

Critical Analysis of E-Governance with Big Data in India

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Abstract. ICT4D projects are examined through the lens of a developing country - India. Out of the sixty seven e-Governance projects, three big data projects are chosen based on an identified inclusion criteria. The predictive policing case study aims to empower rural police to track criminals and rural oppressed to register complaints with ease. However, the application lacks cultural context. The information kiosk project has strong roots in empowerment of locals but could focus on financial sustainability. Finally, post based banking systems for rural areas employs the trust circle for rural folk to introduce them to cashless payments and mobile banking. However, the ambitious project's success hinges entirely on a single agent - the postman.

Keywords: ICT4D, India, e-governance, info-kiosk, predictive policing, postal banking, big data

1 Introduction

Information and Communication Technology for Development (ICT4D) has developed in the recent century as a result of two factors - widespread adoption of internet based technology and continued prevalence of inequality amongst underdeveloped countries [10]. The Government of India, amongst other countries has undertaken large-scale efforts since 2005 to consolidate rural areas that were thus far left out of context and connect them with the rest of the country through means of web based technologies and centralised databases. Due to the large population, almost all involved data has been identified as *big data*. Big data has become the modern day buzz word to refer to a *large* set of data or information. However, broadly speaking, any dataset that shares physical characteristics of volume, velocity and variety can be considered as Big Data [2]. This study keeps this definition in mind in order to search for and obtain studies under big data.

There are several studies that have already explored ICT4D in under-developed regions of Africa however, there are only a few that asses or discuss projects in rural India. Bardhan et al (2006) reviewed how different understandings of technology guided land reforms in India via a case study on computerisation of land records. They found that while the project was technologically sound, it did not take into consideration the beneficiaries involved [1]. Garai (2006) in his report assessed four separate case studies of ICT in rural India but noted that the projects never aimed for human empowerment through their deployment [3]. This study focuses on projects that instead deal with challenges of a developing country under the context of ICT4D.

This study identifies a criterion to select three out of sixty seven different case studies of e-governance in India using big data. First, the identified criteria are stated and the projects that abide by this criteria are identified. Next, for each project, the key idea is summarised and the nature and design of the project including any potential shortcomings are critiqued. The paper concludes with general remarks about observed trends in design of such rural focused e-governance projects.

2 Criteria for Case Selection

There are sixty seven ongoing case studies under big data based e-governance in India. In order to focus on a few, a criteria was established to select the most appropriate studies [2] (Table 1).

#	Criteria	Rationale
I 1.0	The study's scheme policy documents must be self identified as a big data study	An official statement on Policy documents must state use of big data techniques to ensure relevance
I 2.0	Publicly available third-party sources must have assessed the project and concluded it to be driven by big data	Assessment by public third party studies can ensure validation
I 3.0	The study must make use of data to arrive at decisions for rural population [3]	By ensuring that projects clearly state and follow these principles, study relevance can be assured

Table 1. Inclusion Criteria for Selecting Case Studies for e-Governance in India

Based on this inclusion criteria, predictive policing, rural information kiosk and post based banking were identified as three suitable projects.

3 Predictive Policing - Crime and Criminal Tracking Network System

The Crime and Criminal Tracking Network System (CCTNS) is an ICT based government project whose goal is to connect 14,000 police stations across the country for all states and provide an efficient real time tracking and reporting of criminals and civilian complaints. Rural police stations do not share the same IT resources as metropolitan stations to record and release criminal data. Thus, it has often been the case that criminals have concealed themselves in rural areas causing for their trail to go cold since crime in such areas rarely get registered and shared across other stations. Moreover, rural police have a harder time investigating cases due to lack of structured databases. This project especially focuses on making such data available to rural police stations and allowing them to track complaints and monitor criminal activity.

The driving principle behind the application is valid as rural police have a harder time tracking down criminal behaviour with inferior resources and shortage of qualified personnel. Moreover, rural areas face

larger number of domestic violence cases that are not easily identified or reported. With a shared knowledge base, rural police can not only continue tracking criminals but also identify patterns in criminal behaviour and identify potential crimes and monitor them at hand. The main concern with ICT4D projects are their lack of sustainability and high rate of failure [10]. There is better potential for economic sustainability since the application is available online and only requires use of existing internet connected computers. Application development can occur in a region with access to skilled developers and technology and can be shared via the Internet to lesser developed regions which have internet access but lack all other resources. Moreover, involvement of the local community is enabled since the application has Citizen Complaint Information (CCI) system that can encourage hesitant users to come forward and register domestic crimes that often plague their communities. Thus, economic and technological sustainability combined with user empowerment are the strengths of this program.

In a complex and heterogeneous country like India, several contextual factors often serve as complications to technological interventions. First, police law is state relevant and thus the application fails to take into account user context. It might not be wise to provide a predictive algorithm that is generalised across all states. Next, there is a underlying bias against certain groups of people in the rural areas, especially the tribal communities that often get viewed as criminals and their behaviours perceived as odd. Often, these people are part of the database simply for being a part of that community [5]. Incomplete, biased and censored historic data that forms the basis for such a model will be trained with biases leading to biased predictions. With no historical data quality check mechanisms, police are likely to then act on such data. Institutional and religious biases against certain religions are also prevalent in India that run risk of being unfairly amplified by the algorithm due to historical data and police feedback. Moreover, the application does not consider social sustainability since there is limited literature on how results from such models will be handled in courts [5].

4 IVRP Kiosk - Information Village Rural Project Kiosk

Knowledge sharing has been the key mission for projects in the most rural, underdeveloped parts of India [8]. It is believed that highest benefit can be passed to rural community members by giving them livelihood opportunities and technical expertise for exploiting natural resources in a sustainable, cyclic manner. As a pilot study, villages with highest poverty and lowest literacy rates were chosen and linked with a wireless hub. Local community volunteers and villagers were chosen as project managers and technical experts to install and develop the network.

The application's main strength lies in it's intensive long term information needs assessment for the users [7]. According to Punathambekar (2004), results from the assessment highlighted the community's reliance on local market places and agri-vendors as information sources. Additionally, the assessment showed a 96% penetration of television and radio amongst the communities. The project took a bottom-up approach by making use of this already popular technology. VHF radio-based devices were used first to connect field workers with experts and allow for knowledge sharing. This was upgraded to internet connected info-kiosk for neighbouring villages and a centralised hub to allow knowledge exchange between villages [8]. The project also showed a sense of responsibility by conducting several impact assessment studies before, during and after the installation of the project [7]. Through this, it was seen that all benefits were being reaped by the beneficiaries. Content was adapted using local context gathered engaging rural members. The existing system was slowly enhanced and new technology was built upon existing infrastructure. This allowed for reduced costs and higher possibility of technological completion. A capacity building cycle was established to employ rural workers successfully trained by the system as official members of the IVRP. This created a sustainable employment cycle. Women and downtrodden sections of the community were specifically strategically chosen as key members to help them overcome social stigma. The success of the project led to Kerala becoming the first state in India to achieve full literacy [8].

The ongoing project's financial sustainability plans are not very long term since it is presently driven by government-based plans [8]. A more sustainable approach would be to engage in long term financing via partnerships with local businesses. The mission for IVRP was to promote empowerment by opening up channels for information access [8]. However, this mission statement needs to be adjusted to sustain a large scale operation that can undergo developments and changes in goals based on current user needs. Plan needs to be implemented to allow for a revenue generator

5 India Posts Payment Bank - IPPB for Rural India

A survey in 2007 demonstrated a very low penetration for ATMs in rural India. Alternatively, post services had a 90% penetration rate for these very same rural regions [4]. It was decided that the Indian Postal department which is already digitised would utilise its massive network to bring financial services to rural areas with the goal of maximum rural inclusivity. A new banking system called the India Posts Payment Bank (IPPB) was incorporated as a public bank with digital payment schemes and remittance services between individuals [4]. The concept of using the postman's network to reach to the very rural parts was a great concept. The postman's role was extended to that of a banking correspondent providing typical banking services, insurance, pension and investments with the help of a mobile ATM [4]. This use of trusted community member was a valid idea of introducing digital banking and banking in general to the rural communities. Among such communities, there is a general lack of trust for banking services that occur behind computer screens but the use of the trusted and familiar local postman could help communities ease into the service. It was noted that digital banking via phones could be made possible since the rural communities did possess a smartphone or a phone with internet connectivity or had access to internet connected community devices [6]. The goal was that the circle of trust would expand from the postman conveying banking services, to the banking services themselves. Moreover, use of postmen who can visit the villagers at their homes removes barriers of travelling long distances to visit a bank or an ATM. It gives into the goal of inclusion for women and disabled who can now easily access banking services at their doorstep. There is again evidence of bottom up development approach with the use of existing postal network.

The primary actor in this project is the postman who determines the success or failure of the project. While it is accepted that postmen are highly trusted by the rural population, it is unclear if they possess the required expertise or training or commitment to perform these additional duties. Moreover, to open up third party services such as pensions and investments, there is a reliance on external agencies. These external agencies might not trust the use of the IPPB to share their services, which would again undermine the entire project. The scheme heavily relies on users depending on cashless digital payments over the internet.

The scheme overall makes excellent use of existing technology and taps into the grassroots level to make use of the widely trusted postal service to introduce a mistrusted service - online banking. While ingenious and promising, there may be a greater unseen force at hand. Centuries old reliance on physical money for transactions has become a way of life. Converting these people to cashless banking will require more than just access to technology.

6 Conclusion

There have been several studies on ICT projects in underdeveloped countries. This study instead focuses on what ICT looks like for a developing and emerging country like India. With comparatively fewer technological barriers and better access to network and internet, the scope of ICT4D projects differ. However, with a complex socio-economic disparity, varied regional, religious and political backgrounds, ICT4D projects face a new set of challenges. This study extracts three out of the sixty seven e-governance projects that use Big Data in India and assess them for relevance, and note shortcomings if any.

The three case studies overall all showed the use of a bottom up approach unlike observed as typical [9]. This seemed to contribute to the success and acceptance of the project overall as it can be deduced that rural users might be more willing to start with what they are already familiar with. Moreover, projects found acceptance when empowering and involving the end users directly allowing them to feel responsible and committed. Impact assessments could be used for future studies to highlight facilitation of information and technology empowerment to its key beneficiaries. The projects often seemed to overlook historical and cultural contexts as in the case of marginalised communities being victimised by policing software or deep rooted habits of cash based payments. While there was almost always economical and technological sustainability, financial sustainability took the back seat. This could be because the projects started out with the strong goal of empowerment and inclusion, with lesser emphasis on costs. However, these missions need to be updated to reflect current status and to allow the projects to be better shared with the rest of the country and even outside of it.

Overall, it can be seen that with intuitive planning and use of big data, e-governance can be achieved using ICT as a framework.

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