

Institutionalising decentralised information systems for local level planning: Comparing approaches across two states in India

ABSTRACT

Since the 1980s, administrative reform in a number of developing countries has been directed at achieving decentralisation of planning through the use of information systems. These experiments have not led to any significant improvement in planning and monitoring of development programmes. In this paper, we argue that a closer look at different approaches to decentralisation is useful in order to draw wider lessons about long-term impact.

In this paper, we trace the process of decentralisation adopted in two states of India, namely Gujarat and Karnataka. While both states are noted for their decentralisation efforts, the degree to which new work practices have become institutionalised has been influenced by differences in the structure of their planning apparatus and different approaches to the implementation of information technology for local-level planning.

Keywords: India; information technology; decentralisation; district planning

INTRODUCTION

The popular remedy for excessive concentration of decision-making and authority within the central government in many developing countries was believed to be decentralisation – a term often imbued with many positive connotations such as participation of the local people, relevance of locally-generated data, autonomy of decision-making, accountability, and democracy (APDC, 1991; Turner & Hulme, 1997). According to many writers, decentralisation involves some combination of three factors: delegation, devolution and deconcentration (Conyers and Hills, 1984; Rondinelli, 1993). Delegation can be described as a functional concept referring to a situation in which a higher authority assigns duties to a lower authority, but still retains discretionary capacity to overrule the lower authority as against devolution where a higher authority assigns duties and discretionary capacity to a lower authority often involving simultaneous deconcentration of activities in developing countries to relatively small areas called districts.

Although a few experiments with delegation of function to local administrators led to increased production activities in a number of sectors such as agriculture, fisheries and forestry in the 1950s and 1960s, millions of people continued to suffer from hunger, malnutrition, disease and illiteracy (Shams, 1987). In response, devolution experiments with an increased emphasis on institutional development were proposed to lead to improved coordination between various local agencies involved in planning and implementing programmes locally. However, even these policies did not result in making state-sponsored interventions more effective in promoting development (Turner and Hulme, 1997). For example, in Africa, under the banner of decentralisation, the 1960s and 1970s actually witnessed the clawing back of power by the centre

with attempts to exert even greater central control over local decisions through state-controlled cooperatives and other bodies (Hyden, 1983). In South Asia and Latin America, there was also much rhetoric about participation and local autonomy first through local administrators and later through elected representatives. But in practice central governments have guarded their power and people were not allowed to decide, control and manage their own development (Turner & Hulme, 1997).

Promotion of IT applications in priority sectors was resorted to in many parts of the developing world in the 1980s to promote decentralisation (APDC, 1987). Planning, management and productivity of agricultural and rural development, poverty alleviation, environment management, energy and transport, urban development, health and family planning and education were among local-level development programmes to which information technology was applied. A central goal of such initiatives was to improve access to information, thereby producing more informed, better-reasoned decision-making. Studies on the impact of these initiatives have pointed to a variety of difficulties hindering their success such as lack of funds, lack of detailed planning for the management of the project, inadequate human resource development, and various socio-political factors (Madon, 1994; Kamel, 1994).

Practical experience with these experiments suggest that there exists an implicit belief amongst practitioners and policy makers that decentralisation occurs via legislation. We argue that such a belief rests upon a naïve view of administrative reform and that we need to improve our understanding of the subtle, incremental process by which devolution of power and responsibility to local level administrators occurs in practice. We believe that the institutionalisation of technology within development bureaucracies is a complex process mediated by factors such as the extent of devolution of power and responsibility, the extent of opportunity for local input into decision-making processes, and administrative capacity for change. For example, Korten (1980) reviewed successful Asian local development programmes and argued that in developing countries, what is interesting is the process by which some institutions gradually overcome their constraints.

In an interesting study, Peterson (1990) proposes a framework to study the process of institutionalisation of technology within development bureaucracies. Drawing on case material in Kenya, he argues that the institutionalisation of technology in a development bureaucracy is heavily influenced by the significance and complexity of the application. An application is considered significant if its output is essential to local decision-making. The complexity of a computer application is primarily a function of the strategy of use and can be categorised as applications which aim to automate tasks, thereby increasing the speed and volume of transaction processing, or to informate tasks, thereby improving comprehension and analysis of operations. From his case study of two ministries in Kenya, Peterson concludes that the significance of the application to user groups, rather than to technical personnel, is the most important variable influencing institutionalisation. Many writers have argued that the full benefits of information technology will not be achieved when it is merely applied to automating manual operations, but only when it provides additional information about the nature of work (Zuboff, 1988; Peterson, 1991). However, Peterson's (1990) case showed how at this point in time the automating role of information technology has been much more significant to users in the Kenyan ministry than the informing role.

In this paper we aim to draw on elements from Peterson's framework to compare and contrast the decentralisation experience in two states in India - Gujarat and Karnataka. While both states are perceived to be pioneers in decentralisation efforts, the difference lies in the structure of their planning apparatus. In the next section, we describe these decentralised structures at the district and sub-district levels. Section three presents our findings on key dimensions of the implementation and use of computer-based information systems for district planning in the two states. The final section discusses the implications of experience for decentralisation policy.

DECENTRALISED DISTRICT PLANNING IN GUJARAT AND KARNATAKA

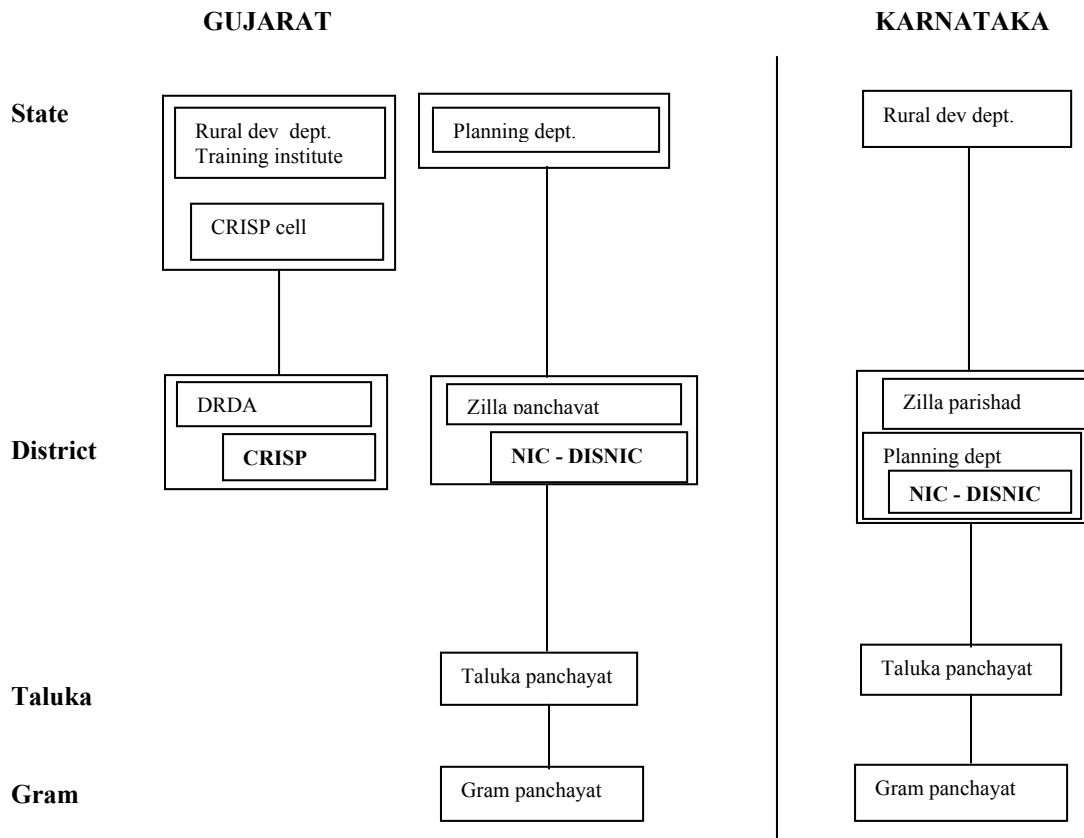
In India, the Panchayati Raj, a system of democratic political decentralisation, came into being and was met with public enthusiasm and government acceptance. Legislative measures were taken in different states for setting up the system and popularly elected representatives of the people became officially associated with rural development administration. The Panchayati Raj system established a linked system of rural local self-government at the district, block and village level. The formal structure in most states consisted of elected village panchayats with indirectly elected panchayats at the block and district levels (GOI, 1978). With the assistance of administrative personnel assigned by and reporting to the executive departments of the state government, all development activities were to be channelled through these councils. An elaborate system of financial devolution was prepared, and in addition to central and state government grants, the panchayati raj institutions were also empowered to raise resources of their own.

However, the euphoria generated by the initial efforts at democratic decentralisation in India faded. Except in a few states like Gujarat, Maharashtra and Karnataka, studies reveal that no serious attempt was made by the state governments to entrust to the panchayats the responsibility of development administration (Inamdar, 1985; Crook & Manor, 1994). Conflicts arise at two levels. First, between the political leaders and the bureaucrats running the planning apparatus. The bureaucracy actively sought to disassociate the panchayats from the development process and was averse to panchayats being entrusted with additional functions (Singh, 1989). Second, between the lower and higher echelons of political and bureaucratic hierarchy. The elites at higher levels showed a lukewarm attitude towards strengthening of the democratic process at the grassroots since they perceived a threat to their position in the administrative hierarchy. Devolution of planning gradually faded in the 1970s giving way to centrally directed administrative district-level institutions that could be delegated specialised development tasks (GOI, 1978).

Gujarat is an example of a state, which has achieved a degree of decentralisation through delegation of functions from state government to the District Rural Development Authorities (DRDAs). The planning apparatus in Gujarat consists of two agencies – one responsible for rural development programmes run by local administrators called the District Rural Development Agency (DRDA), the other responsible for overall district planning run by local politicians called the zilla panchayat. The choice of Karnataka was made in order to provide a contrast in the style of decentralisation that has been adopted. Karnataka state has shown great commitment to the Panchayati Raj legislation. In 1987, it was one of the first states to reorganise

its district machinery by transferring the responsibility for district planning to an elected local government structure called the zilla panchayat. Here, the emphasis has been on devolution of responsibilities for district planning to locally elected representatives. In Karnataka, since 1987, only one agency called the zilla parishad existed that was responsible for both rural development programmes and overall district planning seemingly establishing a more coherent structure.

The diagram below illustrates differences that existed in the decentralised structure of district level administration in the two states.



In terms of information technology implementation in India, the National Informatics Centre (NIC) has been pivotal. The NIC was set up in March 1975 by the Government of India to play a promotional role in creating computer awareness and developing and implementing computer-based information systems for decision support in the ministries and government departments. The NIC presently has a strength of over 3000 personnel with 80% of them being technical personnel, primarily with a computer science or mathematics background. Each district has a systems analyst/programmer as the District Informatics Officer (DIO) who is assisted by a District Informatics Assistant (DIA). With the requirements of large quantities of data for decentralised planning, the NIC has undertaken several projects to develop computer applications for planning and monitoring of development programmes at the district level. Two such initiatives are DISNIC (the district information system of the NIC) and CRISP (the computerised rural information systems project). DISNIC launched by the NIC in the mid-1980s, expected to bridge various gaps that existed for planning at the district level with the help of the NICNET telecommunications network. The system consisted of a 27-sector database

covering the various fields of local administration. CRISP was launched in 1987 with the objective of improving the efficiency and effectiveness of the anti poverty programmes targeted at poor rural households. Both DISNIC and CRISP were based on prior pilot projects designed to support one particular district spurred on by the enthusiasm of individual administrators.

In the next section, we present the results of our comparative study of the implementation of information technology at district level in the states of Gujarat and Karnataka. Data to support our findings comes from both primary and secondary sources. The latter consist of mainly government publications, working papers, reports and memoranda provided by government departments and other agencies. Some valuable information was also obtained from research studies available in India on decentralised development planning. The main contributors of primary data included a variety of district agency personnel and NIC district staff. We interviewed user groups and technical personnel from 18 district agencies in Gujarat and Karnataka (see Appendix B for list of districts). A longitudinal research design was adopted for the study as we felt that change was likely to be observed over several years. We therefore chose to study the same set of agencies in the two states and the same issues over a period of time spanning from 1993 to 1998.

COMPARING EXPERIENCES OF DISTRICT LEVEL COMPUTING IN GUJARAT AND KARNATAKA

In this section, we present findings related to a decade of experience with computerisation for district planning. We collected data on various dimensions of interest related to the significance and complexity of the system. We followed Peterson's use of some critical indicators of the significance of information technology applications. For example, his use of the physical usage of the system, and the degree to which the application could measure performance of the development programme. In addition, we added other dimensions specific to our study related to the management of technology, work processes and morale which would give us a rich picture of the degree to which the technology has been institutionalised within the districts. Table 1 gives details of the dimensions and indicators used for our study.

Table 1 : Dimensions and criteria of study

DIMENSION	CRITERIA
Trend towards centralised/localised applications	Number of centralised/locally-designed applications
Use of computer system	Number of machines; hours of daily use; downtime
Understanding of IT potential	Use of IT for standard reports; use of IT for non-regular reporting; appropriate use of packages; use of data for analysis
Management of IT	Computer room; number of trained personnel and levels; quality and content of training; support
Enthusiasm	Enthusiasm of senior administrators and user departments
Value attached to local decision-making	Local interest in decision-making

Our first phase of empirical investigation was undertaken in 1993-1994 to coincide with the take-up of computers for routine processing at the district level in Gujarat and Karnataka. The second period of fieldwork was undertaken in 1997-8 by which time the computer system had been

operational for around five years. Table 2 shows a summary of the status of the districts surveyed in the two states in 1997-8. The table shows an assessment of the strength of each indicator in terms of H(igh), M(edium) and L(ow).

Table 2 : District-level computerisation in Gujarat and Karnataka 1997-8

1997-8 Karnataka

	Localised applications	Usage	Local user management	User understand of computers	User enthusiasm	Local input
Kolar	L	L	L	L	L	L
Bangalore	L	M	L	L	M	L
Tumkur	H	H	L	L	L	L
Mandya	L	H	L	M	L	L
Mysore	L	H	L	L	L	L
Hassan	L	H	L	L	L	L
Mangalore	M	H	L	L	L	L
Karwar	L	H	L	L	L	L

1997-8 Gujarat

	Localised applications	Usage	Local user management	User understand of computers	User enthusiasm	Local input
Surat	L	L	L	L	L	M
Ahmedabad	L	L	L	L	L	L
Dangs	L	L	L	M	H	M
Banaskantha	M	M	M	M	M	H
Baroda	M	M	M	M	M	M
Bharuch	M	M	M	M	M	M
Gandhinagar	H	M	H	H	H	M
Mehsana	H	M	H	H	H	H
Valsad	M	H	H	H	H	M
Kheda	H	H	H	H	H	H

An entry of Low, Medium, or High is indicated for each pair of district and dimension.

The 1993 Phase:

By 1993, the status of computerisation in the two states varied considerably. In Karnataka, the NIC in Karnataka and the zilla parishad had been established at same time and on the same premises which led to a feeling of 'growing and learning together'. The zilla parishad staff was focused on integrating district planning functions under the aegis of the newly established agency and were content to let the NIC take the lead in the development of its computer applications. In each user department the district NIC staff spent around 2/3 months analysing the manual system, consulting and training users. The usage of computers at the district level NIC centres was generally high.

In contrast, Gujarat had experienced many problems in the first few years of computerisation related to poor support and maintenance, lack of training and education, and inappropriate

systems design. These problems have been discussed at length elsewhere (Madon, 1994). By early 1990s there was a distinct possibility of the projects stagnating completely as in most districts the computers were not being used and the administrators had reverted to the manual mode of functioning. At this juncture, the NIC authorised that district DRDAs should be allowed to develop their own applications in consultation with local NIC staff. In Gujarat, the menu-driven software developed and designed by the centre gradually came to be replaced with end-user applications at the district level and in 1993 the state government training agency began training end-user on software packages.

During our empirical investigations in 1993 in Gujarat and Karnataka, we found that most NIC offices in the two states had developed 3-8 reporting applications for user departments while 5 districts had developed more than 8 applications. However, the difference was in the perceptions of user departments towards information technology. In Karnataka, while many applications had been developed by the NIC for user departments, user understanding of the value of data for local planning remained poor. As a consequence, zilla parishad staff showed little enthusiasm in becoming involved in computerisation initiatives regarding such activity as a waste of time and effort. In contrast to this state of affairs, a considerable degree of curiosity was seen among some administrators within the Gujarat DRDA in terms of their use of packages for simple reporting tasks. In terms of understanding the potential and utility of information technology, most DRDA staff were aware that the computer system could result in faster report generation and that it could also be used as a tool for assisting decision-making.

While none of the staff in the zilla parishad offices in Karnataka had taken the initiative to develop local data processing applications, in Gujarat the status was different. One of the most popular local processing applications in Gujarat was production of the annual action plan for the Integrated Rural Development Programme (IRDP) which is a document that specifies how the IRDP will be implemented over the next year. Another popular routine application at this time was payroll processing. Six DRDAs in Gujarat used more than one such application for reporting. One district had three such applications – one for monitoring the IRDP, one for monitoring the micro-level planning and one for the preparation of the Annual Action Plan. Despite the increasing use of information technology for local applications, the majority of the DRDAs in Gujarat reported usage of only 3-4 hours weekly mainly for centrally developed reporting applications. The majority of DRDAs had one computer with only one district boasting two machines. The low usage of the computer systems in Gujarat could also be attributed to a lack of sufficiently trained staff. Most of the DRDAs in Gujarat had only 2-4 trained staff using the computer system. Except for 2 districts at which the local NIC office was located at the same premises as the DRDA, most districts admitted that NIC support had not been forthcoming. All DRDAs in Gujarat without exception found that support from the CRISP cell was non-existent.

Alongside the local development of applications in Gujarat, initiatives were being taken at the DRDA level to manage the computer system in terms of arranging for local maintenance, training and daily wage data entry operators. Some DRDAs has established links with local engineering colleges for support and training. Others had begun to recruit daily wage data entry operators in order to clear the backlog of data that needed to be computerised under the IRDP programme.

The 1997 Phase:

By early 1997, NIC offices in both states reported full time usage of their system with two full-time officers in place to develop new applications for user departments and to conduct training sessions for them. Regarding applications being used at this time, at NIC offices, almost all districts had around nine local applications for reporting which normally included payroll, agricultural marketing, kerosene distribution, document registration, arms licensing, small scale industry, elections pensions and midday meal.

At the district offices in Karnataka, the NIC continued to dominate the development of applications for user groups in the zilla parishads resulting in many applications that were not perceived as locally relevant. In Gujarat, physical usage of computers was found to have increased to about 10 hours a week for most of the DRDAs with even the weakest districts using the system for about 8 hours a week. While the number of computers at sites in the majority of the districts remained one, three districts in Gujarat already boasted a LAN multi-user five-node system. All DRDAs had shifted the computer to a separate cabin.

By 1997, only 3 district DRDAs in Gujarat continued to run a centrally developed application for reporting purposes at the district level. Around half the districts made use of locally prepared applications for reporting while 7 districts were developing all their reports locally using packages. Three districts in Gujarat had developed local applications for their own analysis. For example, one district was involved in the clustering of villages with similar sizes and composition of people so that villages with similar features could be allocated similar projects. Some DRDAs also began to record names of poor households and to order output in terms of income levels, caste and occupation in order to be able to assist in the allocation of funds to the poorest groups. Around this time, a more complex analysis was conceived in DRDAs in Gujarat based on the recommendations of a committee comprising NIC personnel, DRDA staff and State NIC personnel. The analysis involved household data collection through a survey conducted in 1994 wherein each district was given the flexibility to identify a criteria related to the household's well-being such as land holdings or possession of assets and to attach weightage according to their perceived importance in the local area. This data was then superimposed on the data concerning the IRDP scheme available in the area and district-specific criteria for the successful execution of the project given the infrastructure and natural resources in that locality. In terms of human resource development, NIC offices in both states had 2 trained staff that felt that the user department lacked motivation and enthusiasm to learn about information technology. Most of the DRDAs and zilla parishads still had only 1 or 2 trained staff using the computer and most district staff commented that they needed more advanced training for working with the analysis-type applications.

Junior DRDA staff in Gujarat began to play an increasing role in computerisation, leaving computerisation efforts no longer dependent upon the vagaries and whims of the agency director who might be transferred at short notice. In many cases, while many of the DRDA directors were still unaware or indifferent about the potentials of IT, junior staff was more knowledgeable and motivated to learn. At the same time the NIC officers continued to feel that they were inadequately trained to develop applications for user departments, especially for local analysis rather than routine reporting. Six districts in Gujarat had taken local initiative to manage their own IT resources in terms of applications development, training engaging private companies,

data collection engaging private marketing agencies, recruitment of daily wage operators and private maintenance and support staff.

In sum, over the past ten years there has been considerable growth of computer applications within the district administration in both states. In Karnataka, most applications remain at the operational level and are concerned with routine administration while in Gujarat there are tendencies for district development administrators to direct the technology for more analytical applications to assist in local-level decision-making.

DISCUSSION AND CONCLUSION

Gujarat and Karnataka have adopted different styles of decentralisation as we have described in this paper. The zilla parishad agencies in Karnataka are powerful agencies in terms of their budgetary allocations and in terms of the rank of officers designated to manage the agency. The administrative head of the agency has effective control over individual line department and can therefore act in the interests of the district as a whole. In contrast, the district planning apparatus in Gujarat is fragmented into the district panchayat comparable in status to the zilla parishad, and the DRDA which is a centrally sponsored agency controlled by the central government and having little autonomy in local-level decision-making.

Within this overall structure, decentralisation in Gujarat has veered towards mere deregulation of functions, while that in Karnataka has veered more towards devolution of decision-making powers. Given this structure, this paper has aimed to investigate the impact of district-level computerisation initiatives in the two states. Our major findings are as follows:-

Decentralisation is a subtle, incremental process

One would have expected a greater impact of district-level computerisation initiatives in Karnataka than in Gujarat. However, a key finding from this research is that the reverse is true. Despite the progress made in terms of legislative acts towards devolution in Karnataka, most systems being developed in that state are not critical for planning and the output remains in the form of physical and financial targets that have little to do with the objective of improving planning processes at the local level. Links need to be established between the rural development department and the NIC especially since the zilla parishads are effectively under the jurisdiction of the rural development department. NIC staff training should become more responsive to zilla parishad requirements. There could, for example, be a module explaining problems of designing and developing systems for the administration. In Gujarat, on the other hand, despite the DRDA's lack of formal autonomy, there are signs that move towards more locally relevant applications for planning and considerable incremental 'learning by doing' is taking place. These findings stress the naivety of the view that decentralisation occurs via legislation. A significant implication from our research is that rather than believing solely in radical reform undertaken by Central government, a key aspect of change arises from subtle incremental processes at all levels, involving changes in perceptions, realignment of power and shifts in norms among the stakeholders involved in the situation. While efforts to date may not have resulted in any major change in the status quo in Gujarat, we have found that through the regular action of stakeholders involved in local governance, patterns of interaction and work

practices are gradually becoming institutionalised.

Information technology applications have greater impact in situations where users develop their own applications

Drawing on Peterson's categories described earlier in the paper, in terms of the complexity of applications, although the automating role of information technology has proved to be much more prevalent than the informing role, there has been a gradual trend towards analytic application in Gujarat as end-user computing replaces menu-driven systems designed and developed by the central government. In Karnataka there has been no discernible move towards end-user applications. Administrative capacity has improved in situations where the users themselves are 'owners' of the application as in Gujarat rather than where they are passive recipients of technology designed by the NIC, which remains the case in Karnataka. For example, our findings reveal a close correlation between the number of processing applications in the district offices and local initiative in managing the technology.

The need to build capacity to value and work with data

What is more important in terms of institutionalising the information technology resource is not the information per se, as that may become obsolete and need updating. Rather, it appears that building capacity to value and work with data in locally relevant ways should take precedence over building costly structures for information storage and retrieval. This capability building for organisational learning has to be legitimised by senior managers and the necessary resources provided. Experience shows that people are unlikely to use or value learning if they see it as someone else's responsibility. District heads need to pay special attention to encouraging learning among those who traditionally have not been encouraged to see themselves in this light.

Decentralisation beyond the state

Throughout the period 1940 to 1980, decentralisation has been a concept that focused on the delegation of power within the state. However, the 1980s saw the term extended beyond the state to refer to the market-oriented policies of the new right that dominate development policy. For example, in the Gujarat DRDAs, there are many trends towards decentralisation, which go beyond the state and involve private training and support agencies. We have obtained some interesting insights by reviewing initiatives of decentralisation in the dairy sector in Gujarat and Karnataka and the use of IT within these initiatives. In Gujarat, nearly 1000 societies and in Karnataka nearly 600 rural societies have installed computers for processing the transactions of milk buying and selling. This is a significant level of computerisation at the grass-root level. Most of this computerisation has happened because of the involvement of private sector. Initially, National Dairy Development Board (NDDB), the apex organisation at the top of the pyramid, developed the application to be implemented at the rural societies. This application integrated an electronic weighbridge, a plastic card reader, a semi-automatic fat testing machine and a PC. After a member puts in his card, pours the milk and the fat content is tested, all these inputs are transmitted to the PC which calculate the amount payable to the member. The PC maintains a yearlong data base of each member's daily sales. Software has been developed to analyse this data and also perform the monthly and annual balancing of books and closing of accounts. The NDDB software was implemented in just 15 locations over a period of 5-6 years. It is at this juncture that NDDB decided to share the software with a few small enterprising IT companies. These companies took it upon themselves to aggressively market the application in

rural areas and to provide support. The private entrepreneurs were able to bring a high level of energy to this whole process, which resulted in thousands of milk societies buying these systems. The decision to buy has been left entirely to the rural societies and there is no push from the unions or the NDDB. There is perhaps a strong lesson for IT applications in other sectors, which are largely based on technology pushed by centralised bureaucracies.

CONCLUSION

In this paper, we have described the different styles of decentralisation in the two states of Gujarat and Karnataka drawing on Peterson's framework to study the process of institutionalising information technology within the districts. Our findings reveal that naïve attempts to impose decentralisation by decree typically backfire when imposed upon complex organisations such as development bureaucracies. A key implication of our study is that long-term strategic change in the administration arises from users having a sense of ownership of information technology and the ability to direct the resource in locally relevant ways, rather than by mere enactment of decentralisation legislation.

While there is considerable learning by doing taking place in some districts, we recognise that it is still early days for the trends we have described in this paper. This calls for further indepth and longitudinal study of the process of institutionalising decentralised information systems for local level planning at district level.

References

- APDC (1987) Trends in IT Applications in Asian Government Systems. Asian and Pacific Development Centre. Kuala Lumpur. Malaysia.
- APDC (1991) Reaching Out Effectively: Improving the Design, Management and Implementation of Poverty Alleviation Programmes (Getubig, I. and Shams, K., eds.). Asian and Pacific Development Centre. Kuala Lumpur. Malaysia.
- Conyers, D. and Hills, P. (1984) An introduction to development planning in the third world. John Wiley & Sons. Chichester.
- Crook, R. and Manor, J. (1994) Enhancing participation and institutional performance: Democratic decentralisation in South Asia and West Africa, Overseas Development Administration, London.
- GOI (1978) Report of the Committee on Panchayati Raj Institutions. Government of India, Ashoka Mehta Committee. New Delhi.
- Hyden, G. (1983) No shortcuts to progress: African development management in perspective, Heinemann, London.
- Inamdar, N.R. (1985) Development administration and administrative reform. Indian Journal of Public Administration. Vol. 31, p504-513.

Kamel, S. (1994) The use of decision support systems in development planning in Egypt, July 1994, PhD Thesis. London School of Economics & Political Science. University of London.

Korten, D.C. (1980) Community organisation and rural development: A learning process approach. *The Public Administration Review*. Vol. 40, p481-511.

Madon, S. (1994) Designing information systems for development planning. Alfred Waller. Oxon.

Peterson, S.B. (1990) Institutionalising microcomputers in development bureaucracies: Theory and practice from Kenya. *Information Technology for Development*. Vol.5, No.3.

Peterson, S.B. (1991) From processing to analysing: Intensifying the use of micromputers in development administration. *Public Administration and Development*. Vol. 11, p 491-510.

Rondinelli, D.A. (1993) Development projects as policy experiments. Routledge, London.

Shams, K. (1987) "Organising local initiatives for decentralised rural development: The regional experience". In *Building from below: Local initiatives for decentralised development in Asia and Pacific* (Bhatt, A. Carino, L. Shams, K. Siedentopf, H. and Sosmena, G. eds.). Asian and Pacific Development Centre. Kuala Lumpur, Malaysia.

Singh, A.K. (1989) Decentralised planning under five year plans: Emerging perspectives. *Journal of rural Development*. Vol. 8, pp. 227-238.

Turner, M. and Hulme, D. (1997) Governance, administration and development: Making the state work. Macmillan Press Ltd. UK.

Zuboff, S. (1988) In the age of the smart machine. Basic Books, New York.