

# Effective Deployment of Digital Technologies for Rural Development: Digital Village Harisal

Arun M. Ranvir

**Abstract**—Mahatma Gandhi said that the soul of India lives in its villages; the basic facilities such as health, educational, employment, etc need to be available in rural, tribal areas. Now a day's Digital Technologies are playing a vital role for the development of rural areas by means of service provision to the citizens. Harisal village is a part of melghat region of satpuda mountain range inhabited by korku tribal community, infamous for higher prevalence of malnutrition, infant and maternal mortality rates. Digital Technologies are acts as a catalyst for rural development in education, improving health, enabling local business opportunities and welfare of tribal as well as other rural citizens of harisal.

**Index Terms**—ICT, Digital Technology, Digital Village, Telemedicine, Digital classroom, CSC, DSC

## 1 INTRODUCTION

Digital Technologies includes electronic devices such as Computers, television, smart phones, tablets, communication and networking devices that uses information in the form of binary code for transmission, receive and storing purpose. Digital technologies have a great impact on ways of working, communicating, creating in our day-today life. The use of Digital Technologies also had a great influence on the socio-economic factors and living styles of the people across the world. These technologies are also playing a major role in development by bridging the urban-rural divide by upgrading the standard of living of people in rural areas. India has been one of the emerging super powers in the field of Digital Technologies.

Seventy percent of population of India lives in villages; major problems being faced in rural areas are poverty, illiteracy, language dominance, discrimination, citizen's awareness, resistance to change, and infrastructure problems such as electricity, communication, transportation and lack of knowledge about new technology. Rural development implies both the economic betterment of people as well as greater social transformation. In order to provide the rural people with better prospects for economic development, increased participation of people in the rural development programmes, decentralization of planning, better enforcement of land reforms and greater access to credit are needed [1]. Rural development is a systematic ongoing process of improving the quality of life by socioeconomic well being of the people living in rural areas [2]. ICT and e-governance are very helpful for development of

country without the help of government we cannot implement technologies in rural areas [3]. The emergence of ICT has provided means for faster and better communication, efficient storage, retrieval and processing of data and exchange and utilization of information to its users, be they individuals, groups, businesses, organizations or governments [4]. Rural Development which is concerned with economic growth and social justice, improvement in the living standard of the rural people by providing adequate and quality social services and minimum basic needs becomes essential. ICT is the new tool for rural development, if used properly can be of great advantage for the development at grass root levels [5]. The life in Indian villages is simple and isolated, although they are connected now a day with cell phones and digital television transmission, yet they are cut off from the main stream of urban areas due to poor road connectivity and market for their agricultural commodities. Digital India is an initiative of the Government of India to ensure that government services are made available to citizens electronically by improving online infrastructure and by increasing internet connectivity. Indian villages need to be more focused on basic things such as health care, sanity and education. Sanitation & water supply is another important issue [6].

Prime Minister of India Mr. Narendra Modi insists on creating digital villages for rural areas development, empowerment of farmers and labours under Digital India programme. In line with the vision of Digital India, Ministry of Electronics and Information Technology (GoI) has envisaged the Pilot of Digital Village with a view to showcase the transformation that Digital India Programme can bring about, to different stakeholders like Departments of Union Government, State Governments, Private Telecom Players, other corporate services providers and citizens especially living in the rural areas. Digital Village pilot intends to provide a platform for availability of services such as Tele medicine, Tele education, LED street

• Arun M. Ranvir is currently working as Scientist-E and Technical Director in NIC, MEIT, GOI Amravati India, PH-0721-2662893. E-mail: am.ranvir@nic.in

Lighting, Wi-Fi Hotspot and skill development to the people at the Gram Panchayat level [7].

Harisal village is a part of Melghat region of Satpuda Mountain range, remotely located, forest area and inhabited by Korku tribal community. This region is also infamous for higher prevalence of malnutrition, infant and maternal mortality rates. The region is administratively difficult due to lack of road, power, mobile connectivity and meager public infrastructure. Digital Village Harisal project is a joint collaboration of Government of Maharashtra and Microsoft Corporation, Hewlett Packard Enterprise India Ltd, National Informatics Centre, Tata Trusts, Bharat Sanchar Nigam Ltd, Dayalbagh and other Organizations for improvement of delivery of public services in remote area using cutting edge technologies.

The remaining part of paper is organized as Section-2 Related Work, Section-3 Methodology and Strategies, Section-4 Outcomes and Discussion and Section-6 Conclusion.

## 2 RELATED WORK

Digital village projects are being implemented for rural development as well as providing online services to the masses. Performed study for concept, methodology and services provision for some of the recent Digital village projects. A Digital village is often seen as an idea that can help remove Digital divide, enabling development to reach underdeveloped regions and the country to leapfrog [8]. Making villages as Smart Villages is surely a noble program announced by Government, it has also promoted rural community development by providing technical, educational and entrepreneurial skills training to disadvantaged individuals in an effort to create social and economic opportunities. These opportunities have the potential to change people's lives and transform communities [9]. The Digital Literate and trained persons may be employed to convert records of village level or panchayat level government records to digital data, many employment projects like MPNREGA, etc, will certainly be useful to the Government, as well as the general people [10].

A Digital village is an e-centre that provides a suite of services to the public via computers connected to the internet, digital cameras, printers, fax machines and other communication infrastructure. The services include e-government, banking, e-learning and communication services among others [11]. ICICI Bank's innovation agenda for villages is driven by the future needs of a Digital India, inspired by the success of India's first Digital village at Akodara that stood out as a model cashless village in the wake of demonetization. The Digital villages initiative takes a holistic approach to the development of rural India and encompasses digitisation of retail and commercial payments and banking transactions, Imparting vocational training to underprivileged villagers so that they can earn a

sustainable livelihood and provision of credit facilities to villagers and enablement of market linkages so that they can enhance their livelihood opportunities, the village empowerment programme is a key community change agent which will transform the nation, one village at a time [12]. A digital village is a lighthouse project in Germany with respect to digital services with social impact in rural areas. The Digital village project demonstrated the potential of digital services to improve the overall situation of rural areas in Germany [13]. Smart community centre model follows a descriptive analysis of ICT related work spanning over two decades performed within the SEIDET context, including the ongoing SEIDET Digital village. The benefits of the model include community and rural development through sharing of scarce ICT resources [14]. The Digital village Initiative was launched to design and test infrastructure technologies for both local and national telecommunities. Among the many applications being explored and modelled as part of the Digital village initiative are telemedicine, electronic commerce, digital libraries, telecommuting, electronic classrooms and electronic government services [15].

Harisal village is a part of Melghat region having more than 300 villages and the mobile connectivity is restricted to less than 50 villages surrounding the Taluka headquarters. Most of the area is secluded from the modern means of telecommunication facilities. The major aim of the project is to involve the villagers in Digital transactions directly rather than limiting the internet connectivity to the Government offices. Therefore, it was decided to make the free internet available through Wi-Fi hotspots in the village. The next major challenge was to computerize the data in various Government offices and bring them on the internet network. It was noticed that there are issues which required to be addressed immediately are back end computerization at Government office for different schemes, Capacity building of the Government officials, Lack of required Hardware and Software, Digital Literacy of the staff and officials and awareness about the benefits of Digital transactions among the citizens of Harisal village.

Following areas of priorities were identified in consultation with the District administration and local people:

Mother and Child Health care through Telemedicine (Hewlett Packard)

Eye Care Centre (L V Prasad Eye Institute, Hyderabad)

Education- eLearning, Digital Classroom (Hewlett Packard, Muskan Foundation)

Citizen Centric Services (NIC, Amravati)

Agriculture-Farmer related Advice (NIC, Tata Trusts Mumbai)

Internet -Mobile Connectivity (Idea, Indus Towers)

Skill Development (Skill India Mission, Dayalbagh, Agra)

Public Distribution System (Government of Maharashtra)

Banking Services (Bank of Maharashtra)

Solar Power Plant (Tribal Dept)



Fig 1 Services identified under area of priorities

Out of the priority areas identified for the project, providing quality Health service was very vital as the region is infamous for incidences of malnutrition, infant and maternal mortality over the last few decades. Harisal village has a Primary Health Center, no specialist doctors are available and patients were invariably referred to Amravati which is about 120 KMs away. Therefore, it was decided to make the Telemedicine facility available in the Harisal PHC. In this regard, the Hewlett Packard Enterprises was approached to provide the equipments. Fig 1 shows Services identified such as Telemedicine, Eye care, Digital class room, e-PDS, CSC, Banking, Agricultural, Skill development, Internet and Mobile connectivity and Solar power plant for the Digital village project

### 3 METHODOLOGY AND STRATEGIES

The major problem faced by the Melghat region is the acute malnutrition and infant and maternal mortality rates. Hewlett Packard Enterprise has setup an eHealth Centre (eHC) in PHC for local healthcare and telemedicine services. To address the high rates of eye problems in the region, L.V. Prasad Eye Hospital has set up a facility and has trained the technicians. Microsoft India Ltd deployed TVWS equipments and enabling last mile connectivity in harisal by providing necessary hardware, software and related technology. Setup of Digital Classroom by HP and e-Learning facility for imparting quality education in the Melghat region.

#### Strategies Adopted In Implementation

Digital village Harisal project implementation is challenging task for District administration as well as implementing agen-

cies. Following strategies are adopted in implementation of Digital village Harisal project in Harisal

1. Conducted a Survey and Prepared Report for existing resources and resources required in different Offices, Hospital, Schools, bank, etc
2. Setup a Digital village office with required Hardware and manpower at GP harisal for Review and monitoring progress of work in the village.
3. Setup a BSNL Control room at GP harisal, Commissioning of 20 MBPS BSNL leased line for Internet Connectivity
4. Erection of Indus tower for Idea and Airtel Mobile Connectivity to the citizens of Harisal as Reliance Connectivity is not reliable.
5. Frequent visit and meeting at Harisal for the progress of work, weekly review meeting with Collector and implementing Agencies for Digital village work progress.
6. Setup and operationalization of CSC centre to provide citizen centric services to harisal and neighboring villages.
7. Virtual Agri mobile App deployment and training to farmers for scientific advice, crop planning, profile updation, organic farming, and marketing.
8. Survey by TCS and Tata Trust for m-krisi, Expert advice, marketing, soil, analysis, training, Organic agriculture, etc implementation.

#### Perceptible Improvements In The Processes

Some of the Strategies that are adopted during the Pre-implementation phase for the improvement in existing process and systems for successful implementation of project:

1. Formation of Digital Village Harisal Committee with 20 qualified youth from village itself for seeking suggestions, monitoring the work progress and capacity building for services being provided under the project.
2. Organized Digital village workshop for all Engineering College Professors and Students for awareness and seeking suggestions for process and system improvement.
3. Backend Computerization of offices as per schemes and capacity building of the employees for usage of software systems.
4. Upgradation of existing Primary Health Centre with advanced eye care equipments and Ophthalmic Technician training from LV eye institute Hyderabad.
5. Organized Training to Zilla Parishad Staff for usage of Digital Classroom equipments and PHC doctors for Telemedicine systems by Hewlett Packard India Ltd.

6. Setup of VC studio in Grampanchayat for regular interaction with citizens and review and monitoring of project.

Other departments also considerably made improvements in their existing process and infrastructure to provide citizen services.

#### 4 OUTCOME AND DISCUSSION

Digital Technologies includes Smart phones, Tablets, Digital Signature, Biometric and iris scanner, Smart Card, Mobile Apps, etc. is being increasingly used in the village to deliver public services. Impacts and outcomes of Digital village harisal project Implementation listed out are as follows:

Internet Connectivity is being provided to entire village through Wi-Fi by means of four hotspot devices located at strategic points. Internet usage has been steadily increasing as the purchase of smart phones and the use of internet services including online job applications and banking, particularly during the peak of demonetization. Fig. 2 shows graph of no. of Internet/ Wi-Fi users, it is observed that no of user increases steadily as the tally goes to 644 users in 2018.

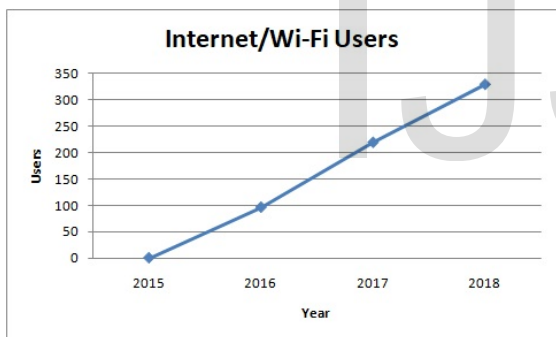


Fig.2 No. of Internet/Wi-Fi users

The Indus tower provides connectivity to Idea network, the first reliable telecom provision in the village. The tower is benefiting harisal as well as surrounding villages which fall within its range. The launch of Internet has enabled the creation of a CSC Centre in the village which can cater 8-10 villages in the surrounding vicinity. About 40 common citizen services including RoR, Age and Nationality, Caste, land permits, birth and death certificates, ration cards, etc. are now enabled through the centre in the village itself, saving travel of 30-50 km to the district office in Amravati. Aadhaar enrollment is also available at the centre which has reached a lot of people. Fig. 3 shows graph of CSC services, about 5780 Services are delivered through CSC under e-District project using Digital Signature Certificates and Gram Panchayat through Service Plus system.

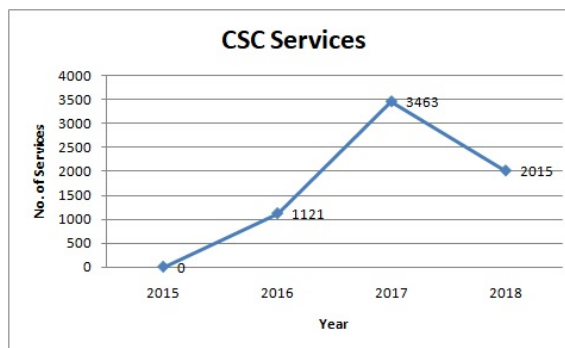


Fig. 3 CSC services being provided

Public Distribution System is a food security system based on the ration card, which is used to establish identity, eligibility and entitlement. ePDS system being effectively implemented for distribution of grains and pulses to the ration card holders with the help of PoS. Over 450 women households have been registered on the e-PDS system, which has prevented leakages in the delivery of ration to the villagers. Agriculture Services are being provided through mobile apps Kisan Suvidha, Ag-Marknet, mKrishi for weather alert, dealers, market prices, agro advisories, plant protection, etc to empower farmers in the best possible manner. Farmers are already trained for the apps and being benefited from agriculture productivity point of view. 50 Women's have been trained for Self help group procedure and methodologies. Efforts are being made to initiate poultry farming and beekeeping. Farmers are aware of the new techniques, methodologies and agriculture production increasing day by day in the village.

Since the availability of Telemedicine unit at PHC, specialist consultation for patients residing in remote tribal areas has become easier. Patients can avail of advanced healthcare from specialists in urology, pediatrics, gynecology, plastic surgery, psychiatry, etc. Backend operation has also been ensured by connecting with doctors across three district hospitals in Amravati. Table 1 shows Telemedicine session's arranged since 2016, about 138 sessions of Telemedicine have been conducted so far reaching over 1225 patients in harisal and surrounding villages. Telemedicine has definitely decreased the financial burden of transportation, consultation and investigation charges and saved their money and time.



TABLE 1 TELEMEDICINE SESSIONS CONDUCTED

Disease Category	Year		
	2016	2017	2018
Gynae and Obs	05	91	102
Paediatric	20	67	15
Urology	01	04	5
Dermatology	01	02	03
Ophthalmology	00	04	03
Medicine	00	01	05
Psychiatric	00	01	04
Paediatric Surgery	02	10	01
Total	29	180	138

With the opening of renowned eye care centre, patients from melghat area are getting quality eye care services. The cataract patients are much happier with their improved vision quality after surgery. An ophthalmologist conducts outpatient eye-care on bazaar day is attended by a number of people. In addition, five eye camps, which have reached over 1094 people, were examined in the facility. Special camps were conducted for students of 29 schools and 3634 students were examined for eye problems.

TABLE 2 EYE CARE PATIENT'S EXAMINED

Year		
2016	2017	2018
450 Patients	352 Patients	292 Patients
Total		1094

All students in village being benefited from Digital classroom for their class curriculum, 78 youth are benefited for Tally and ICT courses. The tribal students are able to learn through e-Learning facility. Anganwadi workers say that the video content is attractive to the children and has helped with attendance and retention. Children were seen engaging with tablets by reading sentences aloud and solving math problems. 54 Aganwadi students and 665 ZP school students are benefited from e-Learning that indicates technology is changing the face of education in harisal. Due to increased involvement of villagers in the project and more exposure and awareness of women, the demand for Skill development was noticed. Skill development is being done under Maha-Kausalya project for the local females for Dress Designing and other course. Vocational training centre has conducted dress designing course for 180 women till date. They are also being encouraged to open

their own shop in the village. Honey and Bamboo processing courses are likely to be started.

Bank of Maharashtra opened account for all 1350 citizens of harisal village and debit card distributed to account holders, banking services includes mobile banking, SMS banking, POS, etc. Bank set up an ATM facility in the village and separate counters for MGNREGA and other social schemes. Training of BHIM app imparted to youth and citizens for promotion of Digital payment in the village. Solar power plant are installed at digital village office, angnwadi, aashram schools and other offices as a Power backup for the installed facilities such as hardware, internet, e-learning and other devises.

Digital village harisal project opens the doors to youth and Citizens to the outside world to avail the benefits of skill development, local business opportunities, employment, etc.

#### 4 CONCLUSION

Rural development made possible by means of effectively deployment of Digital technologies in interior, tribal village of harisal which was facing problems such as poverty, illiteracy, unemployment, health, education, etc. Technology is changing the face of education in village, schools using Digital technology to impart education and teaching happen with the help of audio-visual content. Citizen centric services are available in village itself through CSC using DSCs. Entire village is covered by Wi-Fi, internet usage has been steadily increasing as the purchase of smart phones and cashless transitions are being carried out in shop and hotels. ePDS system being implemented for distribution of grains that prevent leakages in the delivery of ration. Technology helped farmers to learn new agriculture techniques and increase their income. Citizens have access to quality medical treatment and advice by means of Telemedicine with other hospitals; also patients from melghat area are getting quality eye care services. Digital village harisal project implementation makes it possible to citizens of harisal and melghat region to avail good quality health care, education, banking and agriculture services by means of effective deployment of Digital Technologies.

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