Impact and Challenges of Information and Communication Technology, Cloud Computing and Open Source Software in e-Governance in India

Jovi D’Silva
Assistant Professor, MCA Department, Don Bosco Institute for Post Graduate Studies and Research, Panjim, Goa, India. (jovidsilva@gmail.com)

Amrita Mukherjee
Assistant Professor, Department of Social Work, The Oxford College of Arts, Bangalore, Karnataka, India. (amrita.mukherjee18@gmail.com)

Abstract

E-Governance is an emerging concept in India. Though multiple challenges in implementation of E-Governance in a developing country like India, the government has taken up the challenge and is making efforts to reach out to the stakeholders. This paper deals with a detailed account of the present state of E-Governance in India as well as the changes that are necessary to the framework in terms of new and evolving technology of E-Governance in India so that it reaches the masses who need it the most.

1. e-Governance at a Glance

The present era has been marked by the booming of the Information and Communication Technology which has paved the way for faster and improved ways of communication, well-organized storage, processing, use and recovery of massive amounts of data and information which is available at hand for the users for day to day exchange and utilization of such information. This system of information and communication also ensures transparency, efficiency and convenience for the users who may either be individuals or groups of people. The present state of Information and Communication Technology allows users to gain access to ways of addressing almost all their needs with help of computers and internet. With the flourishing of the Information and Communication Technology, along with other applications of Information and Communication Technology like e-commerce, the period after 1990s saw the rise of concepts like ‘e-Governance’ which in simple terms means employing Information and Communication Technology in day to day governance to make the process of governance fast, efficient, user-friendly, responsive and transparent. E-governance is now the need of the day keeping in mind the fact that Information and Communication Technology has also made citizens increasingly aware of their rights and duties and definitely more participative in day to day governance.

A government is the spine of any state and the primary agenda of any government is to reach out and implement schemes for public welfare. Given the complex nature of every state, the threat that every Government faces is the way and extent to which welfare schemes dissipate to the marginalized sections of the society. In order for the Government machinery to run smoothly, the system of Governance should be responsive, fast, transparent, accessible and free from corruption. E-Governance ensures all this and more in term of involving the stakeholders in the process of governance. In e-Governance, Governments tap on information technologies such as Wide Area Networks (WAN), Internet, World Wide Web and mobile phones to network with citizens and other aids of the government to:

- speed up delivery of services to citizens, businesses and government employees,
- make citizens participate in the process of governance,
- increase transparency in governance through access to information for the citizens,
- make the working of the government less time consuming and fast,
- curb corruption, red tape-ism and bureaucracy,
- ensure growth in revenue with the help of easy online tax filings,
- easy and convenient registrations,
- easy access to knowledge with help of online forums.

Though the concept
of e-Governance has gained an impetus in the recent years, there have been many extensively used definitions of the term: According to the World Bank, 1 “E-Governance refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions.” UNESCO defines e-Governance as: 2 “Governance refers to the exercise of political, economic and administrative authority in the management of a country’s affairs, including citizens’ articulation of their interests and exercise of their legal rights and obligations. E-Governance may be understood as the performance of this governance via the electronic medium in order to facilitate an efficient, speedy and transparent process of disseminating information to the public, and other agencies, and for performing government administration activities.” E-Governance can be administered by the Government in many ways by:

- Sharing information about various Government Departments online including delivering of services online on the basis of requests by citizens,
- For regions which do not have continuous access to internet, service centers are provided for the communities which have public servants to take requests from citizens or assist them in acquiring services of the Government through online services.
- Self-service by users who are capable of using online services for accessing information about various Government Departments and submitting applications for various services with the help of backend computing etc.

Types of interactions in e-Governance:

- Government to Government: for communication in between Government agencies or wings which can happen at vertical (from higher level government offices to lower levels of the same organization and vice versa or between different levels of governance like the Central Government and the state governments) as well as horizontal levels (between various government wings and offices or different departments in the same organization).
- Government to Citizens: for interaction between the government and the direct stakeholders or the citizens basically for efficient and fast delivery of government services through service centers, kiosks or by users from their homes or workplaces.
- Government to Business: for speeding up the processes of issuing licenses, registrations, permits and for effective collection of taxes and revenues from the business sector.
- Government to Employees: for interaction and communication between various organizations and employees of the government for speeding up the process of service providing.

E-Governance has been used by various Governments for collection of taxes, custom duties, land record information, providing various government services to the citizens, transportation services, municipal services, agricultural services, disaster management and so on.

2. Impact and Application of e-Governance in India

The concept of e-Governance has been working successfully in many countries. The rate of success and implementation of e-Governance in India is however debatable. The first milestone to the path of ushering India into the era of e-Governance can be dated back to 1970s when the Government of India first started computerization of few government offices for the purpose of easier access and sharing of information between government offices.

The second major step was the setting up of the National Informatics Centre (NIC) in 1977 for the purpose of managing information system for the Government of India. This to a great extent paved the way for the National e-Governance Plan (NeGP) being initiated in the year 2006 by the Government of India. The NeGP works on the basis of Mission Mode Projects or MMPs which are divided into 3 categories:

- Central MMPs under the Central Government with projects like banking, income tax, central excise, passport services, unique ID, pension etc.
- State MMPs under the State Government with agriculture, commercial tax, land records, panchayats, municipality, police,
Integrated MMPs being governed by all levels of Government with projects like citizens service centre, e-courts, e-trade, India portal for e-governance and so on. The purpose of these MMPs is to make governance more user friendly, citizen friendly and to make governance a day to day affair with the help of participation of the stake holders.

Presently, e-Governance has become popular to an extent in India with various initiatives by the Government of India. In urban areas, e-governance has been used to provide services like:

**Transportation:**
- Railway reservation system by the Government of India.
- Various state governments have started online booking and cancellation of tickets like Karnataka State Road Transport Corporation (KSRTC), Orissa State Road Transport Corporation (OSRTC) and so on for booking of bus tickets.
- Within cities, transportation has been made easily accessible with help of bus time tables, routes etc available online on government websites.

**Online bill payments and tax filing:**
- BWSSB started in the city of Bangalore is an example of the use of e-Governance for the purpose of paying electricity, water bills online.
- FRIENDS project in Kerala is also an example of a project started for paying of bills and taxes online using government website.

**Municipal services:**
- Online issue of birth and death certificates has been started by various Governments like in Assam.
- Maintaining details of property and land holdings.
- Maintenance of roads and sanitation facilities.
- Pollution control and safety of citizens.

In rural areas various initiatives have been taken:

**Land Record Management:**
- In 2008, the Government of India launched the National Land Record Management Programme for increasing transparency in the area of ownership of land and to reduce property disputes especially in rural areas with aid of Geospatial Information System.
- BHOOMI programme in Karnataka is an example of e-Governance in this area.

**Agriculture:**
- E-agriculture has been a major step in spreading e-Governance in to rural areas.
- Cropping patterns, best agricultural practices, increased knowledge and information about agriculture.
- Forums for experience sharing among farmers.
- Facilities for online trading of goods and products.
- Information on weather and natural calamities for protection of crops.
- Availability of seeds, manure, pesticides etc online.

Given all the e-Governance projects that are being implemented in India, the rate of success or failure of e-governance is questionable. India is one of the fastest developing countries and despite that, India faces threat from its unique social and political climate, poor infrastructure, lack of basic education among masses and the huge gap between the rich and the poor. However the impact of e-governance has been considerable in India.

3. New Technologies that can be implemented in e-Governance

E-Governance is still in a stage of infancy in India. For e-Governance to attain impetus in India, the system of e-Governance has to be modified and made better so that its benefits can be reaped by the government as well as the citizens. In this regard it can be said that e-Governance can be modified using either open source or cloud computing.

3.1 Cloud Computing

Cloud computing means internet based computing in which a large number of remote servers are used for the purpose of storage, processing and access of data instead of storing the data on personalized devices. Cloud computing ensures that the data thus stored in a ‘cloud’ or the internet is readily accessible to the users who wish to utilize such data.

Cloud computing in e-Governance will ensure that information of governance thus uploaded to a ‘cloud’ will is available on multiple devices across regions and areas with the help of a simple web browser and an internet connection. Therefore sharing of knowledge and information becomes easy and user friendly.

Since cloud computing is internet based computing, a massive amount of data can be stored in the cloud which can be retrieved at any particular
time for the purpose of data analysis and processing. This helps in analysing events or patterns across a time line.

![Figure 1. E-Governance using cloud computing](image-url)

In the figure above, we can see a model of how cloud computing can be used for e-Governance. In this:

- **SaaS (Software as a Service)** allows the e-Governance software to be hosted in the cloud as a service and thus it allows the access and usage from any device with internet and a web browser.
- **PaaS (Platform as a Service)** allows us to store data in a cloud based database platform which will allow global access and analytics of data stored in the cloud, e.g. data collected can be used for data mining and census studies.
- **IaaS (Infrastructure as a Service)** this will allow us to ensure that the e-Governance software stays live if not all the time but most of the time and it will be able to handle extreme load because we can dynamically adjust the need of software based on the load stress.

Cloud computing will therefore solve a lot of issues like high cost of storing data, low levels of data integrity, low rate of response, loss of data, low performance and low elasticity.

### 3.2 Open Source

Open source software is another way to make e-Governance fluid and user friendly. In open source, the source code of the software that has been developed is available for free and is open to be used, redistribute and improvise since no payment need to be made to the developer of the software.

Open source has a lot of potential since software is freely available and therefore is cost effective. The other strength of open source is that it is open to the community and it can be improvised by anybody who wished to access such software. If e-Governance is developed in this framework, then the software can be constantly be evolved and be improvised on tapping on the expertise of a vast community of people without having to pay a huge cost for the development of such software.

![Figure 2: E-Governance using Open Source](image-url)

The active entities are the code developers who develop software which are then used by the Government to provide services to the citizens who are also the users and these users are the passive entities in the open source environment.

Open source can be used for successfully broadening the scope and accessibility of e-Governance as it is cost effective and dynamic since it can be improvised on and can be made better as per the requirements of the generations.

### 4. Our Model: Kisaan Saathi

So far we have seen the ways in which e-Governance has been implemented in India. it is also noticeable that despite efforts being made by the government, there is a wide gap between urban and rural areas in terms of the popularity and access of e-Governance. Though e-Governance has penetrated the urban areas to an extent, rural areas have not been touched to that great an extent by e-Governance. Various reasons can be stated for this, the most important reason being the lack of education and technical knowhow among the rural masses.

Recent times have however seen a change in the rural areas. Due to the widespread availability of mobile phones and networks, technology has definitely touched the rural areas of India. Banking on this, it can be said that with the help of mobile web browsers and internet connections being provided by service providers, e-Governance can be reached out to the rural areas as well.

#### 4.1 Kisaan Saathi

Kisaan Saathi is a model of how e-Governance can be reached out to the rural areas especially to the farmers who hold the key to the economic base of our country but have been neglected so far leading to increased rates of farmer suicides. This application targets to reach the farmers and connect them directly.
to the government so that benefits can be reaped from it by the marginalized sections of the society. In our model we make use of an inexpensive and popular open source mobile Operating System platform Android with an assumption that the area has a bare minimum wireless internet connectivity such as 2G networks and a basic Android phone with networking capabilities and touch screen.

Our system is a complementary system to the existing e-Governance infrastructure. This model or Kisaan Saathi works on the basis of public-private-partnership (PPP) model wherein information of all Non Governmental Organizations and Community Based Organizations who are working hand in hand with the government in areas of rural welfare, organic farming, agricultural development, women welfare, agricultural forums for farmers, self help groups are stored into the database of the application region wise.

Kisaan Saathi is an easy to use application, which allows farmers to quickly submit a complaint to the government authorities using the application for example complaints regarding crop failure, droughts, land disputes, middlemen problems etc. Our model app stores the information of all the government as well as non government organizations that are working in that particular region where the application is being used. Therefore, a copy of the complaint will be sent to NGOs working in the same region as well, which specializes in this field. This allows for transparent and quick action in order to help aggrieved farmers. The NGOs can help in following up of the complaint thus registered.

The application also allows a farmer to send a voice message by selecting the language in which the farmer is comfortable speaking in; this application can be customized to take input based on the local dialect. It will also allow the farmer to click a photo which shall include geo-tagged information along with it that is, the Latitude and Longitude values. Through this application, the voice of the farmers who have been marginalized can be heard directly by the Government to boost up the agricultural sector.

This application has many benefits and they are enumerated as follows.

1. The admin group in charge (run by the government) will have direct access to complaints from farmer and with quick consultation from experts a representative can quickly call the farmers and give them necessary guidance.

2. The voice message can be directly decoded into text using features of the application making the process fast and lag free.

3. Data mining experts can use Latitude and Longitude data to plot clusters and study common effects or a widespread outbreak of natural calamities if it occurs. E.g drought.

4. The metrological department can use the latitude and longitude values to quickly respond and intimidate if the effect is due to a change in weather.

5. The application can incorporate technologies such as cloud computing to allow for analysis of historical events or events from other geographical areas in India.

6. The government can also use this application to suggest the “best crop” of the season, best cropping patterns, technical know-how based on some data analytics to the farmers.

This model if implemented can give a huge boost to e-governance and also a boost to the backbone of the Indian economy that is based on agriculture.

5. Conclusion

To conclude we can say that efforts are being made by the government to promote e-Governance in the country. There are a lot of challenges however, in implementing e-Governance starting from

- widespread illiteracy,
- low infrastructural development in rural areas,
- corruption,
- lack of dedicated officials,
- lack of interest on the part citizens,
- size of sub-continent,
- regional disparities and so on.

Despite all these challenges, the e-Governance plan has become quite popular at least in urban areas and with the help of new and improved technology as suggested in the paper and public private partnership, e-governance can be reached out to all the corners of the society and to those sections as well who need e-Governance the most.

E-Governance portrays development and change in the country and for India to be at par with the other nations, efforts must be made by everyone to give e-Governance the necessary thrust so that it can run successfully and so that the role of civil society in India can be realized.
6. References

[1] Source: (http://go.worldbank.org/M1JHE0Z280
(extracted on 18.08.2008)
URL_ID=4404&URL_DO=DO_TOPIC&URL_SECTION-
=201.html)
Present and Future in India”, International Journal of
Computer Applications, Vol. 53, No.-7, September 2012,
pp. 43.
[4] ibid, pp. 42
Importance of Cloud Computing in Driving New
Initiatives”, SETLabs Briefings, Vol. 9, No.-2, 2011.
on emerging themes for e-Governance in India.
9, No.-2, 2011.
implementation: a practical guide with case studies” SAGE,
2004.