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Information Age Reform of the Public Sector:
The Potential and Problems of IT for India

RICHARD HEEKS

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Information Age Reform of the Public Sector: *The Potential and Problems of Information Technology for India*

Richard Heeks

IDPM, University of Manchester, UK

richard.heeks@man.ac.uk

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Abstract

As in many countries, public sector reform in India has consisted of five main components: increased efficiency, decentralisation, increased accountability, improved resource management, and marketisation. 'Information age reform' means delivering these ongoing reform components with a more overt role for information and with greater use of information technology. A review of global experience suggests that information age reform has great potential to improve public administration and other components of the public sector.

However, the Indian reality – like that for many developing countries – has been more problematic, with many failures of such reform; failures that can be described as total, partial or failures of sustainability and replication. The explanation for such failure lies partly in the approach to reform adopted by senior public officials. A 'four Is' model of approaches is described: the pre-information age approach of 'ignore', and the information age approaches of 'isolate', 'idolise' and 'integrate'. Analysis of Indian cases suggests it is the last approach that is most likely to deliver reform objectives; yet it remains the least commonly-adopted. Changes are therefore required in current strategies for public administration training and the management of change. Such findings will hold true for many other developing countries.

A. INTRODUCTION

A1. The Reform Agenda in India

Public sector reform is, if generally defined, change within public sector organisations that seeks to improve their performance. As such, reform can be seen as an ongoing process in India since the inception several centuries ago of institutions that we now label 'public sector'. However, reform is typically defined more narrowly. It is often associated with the ideology of the 'New Right' towards the public sector; an ideology that grew up especially from the 1970s and which sought particular types of change in the way the public sector was run. This ideology has, albeit slowly and by 'fits and starts', increasingly begun to shape the agenda for change in the Indian public sector.

What constitutes the public sector reform agenda in India? There has been no consistent menu of elements but typical components – driven by the global agenda of new public management – include those listed below (Bhattacharaya, 1996; Maheshwari, 1996; Sengupta, 1995; Singh, 1996).

- *Increased efficiency*: improving the input:output ratio within the public sector. The rationale of such reforms is to address the large size of public sector expenditure and/or the inefficiency of many of its processes.
- *Decentralisation*: the transfer of decision making to lower, more localised levels of the public sector. The rationale of such reforms is to reduce the costs of centralised decision making, and to create more flexible and responsive decision making.
- *Increased accountability*: making public sector staff more accountable for their decisions and actions. The rationale of such reforms is to increase the pressure on staff to perform well, to make them more responsive to recipient groups, and to reduce inefficient or corrupt practices.
- *Improved resource management*: increasing the effective use of human, financial and other resources. The rationale of such reforms is clear from their definition. It often includes a refocusing of the way the performance of these resources is planned, measured and managed.

- *Marketisation*: increasing the use of market forces to cover relationships within the public sector, relationships between citizens ('consumers') and the public sector, and relationships and boundaries between public and private sector. The rationale of such reforms is that market relations will drive costs down and increase efficiency and/or effectiveness of service delivery.

There has been much criticism of the components listed: of what they seek to achieve in theory, and of what they do and do not achieve in practice. In this paper, we are not going to participate in that particular debate because that is not our purpose. These components will be taken as a given; as initiatives that are being ever-more widely undertaken or imposed. For increasing numbers of Indian public servants, the issue is not the rights and wrongs of reform, but how best to implement reform initiatives in which they find themselves involved.

A2. The Information Age in India

Almost simultaneous with the development of a reform agenda, there has been a growing sense in India of a real or impending 'information age'.

The roots of ideas about a new 'information age' – treated here as synonymous with emergence of an 'information economy', 'information society' or 'post-industrial society' – are invariably traced back to the work of writers such as Daniel Bell, Fritz Machlup, Yuji Masuda and Alvin Toffler (e.g. Bell, 1974; Machlup, 1962; Masuda, 1983; Toffler, 1980). Through analysis of extant trends, they described a vision of a new world paradigm that was already coming into existence and that would increasingly develop. General features of this new paradigm include a domination of services over other economic sectors, niche instead of mass markets, and the emergence of a 'post-bureaucratic' form of organisation.

The early, and optimistic, writings about the information age have been much criticised. Critics argue:

- That things have not changed as much as predicted. Peasant farmers – who, with their families, form a major proportion of the world's population – continue to live and work much as they have ever done. They have yet to appreciate the pleasures of surfing the Net or teleworking. Even in the high citadels of the new world, shifts in working patterns and social life may be tangible and important, but they are not yet revolutionary. A modified criticism is therefore that change has been, and will be, a very uneven process that creates inequalities.

- That, when things do change, there will be problems as well as benefits. The information age may be marked by higher living standards but also by unemployment, insecurity, electronic surveillance and alienation.

- That the technology focus of information age writing distracts us from the human, social and political factors which explain – and therefore ultimately determine – what happens in our world.

There is a great deal of validity in these criticisms, but what they do not deny is that – albeit slowly and unevenly, for better or worse – there are identifiable information age trends. Thus, while the concept of an information age retains a large measure of hyperbole, it does serve to highlight important trends that are shaping the world in which we live.

It is certain that they have begun to shape the economic and political context in India. Whilst many see the 1970s as something of a 'lost decade' for India in computing terms, the country more than made up in the 1980s. The 1984--87 period in office of 'Rajiv and his computer boys' marked a defining moment during which India's image and activity as a global software player really began to take off, and during which a clear link was made between computing and reform of Indian public administration.

Although information technology (IT) has never since been so heavily-championed at such a high level in government, the catalytic actions of the mid-1980s set loose two specific, related and seemingly unstoppable information age trends in India:

- The increasing importance of information, including the increasing visibility and value of information systems (see Box 1).
- The increasing use of information technology (see also Box 1).

Box 1. Defining IT and IS

Information technology can be defined as computing and telecommunications technologies that provide automatic means of handling information. IT is therefore taken here to represent equipment: both the tangible hardware and the intangible software. A computer linked to other computers on a local area network represents one example of IT.

Information systems (IS) can be defined as systems of human and technical components that accept, store, process, output and transmit information. They may be based on any combination of human endeavours, paper-based methods and IT. A financial information system of staff and computers that gathers data and processes it into reports used for managerial decision making represents one example of an IS.

Thus:
- IT on its own does not do anything useful; in order to do anything, it must become part of an information system.
- Information systems do not necessarily involve computers and telecommunications equipment.
- Even when they do, information systems are much more than just IT because they involve people and their actions.

For the public sector in India, this means that one can therefore see a trend of 'information age reform' that combines the existing reform agenda with the promise of the information age. Indeed, from humble beginnings in the Indian Statistical Institute in 1956, government expenditure on IT has grown to average more than US$350m per annum by the late 1990s (*Dataquest*, 1998).

Information age reform is therefore a growing reality for India which means two things that are different from traditional reform:

- First, a much greater (i.e. more overt) role for information and information systems in the processes of change in the public sector.
- Second, a much greater (i.e. more widely employed) role for information technology in the processes of change in the public sector.

B. THE PROMISE OF INFORMATION AGE REFORM

There is great potential for these trends of information age reform to bring significant benefits to India because government has been, and still remains, the single largest collector, user, holder and producer of information. Information is a central resource for all staff levels and for all activities: 'In pursuing the democratic/political processes, in managing resources, executing functions, measuring performance and in service delivery, information is the basic ingredient' (Isaac-Henry, 1997, p.132)

The work of government is thus very information-intensive, and four main types of formal information are identifiable:

- *Information to support internal management*. This includes information about staff for personnel management, and information about budgets and accounts for financial management. Like the other three types of information, it can be used for everything from day-to-day operational implementation up to long-term policy analysis and planning.
- *Information to support public administration and regulation*. This includes information that records the details of the main 'entities' in India: people, business enterprises, buildings, land plots, imports/exports, etc. It is used for a variety of purposes such as legal, judicial and fiscal.
- *Information to support public services*. Examples include education (e.g. school staff records), health (e.g. patient records), transport (e.g. passenger reservation information) and public utilities (e.g. customer billing information).
- *Information made publicly available*. This includes:
  - Information government wishes to disseminate such as press releases, consultation papers, details of policies, laws and regulations, and details of benefits and entitlements.
  - Information government collects that it may make available, such as demographic or economic statistics.

- Information government is required to supply such as audited accounts, internal policy documents and correspondence, and responses to requests from politicians or journalists or citizens.

Given this information-intensity, changes in information systems must be an essential part of all reform initiatives in India, and changes in information technology will also have a great potential. In theory, everything that IT can do could be done by some other means. In practice, its ability to increase the speed and/or reduce the cost of information tasks mean it can do things that would not otherwise be contemplated. IT therefore can bring change and has three basic change potentials within reform:

- *Supplant*: automate existing human-executed processes which involve accepting, storing, processing, outputting or transmitting information. For example, the automation of existing clerical functions.

- *Support*: assist existing human-executed processes. For example, assisting existing processes of government decision making, communication, and decision implementation. (This can also be seen as a potential to *empower* if IT assists the activity of citizens outside government.)

- *Innovate*: create new IT-executed processes or support new human-executed processes. For example, creating new methods of public service delivery.

IT can bring five main benefits to the reform process. In practice, these are not neatly differentiated but they can be summarised as:

- *Cheaper*: producing the same outputs at lower total cost.

- *More*: producing more outputs at the same total cost.

- *Quicker*: producing the same outputs at the same total cost in less time.

- *Better*: producing the same outputs at the same total cost in the same time, but to a higher quality standard.

- *For the first time*: producing new outputs.

The first three represent efficiency gains for the public sector; the last two represent effectiveness gains. Of course, these are the direct and objective benefits. IT can bring many others such as better staff motivation, greater political control, or an improved

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public image for the organisation (with Indian Railways being a case in point for all three of these indirect benefits).

IT is therefore seen to have a great potential to contribute to reform (Traunmuller and Lenk 1996), with this potential being illustrated by the following examples from around the world:

- *Increased efficiency*. IT's role in increasing efficiency has been described above, mainly relating to its 'supplant' role. In the US, the Lawrence Livermore National Laboratory developed a World Wide Web-based system to reduce the cost and increase the speed of parts procurement (Gebauer and Schad, 1998).

- *Decentralisation*. IT can provide support for more efficient and effective decision making at decentralised locations and create new information flows that incorporate those locations. In Ireland, the Department of Social Welfare created more than a dozen computerised applications in order to support the decentralisation of responsibilities from Dublin to outlying offices (Cooney and O'Flaherty, 1996).

- *Increased accountability*. IT can create new accountability information and can deliver accountability information to new recipients, providing for more efficient or effective accountability. In the US, 'collusion detection software' was developed and applied to root out impropriety in bids and contract awards for supply of public school milk (Anthes, 1993).

- *Improved resource management*. IT can create new performance information and deliver it to decision makers, providing more effective managerial control over government resources. In Malaysia, government development authorities collaborated to develop a computerised system to facilitate land resource management (Raman and Yap, 1996).

- *Marketisation*. IT can supply the new information necessary for the establishment of market relations, and can also form the conduit for delivery of new forms of public service. 'In Spain and Portugal, smart cards are issued to people to claim unemployment benefit at kiosks, and to check on job vacancies and training opportunities.' (Gosling, 1997, p.69).

C. INDIAN REALITIES OF INFORMATION AGE REFORM

Globally, then, new information systems and new information technology are both supporting and driving forward the process of public sector reform. But what of India? Has the country unleashed the power of information age reform, or does the potential still lie mainly dormant?

Objective reporting of information age reform cases in India (and elsewhere) is rare. Many reports are written from a 'rose-tinted' viewpoint by those with a vested interested in the reform initiative. Their glowing and uncritical claims of success frequently bear little relation to reality. Nonetheless, reliable cases can be found and one can place these into three categories.

Success

Computerisation of the Indian Railways' Passenger Reservation System may be branded a success (Heeks, 1996a). Not only did it significantly increase the efficiency of the reservation process, but it also reduced corruption (though did not eliminate it), increased rail staff morale, and improved the quality of customer service. Beyond these reform components, it also gave Indian Railways (and India more widely) a more modern image, and it helped to build information age capabilities within the country. Sadly, this case remains almost a lone beacon in India which 'seems to stand out as a solitary example of success.' (Bhatnagar, 1997, p.5).

Open Verdict

A few ongoing information age reform projects have yet to fall clearly into the categories of either success or failure. Perhaps the best-known of these is CRISP, the Computerised Rural Information Systems Project. When initially analysed, after some five years of operation, this appeared to have made little impact and to be heading for failure (Madon, 1993). Subsequent analysis, however, revealed 'sparks of life' within

the project, with some computers being used to support analytical management decision making, thereby enabling decentralisation and improved delivery of assistance (Madon and Sahay, 1996).

Failure

By far the largest category of reports – both from the formal literature and from the dozens of Indian public servants trained each year by the author – is that of failure. There are no cast-iron statistics on this and there are unlikely ever to be. Nonetheless, based on the available evidence, one can state with some degree of certainty that the majority of information age reform initiatives in India end in failure. This may be the *total failure* of an initiative never implemented or in which a new system is implemented but immediately abandoned; the *partial failure* of an initiative in which major goals are unattained or in which there are significant undesirable outcomes; the *sustainability failure* of an initiative that succeeds initially but then fails after a year or so; or the *replication failure* of an initiative that succeeds in one place but cannot be repeated elsewhere.

Formally-reported examples include the following:
- The Director of Adult Education in the National Literacy Mission Authority was smitten by the potential of IT to improve the management of literacy programmes (Jain, 1994). Having seen a software firm's demonstration, and despite glaring technical and data constraints that were obvious to any neutral observer, he commissioned a complex executive information system (EIS) that soon fell squarely into the 'total failure' category.
- Part of the Income Tax Department's tax system was computerised. The project ran into difficulties due to political antagonisms between various groups; notably between regional tax commissioners and the central tax board, and between management and unions. As a result, only parts of the information system and only a sub-set of intended process reforms became operational and even these were resisted by staff. There was therefore only very limited achievement of reform objectives (Singh, 1990).

- A computerised decision support system (DSS) was created for the Narmada Irrigation Project Authority (Rama Rao, 1990). The system was initially used to increase efficiency by helping engineers save time in their cost estimations of canal engineering work. However, the system was never properly used for its main intended purpose: the production of improved canal design. Upon retirement of the Chief Engineer who had championed use of the DSS, even the estimation use was discontinued.

- A computerised management information system was developed in Surendranagar district, Gujarat state, to demonstrate the feasibility of providing computer support to planning and monitoring tasks at the district level, thereby enabling decentralisation (Bhatnagar, 1992). Although the system proved useful, it was never adopted elsewhere because other district officers had a 'not invented here' mentality that rejected innovations made by anyone other than themselves.

C1. Understanding Information Age Reform Failure in the Indian Context

One is naturally drawn to analyse why failure should be so prevalent in India. There are almost as many explanations for failure as there are information systems. However, one key factor that emerges again and again from case study analysis is the attitude and actions of senior public officials, both politicians and managers (Gupta, 1996; Bhatnagar, 1997; Peterson, 1998). Based on discussions with such officials and their subordinates, and a review of relevant cases, we can create a 'four Is' model of different approaches to information age reform that appear over time, as described below.

The 'Ignore' Approach

In this case, public officials are ignorant about IT and information systems. They therefore do not include consideration of either in their plans for reform. IT expenditure is minimal or non-existent. This approach does not constitute information age reform and will therefore not form a major focus of this paper. Nevertheless, this

approach is still found in many – perhaps even most – Indian public sector organisations. This is sometimes even so when computers are present for, in some cases, those computers remain unused and merely act as costly 'executive paperweights'.

The 'Isolate' Approach

In this approach, public officials remain computer-illiterate and lack an understanding of information's role. They nevertheless are aware of IT and its potential. Investment in IT is therefore included in reform plans but is seen as the separate responsibility of 'computer experts'. It is mainly associated with automation and some (often spurious or concocted) idea that efficiency gains will result. For other reform agendas, it is added as an afterthought and is not linked in any systematic way to the process of reform. This, nonetheless, represents the first step on the path of information age reform.

Both the early years of the CRISP project and the Indian Income Tax project cited above are examples of the isolate approach. In these cases, the introduction of computers was seen as the responsibility of technical staff rather than being something in which mainstream managers should become involved. As a result, huge investments made very little, if any, contribution to reform agendas in these Indian public sector organisations.

This approach should not be seen as some historical aberration for it can still be found. The recent Asian Development Bank-supported project for restructuring of Gujarat's financial sector provides an example:

> 'Yet when it comes to computerisation, the cart has been
> put before the horse. There is a separate allocation for
> computerisation … The type of hardware and its allocation
> to various tax collection agencies has already been
> decided. It was envisaged that the process of
> computerisation would be completed even before the

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        thinking on financial sector reform made any headway.'
        (Bhatnagar, 1997, p.8)
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The 'Idolise' Approach

In this approach, public officials have become semi-literate. They use computers and are over-aware of IT's potential. They believe that IT can transform the business of government (or at least transform their own career/political prospects if they are seen to initiate a high-profile IT project). They are dimly aware that information is something important. The public sector becomes awash with IT-driven reform projects which place technology at the heart of the change process.

This approach has recently leapt to prominence thanks to N. Chandrababu Naidu, Chief Minister of Andhra Pradesh state. In 1997, he launched a high-profile project – the LEAP21 (Leadership and Excellence in Andhra Pradesh in the twenty-first century) initiative – that exactly fits the idolise description. This initiative aims to use IT as a main lever in the creation of better government in Andhra Pradesh and, more generally, 'focuses … on using Information Technology as a strategic tool for improving the quality of life for the people of Andhra Pradesh.' (Naidu, 1997, p.1).

The jury currently remains out on LEAP21. Chief Minister Naidu's intention of using state promotional interventions to support the development of the IT industry and IT technological capabilities is based on sound historical precedent (Heeks, 1996b). However, his hopes of driving public sector reform with IT are not. There is a long history of failure to deliver reform objectives via technology-driven projects, of which the literacy EIS case cited above is but one example (Kraemer *et al.*, 1981; Davies, 1997).

Even where technology-centred projects initially appear to succeed in delivering reform objectives, Bhatnagar (1997) warns that they may not be sustainable or replicable since they so often depend on a single 'idolising' figurehead. When that senior official transfers to a new post, the project often collapses; when other organisations try to copy, failure ensues because the originator's drive or skills are

lacking; and copying rarely takes place because 'a replication will never attract the same attention as a first time use' (Bhatnagar, 1997, p.6). In all situations, the cause is the lack of the original IT-focused champion.

Examples of these sustainability and replication failures from India include the canal design and district administration cases cited above, and another DSS used to support improved planning of resource usage in two zonal railways which was never used in other zones (Ramani, 1994). With LEAP21 so focused on Naidu himself, prospects are limited for the sustainability and replication of any successes it may fortuitously achieve.

The 'Integrate' Approach

In this approach, public officials have become information-literate. They recognise information as a key organisational resource that is central to all government functions. IT is relegated to a secondary role: it is seen as a valuable means to achieve certain reform ends, not as an end in itself. The reengineering of information systems and the introduction of IT are now fully integrated into the process of organisational change, driven by reform objectives.

The integrated approach therefore places information in the driving seat, relegating technology to an important but enabling role. In very simple terms, we can see four main steps in initiation of this approach:
1. Acceptance by key stakeholders of the need for reform.
2. Identification and communication of an agenda for reform.
3. Identification of the new and/or reengineered information systems requirements of this reform agenda.
4. Identification of the role, if any, that information technology has to play in meeting these requirements.

The successful computerisation of passenger reservations on Indian Railways can be seen to have followed this route. The need for reform of reservations was understood since at least the mid-1970s, with an agenda of modernisation widely discussed and the

need for reengineering of systems to escape the old 'one-train-per-clerk' situation widely accepted (Jain and Raghuram 1992). Information technology was then identified as the servant of this pre-existing reform agenda, not as the master of reform. Despite undeniable hiccups, this project was kept on track thanks to a vision of efficiency, accountability and customer service objectives that was shared by key stakeholders, not held by just one champion. As a result, technology solutions were shaped to fit reform objectives rather than vice versa, as is so often the case in examples of the idolise approach.

However, other examples of the integrated approach hardly exist in India. Approaches and chronologies remain unevenly distributed in India, but Bhatnagar (1997) sees much of the public sector still struggling to move away from the ignore stage. If anything, it seems likely to move on to 'idolise', as exemplified by the LEAP21 initiative, rather than 'integrate'.

D. CONCLUSION

Information age reform is seen as a relatively new activity in the Indian public sector that recognises a significant – at times even central – role for information systems and information technology. Information systems change has always been an essential part of all organisational change in government (though this may not have been well recognised at times). But what is palpably new in information age reform is the presence of information technology, which has been seen to have great potential to contribute to the reform process.

Public officials are central to information age reform and they can take different approaches in trying to realise the potential of information and IT. These approaches are summarised in Table 1.

Table 1. Summary of Approaches to Information Age Reform

Approach	Role of IT in Reform	Role of IS in Reform	Delivery of Reform Objectives	Prevalence
Ignore	None	Unrecognised	Weak	Widespread, but declining
Isolate	Peripheral	Unrecognised	Weak	Relatively limited, perhaps static
Idolise	Primary role	Limited recognition	Weak	Limited, probably growing
Integrate	Enabler	Central role recognised	Strong	Very limited, growth constrained

Despite the potential of information age reform, there remain substantial problems a) for the Indian public sector to enter the information age reform era at all; and b) for it to move on within that era to an integrated approach that will use IT to effectively enable delivery of reform objectives.

There is no magic recipe for ensuring widespread use of the integrated approach but education and training must surely form a substantial part of the package. Yet any review of current public administration training programmes in India will show that most can be described as 'ignore going on idolise' in their approach. There is little attempt to build the hybrid managers – spanning managerial, IT and IS skills – that information age government requires (Mundy, forthcoming). These skill sets remain unintegrated within current training and often ignored. Some potential public employees and in-service trainees may gain computing skills on their training programmes, but they do not gain information or information systems knowledge and skills. Any view of IT beyond the hands-on is typically simplistically-positive.

Not only does this hamper integrated approaches today, it also hints at a dangerously self-reinforcing spiral. If the present generation of Indian public managers cannot value or manage information, that sets the 'information-blind' agenda for current training and debate, thus ensuring that the next generation, too, will be unable to value or manage information. A similar spiral runs the risk of developing a 'blinded by computers' agenda of IT idolatry.

Indian public managers will also need to adopt a more strategic approach to change that drives technology needs from information needs, and information needs from reform objectives. Strategic information systems planning of this type is very much in vogue in the private sector, though the application of such techniques in practice and in the public sector remains questionable (Ballantine and Cunningham, forthcoming). Perhaps more realistic is a 'core-periphery' approach that balances strategic and tactical, central and local needs (Heeks, 1997).

Finally, encouraging an integrated approach will require cultural and structural changes in the Indian public sector to ensure that technology is the servant of reform. Such changes are never quick and so the move to an integrated approach can only be seen as a long-term process. In the interim, such information age reform initiatives as do take place in India are likely to remain dominated by isolate and, increasingly, idolise approaches. The true potential of information technology will therefore remain

untapped in most cases, with initiatives undershooting in their delivery of reform objectives.

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