Information Systems for Development Planning : Managing the Process of Organisational Change*

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Recent years have seen many developing countries taking initiatives aimed at promoting decentralized planning through the application of computer-based information systems. However, with all these experiments, the major objective of improving the effectiveness of development planning remains unfulfilled. This has been due in part to the lack of adequate infrastructure and resources to operate the machines — an issue which has been widely discussed in the literature. In addition, the problem stems from inadequate attention paid to the process of managing organisational change through computerisation. However, there exists a chronic paucity of literature which aims to improve understanding of this process.

To rectify this, we present a case study of the application of computers for development planning in India. We identify seven major barriers which have hampered the process of organisational change through computerisation. This leads to a discussion of issues relevant to the management of change through computerization and leads to some guidelines for more effective deployment of technology for development planning.

1. Introduction

The advent of microcomputer technology has fostered the emergence of decentralized information systems for development planning during the mid-1980s (Sanwal, 1987; Bhatnagar and Patel, 1988). In India, district planning was introduced with the National Informatics Centre placing microcomputers in each of the 439 districts (Sanwal, 1987). In Africa, the Resource Management for Rural Development Project for Kenya was engaged in the introduction of microcomputers in the districts (MPND, 1987). In South-East Asia, Malaysia began to extend its Integrated Development Project Information System (SETIA) to the districts (Han and Render, 1989).

The small amount of literature relating to the impact of these initiatives tends to focus on variety of difficulties hindering the fulfillment of initial intentions such as lack of funds; lack of appropriate data collection mechanisms; inadequately trained computer operators; and the lack of technical support for maintaining the computer resource (Deboeck and Kinsey, 1985; Odedra, 1990; Singh, 1990). A few writers have acknowledged that in addition to these factors, a multitude of complex socio-economic and political factors prevail (Eres, 1981; Sanwal, 1988; Walsham et al., 1990). For example, Avgerou (1990) criticises systems developers for assuming that development planning is a rational process and for thereby ignoring the informal aspects of the system. In many cases, dominance of these informal aspects has led to problems during system implementation. This was confirmed in a study conducted by Sirivedhin et al. (1987) of the development of a computer-based information system for water resource management in Thailand. In a similar vein, Peterson (1990a) found that the difficulties encountered with the process of institutionalizing technology within the Kenyan Ministry of Finance were related to a lack of understanding of the informal subsystem which dominated the formal system of management.

The scope of this paper is to investigate the interaction between the informal context of development administration and the process of man-

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aging organisational change through computerisation. We aim to do this by presenting a case study of the Computerized Rural Information Systems Project (CRISP) which is a government initiative to promote decentralized rural development in India. Within India, the study focuses on the state of Gujarat which is a medium sized province of western India with a population of over 30 million. The selection of Gujarat was based on the fact that this state ranks very high in terms of administrative efficiency. Gujarat has also been actively involved with computerisation projects since the 1980s.

Data to support the findings was obtained primarily through semi-structured interviews held with a variety of administrators at different levels of the administrative hierarchy although secondary data sources such as government publications and working papers were also used. A longitudinal research design was adopted for the study in order to explore patterns in the coevolution of information systems development and social settings. The author returned to the research site at intervals of about nine months in order to see how the situation had altered. In many cases, data collection required a certain rapport to be built between the researcher and the respondent. It was feared that without this, the required openness of discussion would not be achieved. The research therefore required long spells of field work with regular contact with respondents over a period of months. Due to the anecdotal nature of the data obtained, the technique of triangulation was applied to verify and strengthen the validity of the findings by applying two or more means of data collection to the same person.

The next section describes how the process of change was managed in the pilot project which formed the basis of CRISP. This is followed by an identification of contextual factors which have prevented the development of computerization within the administration. The final section is devoted to a discussion of relevant management issues which need to be considered at various levels of the administration.

2. The Genesis of CRISP

In the mid-1980s, the Government of India realized that a massive amount of data had been collected for managing rural development, but that not much of it had been used effectively. Problems with the manual system were twofold. First, the very large physical dimensions of rural development programmes and the disaggregated nature of the various projects and schemes involved meant that data compilation from lower to higher echelons of administration was often delayed because of shortages of skilled manpower. Second, the vast amount of data maintained in the records of block and district offices could not easily be retrieved for further analysis for micro-level planning. Hence, data mobility was invariably upwards without any horizontal or downward flow of information (Kurian and Das Gupta, 1987).

With a view to improving the efficiency of report generation and the effectiveness of micro-level planning, the Planning Commission recommended in 1985 that the Department of Rural Development initiate steps to develop a computerized information system at the district level. Several attempts were made during the mid-1980s to develop applications of this type. However, these attempts were ad hoc and there was poor coordination in terms of information sharing and technological compatibility between them.

One experiment to develop a computerised system for rural development management which later led to the genesis of CRISP was initiated by an enterprising senior district officer (director) in Karwar district in South India. The project commenced with a joint effort by the district staff to revise and streamline existing proformae in the manual system. The revised manual system then became the basis for computerised efforts and the director began to develop the necessary applications through consultation with his staff. Data entry was performed by each clerk who was responsible for a particular rural development programme in order that errors and mistakes would be more easily identified and corrected. In order to enable this, as many as 18 out of the 30 clerical staff at the district had to be trained to interact with the database package. Training was done on-the-job with each clerk given a block of time for hands-on usage. Each evening, time was available for spillover work, self-learning and even for the playing of games in order to break down the psychological barrier of using a computer. A small library

of magazines and computer manuals was set up to stimulate interest and awareness. Sharing of experiences of computer usage was encouraged in order to generate a team spirit amongst the staff.

The experiment at Karwar resulted in improved access to basic village data which significantly increased the ability of the director to make better planning decisions. It also led to tighter monitoring of scheme implementation as it became easier to identify spatial maldistribution of resources and instances of misuse and misallocation of funds (Patel, 1987). To that extent, the system provided an input for corrective planning. In addition, there was very little need for staff to stay back late to finish paper work. This was partly due to the speed of the computer, and partly due to better, more rational paperwork procedures which had been introduced at the district. More efficient use of human resources meant that local officers had more time for carrying out other vital duties related to the implementation of rural development programmes.

Based on the alleged success of the Karwar experiment, the Department of Rural Development envisaged that the diffusion of information technology to all districts would automatically lead to more efficient report generation and more effective rural development planning on a nationwide scale. All 439 District Rural Development Agencies (DRDAs) in India were provided with a PC/AT microcomputer and the necessary peripherals, a menu-driven application called CRISP which had been developed by the central government's National Informatics Centre, and several high level languages. However, fieldwork carried out by the author reveals that the process of organisational change through computerisation was hampered by several factors which are described in the next section.

3. Factors Preventing the Effective Deployment of CRISP

In order to manage the process of change through computerization, the technological, social, economic and political factors involved in orchestrating the change need to be understood. The scope of this section is to describe the nature of these factors and how they have influenced the process of technology adoption in the context of the CRISP initiative.

Bureaucratic Inefficiency

The design approach adopted for the CRISP system served to reinforce the inability of the bureaucracy to modify structures and attitudes. Although it was acknowledged that the manual system was obsolete and that a new management approach was needed to transform the administration with the aid of technology, this seemed too radical and threatened the risk of failure through resistance to change by administrators. In order to increase chances of greater acceptability of the system, a deliberate design decision was taken to introduce the CRISP system as an overlay of the existing manual system thereby perpetuating existing inefficiencies within the administration.

Highly Politicized Decision-Making

While CRISP was supposed to promote decentralisation, in practice the system was designed and developed without consultation with state governments about their requirements. This action served to perpetuate feelings of hostility between the centre and state governments which had been built up over the years due to the reluctance of the centre to devolve decision-making powers to the states. This situation caused the state governments to act as an opposition group to the CRISP initiative soon after it was launched. Politically-motivated decision-making in the Indian administration has often resulted in poor project planning and control. In the case of CRISP, this resulted in adequate hardware and software support for maintaining the equipment and inadequate human resource development. This point is elaborated on below.

Poor Infrastructure and Human Resource Provision

During the first few years of implementation, there seemed to be a total lack of technical support provided for the districts by maintenance companies and by the CRISP Monitoring Cell set up by the state government in 1987. Despite

several pleas for assistance, districts often had to wait many months for help to arrive. First, there was the problem of distance. Some DRDA offices were hundreds of miles away from maintenance company's headquarters and from the Monitoring Cell. Second, poor telecommunications infrastructure often resulted in unnecessary delays in reporting problems.

Efforts to computerise during the initial few years of the project were also hampered by the inadequacy of training in terms of course content, duration and frequency. Trainees were often novice users with no keyboard skills. The courses they attended were typically of about three days duration which did not enable them to grasp the basic concepts and to be able to retain the knowledge they had gained. As a result, there was a lack of trained operators at the DRDAs. Each district was equipped with only one or two clerks who had to operate the machines over and above their regular duties. These officers were made responsible for processing around 100 000 records of rural poor households within the district. Rather than information technology resulting in less pen-pushing, this group of workers saw a rapid expansion of their duties. As a result, there was a serious disincentive for them to use the machines.

Language Barrier

Human resource development at the DRDAs has also been significantly hampered by the language barrier. The CRISP user interface was in English while the main language of communication at district level is Gujarati. Most data entry clerks have a very poor command of English and find it very difficult to comprehend the meaning of prompts and simple commands. Moreover, the data required for CRISP has to be input in English which creates the problem of the incorrect spelling of village names. The training institute's own manual was also in English and had not been translated into Gujarati because of the apparent difficulty involved in finding appropriate translations for commands and operations.

Lack of User Involvement

Lack of involvement in systems design of district users has hampered the success of the CRISP initiative. While the stated objective of CRISP was to promote decentralisation of rural development administration, the top-down process of systems design and development led to the establishment of centrally-defined data sets without regard to local conditions. A serious consequence of this was the mismatch which resulted between the reporting requirements of districts and the output formats generated by CRISP. This ultimately led district administrators to boycott the computer system and to revert to the manual system of report generation.

The lack of channels of communication between systems developers and users prevented users from communicating their concerns about the system. Many situations were recorded in which users felt that a feature of the CRISP system was dysfunctional, but there had been no channel available for them to communicate that knowledge thereby reinforcing feelings of apathy amongst local administrators towards their work which had existed over the years.

Transfer Structure

One factor that has adversely affected the process of computerization at the DRDAs was the transfer structure prevailing in the bureaucracy. With new people arriving for training each time, there was a lack of continuity in the training programme at individual DRDAs. The transfer structure also acted as a serious disincentive for directors at the DRDA to invest time and money in sending their staff for training in the knowledge that they may be transferred at short notice. This meant that efforts at computerization have been staggered and reliant on the training received by incoming staff. It has also meant that some districts were left with no trained personnel for long periods of time.

Given the importance attached to the concept of the 'leader' in Indian administrative culture, the attitude of the director has been a crucial determining factor in the success of CRISP at individual districts. Due to their short tenure at the DRDA, directors often lacked the motivation and desire to become involved in computerization projects since this did not directly affect

their career progression. As a result, leadership messages have tended to be negative. In many cases, staff have taken this as a signal to disregard the CRISP initiative resulting in non-utilization of the technology.

Status and Hierarchy

The majority of administrators agreed with the view that caste and status influenced relations between senior and junior officer and created a psychological hiatus between ranks. With CRISP, many directors viewed the computer as a status symbol rather than as a strategic tool for more effective development planning.

According to Government of India guidelines, the computer was to be located in a cabin adjacent to the director's cabin which was to be prepared prior to installation of the computer (GOI, 1987). However, in the majority of cases, the popular choice of location became the director's cabin. The computer was seen by directors as portraying status and power as directors were able to acquire air-conditioning and improved furniture for their cabins. However, in many districts the computer caused a distraction to both the director and the user. The director himself was often too busy to use the machine, and the user felt intimidated to use it in his presence. Despite these organizational problems, the computer remained in the director's cabin and was consequently grossly underutilized.

In addition to the improved status, there was another incentive for directors to keep the computer in their cabin. With the manual system, it was possible to manipulate figures on the hard copy. However, with the computerized system, it was feared that information would be visible to many and that the elasticity of data would be reduced. Faced with the prospect of a possible realignment of power, some directors were reported to have actively discouraged other officers to use the machine.

The Informal Subsystem

While the process of decision-making within the administration appears extremely formal, this formalistic environment is only a cover for a substantially different reality of informal behavior based on deep-rooted values. For example, the formal government model of rural development planning, implementation and monitoring has been subverted for an informal system based on collusion between functionaries, nepotism and corruption. Dominance of this informal subsystem seems to have given way to a negative or passive attitude amongst local administrators towards the task of generating performance indicators which are relevant for alleviating rural poverty. This has resulted in a monitoring system which provides no input for corrective planning action.

4. Managing the Process of Organisational Change through Computerisation

The findings in the previous section reveal that the process of CRISP implementation was heavily influenced by contextual factors in the administration. Some of these contextual factors were seen to be institutional such as the transfer structure which has impeded the continuity of training, awareness-building and motivation. Other factors were social in nature such as the importance attached by individual officers to status and power. The combination of these contextual factors meant that by the end of 1989, there was the distinct possibility of the CRISP project stagnating.

This section argues that the success of the Karwar experiment and the near-stagnation of CRISP can both be attributed to how the process of change within the administration was managed in the two situations — in particular the extent to which this process included consideration of its social context. While acknowledging differences in the scale of operations between the cases, important lessons can be learnt concerning the management of organizational change through computerization by comparing the two projects.

First, perhaps the most important factor for the success of the Karwar experiment was the fact that the DRDA director himself was in control of managing the project. Since he was a local administrator himself, he possessed a good understanding of problems and requirements in rural poor communities. In contrast, the poor performance of CRISP can be attributed to the fact that from the outset there was lack of clarity about who was managing the project. Definition of the exact roles and functions of the centre and

the state in managing the CRISP initiative was a controversial issue since the centre was reluctant to hand down strategic decision-making to the state. The absence of a clear demarcation of roles resulted in poor channels of communication between end-users and those managing the project.

Second, in terms of the methods used to manage the change process at Karwar, there was a conscious effort to modify inefficient structures, procedures and formats within the DRDA with the participation of the users in systems design. With the CRISP system, the design approach adopted by the central government to replicate the manual system without altering formats, or modifying work procedures had the effect of reinforcing the inherent rigidity in the administration. Although there was general agreement by the centre on the importance and need for active user involvement in systems introduction and implementation, this principle was more preached than practiced. The lack of consultation with state governments and district officers about their information requirements led to poor awareness and knowledge on the part of many senior district officers of the problem and opportunities posed by computerized information systems.

The third point concerns the provision of resources needed to manage the project. As 'manager' of the process of change, the director had the authority to provide various incentives for staff to become familiar with the new technology. This was achieved by making time available for users to practice on the computers, and for them to share experiences with each other. With the CRISP initiative, however, the provisions made with respect to resources were insufficient in a number of ways. The findings revealed inadequacies in terms of support, training, and the provision of skilled personnel to operate the system. Junior users were pressurized into preparing reports over and above their normal duties without any incentive. It appears that the quality of working life of users was not considered in the drive to obtain greater efficiency.

In the light of the above, we suggest below some guidelines as to how the management of organisational change through computerisation may be managed more effectively within the administration. It is advocated that various groups should be involved with the change process. In this way, ownership of the problem would be shared. At the same time, it is also felt that there should be a clear allocation of duties between levels so that responsibilities can be clearly attributed.

Strategic Management — the Role of Central Government

Computer technology is extensively being used for planning and administrative functions in India. However, despite these developments, the usage of technology for development planning is a result of isolated initiatives without any preconceived strategy. In the light of the recent trends towards end-user applications, India can no longer afford to make the mistake of allowing such IT applications take their own course. Strategic direction is needed to promote long term socio-economic development, continuity and sharing of resources. In the absence of such a policy, there is a real danger of 'losing control' in terms of national development goals and priorities.

Tactical Management — the Role of State Government

Policy towards long-term development goals should be supplemented by a strong state level cell which can encourage those districts which demonstrate initiative and use state level authority to prod those districts which are recalcitrant. Incentives can be tangible or intangible. For example, positive feedback and recognition from senior officers can provide powerful incentives for junior staff to learn to use computers. Indeed, training courses themselves can be improved in such a way as to provide an incentive to users. Peterson's (1990b) study of computerization in Kenyan administration demonstrated how the issue of a certificate on successful completion of training proved to be an effective incentive as a testimony to the acquisition of a scarce skill.

The transfer structure inherent in the administration acts as a serious disincentive for the development of computerization at individual DRDAs. This suggests the need to establish a separate cadre consisting of rural development

administrators who also possess basic awareness about the potential of computers.

The state should be responsible for effective management of human resources. Training should be directed not only towards operation of the computer, but also towards local management of the technology. A special kind of training is needed to sensitise senior administrators to the technology and its application. While some hands-on experience of application packages is imperative in order to help to remove fear of the computers, sessions should deal primarily with the managerial issues related to the functioning of the information system at the DRDA. These issues may relate to the development of human resource capability, to the logistics of data collection and processing at the district, and to the exposition of recent developments in technology such as local-language user interface cards.

In order to encourage the use of information for decision-making, participants should be introduced to various analytical decision-support tools or simple spreadsheets which can be used to generate such debate in situations where a variety of 'what-if' situations need to be examined. Teamwork in carrying out projects should be given prime importance to ensure that all participants are involved with the process of development and to encourage personalized styles of working in the administration.

Finally, the state government should take steps to strengthen its capacity to provide technical support to the districts within its jurisdiction. There should be regular monthly visits by the state level support agency to individual districts. User-groups should be established to provide a regular forum for exchange between DRDA users throughout the state. These measures could greatly enhance the productivity of the microcomputers and lessen dependence on high cost technical assistance. The state government should also take steps to strengthen the capacity of individual districts to provide technical support.

While the state government should provide an overall framework for managing the process of change, care should be taken not to stifle innovative capacity at the district level.

Information Management — the Role of the Districts

The informal system was identified earlier as one of the factors preventing computerization at local level. Dominance of the informal system within the administration has resulted in a variety of leakages such as mismanagement, corruption and pilferage which are persisting unchecked behind a screen of 'rational planning'. While these leakages may be small in magnitude, their cumulative effect could substantially reduce the effectiveness of rural development.

Most information systems in the public sector are full of obsolete information, yet important decisions are often based on them. The findings revealed that the performance indicators in the existing monitoring system bear little relation to the desired objective of alleviating poverty. In order to use technology effectively, there is a need to identify useful categories of information for planning and monitoring purposes through greater involvement of local administrators as information sources.

One of the shortcomings of the present process of planning was identified as being the non-involvement of local administrators. These workers are generally in possession of vital qualitative information relating to economic variables such as seasonal unemployment, prices and social characteristics such as class structure, inter-class linkages and the political milieu. At present, however, these insights tend to remain simply at the level of informal awareness without becoming inputs into a systematic feedback system from the field, thereby introducing more accountability among workers.

Managing the Logistics of Data Capture — the Role of Districts

Given the sheer volume and volatility of data which needs to be collected for rural development monitoring, the logistics of the current system of data collection needs to be revised. Chambers (1980) presents an argument for the application of less rigid, less exhaustive and more rapid methods of rural appraisal. Apart from having the advantage of reducing the cost of administrative expenses, rapid rural appraisal

techniques would involve less time to conduct and therefore spare time for contact with the rural poor. Another possible solution to cope with the sheer volume of data which needs to be collected at base level and entered into the DRDA computer may be to automate the process of data capture at base level through the use of battery-driven data entry machines which cost roughly Rs. 7000. The information collected at base level by the village level worker could simply be downloaded onto the DRDA computer. Such a system is currently in operation in several dairies in Gujarat where hand-held data entry machines are used by the extension worker to enter data concerning milk yield.

5. Summary and Conclusion

Recent experiences of introducing computerized information systems for development planning reveal that inadequate attention has been paid to the process of managing such initiatives. This process necessitates an understanding of the organizational and human factors involved in orchestrating the change. The scope of this paper has been to describe the nature of these factors and the way in which they interact with the process of information systems implementation by presenting a case study of the CRISP system.

The findings reveal that the process of computerization needs sensitive management which was not recognized when the CRISP system was implemented. Future implementation of district level computerization will depend on how committed administrators are to the process of organisational change. It is believed that such commitment can only arise if administrators find themselves involved in this process. Some tentative guidelines were proposed which attempt to spread the responsibility of management between different administrative levels as summarized in table 1. Although the research findings presented in this paper are based on a study of selected districts in the state of Gujarat in India, the findings are suggestive of the situation in other environments and can therefore be generalizable to other developing countries undertaking similar investments.

Table 1. Managing the process of IT adoption in development administration

LEVEL OF ADMINISTRATION	ASPECT OF IT MANAGEMENT
Central government	Strategic management * long-term development goals
State government	Tactical management *incentives *education and training *coordination and support
District administration	Information management * information sources * logistics of data capture

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