Chapter 3

Review of Literature
3.1 Introduction:

Literature review is the level of research, knowledge that has been developed in the field of study, thus present what is already known and what remains to be investigated in the specific area of research. Call, Borg and Gall (1996) stated that delimiting the research problem, seeking new line of inquiry, avoiding fruitless approaches, gaining methodological insights, identifying recommendation for further research and seeking support for grounded theory.

3.2 Prof. T.P. Rama Rao\textsuperscript{1}, “ICT and e-Governance for Rural Development Center for electronic governance”, Indian Institute of Management, Ahmedabad.

3.2.1 e-Governance projects: Researcher has worked on rural e-Governance applications in the recent projects and demonstrated the important role the Information and Communication Technologies (ICT) play for rural development. Several states have initiated the creation of State Wide Area Networks (SWAN) to facilitate electronic access of the state and district administration services to the citizens in villages. E-Governance projects like Andhar Pradesh- APSWAN, Karnataka - Bhoomi, Tamil-Nadu- Sustainable Access in Rural India (SARI), Kerala- Akshaya Project, Maharashtra - Integrated Citizen's Service Centers SETU, Gujarat- Gyan Ganga Project with nLogue Communications Pvt. Ltd, Madhya Pradesh- Mandi network , West Bangal-Government-to-citizen portal, Himachal Pradesh- HPSWAN, Pondicherry - Information Village Research Project was M.S. Swaminathan Research Foundation, for Pondicherry fishermen. Detail summarization of project, what type of network connectivity required, How to get information mention in their project, How to make sustaining capacity, what are the flaws and how to maintain it. Researcher has recommended that typical ICT infrastructure for rural application model.
Researcher has larger perspective to indicate that significant efforts are required to design, develop and internalize the ICT solutions through well managed reengineering of back-end processes and capacity building efforts to ensure sustainability.

Suitable public-private partnership models have to be adopted to ensure rapid development and cost effective solutions.

3.2.2 Sources of Information: Researcher has referred lot of literature like books, published papers, web sites, new paper article and study the contribution of various authors in the area of development of area of it in India specifically in rural India. Researcher has came across various it model working in rural area. Information and communication Technology play a vital role for enhances the base, minimize the processing cost and increase transparency.

3.2.3 e-Governance Projects Connectivity status: e-Governance projects based on Internet technology and Network connectivity in the form of other value added services to remote location, access through ISP as inexpensive solution. Some project on wireless technology to reach the remote place.

APSWAN project based on connectivity to Police Department across Andhra Pradesh. The basic information like voice, data and video communication between government-citizen and government-industry interface. APSWAN make use of the 2MB dedicated communication network established by AP Telecom from the State Headquarters to all the Districts and the other two important centers viz. Vijayawada and Tirupati.

Bhoomi project managing the centralized database and kiosks managed by an operator to assist the citizens in rural areas for accessing the services of the government. Revenue Department would connect 177 Bhoomi data centers located at various taluka
places. Rural Digital Services (RDS) to offer value added services, including video conference, to citizens across the state by charging minimal costs. A satellite network, which is being set up by BSNL will set up a wide area network (WAN) for the Karnataka government at an estimated cost of Rs 170-crore. The WAN called Karnataka State Wide Area Network (KSWAN) will provide 2 mbps connectivity from Bangalore to all district headquarters of the state (27 locations) and 64 kbps connectivity to taluka headquarters.

Sustainable Access in Rural India (SARI) Project was initially implemented in Melur taluk in Madurai during 2003-04. Its aim was to help villagers harness the power of the Internet for social development, wealth creation and job generation and to establish rural connectivity at a low cost. Touch screen Internet kiosks had been installed through public-private partnerships in all taluka of the State. TNSWAN Network will be linking all the Government departments to provide voice, data and video connectivity for improving delivery of services to the citizens and for improving the response-time and transparency. Connectivity will be established for the 29 District Headquarter to Chennai and also to Taluka and Blocks using the free 2Mbps bandwidth available from Private Communication Providers (PCPs). Each PCP has to provide free bandwidth of 2Mbps for connecting the State Headquarter to the District Headquarter dynamic bandwidth allocation at State Headquarter among various Government users and also Intra District bandwidth requirements.

Akshaya Project aims to set up a network of 6000 information provide services like data-entry, Desk Top Publishing, Computer Training and Internet Telephony; generate and distribute locally relevant content; improve public delivery of services for Government departments like payment collection, e-commerce, e-courier; and create employment opportunities. The Akshaya project is being implemented through Panchayati Raj Institutions, and involves private enterprise in the development of training institutes and content generation. Networking and computerizing the 1214 local self-governing bodies to expedite transactions like issue of certificates, licenses, tax collection etc. Internet kiosks, accessible to the public in every Panchayat ward. The
government is setting up broadband Internet facility to connect all the Akshaya centers. The Kerala State mission is thinking of providing the Akshaya e-centres the facility of collecting the government revenue as part of the existing FRIENDSs project.

Integrated Citizen's Service Centers SETU has been established in 25 District Headquarters and 225 Taluka places. At this stage these centers provide all the collector office related facilities. Warana Wired Village covering 70 villages- executed by the NIC and the Warana Vibagh Shikshan Mandal. The existing co-operative structure has been used in concert with State of the art infrastructure (high speed VSATs) to allow Internet access to existing cooperative societies.

The project aims to provide agricultural, medical, and educational information to villagers by establishing networked "facilitation booths" in 70 villages.

Gyan Ganga(Gujrat) Project with nLogue Communications Pvt. Ltd: 5 Talukas commissioned, 3 Talukas final stages, 70 kiosks connected and operational. Services started: Computer education, photography, email, videomail, video conference. E-governance, Health, Veterinary – to start soon SWAGAT (Online Grievance Redressal System) Mahiti Shakti in Panchmahals district. Connectivity: All districts Head Quarter (HQ) are linked with the Secretariat with 2 Mbps leased circuits and all Talukas (TC) linked with the District HQ (DC) with 64 KBPS leased circuits taken from Bharat Sanchar Nigam Limited (BSNL). There are at least 20 other offices at each district HQ, in the process of integration with the district wide area node (DC) through bare copper from BSNL. Each DC has 10 telephone (receive only) lines from PSTN terminating on to dialup services. In all there are 250 dialup ports available through the state enabling units/offices/individuals to hook on to GSWAN just by making a local call, from anywhere within the state.

Setting up of information kiosks for providing email, Internet and other value added services. The existing public grievance redressal system is being upgraded, to facilitate access to citizens through kiosks. Mandi Board has prepared a scheme to computerize its activities and for integration of Mandi network through Internet/Virtual Private
Network. Reliance Industries Ltd. has entered into a Joint Venture (JV) with Madhya Pradesh State Industries Development Corporation (MPSIDC). Reliance was set-up 500 information kiosks by March 31 2001, and 7,300 more in the following year. 80% of these kiosks would be set-up in rural areas for which Reliance will lay an optical fiber cable network of 4500 km in the State.

Government-to-citizen portal (West Bangal), anybody can download non-saleable government forms and avail many more facilities through the Internet. 82 information kiosks have been created to provide services at a nominal fee. Three major hospitals have been connected to rural hospitals to provide the benefits of their quality healthcare facilities to the rural populace. The systems operate on conventional telephone lines and ISDN mostly on store and forward technology with live video and data session support. Almost 1,500 people have been treated so far. A GIS databank is being developed to reach the smallest of municipal areas.

The State Government has recently taken up the implementation of LOKMITRA project on a pilot basis in Hamirpur District. The project envisages the setting-up of a District-wide INTRANET with Servers at the District headquarters, connecting 25 Citizen Information Booths located in the rural areas throughout the District. Connectivity: The State Government, as a part of its comprehensive Information Technology Plan and for E-Governance, is creating a State Wide Area Network (HPSWAN), which will also be connected to the Internet. This State wide computer network will link all the district headquarters with the State headquarters.

Information village Research Project was M.S. Swaminathan Research Foundation, for Pondicherry fishermen. Computers were placed in the village center and connected to the Internet, through which regular weather reports of the Indian astronomical office could be accessed. The weather report is broadcast by loudspeakers and through VHF radios which enabled fishermen to determine low and high tide before sailing off to the sea to fish. Connectivity: Technology for the Internet access was based on a hybrid of 2-
way VHF radio and the wired public telephone network, providing integrated voice and data communication capability. The data transmission was restricted to a maximum speed of 14.4 KBPS on the wireless, where Email (SMTP) or fax protocols were used. Through a PBX (office intercom-style), every village center could be connected to this hybrid network. To overcome power outages, a hybrid system of solar photovoltaic panels and grid power, interfaced by a commercially available digital circuit, was used as source of power.

3.2.4 Connectivity options: Researcher has given standard for connecting the rural ICT solutions are normally offered through Internet portals hosted on a delivery web server to provide access to the citizens through inexpensive Internet medium.

- Related Departments to Central Servicing Agency: Manual or WAN / Intranet / LAN of individual departments, agency should be Individual departments of central, state and district administration.

- Central Servicing Agency to Delivery Server (web server) and technology required LAN with or without Intranet; agency should be Coordination committee offering the service.

- Deliver Server (web server) to Internet Service Provider (ISP), technology may be Leased or Dedicated line /VSAT; agency should be Service deployment agency.

- Central Servicing Agency’s ISP to Rural –ISP technology may be ISP dedicated lines / BSNL / VSNL / Private Telecom; agency should Internet Service Provider(s).

- Rural - ISP to Rural Kiosks and technology may be Dial up line or Wireless (WiLL); agency should be Service Delivery Agents (Village Panchayats, Private Entrepreneurs).

3.2.5 Problem Solution: Most of the villages are has load-shedding problem that is why connectivity problem plagued most of the rural ICT application. The alternative of electricity is solar and wireless connectivity solution. Researcher has given insight for improvement in convenience, reduction of cost, reengineering, integration with public-
private partnership, focus on application development and enhancement of revenue for the government and service provider.

3.3 Anand Chopra 2005 “2, “Bridging India’s Digital Divide: Some Policy and Technological Options”.

3.3.1 Insight of problem: Researcher has referred lot of research paper, web sites and deals with the problem of digital divide in India especially in rural India. Researcher has found that coordination required with government, industry, civil society and establishing Internet kiosks to dissemination of ICT in rural areas. Researcher has taken nineteen personal interviews were conducted in related field and recommended the policy to enhanced the effectiveness of kiosks center.

3.3.2 Review of Literature: Researcher has taken around forty review of literature to investigation of digital divide-employment and development implication research through International labor review (2001). Referred Steinmueller(2001) literature and found that ICT are unique in a number of ways compared with the leading industries of the past that were responsible for industrial growth and development. Researcher has referred Ashok Junjhunwala literature and found that level of infrastructure and industry has gain self-confidence that divide the urban, semi-urban and rural. Computer and Telecommunication are fast changing lifestyles, overall efficiency of human activity and Internet is enabling one to have access to almost any kind of information on one’s fingertips. But this difference between the haves and have-nots. It is huge gaps within India when it comes to ICT infrastructure and equipment leads to gaps between in provision of basic services that is health, education and opportunities for sustainable development. Even as late as 1996, the Indian telephony density was 1.3% as compared to the world average of 11%. It was in 1986, when the then Prime Minister Mr. Rajiv Gandhi said that “India had missed the telecom revolution bus”, that the mission ‘Better Communications’ was taken up at his behest. Also the ‘Perspective Plan’ 1990-2000 as
formulated for development of this sector. The main objectives of both were towards improving quantity and quality of telecom sector.

3.3.3 Expected connectivity for rural area: Researcher has suggested that Jhunjhunwala model for Internet access. Quoted some problem regarding the access of Internet like PSTN in India has been designed to serve peak-hour of 0.1 Erlang per subscriber, telephone is presumed to be used on the average for 10% of the time busy part of the day, Internet access complicated the way. Internet user offers a load of as much as 0.3 Erlang during peak hour. As the ratio of Internet users to the total users grows, the PSTN will just not be able to handle the load. The network will get congested and fail to complete a large number of calls.

VSAT-is based on rural telephony solutions offering reliable connectivity. VSAT can handle anything from low-bandwidth voice calls to high-bandwidth images of X-ray, photos and broadcast-quality moving videos. No other technology reaching the rural market can do that. VSAT can support multiple connections, installed in a village kiosk can be used to support not just a kiosk, but also phone lines reaching villagers' homes this alters the economics of rural telephony as the fixed cost of the VSAT is spread over multiple sources of revenue. Depending on the government's relaxation of DTH norms, we will see the introduction of small satellite antennas that can be used to receive TV signals and also offer broadband Internet access and Voice over Internet Protocol (VoIP), further driving penetration and improving the economics of the business. All this ties into the long-term vision of the DoT, which is to turn today's VPTs into 'information kiosks' offering everything from tele-medicine to tele-education and the Internet. The deployment of rural telephony reveals a market that faces innumerable challenges irrespective of whether the technology used is wireline, GSM, WLL or satellite. In fact VPT costs more than Rs 100,000 (US$ 2,300), without including the space segment charges. In addition, precautions must be taken on equipment safety and the quality (and, hence, the cost) of manpower hired to service the equipment is higher.

VSAT based solutions face the additional barrier of having to compete with cheaper terrestrial technologies such as copper, WLL and wireless. VSAT based solutions face
competition from such players as ACeS and Thuraya that offer portable and low maintenance satellite phones.

Researcher has insight on communication media that is Copper wire not larger scope for longer distance. Wireless networks are requiring line-of-sight signal relay for long-haul network. Sometime mix and match used combining international connections via satellite with microwave connections between cities and ‘last mile’ connections that are often established via cable.

Researcher has focused on cost effective way of communication for rural people which was Wireless Local Loop (WLL). This was originally designed to provide to narrowband telephony service in developing nation that lacked a telephone infrastructure. WLL is a system that connects subscribers to the public telephone network using radio signals rather than copper for all or part of the connection between the subscriber and the switch. Cost advantage of WLL is based on three factors; first, WLL tends to have a low ratio of fixed to incremental costs. Once base stations and the link to the telephone exchange have been installed, new subscriber can be added quickly and at low cost. Second factor, less prone to failure than copper wire, low maintenance cost. Third factor, easier to locate the point of failure in WLL networks than wire network.

802.11 wireless (WiFi) networks, 2.4 GHz frequency required antennas, cables and adapter or total antenna with accessory kit for about US $50 to US$ 100. For rural areas in developing nation, most likely model is going to be Internet cafés, community center, recommended for fast access communication in school, colleges and Universities.

3.3.4 Dimensions of Digital Divide: According to ICTs can contribute significantly to socio-economic development. More focus on the digital Divide and technology dualism and liberalization Coordination and Internet Kiosk. Dimensions of the digital
divide: Service availability, Awareness, Opportunity to learn and use new media, Mastery of technologies, Experience, Skills, Support, Attitudes, Contents, Culture, Disability.

3.3.5 The Role of Government: WLL systems tend to suffer attenuation where there is heavy rainfall or extensive foliage. The need to have frequency allocated for WLL imposes constraints on operators planning to use this technology. WLL technology have relatively low bandwidth, restricting ability for broadband applications, competes with mobile cellular operators who have paid in some cases high spectrum fees. GSM towers only reach 5 kms, but WLL users can travel 50 kms from their towers, meaning many fewer wireless loop towers are needed to cover a country and this system is less expensive to build. Thus technologically Grameen Telecom’s GSM system is in fact not the most cost effective way of getting universal telecommunications into these villages.

ICT is a tool, required parallel action step by step, more technology use, reaches to masses, collaborative work is required with government, commercial approach is required, computer for individual rural people with proper application works like health education business and so forth. The view of digital divide has number of dimension that go beyond to access technology, share benefits.

In the case of India, lately there have been a number of initiatives by the central and state governments along with NGOs and private sector to help the diffusion of ICT to different economic sectors. Such initiatives have been unprecedented not only in terms of scale but also with regard to new organizational innovations. While most are in their initial stage, available evidence suggests that ICT could effectively be used to transform rural regions.

Some of these projects such as Gyandoot, Drishtee, TARAhaat, etc. just to name a few, which suggests that by only installing a Village Public Telephone (VPT) in a village is
not sufficient because of the reasons that people in villages use telephone mostly for economic reasons such as checking market prices of agricultural produce and thus saving money and time on transportation outside the village; security protection and possibility of emergency are also key reasons for using the telephone. If a network of Internet Kiosks is established throughout at the district and village level, beneficial to the villagers in terms of making necessary phone calls as well as accessing information about various other relevant issues such as government programmed for villagers, filing complaints, market information, selling online, learning and training new applications, etc.

Telecenters come with a variety of names, such as Internet kiosks, telecottages, or information shops. Giving the standard model of telecenter is required as well as connectivity will be required among the other telecenters. Telecenters provide public community based access to ICTs for educational, personal, social and economic development. Planning for location, infrastructure, skilled staff required budgeting/finance, startup then software tools, services like e-mail, World Wide Web connectivity, Whatever information they grasp, how they are using such information guideline is required, To give some facility to solve query of the people (facility in term of connectivity is required to get the solution e.g. some telephone no is required BPO ,KPO to answer the questions) Learning center also required, good relationship with the people, partnership, government policies, political leadership is required, social structure, gram panchayat.

Researcher has given some variable to design telecenter:

- Multipurpose training
- Business organization based.
- Operator is associated with school, bank, etc
- Universal need to all community people
- Network is connected to other telecenters.
- Association of public and private sector.
• Focus on service oriented not only profit.
• Private as well as public funded.
• Commercial approach with some free subscription policy.

Researcher has mention strong recommendation as an India is full of projects and experiments in the area of technology for the poor but there is no policy in place per se. In the long run there need to be a government policy that deals with the infrastructure and accessibility issues in rural areas, but in the short run these projects that are examined in this paper run by various organizations, though, in an unorganized manner, with many problems related to financial sustainability, information sharing, networking, infrastructure etc., still hold a hopeful scenario based upon the successful replication throughout the country.

3.4 Ranjesh Gajra "3, “microfinance companies are leading fast but many are still un-banked”, Cover story (Finance Inclusion), Business world, RNI no. 39847/81, 28 December 2009.

Mr. Manohara Raj, Business Head of Microfinance, HDFC Bank) says that “60% of our country population is un-banked and it difficult for these people to participate in India Growth story” Providing financial services at affordable cost to the un-banked is vital for sustaining long term. Concern with Rural India, Bank is most important medium for mutually beneficial distribution of capital from those with surplus capital to those who require it. According to National Bank for Agriculture and Rural development (Nabard) these has been good 30% growth in loan disbursement by Banks. Rs. 12,253/- crore in 2008-09 compared to Rs.8,849/- crore in 2007-08 to Self –Help Groups (SHGs) which small borrower (90% are women). Outstanding loan amount Rs. 22,679 crore of 31st.
March 2009 from Rs. 17,000/- crore in same last year. SHGs model has been leading
driver of microfinance in the country. Microfinance companies (MFCs) has been
leading to small borrowers, disbursals were up by 94% to Rs. 9,500/- crore in previous
fiscal, outstanding amount was up to Rs. 14,400/- crore as of 31 March 2009 from
Rs.6,000/- crore as of 31 March 2008. Therefore indirectly lending to borrower.
Recently strategies of SBI lending directly through the SHGs model and MFCs are
attractive to small borrower because they offer funds at lower interest rate compared to
private money lenders only problem is that poor people does’t get identification card,
house document , neighbors reference, they required some help desk, how to use
technology such problems. Crisil estimates that at least 90% of all MFCs funds came
from the Banks. According to a study by National council of applied Economic
Research in 2008 on impact and sustainability of SHGs bank linkage programmers.
Role of SHGs is that performing better not only providing of financial services in term
of augmenting saving , lending and ensuring loan recovery but also awareness and
empowerment.

Mr. Vijay Chandok, senior general manager and global head (SME), ICICI Bank say
that “Bank is straggling to build the right model to reach to make microfinance high
growth, scalable and cost efficient”.

RBI approved Business correspondent (BCs) to disburse credit in rural area. Similarly
HDFC Bank started lending to MFCs in 2003 and then move to a BC model.

Private sector Bank are facing a problem of corruption, Example “In Muzaffarpur
district (Bihar) who refuse loan to farmer and other borrower on the pretest of funds not
available for such lending”, says vikash kumar singh , president of Bihar based network
Institute of Socio- Economic development, “But these borrower approach through
unauthorized agent of these branch manger and per as commission of 10% to 15% they
get the loan he adds”.
Dr. Subbarao (RBI Governor) say that “to draw a road map by March 2010 for ensuring that all villages with population of over 2,000 will have access to financial services through a bank outlet not necessary branch.

3.5 Mr. Srikanth Srinivas “4, “Faster, safer larger Banking, with technology as its core, HDFC Bank is most friendly Bank”, cover story technology, RNI no. 39847/81, 28 December 2009.

RBI making it mandatory bank to route their high value payment through the real time group’s settlement system (RTGS), RTGS account for 96% of payment in value term but 1% in volume customer using electronic payment and net banking.

Mr. Anil Jaggia, chief Information officer at HDFC Bank says that “we have one million active customers who use net banking at least once a month”, they give transaction security. Need Protection against unscrupulous hijacking of their account. He says that Bank has lost the customer because of poor technology they are focus on Customer Relationship Management.

3.6 Mr. Shane Greenstein “5, “Economic and Business Dimensions The Broadband Price is not Right, Developing an effective pricing index is essential to understanding the value of broadband connectivity” DOI:10.1145/1592761.1592771, Communication of the ACM, November 2009, volume 52, No.11.

Researcher says that In September 2001 approximately 45 million U.S. households accessed the Internet through a dial-up connection, while only 10 million used a broadband connection. By March 2006 approximately 47 million household connection,
while 34 million (declining) used dial up connection. Latest survey of Pew Internet and American Life Project, in April 2009, less than 10% of U.S. households had dial up Internet connections and 63% of US household had broadband.

3.7 Mr. Deepak Halan and Amit sharma “6, “Estimating Internet Traffic (the Internet is expanding rapidly in India. Unless we have reliable traffic data the quality of service cannot be improved)”, India Management, The journal of All India management Association(AIMA), December 2009, volume 48, issue 12.

National Internet exchange of India (NIXI) was set up in 2003 as non profit organization with primary objective are 1) to facilitating domestic bandwidth traffic with the country, 2) quality of service by reducing latency and enable efficient utilization of international bandwidth, 3) reduction in Internet usage price (digital divide).

Researcher suggested that some Research problems are:

1) Growing need for higher quality of service (Demand for bandwidth), 2) setting up more exchange would enable optimization and allow faster and cheaper Internet access via load blanching of traffic. They are giving some challenges 1) Estimating the bandwidth for large and heterogeneous country like India. 2) Bandwidth consumption is depends on type of Internet owners, type of connection, used and port capacity of connection.

Problem is that, no one is aware of inflow and outflow bandwidth in India because of duplication of data submitted to TRAI and Primary survey to map the demand side. Business interest of ISP not totally aligned with objective of NIXI.
Researcher has given the research approach:

Qualitative research, supply side data, in depth interview with CTO and Marketing heads in ISP and Data center, most of which were recorded, transcribed then content analyzed. Data mining from the plan India larger scale syndicated studies. Researcher has found comprehensive secondary research (white paper, reports books, articles and websites) and Studied Internet traffic patterns of other developing nation (Brazil and Thailand).

Home segment, ISP home segment refers to demand for bandwidth at retail level in term of Internet Penetration, Access technology that drives the bandwidth consumption in ISP home segment. Business segment: PC Penetration is primary driver for bandwidth consumption (mode of accessing Internet, number of Internet account play a major role in bandwidth consumption). More important is that availability of power, number of data center, active ISP and emergence as an IT destination

3.8 Renee Kuriyan and Kentaro Toyama “8, “Review of Research on Rural PC Kiosks” rkuriyan@berkeley.edu; kentoy@microsoft.com, April 14, 2007 http://research.microsoft.com/research/tem/kiosks.

3.8.1 Methodology: Researcher has selected location like In India (Andhra Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Pondicherry, Tamil Nadu, and Uttar Pradesh) and Additional projects in Africa – Ghana, Kenya. Surveys of 300 kiosks, 1000 kiosk customers and non-customers, In-depth interviews of 100 kiosk operators, Conversations with 60 proponents, observers, agencies, government officials, Site visits to 200 kiosks spanning 20 kiosk agencies, Intensive participant observation of 30 kiosks in operation, Software-based logging of kiosks in 13 kiosks, researcher has referred reviews of relevant literature in social science, development, and technical journals. Rural Kiosks sustainability depends on governments, academia, multilateral
organizations, corporations, and non-profits, and all have channeled substantial investment into rural kiosk projects around the world.

3.8.2 Sources of Information: Researcher has referred lots of literature reviewed, journals, websites, regarding rural kiosks, how they sustain, what are their problem to sustain, what are their role, find out the impact of rural kiosks for development not only technology as well as social.

3.8.3 Adopting new Technology: Researcher has faced so many questions, through these questionnaires; researcher has strong recommendation about rural kiosks. Rural kiosks have big challenges of economical, social, educational, mistrust, overabundance of information poor infrastructure, maintenance and sustaining barriers. Researcher has strong observation in term of 100,000 kiosks in over two years, but this would required the concerted effort of all 20 of the corporation in India that match in overall size.

Successful kiosks are several types of rural PC sustainable capacity that is they have maintaining service consistency in terms of Internet café, Computer Training program, Digital Photo and video service and kiosks operators. To make business environment to maintain financial sustainability and social development are difficult to achieve simultaneously. Their goals are development oriented, increasing economic opportunity and overall well being. Such Findings is often tried to the achievement very least. The consistent demand for more government services, agricultural services, computer education, health but these depend on implementation. Entertaining services are more focus on usage rather than development oriented; need to have awareness of services, importance of usage, tremendous focus work as well as urban association is required as a social responsibility.

Social structure of villages are changing, people are more adopting new technology such as mobile, every corner of village, people using mobile. Small entrepreneur are doing a critical role in term of awareness. Local village leaders, Teacher, Bank employee, Post Office employee, Hospital employee as well as NGOs are doing critical role for the long-term success of a kiosk project.
3.8.4 **Recommendations:** Rural kiosks have become a one-stop shop for meeting several kinds of demand. Some studies suggest that kiosks do better in towns than remote villages. Researchers have found that fewer wealthy customers and less demand for services. Research has evidence that: 1) Rural Service Delivery Points are located in villages of population up to 5000 and provide electricity bill payment services successfully. 2) eSeva kiosks are located at the district level in urban and peri-urban areas and provide mainly e-governance services. Average profit in the district was Rs. 8453 per month; the more rural kiosks were losing money on average.

3.8.5 **Meeting business needs and social development simultaneously:** Researchers say that meeting business needs and social development goals simultaneously is difficult. It is very true because the rural people have to be willing to come use the service with respect to money, as per socio-economic growth on other hand that is very big challenge. At the root level, it is very necessary that sustain business and growth dual role are match. This is difficult task. Business Development with social development is not only role of government even educational institute, gram-panchayat, industry people and bank. Funding is often tied to the achievement of or at the very least, the attempt to achieve these goals.

Need some standardization of rural kiosks fix role of each and every individual aspect. Monitor global perspective manner, appreciation is one of the key development activities. Focus on wireless network connectivity appreciable. Localized content requires resources that scale with the geographic area covered.

3.9 **M V Ramana Murthy** “8,” Mobile based Primary Health Care System for Rural India”, Mobile Computing and Wireless Networks, CDAC, Electronics city, Bangalore, 560100, murthy@ncb.ernet.in.
3.9.1 Mobile based Primary Health Care System: Researcher has found that Mobile technologies are increasingly growing in developing countries like in India. Mobile is emerging tool for everybody, easy to carry, through new information accessing medium for rural or urban area. Mobile has such medium bridge the digital divide, author has identified that by the end of 2008, and three quarters of India's population will be covered by a mobile network. Now low-cost mobile phones get the GSM networks in India. It is a huge opportunity to provide services to rural to urban part of area and through this new opportunity for development, improve people’s lives. Researcher has found that present status of Mobile based Health Care systems in different countries, shortfalls in primary Health Care Management in rural India and the potential solution to fill it with the enabling of Mobile Web technologies for Primary Health Care management. Mobile based Primary Health Care Management System under development by CDAC, Electronics City for deployment in the PHCs in rural India.

3.9.2 e-Health services in Mobiles: Primary health care, mobile & wireless technologies offer some exciting opportunities for a low cost, high reach service. The impact of the use of multiple systems is that it is difficult & costly to develop a national overview of patient statistics. On a more basic level, it is extremely difficult for individual institutions within the healthcare sector to share information between each other. One of the clearest examples of this is to be found in the sharing of patient laboratory results. Currently in most instances, this only takes place through manual exchange. Many vendors of Cellular phones started to embed a variety of e-Health services in Mobiles.

3.9.3 Technological need: Researcher has main objective to increased quality of primary healthcare (PHC) services. Increased efficiency of service care with an adequate referral and remote consultation system. Improved epidemiological surveillance and control. Better pregnancy case registration and management. Reduction of maternal and prenatal mortality and morbidity.
According to the ITU, author has state worldwide as of late 2006 mobile user are 2.7 billion and 1.1 billion are Internet users through mobile, majority of population are not using this technology In theory, many government services can be now made available on a 24x7x365 basis at any place in the world covered by mobile networks. Approximately 50%–60% of government services including Primary Health Management can be delivered via mobile channel.

Researcher has taken as a case study in Experience in South Africa. Dokoza system is an innovative cost-effective interactive real-time mobile system for fast-tracking & improving critical services to the broader majority. That office worked as a back end office and they maintain data of HIV/AIDS and TB treatment. The system involves the use of SMS & cell phone technology for information management, transactional exchange & personal communication. Dokoza back-end system is easily integrated with all existing hospital systems (such as the National Lab) and Dokoza can also be accessed in real-time via PC web, laptop, PDA, Smart phone, Palmtop and is able to interact with fax and email.

Primary Health care in India, the rural primary public health Infrastructure has recorded an impressive development during the last 50 years of independence. The network consists of 1,45,000 sub-centers, 23,109 primary health centers and 3222 community health centers, catering to a population of 5000, 30,000 and 1,00,000 respectively (and 3000, 20,000 and 80,000 population in tribal and desert areas). Each PHC is targeted to cover a population of approximately 25,000 and is charged with providing primitive, preventive, curative and rehabilitative care. This implies offering a wide range of services such as health education, promotion of nutrition, basic sanitation, the provision of mother and child family welfare services, immunization, disease control and appropriate treatment for illness and injury. The PHCs are hubs for 5-6 sub-centres that cover 3-4 villages and are operated by an Auxiliary Nurse Midwife (ANM). These facilities are a part of the three tier healthcare system; the PHCs act as referral centers for the Community Health Centres (CHCs), 30-bed hospitals and higher order public hospitals at the taluka and district levels.
Researcher says that PHCs for betterment of rural or urban slums area they covered, this software they considered Patient Database management, Interaction between doctor and a patient, capture of Medical data acquisition- such as ECG, images of heart & lung, eye etc and Scheduling management. Sources of information from web, SMS (2nd Generation mobile system (GSM/CDMA) , WAP Gateway for Web access Applications using WML for integrating GPRS/3G/4GMobile devices of Doctors and Nurses with the Web server and National and other Indian languages in mobiles by providing interface for translation.

3.9.4 Recommendations: Researcher has found that the Primary Health Care strategy seems to be a right intervention in terms of basic preventive methods but it needs to be supported by other strategies as well to close the gaps. Primary health care is presented by the Alma-Ata declaration as essential health care based on practical, scientifically sound and socially acceptable methods and technology, which is universally accessible to individuals, family and the community through their full participation and at the cost they can afford. Researcher has strongly recommended that instant medical health system. It is transparent and easily accessible by the implementation of “Mobile based Primary Health Care Management System”.

3.9.5 Implementation of service: Researcher has doing further research on implementation module on a Central Information Repository with database of the Patient information and other resources and services, Web server, SMS interface for receiving-sending SMS to 2G Mobile systems, which receives the SMS, converts the SMS into a query and executes the query. The results are then sent as an SMS reply. WAP Gateway for linkage with a GPRS/3G mobile. The gateway server translates mobile phone requests (WAP) into HTTP requests and sends them to Web server. The Web server processes the request, and sends WML to gateway server, which in turn sends the WML to phone in the binary compressed. WML format Localization Module for providing interface for translation.
3.10 Kentaro Toyama¹, Karishma Kiri², Deepak Menon³, Joyojeet Pal⁴ Suneet Sethi⁵ Janaki Srinivasan⁶ “PC Kiosk Trends in Rural India”, Microsoft Research Bangalore, India. Microsoft Corporation, Washington, USA, Microsoft India Pvt Ltd, Gurgaon/Chennai, India. University of California, Berkeley, California, USA. Indian Institute of Information Technology, Bangalore, India.

3.10.1 Indian kiosk agencies: Researcher has focused on two agencies Drishtee and n-Logue. Respondents are kiosk operators and customers. Kiosks initiated by two prominent Indian kiosk agencies, Drishtee and n-Logue, as a franchise business, while maintaining the goal of delivering relevant services for rural socio-economic development through connected PCs. Working style of Drishtee, operates approximately 500 kiosks, primarily in the northern and eastern states of India. The focus was on providing e-governance services to rural villages i.e. birth certificate applications, vehicle licensing, etc. in the regions in which it operates. In addition, it forms partnerships with banking, insurance, and other industries to bring commercial services to rural villages. Set up a new kiosk they provide Infrastructure, Network requirement, location, information of web portal, kiosk operators are expected to pay a monthly fee, as well as per transaction costs for online. Drishtee spends considerable effort on choosing host villages as well as on selecting and training the operators who run their kiosks. Drishtee seeks certain characteristics in the villages and operators with whom they work villages should have a population greater than 5000, operators should have undergone 12 years of standard schooling, etc.

Researcher has found that there are major challenges to run the kiosk successfully with sustaining capacity. n-Logue was founded by the faculty of the Telecommunications and Computer Networks (TeNet) group at the Indian Institute of Technology, Madras, “to significantly enhance the quality of life of every rural Indian by driving the digital revolution profitably”. The TeNet group developed corDect wireless local-loop technology, which remains at the heart of n-Logue’s business of providing rural
connectivity. n-Logue seeks entrepreneurs to act as “local service providers” (LSPs), who run a regional kiosk business based around a corDect tower that provides phone services and Internet connectivity. Each LSP is expected to set up as many kiosks as it requires sustaining itself. n-Logue shares profits and losses with the LSP. n-Logue has focused on rapid expansion across several states, with over 30 LSPs and approximately 2300 kiosks total. n-Logue operates primarily in India’s southern and western states.

Like Drishtee, n-Logue sells kiosk start-up kits consisting of the necessary hardware and offers assistance with loans where needed. Unlike Drishtee, its revenue comes from providing phone service and connectivity, for which it charges a per-hour fee or a fixed monthly fee for unlimited access.

There are three questionnaires:

- Baseline questionnaire for each kiosk village, delivered to the kiosk operator.
- Recurring questionnaire for kiosk operators.
- Recurring questionnaire for kiosk customers.

All three questionnaires have between 50-70 questions, with a closed set of responses for most questions (i.e., there are very few open-ended questions). 150 kiosks were chosen for Drishtee and 150 for n-Logue, for each kiosk, one operator and five customers were interviewed. Thus, each time the surveys are conducted, we complete a total of 225 questionnaires for kiosk operators and 1125 for kiosk customers.

For Drishtee, the first set of surveys was undertaken in Sirsa district (Haryana state), Madhubani (Bihar), and Sonitpur (Assam); the second set were from Lakhimpur (Assam), Golaghat (Assam), and Jaipur (Rajasthan),

For n-Logue, all studies were conducted in Thiruvallur, Vaniyambadi, Thirupattur, Allagumalai, Bhavani, Myla, all in Tamil Nadu state, and Mandya, in Karnataka;
Surveys were conducted by employees of Drishtee and n-Logue whose primary responsibilities are to administer these surveys, under a contractual agreement with the two agencies.

3.10.2 Sources of Information: A researcher has referred books, research journal, web sites for Rural PC kiosks. Kiosks sometime refer as telecenters or Internet cafes for rural villages, with one or more connected PCs available for shared use by village residents. For Urban and Rural Purpose of running Kiosk and their operational challenges and user need of urban as well as rural village people. They found urban cafés tend to focus purely on Internet access and standard computer applications. Across India, 150 rural PC-kiosk projects, rural kiosks can help villagers improve their economic standard of living by expanding livelihood options and empowering them with information, tools, goods, and services such as education and healthcare. The true challenge is in finding ways to deliver this benefit broadly and consistently, while making kiosk projects economically sustainable in the long term. As would be expected when the world’s most advanced technologies are dropped in the middle of farming communities, great innovation is required at the interface, both technically and in terms of sustainable business models.

Every sector is involved – large enterprise, entrepreneurs, universities, government, and NGOs – with motives ranging from turning a commercial profit, to driving socio-economic growth, to streamlining government bureaucracy.

3.10.3 Customer Demographics: Age group of Kiosk customers tends to be young, with 30% between the ages of 19-25 and another 35% between 26 and 35. Education levels are spread roughly evenly across different levels of accomplishment, although those with less than 4 years of primary schooling and those with post-graduate degrees are rare. The predominant users of kiosks are students. One interesting fact is that the gender of kiosk customers very consistently mirrors that of the operator. Overwhelmingly, more girls and women visit kiosks when the operator is female, and almost no women visit kiosks run by men. This is likely due to cultural barriers to men and women interacting in one-to-one outside of familial relationships.
Kiosk Operation, 60% of respondents having chosen to make their first visit to a kiosk based on hearing from friends and family. 70% of kiosk customers report that the kiosk operator handles all transactions on the computer, and that they remain unable to use a computer.

Service, although computer skills education is highly sought by rural kiosks customers (among 15% of customers), more n-Logue kiosk customers visit a kiosk for entertainment (35% for e.g., games, music, movies) and more Drishtee customers visit their kiosks for e-government applications (35%), desktop publishing (35%), and other activities, than either do for computer training. These differences are due to what the kiosk operators market in the village, as well as, the type of services available from each agency. Drishtee, in particular, began with a focus on e-government applications, which may be reflected in this data. Despite the relative frequency of use of these applications, computer education remains a major revenue generator as cost for computer courses for a monthly range between Rs. 375-400 for 4-8 hours of classes a month, whereas other services typically bring only between Rs. 15-30 per transaction.

A number of services are consistently requested like language courses, income-generating services, services to support agriculture, basic computer education, and e-government.

Sustainability, Most critical for those interested in kiosk sustainability, average monthly income at kiosks remains low, with both mean and median at approximately Rs. 2000 per month, and this is below the target break-even income desired by either company (between Rs. 3000 and 5000, depending on terms of the loan, cost of connectivity, and the initial capital expenditure on hardware). This data is consistent with that observed in other studies (Dhawan, 2004; Srinivasan, 2004). Almost without exception, kiosk operators do not see the kiosk as being the source of their primary revenue. It is still unclear whether this will change over time as more relevant services become available.
The number of daily kiosk customers is low, with nearly a third to a half of the kiosks reporting less than five customers per day. The rate of return use is high, however, with nearly half claiming to be certain to revisit kiosks, and another 20-30% suggesting they are likely to do so. It is not clear at this point in the study whether more time is required for information about the value of the kiosk to spread, or whether the kiosks simply do not provide sufficient value to their communities.

Despite the low revenue, kiosk operators widely report satisfaction with their kiosk businesses. Most appear to run kiosks as a side business that is not their primary occupation (most frequently, farming on owned land). At the same time, experienced kiosk operators appear averse to opening a second kiosk, with over 88% of respondents not seeking another such business. Of those who are considering opening another kiosk, revenues top Rs. 3000 per month.

3.10.4 Sustainability factor: Sustainability as a business for kiosks currently remains difficult. There is a fundamental challenge posed by the fact that the poorest communities, where socio-economic development is most desired, are exactly the communities whose economies are too small to sustain a connected PC. Indeed, in many of the larger villages in rural India, Internet cafes sprout up spontaneously, as local entrepreneurs see clear value in setting up shop. The question is whether kiosks in villages with smaller economies can be made to deliver enough additional value to support them. This also raises an important question in the short-term on whether kiosk projects should be seen as an entrepreneurial space, or whether a subsidized, public-utility model is a reasonable alternative view.

On the ethnographic side, the highly varied regional contexts under which kiosks operate create critical invisible bias elements that can undermine any serious statistical work. There is further work to be done in a detailed regional analysis of rural locations where kiosks are successful.
3.10.5 Status of Drishtee and n-Logue: Drishtee and n-Logue continue to work hard to find a viable business model. Realizing that a combination of computer-related services combined with non-computer-related services can sustain a kiosk as a whole, they encourage services that go beyond the connected PC, such as vocational training and petty trade. Both also continue to seek applications and services that help generate greater income for village residents while also saving them money in everyday activities. For kiosk operators, the combination of reasonably high satisfaction, even while break-even revenue is not being generated suggests that non-economic benefits are being felt. Anecdotal evidence, as well as evidence from ethnographic studies (Srinivasan, 2004), suggests that kiosk operators often gain self-confidence and stature in the community when they are associated with computers.

3.11 Dr. Rahul De’, Hewlett-Packard Chair Professor, “The Impact of Indian E-Government Initiatives: Issues of Poverty and Vulnerability Reduction, and Conflict”, Institution Indian Institute of Management Bangalore, Email rahul@iimb.ernet.in.

3.11.1 Government Projects: Researcher has referred seven e-government projects that implemented in India. Each project is an attempt by various state governments to use ICT for development, reduction of poverty and improved access to government services. Researcher has focused on which e-government service are popular, positive significant and more usage. For example Bhoomi is used by about 800,000 people a month to access land record, eSeva has registered over 41 million transactions. Lokvani has registered almost 30,000 transactions in few months. Researcher has more focus on Bhoomi project, Bangalore region as a sample area, found some problem regarding tenant farmer because this provision not considered in Bhoomi project. SARI, Gyandoot and Lokvani projects has given evidence of participation, of woman, around 65% of participation recorded in Akshaya project in term of computer literacy. Researcher has more focus on participation by marginal groups.
3.11.2 Sources of Information: Researcher has referred lot of review research journal, paper, and books, worked on e-government projects. Researcher has mention SARI kiosks user survey and gender distribution 2003 analysis.

3.11.3 Identified segment: Researcher has pointed out the working style with e-government systems in addressing the needs of the marginal sections of India’s society, particularly women and the marginal groups. Although many studies of e-government systems in the past have included an analysis of costs and benefits and an assessment of the project itself, few have actually addressed the issues of impacts on the population that is a stakeholder in these projects. It is implicitly assumed in most projects that certain principal stakeholders will be benefited and the assessment studies only survey these stakeholders and include the benefits or problems from the implemented system. Marginal population groups are rarely included as the stakeholders that benefit from such projects.

3.11.4 Impact of Projects: The framework used for the analysis of the projects is based on an assessment of first- and second-order effects. All the projects showed positive and significant first-order effects. For example, Bhoomi is used by about 800,000 people a month to access land records, eSeva has registered over 41 million transactions since inception, and even a small project like Lokvani has registered almost 30,000 transactions in a few months. Few of the projects have shown any significant second-order effects. eSeva has had a small impact in terms of forcing participating departments to streamline their activities. A deeper analysis of the developmental impact of e-government systems is undertaken by using Amartya Sen’s fundamental freedoms approach. This analysis was conducted for the Bhoomi project in particular, for which detailed data was available. The analysis shows that for landless and poor farmers and for women, a system such as Bhoomi has been of marginal relevance. Poor farmers are adversely affected by Bhoomi as it enables, for example, in the Bangalore periphery region, land sharks to identify and target them. Tenant farmers use records that are not covered by the Bhoomi system. Farmers do obtain some benefit from RTC certificates by being able to obtain credit and insurance, but a portfolio is an application is missing.
3.11.5 **Status of Projects**: Researcher has taken seven e-government schemes as an example of Bhoomi, CARD, Gyandoot and eSeva, and three are relatively lesser known in Akshaya, Lokvani and SARI purpose of this scheme is as follow. The e-government project provides some services or product to a fairly large population. This criterion would rule out internal, intra-government systems. The project has sustained for a period of time that exceeds its rollout period. Roughly, the project should have been ‘around’ for some time, beyond the time it took to build it. This ensures that projects of a certain scope and scale are included. The project has been demonstrably used by a large number of people in the targeted population. The exact numbers are not important, but the project has to have had some impact on the users that can be measured.

The digital divide is defined as the difference in access that groups of people have to information and communication technology resources. This divide results from income differences, urban-rural differences, language differences, developed nation or developing nation differences and so on. E-government systems principally address the problem of the digital divide. The supply-side designs fail to include key requirements of citizens. Kiosk-based systems that are built up from citizen requirements, such as Akshaya, can deliver on some of the needs expressed by citizens. However, most e-government efforts are focused more on the needs of the government agents and departments than on citizen needs. System roll-outs fail to educate or make literate citizens as to the nature and role of the proposed projects. Citizens do not participate in either discussing the governance issues or in the nature and problems of governance delivery. Even in situations where citizen participation is possible (in cities such as Hyderabad) this exercise is not undertaken.

For instance, all the systems dealing with governance in rural areas emphasize the central, the district or taluka, offices as nodal points rather than the village. Even kiosks located in villages have to ultimately rely on the district offices for services.
Deployment of e-government services is typically done by individual government departments that don’t communicate or coordinate the exercise with other departments. Even though there may be no duplication of services (as there is in some cases), the larger picture is missed. Portfolios of services cannot be offered and the significant externalities that digital kiosks can offer are missing.

One aspect of capacity building for government services is also building institutional memory. It is well known that in state and government department’s officers are rotated frequently and often, with the result that the memory of decisions taken is lost, unless recorded in text. It is also well known that decisions are based on a complex set of factors and after a complex negotiation process; what is recorded finally are only some of the issues that were brought up and considered for the decision. When similar decisions have to be made again later, or decisions that are based on the same criteria set (such as governance issue related to land), this memory cannot now be invoked as the people concerned are not available.

Some respondents in the primary survey conducted by the researcher author argued that local people who are affected by projects do recall marginal groups of decisions taken and activities conducted. Their tacit and explicit knowledge is rarely included in decisions that are made by the supply side. Further, with the introduction of e-government systems and the systematic de-politicization of grassroots officials (as in the case of village accountants), this institutional memory is further eroded.

3.12 “Rajendra Chaudhary”\textsuperscript{11}, “Maharashtra’s state WAN, Maharashtra

SWAN: a gateway to multi-nodal services” rajendra.c@expressindia.com

3.12.1 Structure of Connectivity: Maharashtra's State Wide Area Network (MSWAN) provides vertical connectivity to facilitate the seamless integration of 366 offices from the CM's office to the district headquarters right down to the taluka level.
The state appointed SETU Maharashtra as the State Implementation Agency (SIA) to deploy the SWAN.

Main objective has to facilitate the smooth exchange of information within various government departments and enable good governance. Horizontal connectivity knits together departments such as the police, treasury, transport departments, food & civil supplies, employment offices and municipal corporations.

3.12.2 Sources of Information: Researcher has given insight of how this process going, what are their constraint, how to reach on successful scenario, what is the methodology adapted to fulfill the requirement.

3.12.3 SETU set up Requirement: The state, under the aegis of SETU, eventually awarded the contract for setting up MSWAN to a consortium of ITI and Spanco (service provider), which is implementing SWAN as per the guidelines and technical requirements specified in the tender. The MSWAN was completed at an estimated cost of Rs. 104 crores and the scope of vertical network connectivity included planning of network deployment design for backbone and horizontal offices; IP planning; setup Network Operations Center (NOC); integration with existing network; design, validation, implementation and maintenance of NOC; civil, electrical and mechanical work required at each site; installation and commissioning of equipment at sites; operation and maintenance of network, passive infrastructure, security management, etc. Additionally all the processes had to be ISO certified.

3.12.4 Current status of project: At present, key offices such as the Chief Minister’s office and State Ministers are linked directly to the District Collector’s offices and Taluka Headquarters through a secure network to communicate using Video Conferencing (VC) and VoIP.

3.12.5 Expected application: The state also wanted the network (SWAN) to support voice, data and video-based media applications and unique departmental applications. MSWAN has become operational; the state government is looking to leverage the infrastructure in a big way. Although currently there aren’t too many applications on the
newly established network, people are excited about the Video conferencing (VC) and Voice over Internet Protocol (VoIP) connectivity.


3.13.1 Researcher has focus show declines in primary industries and manufacturing and rapid growth in the service industry. Service industries are only focus on change in public and private industries. Information activities account for the largest part of the growth in services, and other sectors are becoming increasingly information intensive. Thus, access to information is an important requirement for rural development. New economic development now more often depends on human resources, telecommunications, and information-processing infrastructure. In the provision of these goods and services, reliable telecommunications infrastructure makes geography and distance irrelevant. Rural education and medical services also face wrenching changes. Rural health care services are also vital to rural economies: "If a community doesn't recognize the value of its health care system and loses it, it doesn't just lose the health care system. It loses a great big piece of the economic machine of that community" (Lyons 1991).

Rural demand for high-quality telecommunications is growing substantially, largely because of the changes described above. Facsimile communication is particularly important in rural areas, because mail delivery is often slow and unreliable. The need for access to centralized data bases, whether for libraries, inventory control and ordering, or updating of government records, has increased demand for data communications. Electronic mail and computer conferencing are also spreading to rural areas, where they can save time or travel costs. Demands for access to a wider range of educational opportunities under restricted educational budgets have led to growing interest in distance education using telecommunications. Change technology in term of
Wireless technologies. Cellular radio and rural radio subscriber systems, offer affordable means of reaching less isolated rural customers without laying cable or stringing copper wire. Compressed voice, Uses algorithms to "compress" digital voice signals, so that 8 or more conversations can be carried on a 64 kbps voice channel to reduce transmission costs. Compressed video, Transmits motion video over as few as 2 telephone lines (128 kbps), providing relatively low cost video for distance education and for transmission of medical imagery.

Research has shown that instantaneous communication can help improve: Efficiency, the ratio of output to cost Effectiveness. The quality of products and services Equity, the distribution of benefits throughout society.

- **Accessibility**, we should strive to ensure that the widest range of telecommunications facilities and services are available throughout each state, and that all Americans have access to basic services.

- **Equity**, we need to ensure that there are not disparities in access to telecommunications technologies and services. That is, in addition to maintaining universal access to basic services, we need to make sure that Americans are not penalized because of where they live or what companies offer services to them.

- **Connectivity**, the question of whether there should be one or many providers is unresolved, but multiple providers are likely in some rural and many urban areas. We need to ensure universal connectivity, so that Americans can communicate with each other and with information sources regardless of who provides their services or what technology links them to networks.

### 3.13.2 Application of Rural Telecommunication:
Telecommunications can be used for a wide range of applications for stores on rural main streets, for education, libraries, health care and social services, agriculture, tourism and other rural industries, and for other applications not yet discovered. The operative word is ‘can’ whether these applications will be widely implemented may depend on the vision of state and federal policy makers and regulators. The underlying rationale must be that universal access to information is critical to the development process. Mobile services, Mobile services also need to be universally available. Mobile communications can be particularly important to people who spend much of their time on the land far from their homes, or who travel long distances across the countryside.

Technologies such as cellular radio that are dedicated to mobile use in cities may also be the least-cost way of providing primary service to isolated villages and homesteads.

There should be coordination within states, and among regulators, state legislators, public service agencies, and consumer representatives involved with rural telecommunications. We also need communication among the states and between state and federal agencies. The goal is to work towards a shared national vision, not to implement identical goals and strategies in each state, but to share information on state initiatives and regulatory decisions, and to ensure that there are not major disparities in various parts of the country in terms of availability of facilities, access to services, and pricing.

Monitoring Progress, it is likely that the marketplace will be the best mechanism for bringing innovative and affordable services to most Americans, including the majority of rural areas. However, we will need to monitor progress to determine whether there are disparities in access, quality of services, or pricing that need to be addressed.

Telecommunications policy and rural development policy in the past have seemed to be "two solitudes." However, the importance of access to information for economic
development activities and social service delivery now point to the need to bridge the gap between these disciplines and responsibilities. The above approach, which may be termed a “rural development-based approach to universal service”, is based on the assumption that telecommunications planners consider the socio-economic implications of telecommunications policies.

3.13.3 Service Quality and Upgrading: While quality of service is certainly not a uniquely rural concern, it is likely to remain a pressing rural issue because carriers for urban and rural areas are likely to invest more in upgrading and maintaining the potentially more profitable urban and suburban networks.

Rural disparities, in addition to rural or urban disparities, there may be disparities in service quality within rural areas, with high quality networks available only to some users. For example, in many states, the state lotteries have data communications links with every county, while rural residents, schools, and businesses may still be waiting for access to comparable facilities.

Digital switches can become platforms for a wide range of services, such as compressed digital video for teleconferencing and distance education. Another enhancement is Common Channel Signaling System 7 (SS7), a digital switching enhancement that separates signaling and transmission functions, with several advantages including extending signaling information to subscribers and the ability to set up services through access to databases.

SS7 access can be important to many rural businesses. During the past few months, I have heard from both customers and carriers about limited rural access. The potential customers included a forest products company in Oregon and a nonprofit organization in northern California. According to the customers, the local exchange carrier (LEC) in California claimed to be several years away from providing SS7 in the customer's territory, while the LEC in Oregon said it had no plans to provide the service in that region. A small telephone company from another part of northern California said it had
installed the software, but was unable to offer services to its customers because the Bell Operating Company it connected with does not offer the service in that region.

3.13.4 Pricing Issues: Rural users are concerned about price as well as quality of service, especially where LEC boundaries, intraLATA tariffs, and limited access to competing interexchange carriers (IXCs) may contribute to high costs in reaching their communities of interest.

Rural subscribers often have to pay toll charges to call places such as government agencies, doctors' offices, and stores and services that urban dwellers can reach with a local call. A way to reduce these disparities is to consider communities of interest in pricing of services. For example, local calling areas for rural residents can be designed to generate the same percentage of local calls compared to all intraLATA calls made by urban residents. Alternatively, toll free access can be provided to frequently contacted public services. Some specific solutions include:

Extended Area Service (EAS). EAS offers callers an option of discounted or flat-rate calling within a zone. For example, the Washington State Utilities and Transportation Commission required carriers to identify exchanges where less than 80 percent of intraLATA calls are local calls, and then to extend local calling areas until 80 percent of intraLATA calls are local calls.

Toll-free access to government services. Various approaches can be used to offer toll-free calling to regional government offices or other important social services.

States including Colorado, Georgia, and Louisiana have extended local calling areas to enable rural citizens to reach county government offices with a local call.

Policy Options and Strategies, regulators and policy makers may need to use incentives to achieve certain goals where the marketplace alone is insufficient-for example,
incentives for upgrading services in isolated rural areas, incentives to encourage carriers to conduct pilot projects, to offer attractive rates to education and social service users, and to maintain service quality standards.

An alternative to financial incentives would be a management-by-objectives approach where regulators would set objectives and carriers would be rewarded for achieving them. Several states have used incentives to the carriers to spur upgrading of rural facilities in return for more flexible pricing. Incentives might be tied to other goals such as quality of service. Carriers would have to show that they met quality performance targets in each local exchange area (not on a statewide or LATA wide average) to obtain regulatory flexibility.

Rural areas often lack the economies of scale that make provision of new services attractive. An approach to reducing costs per customer and to attracting new services is to aggregate demand. Both carriers and customers can take steps to aggregate demand in low-volume rural areas. For example, small telephone companies may aggregate their traffic to provide sufficient demand to attract new services. Iowa Network Services is a consortium of small telephone companies in Iowa that has built a fiber network to deliver their traffic to a Point of Presence (POP) where the traffic can be picked up by long distance carriers. INS made this investment to attract additional long distance carriers and to provide an attractive market for other new services.

Implementing the Vision, this approach also assumes a broadening of the definition of "public interest" beyond the simple assessment of connection to the network and pricing of basic services. It involves an analysis of the potential benefits of access to education and social services, the impact of geographical and income-related disparities, and the potential economic benefits of affordable access to information for both individual and collective activities.

Many of the steps in implementing the vision will need to come from other entities: the communications industries, government agencies that fund pilot projects, and users who
identify needs and develop strategies to aggregate demand and share costs. Yet policy makers must take a prominent role, both in setting the agenda and in devising incentive-based strategies to achieve national communications goals.

As Harlan Cleveland has noted, "The passing of remoteness is one of the great unheralded macro-trends of our extraordinary time. The fusion of rapid microprocessing and global telecommunications presents nearly all of us with the choice between relevance and remoteness." Whether this promise is realized depends on providing access to rural telecommunications infrastructure and services based on an understanding of rural development information needs and priorities. Without such information access, rural residents will find it more difficult to survive economically, let alone to prosper.

3.13.5 Recommendations from Electronic Byways, Goals for Rural Telecommunications: In order to ensure that telecommunications technologies and services can be put to optimal use for rural development, the basic goal should be to provide in rural and remote areas affordable access to telecommunications and information services comparable to those available in urban areas. The underlying rationale is that universal access to information is critical to the development process. It should be noted that this goal is in effect a "moving target": it does not specify a particular technology, but assumes that as facilities and services become widely available in urban areas, they should also be extended to rural areas.

The goal should apply to both fixed and mobile services. Mobile communications can be particularly important to people who work on the land or who travel long distances across the countryside. Technologies such as cellular radio that are dedicated to mobile use in cities may also be the least-cost way of providing primary service to isolated villages and homesteads.

Telephone service should be universally available. Switching should become totally digital, so that everyone has the option of using touchtone phones to access information
services. Service quality sufficient for voice, fax, and data. Line quality should be adequate for data transmission up to 9600 bps.

Rates based on community of interest. Rate structures should take into consideration rural calling patterns so that rural residents are not unduly penalized for calling businesses and government agencies that urban dwellers reach with a local call. Optional flat-rate plans such as Extended Area Service should be introduced.

Universal enhanced 911 (emergency services). All subscribers should have enhanced emergency service access. The telephone number is linked to a data base, so that when the emergency number is dialed, the operator immediately sees the address and any special information such as medical conditions or disabilities, etc. (This service is being implemented in urban areas in the U.S., but is not yet generally available in rural areas.) Access to optional information services. All subscribers should be able to access optional information services such as remote data bases and electronic mail services through a local or toll-free call to a gateway. (In the U.S., rural subscribers usually have to pay long distance charges to reach a gateway, whereas urban subscribers require only a local call).


3.14.1 Aspect: Researcher has focused on digital divide, rural area development through telecommunication facilities. Internet is universal service but problem that how to reach rural area. While rural economies may be less complex technology than the highly urbanized economies of the developed world. Social benefits of maintaining long
term contact with family members working aboard or in the city. Researcher has suggested Franchise model, the objective are standardization and demand aggregation (maintain the hardware, software support, bargaining power for fees and leased line prices). This model preferred for small entrepreneurs.

Internet has tended to empower civil society organization that can make effective use of the technology to share information, disseminate their views and co-ordinate action.

The big challenge of ICT access to low-income communities at low cost and at the same time financial sustainable basis. The challenges are remoteness, leading to high start-up, maintenance cost, electricity, low population density (negative impact upon costs), lack of relevant human capital, low earning capacity (commercial viability).

Researcher has recommended that Grameen Village Phones (Bangladesh), Telecenter and n-Logue model (India).

3.14.2 Grameen Telecom: Aminuzzuman (2002) has conducted survey based on a sample of 350 VPP owner or operators and users. Most owner/operators found “Village Pay Phone” (VPPs) a profitable investment and ownership has substantially raised their average monthly incomes. The mostly female owner/operators have experienced some social and economic empowerment by virtue of the income the phones bring to their households.

The VPP initiative of Grameen Telecom (GT) combines the Grameen Bank’s (GB) expertise in village based micro-enterprise and micro-credit with the latest GSM digital wireless technology of a sister company, Grameen Phone (GP), which primarily services the urban mobile phone market. Grameen Phone has become the country’s dominant mobile carrier, providing services in urban areas and along the major railway routes via a network of cellular towers linked by fiber-optic cable. It has approximately 600 000 subscribers. GT and GB work together towards the dual objective: to help the
latter’s members shift from relatively low-yield traditional ventures (mostly animal husbandry and agricultural activities) into the technology sector, and to provide whole villages with connectivity.

GT’s use of cellular technology for its VPPs, a choice that is neither efficient nor probably competitive over the long run. GSM used throughout much of Europe and Asia is far more expensive than fixed wireless local loop (WLL) systems. While GSM towers can provide service within 5 kilometers, WLL towers provide coverage within 50 kilometers. Moreover, WLL provides better bandwidth for data transmission at a lower cost. This raises the possibility that GT may be put at a severe “first-mover” disadvantage due to technology lock-in effects.

3.14.3 Tele-centers: Tele-centers are also sometimes established in schools and universities, where the physical infrastructure can be extended at modest cost to accommodate the tele-centers and some of the ICT-relevant training can be integrated into the mainstream curriculum of the educational institution. At the same time, tele-centers in universities have little direct impact on those with little formal education, and hence on the mass of the rural poor. In any case, almost all universities in developing countries are in urban areas. At a minimum, these tele-centers could be connected with the rest of the community by, e.g. opening their doors to the public at the end of the school day.

3.14.4 n-Logue Model: The Indian startup n-Logue has created a for-profit business model to tap into what it believes to be a latent rural demand for connectivity. n-Logue was incubated by the Telecommunications and Computer Network (TeNet) Group of the Indian Institute of Technology in Madras as part of the group’s strategy of disseminating low-cost communications technologies to the rural poor (Prahalad and Hammond). Unlike the Grameen Village Pay Phone Model or the majority of telecenters, n-Logue takes the franchise concept above the level of the retailer to other levels of the network. n-Logue has fashioned a franchise-based business model that consists of three levels of interdependent networks.
At the foundation-level, n-Logue forges and facilitates relationships among a range of institutions — hardware and equipment providers, non-governmental organizations, content providers, and government that support the businesses of franchise owners.

At the intermediary level, n-Logue maintains regional networks of franchised Local Service Partners (LSP). These cooperate with n-Logue to establish Access Centers or nodes to which individual kiosk operators are connected, using Wireless Local Loop technology.

Finally, at the highest level, local entrepreneurs are recruited by the LSPs (who are usually established business people or district governments) to establish village-level kiosk franchises to provide Internet and telephone access to the local population. The LSPs provide training, business advisory services, and collect revenues from the kiosk operators, which are then passed on to n-Logue. Through the LSP, n-Logue offers low-priced “kiosk packages”, a computer, printer and backup battery. Local franchise owners are themselves responsible for developing additional product and service offerings (e.g. computer courses) as well as marketing strategies.

n-Logue employs a unique fixed wireless local loop (WLL) technology designed by TeNet for its village-level communications package. As with other WLL technologies, voice and data are transmitted over radio frequency rather than wires, in this case with a fixed unit emitting the signal. The subscriber wall set can communicate both voice and data simultaneously to an Access Centre that must be located within a 25 km line-of-sight distance. Because the central base station handles traffic from 200-1000 subscribers, it works well in small, dispersed markets and does not require the large subscriber base that traditional landline or cellular systems do to be profitable (Prahalad and Hammond, n.d.).

3.14.5 Advantages of WLL: In rural areas, the segment connecting the subscriber to the exchange often accounts for more than 50 per cent of initial investment. The cost advantage of WLL is based on three factors: 1) Quick deployment compared to copper
wire. 2) WLL typically tends to have a low ratio of fixed to incremental costs. Once base stations and the link to the telephone exchange have been installed, new subscribers can be added quickly and at relatively low cost. 3) WLL tends to be less prone to failure than copper wire and is less likely to be stolen or damaged, lowering maintenance costs. Furthermore, it is much easier to locate the point of failure in WLL networks than in hard-wired ones. New customers can be added easily, redeployable, implemented more quickly and less obtrusively than copper wires.

3.14.6 Obstacles: There are some obstacles of various kinds (hills, forests, rivers). WLL systems can be used in the mobile mode; users can theoretically roam freely with their handsets within the coverage area of their base station, which can range up to 50 kilometres.

3.14.7 Challenges: Some challenges no global standard, suffer attenuation, need to have frequency allocated, low bandwidth, restricting ability for broadband applications, probably not required for low-cost rural telecommunications.

3.14.8 Future direction to ICT: Provision of ICT access in rural areas is likely to prove most beneficial where complementary infrastructure and services are also made available. Rural electricity and roads are the most obvious infrastructural complements. In terms of services, access to credit, micro or otherwise, is one of the most valuable accompaniments. Also, small entrepreneurs may benefit from IT-enabled business support services e.g. outsourced accounting and bookkeeping, web-page design and management, etc. as well as training in small business software applications. NGOs and local government agencies may also perform a useful public service in initial local content development, increasing the utility of ICT access to the point where a critical mass of users attracts private entrepreneurs into web-based services.

3.15.1 Kothmale Model: Researcher has given a simplified approach to ICT and use of Internet. Internet is a tool with its huge qualities and variety of content is increasingly becoming an effective delivery and exchange system for information and knowledge, continuing education and learning. ICT required special effort to create appropriate model for those tools are use and create environment. Digital divide concept follow, found some barrier for rural ICT usage.

Researcher follow the KOTHMALE MODEL, in this model more focus on KOTHMALE Community Radio (KRC) and Internet, technology use for initial setup required wired for the Internet using a dedicated 64 kbs. Microwave connection, a server computer, and three Internet computers at the radio station itself, two for community access and one for radio programming and also a telephone line. Some guideline given by the researcher which are very informative, the Internet and other new communication technology should not be presented as a technological marvel. They should be presented as a something that is useful in day-to-day life. There is need for active participation by community, user friendly manner, simple step by step instruction should be prepare on how to use the Internet and there should be someone at the radio station and access point to explain the Internet and how it is used.

Internet content should be put across the radio program with reference to the local context. As a consideration degree of preparation is needed any single presenter should not do more than one radio program per week. Women should be encouraged to participate. The local database should be up dated regularly taking in to account information needs that would emerge within the process. The staff should not be over cautious about breakdown in computers. The user should be given a free hand.
Through this model some different elements that are essential for the success of ITC in rural context: community awareness, skill capacity, public access, locally appropriate content, some are integrated approach.

3.15.2 Sources of Information: Researcher has referred so many journal, papers, and books and given different set of easy way of communication medium.

3.15.3 Kothmale Community Radio (KCR): Kothmale Community Radio (KCR), based in Sri Lanka. The towns of Gampola and Nawalpitiya as well as some 50 villages and 17 schools are within the station broadcast range and total potential audience of over 200,000 people. KCR has one functioning studio that feeds to a 300 watt transmitter that in turn puts out an 11.5 hour split morning–evening broadcast day. It is an integral part of process of motivating members of a rural community to use ICTs.

RADIO WEBBROWSING, it is new communication technologies; they used the radio to introduce computer and the Internet to listeners. The morning program announces the daily exchange rate and daily wholesale agriculture prices from the central bank of Sri Lanka. The weather report is also read from the interest radio web browsing has opened a window onto the Internet for the local community. By linking media, a single computer with access to the Internet reaches thousands of people. Kothmale’s programmer browses the Internet live on the radio using a computer in the studio. The content of each programme focus on specific information within a different topic: Health, Legal issue and ICTs themselves. Staff, volunteers and guest experts provide interpretation and translation of web-based information for the local audience. A huge amount of information becomes accessible, first because it is explained in simple terms, secondly because it is contextualized to suit the local environment and thirdly most importantly information is presented in the local languages. The programmers have a major appeal because the type of information broadcast is not available to listeners anywhere else and in the early stage of the project the local community knew nothing of the Internet.

3.15.4 Research methodology: method of research – survey, data sample 93 users of the Kothmale Internet facilities over a two week period.
3.15.5 Status of Project: Kothmale projects focus on awareness through radio. 48% of user sampled in a survey of 93 head about the project’s Internet access because of the radio. In the same sample 96% of user listened to the station’s Internet radio programmed 38% sometimes and 43% usually and 15% always.

Kothmale staff trained 31% of participant surveyed, 44% who had an opinion, 35 % wanted more computers and 27% wanted more support to their learning how to use them.

Kothmale employs a microwave lease in for its connectivity, 64 kbs dedicated connection has worked extremely well for the station’s three computers and it offers unexplored potential for remote access from other sites, however kothmals’s connectivity model is not as yet sustainable. The equipment and installation cost were high but were borne by the project and its partners as a capital investment. The Internet line was down for most of 2001 because the original agreement for the project expired and no one was in a position to pay the costs or renew the agreement. Between 150 and 250 people in a typical two week period use the two computers at the radio station making the Internet room a fairly busy place. Access is free and the station has tried developed a supportive system and environment for users including girls who from a minority amongst users. Kothmale access center is a unique resource in the area. 71% of participant in a survey used the Internet for the first time at kothmala and for 82% of users the kothmale computer represents their only access.

In a sample survey, 95% of users were between the ages of 10 and 25 with 60% between 15-20.the majority are still boys. Gender equity in access has improved. In the first year, there were very few girls using the center and it took a door-to-door campaign to increase the number of girls and young women participating in orientations, training and using the computers. In a samples survey after two years, 41 % of users were female.

Researcher has given the statistic based on the 56% of users traveled over 1 hour to use the facility, 33% over 30 minutes and over 90% of these users to the radio’s Internet programmed for more information.
Staff, volunteers and their efforts not the least of which is the radio browsing format have mitigated the language barrier by providing necessary support: guiding basic skills development, clarifying terminology, assisting with navigating technology, directing users to appropriate websites and providing interpretation and translation. 47% of users surveyed accessed the web for information gathering or educational purpose and 22% accessed the center for more general computer training.

3.15.6 Awareness: Awareness is a formidable barrier, ICT coverage in the media that boosts overall awareness tends to come only once a market has been established, likewise, word of mouth functions only when there is a something to talk about. The situation may be changing but very slowly amongst a vast population.


Researcher felt that Telecom connectivity in rural areas poses a challenge and yet a highly profitable enterprise. The study noted that the need for subsidization of rural telecom projects are on the decline and in this context proactive regulation regarding spectrum, new technology and infrastructure sharing can help facilitate rural coverage.

India has 63.5 million telecom subscribers in rural areas, which includes 52.5 million wireless and 11 million wire lines – approximately 7.5 million net additions each quarter. Telecom penetration in rural areas is about 7.9% and average revenue collected per user is Rs 150. According to ITU report of May 2008, India has connected 91% of its some 600,000 villages with payphones.

Listing out the challenges of rural connectivity, the Ernst & Young-FICCI study said that low income and geographical variance pose difficulties for network layout as well
as for setting up of distribution channels in remote areas. Low average revenue per user generated by rural customers does not offset return on investment and revenue for rural outlay for private operators. Lag in the accrual and disbursement of Universal Service Obligation funds for setting up technologically advanced schemes, including IP based network, Very Small Aperture Terminals (VSAT) also poses a problem. Besides there are non-availability of sufficient back-haul capacity between district headquarters and the block headquarters in rural areas. In some cases the optical fibre network only reaches up to district headquarters.

The study called for an urgent need to shift emphasis from the present village phone terminal subsidy and individual district exchange line subsidy to infrastructure growth empowering subsidy. It also suggested the need for customized applications and content in local languages in the handsets to suit rural subscribers.

The study noted that the necessity and value of a comprehensive network expansion have been identified by stakeholders. Business models that are tailored to reduce operational costs and promote savings on capital expenditure are being redefined to meet the rural opportunity. It suggested that the operators can learn from interesting business models that have been experimented across the developing world for expanding rural connectivity.

It noted that marketing innovations are being implemented that help establish a comprehensive sales and distribution channel to enable reach and access.

Government of India announced the National Telecom Policy in 1994 and the New Telecom Policy in 1999 to provide private sector participation. The opening up of the basic services provided a big opportunity for private & foreign investors and Amendment to Broadband Policy 2004.

Telecom Commission include policy formulation, review of performance, licensing, wireless spectrum management, administrative monitoring of PSUs, research and development, standardization, validation of equipment and International Relations.

As on March 31, 2009, there are 1235.13 lakh phones in rural areas with a teledensity of 15.11% and the strategy for network expansion in rural areas mainly involves provision of phones in the viable areas through market mechanisms and through Universal Service Obligation Fund (USOF) in the non-viable areas.

While Village Public Telephones (VPTs) and Rural Community Phones (RCPs) will enable public access, launched under USOF to create infrastructure in rural and remote areas. Under Bharat Nirman, a target of providing Village Public Telephones (VPTs) in 66822 uncovered villages was visualized. Out of this, 57181 VPTs have been provided till March 2009.

The number of wire-line and wireless telephones was 382.91 lakh & 66.77 lakh respectively in 2002. This increased to 379.65 lakh & 3917.61 lakh respectively in March 2009. The share of wireless phones therefore, has increased from 14.85% in March 2002 to 91.17% in March 2009. Private sector has been growing very fast, grew at a rate of 79.16% in 2009 as against public sector that grew at the rate of 20.84%.

Broadband subscribers grew from a meager 0.18 million as on March 2005 to about 6.22 million, up to March 2009. It is also envisaged that Internet and broadband subscribers will increase to 40 million and 20 million, respectively, by 2010. The aim of e-governance and data services to the rural masses, under this scheme, 5000 blocks
shall be connected by wireless broadband and villages coming within a radius of 10 kms of the taluka or block headquarters shall be covered by such connectivity.

With a strong population of over 1.1 Billion, India has become one of the most dynamic and promising Telecom markets of the world. In recent times, the country has emerged as one of the fastest growing telecom markets in the world. It has third largest telecom network and the second largest wireless network in the world. Proposed to achieve rural teledensity of 25% by means of 200 million rural connections at the end of 11th Plan. Eleventh Plan targets to provide the broadband for all secondary and higher secondary schools, Public Health Care Centers and Gram Panchayats. Broadband growth will increase to 40 million and 20 million, respectively, by 2010.
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