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Role of Information and Communication Technology (ICT) for Rural Development through E-Governance Initiatives

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Abstract--*Among the various Asian Countries, India is the country with nearly 70% of the people resides in rural areas. People living in remote villages faces various challenges in accessing various governmental services developed for the benefit of rural development. Information and Communication Technology (ICT) act as a gateway in providing various opportunities to reach the rural citizens and contributor for reducing the poverty. Productivity can be increased in rural areas by improving the usage of ICT (Information and Communication Technology). Through different e-governance services like Government to Government (G2G), Government to Citizens (G2C), Government to Businesses (G2B) and Government to Employees (G2E) our Indian Government has desire in transforming the government interaction with the citizens in an electronic form. This research paper is an attempt to examine the various e-governance services designed and developed by Government of India (GOI) to deliver their information and services in remote villages for rural development. This paper also analyses the role of Information and Communication Technology towards rural development through e-governance initiatives.*

Key words*--e-governance, rural development, Information and Communication Technology (ICT)*

I. INTRODUCTION

Information and Communication Technology (ICT) has brought a dramatic change in todays business world. It has given a significant change in the lifestyle of the rural people residing in remote villages towards accessing government services. Several Information and Communication Technology (ICT) Applications have been specially developed for the people living in rural villages. In India, Ministry of Rural Development has taken several initiatives at various level for strengthening the infrastructure of Information and Communication Technology (ICT) to provide information, easy access and opportunities for the rural development to all the rural citizens in India. Those developments have provided access to many services but still the cost for accessing the services is found to be a biggest hurdle for the rural citizens. E-governance is the major initiative and milestone to reach the governmental information and services to the citizens in India. Various e-governance initiatives have been developed through Information and Communication Technology (ICT) that acts as a major contributor for development of rural areas.

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II. RESEARCH OBJECTIVES

1. To discuss about several e-governance initiatives taken by the Government of India
2. To analyse various components associated with Information and Communication Technology (ICT) related to e-governance services towards the development of rural areas

III. REVIEW OF LITERATURE

3.1 E-Governance and Its Initiatives Taken by The Government of India For Rural Development

E-governance is defined as a of usage of information communication technologies to improve and increase the interactions made between the government & citizens and within the department of the government [1]. Prabhu (2004) has defined E-Governance as "delivering SMART (Simple, Moral, Accountable, Responsible and Transparent) Governmental services to the citizens [2]. Abramson and Means (2001) have defined E-governance as an electronic interaction between the government for the information exchange and transactions [3]. World Bank has referred E-governance as the usage of IT (Information Technology) through various governmental agencies to increase the connectivity of relations among the people, businesses and the government [4]. Computerized Rural Information System Project [CRISP], National E-governance Plan [NeGP] and National Informatics Centre (NIC) are the three major projects designed and developed by the Indian Government for the benefit of rural citizens to uplift their level of education and lifestyle [5].

Computerized Rural Information System Project [CRISP]

Computerized Rural Information System Project (CRISP) has aimed at supporting the DRDA (District Rural Development Agency) in monitoring the activity of poverty alleviation programmes through the computer-based information system. There are four different versions of Computerized Rural Information System Project (CRISP) software packages have been designed and developed by the Government of India. Rural Soft of fourth version is the application developed for rural development. Transferring of information among rural citizens has been identified as a greatest challenge and it can be easily managed by the applications of e-governance in India. Rural Soft 2000 is the one among the initial effort taken by the government of India. In this application a common man could access all the information through government portals and the application will also monitor the activities of different agencies. The application is said to be a best solution that helps in monitoring the web-based poverty alleviation schemes [6].

National E-Governance Plan (NEGP)

National E-Governance Plan was introduced to make all the public services easily accessible by the common person in their own locality at an affordable cost through common services delivery outlets. NeGP was made with about 27 Mission Mode Projects and 8 different components. It was specially designed for the development of rural areas to make the rural citizens to easily access the services offered by NeGP SWAN (State Wide Area Network) and Common Service Centres (CSC) [7].

National Informatics Centre (NIC)

National Informatics Centre was introduced in the year 1976, it is a part of Indian Department of Electronics & Information Technology and Ministry of Communication and Information Technology. It is said to be a website and it has been specially designed to access all the e-governance initiatives made by the government.

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This website includes all the districts, blocks, central and state government. The information and communication technology (ICT) network of National Informatics Centre (NIC) is said to NICNET [8].

3.1.2 Types of Government Interactions in E-Governance

There are basically four different types of government interactions made in e-governance to safeguard the legal rights of the rural citizens and ensure them to get equitable access for public services.

1. Government to Government (G2G)
2. Government to Citizen (G2C)
3. Government to Business (G2B)
4. Government to Employee (G2E)

Government to Government (G2G) Initiatives

Government to Government (G2G) is said to be the electronic sharing of data or information systems between the government agencies [9]. The primary objective of government to government (G2G) is to support the initiatives taken under e-governance services for improving the communication, data sharing and data accessing [10]. The initiatives taken under G2G helps in making the implementation of government procedures in an effective and efficient manner. Crime and Criminal Tracking Network & Systems (CCTNS), e-Procurement, e-courts and e-office are the electronic services offered under G2G [11].

- **Crime and Criminal Tracking Network & Systems (CCTNS):** CCTNS is a scheme established under the Mission Mode Project of National e-governance plan. This scheme aims at creating an integrated system for investigation of crime and detection of criminals. This scheme also supports in effective functioning of law and order and Traffic Management. Under CCTNS project 14000 police stations through out the country has been automated that is helpful to share the accurate information with the police department [12].
- **E- Procurement:** It is also called as electronic procurement that helps in business to business, business to consumer and business to government purchases through internet. It also helps in electronic exchange of data and enterprise resource planning [13].
- **E-Court:** It is an integrated Mission Mode Project that enhances judicial productivity both quantitatively and quantitatively in order [14].
- **E-Office:** It is a product that supports the governance for transparent intra and inter government processes. The major objective of e-office application is to obtain a transparent, effective, responsive and simplified working of all government offices [15].

Government to Citizen (G2C) Initiatives

Government to Citizen initiatives are the activities made by the government for delivering the online information and services to the citizens. Various initiatives have been taken by the government under this category such as application for Right to Information (RTI), e-Payment, e-District and Dial.gov [16].

- **Right to Information (RTI):** Right to Information is a web application developed by the Department of Personel and Training, Public Grievances & Pensions and Ministry of Personnel under Right to Information Act 2005, to provide a portal gateway for the citizens to search and retrieve the information published by the authorities under central and state governments [17].

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- **e-Payment:** e-Payment is an application developed by Ministry of Electronic and Information Technology (MeITY) through which the government of India provides a Mobile enabled/ Web -enabled anytime, anywhere access for the information and services across the country, specially for the remote as well as rural areas in India. MeITY further provides a payment gateways for making online payments for the citizens, businesses and internal government functions through common e-governance infrastructure [18].
- **e-District:** It is a state mission mode project for accessing high volume citizen centric services through Common Service centres. Certificates for income, caste, birth and death, Arms Licenses, Public Distribution System (PDS) for issuing Ration Card, Adhaar Card and Voter ID, disbursement for family pensions, widow pensions and old age pensions through social welfare schemes, filing complaints related to absentee teachers, unfair prices and non-availability of doctors, receiving information through Right to Information (RTI), Linking with projects of e-governance for receiving driving licenses and registration for Land Records, Dissemination of Information about government schemes and entitlements, Assessment of Property Tax and other government taxes and Utility payments through online related to water bills, property taxes and electricity bills are the services offered under e-District mission mode project [19].
- **Dial.gov:** It is the interface for accessing information at single point source related to welfare schemes for Health, Jobs, Law, Education, Travel and Tourism offered by the government of India to reach the common man. It is the official portal of Government of India (GOI) designed and developed under National Informatics Centre (NIC) [20].

  Government to Business (G2B) Initiatives: Government to Business (G2B) is an initiative has been taken to make an interaction between commercial business sectors and the government for accessing online businesses information and services [21]. e-Procurement project and Ministry of Corporate Affairs (MCA) 21 are the services provided under Government to Business (G2B) initiatives.
- **e-Procurement:** It is an internet-based business to business/ business to consumers/business to consumers sales and purchases. Its value chain consists of e-Informing, e-Auctioning, e-invoicing, e-payment and contract management. This application helps the vendors as well as government to reduce the cost and time of doing business related activities [22].
- **Ministry of Corporate Affairs (MCA) 21:** It is the project developed by Union Ministry of Corporate affairs that aims in providing all registry related online services in easy and secure manner. It is an application that protects the investors and provides services to the stakeholders. It provides a common gateway to offer services, guidance and information related to the corporate affairs [23].

Government to Employees (G2E) Initiatives

Government to Employees (G2E) is the online facilities provided to the employees for applying leave, retrieving record for salary payment. The main objective of G2E is to bring the employees together and to improve knowledge sharing. It enables the relationship between employees, government institutions and their management [24]. E-payroll, E-benefits, E-training, E-Learning and Maintaining records about personal information.

- **E-payroll:** It is an online application that helps to maintain sources for payment of bills, payment of stubs, bills and keeping records on tax information [25].
- **E-benefits:** This application helps the employees to look up the benefits that can be received from the government [26].

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- **E-training:** This system allows the current and new employees to attend training regarding the development of new technology and make the new employees to learn about the new materials at one location [27].
- **E-Learning:** It is the computer-based learning tool similar to e-training application to share the information about the materials regarding animation, videos and visuals [28].
- **Maintaining Records about Personal Information:** It allows to maintain all the records of an employee like social security numbers, information about taxes and current address in one location [29].

3.2 Information and Communication Technology (ICT) Related to E-Governance Services

Information and Communication Technology plays a significant role for the development and economic growth of marginalized segments in our society. ICT is said to be a delivery channel that transfers the information and knowledge in an effective regarding any decision taken under political, socio-economic and cultural developments. ICT also provides a gateway for the economic as well as social empowerment [30]. **Bhuvana and Vasantha (2016)** has analysed the factors that are associated with the usage of Information and Communication Technology (ICT) by the people from unreached segments in the society [31]. **Bhuvana and Vasantha (2017)** have adopted TAM (Technological Acceptance Model) for building a theoretical framework on Mobile Banking Services among rural people. The researchers have identified that Trust is the most influencing factor among the rural customers [32]. **Bhuvana and Vasantha (2017)** have examined that perceived usefulness is the most dominating factor among Information and Communication Technology (ICT) adoption for accessing Mobile banking services among the rural people [33]. **Bhuvana and Vasantha (2017)** have ascertained that demonetization of currency notes have played a major role in bringing the rural people in accessing ICT based banking services. The authors have analysed that demonetization has played a mediating role between the attitude and behavioural intention of rural people to adopt cashless payment system [34]. **Bhuvana and Vasantha (2019)** have done an examination on accessing Mobile Banking Services among the rural people. The study has adopted Technological Acceptance Model 2 (TAM2) for building a conceptual framework. The researchers have found that Financial Literacy about Information and Communication Technology (ICT) among the rural people has a mediating effect between attitude and behavioural intention of rural people in accessing mobile banking services [35]. **Bhuvana and Vasantha (2019)** have measured the actual usage of banking technology among the rural respondents by considering the Direct Benefit Transfer (DBT) through Information and Communication Technology (ICT) as a mediating variable between Attitude and behavioural intention of the rural people. The authors have highlighted that awareness about information and communication technology among the low-income group people increases the usage of banking technology among the rural people [36].

Bhuvana and Vasantha (2020) have analysed the determinants of Behavioral Intention towards accessing e-governance services by the rural people along with the mediating effect of ICT (Information and Communication Technology) Literacy. The researchers have highlighted that Information and Communication Technology (ICT) enhances an opportunity to create a building blocks for rural development through e-governance initiatives [37]. **Vinitha and Vasantha (2020)** have explored the most influencing dimensions towards accessing Electronic Payment System among the consumers. The researchers have developed a conceptual model for analysing the adoption among the consumers. The authors have analysed that perceived benefits have the significant influence on consumers towards usage of e-payments [38]. **Sarika and Vasantha (2019)** have done a study Mobile wallets usage among people for adopting cashless transactions. The study has

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analysed that the effect of demonetization has triggered the usage of mobile wallets by the public [39]. **Srivathsani and Vasantha (2019)** have highlighted that Digital economy acts an umbrella to perform social and economic activities through Information and Communication Technologies (ICT) [40].

3.2.1 Information and Communication Technology (ICT) Tools Used for Providing E-Governance Services

Various ICT tools has been used to offer e-governance services for the rural citizens. Optical character recognition (OCR), Video Conference, Magnetic Ink Character Recognition (MICR), Cloud Services, Personal Digital Assistant and Biometric Technologies are six specific tools has been used to deliver e-governance services under common service centres.

- **Optical Character Recognition (OCR):** It is the combination of software and hardware system that helps to identify the handwritten or printed text characters within the digital images of paper document. It is also called as a text recognition. It is highly used to process cheques and credit card slips. It is also helpful for paperless governance through reducing unnecessary hardcopies of receipts and documents [41].
- **Magnetic Ink Character Recognition (MICR):** It is the commonly used device in banking industry for identifying customer information and it is a 9-digit code helps to translate the characters in the cheques into the digital form for faster processing [42].
- **Video Conference:** It is the technology that conducts conference at different websites with two or more participants through computer networks by transmitting video and audio data. This system has been used to monitor several government projects, public grievances and government projects [43].
- **Personal Digital Assistant (PDA):** It is the small hand held device like mobile phone that provides information storage to schedule calendars, retrieval of information and acts as a handy address book. PDA includes Windows Mobile, Apple IOS and Google's Android [44].
- **Cloud Computing Services:** It is the model for convenient access on computing resources such as storage, services, applications, networks and servers. It offers three different types of e-governance services such as SAAS (Software as a Service), IAAS (Infrastructure as a Service) and PAAS (Platform as a Service) [45].
- **Biometric Technologies:** It is the device that receives the immediate biometric information in a digital format. Some of the methods of gathering biometric information are Fingerprint recognition, Retina Scanning, Hand Geometry, Facial Recognition, Keynote dynamics, Signature dynamics and Voice Recognition [46].

IV. RESEARCH PROBLEM

As discussed from various research studies Common Service Centre is a most important initiative under e-governance services. It acts as an umbrella for all governmental services towards rural development. The research study highlights that issues related with the Network coverage, computer and electricity is greatest challenge (fig 1) faced by the rural people residing in remote villages in India [47]. Majority of the respondents in the research study have narrated that they have to revisit the common service centres due to these kinds of issues for accessing e-governance services.

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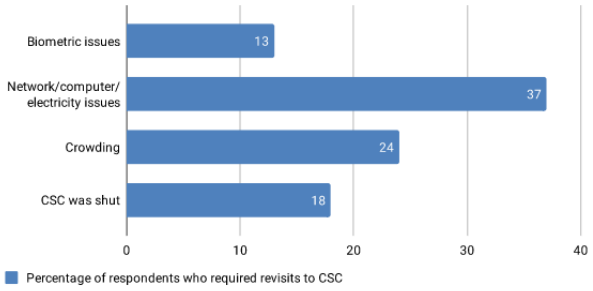

Figure 1: Challenges in Accessing Common Service Centres

V. CONCEPTUAL FRAMEWORK

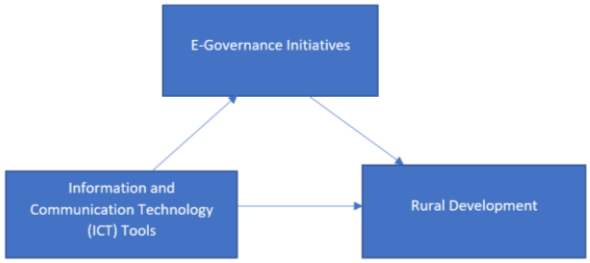

Figure 2: Role of Information and Communication Technology (ICT) for Rural Development through E-Governance Initiatives

E-governance is said to be the delivery of governmental information and services to the citizens, businesses and governmental agencies. Various initiatives have been taken by the government for the development of rural areas. E-governance plays a significant role in targeting the rural areas by using various Information and Communication Technology Tools to make the rural people get an assess for governmental services in an effective manner. E-governance is said to be the best way to use Technology for communicating with the rural people to satisfy their basic needs and requirements. Figure 2 displays that rural development could be achieved effectively by ICT Tools through E-governance initiatives taken by the government.

VI. DISCUSSION AND CONCLUSION

Government of India has developed various services for the benefit of citizens specially to reach the development of rural citizens. Today most of the governmental services are offered to the people at anytime and anywhere basis through Information and Communication (ICT) Technology. But still most of the e-government services are informatics and have only single side interaction-based applications. Hence the participation of the people towards accessing the e-governance services is found to be less among the individuals specifically in the rural areas. This research paper reviews regarding various e-governance services, different technologies and Infrastructure designed and offered by the Indian Government for the development of rural citizens. E-governance is an effective way and the best method to deliver the governmental services for the citizens empowerment, reduce corruption, increase in convenience and transparency, decrease in effort and time, cost reduction and for the revenue growth.

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