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### Full Length Research Paper

## Information & Communication Technology (ICT): A Key to Rural Development in India

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### ABSTRACT

India is a country with a huge population of 1,21,01,93,422 out of which a gross of 83,30,87,662 population constitute the rural India. These mathematical numbers are just to acknowledge, how important is to promote the development of the Rural India. This paper reports to the implementation and utilization of Information and communication technology as a tool for the upbringing of rural population in India. Rural India continues to be economically and socially backward and faces problems of inadequate infrastructure such as roads, inadequate access to government functionaries, electricity, health workers, primary school teachers and agriculture extension workers, etc. The novelty of this topic leads us to define the framework of relative strength and weakness of different approaches done till date for the development of rural India by using information and communication technology.

**Keywords:** Information Technology, ICT, IT education, Cable TV, Broadband, Internet, Rural India.

### INTRODUCTION

For a developing nation like India with such an exploding population, it may seem paradoxical to consider modern information technology associated with developed country markets and capital intrusive methods, has any relevance here where millions still lack basic needs. But this thought cannot deny the fact that for a strong economic base we need to consolidate the strong ICT sector to govern trade relations with developed nations.

Since independence rural development has been the chief concern of the policy planners in India. Even though rural development was the base of development planning in India it has failed to achieve its objective of eradicating poverty and starvation for which the chief reason seems to be the faulty implementation and poor governance. This has leads to severe losses of crucial financial and human resources. Several alternatives have been explored to find more accountable system of governance. Governance through use of ICTs is expected to solve a variety of problems from removal of hardship in obtaining services from government authorities, having a transparency to alleviate poverty. ICTs and e-governance holds the promise for better governance for rural India, provided resources are made available for building infrastructure and developing capabilities of rural masses. This paper outlines the efforts underway for the rural education, conceptual and empirical use of ICT for a better rural economy, knowing the issues of demand and supply of IT-based services to rural population.

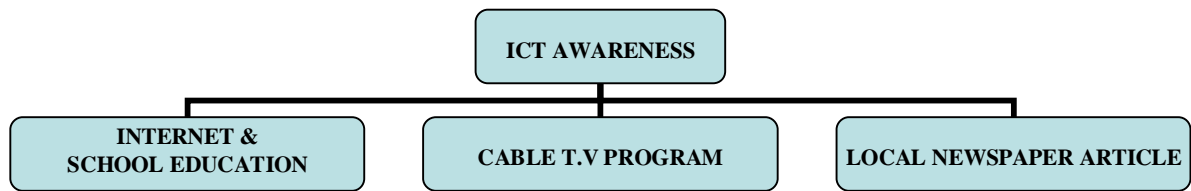
### RURAL EDUCATION AND ICT INTERVENTION

Education plays the pivot role in the growth of a developing nation. It provides people the opportunity to reach a platform where the gap between rural and urban merges.

Education provides better understanding of social and economic issues. It provides an effective interaction

between various arms of government and its environment i.e. citizens, civil society, private sector etc. If we discuss the intervention of rural education program with ICT awareness then it may generate new possibilities to attack the problems that have traditionally been stumbling blocks for rural development such as rural poverty, inequality and environment degradation.

In India, there is now a new mantra of Information and Communication Technologies (ICT). In a burst of technology as solution enthusiasm that has not been seen since the green revolution, ICT are expected to solve a variety of problems, ranging from assuring India a place in the sun, to establish good governance and alleviate poverty. There are many efforts underway in India to demonstrate the concrete benefits of IT for rural population. These may be in the form of ICT education program, ICT awareness centre. ICT awareness may reach population by electronic or paper means like it may be included in school education, local newspaper or a cable T.V program. People should understand the relevance of ICTs for their lives and if so happens there will be a gross economic or social growth among rural population.



**Figure 1.** Dimensions for the awareness of the ICT.

### RURAL ECONOMY AND ICT

At the time of independence 70 percent of India was rural and rural development has been the chief concern of the policy makers since then. A large number of programs like. *Integrated rural development program, National rural employment program, Training of rural youth for self-employment, Jawahar rojgar yojana* were directed to rule out the hurdles in the economic development of rural areas. These programs were implemented through a large and elaborate mechanism of bureaucracy at the central, state, talukha and village level. Actual implementation of the development program was done by talukha level officials, but the traditional approach to governance has been marred by several limitations. Information technology boom in India was instrumental in promoting use of ICT and e-governance for better implementation of the policies, thereby ICT plays role in effecting economic improvements in capabilities such as education, health, nutrition, ability to participate in democratic decisions have a positive impacts on long-run economic well being.

Turning to specific impacts, note that IT involves the electronic processing storage and communication of information, where anything that can be represented in digital form is included in the term "information". Thus news, entertainment, personal communication, educational material, blank and filled-out forms, announcements and so on are all information. Software programs that process data (searching, tabulating and calculating) are also information in this sense, representing a particular kind of intermediate good. We can use standard economic characterization to classify the difference for example, entertainment, personal communication and sometimes news, are final goods. Educational material, job announcements, or some kinds of news (weather news) are used for importing income earning opportunities. Information goods typically have the characteristic that one person use does not reduce the availability for another person. Thus, a message or weather news can be viewed by many people, simultaneously or sequentially. Depending on the content of the news or message, different people may place different valuations on the information. Only friends and relatives may be interested in a personal message, all farmers in a

district may be interested in local weather news, and so on. The ability to share information among users can impact the feasibility of providing it on a commercial basis. IT dramatically increases share-ability of information, and this affects the economics of private provision of information goods and services.

For both government and private provision, one of IT's main direct benefits is in increasing efficiency by economizing on resource use in the operations of firms as well as in market transactions. Information that would otherwise be conveyed through face-to face contact, post, courier, print delivery, telegraph or telephone may instead be communicated in digital electronic form via the internet. Efficiency gains from internet use are not automatic: the telephone, in particular, is an efficient means of communication for many types of information .IT also requires new investment, so the benefits of tips, time and paper saved must be weighed against the cost of installing and maintaining the new infrastructure. Efficiency benefits of IT are not restricted to the communication itself. IT can improve the efficiency of the telephone network, and it can make it possible to track and analyze communications. Word processing, maintaining accounts, inventory management, and other such activities that may not require long-distance communication are also made more efficient by IT.

The ability of IT based communications (combined with storage and processing) to bring together buyers and sellers more effectively represents major potential gains. These gains can come about through lower search cost, better matching of buyers and sellers and even the creation of new markets. In rural Indian context, farmers selling their crops and buying inputs, parents seeking matrimonial alliance for their children, and job seekers are all potential users of Internet-based matching services. Efficiency gains of IT can also come about through the enabling of new goods and services. In many cases, the new good is related to something available earlier, but is presented in a form that reduces cost and expands the size of the market. Educational material is another example where recording and duplication can replace more expensive, skilled labor-intensive alternatives for delivery. The possibilities for interactivity with IT-based educational materials illustrate the advantages of IT over older technologies based only on recording and

duplication. Interactivity also implies personalization, in that an individual can select the precise content that he or she wishes to see. This feature also distinguishes IT-based content from what was available through previous technologies. This allows new kinds of services to be provided at a cost that is affordable to larger segments of the population. If IT economizes on current resources, more is available for investment, which can increase growth. If IT increases the efficiency of education delivery to the broader population, this investment in people (human capital acquisition) is also likely to lead to higher growth.

An important barrier to realizing the economic benefits of IT is the often-substantial up-front cost of investment in new infrastructure – both hardware and software. In developed countries such as the US, large potential customer bases and efficient capital markets help overcome this barrier. Hardware and software designed for developed country markets can easily be adapted to serve higher income consumers in developing countries. Thus, one potential consequence of IT is an exacerbation of inequality, as only higher income groups enjoy its benefits. On the other hand, because government-provided goods and services, including redistributive transfer payments, are often aimed at lower income groups, to the extent that IT can increase the efficiency and effectiveness of government, the benefits of IT will be more widely spread, partly reducing these concerns. However, achieving these benefits requires more than just internal use of IT: beneficiaries of government services (particularly the economically disadvantaged), must be able to access IT resource also. While governments may invest in such front-end interfaces with citizens (and have done so in developed nations), the cost of doing so for governments in developing countries may be prohibitive. Such governments typically already have difficulties in raising sufficient resources through taxes and user charges.

Private organizations may therefore have a role in delivering IT-based information services that are complementary to government services, as well as in providing conventional private goods and services. However, the private individual benefits that determine the prices charged by private providers may not reflect the overall social benefits of provision. As discussed earlier, these may include benefits such as greater awareness and participation in the political process. In such cases, there may be a role for government subsidization of private provision. Looking at the case of India, in cities and larger towns, cyber kiosks have already begun to proliferate. Urban population densities, income levels, cultural attitudes and telecom infrastructure all seem to be sufficient for the commercial success of these enterprises. In rural areas and small towns, however the various demographic and socioeconomic factors such as income levels, cultural attitudes, and geographic and social fragmentation may not be present in configurations that would easily enable the diffusion of commercial access to

various IT-enabled services. Furthermore, the market power of traditional rural intermediaries may act as a barrier to partial innovations in how matching of buyers and sellers is conducted. Finally, vernacular language requirements and different demand patterns imply the need for software that is tailored for fragmented rural markets. The overall end result helps us to look for a growing rural economy.

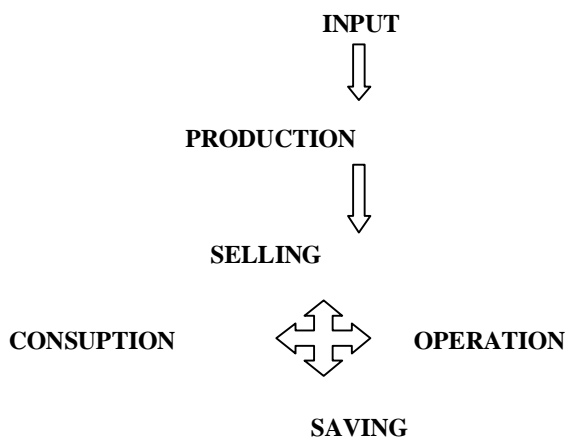
### ISSUES OF DEMAND AND SUPPLY

We very well know that the use and deployment of information and communication technologies have been largely an urban and upper-class activity but now we need to examine the potential for rural IT use, both from demand and supply perspective. *On demand side* we examine the potential benefits that IT can bring to these populations, if the implementation is successful and *on the supply side*, we examine the technical and organizational issues that arise for delivering IT-based service to rural population of India.

Before we discuss the source of demand for IT-based services we need to explain the rural population that ICT covered a range of facilities (electronic and paper based). There by itself creating the demand. Rural population will use ICT facilities if they meet immediate needs for them and their families for example:

- Sending urgent messages
- Obtaining health information for preventive measures for epidemics
- Exploring job opportunities in the cities
- Obtaining market prices of grains
- Ascertaining the availability of fertilizers at affordable prices
- Obtaining weather forecast
- Desire to acquire higher status in the community
- Encouragement of children to enroll for IT training as means of improving job chance

Knowing the above issues we can frame the potential sources of demand representing decisions of rural household.

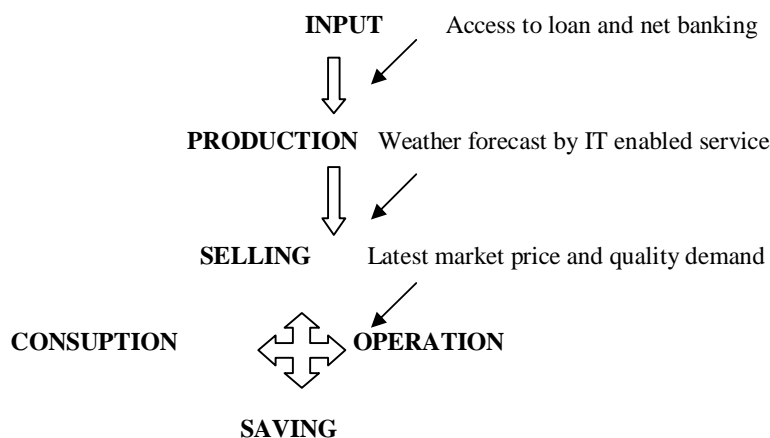


**Figure 2.** Potential source of demand representing economic decision of rural people.

The *input* decisions include material inputs such as seeds, fertilizers and pesticides; and capital inputs such as tractors and land; as well as the credit required for such purposes. The focus of analysis will be market transaction for inputs. Here at each aspect there is a potential for benefiting through improved information about prices, quality and availability. Operation includes decisions with respect to quantity and timing of inputs. A crucial aspect of agricultural operations is risk management, as both the weather and pest incidence are extremely variable. People have to take decisions in the face of uncertainty. Here predictive (based on weather change and production) and technical information (input cost, market price or knowledge of quality required) are both important for agricultural operations.

*Selling* of produce provides income for consumption, investment and inputs. The households that are severely limited in their consumption, or may be human capital investments in education, health and other social operational spending related to marriages and other life cycle events.

A significant proportion of rural households in India have incomes sufficient to support such consumption. Finally there left some household *saving*, which may not be feasible for all rural households, is to be utilized in further investment or kept for some precautionary purpose. This brief summary of a rural household illustrate the economic activity showing that they engage in a broad range of transactions and economic decisions. These decisions are made with very limited information which ultimately leads to high transaction cost, time delays thereby less of gains and saving. Here the role of IT can be understood in terms of reducing transaction cost, as well as improving the efficiency of decision making within household. Reductions in communication and transaction costs have allowed new markets to develop, offering goods and services to broad cross-sections of the rural population. Now we can revise the flow diagram in terms of ICT intervention.



**Figure 3.** Role of ICT for economic growth of rural household.

Here we can expect better decision making, better information sharing, quality production, less of transaction cost better saving and ultimately a better living for the rural population.

Now turning to *supply side*, rural development is a multifaceted phenomenon; innovative solutions have always been sought for addressing the problems of poverty. ICTs can be regarded as the instruments which can alleviate problems of accessibility or corruption which are the traditional hindering factors to rural development. The earliest recognition of potential of computers in rural development in India came through applied research of some academics during 1975-80. A general awareness of the utility of computers was created in the bureaucracy through seminars and training programs this was followed by a few pioneering experiments in the use of computers by the districts administrators. An interesting application in the health sector was developed at a primary health center training school located in the taluka. In this project a PC was used to store data on the couples in the reproductive age. The system demonstrated how monitoring a program could be more effective once access to detailed data was available. Initially the major problem in spreading the use of computer was the need for significant investment in the hardware and software. But later when prices of computer's had begun to decline, the availability of the locally produced computers had improved.

In 1985 when Shri Rajiv Gandhi came to power, the government of India decided to force the pace of IT use at the district level. The National Informatics Center (NIC) - a central government department was chosen to implement a national program called District Information System of National Informatics Center (DISNIC) to computerize all district offices. NIC quickly built up its manpower capability to 2000 technical staff to undertake the challenge. Each district computer was connected to a state computer through a local dish antenna and a satellite communication network. The state computer in turn was connected to computer in New Delhi. This network is called NICNET. The approximate expenditure on the hardware was roughly Rs.6,451.4 crores. Software application development was done centrally for about 15 standardized applications for each district. It was expected that in these applications database would be created at the district level from which data could be retrieved for central planning. NIC was also expected to provide two computer professionals to each district to implement the software. But the existing concerns were the access to electric power and internet connectivity. In both cases, a major constraint is the failure of the public sector to deliver adequate power and telecommunications to rural India. Privatization has helped in the case of telecommunications as has technological change.

In fact, innovation in digital communications technologies is the foundation of all rural IT-based service delivery. While conventional telephone connectivity has often proved inadequate for Internet access in rural areas, because the quality of existing voices lines is too poor to sustain data transmission, several innovations provide alternatives that

are likely to be cost effective. These include wireless in local loop (WLL), fiber optic cables, and high powered versions of Wi-Fi (802.11 wireless standards). In some cases, VSAT satellite connectivity has been used for Internet access. Electric power is more of a problem, and this is true throughout India. Battery backups are a very partial solution to the lack of reliable power supplies, and solar technologies may be more promising in the near future: they are already in use in existing rural IT efforts. The difficulty is that having to rely on these alternatives and backups unnecessarily raises cost of operation. Of course this is true for all of India's economy. It is well recognized that the power sector is the major bottleneck, with capacity well short of demand, and the quality of transmission and distribution remaining poor.

The department of Information Technology has identified successful projects on ICT such as Registration Transport, Municipalities, Gram Panchayats, Treasuries and Integrated citizen Services Centers which are running in different states on a pilot scale. The Department of IT has setup Community Information Centers (CICs) at 487 blocks in the seven North – East States. The project is intended to reduce the digital divide by providing access and IT enabled services to the community at large. It is now possible to fully equip a single computer rural Internet kiosk for less than Rs. 50,000, including CD drive, printer, scanner, power backup, and a web cam. Training of rural kiosk operator, whether they are formal franchisees or independent farmer operators, becomes a key aspect of the delivery model but also training the field personnel at various levels (village and district hub) seems critical. The software and hardware for basic kiosk operation are quite standardized, and their cost has been falling. Various local language software applications have been developed, for e-governance, market price information, buying and selling, and so on.

## CONCLUSION

This paper surveyed a substantial role of ICT in the development of the rural areas in the future. This also provides overview of the economic impacts of IT and examines the demand side and supply side issues of successful implementation. However, it requires simultaneous investment in education and infrastructure creation and at times this initiative is lacking. There appears to be enough evidence now that it is commercially feasible to use IT to deliver services to rural population either at cost that are lower than previous delivery methods, or in ways that make it possible to achieve deliver where none was earlier cost effective or feasible. It is important to recognize that ICTs are an instrument to achieve development but the mere introduction of technology cannot change the face of the rural hinterland. The solutions lie in effective implementation and commitment to bring about a change.

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