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Two Readings of a Land Records Management E-Government System: A case Study in India

By

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Two Readings of a Land Records Management E-Government System: A Case Study in India

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Abstract

E-government systems pose an interesting challenge for developing countries, for though they represent a powerful tool for addressing development needs, most efforts seem to fail. Questions about design, implementation and impact of such systems become important. This paper addresses the issues of assessing the impact of e-government systems by considering design and contextual issues for a particular land management e-government system in the state of Karnataka in India.

The research is reported via two readings, each assuming a different philosophical position. The first reading is positivist, and uses a framework of stakeholders and a theory of first- and second-order effects of information systems to analyze the data related to the impact of the system. The results show that the system is successful in terms of first-order effects, and also for second-order effects, though somewhat inconclusive for the latter. A second, interpretive reading invokes the history of land administration in India, the role of the bureaucracy and the issues of de-politicization and reification in development practices. The results show that the e-government system addresses a small issue in the larger problem of land administration and that such development projects help to centralize the power of the bureaucracy. Another impact of these systems is to de-politicize governance issues and reify social relations regarding land tenancy.

The main contribution of this paper is to show the need for and value of multiple theoretical lenses by which to study e-government systems. This paper addresses the expressed need for theory building in e-governance research by developing the stakeholder framework and the theory of first- and second-order effects. In addition, this paper shows the usefulness of understanding development discourse and the role of historical contextualization for evaluation of such systems.

Keywords: E-government; stakeholders; development; interpretive research; de-politicization; reification.

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Introduction

E-government systems pose an interesting conundrum to those observing India's moves to deploy information and communication technologies (ICT) for development: on the one hand, scores of projects have been initiated with very low success rates, only about 15%[1], and on the other, the central government is poised to spend Rs. 124 billion (0.4% percent of the GDP) on such systems. Central to this urgency to push for e-government systems is the rationale that failures have to be set right and 'best practices' available from the successful projects have to be replicated at a rapid pace. It is a firm belief of many intellectuals in India that ICTs are the means by which India can 'leap-frog' its developmental lethargy and energize its governance mechanisms to keep pace with its industrial growth. This view is widely shared by foreign observers, particularly in other developing countries that are also embarking on a similar path.

Understanding an artifact such as an e-government system requires careful study and analysis. Technology descriptions or project case studies or anecdotal reports do not do justice to the complex nature of such implementations. Most research reports available fall under the above categories, thus it is imperative that research studies focus on rigorous analysis to answer basic questions related to the nature of e-government systems, their role in development, their design and implementation challenges, and their social-political-historical context.

For this paper, I study a particular e-government system that deals with managing land records in the state of Karnataka in India. This system, called Bhoomi ('land' in Hindi), is one of the most celebrated systems in India. It was initiated to digitize manual land records and to enable their speedy processing and access. Strongly backed by the state government, it was rolled out in record time and went online in 2001. Since then, about 23 million land record certificates, called RTC certificates, which are Bhoomi's main product have been purchased ever year. No other e-government system in India is used so heavily.

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[1] Figure reported by Robert Schware, Lead Informatics Specialist of the World Bank, at a seminar on E-Governance, in Bangalore, November 5, 2004.

In early 2003, when I started on this research project, studying Bhoomi was a natural choice owing to the positive media reports it had received. I did consider many other e-government systems around India, but Bhoomi stood out in many respects for being the most comprehensive and detailed implementation. I selected it as the focus of an extensive case study. Using interviews, field studies, and secondary reports I formed a set of conclusions about Bhoomi and its impact. This was the first phase of the study.

In a second phase of the study, I realized that the original set of questions that I had started with were not enough, and I needed to take a closer look at the data, perhaps with some 'suspicion' (Klein & Myers, 1999), and examine my own biases and received notions of land, land politics, e-government systems and development. The published literature in MIS assures us that having multiple 'readings' and analysis of the same data is an accepted and encouraged practice (Kumar, Dissel, & Bielli, 1998). I conducted more interviews and expanded the scope of the study to include more and diverse stakeholders.

In this paper I report on the findings and conclusions of the two readings of the Bhoomi data. The conclusions of the two readings are different but not necessarily contradictory. When juxtaposed they present a complex picture with valuable insights for Information Systems research and practice related to e-government systems.

Research Questions and Methodology

This research project was initiated as part of an ongoing project on 'Innovations and Excellence in Governance' that is partly funded by the Government of India. One objective of the project was to identify and study innovative ideas in governance that had been implemented in various states in India and that had shown tangible benefits and practices that could be documented and then replicated in other states. It was evident that e-governance was one of the most widely practised innovations, and was strongly supported by almost all state governments in India. (The understanding of e-government used in this paper is: the use of information systems by governments to improve efficiency in their own functioning and in their service offerings to citizens.) A scan of the e-government projects underway, or completed, in all the states revealed that there were few that could claim to have made a significant impact and fewer that could claim to have been completed (along any measurable parameter). The

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remaining few projects were highly diverse in their scope, scale of implementation and eventual implementation results. These projects raised a large set of questions: How are such projects initiated, funded and commissioned? What are the means by which such projects are sustained in terms of both funding and long-term support from champions and the political leadership? How are such governance initiatives institutionalized? How can large public interventions like e-government systems be evaluated? How can one say, at a given point in time, that the systems are successful and that their intended benefits have been realized? What lessons can be learned for future implementations of such systems? What are the larger societal implications of e-government systems?

In early 2003, when I first framed these questions, the method by which they could be answered was not clear. A literature review showed that prior, published approaches ranged from technology descriptions and anecdotal descriptions to brief project case studies and user surveys. Theory, barring in a few notable exceptions, was clearly missing and the answers to the questions posed above were not evident and usually only incidentally addressed. There was an obvious and dire need to seek answers to those questions and also base the study on a sound methodology.

The case study methodology (Yin, 2003, Lee, 1989) was selected as it suggested a rigorous means by which to study the plethora of questions that had been raised. A case study "examines a phenomenon in its natural setting, employing multiple methods of data collection to gather information from one or a few entities (people, groups, or organizations)"(Benbasat, Goldstein, & Mead, 1987). What is more, a case study is useful when the "boundaries of the phenomenon are not clearly evident at the outset of the research and no experimental control or manipulation is used" (Benbasat et al., 1987). With the selection of Bhoomi as the e-government system that would be studied as a case, the criteria for the adoption of the methodology were further examined:

- Bhoomi was a contemporary phenomenon, it was unfolding as I was initiating the study. It had to be examined in its real-life context as it was a large public intervention with consequences affecting millions of people and with policy implications for the state government and the federal government.

- Bhoomi was a single entity that was to be examined. Although I considered and examined other e-government systems, my focus remained largely on Bhoomi.

- The complexity of Bhoomi's implementation and impact had to be studied intensely. Although

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reports and surveys on Bhoomi's impact were already available, it was evident that a rigorous analysis was required.

- It was not possible to hold controlled experiments. For example, I could not study groups of people who were impacted by Bhoomi and those who were not. Bhoomi had already been rolled out in all districts of Karnataka and I could only rely on the memory people had of the earlier manual system of land records.

- It was clear at the outset that as the investigation progressed there could be a need to define new hypotheses and propositions and seek fresh data.

With a clear understanding of the methodology, it was imperative that the research questions had to be sharpened to give direction and focus to the study: How can a system like Bhoomi be assessed for its implementation, impact and service features? How can the economic feasibility and sustainability of such projects be examined to guide future efforts?

The philosophical basis of the study was initially positivist. This was by choice, as much of the case study literature in Information Systems substantiated the rigor and value of positivist research (Benbasat et al., 1987, Lee, 1989), and laid clear guidelines for conducting the research. In addition, the ontological and epistemological assumptions of positivist research were valid for the questions framed and the proposed methodology. Table 1 shows the different assumptions that positivist research is based on, as compared to interpretive research (Orlikowski & Baroudi, 1991). In essence, the positivist approach assumes that Bhoomi can be assessed by the researchers as an independent object, hypotheses can be formulated about it, and generalizations can be drawn from the results.

A positivist reading of Bhoomi yielded interesting results but it also raised a number of issues that seemed to escape its explanatory potential. I initiated a second, interpretive, study that led to a reexamination of many assumptions in the first part and a resetting of research propositions. The emphasis was much more on the context-of-land-administration and its role in developing countries. Inspired by the approaches suggested in the Information Systems literature (Klein & Myers, 1999, Walsham & Sahay, 1999, Kumar et al., 1998, Walsham, 1995), I set about to examine my assumptions about land, the relationship farmers have to land and land records, the role of bureaucracy, the historical context of land records digitization in India and role of development discourse on ICT deployment.

The data used for the first part of the study included interviews of the Project Champion (a senior

IAS officer in the Karnataka state government), survey of users, survey of Bhoomi kiosk operators, interviews of five other district officers who had helped with the implementation of Bhoomi, and data from Bhoomi internal reports, published media reports, reports from development and funding agencies, and student reports on field visits. Details are provided in the Appendix.

The data for the second part of the study was obtained by interviews of persons at kiosk sites, including land-owning users, kiosk operators, bureaucrats, land developers. Secondary data was obtained from media reports.

An analysis of the data in the second phase of the study showed interesting differences with that obtained from the first part. Aspects of e-government systems and e-governance that would have remained hidden were revealed. These different readings form the primary contributions of this paper, as they address the questions that initiated the research and identify a theory that is applicable for such systems in developing countries.

The rest of this paper is organized as follows. The next section builds up the theoretical foundation for conducting the study. The section after that is an analysis of the data from the first phase of the study. This is followed by an analysis based on the second phase of the study. The next section contrasts the key findings of both readings of Bhoomi and highlights the theoretical insights gained from the study. The final section concludes the paper and points to further research.

Background Theory

Reading One

For a developing country like India, e-government systems appear to be a natural choice for 'leap-frogging' from an archaic and grossly inefficient governance structure to one that is modern, efficient and technology-supported (Keniston, 2003). This leap-frogging could overcome years of learning and institution-building that would be otherwise needed to build up efficiency in governance. This premise is supported by the tremendous achievements of the Information Technology industry that seems to have overcome traditional barriers that other industries faced, to grow at an incredible rate and now has companies that rank amongst the best in the world. Commentators such as Keniston base their faith on just such feats, stating that despite that fact that about 25% of India's population is below the poverty

line and that, for example, Bangalore city's high-paying software jobs have not helped raise the standard of living of the 40 million people living in rural Karnataka, there is hope in ICT and such artifacts can and will be deployed successfully for development.

Research on ICT for developing countries in general and on e-government systems in particular retain this cautious optimism, so issues of scrutiny pertain to those criteria that will enhance the successful leap-frogging and to the reasons why failures occur and how they can be overcome (Heeks, 2002b, 2002a, 2000). Measurement criteria, best practices, frameworks for design and implementation of systems and for training of personnel are discussed. Data is obtained from different projects within a country or an entire continent (Heeks, 2002b). The conclusions of the research, though thoroughly argued, appear coarse-grained and have too broad a focus to be useful theoretically.

The research questions framed for this first part of the study were inspired by the earlier research but the attempt in framing the theory was to seek fine-grained answers that dealt with the particularities of the location and the situational context. Bhoomi was designed for the particular task of land records management and its design and implementation details were tied to the complex task of accommodating 20 million land records in 27 districts and 177 sub-districts of Karnataka. Bhoomi is thus different from other e-government systems in India in its scope and scale of operations. Studying it requires a clear framing of research issues that include the detailed context and, simultaneously, are generalizable to other systems.

Stakeholders

The concept of the stakeholder in Organization Theory attempts to redefine firm boundaries to include those who are impacted by the firm and those whose interests the firm is concerned about. The literature deals with either defining who stakeholders are, based on the firm's position in a legal, social and business context, or with managing stakeholders and their interests (Clarkson, 1995, Jawahar & McLaughlin, 2001, Jones & Wicks, 1999, Reed, 1999). Stakeholder theory is used in the field of Information Systems also to understand the impact of various people involved in systems design, where it draws on theories of user participation and inclusion (Coakes & Elliman, 1999). Research has focused on the value of stakeholder theory in e-government systems too (Scholl, 2001), motivated by the complexity of government-to-citizen systems that impact a large population and whose social, political and legal implications are not obvious.

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Going by the definition that a stakeholder is a person or group who is able to have an impact on the eventual system in a practical sense (Coakes & Elliman, 1999), it is important to include as stakeholders all those who can affect the e-government system, whether positively or negatively. It is useful to view the stakeholders that impact the eventual success of a system as belonging to either the demand-side, those who will consume the services of the system, or to the supply-side, those who fund, design, implement and maintain the system. Individuals, groups and organizations belong to either stakeholder group according to their relationship to the system. These categories are not water-tight, that is, there could be individuals or groups who belong to both categories. Supply-side stakeholders, in this view, dominate the implementation process and have control over all the resources and deploy them according to their understanding of demand-side needs. They have power over the demand-side groups (Markus & Bjorn-Anderson, 1987). Demand-side stakeholders consume the services of the e-government system and, possibly, provide the revenues that sustain the system. They contribute to the eventual success of the system through use or non-use and are directly impacted by the service efficiencies achieved.

First- and Second-Order Effects

The productivity paradox emerged as a topic of interest in the late 1980s in the United States when economists discovered that despite large investments in computing power for white collar workers there was no commensurate increase in their productivity (Brynjolfsson, 1993, Brynjolfsson & Hitt, 1998, Dewan & K.L.Kraemer, 1998). Researchers understood that there was a problem of measurement, in that, the subtle aspects of information systems, such as flexibility to respond to a market or ease of use for customers, could not be captured by conventional output measures such as number of widgets sold or bushels processed. A few years later more detailed, micro-level data was available that allowed measurement of a larger number of parameters at the level of the firm. Intangible value that was being created by firms could now be identified and measured more accurately.

The productivity paradox literature highlights the fact that the effects of information systems over a large unit of analysis, the industry or economy for instance, can be subtle and different means for measuring and different parameters to measure over time have to be sought. With the issue of measurement, as above, there is also an issue of the effects of technologies diffusing over a period of time. For instance, when new technologies diffuse into the economy the effects are spread out over

time, and are referred to as first-order, second-order, and third-order effects(Malone & Rockart, 1991). These effects may be examined in the context of e-government systems which are also complex interventions in the economy of a region and in the social environment. First-order effects have to do with the immediate changes in the volume and speed of the service delivery. Second-order effects are subtle, and include the effects on institutions and groups that used to rely on the government service. Second-order effects enable possible reduction in transactions costs for these agencies that reflect in their productivity or performance. Third-order effects show in broad societal changes and emergence of new economic phenomena (Sein & Harindranath, 2004). It is not possible to predict, in a general sense, what exactly these phenomena will be for any given e-government implementation and the challenge would lie in analyzing each case independently to identify those aspects of the economy and society that have been impacted.

In summary, I theorize that to evaluate the impact of e-government interventions with a view to identify ideas and practices that can be replicated elsewhere, it is imperative that a detailed, fine-grained analysis be undertaken. This analysis has to be based on an understanding of stakeholders who are divided into, roughly, two groups, demand-side and supply-side, and whose participation in the life cycle of the e-government project has to be understood and measured. Measurement of the impact of e-government systems has to include, as is learnt from the history of the productivity paradox, first-order, second-order and third-order effects that will identify and illustrate the impacts of the system at different levels of the economy and society.

Reading Two

The idea of a 'public discourse' is that of a process of reasoning that a society undertakes. Elements of this reasoning process may be read from media reports, public statements by citizens in various capacities, cultural creations and other forms of written or oral communications. Discourse that pertains to a subject, such as development, may have myriad origins, but it has the power to shape public opinion. ICT projects in India originate from a logic and discourse of development that has evolved to a particular form over the last fifty years of India's independence and that informs much of the thinking of the government and bureaucracy that ultimately executes these projects.

A brief examination of the bureaucracy and development discourse follows.

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The Indian Bureaucracy

The current Indian bureaucratic structure was evolved by the British for their colonial administration. After India's independence, in 1947, the elected government retained the old structure, while changing the name of the apex organization from the Indian Civil Service to the Indian Administrative Service. In the early years of Indian democracy, under Nehru's lead, the Congress party was dominant in both the states and the center and held the reins of the executive tightly. The bureaucracy retained its image of professionalism and a non-partisan entity. The Congress dominated planning and development issues and the bureaucracy participated in the broad consensus on national goals. But after the Nehru era the Congress party was unable to retain its strong hold on the entire party organization and began to rely on the bureaucracy for its executive and partisan agenda. Using destabilizing and demoralizing means, such as "favoritism in promotions, penalizing transfers, vitiation of normal procedures and operations through corruption" (Vanaik, 1990), the legislatures in the states as well as the center eroded the non-partisan nature of the bureaucracy. With an elected leadership that was increasingly incompetent at delivering the executive function, politicians began to rely more and more on bureaucrats who were sympathetic to their party ideology. These willing accomplices soon became the most powerful elite within the country.

Despite the erosion of professional values and the deep internalization of corruption, the service still managed to attract some of the best talent in the country and the bureaucracy "remains a reasonably effective instrument"(Vanaik, 1990), particularly, when compared to other South Asian nations. The selection procedure remains un-corrupted and the aura of the services ensures that highly talented candidates apply for selection. Once selected they are rigorously trained and assigned to various "field" postings before being empaneled for senior, more policy-oriented jobs.

The Discourse of Development

The phrase "developing countries" usually refers to those countries that have adopted the structural adjustment guidelines of multi-national lending agencies like the World Bank and International Monetary Fund and have implemented changes in their economy such as deregulation and reduction of government controls, greater autonomy of private investments, less reliance on the public sector, more opening of the economy to international trade, among others. There is a broad consensus amongst the

elite in India (comprising the elected leadership, the bureaucracy, the industrialists, middle-class intellectuals and the media) that the word "development" too follows a similar notion of structural adjustments, following the Western models of liberal democracy and *laissez faire* economic policies.

This idea of development though is a contested one where scholars and social activists have challenged this model on the grounds of its inadequacy for India: it is based on a Western model; it relies on environmentally-destructive growth policies; and it emphasizes reducing social benefits that a country like India needs (Kamat, 2002). Development thinking though, critics argue, has become a catch-all justification for all sorts of programs that governments and bureaucrats want to impose, mostly to satisfy the requirements of the structural adjustment regime.

A critical view of development practices states that there are two basic modes by which development discourse and practice proceeds: one, by the de-politicization of social and deeply political processes, and two, by the reification or the "freeze-drying of social relations into 'things' " (Kamat, 2002). De-politicization is the effort to dissociate economic issues from political ones. This theory states that governments try to remove associations of political struggles or movements from economic issues to deliberately create a discourse that dis-empowers political action. For instance, the British, during the 1930s in India, consciously monitored peasants and factory workers, participating in civil disobedience, to prevent them from joining the political movement for independence. The real threat to the British was the linking of the political nationalist struggle with the economic one, not that of economic losses from strikes. In a similar vein, when in independent India many groups started political action to demand land reform and address the concerns of the poor, the government in many cases responded by setting up an administrative framework for 'development' via credit relief, free schooling, mid-day meals etc. The attempt was to dissociate political and economic discourses.

The act of reification is also understood as discourse and practice. Reification (or making concrete) is the process by which social relations are deprived of their history and their particularities and rendered as objects with properties. For example, when the powerful frame tribal groups in India, or peasant groups, as 'backward, poor, low skilled, landless, etc.' they are participating in a reification process where they are depriving social groups of their history, their particular relation with the world and their attempts to be seen in the world as citizens with legitimate demands and rights. Reification, critics argue, is almost necessary to demand development aid on behalf of peoples' groups (Kamat,

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2002). The process of reification simplifies and homogenizes the history and conditions of people to make them palatable to the media and donor agencies.

To summarize, the bureaucracy in India consists of celebrated elite, who have over the years lost their non-partisan character, owing to manipulations by political parties. Some officers, though, who have gained political patronage, have risen to positions of high power. The broad discourse of development in India is diffuse but two strong elements characterize it, those of de-politicization and reification. De-politicization is a process by which a discourse of politics is deliberately dissociated from its economic implications. Reification is the process by which social relations, of say groups and peoples, are objectified and deprived of their history to make them palatable to development thinking.

Data and Analysis

Reading One

A Brief Description of Bhoomi

The Bhoomi system of land records management was deployed in 2001 in Karnataka, via kiosks installed in 177 taluk (a sub-district) offices of the state. Each kiosk consists of a computer that holds the digitized land records of the taluk, a screen that displays the contents of each database entry, a printer to print out the records, and power backup and storage devices. Bhoomi kiosks are located in taluk headquarters, where each district in Karnataka (there are 27 districts in this state) has about 6 taluks. The taluk headquarter is known as the office of the Tehsildar, a sub-district magistrate, and is usually located at the center of each taluk town, close to the bus depot. Farmers within the taluk have to visit the town to access the kiosk, which is open from 10:00 am to 5:00 pm on working days. Farmers identify the plot they want a certificate for by mentioning its *khata* number, or record number, and a printout is given to them after a payment of Rs 15 (about $0.30 at the time of writing). The printout is signed by a Village Accountant (VA), known as a *patwari*, and a hologram sticker is placed on the document as further verification of its authenticity. If a farmer wishes to change the information on the certificate, because the property has been sold or divided amongst family members, then an application for a

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process known as 'mutation' has to be entered. This too may be filed in the Bhoomi system, for a fee of Rs 35.00, and with some additional manual forms. Mutation requests are treated on a first-come-first-served basis by the system, where each request has to be addressed by the officials in a 45-day period.

The RTC certificate, which stands for Record of Rights, Tenancy and Crop Inspection Register (Form 16), is a document that validates the farmer's claim to the land and provides details about the land size, location, number of divisions, and details about the crops cultivated on it. It also records loans taken against the land. This certificate is not a title deed, but is a record of cultivation, ownership and tenancy. The RTC certificate is used for securing loans from banks and other financial institutions, as a surety in courts, for obtaining government grants and aid, for selling crops to government agencies, for obtaining the irrigation allocation, for paying land and water taxes, and as a document to check proof of ownership.

The implementation of Bhoomi was initiated in 1991, when the digitization process could not be completed successfully, and this was followed by a second attempt in 1996 with the same results. The Project Champion (PC), a senior IAS officer, stated that the problem was that the digitization process was so slow, the records were outdated before the digitization cycle was complete. In a third attempt in 1999, the entire digitization task was outsourced and completed in 18 months. The digitization process entailed translating manual records (a total of 20 million in the state) in 5 different languages and about 1500 different formats into a single format in the Kannada language. After each record was input it was verified by the VA, in whose village the property was located, and errors were corrected. The PC trained a batch of new VAs who were conversant with computer technology and would stay with the kiosk operators at the taluk offices. The 1000 new VAs are responsible for verifying the RTC documents and signing them. The old VAs (a total of about 9000 are employed in the state) are responsible for collecting data on cropping details and helping with mutations. Many are provided with hand-held computers to record crop details in their villages, which are then uploaded to the Bhoomi system.

The implementation was completed in a phased manner, with 5 taluks in the first phase, 27 taluks (one in each district) in the second phase and all 177 in the third. After records in all taluks had been digitized, the state laws were amended, through an act of legislation, to mandate that all manual records were defunct and the RTC certificates from the Bhoomi system were the only legal documents.

Stakeholders in Bhoomi

The data available from the interviews of officers and from the published reports about Bhoomi clearly showed that there are two broad categories of stakeholders, demand-side and supply-side. Figure 1 shows the stakeholder groups as related to the Bhoomi system. Stakeholder groups, on either side, are divided into categories of those closest to the system, those removed by one level, and those removed by two levels. On the supply-side, those closest to the Bhoomi system are the kiosk operators (or new VAs) who are responsible for attending to farmers who demand services. This level also includes the old VAs who provide crop data, mutation data and tax data to the system; the case workers, who are assigned mutation cases logged into the system; and Revenue Inspectors, who are responsible for collection of taxes and also for the mutation process. At the next level are those stakeholders who do not directly interact with the Bhoomi system but are involved with the work that is carried out by those in the inner level. The District Information Officer is the team lead who oversees the functioning of the hardware and software and training for all the taluks. The Assistant Commissioner, the Shirestedar and the Tehsildar are also involved in the cases related to land mutation, corrections in land records and sale of land parcels. They receive data and files from VAs and case workers to resolve land record issues. For example, for all mutation processing, the Revenue Inspector refers the cases both to the Shirestedar and the Tehsildar. At the third level, the stakeholders are mainly in the role of project champions and supporters, whose explicit support and funding is required to ensure that the system is maintained and running. The Secretary of the Revenue Department oversees the overall functioning of the entire Bhoomi project (he is the Project Champion). The Chief Minister and Cabinet Minister are at the highest level of support for the project and determine the level of funding, staffing, and support for the project.

On the demand-side the stakeholders closest to the system are the farmers who acquire RTC certificates and submit mutation requests in the system. One level removed from the farmers are the banks, other commercial lending institutions (rural cooperatives, caste-based cooperatives, and community-specific banks), courts, police stations and financial assistance organizations. Lending institutions provide loans to farmers for purchasing of seeds, fertilizers and other inputs for agriculture and use the RTC certificates as proof of ownership and tenancy. They do not directly interact with the Bhoomi system but rely on its output for their business. Courts and police stations use Bhoomi

certificates as surety and as support of bonds. Financial assistance and aid granting organizations use Bhoomi RTC certificates to verify income levels for grants. At the third level are agencies such as the National Agricultural R&D Board and Agriculture Department of the state that rely on the activities spurred by level two agencies to determine agricultural and economic policies. The Revenue Department is included at this level also, for although it is primarily responsible for the Bhoomi project (on the supply-side), it also relies on the usage information of Bhoomi to make policies regarding the enhancements of the system.

Once the stakeholder groups are categorized along the lines depicted in Figure 1, one distinction emerges: demand-side stakeholders were not included in the design or deployment of the system. The entire Bhoomi project was conceived, designed and implemented by the supply-side stakeholders.

First-Order Effects of Bhoomi

The immediate effects of computerization of land records and delivery of RTC certificates, the first-order effects, by the Bhoomi system are documented below. The data are obtained from the PAC report (Lobo & Balakrishnan, 2002), and another independent survey conducted by my team. The latter is referred to as the IR survey, and the details are provided in the Appendix. The PAC report is based on a survey of 180 respondents selected from 4 districts of Karnataka, while the IR survey is based on a survey of 63 respondents from 3 districts.

- Of the users who had used the earlier, manual system and also the Bhoomi system, 78% found Bhoomi to be simpler to use (PAC report). In the IR survey 90% found the system easy to use.

- In the manual system about 60% of the respondents had to meet 2-4 officials for their work, whereas with the Bhoomi system 79% could complete their work by interacting with kiosk staff only (PAC report).

- 74% of users of Bhoomi stated that their documents were error-free (PAC report), whereas 63% said so for the manual system. (81% stated documents to be error-free in IR survey).

- The costs associated with traveling to the taluk headquarters was an average of Rs 47.10 from the IR survey. The PAC report shows that 28% had to make more than one trip to the kiosk. The average time to visit a kiosk (one way) is 1 hour, for an average distance of 15 kilometers (IR survey). There was no significant cost associated with travel in the manual system, as the village

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accountants lived in the same hobli (cluster of villages).

- The average time spent in the queue is 27 minutes in the PAC report, and about 75 minutes in the IR survey.

- 3% of users had to pay a bribe with the new system (PAC report), as opposed to 66% in the manual system.

The summary points mentioned indicate that on practically all counts - ease of use, reduced interaction, error in documents, and paying bribes - the computerized system is an improvement. The down side is that farmers have to travel further and incur an additional cost. The IR survey was conducted as a means to triangulate and validate some of the results obtained by the PAC report. The IR survey mostly confirms the findings of the PAC report and the differences are not significant and possibly result from the smaller sample size of the survey. The main difference is in the average time spent in the queue, but this may be because respondents included travel time in their answers in the IR survey.

Second-Order Effects of Bhoomi

Most users of the Bhoomi system sought RTC certificates to apply for a loan (40% in the PAC report, 45% in the IR survey). This is the single most important application for the certificate. Since its inception, Bhoomi users have purchased about 700,000 RTC certificates a month from the kiosks state-wide. A natural answer as to why they were buying so many would be that the certificates were being used to apply for loans from commercial and other lending institutions. The structure of rural credit in Karnataka, and in the whole of India, is very complicated, with many sources and many different ways in the which credit is given and then paid back (Dreze, Lanjouw, & Sharma, 1997). Loans may be obtained from institutional or private sources, where the institutional sources may be banks, local cooperatives, self-help groups, and caste-based cooperatives, and private sources may be money-lenders and people from the community. RTC certificates are only used when loans from institutional lenders are sought (not all require them).

Once the loans are obtained they may be used for agricultural inputs and these increased inputs in turn may have an impact on agricultural yield, on income, on consumption and on loan repayments. A cause-effect diagram, see Figure 2, shows the impact of easy availability of RTC certificates on bank

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loans and the subsequent effects. The plus (+) sign indicates a change of more than the normal expected in the effect. Though somewhat simplified, the figure shows the possible dynamics of improved support for loans. With this model, two hypotheses about second order effects are: 1) since the inception of Bhoomi there is a significant increase in the rural, institutional lending in Karnataka; and 2) since the inception of Bhoomi there is a significant increase in (some) agricultural inputs in Karnataka. If these two hypotheses are accepted, then it will confirm that there has indeed been a second-order impact of Bhoomi. Secondary data collected from published sources revealed the following.

- The data on advances (or loans) from commercial banks for the state of Karnataka is depicted in Figure 3. The dark line shows a gradual increase in the rural lending from 1992 till 2003. A regression line is fitted to the data (lighter line) that shows that in 2002 and 2003, post Bhoomi implementation years, the advances were more than the regressed line, but these increases are not significant (at 95% confidence level). In other words, Bhoomi's impact on bank loans have not been significant, assuming all other factors that affect bank loans have remained the same.

- Data on fertilizer consumption (per capita) for the state of Karnataka is provided in Figure 4, plotted with total lending. There is a sharp increase in the fertilizer consumption in 2003 after a decline from 2000 to 2002. Our background research indicates that this increase is not due to some promotional campaigns by fertilizer companies but instead can be attributed to the increased loan availability. However, there are not enough data points to justify a strong conclusion.

Though the data is not conclusive, I argue that it is indicative of some positive second-order effects, particularly the sharp increase in fertilizer uptake in 2003. Issuing of loans by rural banks is a highly bureaucratic and slow process. Most banks require that farmers produce a 'no dues' certificate from all banks in the taluk, show encumbrance certificates for the last 13 years, and, in most cases, produce a surety from a fellow farmer. In some cases, if the RTC certificate does not mention the particular crop that the farmer has sown, because the VA did not record this in time, then farmers have to obtain a separate certificate to establish this, as most bank loans are given for particular crops. Thus, despite the relatively easy availability of Bhoomi certificates the loan processing process remains slow. Data from interviews with bank officials who use RTC certificates to issue loans supports our conclusions. The officials indicated that because of Bhoomi the certificates are available to the farmer faster, however the

other document requirements prevent a greater speed-up in loan processing.

Summary and Conclusions of Reading One

From the perspective of the supply-side stakeholders, the Bhoomi project is a success as it was rolled-out on schedule and is being heavily used to obtain certificates. The first-order effects of the immediate benefits of computerization are being realized by the first-level demand-side stakeholders, and there are clear improvements in ease of use, the errors found in documents, the number of officials to be met and the bribes to be paid, as evident from the data from the two surveys. There are some negative implications in that farmers have to travel a longer distance to the kiosk and have to incur that additional cost (plus the cost of loss of earnings). Overall, both surveys show that farmers prefer the new, computerized system to the manual one for the purposes of obtaining RTC certificates.

The second-order effects are positive, though not significant. There is some impact on second-level demand-side stakeholders as the loans given from rural financial institutions and the amount of fertilizer inputs in the state after the introduction of Bhoomi have increased. Although, it is too early, and not enough data points are available, to conclude that the effects are conclusive and significant. Figure 2 shows that loans from banks, that require RTC certificates, could be used for consumption also, or non-agricultural activity, that would not lead to any impact on agricultural productivity. Further, the cumbersome process of obtaining loans could in fact negatively impact the use of RTC certificates (and their demand) in future.

First-order effects, though helpful in understanding the immediate benefits of an e-government project, are not sufficient to indicate the long-term sustainability of large and complex projects. In such situations the designers have to consider second-order effects and the impact they will have on the demand for the services of the system. Stakeholder analysis shows us that there are multiple levels of users of an e-government system and their needs also contribute to the demand for the services of the system. For the Bhoomi project, the supply-side stakeholders had not consulted any demand-side stakeholders for the design of the system (it is well-known that government departments in India don't cooperate (Walsham & Sahay, 1999)). This was a lacuna. Had they included financial institutions as one of the stakeholder groups whose requirements had to be understood, Bhoomi would not have been designed as a silo application, but one with inter-linkages with the financial institutions. I can imagine a scenario where RTC certificates are directly transmitted to banks, courts, police stations, or aid granting

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institutions, upon the request of farmers who are requesting various services. The data suggests that the contingencies of the situation and the pressures under which bureaucracies operate to deliver on projects precludes a broad and long-term perspective for analysis.

Reading Two

Brief Discussion of Land Records

Land administration in modern India is traced back to the British period when revenues from land were an important source of wealth for the Empire. Land records identified the tenants and cultivators of land and essentially identified the amounts that land holders had to pay in taxes. One aspect of post-independence land revenues is that they constitute a small fraction of the total revenues that the state earns (Saxena, 2005). For example, in Karnataka, the land revenue share was only 0.8% of the total state revenues in 1989-90, down from 23% in 1957-58. A consequence of this drop in revenue is that states have reduced their interest in land administration, staff have been assigned many other activities and the function of maintaining land records has suffered. In the British system, land was surveyed and revised every 30 years. When records had to be mutated, this was done during the survey without the farmers having to go to court. Errors could be corrected at this time. Surveys too are not conducted regularly in Indian states now. In Karnataka, for instance, the last survey was conducted in 1966-76. By the time land record digitization started in the mid-nineties in Karnataka, the records had not been revised for over twenty years. These records were entered into the database on an as is basis.

The first-order results showed that most users found RTC certificates to be error-free. In the light of the above understanding of land records, when probing questions were asked about the nature of the record itself the users clarified that the errors were low compared to the original manual record. The fact that the manual records were themselves outdated was not captured by the surveys. For instance, many records still gave the names of a grandparent, whereas the land was being cultivated and loans were being taken against it by the grandchildren.

Commentators claim that the real problem with land administration in India that has to be addressed is that of updating and revising land records (Acharya, 2003, Saxena, 2005). The task of digitization does not address that, and, on the contrary, aggravates the problem because records are not in their

original form (see below).

The Role of the Bureaucracy

The Project Champion for Bhoomi is a senior IAS officer who was deputed to this task in 1999 and has stayed on till now (it is usual for senior officers to be rotated every three years). The prime reason for digitizing land records for the PC was to address the problems posed by the VA. In the interviews, public speeches and public records by the PC the same message is conveyed repeatedly. According to the PC (Chawla & Bhatnagar, 2001):

> "Land owners find it difficult to access the Village Accountant, as his duties entail traveling. The time taken by Village Accountants to provide RTCs has ranged from 3 to 30 days depending upon the importance of the record for the farmer and the size of the bribe. A typical bribe for a certificate could range from Rs.100 to Rs.2000. If some details were to be written in an ambiguous fashion, out of selfish motives, the bribe could go up to Rs.10,000. Land records in the custody of Village Accountant were not open for public scrutiny."

To run the operations of the kiosks across the state, the PC hired 1000 new VAs and trained them over several months. All high school graduates. they were "hand picked" by the PC and motivated to perform the tasks with energy and diligence. All the trainees were closely watched by the PC and were given direct access to him (via his mobile phone).

Village Accountants (the traditional ones) are at the lowest levels of the administrative setup and are often at the margins of the direct control of the district administration. They have many roles to play, along with those of maintaining land records. They are called upon to help in conducting general elections, issue various certificates to villagers, implement and monitor development programs, and provide relief during natural calamities. They still collect the land and water taxes levied on farmers. They have political clout as the village residents rely on them for most of their interactions with the government. Local politicians too rely on them to assist with campaigns. The PC retained the old VAs for the task of collecting data pertaining to crops and updating records at the kiosk. Moreover, the VAs are crucial for the mutation process as they are required to verify the ownership status.

While removing the old VAs from the task of dispensing RTC certificates, the PC also introduced higher-level bureaucrats into the new process. Figures 5 and 6 depict the mutation processes in the

manual system and in the new system. In the manual system the VA, Revenue Inspector and Shirestedar were the three officials required, whereas in the new system the Tehsildar has also been introduced. The rationale, as explained by the PC during a speech, was to monitor the process and to ensure that the queue discipline introduced by Bhoomi was not violated.

The above data shows that the PC increased centralized control over the land administration process by first replacing the old VAs with a new, young set whom he had personally trained and from whom he could extract direct loyalty, second, by introducing high-level bureaucrats into the mutation process, and third, by moving the management of records from the village to the taluk level. The increased control was rationalized by the unreliability of the old VAs, but they were not entirely removed from the land administration process. This data provides direct support for the theory that senior bureaucrats centralize control over administration, using systems like Bhoomi as the means. It will be noted that this is in sharp contrast to the rhetoric normally propounded by the bureaucrats themselves of reducing controls and the number of officials farmers have to interact with.

De-Politicizaton

The act of de-politicization is effected by denying that certain political processes have meaning, and a history, and instead mounting a discourse of technical-economic problems and their solutions. The supply-side stakeholders of Bhoomi, led by the PC and the state government, effected such a method to remove many historical practices and replaced them with a monolithic and centralized system of control. Land administration in the manual method, though sloppy and chaotic by modern standards, did manage to serve a large number of diverse farmers. Some salient facts are revisited here:

- The state of Karnataka was formed from five different linguistic and administrative constituencies, and so the forms of land tenure were highly varied. There were over 1500 types of land records, in five different languages, that were all converted to a single format and a single language.

- The old VA served many functions in the villages and was an important link of the village people with the government and the bureaucracy. The VAs worked with the diverse land records (in their hobli) and performed essential tasks like providing RTC certificates and mutations. Though their status granted them the power to make arbitrary demands on people, their services were essential and available locally. Many farmers who were interviewed asserted the worth of the VA.

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- Surveying land and enacting land reforms is a daunting political task in almost all states in India. Owing to deteriorating governance, it is widely believed that a land survey is an occasion for government officials to loot village property (Saxena, 2005). Although surveys are badly needed to address the gross inequities in the land records, they are resisted by village residents as well as by the political leadership (as it is a sure way to lose an election).

The VAs dealt with the complexities of the multiple forms of land records that farmers in various parts of the state were comfortable with and had used for many generations. They were the essential link of the village with the governance mechanism of the state. Reducing and diluting their role in land administration was an act of de-politicization; technology, and an alien and remote administrative mechanism replaced a familiar figure of power and authority.

Resolving the problems of managing land records, those of petty corruption, delays in obtaining records, and errors in records, required mainly a political process. Involving VAs, village governance members, district officials and local politicians, to address the problematic issues and seek solutions, would have been a political alternative that Karnataka could have attempted (something other state governments, such as West Bengal, have effected (Sengupta & Gazdar, 1996)). However this alternative was much more difficult, was fraught with thorny political issues, and required dealing with uncertainty and complexity.

De-politicization builds a discourse that rationalizes technical and manageable solutions to large and messy political problems. In all the writings and speeches made by the PC and by other supporters of the Bhoomi system, the fact that the project had support from the top political leaders like the Chief Minister and the central government was highlighted, however the political issues related to land administration were never discussed or brought into question. Further, the framing of the problems of land administration was such as to make obvious the need for a computerized system (see the quote above), eliding the complexities of the local situation.

Reification

Begar Hukum land is land that is cultivated without official sanction or "without order." This land either belongs to the village commons or to the Forestry Department and is usually cultivated by poor or marginal farmers. Over time, and with increasing productivity, the farmers try to have the land

regularized to their names. *Gomala* land is grazing land, often also belonging to the Forestry Department, that is sometimes cultivated by poor farmers, for which they subsequently seek regularization. Land under *pada* is land for which taxes have not been paid, although they are cultivated. These lands usually belong to small farmers, who are unable to pay taxes in a year when there is drought or for some other reason. *Kharab* land is land that is fallow and unsuitable for cultivation. However, many landless peasants work on kharab land to make it fertile and extract crops from it. Such farmers often seek regularization and tenancy rights for this land.

These four examples indicate the many ways in which land is claimed and categorized in the local context. There are complicated problems with assessing taxes for these kinds of lands and also with ownership. The district administration's responsibility is to rule on disputes over claimants, to decide who has to pay taxes, what amount, and who could claim ownership for the purposes of selling the land. VAs often overwrote on the (manual) land records the nature of land and cultivation that had been done, and also marked the cadastral maps, which they maintained, with these changes.

The different ways in which land is used and claimed leads one to define land as being "... bound by an ever-changing bundle of competing claims on it (rather than 'rights')" (Benjamin, To appear). These local arrangements of land tenure were legal, in the sense that they had sanction of a government authority, but did not reflect in the higher bureaucracy records, say, at the taluk level.

With the new Bhoomi system in place these local arrangements are either not possible or very difficult to sustain any more as all changes to the record have to be done at the taluk office only. This is a process of reification of land and it removes the organic nature of land claims and ownership that existed before and replaces with a uniform and reduced, mechanical system that is manipulable only by high-level district officials.

Summary and Conclusions of Reading Two

A broader understanding of the history and context of land administration in India highlights the problem of land surveys and the issue of inequities in land records. This is a problem with a long history and requires a deep political commitment by the state to address it. Our reading indicates a process of de-politicization wherein a political and social issue is framed within the language of a technical-economic discourse that dis-enfranchises the role of politics and anoints a technical, e-government solution. The

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task of de-politicization in the case of the Bhoomi project includes a process of centralizing control by the bureaucracy by both physically removing the location of land administration from the village to the taluk, reducing the powers of the old VA, and by introducing higher-level bureaucrats in the process.

Reification of land tenure seeks to remove the multiple ways in which land is used and re-used and the diverse claims on it, by a centrally-controlled system that enforces a single standard and rules out multiple forms of use. This aspect of land management is supported by arguments of ease of transactions and the increased capitalization of the land parcels (de Soto, 2000). Though this is a strong rationale for land administration systems such as Bhoomi, the benefits, critics argue, accrue mostly to the rich who can participate in the land markets as buyers and sellers, but hurt the poor and marginal farmers who survived on the older, manual and multiple forms of tenure (Benjamin, To appear).

Contrast of Two Readings

I am a professor in a management institute where I had the opportunity to present the findings of the first phase of the study to groups of Indian Administrative Service (IAS) officers who were on campus on Executive Education programs, and who were interested in e-government issues. These officers were from many different states in India and were keen to understand the rationale behind Bhoomi and the basis of its success. My findings intrigued them – many challenged the findings stating that they were inconclusive; while others were more interested in the broader questions about the validity of the findings; while a third group outright dismissed claims about Bhoomi made in the press saying that the success was staged and that the real story was in the political manoeuvering that went on in the state government offices to ensure Bhoomi was installed despite resistance and opposition.

A few months later, after the first phase of the study, I advised a group of graduate students who wanted to study Bhoomi and its implications as part of a class project. I asked them to validate some of my findings by collecting fresh data from the field. A comment they made in the methodology part of their report caught my attention:"Language barriers, biased perspectives and personal agendas were all around us and we were trying to capture these complex issues in an inflexible questionnaire."

The comments of the IAS officers and later the students, including my own findings, led me to re-examine some of the assumptions of the positivist reading, and led to the second, interpretive reading.

In this section, I articulate the differing assumptions of the two readings with a view to revealing some larger truths.

The positivist reading was guided in large measure by the discourse on e-governance and Bhoomi at the time I initiated the study. Bhoomi appeared to be 'at a distance' as a public and much written about project. I was able to frame questions about it and also hypotheses that could be tested with data. In retrospect, it appears that detachment and distance also insulated the questions that I framed about Bhoomi and that I set about to investigate. For instance, although questions about the rationale for a system such as Bhoomi were asked in interviews of the PC and others, fundamental questions about the nature of land reforms remained unaddressed. Though I remained suspicious of the answers and sought to validate them through other means, the direction of inquiry was to establish the economic rationale (Bhoomi would be sustainable if it satisfies a need in the economy) and to seek generalizability (what are the take-aways for other similar projects).

Another issue that remained insulated by the positivist approach was that of the role of the old VA. Bureaucrats are widely believed by the elite, of which I am a part, to be inefficient and corrupt. Though this belief is highly contested and problematic, as most bureaucrats will point out by invoking the difficult conditions in which they work, it easily led me to believe that the traditional VAs must be the same. In addition, the logic of replacing a manual process by a computerized one seems attractive to most elite. The IR survey conducted by my team as well as the PAC report, had questions comparing the efficiencies in the manual and computerized systems of accessing RTC records, but left out questions about the larger role of the VA. The assumption here is that an effect, inefficiency and corruption in government service delivery, results from a cause, the manual process of approaching a VA and asking for a certificate. This is reductionist in nature as it excludes the historical reason why the VA is needed and what the VA does in the land administration process. The reductionist, cause-effect assumptions serve the rationale for e-government systems that remain the dominant discourse.

The results of the positivist reading though are not wrong. The first-order effects of Bhoomi are substantial and the farmers surveyed, those who had gone to the taluk office to collect RTC certificates, had indeed benefited. And they, in turn, were causing second-order effects to be visible, however weakly. The truth of Bhoomi's success holds for these farmers and is generalizable to others in the population from which this sample is drawn. The positivist reading does not account for those farmers

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who do not access the system and never go to the Bhoomi kiosk at the taluk office. They are marginal and subsistence farmers not included in the population of the positivist reading.

Contributions, Future Work and Conclusion

Contributions

The literature in e-government systems in general, and for developing countries in particular, consists of technology descriptions or narrow case studies (Gronlund, 2004), with few instances of rigorous analysis or theory building. This paper addresses this gap in the literature and reports on a rigorous analysis of a particular e-government system in a developing country. The research uses multiple theoretical lenses to closely analyze the system.

With the positivist reading, this research contributes a stakeholder framework with which to classify the various groups of people impacted by an e-government system. The theory of first- and second-order effects develops a method of assessing the impact and sustainability of large-scale, government-to-citizen, e-government systems. Such a method was lacking in the literature.

The interpretive reading grounds the analysis of e-government systems in a historical and social context. Theories about development discourse and the role of the bureaucracy are advanced, and that they are needed for such analysis is demonstrated. The ideas of de-politicization and reification are used to understand the social impact of an e-government deployment.

Future Work

In the survey reports in reading one, we found that corruption had reduced because farmers used Bhoomi kiosks to obtain RTC certificates. However, the data from reading two was inconclusive on this issue. Some farmers reported that corruption at the taluk office for mutation requests had increased and some published reports (Benjamin, To appear) also confirmed this. With increased centralization, the possibility of corruption increases, but, surveillance capabilities also increase and that deters corruption. This issue requires further examination.

The second reading points to a key problematic of e-government systems, the issues of de-politicization and reification. How such development efforts can overcome de-politicization and

reification remains unanswered. Intellectuals working on development issues provide some answers, and I explore one such in the next section, and this too is an issue for future research.

Conclusion

Development is not an end in itself but a means to an end, as is eloquently argued by Amartya Sen. The ends of development are the achievements of freedom from hunger, poverty, illiteracy and deprivation. Achievement of these goals of freedom is made possible by social and economic arrangements, such as facilities for education and health, by political and civil rights, such as the freedom to participate in public discussion, and industrial and technical progress and social modernization (Sen, 2000). Such freedoms enable citizens to participate in the development process, leading to a virtuous cycle of growth (Sen, 1996).

Sen's theory of development enables me to position the conclusion of this study in a broader perspective. Projects such as Bhoomi are attempts at technical and social modernization, and in that sense means towards the ultimate goals of development. We can imagine e-government systems that include demand-side stakeholders in the design process and that address their needs. This would necessarily have to be a political process of mobilizing all classes of farmers to participate in stating their requirements. It is possible that this will force governments to address the needs of supporting social institutions, such as facilities for health, education and political and civil rights, before focusing on narrow technical solutions. Systems that are intended to support government services efficiently can enhance the social and political freedoms of citizens only if they are part of a larger institution-building exercise. This is not outside the realm of feasibility.

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Table 1: Comparison of Positivist and Interpretive assumptions (adapted from Orlikowski and Baroudi, 1991).

Positivist Assumptions	Interpretive Assumptions
The researchers and the object of inquiry, the Bhoomi system, are independent.	Bhoomi, a real artifact, is incapable of being understood independently of researchers who construct and make sense of that reality.
Bhoomi could be studied by objective methods and law-like generalizations independent of time or context are possible.	Bhoomi is understood in its historical and social context that is interpreted by the researchers.
There exist real cause-effect relationships that can be hypothesized and studied.	Meaning and intentional descriptions are dependent on researchers behaviours, while at the same time constituting those behaviours.
Bhoomi can be studied by a reductionist approach and a best description of its component parts can be obtained.	Bhoomi exists in a social world that is not "given" but is produced by humans and their interactions.

Table 2: Glossary of Terms

Term	Meaning
RTC	Record of Rights, Tenancy and Crops
IAS officer	Indian Administrative Service officer
Nehru	Jawaharlal Nehru, the first Prime Minister of independent India
Taluk	A sub-district, usually 6 in a district
VA	Village Accountant
Khata number	The file number by which records are accessed in the database
Patwari	The Kannada name for a VA
PC	The Project Champion
Tehsildar	One of the highest officials in a district dealing with land issues
Kannada	Official language of the state of Karnataka
Shirestedar	An official in the district reporting to the Tehsildar
Begar Hukum land	Land cultivated without official sanction
Gomala land	Grazing land
Pada land	Land for which taxes have not been paid
Kharab land	Fallow land, unsuitable for cultivation

Appendix: Data

Two research assistants and I collected data for both the phases of the study. One research assistant was fluent in Kannada (although his mother-tongue is Marathi) and conducted the survey of farmers and most of the farmer interviews. When I interviewed the farmers, he was present as a translator. I am conversant in Hindi and used that whenever possible. For interviews of district officials, English and Hindi sufficed. Some interviews were conducted over the phone.

The tables below record the data collection events. When data was collected in Kannada, the research assistant translated and immediately wrote the material on the questionnaire or in a notebook in English. Data collected in Hindi was also translated immediately into English.

The IR survey was administered to 63 respondents in 3 districts of Karnataka: Shimoga, Chitradurga and Mandya.

Table 3: Data Collection for Phase One of the Study

Data Collection Event	Date	Language	Recording device
Project Champion Interview	August 2003	English	Tape recorded and transcribed.
Project Champion Speeches	Sept 2003 & Nov 2004	English	Notes and PowerPoint slides
IR Survey	Sept-Nov 2003	Kannada and Hindi	Questionnaire
Interviews of Kiosk Operators	Sept-Dec 2003	Kannada, English	Notes.
Interviews of District Officials	Sept-Dec 2003	English, Hindi	Notes.
Student Group Field Visits	Mar 2004	English, Hindi	Notes.

Table 4: Data Collection for Phase Two of the Study

Data Collection Event	Date	Language	Recording device
Interviews of District Officials	Aug-Dec 2004	English/ Hindi	Notes.
Interviews of Farmers, Agents, Kiosk operators	Nov-Dec 2004 & Feb-Mar 2005	Kannada/ Hindi	Notes.

Table 5: Bhoomi Internal Documents used as data.

1.	"Computerisation of Land Records Guidelines." Volumes 1-6. A collection of Government Circulars issued to various district officials on policy regarding the computerization process. Most circulars are authored by the Project Champion, Mr Rajeev Chawla. About 600 pages in all volumes.
2.	"Roll Out of Successful E-Governance Projects: Bhoomi – A Case Study." Authored by Mr Rajeev Chawla and partners in the implementation process: PriceWaterhouseCoopers, Wipro, and ICICI Infotech. June 2003. 118 pages.
3.	Notes maintained at the Bhoomi website: www.refdept-01.kar.nic.in

Table 6: Media Reports on Bhoomi used as data.

Title and Author	Source	Date Published / Accessed
Bhoomi to Change Karnataka's Urban Landscape	The Financial Express	03-03-2005
This Land is My Land	Times Agricultural Journal	03-03-2005
Computerisation of Land Records: Moving Slowly	Economic and Political Weekly Editorial	29-01-2005
Bhoomi Project: Karnataka Mulling Value Addition	The Deccan Herald	25-07-2004
The Digital Village	www.cgijeddah.com	28-06-2004
On the Road to Shanghai: India, by Carl Hanlon	web.worldbank.org	20-05-2004
World Bank Showcasing Bhoomi	The Hindu	04-02-2004
Bhoomi Now Close to PM's Heart	The Times of India	03-08-2004
Simputers to simplify Bhoomi	The Times of India	29-02-2004
India's Move To E-Governance Exposes Ancient System Flaws	Panos Features	22-07-2003
Looking Beyond Bhoomi, by M.N. Kulkarni	The Deccan Herald	19-06-2003
Beyond Computerization of Land Records	Economic and Political Weekly	14-06-2003
Land Records Now at Private Kiosks	The Deccan Herald	02-12-2003
'Security' Check for Bhoomi Now	The Times of India	19-01-2003
'Bhoomi' earns kudos for Govt.	The Hindu Business Line	16-12-2002
Simputers to Chip in for Major Rural Cause	The Deccan Herald	12-09-2002
Bhoomi Bags Global Awards	The Economic Times	29-9-2002
Bhoomi Will Open Gateway to Villager's World, by S. Tippoo	The Times of India	26-09-2002
A Record Achievement, by S. Gulhati	The Hindu	23-09-2002
Karnataka Farmers Take to Electronic Land Records	The Times of India	20-09-2002
Bhoomi Boon for Farmers	Computers @ Home	Sept 2002
E-Governance Calling	SiliconIndia.com	08-07-2002
Creating Economic Value Key to E-governance Success	The Hindu Business Line	05-12-2002
Prone Possession	Smart Inc	01-09-2002
Bhoomi Land Records Programme Bags Commonwealth Prize	The Times of India	12-09-2002
Craig Barrett Filming Digital Revolution in Karnataka	The Financial Express	06-08-2002
Karnataka's Bhoomi Project Opens New Vistas of E-governance	The Financial Express	05-08-2002
Finally, A Down-to-Earth Success, by N. Vittal	The Economic Times	22-06-2002
Indian E-Governance Project Finalist for Commonwealth Award, by Imran Qureshi	Yahoo! India News	30-05-2002
Treasures of the Earth, by S. Rani	Dataquest	24-01-2002
E-Governance in Land Records Management, by M.A.S. Rajan	www.revdept-01.kar.nic.in	Accessed, 2003
Land Records Transactions to go Online: RTC Kiosks in Two Taluks	The Deccan Herald	03-11-2000

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Table 7: Media Reports on other E-Government projects in India used as data.

Project	Title and Author	Source	Date
e-Seva	ESeva APOnline Launches Home Seva	The Information Company	19-07-2004
e-Seva	Eseva joints call center bandwagon	The Times of India	22-02-2004
e-Seva	ESeva encounters and online rival	The Times of India	27-10-2003
e-Seva	ESeva eGove Made in India	Business Magazine Online	09-04-2003
e-Seva	CAG Slams Andhra E-Seva Project	The Financial Express	01-04-2003
e-Seva	e-Seva's Explanation	The Hindu	01-04-2003
e-Seva	Government by Computer	The Economist	20-03-2003
e-Seva	Wait at E-Seva counters irk customers	The Deccan Chronicle	23-07-2003
e-Seva	e-Seva centers at 117 municipalities planned	The Hindu Business line	02-04-2002
e-Seva	Governor Launches e-Seva Project	The Hindu	26-08-2001
e-Seva	e-Seva Project Launched	www.chandrababunaidufa nclub.com	Accessed: Aug 2003
Gyandoot	APDIP Case Study: Community Network	Website	Sept 2003
Gyandoot	ICT and Governance: The Gyandoot experience in Dhar district of Madhya Pradesh, by A. Jafri, A. Dongre, V. Tripathi, A. Aggrawal, S. Shrivastava	Overseas Development Institute, Technical Report.	2002

Table 8: Media Articles on Land Issues used as data.

Title / Author	Source	Date
Politicians Fuel the Fire and Farmers 'Burn'	Deccan Herald	29-07-2004
A Farmer's Perspective, by P. Surendra	www.india-seminar.com	2003
Many Factors Behind Farmers' Suicide, by S.K. Ramoo	The Hindu	16-09-2003

Table 9: Comparison of certain statistics of Karnataka, India and England. The figures for England are included as a reference.

	Karnataka	India	England
Population	52,733,958	1,085,595,167	49,138,831
Population Below-Poverty-Line	In rural 29.88 % of the population. In urban 40.14 % of the population. Rural 9.60(in millions) Urban 6.05(in millions)	26% of the population. (Source: Economic Survey of India, 2001-02)	17% of the population (Source: Oxfam)
No of Districts	27	602	39 counties, 7 metropolitan
No of Taluks	177		
M/F Ratio	Sex Ratio [No. of females per 1000 males] 964	1.07 male(s)/female	0.97 male(s)/female
No of Telephone Connections	Main Line: 1,829,400	Main Line: 18.95 million Mobile cellular: 24 million (Source: www.coai.com)	Main lines in use: 29.41 million Mobile cellular: 13 million
KM of Road	Total: 98,419 km.	Total: 3,319,644 km Paved: 1,517,077 km Unpaved: 1,802,567 km	Total: 371,603 km Paved: 371,603 km (including 3,303 km of expressways) Unpaved: 0 km (1998 est.)
Landmass	192,000 Sq km	3,287,590 Sq km	244,820 Sq km
No of Televisions		63 million	30.5 million

Sources: Indian data from www.indiastat.com except where indicated. England data from websites.
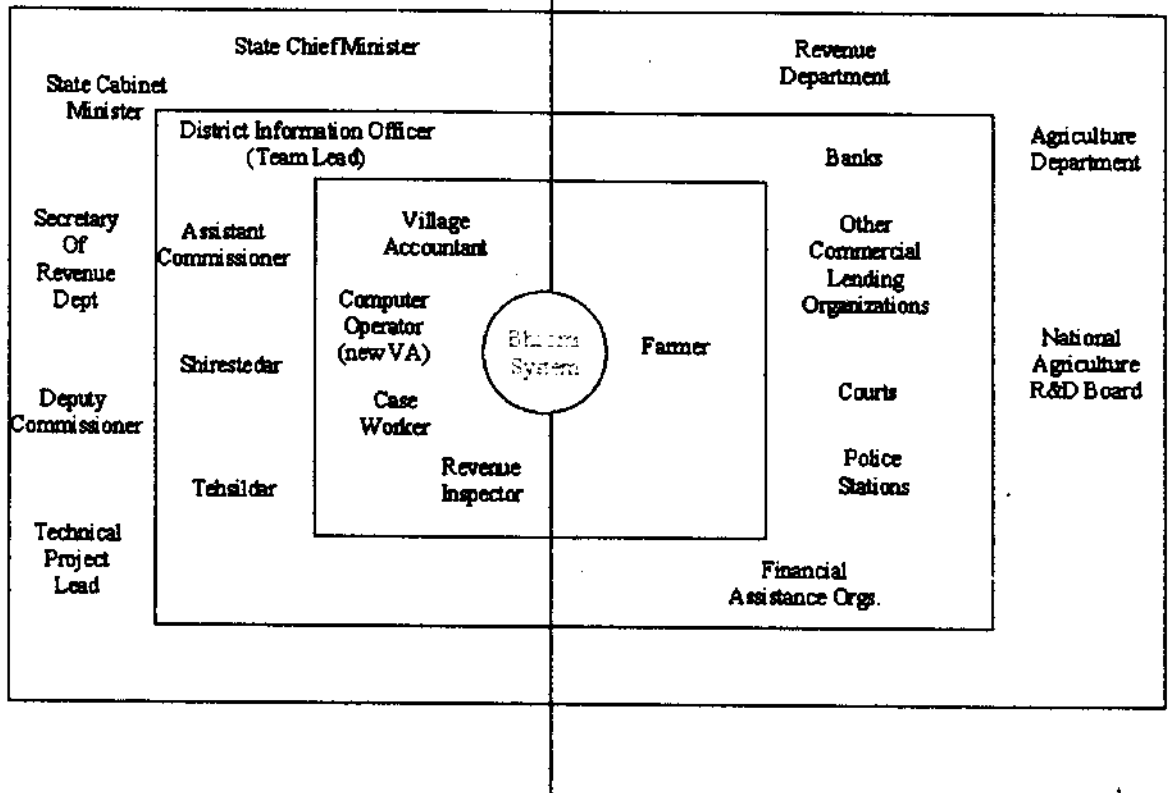
Supply-Side Stakeholders | Demand-Side Stakeholders

State Chief Minister

Revenue
Department

State Cabinet
Minister

District Information Officer
(Team Lead)

Agriculture
Department

Banks

Secretary
Of
Revenue
Dept

Assistant
Commissioner

Village
Accountant

Other
Commercial
Lending
Organizations

Computer
Operator
(new VA)

Bhoomi
System

Farmer

National
Agriculture
R&D Board

Shirestedar

Deputy
Commissioner

Case
Worker

Courts

Tehsildar

Revenue
Inspector

Police
Stations

Technical
Project
Lead

Financial
Assistance Orgs.

Figure 1: Stakeholder Diagram - Bhoomi
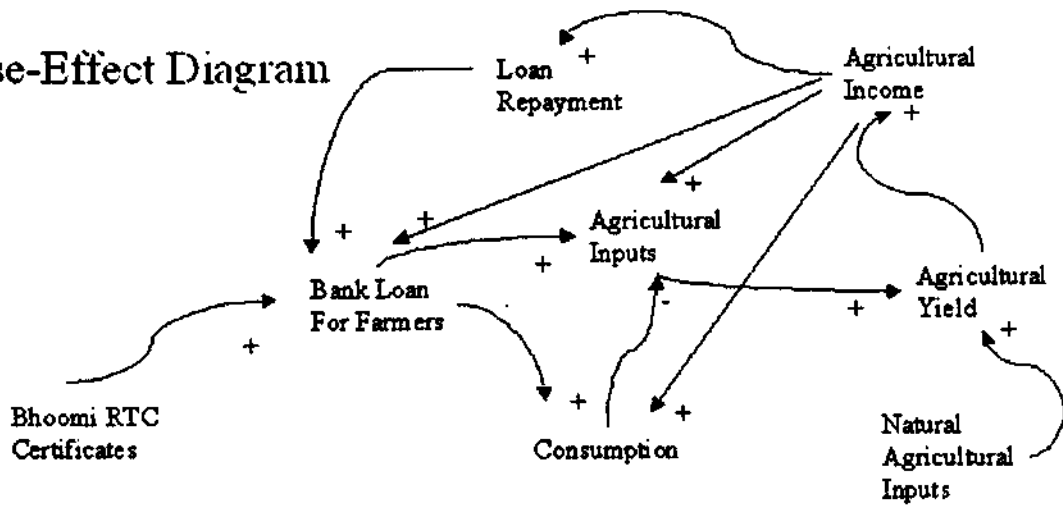
Figure 2: Cause-Effect Diagram for Second-Order Impact of Bhoomi

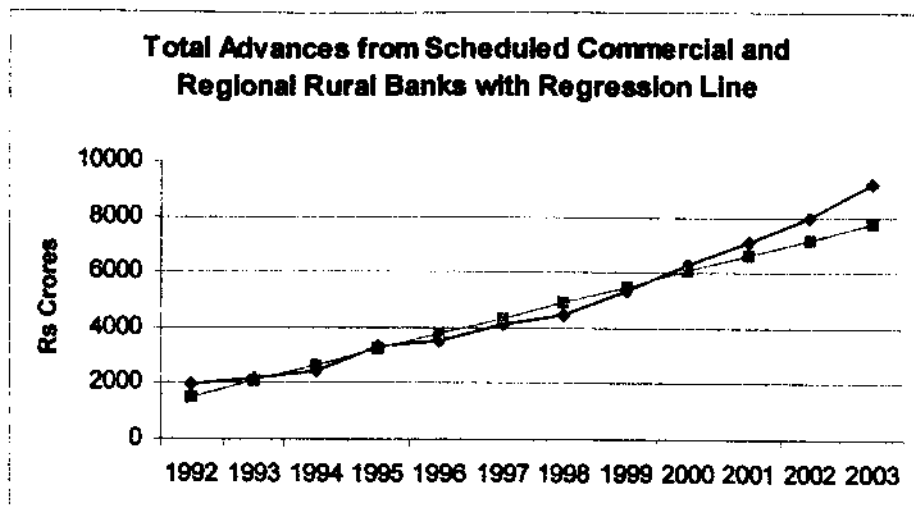## Total Advances from Scheduled Commercial and Regional Rural Banks with Regression Line

Figure 3: Rural Lending in Karnataka (One Crore is ten million rupees). Source: www.indiastat.com. Accessed in June 2004.
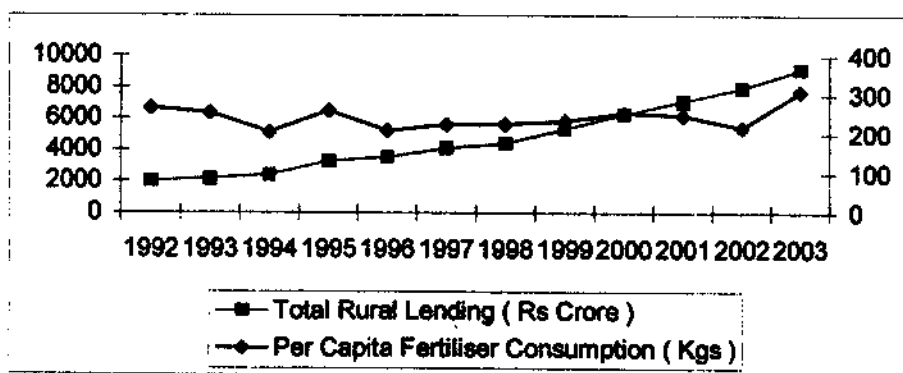
Figure 4: Fertilizer Consumption and Rural Lending in Karnataka. Source: www.indiastat.com.

Accessed in June 2004.
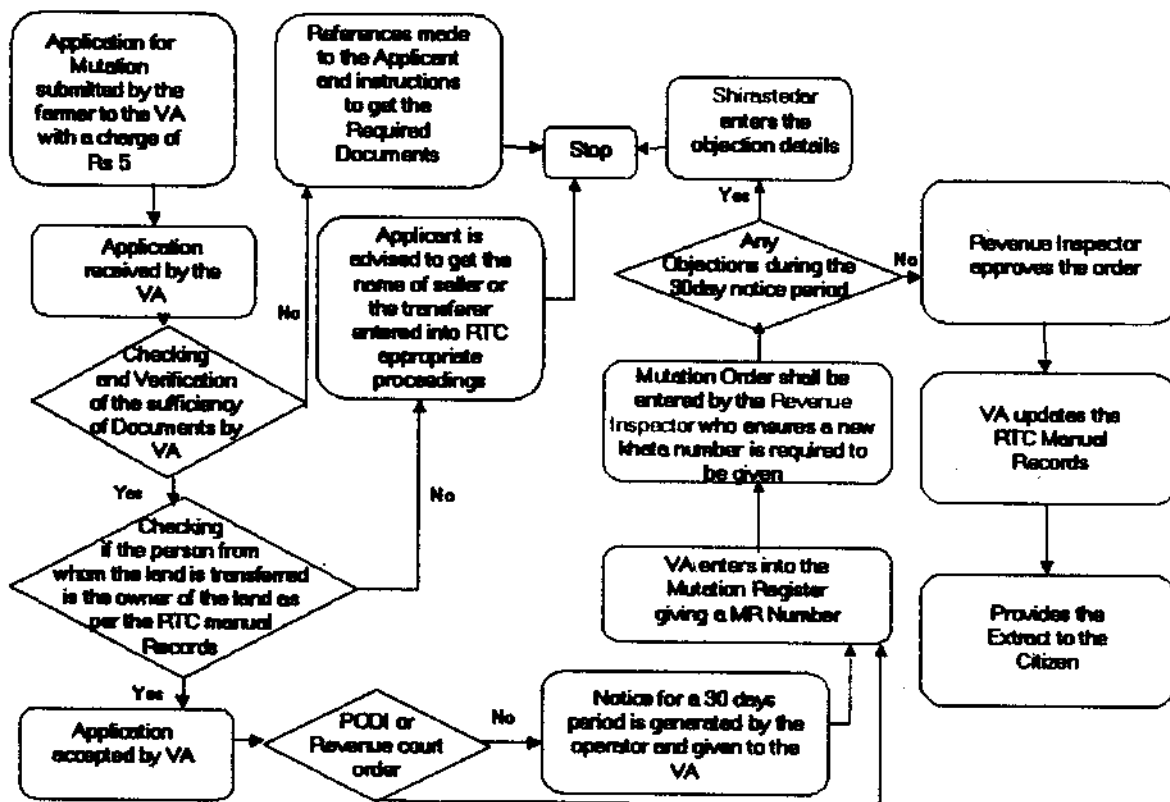
Mutation Process(Manual System)
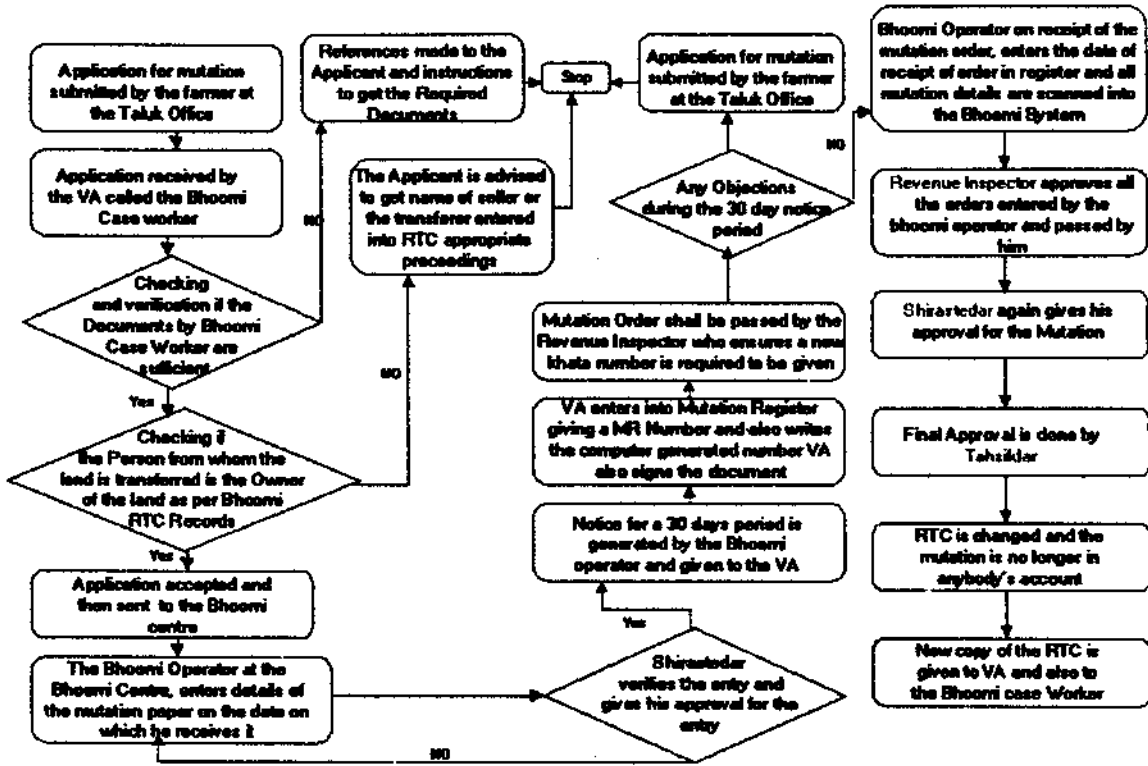

Figure 5: Manual Mutation Process

Mutation Process in Bhoomi system

Figure 6: Mutation Process Using Bhoomi