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Enactment of Technology Structures in ICT4D Projects : A Study of Computerization of Land Records in India

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Abstract
In this paper, we argue that technology use depends on the action of human agents and is influenced by the context in which this use takes place. We draw upon the literature on social shaping of technology, particularly that which looks at its usage, to base our claims. We have used a practice-oriented approach to studying technology, derived largely from Giddens' structuration theory, to understand the use patterns of a widely acclaimed ICT4D (Information and Communication Technology for Development) project in India. We find that the technology structures enacted by users reflects differences in their existing social contexts and, therefore, technology, and particularly ICT designs need to be sensitive to these variations if they intend to serve any significant development purpose.

Keywords : ICT4D, ICT use, Technology structures, Social context, Bhoomi

Introduction

The popularity and growing importance of ICTs (Information and Communication Technologies) in the life of high-income countries of the world has been on the rise in the past couple of decades. ICTs not only promise increased efficiencies (Brynjolfsson and Hitt 1998) but also seem to address the problems of reaching out to people by bringing about 'the death of distance' (Cairncross 1997). ICT has, therefore, found strong supporters in international development agencies as well as in national governments that are on the look out for confronting issues of inefficiencies and reach. In the past decade, we have seen the introduction of a number of initiatives for using ICTs to address the problems of under-development and inequality, particularly in low-income countries like India.

Bhoomi (meaning land in the local language) is one such ICT based project, which aims to restore the efficiency in management of land records in the Indian state of Karnataka. Through the use of ICT, the project aims to rectify the existing inefficient system of creation, updating, storage, retrieval and issue of agricultural land records. Technology adoption and usage is seen here as an enabler of a favourable change in society by bringing about an improvement in the delivery of government services (Chawla and Bhatnagar 2004). The perspective that appears to guide such a conception of technology usage resonates well with technology having a unidirectional and deterministic impact on society, which has been extensively critiqued for missing out on the mutual interaction effects that technology and society are shown to have on each other (MacKenzie and Wajcman 1985; Williams and Edge 1985). A growing body of literature talks about the social shaping of technology – not only at the time of its design but also during its usage. While the social context of the designers

influences the material properties of the technology, its meaning is defined by the context of use (Orlikowski 1992). Even though the social rules and resources guiding the action of technology designers tend to inscribe it with particular ways of usage (Friedman and Nissenbaum 1996) to achieve certain intended consequences, whether the usage and outcomes turn out to be as desired is contingent on the action of human agents in the context in which it gets used.

Very few studies have explicitly looked at importance of human action in the use context in ICT4D (ICT for Development) implementations. The literature under ICT4D has primarily looked at supply-side stakeholders and their influence on project designs and outcomes. The few that also look at the demand-side stakeholders (e.g., Madon 2004; De' 2005) have not explicitly incorporated the influence of social context in explaining their specific actions. In this paper, we plan to address this gap in literature by looking at the social context of technology users to find out how it structures their use patterns and in turn the project outcomes. We do this by looking at *Bhoomi* use in two districts of Karnataka, which show significant variations in their contextual dimensions relevant to this use. We focus on the following specific research questions : Why is *Bhoomi* used by farmers in these two districts ? Are there any differences in use patterns ? What could these differences be attributed to? In the ensuing sections we will look at the relevance of structuration theory to study technology usage, particularly because it provides us with a holistic approach to study technology and society. We will then talk of the research design and findings from our study of structures guiding the usage of *Bhoomi* as they find instantiation in the action of *Bhoomi* users, particularly the farmers in the aforesaid two districts.

The Theory of Structuration

Anthony Giddens, a British social theorist, developed the theory of structuration in the 1980s as an attempt to accommodate and integrate the prevailing objective and subjective approaches of understanding social phenomena, which were perceived to be generally mutually exclusive (Orlikowski and Robey 1991). Those who viewed social reality as subjective used to posit social systems as the result of meaningful human behaviour, while the objectivists focused on its institutional aspects, which were seen to be independent of and constraining human action. In Giddens' view of social reality, both are equally important, and hence both should inform social theorizing and empirical investigation (ibid.). Through his conception of 'duality of structures', Giddens proposes that the structure or institutional properties of social systems are created by human action, and it then serves to shape future human action.

A simplified but useful summary of the structuration theory is provided by Clark, as quoted in Rose (1998) :

Social practices lie at the root of the constitution of both individuals and society. They are accomplished by knowledgeable human agents with 'causal powers' i.e. powers to make a difference. However, these social practices are not random and purely voluntaristic, but ordered and stable across space and time, in short, they are routinized and recursive. In producing social practices, which make up the visible patterns that constitute society, actors draw upon 'structural properties' (rules and resources) which are themselves institutionalized features of societies. Structure is therefore activity-dependent. It is both the medium and outcome of a process of 'structuration' - the production and reproduction of practices across time and space.

Structuration theory posits that all human interaction is inextricably composed of structures of meaning, power and moral frameworks and that any human action can be analyzed in terms of these structures (Orlikowski and Robey 1991). Giddens has specified three modalities that link the realm of human action and social structure (for a schematic representation see Figure 1 in Orlikowski and Robey 1991, p. 148). As human actors communicate, they draw on interpretive schemes to help make sense of interactions and at the same time those interactions reproduce and modify the interpretive schemes, which are embedded in social structure as meaning or signification. Similarly the facility to allocate resources is enacted in the wielding of power, and produces and reproduces social structures of domination, while moral codes (norms) help determine what can be sanctioned in human interaction, which iteratively produce structures of legitimation (Rose 1998).

A Structurational Model of Technology Use

The theory of structuration also provides an integrative framework to the earlier mutually exclusive approaches of studying technology, either through purely objective-deterministic or subjective-constructionist lenses (Orlikowski and Robey 1991; DeSanctis and Poole 1994). A number of studies have drawn upon the tenets of structuration theory to study the use of technology and technology-induced changes in organizations (Orlikowski 1992; DeSanctis and Poole 1994; Walsham and Waema 1994; Flynn and Hussain 2001; Evans and Brooks 2005 have all used structuration theory to study different aspects of ICT introduction and use in organizations). In this study we draw extensively from the structurational model of technology developed in the works of Orlikowski (1992; 2000). Orlikowski (1992) had proposed that technology be considered as a kind of structural property of organizations developing and/or using technology because it embodies and hence is an instantiation of some of the rules and resources constituting the structure of an organization. (Though she has used organizations as her level of analysis, she emphasizes that the structuration processes are relevant at multiple levels of analysis, more so at the level of society for which Giddens had originally posed his theory of structuration.) However, while the model is repeatedly found to be valuable in explaining the outcomes associated with the use of given technologies in different contexts, she acknowledges that it is less effective in accounting for ongoing changes in both the technologies and their use, in a later work (Orlikowski 2000).

To overcome this, she proposes a practice-based extension to the structurational model of technology (ibid.) which is premised on the notions of emergent technology structures enacted in practice rather than embodied structures fixed in technologies. She argues that once the elements of technology (such as voting procedures, stored data and public display screens) are built into a technology they no longer remain within the purview of human action and hence do not qualify to be structures (2000, p. 406). It is only when these technological elements are routinely mobilized in use that they become implicated as rules and resources in the constitution of a particular recurrent social practice, and hence can be looked up as structuring human action. Orlikowski calls these emergent technology structures ‘technology-in-practice’. The notion of ‘technology-in-practice’ allows looking at technology use as an enactment rather than as an appropriation of embodied structures that the earlier structurational models of technology were concerned with.

This practice oriented approach to studying technology posits that through their regularized engagement with a particular technology (and some or all of its inscribed properties), in specific ways and conditions, users repeatedly enact a set of rules and resources which structures their ongoing engagement with that technology. It acknowledges that while users can and do use technologies as they were designed, they also frequently circumvent inscribed

ways of using the technologies – either ignoring certain properties, working around them or inventing new ones that may go beyond or even contradict designers' expectations (Orlikowski 2000, p. 407). The manner in which a particular technology structure will get enacted through recurrent use and the form that it will assume will depend on the manner in which the structuration processes unfold in a given social context.

Research Design

A study of technology and society using this practice-based framework requires one to focus on human action and examine how it enacts emergent structures through a recurrent interaction with the technology at hand (ibid.). This is in contrast to designing research studies with technology as the starting point and finding out how human beings appropriate its embodied structures.

In this study, our primary focus is on usage of the *Bhoomi* project by different categories of cultivators – both landowners and tenants, the principal beneficiaries of the project. When we look at usage, we essentially restrict ourselves to that component of the project which is concerned with issue of computerized RTCs (Record of Rights, Tenancy and Crops) from the kiosks situated at the *taluk* (a sub-district) headquarters. We have looked at two different districts in the Indian state of Karnataka – Mandya and Koppal. These districts were selected because they have followed different historical trajectories in terms of land administration and we feel that this could have induced significant contextual variations, which can offer interesting insights in understanding their respective usage patterns.

The field study was conducted between August 2006 and February 2007. Data was generated mainly through around 160 semi-structured interviews with the cultivators, agricultural labourers, officials of rural banks and cooperative societies, money lenders and commission agents, serving and retired officials of the revenue department (which is primarily responsible for project execution), erstwhile landlords and village officers (only in Koppal) and social and political activists. The researcher was accompanied by local assistants, one for each district, during the interviews to facilitate easier access to the interviewees as also to help with the local language. Notes were taken during the interviews, consolidated at the end of every day and transcribed after the end of every trip. Secondary sources, mainly websites and annual reports of related departments of the state and national government, were also used.

Computerization of Land Records in India

The central scheme (sponsored by Department of Land Reforms, Government of India) on Computerization of Land Records (CLR) was started in 1988-89 as a pilot project in eight districts in different states of the country. By the end of 1991-92, the scheme had been extended to 24 districts and by the end of the 8th Plan period (1996-97), 323 districts in the country were brought under the scheme with an expenditure of INR 64.44 crore (approx. USD 14.65 million). At present the scheme covers almost all the districts of the country leaving only a few districts in some areas where either there are no land records or they are in the process of being prepared. Since its inception till the end of 2003-04, the Government of India has released around INR 300 crore (approx. USD 68.18 million) to the states for implementation in 582 districts and over 2400 taluks across the country (Saxena, 2005).

It was felt that a computerized land record system was crucial for effective planning, implementing and monitoring of land records and related activities in the country. This perception was a result of the government's understanding of the prevailing manual system of

land records as not only time consuming, cumbersome and unwieldy due to myriad changes taking place on a recurring basis but also as one which is not impervious to manipulations and tampering. The main advantage of introducing computer technology, according to them, is that the records can be stored in a smaller place, updated easily and retrieved quickly (Vision Document, Ministry of Rural Development, 1999). They also foresee utilization, for the data so captured, for furthering land reforms and for village level planning and decentralized administration as visualized in the 73rd amendment to the Indian Constitution.
The *Bhoomi* project in the south Indian state of Karnataka is one of the most acclaimed and publicized CLR projects and is one of the few ICT4D implementations which has stood the test of time in the country. The project is looked upon by many as a successful model, fit for replication not only across other states in India but also in other countries of the world (Chawla and Bhatnagar 2004).

The Bhoomi Project of Karnataka State

The *Bhoomi* system of land records management was deployed in 2001 in Karnataka, via kiosks installed in 177 taluk 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 headquarters is known as the office of the Tehsildar, a sub-district magistrate, and is usually located at the centre 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 survey number, or record number, and a printout is given to them after a payment of INR 15 (approx. USD 0.34). The Village Accountant (VA) manning the kiosk signs the printout and affixes a hologram sticker on the document as a proof 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 process known as `mutation' has to be entered. This too may be filed in the *Bhoomi* system for a fee of INR 35 (approx. USD 0.80) 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 is a document that validates a farmer's claim to land and provides information on extent of land, type of soil, revenue demand, number of divisions, owners and their type of ownership, names of the cultivators and details about the crops cultivated. It also records loans taken against the land and any other encumbrances on the land. This certificate is not a title deed, but is only a record of the ownership, tenancy and cultivation details of a land parcel and can be used for various purposes including accessing agricultural loans from banks, for obtaining government grants and aids and for checking ownership claims.
The Bhoomi project was initiated in 1991, but only in the third attempt, starting in 1999, was the digitization of the project completed in all taluks of Karnataka state and the system was opened for public use in 2001. For its operationalization, 20 million land records of over 7 million farmers have been computerized and as many as 49 million RTCs have been issued till mid-November 2006 (The Times of India, November 20, 2006).

It was felt by the designers of the project that the earlier manual system of land records maintenance and issue of RTCs by the VAs posted in the villages was prone to manipulation who would often resort to fraudulent practices to harass the farmers (Bhoomi website, www.revdept-01.kar.nic.in last accessed in February 2007). The RTC was seen as the most

important land record for the farmers to access loans in the formal sector and it was assumed that delays introduced by the VAs in issuing RTCs was seriously affecting the farm credit programmes. This found a reflection in the design of the project where an attempt was made to isolate the farmers from the field VAs, at least with respect to issue of RTCs.

Bhoomi Use in Mandya and Koppal Districts

The Social Context

The theoretical perspective guiding our research places significant importance to the role of social context where the technology use gets embedded. This context is presumed to act through its various social structures in providing meaning to the technology and its use. When we look at a project for computerizing land records, one of the most relevant elements of this context is the system of land revenue administration. Though this system is supposed to be uniform across the state of Karnataka, in practice there still exists a considerable legacy of the past differences (Pani 1997). We, therefore, find it pertinent to highlight these historical variations in this section.

Of Mandya District

Mandya is situated between Bangalore and Mysore, two of the most prosperous districts in south Karnataka. After the fall of Vijaynagar Empire in the late 16th century, Mandya was mainly under the control of the Wodeyars, except for a brief period in the late 18th century when it was under Haider Ali and his son Tipu Sultan and from 1831-81 when it was under direct British rule (Mandya District Gazetteer 1967, p. 35).

Historical Land Administration System : The system of land tenure that was prevalent in Mandya during most of the 19th century and up to 1947 was largely *raiyatwari* (wherein the land revenue assessment was fixed on the holdings of an individual peasant cultivator – the *raiyat*) and the problem of tenancy was not acute. In 1951, the total area of land leased out under various tenancies was 17,929 acres, which worked out to only 4.3% of the total land owned (Mandya District Gazetteer 1967, pp. 315-316). This was probably a result of the continued initiatives since the early 19th century by the Wodeyar rulers and the British Commissioner to bring the whole of land revenue administration under '*amani*' management, i.e., under the direct management of the government (ibid., pp. 294-295). A comprehensive survey and settlement in the district was taken up in the later half of 19th century to build on the *Paimayish* (general measurement of fields) undertaken earlier. The Wodeyars also introduced a number of measures to extend loans on easy terms to the cultivators – prominently, the Land Improvement Loan Regulation in 1890, formed Agricultural Banks in 1894 and through Regulation III of 1905 ushered in the cooperative movement as an organized attempt at modern banking (ibid., pp. 189-196). As on 31st March 2005, there were 237 agricultural credit cooperative societies in the district (Karnataka at a Glance 2005).

Demographic Details : As per the 2001 census, Mandya district had a population of 1.76 million of which around 84% lived in rural areas. There were 0.41 million cultivators and 0.21 million agricultural labourers. Almost 80% of the 0.49 million landholdings were classified as marginal with area less than 1 hectare (ha). Of the total geographical area of 0.5 million ha, cultivable area was 0.42 million ha in 2003-04 and the total area sown (includes lands which were sown more than once in the same year) was only 0.25 million ha (ibid.). Water from the neighbouring Krishnaraj Sagar dam constructed on river Cauvery irrigates a large part of the district. Sugarcane and paddy are the principal crops while *ragi* (finger millet) is grown in the dry rain-fed areas of the north.

Of Koppal District

Koppal is situated in the north-eastern part of Karnataka, bordering the neighbouring Andhra Pradesh state. After the fall of Vijaynagar Empire in the late 16th century, Koppal passed on to the Muslim rulers – first the Adil Shahi dynasty and from 1724 AD to the Asaf Jahi (the rulers were called Nizams) dynasty (Raichur District Gazetteer 1967, p. 35). It was a separate *jagir* (a large estate) district (comprising the present day taluks of Koppal and Yelburga) under the Nizam administration till 1948, after which it was merged with Raichur district, first under the erstwhile Hyderabad state and then under Karnataka after the linguisitic reorganization of states in 1956. It was again carved into a separate district in the late 1990s.

Historical Land Administration System : Koppal district was a jagir of Salar Jung, the hereditary prime minister in the Nizam administration. The *jagirdars* (intermediary between the king and the peasants for collecting land revenue) were required to pay an annual lump-sum to the Nizam as the land revenue of villages that were under their control (Raichur District Gazetteer 1970, p. 441). Though survey and settlement was carried out in Hyderabad state during the late 19th century, jagir areas were not brought under their purview (ibid., pp. 463-465). Most of the cultivation in the district was carried out through tenants. Tenancy came about largely due to the unauthorized claims of a jagirdar to a right in soil or by the jagirdar leasing his lands to others. Jagirdars generally did not pass on *pattedari* rights (simple occupancy rights to registered occupants) even to old cultivators (ibid., pp. 480-486) and manipulated their records to ensure that these rights did not get established. Money lenders were the main source of farm credit to the cultivators and there was no significant effort on the part of the administration to introduce formal lending mechanisms. Most of the legislations – Land Alienation Regulation Act of 1936, Money Lenders Act of 1938, were directed to regulate the business of money lending by fixing rates of interest and enforcing compulsory registration. As on 31st March 2005, Koppal had only 94 agricultural credit cooperative societies (Karnataka at a Glance 2005).

Demographic Details : As per the 2001 census, Koppal district had a population of 1.20 million of which around 83% lived in rural areas. There were 0.17 million cultivators and 0.24 million agricultural labourers. Of the 0.20 million landholdings, 25% were classified as marginal with area less than 1 ha, 34% as small with area between 1 and 2 ha and 27% as semi-medium with area between 2 and 4 ha. Of the total geographical area of 0.55 million ha, cultivable area was 0.50 million ha in 2003-04 and total area sown (includes lands which were sown more than once in the same year) in 2003-04 was 0.42 million ha (ibid.). Agriculture in the district is mainly rain-fed, however, most of Gangavathi and some parts of Koppal taluk get water from the dam constructed on the Tungabhadra river. Maize, *jowar* (a cereal), sunflower are grown in the rain-fed areas while paddy is grown in the areas irrigated by the Tungabhadra canal.

What is Bhoomi used for ?

In Mandya District

Almost all the cultivators interviewed in Mandya district have land in their name which is recorded in the RTC (a *Pahani* before 1970s). Those who have not got the land as a result of the provisions of tenancy legislations of the 1970s (those who did benefit are a very small proportion) have documents showing land titles and revenue payments which date back to the late 19th century, when the administration was under the Mysore Maharaja (the Wodeyars). The cultivators in Mandya acknowledge RTC as the most important document. Since the project's inception in 2001, farmers have availed the services of the *Bhoomi* kiosks 1.84

million times till May 2006 in Mandya (Bhoomi website, www.revdept-01.kar.nic.in, accessed February 2007).

Many farmers use the computerized RTCs for taking loans from cooperative banks (primarily VSSBN – *Vyavasaya Seva Sahakarya Bank Niyamit* or the Agricultural Cooperative Bank) as well as from public-sector commercial banks. Because the cooperative banks offer subsidized loans for crop production (at 4% per annum in 2005-06) and give priority to the demands of smaller farmers, the bigger farmers generally have to go to commercial banks. Though a sale agreement, to be registered in the sub-registrar's office at the taluk headquarters, is required by certain banks for advancing loans, farmers do not find the process too unwieldy. This could be because of their traditional familiarity with such legal agreements - some older farmers in Karaswadi and Oovinahalli villages said that even in earlier times when they took loans from the money lenders, they would generally enter into a legally valid written agreement on a stamp-paper (*andiment-pronote*). There are, however, a few instances where the banks have asked for surety of bigger landholders for giving loans to smaller farmers. In such cases, the smaller farmers prefer the local *sahukar* (money lender) for their credit requirements, even though he generally charges a much higher interest.

The smaller farmers use RTCs to get subsidy on seeds, fertilizers, pesticides and small agricultural implements from the *Raiyat Sampark Kendra*s (Farmer Interaction Centres) of the state's Agriculture Department. It is required to get a permit for growing sugarcane from the local sugar factory as well as for selling the cane to the factory. It is also required for selling one's produce to the government whenever procurement at minimum support prices is announced (for the last such procurement in Mandya taluk undertaken in 2005-06, however, a different format of RTC, manually issued by the VA was used). RTC is used for registering into certain government schemes like Antyodaya and Akshaya through which rice, wheat and sugar are provided at subsidized rates to BPL (below poverty line) families. It is further required for transacting in agricultural land (to establish that the purchaser is involved in agriculture) and for membership of various agricultural cooperative societies. It is also accepted as a surety for the guarantor of bail application in the police stations (the smaller farmers, who do not have other resources to deposit as a surety, frequently exercise this option).

In Koppal District

Tenancy is still prevalent to a considerable extent in Koppal (at least in the erstwhile *jagir* taluks of Koppal and Yelburga) and many landholders interviewed admitted to leasing out their land to tenants for cultivation (without any legally valid agreements). Only some cultivators who used to farm on the lands of the jagirdars and bigger landowners have got their land as a result of anti-tenancy legislations (through which tenancy has been declared illegal). However, tenancy abolition and land ceiling implementation has not been very effective in the district because most of the landlords transferred the lands in the names of their relatives or loyal servants, instead of the cultivators, as soon as they sensed a threat. Very few landowners have records dating back to the Nizam's times or even before 1980. The jagirdars (mainly the *Desais*) and the earlier village officers (*Kulkarnis* and *Patwaris*), however, do have some old records of their lands.

Though the cultivators are aware of RTC and acknowledge it as an important document, it is of no use for the tenant-cultivators. The landowners in such cases, however, need to ascertain that the tenant's name does not get recorded under the cultivator column of the RTC (which will strengthen the tenant's claim to the cultivated land) and so they regularly (at least once in

a year) get updated RTCs from the *Bhoomi* kiosks. The verification of the absence of any unfavourable recordings in the RTCs (both legal and illegal) was the main purpose for which most of the farmers got their RTCs. A school teacher, for example, who owns around 2 ha of land in Bikenahalli village and gets the cultivation done through tenants said that he was not concerned about incorrect entries recorded in his RTC as long as his name is mentioned under the cultivator column (there were spelling mistakes in the names and incorrect entries under the crop details, which is important for getting crop production loans from banks). Since the project's inception in 2001, farmers have availed the services of the *Bhoomi* kiosks 0.83 million times till May 2006 in Koppal (Bhoomi website, www.revdept-01.kar.nic.in, accessed February 2007).

The other major use of computerized RTC is for procuring bank loans. However, traditionally most of the cultivators in the district used to transact with traders and money lenders (*dalaals* and *sahukars*) for both their requirements of inputs and credit as well as for selling off their agricultural produce. Even today, many farmers have continued their association with these *dalaals* (most of them have shifted shop to the APMC - Agricultural Produce Market Committee- yards and now function as commission agents) and approach them for their credit requirements, which is generally in kind (seeds, pesticides and fertilizers) with minimum cash transactions. The commission agents recover their loans when the farmers approach them for selling off their produce. Due to the comfort levels that most of the farmers have developed in dealing with these *dalaals*, they do not want to shift to banks for loans. Also, they seem to be intimidated by the paper work (largely similar to Mandya except for the insistence of surety from adjoining landholders even for small loans, which is sometimes difficult to get) involved in dealing with banks. A few farmers had to sell off their land to repay bank loans and this created a fear of bank loans among others in their respective villages. Even a moderately well off farmer in Haligeri village (landholding of approx 1.25 ha with assured source of water supply through a self-owned bore well) had to sell 17 *guntas* (approx 0.2 ha) of his land to repay a bank loan taken three years back. He has been transacting with a *dalaal* for decades and feels they are better. Bank loans are relatively more popular in the canal-irrigated areas of the district or where the landholders have managed another assured source of water supply for irrigation (and are relatively certain of paying back the installments in time).

The farmers do not use the computerized RTC for getting subsidies or for enrolment into various schemes of the government. For most of these requirements, separate authorization letters, generally issued by the VA, are used.

Discussions

The technology-in-practice approach of looking at technology situates its use patterns within the structures enacted by users, which are themselves influenced by the broader social context in which this use takes place. Historically, Mandya and Koppal have followed different systems of land administration and this has influenced the meaning of rights in land and management of agricultural practices. The *raiyatwari* system of Mandya meant that cultivators had greater access to land titles and legal documents to prove their ownership. The broad spectrum of land ownership, which is found to bestow increased social status in the Indian context (Sahay 1995), contributed to increased social awareness and a more effective implementation of land ceiling and tenancy abolition provisions. Also, the increased familiarity and possession of formal land records, aided by favourable legislations, facilitated the growth of institutions like cooperative societies and formal lending agencies. Therefore, even before the computerization of RTCs, the farmers in Mandya were using the document

for accessing bank loans and for various other purposes that we have already mentioned before. With the onset of computerization, the only change that occurred was the shift in agency for issue of RTCs – from the village accountant to the *Bhoomi* kiosk, with no change in the nature of content. To the extent that it benefited farmers through easier and faster availability of RTCs, computerization reinforced their existing usage patterns, especially through increased transactions with credit institutions. Accordingly, computerized RTCs are predominantly used in Mandya is for the purpose of bank loans, largely in line with what the project was designed for.

Table 1 : Enactment of Technology Structures by Bhoomi Users in Different Contexts

District	Social Context	Bhoomi Use	Technology-in-Practice
Mandya	Direct transactions of cultivators with the state for land revenue (*raiyatwari*); presence of legal land documents with the cultivators. Better developed cooperative and formal credit institutions.	Use of computerized RTCs by the owner-cultivators mainly to access bank loans; also for subsidy on procurement of seeds and other inputs and for selling produce.	A 'formal credit based' technology-in-practice.
Koppal	Presence of intermediaries (*jagirdars*) in land administration; mainly tenant-cultivation and absence of legal documents establishing their rights. Formal credit institutions not developed and increased dependence on money lenders.	Use of computerized RTCs by lessors (landowners who lease out land to tenants) to check for entries that can adversely affect their ownership claims (e.g., when the name of tenant gets recorded as the actual cultivator)	A 'monitoring of adverse entries' technology-in-practice.

On the other hand, Koppal had a largely intermediary-based *jagirdari* system of land administration and many cultivators did not have formal land records to prove their titles on the lands that they cultivated. Their right to cultivate a particular parcel of land was dependent on their relations with the *jagirdars* and the lesser village officers like the *patwari* (the village accountant). The absence of legal land records meant that formal credit institutions could not develop to the extent that they did in Mandya. This necessitated the importance of money lenders and traders for the cultivators who had to depend on them for their credit requirements. In the absence of formal agreements, the farmers had to pledge their produce to these money lenders, who would recover their outstanding by selling it off to the traders. The money lenders thus became an integral part of the farm supply chain – right from supplying inputs to procuring the output. The concentration of land within few social groups (who had legal documents to prove their ownership) meant that the awareness level with respect to formal rights in land was less and so the implementation of land reforms laws were not that effective. This resulted in the presence of a significant proportion of tenant cultivators within the district, who still do not have legal documents to prove their rights in the land and who still rely on the money lenders (now transformed into commission agents). Though the RTC has a column where the name of actual cultivators needs to be recorded, it

has become a mere formality because landowners collude with village officers to ensure that the actual position on ground does not get reflected in the documents. These landowners have to remain ever vigilant to see that such adverse notings are not made in their RTCs and therefore, they need to get a copy of computerized RTCs on a regular basis. The computerized RTCs are, therefore, used in Koppal mainly to ascertain that the landowners' rights in land do not get diluted, even though this might not always be legally correct.

We, therefore, see that variations in social contexts in the two districts have led to differences in the manner in which users have enacted rules for using the computerized RTCs from the *Bhoomi* project. In Mandya, this use is largely structured around the requirement of formal credit by the owner-cultivators while in Koppal it centres around the need of the owner (who lease out their lands to tenants) to protect his/her titles to land. These differences in technology structures that have emerged are themselves a reflection of the broader social context in Mandya and Koppal where *Bhoomi* usage is embedded (see Table 1 above).

Conclusions

The design of *Bhoomi* is premised on the assumption that isolating farmers from VAs by computerizing RTCs would result in an increase in its usage. One of the main usages envisaged for these computerized RTCs is to ease out the 'cumbersome crop loan mechanism' (Bhoomi website http://www.revdept-01.kar.nic.in/Bhoomi/ManualSys.htm, accessed May 2007) and simplify access to formal credit. This feature of Bhoomi's design implicitly endorses the desirability of formal farm credit, which many believe helps to reduce the farmers' dependence on money lenders, who are often discredited with charging usurious rates (Shah et al 2007). While, this assumption looks largely valid in the context of Mandya, it does not appear to hold in Koppal for reasons enunciated earlier. In fact, the computerization project seems to disadvantage the tenant-cultivators in Koppal, as it now makes it easier for the landowners (to the extent that it reduces their dependence on VAs for the records) to check adverse recordings. And this actually contributes to maintaining the status-quo when it comes to exploitative land relations, which the land reforms legislations in Karnataka and in other parts of India seek to alter (even the CLR scheme, of which *Bhoomi* is a specific manifestation derives legitimacy from its positive impact for land reforms). Further, the absence of a supportive social structure for credit extension in Koppal means that the computerized RTC is of not much significance when it comes to accessing bank loans.

Through the selection of content (the RTC) and mode of delivery (through kiosks) of *Bhoomi*, the designers had inscribed the project with a particular type of usage – mainly to access formal credit. However, because there exists variations in social contexts, which can be attributed to historical land administration systems, within which the use of *Bhoomi* is embedded, we see different technologies-in-practice getting enacted by the users. Some of them even contradict the basic purpose of technology intervention, as we see when computerized RTCs are used to thwart the implementation of land reforms legislations in Koppal. While we see a favourable structural impact through the use of *Bhoomi* project in

Mandya (in the sense that farmers are facilitated in accessing more credit through formal channels and with an assumption that formal credit has a positive development impact on the farmers) that the projects designers would have hoped for, in Koppal, however, the project use tends to reinforce the existing (exploitative) land relations, which is contrary to what various land reforms initiatives (CLR and Bhoomi are the latest addition in this list) have called for – land to the tiller.

Universal prescriptions for development are found to run into problems (Pieterse 2001; Kothari and Minogue 2002) and our study of the *Bhoomi* project gives us no reason to believe that similar universal prescriptions for using ICTs will work. The development literature no longer looks at increase in income as the only manifestation of development with increasing talk of providing substantial freedoms and building capacities (Sen 1999), which would require greater sensitivity to local conditions and acceptance of plurality in designing development interventions. The design of ICT4D projects also need to be sensitive to contextual variations if the benefits of using ICTs are to reach those sections of the society, which have found themselves marginalized from the mainstream development process.

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