



# Advancing Rural Development Through Information Technology

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## Abstract

The Government of India has prioritized rural development to achieve rural-urban integration in the growth process. The core objective is to promote inclusive growth by ensuring equality of opportunity, particularly for disadvantaged sections of society. This paper reviews various studies conducted by researchers, investigators, and agencies on the impact of Information and Communication Technology (ICT) tools in rural India. It highlights the significance of ICT in rural development, community empowerment, and economic growth. After analyzing diverse perspectives and findings, the study concludes that ICT plays a crucial role in fostering environmentally sustainable rural development and enhancing rural communities. ICT has significantly contributed to improving economic and social conditions in rural India. In a developing country like India, creating information-rich societies, empowering marginalized populations, bridging the digital divide, and ensuring the sustainable development of rural communities necessitate the widespread dissemination of ICT at the grassroots level.

**Keywords:** Rural Development, ICT, Rural Health, Rural Education, Skill Training

## Introduction

Strengthening, Modernisation and development of rural India is a crucial question, today. If rural economy cannot be upgraded as required, the upgradation of whole country has no meaning. Prime Minister Shri Narandra Modi has called a social mission with a vision of poverty less India till 2030. But, to save nearly 8.35 crore families from the demon of poverty is a difficult task to handle. Prime Minister has initiated to take necessary help of information technology in this task. The rapid development of agricultural vision, understanding and status of human life. The commerce and trade activities are the one where information technology has contributed a lot. Information technology has helped to diversify the localised trade and commerce beyond the boundaries in the shape of e-commerce. Financial literacy and financial inclusion are another big hurdle of developmental pursuits of Indian economy. Information technology, hereto, has played a catalytic role in bringing more population under the banner of financial literacy as well as financial inclusion. In the areas of education, information technology, again played a marvellous role as it made the access easy and simply. MOOCs, e-pathshala and other platforms are providing easy patterns to educate remote and geographically weak area masses, too. This way, by the implementation of information technology in such crucial areas where the development was stagnant, the condition of Indian Villages has improved over the years. Not alone, the inclusive development is initiated and achieved but also the progress and failure report has also started to reach government in due course of time. Therefore, a lot of wrong assumptions about rural life has started to improvise. New generation of employment, easy education, speedy infrastructural development, change in market, agro-innovations, decrease in corruption, prosperous rural life and other such changes have come due to information technology. These change not only upgraded the life urban but also the life rural areas. Rural Areas in India need development more significantly rather than urban areas. Because, any plan or policy without the upgradation of rural areas is absolutely null and void. Government schemes such as Deendayal Upadhyaya Gram Jyoti Yojana (for rural electrification), Pradhan Mantri Gram Sadak Yojana, Rurban Mission are focused on rural development. Effective implementation of these and rural areas can be sustained with the reach of information in remote villages and towns of the country through information technology. Without the sustainable development of remote rural areas, the socio-economic development of the country is impossible. In today's world, information technology is being used in a easy manner in every

area of human life. This technology is playing a chief role in the development and scope of education, health, infrastructure, trade, industry, commerce and marketing services etc. In this way, information technology revolution has transformed the schemes would depend on the efficiency of our administrative machinery at ground level, but one more factor that can make or mar the government efforts is availability of right technology for rural needs. So, the present scenario forced the authors to conduct research on “Role of Information Technology in the rural development of Western Uttar Pradesh.”

### **Challenges in Rural Development**

At the inception of India's Five-Year Plans, rural development was primarily perceived as the optimal utilization of land-based natural resources—agriculture, forestry, and livestock. It was widely believed that the growth and development of these sectors alone would drive comprehensive rural progress. This perspective was also widely accepted by rural communities, shaping their aspirations and economic activities around these traditional sectors.

However, over time, it became evident that sustainable rural development required a more holistic approach. The engine of growth could not accelerate unless development efforts extended beyond the conventional rural-urban divide. Rural communities needed not just agricultural advancements but also access to education, healthcare, social equity, and employment opportunities to improve their overall standard of living.

Addressing these challenges calls for a multidimensional strategy that integrates economic, social, and industrial development within rural areas. Only by ensuring equitable access to essential services, infrastructure, and livelihood opportunities can true rural transformation be achieved, fostering inclusive and sustainable growth for the entire nation.

### **Objectives of the Study**

This study aims to examine the role of Information Technology (IT) in rural development across various sectors in India. It explores how IT applications contribute to the overall progress and well-being of rural communities. Based on the preceding discussion, the specific objectives of this paper are as follows:

1. To analyze the role of information technology in agricultural development.
2. To examine the impact of information technology on animal husbandry and dairy farming.
3. To evaluate how information technology enhances the welfare of rural populations.
4. To assess the contribution of information technology to rural education and learning opportunities.
5. To explore the role of information technology in addressing rural healthcare challenges.

By investigating these key areas, this study seeks to highlight the transformative potential of IT in fostering sustainable rural development and improving livelihoods in India's rural regions.

### **Methodology**

This study is an empirical research based on secondary data sources. The data has been collected from various reliable sources, including:

- Websites of relevant government and non-government organizations
- National and international journals
- Research articles and publications
- Conference papers
- Reports and official documents

By analyzing these sources, the study aims to provide a comprehensive understanding of the role of Information Technology (IT) in rural development.

### **Review literature**

Information technology industry is one of the most important subjects of the new India. It has created a last long impact on the development and other aspects of growth. A brief and latest review of available literature is executed here to know, to define and to explain different aspects of present research subject i.e., role of information technology in rural development. Its main purpose is to fill the gap in research by following and quoting the methods, objectives and limitations of available empirical research studies. Therefore, keeping in mind the main subject of this research work, the related literature is reviewed as under Atul D et.al. (2016) conveyed that Information and communication Technology (ICT) is the combination of three magic revolutionary words, 'Information', 'Communication' and 'Technology'. 'Information' is disseminating and promoted using 'Communication' and transmitted through 'Technology'. The term 'Information and Communication Technologies' (ICT) can be used to embrace a multitude of standalone media, including telephone, television, video, tele text, voice information systems and fax, as well as those requiring the use of a personal computer fitted with a modem. The latter can include direct dial-up services such as electronic banking, file exchange and closed information services.

Dwarka Nath, H.D. (2013) says that One of the major problems facing our country today is the continued migration of people from rural to urban areas which is essentially a reflection of the lack of opportunities in the villages. Unemployment and poverty continue to plague the Indian economy despite almost half a century of planned development. The magnitude as well as the percentage of unemployment and underemployment has been on the rise. However, the achievement in the field of employment generation is far below the target. Development of infrastructural and marketing arrangements for the growth of non-agricultural activities in rural areas is the need of the hour. Greater flexibility in special employment programmes and their integration with sectoral development to ensure their contribution to growth and sustainable employment would help in generating employment opportunities in rural India. The expert is of the opinion that an expanded programme of development and utilization of waste land for crop cultivation and forestry, would help in generating regular employment to the rural masses. The problem of unemployment in rural India can be eradicated only by increasing productivity of dry land agriculture. In this context, we need a constitution of greater emphasis on research and development.

Patel, Amrit (2014) is of the view that with the process of liberalization, privatization and globalization, India's economy has been witnessing metamorphic transformation. As it is evident now that share of agriculture had phenomenally declined to 13.7 per cent with 1.8 per cent agricultural growth rate in 2012-13. Despite slower growth rate of agriculture due to a plethora of factors/ reasons India's agriculture has made significant performance viz. [i] India ranks the first in the world in the production of milk, pulses, jute and jute-like fibres and second in rice, wheat, sugarcane, groundnut, vegetables, fruit and cotton production. [ii] Fruits, vegetables, meat and fibre accounted for 38 per cent of the total produce by weight in 2000 and 45 per cent by 2010. However, while the quality of the products and the productivity of field crops, fruits, vegetables, milk, eggs, meat, fish per unit of area and resources are very low their wastages are substantially high which the nation cannot afford. Agriculture today is far more integrated with the macro economy and no longer 'rural only' in orientation. Accordingly, in the context of the changing rural employment scenario from farm to non-farm sector, the Government's policy initiatives may now have to prioritize development of secondary and tertiary sectors of rural economy, though not at the cost of farm sector which has and will even have its unique place and role in country's economy in the years to come. Government in a public-private partnership mode will need to evolve policy and develop programs that can progressively move rural population from farm to non-farm sector. Following are the broad-based areas under farm and non-farm sector which have unfathomable potential to generate rural employment.

Singh, K.M. & Singh, Pushpa (2018) writes in their paper that the National Alliance for Mission 2007 and the Common Service Centre Scheme to establish telecentres country-wide in India are clear examples of the government's dedication to enhance rural access. Ensuring sustainability is a major challenge. Cost-sharing arrangements between local stakeholders, such as health centers, farmers' organizations, schools and local government bodies are taking place. Also, payments for local services can generate revenues to sustain tele-centers. Price information projects in India report that farmers are willing to pay for price information from the gains made through access to it. Rural information center, also provide a learning environment for farmer groups on the use of Digital technology but also on jointly solving problems in their livelihoods.

Wadhwa, Manjula (2018) discusses that with an average rural literacy rate of 71 per cent most rural Indians are not likely to sacrifice an entire day's wage to travel to a bank branch which is open between 10:00 AM to 5:00 PM. Intermediaries like NGO's Self-help Group, Micro Finance Institutions, semi-formal delivery channels like Banking correspondents and Business Facilitators are being used by banks to improve access to credit and savings. However, these channels in their current form, offer limited services and suffer from many a lacuna. A part from this, many banks view the rural market as a regulatory requirement rather than an economic opportunity. Since rural households have irregular income and expenditure patterns, the banks have high Nonperforming loans in rural areas. The issue is compounded by the dependence of the rural economy on vagaries of monsoons. The loan waivers driven by political agenda, further aggravate the bankers' woes.

Balwant Singh Mehta, (2013) conducted a study by using field Survey method to explore the socioeconomic impact of mobile phone usage in rural areas of the two Indian States such as Punjab and Bihar and the survey revealed that, mobile phones have reduced the cost of accessing information and helped users to make communication with their relatives and migrant family members and to gather timely information related with agricultural and non-agricultural purposes and also Mobile users get benefit by obtaining timely information on a variety of subjects, including on employment opportunities and higher education for their children, funds transfer, etc. The author also noted that in Punjab state, peoples were early adopted new technologies and hence there is high usage of mobile value-added services (MVAS) and innovative uses like transfer of funds and agricultural related information. Finally, the author made conclusion, With the spread of mobile use, it is

very likely that it could be an arena of innovative activity, reducing costs and thus increasing incomes at the 'bottom of the pyramid'.

Jayade, K.G et al. (2014) published an article entitled as “Study of Information Communication Technology in Agriculture in Vidarbha Region of Maharashtra State of India.” and concluded that ICT has improved the economic condition of the farmers in Vidarbha Region of Maharashtra state; ICT is advanced tools to disseminate the modern agricultural knowledge to the farmers and it plays an important role for the development of economy by enhancing the effectiveness of agricultural market, productivity and competitiveness in Vidarbha region of Maharashtra state. ICT and Mobile technology not only improved the package of practices but also improved the agriculture through knowledge dissemination by e-agriculture but also reduced the gap among agricultural scientists, extension worker and farmers.

The present review of literature shows that none of the research paper is able to reflect a comprehensive picture of the subject of this paper. There are papers, reports and books but a less is written about future possibilities and challenges of information technology in the development of rural India. The main challenge is the reach of information technology to the person living below poverty line.

### **Analysis And Discussion Of Ict Applications For Rural Development**

The above discussion takes towards a discussion that arouses a dire need for information technology based rural development of India. Information technology is proving to be a successful method to reduce the gaps in inclusive development of rural masses as well as urban population. Poverty is a product of improper employment opportunities. Information technology on a side increasing the teaching and learning index among rural masses and on the other side, it is opening up new employment opportunities. The amalgam of both education improvement and employment opportunities is providing multiply platforms to eradicate poverty in a phased manner. These small and strong efforts are contributing to a well-managed rural development system through information technology. The following points better evaluate the role of information technology in rural development.

The text in the image discusses ICT applications for rural development, emphasizing the role of Information Technology (IT) in bridging the rural-urban development gap. The key points are:

- **ICT for Inclusive Development:** IT is helping reduce disparities between rural and urban populations.
- **Poverty Reduction:** A lack of employment opportunities causes poverty, and IT is addressing this by enhancing education and creating job opportunities.
- **Education and Employment Synergy:** The combination of improved learning and new job prospects contributes to gradual poverty eradication.
- **Sustainable Rural Development:** Small but consistent technological efforts are shaping a structured rural development system.

(i) SRIJAN (self-Reliant Initiatives through Joint Action) in Madhya Pradesh, India. It is an Agricultural smart application. It aims at monitoring Soya beans production. This app resulted in increased productivity, profitability and efficiency (ii) (ii) Jayalaxmi Agrotech : This application updates farmers crop specific information by means of Audio/Visual tools. It works without internet with information in regional languages. (iii) (iii) M-Kissan: It is an agricultural application that provides related information in regional languages as per the user choice. Farmers crop specific information like pest control, crop pattern, soil type, weather information, nearest market places, current market prices and so on are available through this application. (iv) M-ARD: Information were being provided in regional languages as per the user choice. This application provides farmers crop specific information like, weather information, nearest market places, agricultural market prices, government services and extension services. (v) M-AGRI (IKSL, IFFCO, GSMA), M-Krishi: It is an agricultural smart application. It also provides information in regional languages to the farmers like pest control, crop pattern, soil type, weather information, nearest market places, current market prices and so on.

The image outlines Information Technology (IT) applications in Animal and Dairy Development, highlighting key initiatives under the White Revolution for rural India. Here's a structured summary of the four major IT-based programmes:

#### **1. Pashudhan Sanjeevani**

- **Type:** Telemedicine & Online Veterinary Service
- **Function:** Provides ailment diagnosis, husbandry advice, and dietary treatments via telephone calls and the internet.
- **Impact:** Farmers can receive veterinary care at their doorstep or at livestock locations.

## 2. Nakul Swasthya Patra

- **Type:** Digital Health Card for Livestock
- **Function:** Maintains records of livestock health, including:
  - Age and vaccination schedules
  - Insemination details
  - Veterinary history
  - Genetic lineage (bull/semen used)
- **Impact:** Helps dairy farmers ensure timely healthcare and breeding management for their animals.

## 3. e-Pashudhan Haat

- **Type:** Online Livestock Marketplace
- **Function:** Provides a virtual platform for buying and selling cattle, integrated with:
  - Health Card information
  - Pashu Poshan app (for nutrition details)
  - Records on fertility, production, and health
- **Impact:** Reduces reliance on informal channels and ensures better livestock quality for farmers.

## 4. National Genomics Centre

- **Type:** Genetics & Breeding Research Hub
- **Function:** Focuses on:
  - Genetic improvement of dairy cattle
  - Automatic milking systems (computer-controlled)
- **Impact:** Enhances dairy productivity, breeding efficiency, and reduces human labour in dairy farming.

## Key Takeaways

- These initiatives enhance dairy productivity, streamline livestock management, and empower rural farmers with IT-driven solutions.
- Health cards, virtual markets, and telemedicine reduce veterinary care gaps in rural areas.
- Genomic advancements and automatic milking systems contribute to sustainable dairy farming.

## 1. Pradhan Mantri Fasal Bima Yojana (PMFBY)

- **Type:** Crop Insurance Scheme
- **IT Integration:**
  - Farmers upload photos of damaged crops online.
  - Satellite imagery verifies the damage.
  - Direct bank transfers ensure quick compensation.
- **Impact:**
  - Reduces delays and corruption in claim settlements.
  - Increases trust in crop insurance among farmers.

## 2. Pradhan Mantri Krishi Sinchai Yojana (PMKSY)

- **Type:** Irrigation & Water Management
- **IT Integration:**
  - Smart sensors measure soil moisture.
  - Automated drip irrigation adjusts water supply based on need.
- **Impact:**
  - Promotes efficient water usage.
  - Reduces manual intervention and wastage

## 3. Public Distribution System (PDS)

- **Type:** Food Security System
- **IT Integration:**
  - Internet connectivity at ration shops.
  - Biometric authentication for beneficiaries.
- **Impact:**
  - Minimizes leakages and corruption in food distribution.
  - Ensures only genuine beneficiaries receive food grains

## 4. Direct Benefit Transfers (DBT)

- **Type:** Subsidy & Welfare Payment System
- **IT Integration:**
  - Subsidies (e.g., LPG, fertilizers) credited directly to bank accounts.
- **Impact:**
  - Stops black marketing of subsidized goods.

- Ensures timely and transparent fund transfers to beneficiaries

### 1. Smart Schools

- **Objective:** Serve as technology demonstrators in education.
- **IT Integration:**
  - Digital teaching aids (smartboards, projectors, tablets).
  - Interactive learning through animations and simulations.
- **Impact:**
  - Helps students grasp complex concepts easily.
  - Encourages active participation in learning.

### 2. IT Training for Teachers

- **Objective:** Train educators to effectively use IT tools in classrooms.
- **IT Integration:**
  - Dedicated IT teachers in schools.
  - Comprehensive teacher training in digital education.
- **Impact:**
  - Empowers teachers with modern teaching methods.
  - Enhances digital literacy among educators

### 3. Development of e-Content & National Teacher Awards

- **Objective:** Encourage teachers to create and use digital content in classrooms.
- **IT Integration:**
  - Government-sponsored e-learning materials.
  - Awards for teachers effectively integrating IT into teaching.
- **Impact:**
  - Motivates teachers to adopt technology.
  - Enhances engagement and retention among students.

### 4. e-Basta (Digital School Books)

- **Objective:** Provide school textbooks in digital format.
- **IT Integration:**
  - e-Books accessible on tablets, smartphones, and laptops.
  - A part of Digital India Initiative.
- **Impact:**
  - Reduces dependence on physical books.
  - Provides anytime, anywhere access to study materials.

### 1. Challenges in Rural Healthcare

- Lack of quality infrastructure in rural areas.
- Shortage of doctors—many prefer not to work in remote areas.
- Limited access to basic medicines and healthcare services.

### 2. Telemedicine: Remote Healthcare Access

- **Objective:** Enable urban doctors to consult rural patients remotely.
- **IT Integration:**
  - Video consultations with doctors in cities.
  - E-prescriptions for medication.
- **Impact:**
  - Affordable & time-saving alternative to physical visits.
  - Better medical guidance for underserved communities

### 3. Mobile Health Apps

- **Example:** MeraDoctor—a private-sector initiative.
- **IT Features:**
  - WhatsApp-like chat between patients & licensed doctors.
  - Instant medical advice without traveling.
- **Impact:**
  - Increases access to medical consultations.
  - Encourages preventive healthcare through early diagnosis.

### 4. Government ICT Initiatives

- Rashtriya Swasthya Bima Yojana (RSBY)
- Biometric smartcards for beneficiaries.
- Ensures cashless treatment in empanelled hospitals.

- **Impact:**

- Reduces fraud & improves healthcare access for the poor.
- Digitized patient records for better health management.

**Conclusion**

Information technology has immense potential. If it is made available to all, it can bridge gap between BPL and APL masses. Following are some points that are concluded-

- i. Information technology can sustain rural development.
- ii. Information technology does not differentiate in socio-economic development to all.
- iii. The benefits that remain hidden and could not be disseminated on a large scale to the cast citizen of the country, are easy to approach through information technology. The main stress is only to develop such mechanism that may generate self-reliant, economic, user friendly and large impact information technology system.

Now, India is rich enough in information technology. It has sufficient members of learning and training centres, supportive technology providers and manufactures. The information technology dissemination, awareness and literacy are the main challenges. The government has to take constructive steps with social servants so that a strong base can be raised quickly

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