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A Study on Needs & Challenges for Rural Technology in India

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1. Introduction

India's approx. 70% of the population lives in Rural Areas. In India's economy, rural areas play a vital role. In past times rural areas people live with traditional and manual method.

Technology in today's world has become imperative in all areas whether they are healthcare, medical, education, transportation, tourism, industry, business, management, administration, banking, or rural development.

Technology mainly is concerned with the usage of computers and software applications. It has several meanings such as machinery, equipment, tools, skills, knowledge, and expertise. For the development of rural areas, the utilization of technology has been done on an extensive scale and there has been expansion and progress in the field of agriculture because of the effective implementation of technology.

Technology has played a necessary role in the development of rural areas. Technology's major function in rural development is to provide individuals with information of any kind, the reason being, they need information because it is indispensable for development. For example, information and communication technology can help farmers in rural areas to become aware of new resources and techniques of farming that lead to more production and thus more Income. information and communication technology can assist the individuals in consulting doctors in urban areas thus plummeting health problems, information, and communication technology can help in enhancing the educational opportunities of the rural people by utilizing distant learning methodologies and appropriate curriculum and instructional techniques.

2. Objectives

Agriculture is the main occupation of the people in rural areas, therefore, for the development of agriculture, technology must be adequately used and implemented.

Within educational institutions and training centres, it is vital to introduce computers and internet facilities so that rural people understand and the usage of technology in learning centres also arouse curiosity and enthusiasm within their mindsets.

In rural areas, various procedures such as the distribution of information, business transactions, trade, dealing, an industry in rural areas are implemented through making use of information and communications technologies.

In villages, information centres have been established that enable rural families to adequately get access to innovative and modern information and communications technologies. The literate youth and women are mainly provided information regarding the technologies so that they gain awareness, and they can adequately make use of them.

The proper organization and maintenance of information technologies require training and generation of knowledge and awareness among the rural masses; their contribution is vital for the effective utilization of technologies for the development of rural areas.

Benefits of Technology in Rural India

- The socio-economically backward sections of the society such as landless labor, migrant labor, and slum dwellers are helped and benefitted.
- The productivity gets increased; whether it is agricultural productivity or the productivity of labor or production in any other area, there is an overall enhancement in production without displacing labor.
- The development of technologies generates more employment opportunities for individuals in rural areas.
- It facilitates reasonable allocation and social equality.
- It stimulates people towards self-help and self-reliance.
- It eliminates hard work and toil of the people and contributes to the improvement of the quality of life of the individuals.

3. Areas of Application of Technology

The areas of application of technology in rural regions to the following:

1. **Agriculture –** In agriculture, the usage of technology has been used in making proper utilization of land, reclamation of unused land, introducing innovative cropping patterns, distribution of improved techniques of cultivation, usage of improved seeds, agricultural tools, and marketing facilities and post-harvest technology
2. **Animal Husbandry –** Improvement in livestock, cattle rearing, dairy improvement in fodder supply, development of fodder, poultry, fish, culture, milk products, etc.
3. **Rural and Cottage Industries –** The development of technology in rural areas has also led to the generation of rural engineering. The production of artworks, handicrafts, and other products has been enhanced through the usage of technical machines and equipment.
4. **Health –** The health sector is considered to be one of the most prominent areas that have made effective utilization of technologies, for instance, the supply of pure drinking water, improvement in sanitation and health services, and supply of low-cost balanced diet.
5. **Water minor irrigation –** The development of technology has facilitated effective water management systems within the rural areas; storage and conservation of water, repair, and maintenance of

water supply systems have been part of effective water management as a result of the development of technology.

6. **Energy –** Development of practical application of renewable sources such as solar, wind, and water power, the introduction of smokeless stoves are some of the sources of energy that have been introduced in rural areas as a result of technology.
7. **Rural Housing –** This is an area that needs to be focused upon and improved; the strategies and the areas of application are required to be developed regarding the construction of rural housing. Designing, constructing, and fabricating of affordable and inexpensive houses in rural areas with locally available material and labor.
8. **Roads and Communication** – There has been a great amount of work done towards the development of roads and communication facilities in rural areas; in some of the areas, roads are still in an underdeveloped state which needs to be improved, therefore, application of technology should be upon the improvement of village roads, transport, and communications systems.
9. **Rural Education –** Within the education system in rural areas, besides the development of schools, educational institutes, and other training centers, there has been the utilization of computer technology, literacy campaigns which focus upon the significance of technology and also this has resulted in improvement in attendance and reduction of drop-outs.

Here, some of the technology initiatives that support rural India.

E-Choupal – ITC is one of India's foremost private sector companies. Their Agribusiness is one of India's largest agricultural commodities exporters. In 2000, they launched 'e-Choupal', which today has become the largest initiative among all Internet-based interventions in rural India. Through 6500 kiosks across ten states, 'e-Choupal' services reach out to over 4 million farmers growing a range of crops – soybean, coffee, wheat, rice, pulses, shrimp in over 40,000 villages. e- Choupal provides farmers with real-time information on market prices, weather, farming techniques, and crop insurance. However, the biggest service that e-Choupal provides farmers is that it procures from farmers, thereby freeing them up from middlemen and intermediaries and dependency on just the local mandis (large agricultural procurement centers in rural India).

Retail Technologies – India's Fast-Moving Consumer Goods (FMCG) and retailers are increasingly relying on a variety of technologies to connect with rural India. The Business Standard report on this subject provides details of how Hindustan Unilever is deploying tablet PCs in rural India. Nitin Paranjape, managing director, HUL said: "We put all the villages on an IT map. The name of the village, its total strength, nearest distributors available, whether it has a school, a hospital, a primary health center, all of this was mapped. We used this information to determine the opportunity the village presented to us." Another example is Marico, a company that manufactures safflower oil and hence needs to procure safflower seeds from farmers. This activity involves their field representatives covering over 80,000 acres of farmland spread across seven states. Marico's IT team created a mobile application that enabled its field representatives to easily locate farmers in remote areas so that the process of procurement was streamlined.

Mobile Applications – Many different-different applications developed for Rural peoples. Like as- **KISANMEET, AGRI APP, IFFCO KISAN, AGRI MEDIA**. Another mobile application that we covered in an earlier quarterly report was the Kisan Raja from Bangalore based Vinfinet Technologies. It is a GSM-based controller that allows farmers to control irrigation pumps using mobile or landline phones from within the comforts of their house.

Rural Technology Lab – Technology solution that this team has been testing is an inexpensive fruit dryer that preserves bananas and creates more demand for farmers' crops year-round.

Some Schemes and Technological Intervention by Govt. for support Rural Development

eNAM (Electronic National Agriculture Market): - This is Launched by Hon'ble Prime Minister Narendra Modi Ji in April 2016. It is an online platform for farmers that integrates agriculture markets online, allowing farmers and traders alike to view all Agriculture Produce Market Committee related information and services, commodity arrivals and prices, and buy and sell trade offers, thus helping farmers bid for the best prices across markets. .

"*MIS Awas-Soft*, mobile based application *Awas Soft*and space technology are being used on a large-scale for monitoring purpose. All transfers of funds to the beneficiaries are done on the basis of Electronic Funds Transfer rder (FTO)."

Digital Health Service: -There are many steps taken under Digital health for enabling and monitoring and fast execution. Here mention some Key initiatives.

1. **mSakhi: -**mSakhi is an award-winning mobile phone app to help health workers in providing high-quality health care to the families in even the remotest villages in different parts of the country. If a mother or baby needs medical attention, an ASHA can use mSakhi to quickly refer them to a doctor who can help.
2. **Kilkari App: -** Kilkari, which means 'a baby's gurgle', delivers free, weekly, time- appropriate 72 audio messages about pregnancy, childbirth and child care directly to families' mobile phones from the second trimester of pregnancy until the child are one year old. Kilakri has been launched in Jharkhand, Odisha, Uttar Pradesh, Uttarakhand, and High Priority Districts (HPDs) of Madhya Pradesh and Rajasthan in the first phase.
3. **Mobile Academy: -** It is a free audio training course

designed to expand and refresh the knowledge base of Accredited Social Health Activists (ASHAs) and improve their communication skills. Mobile Academy has been launched in Jharkhand, Madhya Pradesh, Rajasthan, and Uttarakhand.

4. **M-Cessation: -** This program being provided as part of any mHealth initiative, aims at reaching out to those willing to quit tobacco use and support them towards successful quitting through text messages sent via mobile phones.
5. **MeraAspataal: -**It is a Government of India initiative by the Ministry of Health and Family Welfare, to capture patient feedback for the services received at the hospital through user-friendly multiple channels such as Short Message Service (SMS), Outbound Dialling (OBD) mobile application, and web portal. The patient can submit the feedback in seven different languages on the mobile app and web portal; for the hospitals visited in the last 7 days.
6. **ANM On-Line (ANMOL): -**ANMOL is aiming to improve the quality, effectiveness, and timeliness of the delivery of quality services, especially to rural populations, to ensure better healthcare for women and children

4. Building Agriculture Innovation System

"In the new National Agricultural Innovation System, we must look for total innovation, involving technological and institutional innovations throughout the production, marketing, policy research, and enterprise domains. From the transfer of technology, we must move to learn by using `collective intelligence'. Farmer's role will no more be confined to learning, adapting, and conforming. They must become co-creators of knowledge, process and innovation."

Farming is the main source of income for the people of India. Mostly farmers using traditional patterns and their farming depends on Nature due to this they do not earn more money. So, that government takes major initiatives in the agriculture sector.

Delivering the presidential address at the inauguration of an online workshop on 'Design of knowledge-based systems using AI and machine learning models in the context of agricultural and food products. The rising scarcity of farmworkers has pushed up production costs. Artificial Intelligence can be applied in agricultural gadgets and equipment. This helps farmers to automate many operations and enhance the efficiency of farming activities.

5. New technologies in Vegetables Production

Innovation in agriculture has always shaped the destiny of a promising country like India. The diffusion of science, technology, and innovation in agriculture is rather the key to increase agricultural production sustainably. The role of science and technology in agriculture is pertinent to not only ensure national food security, but it also provides farmers to maintain the affordability of food items for the public. To draw the true potential of farmers towards state-of- the-art technologies for the betterment of agriculture, the Indian government has set up a big chain of over 700 Krishi Vigyan Kendras (KVKs) across the country.

The objectives cum activities of Krishi Vigyan Kendras can be summarized as below:

- On-Farm Testing of new Technologies
- Frontline Demonstration Centre:
- Capacity Building
- Multi-sector Support and Advisory Services

Krishi Vigyan Kendras provide requisite knowledge through pieces of training and other activities to improve the skill and attitude of the people particularly farmers towards new technology and approach in farming, provide proper guidance to solve any problem faced by the farming community in agriculture and allied fields.

"Prime Minister Shri. Narendra Modi has launched **'Lab to Land'** scheme in 2014. The objective of this scheme is to increase agricultural production along with the rational use of water. For this, the PM has coined a mantra **'per drop more crop'**. He has motivated agricultural scientists for the use of scientific technologies to help raise agricultural production. In this scheme, the stress is given on a logical combination of the traditional knowledge system and new technology. The groundwater level is going down in different parts of the country and this situation is alarming. Such schemes can motivate people to conserve water. On 25 July 2015, the Prime Minister invited about 6000 scientists functioning at the various centers and institutes of the Indian Council of Agriculture Research (ICAR) and over 15,000 scientists working with state agricultural universities under a program called **Mera Gaon Mera Gaurav**. The scheme envisages scientists to select villages and remain in touch with the selected villages and provide information to the farmers on technical and other related aspects through personal visits or on the telephone. The center has announced **'Digital Literacy Mission Scheme'** in the Union Budget 2016-17. Under this scheme, the government will cover around six crore additional households in the next three years' time. Digital literacy is defined as the knowledge to handle digital devices such as computers, smartphones, and the internet."

ICT (Information and Communication Technology) for Effective Implementation of Welfare

Every year, the government spends billions on the welfare of the poor. As around two-thirds of the total population and many the poor reside in rural areas, most of these welfare schemes are targeted at the rural populations. The use of ICT can improve the efficacy of these schemes, plug leakages, and eradicate corruption. Some examples are described as follows: ICT will be used in **Pradhan Mantri Fasal Bima Yojana** in a big way. In this, a farmer will have to send a photo of his damaged crop to authorities on the net. Then the government will also access damage through satellite imagery of the field. After that insurance claim will be directly transferred to farmers' accounts. Thus, delays and corruption in payment of claims would not be there. This scheme has the potential to change the way farmers' look at crop insurance. The Government is investing a lot in irrigation through **Pradhan Mantri Krishi Sinchai Yojana**. IT can be used here also for Smart Agriculture by measuring soil moisture through and then automatically

supplying water through drip irrigation. Leakages in Public Distribution System can be plugged by connecting the ration shop through the internet and using a biometric authentication system of the beneficiary. Through Direct Benefit Transfers, the government is trying to give subsidy directly in the bank account of the beneficiary. This has effectively stopped the black marketing of subsidized LPG cylinders.

6. ICT in Rural Education and Skill Training

Thanks to the relentless efforts by the government and schemes like mid-day meals, India has achieved universal enrolment at the primary level. But one worrying fact is that learning outcomes of enrolled children are very abysmal. Attention needs to be focused on this now. Using ICT tools in education can help improve the learning among the kids e.g. through projector and computer, teachers can make children understand complex concepts easily. The Government is promoting the use of ICT through **Rashtriya Madhyamik Shiksha Abhiyan.** Under these following steps are being the taken-The establishment of smart schools, which shall be technology demonstrators.

Provision for engagement of an exclusive teacher for ICT, training all teachers in the use of ICT.

1. Development of e-Content.
2. National Award for teachers using ICT in schools in the teaching-learning process.
3. Also, a project called e Basta is conceived under Digital India Initiative to make school books accessible in digital form as e-Books to be read and used on tablets and laptops.
4. Further, ICT can be used in skilling rural youth under various Government skilling programs e.g. Skill India, PM Kaushal Vikas Yojana.

7. Renewable Energy Making A Difference

The Government at the centre has been focusing on Renewable Energy. The Government declared its intention to achieve 1.75 lakh MW of renewable power by 2022. Of this, one lakh MW was to be achieved through Solar power, while the rest was to be done through other renewable sources of this, 40,000 MW is to be achieved through rooftop panels.

Solar Power

Solar power, a renewable and clean source of energy, could fuel rural India's growth. With a drastic drop in the capital costs and efficiency improvements, solar energy is now a viable alternative for the power-starved individual households and small businesses of rural India.

Wind Power

Wind power is another huge success story, especially in Karnataka and Tamil Nadu, where miles of windfarms dot the rural landscape and produce enough power in a decentralized power to be fed into the power grid.

Some more Initiatives also are taken

1. MS Swaminath Centre (In Pondicherry focused on Agri and fishery applications)
2. Akshaya (Focus on Rural Enterprises)
3. Gyaandoot (in MP with focus on e-governance)
4. Warana (Wired Village in Maharastra by NIC)
5. Drishti (Uses existing telecom infrastructure) **For Profit Initiative*
6. Bhoomi (E-governance Program for land records)

8. Challenges & Limitations of Technology implementations in Rural Areas

Despite technology's promise, there remains a need for a substantial increase in old-fashioned investments to catch up with the backlog in physical infrastructure and education to achieve a geographical more dispersed development away from the 100 big cities. Around 25% of Indian adults cannot read or write, and the gender decide must be addressed with investment, particularly in rural areas; many farmers remain unaware of these advances. Insufficient connectivity in rural areas along with a lack of basic computer knowledge and literacy hinders development. Substantial investment is needed in physical infrastructure, power, broadband, transportation, and education, particularly in rural regions and among the poorest populations to truly reap the benefits of 41R.

- Lack of Suitable Telecommunications Infrastructure
- Lack of Personal Computers at Homes and High Cost of Internet Use in Rural Areas:
- Lack of Familiarities of Villagers with Computer
- Fears of Possible Cultural Damage from Accepting or Rejecting Technology (in Family and Society):
- Villagers Need to Understand the Feeling of Having Information and Communication Technology:
- Lack of Enough Human Resources
- Hopes and Expectations of Information Technology in Rural Development
- Financial Crisis

9. Challenges

The Impact of Micromanagement (Parliament and Government) in ICT Development in the Rural Areas. The most important role of the micromanagement in ICT development is explained below:

Creating A Suitable Environment for ICT:

Creating the situation in which ICT innovation is affordable, depends on the social and economic policies. The socio-economic policies such as exchange rates, foreign trade, and economic efficiency of the government monetary and fiscal policies affect the development and creation of ICT.

Determining A Strategy for Development:

The importance and priority of technology such as ICT depend on how it helps to fulfill its goals and how it implements to develop the strategies. Electronically government system will not be achievable in a short time unless the specialists have a proximate program for developing the fundamental technologies in the rural areas.

Formulation of Objectives and Priorities for Technology Development:

In nationwide management, the objectives and priorities of developing the country should be fully compatible with the technology development strategy. There will be successful executive programs and the objectives will be available in case of having a logical connection between objectives and strategies in developing the program.

Resource/Broadband/Internet access:

For rural districts, internet access is the most pernicious obstacle to taking the digital leap**.** Even if the school itself has internet access, many students live far from school, and it's not cost- effective for telecommunication providers to lay fiber to the remote areas where they live. Satellite is an alternative, but it is too slow and expensive to allow students to do their work.

Funding:

Rural districts are often funded from a smaller tax base, and because of their small size**,** a larger percentage of their per-student spending goes to overhead costs such as transportation.

People:

Rural districts often have a difficult time recruiting staff, substitute teachers, and support personnel. A remote lifestyle may not appeal to teachers coming from college towns or other schools, especially if they can make more money elsewhere. As a result, extra courses such as advanced placement classes may not be offered, and existing teaching staff may have to teach courses that are outside of their specialty.

Understanding the 'why': Finally, some rural communities may be sceptical of the role of technology in their schools and their communities, according to the CoSN focus groups. In some communities, people are protective of their small-town way of life and do not want to see that disrupted.

Consequently, it often takes very clear and compelling communication to make the case to rural citizens that technology has a meaningful role in their public schools.

10. Conclusion& Suggestions

Findings:

The presence of Technology in rural areas is noticeable. Farmers and artisans are using Technology in every sphere, but education, awareness, and research need to be proliferated more. Only a few percentages of farmers avail the facility of soil testing. Use of fertilizers, pesticides are also not done as per the prescribed norms and standards. Krishi channels and helpline numbers have been introduced to enhance the awareness but extensive efforts need to be done. Scientific temperament needs to be infused. Farmers and artisans use Technology in their activities but many a time it is not in the proper way.

There are numerous challenges before accentuating the use of Technology in Rural India.

1. Various agencies are involved in R&D work but the cost of maintaining this technology transfer is very high.
2. Awareness level is very poor, which needs to be increased through regular campaigns and training programs.
3. Mobile phones, Televisions, and social networking sites can be instrumental in spreading awareness.
4. The crux of the problem is that it had worked like this only in respect of some technologies and produced isolated pockets of success i.e. green and white revolution in some parts of the country.
5. Green revolution yielded results in States like Punjab not in eastern UP and Bihar similarly, the white revolution was a mega success in Gujarat, not in many other States.
6. Due to the lack of creative synergy at cutting edge level, Rural India has not been able to reap the full benefits of S&T it deserves. Due to the lack of linkage with industries, the T work in Rural India is badly affected. Even Tenth Plan documented that "lack of linkage with industry has resulted in R&D being largely academic with very few applications.
7. commercialization and patenting. Lack of integration of Technology systems in developmental activities and no Technology-based planning and distributions of responsibility amongst nodal implementing agencies are the major challenges.

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Suggestions:

Considering the challenges for implementing the Technology for Rural India, the following measures can be taken:

Centrally funded Agencies like the District Rural Development Agencies (DRDA) set up in every District for carrying out the poverty alleviation program should be provided with Technology back up to look into the technical aspects of developmental and Need for Rural Technology in India.

A partnership should be forged with Technology institutions and civil society to assess the need and popularise the usage of Technology in various rural economic activities IT means should be used to increase the awareness and disseminate the information regarding the benefits of Technology in promoting rural areas as economic activities centers. Need-based R&D work should be promoted. As in Uttrakhand, research for eco-system balancing, preventing wildfire, innovation in woodcraft, and water conservation should be promoted, however, in Punjab food processing and cold chain storage-related innovations are required to be taken in a bigger way. The objective is to technologically empower the communities to assess their problems and participate in the process of making 'choice of technologies' in specific areas. For this, a consultative Group of Local Science and Technological institutions comprising concerned departmental officials and Technology capable NGOs may be formed. One of the S&T institutions may be selected as the nodal agency. In line with the concept of Mother NGO, a lead Science and technology NGO may be selected to take up various functions. Survey Technology needs and gaps, sector-wise, especially the non-farm sector and identify areas for entrepreneurship development. Select field NGOs who could be trained and supported to develop competency in Technology intervention and to act as incubators for enterprise growth. Arrange training for NGO partners in project activities in the area. Scientific Departments and the autonomy granted to the Departments and Institutions like the existing coordination arrangements at the central level have their rationale and are not amenable to change. At the State level, the Technology Council should be restructured to function as the Technology Advisory Group (STAG) responsible for integrating Technology inputs from all Technology institutions located in the State by making them 'partners in development.

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