people.

After the telecommunication revolution of 1980s the government of India has felt the importance of telecommunication in socio-economic development and to narrow down the rural-urban digital divide to some extent. Hence, the government of India introduced e-governance service. Telecommunication has become a powerful tool of development and poverty reduction through empowerment of the masses. It is one of the key inputs for inclusive and sustainable growth, in areas of poverty reduction, employment generation, gender equity, balanced regional development and special protection for weaker sections of the society. The telecommunication sector of India has emerged as a key contributor in Indian economy with the country witnessing tremendous growth in the wireless sector. With the introduction of wireless phone in rural areas, there is increasing trend in rural teledensity. The Government of India is taking various measures under the Universal Service Obligation Fund (USOF) for expansion of mobile phones in remote and rural areas. Besides, urban areas are already developed and private service providers are also looking for further opportunities in rural areas. This led to the increasing trend in rural teledensity. The rural teledensity which was 5.89% in March 2007 increased to 47.79% in March 2015.

Zooming in to Manipur mobile communication service was introduced in 2004 by BSNL with two BTS installed at Khuman Lampak and Babupara providing service to 1600 subscribers. According to the Census of India 2011, Manipur has total 6, 09,964 household 57.5% have telephone or mobile phone facilities with 74.4% in urban areas and 48.9% in rural areas. Now mobile phone plays a vital role in our daily activities, especially in rural areas with the emergence of mobile phones, there has been an immense reduction in the expenditure of travelling and transportation cost, eventually saving time and money. The population distribution in Manipur follows the national trend in the sense that there is more population living in the rural areas than urban areas. According to the 2011 census reports the total population of Manipur is 25,70,390 of which 17,36,236 populations are living in the rural areas. Thus, the present study will generate an important data base and find out useful patterns of analysis to assess the use of modern communication devices and technologies such as mobile phones in the development process.

In this way, the present study will be helpful in evaluating and highlighting the use of such devices in a rural environment. This will be helpful in revealing the possibilities of testing and utilizing modern technological means for social development purposes. In its scope, the study will further provide a framework and background for research and studies in the domain of media and development studies. Apart from this, the study will examine a new pattern and correlation through the help of empirical data. The study area Imphal west is dominated by urban population and thus researchers can assume that the universe is well connected, a number of service centers are available and essence of modernity and urbanization is not very strange phenomenon for adjacent rural areas. In such environment, how modern technologies are utilized by development agencies and in what way technological adaptation has taken place are very pertinent questions for development planning. The present study will also be useful in this regard.

1.1.2 History of Telecommunication

Telecommunication is the sending of messages by means of an electrical signal from one place to another. Telegraph, telephone, fax, pager, mobile phone, internet, etc., is the example of telecommunication. According to Constitution and Convention of the International Telecommunication Union (ITU), “telecommunication is any transmission, emission or reception of signs, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems”. The history of telecommunication can be marked out with the development of semaphore the visual telegraph in 1790 by a French inventor, Claude Chappe. Semaphore is a system for transmission of information by means of visual signals, using towers with rotating shutters. In this system, information is read when the rotating shutter is in the fixed position. While comparing to post riders, the system has great advantages in transmission of messages over long distances and also cheaper. After semaphore, another input in telecommunication evolution is crude telegraph (1809) of Samuel Soemmering. In this crude telegraph system 35 wires with gold electrodes were used in water and at the receiving end the messages were read by the amount of gas caused by electrolysis.

Fig. 1.1.2.1: Model of Claude Chappe's Semaphore at German

Source: https://en.wikipedia.org/wiki/Telegraphy#/media/File:OptischerTelegraf.jpg

In 1825, electromagnet was invented by British inventor William Sturgeon. His invention of electromagnet was considered, the foundations for a large scale evolution in electronic communications. Later on telegraph systems emerge based on the electromagnet. In 1830, Joseph Henry, an American, demonstrated the potential of an electromagnet for long distance communication by sending an electric current over one mile of wire to stimulate an electromagnet which caused a bell to strike. In 1837, British physicists, William Cooke and Charles Wheatstone patented their telegraph system based on the principle of electromagnetism. However, it was in Samuel Morse's telegraph system that practically and commercially successful. In 1835, he proved that signals could be transmitted by wire. He used an electric current to deflect an electromagnet, which moved a marker to produce written codes on a strip of paper, known as Morse code. The following year, the device was modified to mark the paper with dots and dashes. He made a public demonstration in 1838 and five years later he constructs an experimental telegraph line of 40 miles from Washington to Baltimore.

Fig. 1.1.2.2: Samuel Morse's Telegraph (1) Key and (2) Telegraph

Source: http://bnrg.eecs.berkeley.edu/~randy/Courses/CS39C.S97/telegraph/morse1.html

http://www.worldculturepictorial.com/blog/content/jan-6-1838-samuel-morse-1st-demonstrated-electric-telegraph-what-hath-god-wrought-1st-formal

In 1900, a Canadian inventor, Fredick Creed invented a way to convert Morse code to text known as Creed Telegraph System. In 1843, Scotish inventor Alexander Bain invented fax machine, also known as facsimile machine which was able to send images through wires. As the technology developed new means of communications are increasingly evolving, on March 10, 1876 Alexander Graham Bell invented telephone, which pave the new dimension of electronic communication. The method of Bell's telephone was water based, he transmits sound using a needle vibrating in water, which caused an electric current to change. The change in current was what transmitted the sound. On August 1876, Bell conducts a demonstration of his telephone by using two telegraph offices that were five miles apart. In 1895, Gugleilmo Marconi made another contribution in the field of electronic communication. He further developed the telegraph of Morse by introducing wireless telegraphy. In 1899, Marconi's wireless telegraphy made a transmission from ship in New York Harbour to the Twin Lights in Highlands in New Jersey. This event could be marked as the beginning of wireless communication.

Fig. 1.1.2.3: Guglielmo Marconi with his wireless telegraph

Source:http://people.seas.harvard.edu/~jones/cscie129/nu_lectures/lecture6/marconi/marconi.html

1.1.3 Origin of Cellular phone

Marconi's wireless telegraphy which made a transmission from, ship in New York Harbour to the Twin Lights in Highlands in New Jersey in 1899 laid the foundation of wireless communication. However, the origin of mobile phone or cellular phone can be traced back to the development of car phone in the 1940s in the laboratories of AT&T and Bell. On June 17, 1946 in Saint Louis, Missouri, AT&T and one of its regional telephone companies, South-Western Bell, began operating Mobile Telephone Service (MTS) in the car (Peterson cited in Farley, 2005). MTS used six channels in the 150 MHz band with 60 KHz wide channel spacing. Soon the existing six channels were reduced to only three channels. In 1947 the Bell System asked the FCC for allocation of more frequencies, later on few more frequencies were allocated in 1949. Ironically, the allocated frequencies were distributed half to other firms known as Radio Common Carriers (RCC). In comparison with AT&T, RCC was more advanced in early mobile telephony. RCC initiated automatic radio telephone service on March 1, 1948 and began its operation in Richmond and Indiana. Until 1964, AT&T didn't provide automatic dialing.

Fig. 1.1.3.1: GE Simultaneous Duplex Car phone of late 1950s

Source: http://www.wb6nvh.com/MTSfiles/Carphone3.htm

Development of mobile telephony had also evidenced in other countries. In 1948 the Dutch national radio telephone network inaugurated the world's first nationwide public radio telephone system. And in 1951 the Swedish Telecommunications Administration's Sture Lauhren and Ragnar Berglund designed a new automatic mobile telephone system called the MTA. In 1952, Japan's Nippon Telephone and Telegraph (NT&T) started its studies on radio and telephone. In 1959, UK launched its Post Office

Radiophone Service around the city of Manchester and its service was extended to London in 1965 and other major cities in 1972. Russian also started development of cellular phone since 1958 as a co-operative project by the group of Soviet Scientists.

As a turning point in the development of cellular phone Bell introduced Improved Mobile Phone Service (IMTS) in 1964 replacing its old MTS. IMTS enable direct dialing, automatic channel selection, and reduced bandwidth from between 25 and 30 KHz. In mid 1960s other countries were also replacing its first mobile telephone system. The Swedish Telecommunication Administration began replacing their MTA (Mobiltelefonisystem A) system with MTB (Mobile System B). In 1967, Japan's NT&T further advanced its research for the nationwide cellular system. Bell system initiated the commercial radio for the first time by employing frequency reuse in January, 1969. This commercial radio service was known by the Metroliner train service running between New York and Washington DC. The system used six channels in the 450 MHz band and it was used again and again in nine zones along the 255 mile route. In 1960s SCM Melabs, a complete MTS telephone built into a briefcase was produced by Smith Corona. In October 17, 1973 Martin Cooper of Motorola made the first handheld mobile phone.

Fig.1.1.3.2: Martin Cooper with his handheld mobile phone prototype

Source: https://upload.wikimedia.org/wikipedia/commons/1/12/2007Computex_e21-MartinCooper.jpg

The introduction of cell phone before 1970 were all automobile bases, it was after Cooper's introduction of handheld cell phone present day cell phones were started making in various countries. In 1975 the FCC also allowed Bell System to start its cellular system trial and later on in March 1977, FCC approved AT&T's request to operate their cellular system. Therefore, by 1977, AT&T and Bell laboratories had constructed a prototype cellular system. A year later, public trials of the new system were started in Chicago with over 2000 trial customers. Japan's Nippon Telephone & Telegraph also started its field test as early as 1975. The Advanced Mobile Phone Service (AMPS) started operating near two Americans cities in July, 1978. The first area was around AT&T Labs in Newark, New Jersey, and the second phase was near Chicago, Illinois. In 1976, the first mobile communication satellite, MARISAT or Marine Satellite begins its service. In 1979 INMARSAT, an international group fostering and coordinating satellite telephony for ships at sea began its service. Later on this service was extended to telephone calls made on land and from aircrafts.

In Europe the first multinational cellular service system began in 1981, when the Nordic Mobile Telephone System (NMT450) started operating in Sweden, Denmark, Finland and Norway in the 450 MHz range. In 1985 Great Britain started using the Total Access Communications System (TACS) at 900 MHz. Later on, the West German C-Netz, the French Radiocom 2000, and the Italian RTMI/RTMS helped make up Europe's nine incompatible analog radio telephone systems. All of this mobile where car base phone. On October 12, 1983 Ameritech began the first United States commercial AMPS in Chicago, Illinois. The Korean Mobile Telecommunications Company also began its AMPS service in South Korea on May 1, 1984. The history of cellular phone is not just the study of cellular phone itself, but also included the invention of nano technology. On July 1, 1948 the Bell Laboratories invented the transistor, which replaced the old, fragile and bulky vacuum tubes and revolutionize every aspect of the cellular phone. The invention of the integrated circuit or IC at Texas Instruments in Dallas on July 1958 by Jack Kilby also contributed in the development of the modern day cellular phone. He showed how resistors, capacitors, diodes and transistors could co-exist on a single block of semiconductor. By 1969 transistor mobile phones dominates the cellular system and the tube era for radio telephones was ended. The introduction of the microprocessor by Intel in 1971 also contributed in the development of handheld cell phones. Therefore the development of cellular phone or mobile phone was started from the car phone around the 1940s and in its early stage it was huge and cumbersome. After decades of struggle handheld cell phone was introduced for the first time by Martin Cooper of Motorola in 1973.

1.1.4 Timeline of Telecommunication Development

1790 – Semaphore – Claude Chappe

1809 – Crude Telegraph – Samuel Soemmering

1835 – Telegraph – Samuel Morse

1843 – Fax Machine – Alexander Bain

1876 – Telephone – Alexander Graham Bell

1895 – Wireless Telegraphy – Gugleilmo Marconi

1946 – MTS Car Phone – AT&T

1969 – ARPANET

1973 – Mobile Phone – Martin Cooper

1976 – Mobile Communication Satellite MARISAT

1979 – INMARSAT

1991 – 2G Commercially Launched

2000 – 3G

2006 – 4GLTE

1.1.5 Generation of Mobile Technology

0 Generation: 0G era was the era of radio telephony. The radio phones had powerful transmitters responsible for transmitting over a short distance of 50 miles. Only one central antenna tower required per region.

1st Generation: 1Generation (1G) era was the era of analog technology which was adopted in 1980s. 1G had two distinct features such as verbal communication and text messaging i.e., SMS by using frequencies at around 900 MHz. Advanced Mobile Phone System (AMPS), Nordic Mobile Telephone (NMT), and Total Access Communication System (TACS) were the prominent one among the 1G system. During this era mobile market shows annual growth rates of 30 to 50 per cent, rising to nearly 20 million subscribers by 1990 (Ashiho, 2003). Paging systems, cordless telephone, cordless telephone cell, private mobile radio, cellular systems and mobile satellite systems (INMARSAT) were different standards used in 1G mobile technology.

2nd Generation: 2Generation (2G) was commercially launched in 1991. In addition to 1G service it introduced Multimedia Message Service (MMS), data service, roaming facility and introduced SIM cards. There are three different types of 2G technologies based on the system they are designed. FDMA (Frequency Division Multiple Access), TDMA (Time Division Multiple Access) and CDMA (Code Division Multiple Access) are the three technologies used in the 2G mobile technology. FDMA is first used in 1G mobile as an analog system, with the help of cellular technology it was introduced in 2G. In 1G, FDMA operates by separating the frequency into equal spectrum. Later on in the 2G era instead of frequency division it divides geographical areas with cellular technology. TDMA divides the band into three time–periods. It contains GSM technologies; GSM is the most successful family of cellular standards. It includes GSM900, GSM-railway (GSM-R), GSM1800, GSM1900, and GSM400. It supports around 250 million of the world's 450 million cellular subscribers, with international roaming in approximately 140 countries and 400 networks (Ashiho, 2003). GSM is a Public Land Mobile Network (PLMN) comprises of 3 subsystems RSS (radio subsystem), NSS (network and switching subsystem) and OSS (operation subsystem). RSS covers all radio aspects, which contains MS (Mobile Station), and BSS (Base Station Subsystem) or RAN (Radio Access Network). In BSS or RAN it contains BTS (Base Transceiver Station) and BSC (Base Station Controller). In NSS call forwarding, handover, switching are facilitated. It contains MSC (Mobile Service Switching Centre) and LR (Location Register). In LR it contains HLR (Home Location Register) and VLR (Visitor Location Register). In OSS management of the network is facilitated. It contains

OMC (Operation and Maintenance Center), AUC (Authentication Centre) and EIR (Equipment Identity Register). The working method of CDMA is by using the entire band with the help of code. It is based on a wide spectrum as many calls laid over each other, identifying on the basis of unique code. It gives a separate code to a separate phone. It increases the frequency band space by assigning code in sequence. Both the senders and receivers are able to use a full band with help of using their codes. Contrast to one analog call, nearly a dozen calls can be channelized at the same time (Datta & Niharika, 2013).

2.5th Generation: With the users more demand of data 2.5G came with mobile technologies using General Packet Radio Service (GPRS), Enhanced Data Rates for GSM Evolution (EDGE), and High Speed Circuit Switched Data (HSCSD). This system enhanced the data capacity of GSM and mitigates some of its limitations. GPRS adds packet-switched capabilities to existing GSM and TDMA networks.

3rd Generation: 3rd Generation (3G) known as Universal Mobile Telecommunications System (UMTS) or International Mobile Telecommunications-2000 (IMT-2000) is an extension of existing networks based on the GSM and GPRS technologies. IMT-2000 is a set of requirement specified by the International Telecommunication Union (ITU). 2000 stands for the scheduled year for initial trial system and the frequency range of 2000 MHz. 3G in addition to 2G services it provides video calling, mobile TV, many other multimedia and graphic applications and high speed internet facilities. UMTS combines the technologies such as W-CDMA, TD-CDMA, or TD-SCDMA air interfaces, GSM's Mobile Application Part (MAP) core, and the GSM family of speech codec. W-CDMA is the most popular mobile telephone option of UMTS in use. UMTS, using W-CDMA, supports up to 14.0 Mbit/s data transfer rates in theory with High Speed Downlink Packet Access (HSDPA), although the performance in deployed networks could be much lower for both uplink and downlink connections. A major difference of UMTS compared to GSM is the air interfaces forming Generic Radio Access Network (GERAN). It can be connected to various backbone networks like the Internet, ISDN, and GSM or to a UMTS network (Datta & Niharika, 2013).

4^{th} Generation: 4^{th} Generation commonly known as 4G is operated on two main technologies-LTE-A (Long Term Evolution Advanced) and WiMAX2 (Worldwide Interoperability for Microwave Access). 4G offers speed 30 times faster than 3G networks, LTE-A is expected to provide 1Gbps upload and 500Mbps download speed whereas WiMAX2 is expected to provide 128Mbps upload and 56Mbps download speed. This speed is the requirement provided by ITU-A (International Telecommunication Union Advanced) is being seen as only theoretically as service provider is not able to provide such download speed to end users. 4G used other technologies too such as Orthogonal Frequency Division Multiplexing (OFDM), Multiple-Input and Multiple-Output (MIMO), Software Define Radio (SDR), Universal Mobile Telecommunication System (UMTS), and Orthogonal Frequency Division Modulation Access (OFDMA). LTE-A wireless standard used OFDMA downlink and Single Carrier Frequency Division Multiple Access (SC-FDMA) uplink. LTE is a new technology designed and standardized by 3GPP (3G Partnership Project). 3GPP is a transition technology between 3G and 4G, it is initially designed to be used in 3G, but was transferred to the next generation because it didn't meet ITU-A requirement for 3G. 3GPP LTE is now known as LTE-A in 4G. WiMAX is a new technology which was designed to provide multimedia services such as video, audio, text, high speed internet, telephone service, etc. It used OFDMA for both uplink and downlink. It has the capability to cover a greater distance than WiFi, hence thereby operates within a MAN (Metropolitan Area Network). This technology enables high-speed voice and data transmit over long distances in remote and barely populated areas, as well as in densely populated areas.

1.2 Locale of the study

Manipur is one of the north easternmost region of India with an area of 22, 327 square Kilometer. Manipur is sharing a 352 Km long international border with Myanmar to the south-east. It is bordering with Nagaland on the north, Myanmar and Mizoram on the south, Myanmar on the east and Cachar District of Assam on the west. It lies between 23.80° N and 25.68° N latitude and 93.03° E and 94.78° E longitude. Geographically, the state is categorized into hilly region and valley region. The average altitude of the valley is about 790 meter above the sea level and that of the hills is between 1500 meter and 1800 meter. There are nine districts in Manipur of five are hilly district and four are valley district. Churchandpur, Chandel, Urkhrul, Senapati and Tamenglong are hilly district while Imaphal West, Imphal East, Thoubal and Bishnupur are the valley district. According to the census of India, 2011 the total population of Manipur is 25,70,390.The main language of the state is Meeteilon (Manipuri), and the Meitei ethnic group represents 53% of the total population of the Manipur state. The indigenous tribal groups constitute 20% of the state population which are distinguished by dialects and culture.

The state has four major river basins and eight major rivers: the Barak River Basin (Barak Valley) to the west, the Manipur River Basin in the central part, the Yu River Basin in the east and a part of the Lanye River Basin in the north. Imphal River, Iril River, Nambul River, Sekmai River, Chakpi River, Thoubal River and Khuga River. The Loktak Lake is the fresh water lake of Manipur and also the largest fresh lake in the north east of India. It lies 48 km south of Imphal city which includes a small floating weed islands on which the lake people resides.

Manipur is famous for the rich flora and fauna especially the seasonal Shirui Lily plant found in the Ukhrul district of Manipur. The plant could be found only in the hillocks of Shirui Hill than none other places in the world.

The martial arts Thang Ta, dance Ras Lila, Khamba Thoibi Dance, Maibi Dance, theater and sculpture of Manipur are indeed a charm. The Manipuri Ras Lila is one of the renowned and famous dance forms in the world.

The Keibul Lamjao National Park which is situated 48 km away from the Imphal is home to the rare and endangered species of Brow antlered deer locally known as Sangai. It has also house to other 17 rare species of mammals.

The study is conducted in the rural areas of Imphal West District of Manipur. Imphal west is the most populous and most developed district, among the nine districts of Manipur. According to the 2011 census the total population of Manipur is 25,70,390 of which 5,17,992 were inhabited in Imphal West district. There are 2,55,054 males and

2,62,938 female in Imphal West district. The literacy rate of Imphal West district is 86.08%. Out of the total population of Imphal West, 62.33% lives in urban regions of district. In total 322,879 people lives in urban areas of which males are 158,106 and females are 164,773. Sex Ratio in the urban region of Imphal West district is 1042 as per 1000 males. Out of the total population of Imphal west 37.67 % population lives in rural areas. The total population living in rural areas of Imphal West district is 195,113 of which males and females are 96,948 and 98,165 respectively. In rural areas of Imphal West district, the sex ratio is 1013 females per 1000 males. The said district is divided into four sub-division viz., Lamshang, Patsoi, Wangoi and Lamphelpat. The total population of the Lamshang sub-division is 84856 of which 71661 lives in rural areas and 13195 lives in urban areas. The total population of Patsoi sub-division is 70665 of which 49190 lives in rural areas and 21475 lives in urban areas. The total population of Wangoi sub-division is 141049 of which 64539 lives in rural areas and 76510 lives in urban areas. The total population of Lamphelpat sub-division is 221422 of which 9723 lives in rural areas and 211699 lives in urban areas.

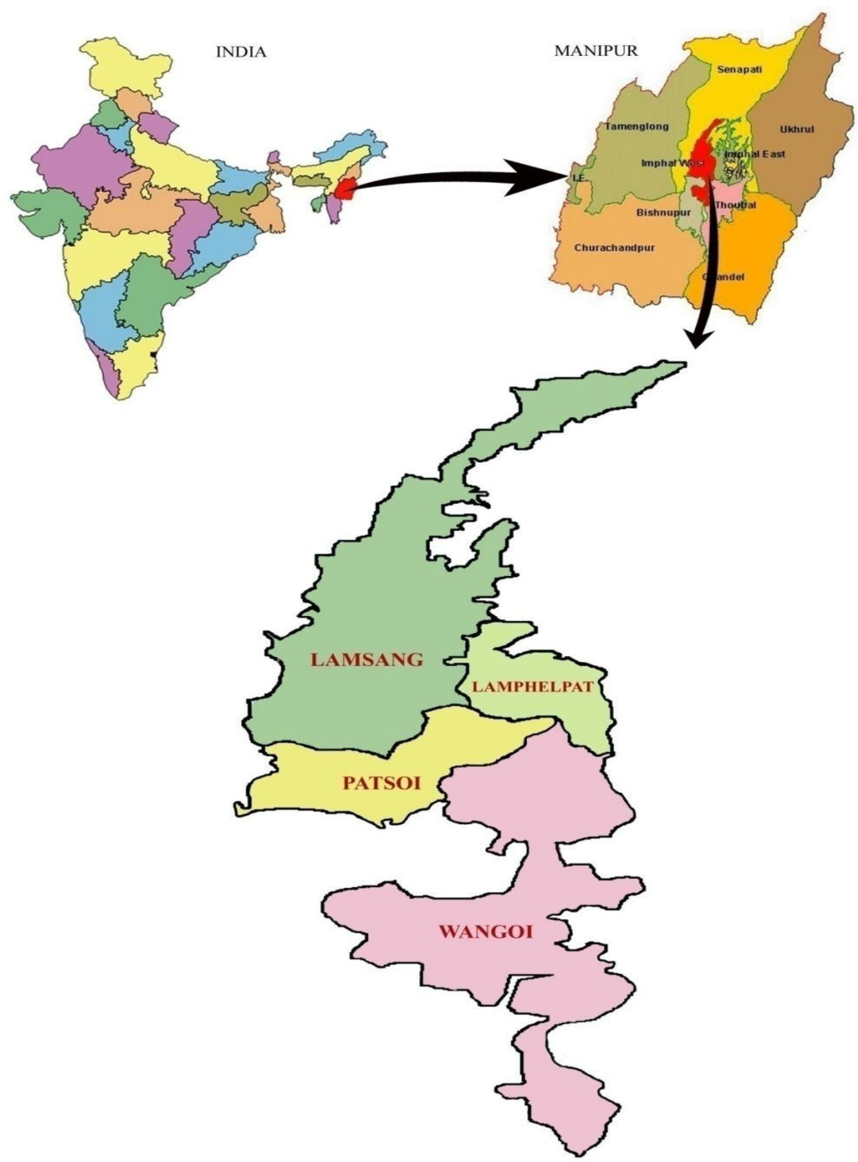

Fig.1.2.1: Un-scale map of Imphal West District.

1.3 OBJECTIVES

1. To study the development and extension of telecommunication in rural areas;
2. To find the pattern of mobile phone usages among villagers;
3. To examine the correlations between mobile communication and rural development;
4. To find out the effectiveness of mobile communication in rural development; and
5. To suggest for designing and developing a model of mobile communication in rural development.

1.4 Theoretical perspectives of mobile communication for development

A theory provides a phenomenon not only to be explained, but also generalized under particular state. It also provides a study to live beyond its origins by providing a meaningful correlation with future studies. The use of theory supports a study by providing a structure of conception, description, assumption, and existing literature of the study. Communication as a discipline has a number of theories that could be used for studies of mobiles in developing contexts. The study of communication is a unique discipline, in the sense that it supports multiple levels of analysis within the discipline and even within a particular study. As a discipline, communication not only has theories that studies mobile particularly, but also enlarge communication theories that address to innovations and media more broadly.

Diffusion of innovation: This theory explained how, why, and at what rate new ideas and technology spread through social systems (Rogers, 2003). In this theory, diffusion is the process by which an innovation is communicated through a channel in a social system. Researchers have brought about significant theoretical advance and empirical support for Rogers' work. A large number of studies on mobile communication for development have used this theory as a theoretical orientation. Diffusion of innovation is a natural fit for studies of mobile media and communication in developing countries because of its demonstrated utility for studying technology in such environments as well as its application at both the individuals and societal level. Thus, diffusion of innovation can aid understanding of the often misunderstood individual-society interactions in developing countries (Pearce, 2013).

Domestication: This theory was designed to help understand the adoption and use of new media technologies by individuals. It explains the processes by which innovations, especially new technology is controlled or appropriated by its users. This theory focus on the individuals' process of discovering, purchasing, and integrating new media devices into their lives, and helps to account for how individuals define others' use of the devices as well as the social consequences of the device (Pearce, 2013). An example is Doner, Gitau, and Marsden (2011) which considers domestication of mobile devices in the absence of experience with a computer. Domestication can be a fruitful theory to use in developing countries because it accounts for social uses and consequences. Understanding cultural and economic variations through domestication enriches both the theory and our insights into mobile media and communication (Pearce, 2013).

Uses and gratifications: The study of media choice of the mobile phone and other information communication technologies is sometimes examined from a uses and gratifications point of view. This approach is concerned with creating the linkages between the kinds of motivations an individual might have for the media. It has been used to study needs and gratifications in mobile phones (Leung & Wei, 2000; Wei, 2008). This perspective can be well used in mobile media and communication studies in developing countries. Assumptions about motivations for use in different environments can produce erroneous conclusions. Thus, uses and gratifications could be a base for further investigation without presuppositions (Pearce, 2013).

Digital divide: The term digital divide is not a theory, but it is popularly used in media studies. The term is an explanation of a phenomenon. Originally, it was shaped to illustrate the socioeconomic gap between computer users and non-users, and between the new technologies access group and non-access group. It has been expanded to encompass any divide between people or groups in their awareness, adoption, and use of, and skill with communication technology, although the term "digital divide" generally implies differences in adoption or use based on socioeconomic divisions (van Dijk, 2005). Much research on mobile phone use in developing countries references digital divide, although the term is used inconsistently between studies (Srinuan, Bolin, & Wareham, cited in Pearce, 2013). Future research carried out in developing countries can help pull out the theoretical consequence of the digital divide. Specifically, mobile media and communication in developing countries can contribute a new observation from resource-constrained environments. The fact is that mobile phones are less expensive than computers and are therefore it is a means to narrow down the digital divide. While there is no practical proof for enhancing the economy from the mobile phone that equal the outcomes of personal computer use, studies that can test policy beliefs will be of great use to development practitioners, policymakers, and scholars (Pearce, 2013).

Social cohesion and maintenance: Mobile phones change the social cohesion and maintenance that was not possible before. The adoption of mobile phones and its utility in every aspect of the daily activities, help in strengthening the social ties and cohesion. Mobiles can strengthen social cohesion in developing countries (Pertierra & Tenhunen cited in Pearce 2013). Ghanaians use mobiles to reproduce, manage, and reduce the costs of relational obligations (Slater & Kwami cited in Pearce, 2013). Study on mobile communication which illustrate social cohesion and maintenance will be of great value in understanding mobile media for development particularly in developing countries.

1.5 Review of Literature

With the more advance of Information and Communication Technology (ICT) new tools of communication were developed and new field of research has been unfolding in the communication sector. In today's society communication becomes a key factor of any development process. Recognizing the importance of communication in development the Government of India established the "Indian Institute of Mass Communication" in 1965, at New Delhi. Among the ICTs mobile phones play an important role in the development process, moreover, in the development of rural areas. In rural areas lack of adequate transportation and communication infrastructure is the main challenge in the path of development. Radio is easily available in rural area and it disseminates information regarding government's developmental policy and program. In order to exercise this policy and program of government now a day ICTs play an important role. Numbers of social scientist and researcher have been conducting research on ICTs and its correlation with different aspects of the development of the rural areas. Further, existing literature on ICTs and its correlation with development is analyzed and highlight its potentiality and application in various aspects of development.

The study of the Indian Council for Research on International Economic Relations (ICRIER) on socio-economic impact of mobile phones on Indian agriculture underlined that mobile phones is contributing to agricultural productivity enhancements. The benefits emerge mainly from the characteristics of mobility, customized content delivery and convenience. In the case of fishermen, in addition to economic benefits, there were other benefits like safety and enhanced quality of life by decreasing isolation and vulnerability (Mittal, Gandhi and Tripathi, 2010).

A study on, "Mobile Phones and Rural Livelihood: Diffusion, Uses and Perceived Impacts Among Farmers in Rural Uganda", revealed that mobile phone is not only being adopted for social reasons, but is considered by the farmer as a tool that will allow for more resourceful response to economic opportunities or threats. In this study an overwhelming majority of respondents has acknowledged the use of the mobile phone for coordinating access to agricultural inputs and market information. The study found that women were later adopters of mobile phones than their male counterparts. Despite of this fact, the recent trend shows that women are more active than men in using mobile phones for agricultural emergency assistance. The study revealed that women are not using the mobile phones solely for kinship maintenance, but also to increase both agricultural productivity and their ability to sell surplus agricultural products for profit. The study further underscores that the necessity of continually incorporating stakeholders' needs into the development and training of farmers in order to use mobile phones successfully in agricultural activities to fit the social framework and fulfill local needs. Farmers strongly believe that the mobile phones increases efficiency and saving money by avoiding wasted travel; it increases effectiveness of operations due to access to improve agricultural resources; and increases the ability to reach new information, such as market prices, agricultural advice, and financial opportunities (Martin & Abbott, 2011).

Mobile Telephony in Rural Areas Perspective from Latin America and the Caribbean shows that mobile telephony increased income for producers and farmers through improved communication with suppliers, buyers, producers, and other stakeholders. The study further incorporate that through mobile communication farmers got timely information that helps to understand and analyze market prices, facilitates trade and informs business decisions; it reduces transaction time, travel, and costs by reducing distances and allowing for a more effective use of time; strengthens communications which promote social networks and communities' progress in health, safety, employment, recreation, and other areas; increases levels of community participation, facilitating an informed decision making process, particularly greater participation from rural women. The study further revealed that Short Messaging Services (SMS) are effectively used to disseminate information to the rural population more extensively and in a more efficient manner. Through SMS the rural population got the news and market prices of agriculture, early warning of condition and weather threats, and information on disasters and how to mitigate them. Farmers can easily make inquiries and receive update price data on a product simply by sending a text message to a specific number. The latest mobile technologies such as mobile GPS, MMS, 3G and others also facilitate the development of innovative services for applications in precision agriculture, geo-traceability, management and control plant and animal health, and other areas (FAO, 2011).

In the study, "Use of Convergent Mobile Technologies for Sustainable Economic Transformation in the lives of Small farmers in Rural India" revealed that the increasing number of suicide cases among the Indian farmers is not only due to lack of funds or failure of crops or enormous amount of interest on debt. But also due to lack of appropriate technologies to incorporate the Indian farming sector with the wider global marketing and planning systems. Lack of information and knowledge about the appropriate crop patterns which are suitable to the market demands and remunerative prices, availability of water, supply of seeds for sowing, proper knowledge of the use of manures and ways to avoid excessive use of pesticides are also the contributing factors which increases in the number of suicides among the farmers. To mend up the problems of rural farmers of India, an appropriate technological approach coupled with infrastructural facilities is required. The study puts forward that the available convergent mobile technologies have the ability to reduce the distress of the farmers and help them compete in the global markets. Further, the technologies hold the promise of offering basic literacy and numeracy skills accessible to the small farmers in India, besides a lot of information concerning the availability of loans at lower interest through banks and self-help groups, crop patterns, remunerative prices for the produce, export norms for the crops, e-marketing and e-commerce, etc (Murthy, 2009).

Another study on the application of mobile communication in agriculture, “Mobilizing the Agricultural Value Chain” revealed the importance of mobile phone in agricultural activities. The study noted information becomes more accessible through the use of mobile phones for stakeholders throughout the agricultural value chain, people are gradually moving toward more efficient ways of producing agricultural products, increasing incomes, and capturing more value by linking fragmented markets. Key benefits include increases in productivity and income for farmers and efficiency improvements in aggregating and transporting products. The study further suggests that the full potential of the mobile phone is yet to be exercised. Government attention is required to examine their role in creating an enabling environment for innovators seeking ways to meet the needs of information-intensive sector. Technologist, governments, NGOs, private business, and donor agencies are starting to work together to leverage mobile technologies for greater inclusion of rural and poor communities into their sphere of activity (Halewood and Surya, 2012).

In a case study of different types of mobile applications for Agriculture & Rural Development of Kenya, Philippines and Sri-Lanka, it is evidence that mobile applications provide information on market trends, prices of the product, advice from experts and also employment information etc. The mobile application of Kenya such as ‘KACE’ provides information on the market and the price of the product. For instance, “KACE” provides daily market information on 20 commodity prices, facilitates offers and bids to match farm outputs with demand from wholesalers, and facilitates links between farmers and buyers. ‘Virtual City’ another mobile application of Kenya provides automated systems to major buyers of tea, coffee, cotton, and dairy for collecting, recording, accounting, and traceability/distribution of agricultural products. Farmers receive faster and more accurate price, quality, and quantity information. Small and medium-size retailers can use phones to facilitate sales, deliveries, orders, and payments. ‘KenCall Farmer’s Information Service’ provides extensive information and advice from experts. Information and answers to questions are available online or by returning phone calls within one day.

In the Philippines, “b2bpricenow” mobile application provides current market price information to farmers and cooperatives. It’s online market platform links sellers to buyers and can process financial transactions using bank accounts (Web) or debit cards (mobile phones). Another mobile application based on agriculture known as “Farmers Texting Centre” provides innovative SMS-based service for answering agricultural queries mainly about rice production from farmers, extension workers, and others. Also provides technological updates on rice production and a virtual network where farmers and clients can interact. ‘TXT CSC’ provides information to citizens on government services and enables citizens to provide feedback and complaints. Complaints are sent by SMS, voice, and other means, and then routed to the appropriate agencies. ‘text2teach’ Provides fast and timely educational content using mobile and satellite technologies. Content includes more than 900 multimedia materials in video, picture, text, and audio formats. Also uses SMS to receive feedback and comments. Project Mind is another mobile application for providing e-education services. This mobile application provides distance and informal education services. Here, in this mobile application students’ performance is monitored through their answers-sent by SMS-to multiple-choice questions. Exams are also administered this way.

Sri Lanka base mobile application "1920 Agri Extension" (also known as GoviSahanaSarana) is a toll-free hotline service that provides crop advisory and technology advice to farmers in Sinhala and Tamil languages. The aim is to help farmers solve problems related to technology, inputs, and marketing matters. Users can call from anywhere in the country for immediate answers by call centre operators. Agriculture experts are also available as a second line of support for more complicated questions. 'e-Dairy' provides farmers with information and access to just-in-time veterinary services using SMS and touch-screen computers. Information covers, animal health, milk prices, feed suppliers, drug suppliers, bank loans, techniques for stall construction, and other topics. '1919 Govt. Info Centre Hotline' provides information on public services from 99 percent of government organizations, such as how to obtain passports, copies of birth certificates, marriage and death certificates, and national identity cards. Also provides information on train schedules and crop prices by SMS (World Bank, 2011).

The study on "Farmers information needs in rural Manipur: an assessment", underline the core area of information required by the rural farmers of Manipur and the channel of communication which can be effectively reached to rural farmers. The study categorized information needs of Manipur's farmers into six groups- Field acquisition: farmers are required to know the different types of schemes, subsidies purchasing of agricultural land. Agricultural inputs: farmers need information about improved variety of seeds, pesticides, agricultural equipment, weather conditions, harvest and post-harvest technology, etc. Agricultural technology: farmers should be fed with information about innovative technology in their farming. Agricultural credit: farmers need information about credit facilities, terms of loan etc. Agricultural marketing: day to day market trend on price of different variety of crops are necessary for the farmers. Food technology: information on post-harvest food technology is needed by the farmers to get optimum benefit out of their crop. To full fill their information need radio is mostly uses followed by television and newspaper. The availability of information service centre in rural areas of Manipur is significantly very less. Majority of the rural farmers are not access to required information needed. Therefore, application of ICT based agricultural information support system is very much important for the dissemination of agricultural information (Shanta & Purnima, 2009).

Information and communication technology has narrowed the gap among communities and improved the knowledge among farmers of developing countries. But still there is a gap among farmers, buyers and extension services of developing countries. Most of the farmers of developing countries require ICT trainings, facilities and skills to boost their product in the future. Many developing countries are facing lack of infrastructure, service delivery from government. Therefore, it is needed to increase ICT based advanced models to expand in developing countries for information delivery to farming communities with proper structural arrangements and connections at different levels of the agricultural supply chain (Chhachhar and Hassan, 2013).

Research has revealed that access to mobile phones is associated with increased agricultural income and productivity. Mobile communication provides a farmer with stronger bargaining power within the existing trade relationship, in addition to being able to seek out other markets. It helps in creating a simple advertising portal, when farmers need additional labour for harvesting or other high-intensity tasks. Mobile communication act as the early warning systems to alleviate agricultural risks and safeguard agricultural income by timely warnings of impending frosts or conditions that favoured pests through SMS. It has the potential for enabling rural people to find jobs without wasting time and travelling costs (Donovan, 2011).

In a study, "M-Governance for Development", delineate the advancing influence of new Information and Communication Technologies (ICTs), in particular mobile phones and its examination of the possible effects on governance. The study report that the Government are increasingly making use of ICT to interact with their citizens, to provide them with services that will benefit them and as a tool to enhance and strengthen the democratic form of government. It further revealed that civil society organizations have used mobile phones to monitor electoral processes in several areas, and in coming near future mobile phone technology will enable m-voting, as the Parliament of Estonia approved the use of mobile technology for the 2011 elections. A vibrant civil society and government's willingness to listen and interact with citizens are just some of the basic ingredients to make m-governance successful. (Tomar, 2011).

The expansions of the mobile phone and its network have created an opportunity for governments around the world to develop service delivery and enhance governance. It also provides an opportunity for citizens to participate directly and engage with government. Many countries, provinces, and cities are showing that mGovernment is taking hold and helping supplement, expand, and innovate services and governance. Government seeking to integrate mobile phone will need to create an enabling environment for technology transformation as well as the institutional capacity to respond to citizen requests for service. Government seeking for successful transformation of government-citizen relationship will be possible only when governments enable the transformation of both elements-"mobile" and "government" (Raja et al., 2012).

In a study "ICT for rural Development: An Inclusive framework for e-Governance", emphasizes the adoption of a more systematic approach for integrating Traditional Knowledge Systems (TKS) and ICT inputs to ensure sustainability of rural e-governance projects. Therefore, the study proposes a framework known as Traditional Knowledge System (TKS) based Government to Citizen to Government framework (G2C2G). This framework suggests for integrating the relevant TKS along with ICT initiatives in the design of e-governance systems for rural development. The output of the framework would be to provide a model for design of rural e-governance projects that are self-sustaining and would lead to socio-economic empowerment of the rural poor. The study highlight some main issues overcome in the path of ICT for rural development, lack of localisation of content for rural communities and inadequate participation of rural communities in design for rural ICT initiatives (Malhotra, Chariar, Das & Ilavarasan, 2007).

In a study "Telecommunication and Rural Development in India: An overview", depicted that there has been a great demand of telecommunication in developing the various sectors of the economy. This sector has been playing an immense role in increasing the Gross Domestic Product (GDP). The study pin point that Government is very keen to provide all infrastructural facilities related to telecommunication in the rural economy so that more socio-economic transformation may take place in the Indian economy. The need to examine various issues and dimensions of the telecommunication sector and their impact on socio-economic development in the economy in general and on the rural economy in particular is also marked out in the study (Gaur).

In the study "The Role of Mobile Phones in Sustainable Rural Poverty Reduction" underlines the positive impact of mobile communication on economy by generating the GDP of the nation. Vodafone (2005) reported that, in a typical developing country, an increase of 10 mobile phones per 100 people boosts GDP growth by 6%. Another evidence of the economic impact of mobile communication is through job creation. Ovum (2006) found that the mobile phone industry created about 3.6 million jobs in India, directly or indirectly. The output of mobile phones such as increasing number of workers, expansion of business, entrepreneurialism, employment opportunities, etc has also a positive impact on the economy. The study further revealed that the use of mobile phones has a potential to enhance entrepreneurship, reduce information asymmetries and market inefficiencies and substitute transportation. In addition to this mobile communication are used to disseminate locally generated and locally relevant educational and health information to rural communities (Bhavani, Chiu, Janakiram and Silarszky, 2008).

The findings of 'the study "Mobile Phones to Rural Livelihoods and Poverty Reduction in Morogoro Region, Tanzania" have revealed that mobile phones provide the households of rural areas with fast and easy modes of communication, thereby increasing their skills to access livelihood assets, undertake diverse livelihood strategies, and overcome their vulnerabilities. The study analyzed three aspects of mobile communication which facilitate to reduce poverty and improve rural livelihoods through a number of ways. First, by increasing and strengthening social networks; increase people's ability to pact with emergencies and to work together thereby reducing costs and increasing productivity. Secondly, mobile phones facilitate rural people to cut down travel costs; minimize physical risks; maximize the outcomes of necessary journeys; increase temporal accessibility; amplify the efficiency of activities; and send and receive money. Thirdly, mobile phones help rural traders and farmers to secure better markets and prices; save time and money; and promptly communicate business-related information (Sife, Kiondo and Macha, 2010).

In a study "Role of mHealth in India and Opportunities for Collaboration" provides an overview of key areas for application of mobile communication in the primary health sector of rural areas. The study underlines the potentiality of mobile communication in enhancing-health service delivery mechanism, promotion of health service such as in giving awareness and monitoring and evaluation of health service delivery mechanism. The study further pin point that research and project based on mHealth which are conducted in developing countries have demonstrated the applications and effectiveness of mHealth. Such research and project are also necessary in India for better designing of mHealth. The emerging technology of telecommunication can facilitate mHealth in rural areas which can add more value to the health sector (Garai, 2011).

Another study on mobile for health communication revealed the potentiality of mHealth in transforming health care systems in low-income economies by generating cost savings and provides more effective health care delivery in limited resource areas. In modern forms of health care systems, people are taking on more responsibility for managing their own health choices, and mobile phones have the ability to change the existing landscape of health decision-making from the state and health institutions to the individuals. Establishment of practicable and sustainable business models that can be simulated and scaled up is the important challenges for designing mHealth. Practicable and sustainable models of mHealth will make a clearer delineation of roles within the health ecosystem between public and private health care providers. Effective monitoring and evaluation of mHealth system is required which could inform the successful design of mHealth application for development (Friederici, Hullin and Yamamichi, 2012).

In a study “Telco-led transformation of healthcare service delivery in India” noted the potentiality of mHealth in transforming the healthcare landscape in India by improving healthcare system for rural areas and enhancing patient care for urban consumers. The study emphasizes that through mHealth, healthcare access would be extended to rural communities and brings service where there is inadequate facilities. It will also facilitate the urban consumers who have the ability to pay for costly monitoring services for improvement of their health. The study suggests that for successful application of mHealth in rural areas a community-based strategy is required. Unlike other common mHealth partnerships that set up a link between a wireless carrier and a healthcare provider, rural mHealth may require a more complex model (Lunde, 2013).

In a study “Special delivery: An analysis of mHealth in maternal and newborn health programs and their outcomes around the world” revealed the impact of mHealth on prenatal and neonatal health outcomes and barriers and strategies in integrating mHealth for maternal and newborn health services. In the analysis of the impact of mHealth on prenatal and neonatal health outcomes noted the role of mHealth in emergency medical response, point-of-care support, health promotion and data collection and management. In the analysis of barriers and strategies in integrating mHealth for maternal and newborn health service noted the problems such as financial issues, policy frameworks and socio-cultural context. Further the study revealed that mHealth presents a new and pervasive platform for addressing prenatal and newborn health, and indicates that mobile technology is an effective tool that empowers pregnant women and healthcare providers. Through mHealth, health workers are enabled to collaborate and improve delivery of care in case of emergency (Tamrat and Kachnowski, 2012).

In a study “mHealth for development the opportunity of mobile technology for healthcare in the developing world” revealed that mHealth will enhance education and awareness, remote data collection, patient monitoring and remote diagnostic, communication and training of health care workers, and disease and epidemic outbreak tracking. Through mHealth, health workers are enabled to provide real-time health information and diagnosis in rural and marginalized areas where health services are often scare or absent together. The challenges of chronic and communicable diseases can be addressed through mHealth. The study also focuses on successful designing of mHealth projects by forging strong partnerships and designing with the end user in mind (Vital Wave Consulting, 2009).

Another study on the application of mobile phone for primary healthcare system in rural India revealed that primary healthcare can be made transparent and easily accessible by the application of "Mobile based Primary Healthcare Management System"(MPHMS). Which have the capability to increase the quality of primary healthcare services, increases efficiency of service care with an ample referral and remote consultation system, improved epidemiological surveillance and control, better pregnancy care registration and management, reduction of maternal and prenatal mortality and morbidity. The study further noted mobile phone can be addressed in slow response rates of government to citizen requests, poor access to services, particularly for low-income and marginalized populations in under-services rural areas (Murthy, 2008).

Technology for Rural Development Role of Telecommunication Media in India, present a detail study on how the telecom media has been boom and contributing towards the rural development process in India. The study noted that telecom media helps in better access to health care and other allied services in the time of urgency and also helps in better coordination for delivery of administration and public services including health, education, etc. It provides information about employment and generates opportunities to women and underprivileged people regarding self-employment and income resources. It creates an atmosphere of national and regional integration, economic diversification, employment, and promotes socio-cultural relation. The study further found that in trade and business sector, it gives timely information on business, price, market, and demands within a few minutes and that too paying a very small amount of price and also interacts with neighboring market regarding business expansion and creates more job opportunities in the local market. It also opens a gateway to the foreign participants in rural sector and establishes a spirit of competitiveness with the Indian players in the development of rural infrastructure and economy. Besides, in the present era of information technology, the telecom services are important for all round development of the society (Rao & Pattnaik, 2006).

In a study, "Mobile Communication: Role and Prospects in the Development of Rural India" provides an overview of issues and challenges of mobile telecommunication in rural areas. The study also highlights the mobile usage pattern of rural areas, satisfaction level and perception regarding the importance of mobile phones. The study outlines the importance of mobile communication as it maintains social contact, emergency relief, health and education. The study emphasizes that rural network infrastructure is difficult to maintain as access to power, transport and road communication is poor. Introduction of advanced technology and changes in the licensing regime in the sector is required to enhance rural telecommunication. The study noted that most of the big telecom operators are taking a wait and watch policy regarding making considerable investments in rural telecommunication. In spite of the creation of the Universal Services Obligation Fund (USOF) which is pool created for financing of rural network by mandatory contributions from telecom service providers, big players are going slowly. Further, the study outline that rural telecom will not happen on its own but great deal of attention from Government sector is require to ensure that all obstacle are removed in licensing, spectrum allocation, technology acquisition, so that small 'niche' operators who are unable to make a mark in the highly competitive urban market (Banerjee, 2011).

"Use of Mobile and Wireless Communication: With Special Reference to Rural India", delineate that the expansion of telecom facilities in rural areas, is enabling rural small traders and others to obtain market information for their products, to contact villagers and or region officials to get information and also certificates and other documents. Information kiosks and tele-centres access to information and connect people in rural areas among themselves and with NGOs, government office etc. The study further include that in recent years use of e-devices, such as, cell phone, wireless, satellite and other communication technologies incorporated with computer and audio-visual devices have greatly improved and advanced intra- and inter-community interactions. It also facilitates the collaboration and expression of views among people across various spheres and at various levels. It also help for the speeding up of empowerment, creation of a more opportunities, facilitation of expression of and greater visibility to the needs and 'dreams' of the rural masses, and drawing upon the wealth of their implicit "community knowledge" for the greater welfare of the society. These programmes are also projected to bridge the "digital divide" within and between nations (Neelameghan & Chester, 2010).

Mobile Phones and Development: An Analyzed of IDRC- supported projects, revealed that in developing countries where there is absence of other ICTs infrastructure facilitate increasingly accessible to mobile phones. Mobile phones simply offer the poor with a relatively affordable and accessible option, compared to other ICTs. The studies further showed that mobile phones help to strengthen social ties among the poor and provide them an opportunity to communicate in the case of emergencies. The study highlights the potential of mobile phones as a tool for economic empowerment. Mobile phones contribute to greater efficiencies for farmers/fishermen and in business development of small entrepreneurs. Mobile phones have great potential in education sector, particularly in the delivery of courses. A few IDRC supported studies have suggested that SMS could be a viable technology for improving distance education courses. The study also demonstrated that mobile phones play an important role in facilitating demographic surveillance or treatment compliance and in disaster relief and prevention (Rashid & Elder, 2009).

The study mobile phones & economic development in Africa identify five potential mechanisms through which mobile phones can present economic benefits to consumers and producers in sub-Saharan Africa. First, mobile phones can improve access to and use of information, thereby dropping search costs, increasing coordination among agents, and increasing market efficiency. Second, this increased communication should improve firms' productive efficiency by allowing them to better handle their supply chains. Third, mobile phones create new job opportunities to address demand for mobile-related services, thereby providing income-generating opportunities in rural and urban areas. Fourth, mobile phones can facilitate communication among social networks in response to shocks, thereby reducing households' exposure to risk. Finally, mobile phone-based application and development projects sometimes known as "m-development" have the potential to facilitate the delivery of financial, agriculture, health, and educational services. (Aker & Mbiti, 2010).

Mobile communications appear to be of greatest utility for those who already have a wide network of personal and business contacts, who tend to travel for reasons of either lifestyle or livelihood, and who are already engaged in some kind of entrepreneurial or business activity. In the case of female homemakers, mobile phones have only limited value, and are not adopted as an essential family resource. The business operates at a very local scale and normal practices do not require on-going communication or remote coordination, mobile phone might be helpful, but it does not prove revolutionary. For farmers, agriculture, sales, distribution and retail activities of the entrepreneur are thoroughly transformed on account of mobile access. These transformations occur on account of better access to market information, improved abilities to coordinate travel and transport, the ability to manage remote activities, and ability to better plan work time and thus increase the number of remunerative work days in a week, month or year (Sood, 2006).

Mobile communications could be used to create and organize car sharing schemes amongst villages and provide real-time information about public transportation services. Mobile phone could considerably transform the logistical problems come across by rural traders and home entrepreneurs, by providing mobile-based ordering systems, delivery request, and the ability to make more consistent and advance arrangements with business partners or clients. Mobile phones are being used in rural areas as an instrument for financial transactions by exchanging airtime for goods and services. New mobile services could better connect rural communities, by establishing a strong network to share and thrash out health information and advice. Mobile phones give a new platform through which rural communities will be able to access government information and services by using text data and audio browsing techniques. Mobile phones could serve as a vital means of communication for children to coordinate one another for educational and peer-learning activities. Particularly, mobile phones are of great value to those communities that are either nomadic or transitional on account of displacement due to a natural disaster or for other reasons. The mainstream entertainment industry is already well aware of the rising prospective of mobile media, there are also many opportunities for local, peer-to-per content to be created and disseminated, affording new cultural and economic opportunities to rural communities (Schwartz, 2007).

In a study "Exploring technology acceptance for mobile services" underlines the importance in designing mobile service provided by mobile service provider. The type of service delivers to the users should be easy and useful. The service provider should focus on the quality of the service, speed and simplicity. The need and want of the users is something which is easy to use and less effort in adoption of the service. The study emphasizes that users do not want to spend extra money and time to use mobile services. If users find it is useless and bring no value to the life, they tend to avoid using that kind of services. In order to encourage people to use the mobile services, mobile service provider should not charge premium prices. Price has always been a barrier for the users to use mobile services. If the price of using the services is reasonable, users will not hesitate to use it (Phan & Daim, 2011).

The study on "ICTs and Rural Development: Review of the Literature, Current Interventions and Opportunities for Action" emphasize that ICTs support in accumulating large capacity of information, and facilitate in the improvement of existing information management processes by improving accessibility, transparency, accountability, efficiency, speed of delivery and providing new information sharing opportunities through affordability, availability and ease of use. It has the ability to bring good governance by developing existing formal information system run by local government and development agencies and also help in decentralisation of information systems, decreasing dependency and empowering the rural poor by developing control over information and knowledge. In the context of market opportunities and institutional environment in rural areas, the study underlines that ICTs have the potential to improve access to information regarding market opportunities and information about their rights, the role and the responsibilities of the institution and the service provided by the institution. ICTs can also maintain improved provision of short-term information necessary by the rural poor for livelihood strategies and have the potential to increase the benefit and reduce the opportunity costs of participation. ICTs can help pro-poor institutions listen to the poor, engage in more meaningful dialogue and build consensus and mutual understanding around development objectives. ICTs provide practical opportunities for improved information exchange between different groups and new and innovative knowledge partnerships (Chapman and Slaymaker, 2002).

In a study "Mobile communication for sustainable development: change and challenges in South Asia" revealed the potentiality of mobile communication in the development of developing countries. Mobile communication has the potentiality of reducing transaction costs, expansion trade networks, and facilitating searches for employment and new market opportunities. It provides market links for farmers and entrepreneurs and are mainly used for communication and information services. It facilitates m-governance by utilizing all kinds of wireless, mobile technology and telecommunication services which in turn increases interaction among citizens, business and all government units. It also has the capability of enhancing education, women empowerment and social movements (Prasad, 2012).

A study on "Impact of information and communication technology on rural India" concludes that for the sustainability of rural masses, an integrated framework for ICT interventions in rural areas is required that could amicably blend community needs, knowledge and inputs along with inputs of other stakeholders. It further revealed that ICT can contribute to poverty reduction, if it is focused to the needs of the poor and if it is used in the right way for right purposes and complemented with required reforms (Chitla, 2012).

In a study “The role of information and communication technologies in Ghana’s rural development” revealed that ICT helps in decentralization of governance, with the advent of mobile phones in the rural areas, the views and problems of rural people are able to bring the attention of their policy maker for response. It attracts micro and small enterprises to the rural areas, thereby creating job opportunities and financial assistance for the rural folk. Through ICTs and the internet many rural banks in Ghana are now automated and networked, which help many micro and small enterprises, traders and farmers in their transactions since they can deposit money in one bank and withdraw it from another. ICT enhanced distance learning services for rural people and also provides learning opportunities by overcoming geographical barriers and limited financial resources. Networking and information sharing among rural people is also enhanced with the proliferation of mobile phones, community information centres and community radio stations. Information and experiences on agriculture, fishing, marketing of produce, health, education and climate change and environmental pollution is easily shared among rural people for the improvement in their standard of living. The application of ICTs in health care delivery services known as telemedicine enables access to professional expertise irrespective of the geographical location of the patient or the doctor. ICTs have helped rural health workers to communicate easily with the district and regional health directorates for fast and prompt supply of drugs and medical equipment. Patients are also able to communicate easily through mobile phones with health workers to report their health status and problems. There is also the important role being played by ICTs in gathering and updating information from the rural areas to help the government to build databases on issues such as climate change, environmental pollution, food production and deforestation. In particular, satellite and remote sensing technologies are increasingly being used for development planning purposes. Through the diffusion of ICTs different forms of entertainment media are now reaching rural areas. This has not only improved the quality of life for rural people, but has also reduced their isolation and cultural distance from urban areas. ICTs have also enabled rural based NGOs to gain visibility at regional, national and international levels. Rural NGOs are widely and effectively using

ICTs, particularly e-mail, to contact people and international organizations, to organize events, coordinate actions and to establish networks (Boateng, 2012).

In a study ICTs for rural development, pinpoint that the explosion of ICT, especially mobile phones, has transformed the development landscape and enhanced economic growth and poverty reduction. The study emphasizes that "in Sub-Saharan Africa one percent growth in mobile networks is correlated with a five percent increased in per capita GDP". For farmers and traders, ICT allows rapid dissemination of information about commodity prices, supply gluts or market fluctuations allowing them to mitigate yield losses. Doctors and health administrators also used real-time information to better track patient, who in turn use ICT to better manage their own health. mMoney facilitate savings, insurance and credit to finance assets or basic services and also provides a new business models that link payments to delivery of other services (SangoNet, 2011).

A study on "Impact of ICT on community development in Economic and social Commission for Western Asia member countries" underline the capability of ICTs in development. The study emphasizes that ICTs improve communication, especially for communities previously isolated from the rest of the world or even the rest of the country they reside in. ICTs have been successful in improving employment opportunities either through training or facilitating access to micro loans. By introducing new and novel ideas, ICTs has also succeeded in encouraging entrepreneurship. Communicating and networking for social purposes may bring about new business opportunities and the advertising of a village heritage may well attract investment. Further the study concludes that breaking up of telecommunication monopolies and promoting completion are closely correlated to increased economic growth. Increased in the usages of mobile phones is also associated with GDP growth, particularly for the poorest citizens of developing nations. Involvement of rural community in planning and implementing ICTs projects produced better significant results than those which are developing far away and implemented on the franchise basis (ESCWA, 2009).

The study on ICTs for education highlights the various important aspects of integration of ICTs in the education sector. ICTs enhanced teacher training and also facilitate the teachers to use ICTs in the classroom and to develop curricular and support materials/ resources. It also provides a platform for distance education for sharing of knowledge and improves management and administration of the educational institutions through institutional website. It also supports the policymaker in implementation and making better framework for education sector. Improves the skill of youth and provides better employment opportunities (IICD, 2007).

ICTs facilitate the rural communities to connect with the local, regional and national market provides better banking/financial services and employment opportunities. It improves e-governance services and bridging the digital divide and reduces the infrastructural gap and addresses other constraint face by the rural community. For better application of ICTs in rural development available and affordable is not only required, but also need to focus on the content of the message to be in local language as per needs of target beneficiaries. It is also essential to use ICTs for capacity building of various stakeholders to achieve the goal of ICT enable rural development project (Gulati, 2012).

The study on "ICT: A catalytic intervention for empowering rural India" emphasize the potentiality of ICTs in strengthening rural governance by improving the transparency, accountability and administrative efficiency of rural institutions, promoting participation of the rural poor in the decision making processes and improving the efficiency and responsiveness of rural service delivery mechanism. It also enhanced the interaction of civil societies and its participation in the rural governing process. With the development of ICTs the flow of information and knowledge are beyond the border of social and economic status which ultimately lead to social transformation. The study further marked that ICTs improves access to markets, health, and education which in turn lead to economic development, job creation and poverty alleviation. It also strengthens the information-base of rural communities by providing government initiatives short-term development information required by the rural communities for effective livelihood strategies. It increases the benefits and reduces the opportunity costs of people participation in the process of rural development. ICTs enhanced agriculture, producing healthy, literate and skillful workers for industry and for bringing about effective participation in nation building activity (Hazra, 2012).

The study on rural telephony for rural development underline that " rural telephony help in distributing locally relevant information, targeting disadvantage and marginalized groups, promoting local entrepreneurship, health, strengthening education, promoting trade and e-commerce, supporting good governance, building capacity and capability, enriching culture, supporting agriculture, creating employment opportunities, reinforcing social mobilization (Kameswari, 2012).

The opportunities of rural communities are enhanced by the application of ICTs in rural development initiatives development program which resulted in better access to markets, health and education. It helps in the expansion of government services through e-governance and reduces the risks by increasing access to micro finance and promotes economic development, job-creation and poverty alleviation. For better development of e-governance, adoption of more systematic approach for integrating traditional knowledge system with ICTs inputs is required and localisation of content and participation of rural communities in framing and designing of rural ICT initiatives (Raheem, 2012).

Another study on "Role of ICTs in rural development with reference to changing climatic conditions" underlines the potentiality of ICTs in the agriculture sector by facilitating the farmers about crop care, animal husbandry, fertilizer and feedstock inputs, pest control, seed sourcing and market prices. The study further emphasizes the application of ICTs in teaching and learning processes. ICT increases the connectivity of the rural communities to the outside world for exchange of information which is a basic necessity for economic development. It also enhanced employment opportunities by providing online services for job placement. ICT enhanced e-governance which makes government processes more efficient and transparent by encouraging communication and information sharing among rural and marginalized people. It support capacity building and empowerment of rural communities and farmers by enabling them to interact with stakeholders, increasing negotiating powers, opens up new business opportunities and allows easier contact with friends and relatives. Development of internet and mobile phone in rural areas has improving service delivery mechanisms and make relevant information accessible to end users, and also improving health sector and help in giving awareness to the environmental related issues (Kumar & Sing, 2012)

One of the study on “Information and communication technology for Rural Development” pinpoint that through ICTs like internet or mobile phone government are able to deliver various developmental services to its citizens. The study further categorise the application of ICT in governance into two categories, i.e., improving government process and bounding interaction within civil society. The potentiality of ICTs in various aspects of development is further emphasized in the study. Through distance education which is the integration of ICTs in education, enhanced education and information flow. One new aspect of ICTs in the development process is underlined in the study, i.e., ICTs has the capability of managing natural resources record in rural areas. Communication channel required in managing such natural resource record can be enhanced with appropriate authorities, landowners, government ministries, and local government officials. So that, all can communicate for taking appropriate decisions about the natural resources available in the rural areas. It also has the scope of strengthening rural financial institutions such as banking and make accessible to take a loan and saving money. It increases social networking in the rural areas and providing opportunities for employment at a regional and national level. It facilitate communication channel for sales of goods on local or global market by making accessible to better market information (Tripathi, Singh & Kumar, 2012).

In a study “Social implications of information and communications technology in developing countries: Lesson from Asian success stories” noted the potential of ICT in accelerating the development process by generating new possibilities to solve the problems of rural poverty, inequality and environment degradation. The study categorised the application of ICT into decision support to public administrations, improving service to citizens, and empowering citizens to access information and knowledge. Decision support systems for public administrators focus on improving planning and monitoring development programs. Improving services to citizens focus on automating the process of delivering services to citizens, and in the process bringing in transparency. Empowering citizens to access information and knowledge focus on providing up-to-date information of markets to producers and increasing their bargaining powers. The study further revealed that improving the skills of rural people on ICT can provide employment in electronics repair centres and information handling services. ICT can also be used to train field workers located in rural areas through innovation designs of distance learning programs. ICT needs to be further deployed to train physically and socially disadvantaged groups (Bhatnagar, 2000).

In a study "Can information and communications technology applications contribute to poverty reduction? Lessons from rural India" noted the application of ICT can enhance poor people's opportunities by improving their access to markets, health and education. It empowers the poor by expanding the use of government services, and reduces risks by widening access to microfinance. ICT can addressed information asymmetric and stimulate poor people's entrepreneurship by better connecting them to markets. It can also improve health care delivery to the poor by reducing travelling cost for medical attention and diagnosis. The study further revealed that ICT can be used by government agencies to transform relations with citizens and business. Through ICT it is possible to locate service centres that provide document, land records and other public services physically closer to citizens. It also increased transparency, less corruption, better delivery of government services and greater government responsiveness. The study further noted that it also facilitates in improving access to microfinance, computerization, smart cards, and software systems, providing loan tracking, financial projections and branch management information can reduce costs and help microfinance institutions reach clients more effectively. The study suggests that for successful implementation of ICT for poverty reduction is not an automated process. It requires attentive public policy formulation and careful project design. Insufficient information and communication infrastructure, high access costs, and illiteracy have bestowed the benefits of ICT on the better off (Cecchini and Scott, 2010).

The study on “ICT for rural education and development: Success factors and lessons learned” revealed the factors to be considered while designing the ICT base projects for rural development. The study noted ICT project for rural development should be focused on the challenges and problems faced by the rural populations and should be aware of the socio-economic background and the habits of the rural people. The study noted that the type of ICT chosen should be flexible and user friendly. The project should be designed to adapt its mechanisms to the needs and skills of rural inhabitants. The study further revealed the importance of participation of multiple stakeholders in the planning and implementation process of ICT for development. The study also further highlight the importance of integration of rural people in the management of the project and imparts training and support activities which in turns will increase the number of beneficiaries and contribute to the project’s longevity (Cauzanet).

1.6 Significance of the Study

The present study is aimed to examine the role of mobile communication in rural development of far flung areas. In its ambit the study is significant because in the near future, mobile penetration is going to exceed 80%. By achieving this number it will be most popular, most distributed communication gadget which can perform multimedia functions. It is expected that with the growth of mobile phones in rural areas the structure and system of governance and distribution of resources will be changed as well as in the micro level business of rural areas. Consequently, it is a significant question that how such communication technology will be utilized. The research orientation in this regard will help the stakeholders, NGOs and government to think, plan and execute adequately and without delay in development activities. This will transform the prospects of rural India by enhancing the socio-economic environment. Therefore, this study is very significant and useful to understand the interrelation between mobile communication and different aspect of rural development. Such as in designing or utilizing mobile communication for agriculture, health, education, governance and for marketing purposes, etc. The study will also be useful as a research reference for further research.

1.7 Research Methodology

This study is empirical in nature and is based on the analysis of primary data collected from selected areas of the study. For proposed study the Imphal West district of the Manipur is the geographical/ administrative universe of the study. Out of total population samples is selected and after analysis of collected data the results of the study is presented.

1.7.1 Universe of the study- The Imphal West district of the Manipur is selected as the universe of the study. Rural residents of the district having mobile phones are examined by researcher to collect the opinion.

1.7.2 Tool- With the help of Questionnaire interview schedule, view of the samples is collected. This tool is constructed by the researcher himself. The researcher collects the data by direct interaction with respondents. The questionnaire is designed both in English and Manipuri.

1.7.3 Sample and Sample size- After assessing the requirement of the study and considering the resource and time constraint of the Ph.D. research an interim number of 608 representative samples felt suitable to cover the heterogeneity of the population is selected. The representativeness of the samples is determined on the basis of scientific method of random sampling. Out of total 107 villages of Imphal West, 15% from each sub division is selected. 8 villages out of total 56 villages from Lamsang, 1 villages out of 4 villages from Lamphelpat, 3 villages out of 19 villages from Patsoi and 4 villages out of 28 villages from Wangoi is short listed for sampling. From the selected villages, individual in a proportionate way with the help of systematic randomization is selected. The collected data is analysed with the help of appropriate method and results of the study is compiled with qualitative conclusion.

Table 1.7.3.1 Selection of respondents from each selected villages for data collection

SL.No	Name of village	Sub-Division	THH (X)	No. of individual selected from each village (y)	Regular interval of respondents selection (x÷y)
1	Moidangpok Khullen	Patsoi	794	38	20
2	Heigrujam	-do-	497	38	13
3	Yurembam	-do-	821	38	21
4	Thaoroijam	Lamsang	267	38	7
5	Karong	-do-	209	38	5
6	Kangdabi	-do-	146	38	3
7	Tairenpokpi	-do-	218	38	5
8	Pheiyeng	-do-	660	38	17
9	Mayanglanjing	-do-	621	38	16
10	Phumlou	-do-	462	38	12
11	Awangkhunou	-do-	678	38	17
12	Ningombam	Wangoi	567	38	14
13	Meijarao	-do-	536	38	14
14	Laphupattera	-do-	831	38	21
15	Bitra Urokhong	-do-	368	38	9
16	Maibam Leikai	Lamphel	664	38	17

Note: THH-Total House Hold

1.8 Definition of Technical terms

Mobile communication: Technically mobile communication is a process where a mobile station (MS) or subscriber unit communicates to a fixed base station (BS) which in turn communicates to the desired user at the other end. Mobile communication is a multi-step flow of communication in which more than two persons can be communicates at the same time base on the service provider. In mobile communication a sender is required, which send messages through a channel to receiver in doing so both the sender and the receiver may act either decoder or encoder. The message in mobile communication may be in the form of text, still image, video, and voice.

Rural: Rural is an area or place used to denote a certain geographical area which is under developed. This place or area is politically, economically, socially, backward from other area. Typically, their main source of income is from agriculture, cultivation, fishing and other forest product, etc. Usually, the inhabitants of such areas remain backward in terms of their standard of life, thus facing prominent problems like extreme poverty, un-employment, lack of education facilities, lack of communication and transportation infrastructure, as well as insufficient medical services.

Development: Development is a process of social change which intend to bring about positive achievement both materialistic and of humanistic value in a society. According to Oxford Advanced Learner's dictionary 8th edition, it is the "gradual growth of something so that it becomes more advanced, stronger, etc." or "a new event or stage that is likely to affect what happens in the continuing situation". Development is the multi-dimensional approach which seeks to transform society by improving the quality of living standard, enjoy greater freedom and equality. The United Nations Development Program uses a more detailed definition- according to them development is "to lead long and healthy lives, to be knowledgeable, to have access to the resources needed for a decent standard of living and to be able to participate in the life of the community".

Role: It is the part played by somebody or certain behavior or nature of some character in a given social context or organization or in some relationship. According to "Cambridge Advanced Learner's Dictionary" third edition, the role is defined as the position or purpose that someone or something has in a situation, organization, society or relationship.

mGovernance: mGovernance is the mobile base application for effective delivery of government services to its citizens and form citizen to government to establish transparency in governance. mGovernance can be exercised through specially designed software or through SMS or voice services.

mEducation: mEducation is the mobile base application for enhancing education either formal education or informal education. It can be exercised through specially designed software or through SMS or voice services.

mHealth: mHealth is the mobile base application for enhancing public health by providing health related information, monitoring public health and creating a data base for health system. mHealth can be practice either through SMS or voice telephony or specially designed software.

mAgriculture: mAgriculture is the mobile base application for improving agricultural related activities by providing timely information on diseases, weather forecast, market information and new techniques of production. mAgriculture can be practice either through SMS or voice telephony or specially designed software.

mCommerce: mCommerce is the mobile base application for enhancing business activities by facilitating buying and selling of the service or product. mCommerce can be practice either through SMS or voice telephony or specially designed software.