Chapter 5

How Do Manual and E-Government Services Compare? Experiences from India

Deepak Bhatia, Subhash C. Bhatnagar, and Jiro Tominaga

Governments in both developed and developing countries are taking active steps to leverage the potential of information and communication technology (ICT) to improve the efficiency, effectiveness, and accountability of public sector organizations. In many countries, harnessing the power of ICT is a critical element of achieving goals to improve governance. As of 2003, 70–90 countries had national e-strategies, with e-government the most common area of focus (World Bank 2006).[1]

E-strategies generally define e-government as the provision of services and information by electronic means through an integrated conduit. A number of developing countries have adopted e-government, and while there are several success stories, a high failure rate—more than 50 percent—has also been reported (Heeks 2003b). In fact, ensuring robust performance by large-scale information systems has proven to be a challenge even for countries with highly sophisticated technical skills.

Given such a high level of risks and the substantial financial resources often required, investment decisions about e-government should be based on realistic estimations of the expected value and costs involved. But measuring the value of e-government is not a simple task. While the returns of ICT investments in the private sector can be measured by their contributions to the firms' profits, the value expected from ICT in the public sector accrues to stakeholders in many different ways and cannot always be measured in monetary terms. Thus, a first step toward more strategic ICT investment planning is to develop a framework for assessing the value derived from implementing e-government projects.

This chapter reviews recent efforts by various governments and researchers to define the value generated by ICT use in the public sector primarily in developed countries. Building on this understanding, the chapter presents an assessment framework that can be used to estimate the value delivered to different stakeholders from an e-government project. This framework of ex post assessment is then applied to five state- or municipal-level projects in India that used ICT to improve the quality of public service delivery, using data from a survey commissioned by the World Bank (Bhatnagar 2007). The assessment analyzes positive and negative changes reported by citizens on the costs of accessing public services and the perceptions of service and governance quality that came with the shift from manual to electronic service delivery in the five projects.

The chapter has three sections. The first reviews several existing frameworks for assessing ICT investment in public organizations and presents the argument for the framework proposed in this chapter. The second section assesses the five projects in India using the proposed framework. The final section summarizes findings, analyzes some of the reasons for the perceived impacts, and explores the application of the proposed framework to ex ante assessments.

Research Review: Assessing Public Sector ICT Projects

A significant number of academic and policy studies have been conducted on effective methods to evaluate public sector ICT projects. For example, United Nations Online Network in Public Administration and Finance (UNPAN 2005) and Brown University (2007) provide macro-level estimates of e-government activity using appraisal indexes focused on supply-side, quantifiable measures such as government Web presence, network coverage, institutional and regulatory support, and human capital provision. These assessments tend to focus almost exclusively on measuring physical access to certain types of ICT without incorporating issues such as affordability, appropriateness, ICT capacity and training, and the regulatory and macroeconomic environment (Bridges.org 2005).

A second group of studies, which have occurred in an unsystematic manner and are largely anecdotal, provide project-level evaluations with little prospect for synthesis from past approaches. This group includes a considerable number of case studies of ICT projects, often commissioned by international development institutions, research institutes, nongovernmental organizations (NGOs), and government agencies. A small number of studies in this group have focused on project impacts in terms of how they affect citizens and government agencies, though their findings have seldom been linked to broader national, regional, or global trends—for example, in terms of changes in the approach to development and governance policy (Grant 2005; Heeks 2003a; Madon and Kiran 2002).

Recent research on information systems and management has focused on the underlying change processes involved in introducing ICT. Of importance here is the evolving historical and institutional background in which ICT projects are implemented, as the organizational background has been shown to influence the process by which resources allocated for ICT projects lead to successful or unsuccessful systems (Avgerou and Madon 2004). The growing body of literature on enterprise information systems focuses on the process of change within projects. The information systems success model presented by Delone and McLean (1992) has been widely cited. This model is based on an analysis of 180 papers and proposes six major, interlinked impact variables: systems quality, information quality, information systems use, user satisfaction, individual impact, and organizational impact. Impact on individuals was later broken down into economic benefits and social benefits (Seddon and Kiew 1996).

The goals pursued by a public sector information technology (IT) system tend to be more diverse than those of a private sector information system. Public sector agencies are expected to achieve various objectives. Some of these are the same as the private sector goals—for example, administrative efficiency and operational effectiveness. But pursuit of other public sector goals, such as fairness, transparency, and support for public goods, adds complexity. Measuring the impact of ICT investments in the public sector, therefore, has been a difficult task.

A fundamental difficulty arises from the fact that for many of the goals pursued and costs incurred, it is difficult to apply market prices. In addition, measurement is hindered by the need for government agencies to deliver services to a wide range of constituents and by the complexities arising from cross-agency contributions to final service delivery (eGEP 2006). Thus, efforts to develop a framework for assessing the effect of ICT applications in the public sector need to encompass the benefits to multiple stakeholders, including both users and implementing agencies.

Policy makers around the world recognize these challenges. However, as ICT is penetrating the public sector rapidly, they need to find practical solutions that will help them make appropriate IT investment decisions and demonstrate reasonable returns on investment to constituents.

Diverse approaches have been taken thus far. For example, MAREVA (méthode d'analyse et de remontée de la valeur, or method of analysis of and value enhancement) developed by France's Agence pour le Développement de l'Administration Electronique (Electronic Administration Development Agency) with help from BearingPoint, relies on return on investment calculations to measure project impact. The WiBe Economic Efficiency Assessment methodology used by Germany's federal administration calculates economic efficiency in monetary terms, taking into account several aspects of IT project costs and benefits: project urgency, qualitative and strategic importance, and qualitative effects on external customers. Under the WiBe methodology, a measure is considered economically efficient if a positive capital value is achieved over the calculation period, usually five years for IT projects (Germany, Federal Ministry of the Interior 2004).

The U.S. government's Performance Reference Model builds on value chain and program logic models to reflect how value is created as inputs (such as technology) and are used to create outputs (through processes and activities), which in turn affect outcomes (such as mission, business, and customer results). And in Australia, the link between user demand and value generation is a key underlying principle of the Demand Assessment Methodology and Value Assessment Methodology. The methodologies are based on the realization that consideration of demand forces enables the government to assess services from the perspective of users.

All these government methodologies broadly focus on the same dimensions. They offer two levels of assessment: first, in terms of how projects provide a business case justification for expenditure and whether they meet the targets set for them, and second, in terms of how projects meet the goals of the agencies concerned and, in turn, how that helps achieve wider government strategies. These assessment frameworks are guided by the strategic outcomes pursued by governments, representing broad policy priorities that drive government activities.

The framework used in this chapter builds on these recent studies and government attempts to assess ICT projects in the public sector. The recent studies described above indicate the diverse nature of benefits pursued by the public sector through ICT investments. They also suggest the difficulty of quantifying the benefits of public sector services. There is a significant emphasis on the links between ICT investments and overall policy objectives. To address these challenges and needs, this chapter defines key stakeholders as users and service providers, specifies the intended benefits to them, and measures the direction of effects using surveys.

In defining expected benefits for users, reductions in costs of accessing services and improvements in the overall quality of services and governance—both of which are based on the perspectives of users—are key measures of performance. For agencies implementing projects (that is, service providers), increases in transactions and revenues and reductions in costs of providing services are key elements of better performance. The main indicators for these performance measures are summarized in table 5.1.

In addition, the design of the survey and the methodology for measurement add some unique features for e-government in developing countries. These features are:

- Services are delivered in public centers by operators across computerized counters connected to back-end databases. Because citizens do not access services on their own through portals, Internet surveys are not an option for collecting data on their experiences with the system. Thus, face-to-face surveys were conducted.
- Reducing corruption is an important goal of many e-government projects, so survey instruments incorporated ways of measuring payments of bribes in addition to other elements of performance.
- Since the quality of record keeping and management information systems is generally poor in the manual systems used by government agencies, a relatively high reliance on perceived changes (rather than disaggregated data) on costs, transaction volumes, and revenues is required.

Survey respondents were asked to compare current services with their recollection of manually delivered services. This, however, is evidently not the ideal way of measuring changes. The survey used in this chapter adopted this approach because the baseline data prior to the introduction of e-government were lacking. Some data on transactions and revenues before computerization were available from implementing agencies. However, information on operational costs was not fully available.

This assessment therefore extrapolated changes in operational efficiency using an additional survey of supervisors who make day-to-day decisions on the operations of the five projects. These supervisors were asked to provide their perceptions of general trends in matters such as employee workloads and the number of workers involved in delivery services.[2] The latter is particularly important because labor tends to be the largest cost in service-oriented activities.

Analysis of Five E-Government Projects in India

The following sections apply the framework described above to analyze five projects in India that aimed to improve the quality of public service delivery through e-government. The services provided by these projects vary—from issuance of land records for farmers, to registration of property sale and purchase deeds, to payment for public utility services, to payment of taxes. A common feature of these projects is that they are intended to improve public services through computerization of service delivery points. Because these are locations where citizens have direct contact with public

Table 5.1 Performance Measures and Indicators for ICT Projects for Users and Service Providers

Stakeholder	Performance measure	Key indicator
Users	Costs of accessing services	Number of trips required to complete the service
		Travel costs, based on distance to service delivery site
		Waiting times at service delivery site
		Payments of bribes to receive satisfactory services
	Quality of service and governance	User perceptions of service quality, transparency, and accountability (five-point scale)
Implementing agencies	Transaction volume and revenue	Growth in transaction volumes
		Growth in revenues
	Operating cost	Supervisor perceptions of cost impact

Source: Data from surveys.

sector organizations, they are quite significant in shaping citizen perceptions of public services. The five projects assessed in this chapter are as follows:

- *Bhoomi.* This project has been operational since 2001. At the time of the survey in 2006, 203 kiosks in the state of Karnataka were delivering two online services: issuance of records of rights, tenancy, and crop inspection register (RTC) and filing of requests for mutation (changes in land ownership) for affecting changes in land records.
- *Karnataka Valuation and E-Registration (KAVERI).* KAVERI has been operational since 2003. By 2006, 201 offices of the subregistrar in Karnataka were delivering three key services: registration of property sale and purchase deeds, issuance of nonencumbrance certificates, and issuance of copies of previously registered deeds.
- *Computer-aided Administration of Registration Department (CARD).* CARD was launched in 1998. By 2006, 387 offices of the subregistrar in Andhra Pradesh were delivering the same three online services provided by KAVERI.
- *eSeva.* In 2002, 45 eSeva centers became operational in Hyderabad, the capital of Andhra Pradesh. These one-stop service centers now deliver 135 services from central, state, and local governments and public utilities, and are used by 3.1 million people per month at 275 locations in 190 towns.
- *Ahmedabad Municipal Corporation (AMC) Civic Centers.* Launched in 2002, this project uses 16 civic centers to deliver three important services: annual payment of property taxes, issuance of birth and death certificates, and issuance of shop licenses.

The framework presented in the previous section was used to assess whether these e-government projects have improved key measures of performance for public services. The assessment is based on data collected through surveys of randomly selected users and project supervisors in the implementing agencies conducted between June and September 2006.

While ICT is an important component of these sample projects, associated efforts such as changes in administrative processes and introduction of more client-oriented public services are also integral parts of the projects. As mentioned earlier, this assessment largely relies on the survey of stakeholder perceptions of public services before and after these projects. It is not an evaluation of investments in narrowly defined ICT, which typically includes hardware, software, and communication equipment. Rather, it is a review of the outcomes of packaged efforts involved in the transition from manual services to those using ICT as a key component.

User Evaluations of Manual and E-Government Services

This section presents the data collected from the survey of users. Data from 240–250 randomly selected users in eight service centers were collected for each project. Questions were asked to encapsulate their experiences using the

computerized service delivery systems as well as the previous manual systems. (Annex table 5A.1 provides a profile of the respondents.) Respondents were asked to answer about 120 questions related to the following:

- Costs of accessing services, including the number and cost of trips required to complete a service, the amount of bribes paid to complete the service satisfactorily, and the waiting time at the service center
- Overall quality of service, rated by a five-point scale, also including questions regarding likely attributes to the quality of service, for example, responsiveness of staff, convenience of office location, office hours, and facilities at the service center
- Quality of overall governance, for example, transparency, corruption, fairness of treatment, quality of feedback, and levels of accountability.

Respondents were also asked to rate the manual and computerized systems based on a common set of 18 attributes covering cost of access, convenience, and quality of service delivery and governance.

Cost of accessing services. Access costs are a key measure of the performance and accessibility of public services. In most cases, computerized services are perceived as improvements over manual services. The number of trips required to complete a service fell in all five projects, with an average reduction of 0.75 trip per user. CARD users claimed a decrease of 1.38 trips—the largest reduction among the five projects (figure 5.1).

E-government helped achieve these improvements in several ways. With manual services, users often were not sure when the service they requested would be delivered. As a result, they had to make several visits to the respective government office to see if the requested services had been completed. Computerization has made service delivery more predictable. E-government systemizes the work flow for delivering services, and automation makes each step more efficient. For example, in CARD, the process of making a manual copy of a 30–40-page registry document has been replaced by scanning, making it possible for the agency to adhere to promised delivery times. Moreover, delays at any stage can be easily monitored and corrective action taken.

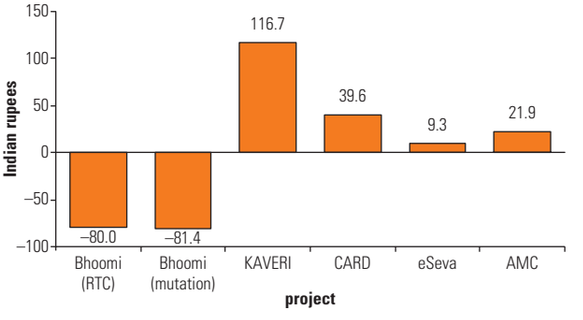
Savings in travel costs depend on the number of trips taken and the distance traveled per trip. For example, in the Bhoomi project, the travel costs increased for many users after computerization even though the number of trips was reduced (figure 5.2). This is mainly because service delivery sites were moved from village offices to *taluka* (an administrative division consisting of a number of villages, towns, and possibly a city) headquarters. Consequently, many users must travel farther to receive services, substantially increasing travel costs.

Waiting times at service sites decreased in all five projects. For projects where the reduction in waiting time was statistically significant (only Bhoomi RTC was not statistically significant), the reductions ranged from 16.2 minutes (AMC) to 96.2 minutes (CARD; figure 5.3). With manual systems, users often had to wait in long lines to receive services. The e-government system has increased the efficiency of document processing.

Figure 5.1 User Report of Number of Trips Saved, by Project

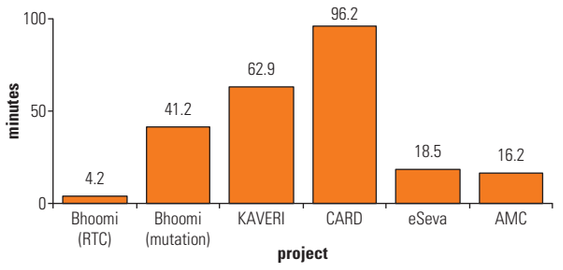
Source: Data are from surveys.

Figure 5.2 User Reports of Changes in Travel Costs, by Project



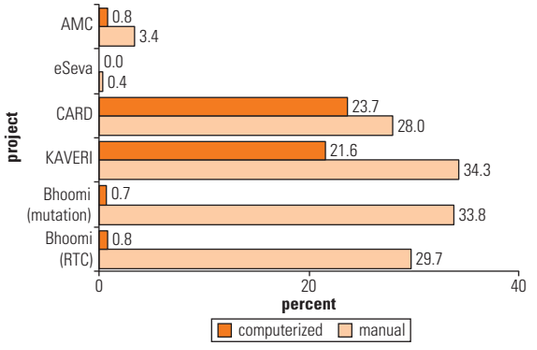
Source: Data are from surveys.

Figure 5.3 User Reports of Reductions in Waiting Times, by Project



Source: Data are from surveys.

Figure 5.4 User Reports of Reductions in Bribe Payments, by Project



Source: Data are from surveys.

Bribes paid to officials are another cost for users, because bribes are often required to accelerate service delivery. Under e-government projects, fewer users need to pay bribes than under manual systems. The decline in bribery is more substantial in some projects than others (figure 5.4). For example, in the Bhoomi project, about 30 percent of users paid bribes under the manual system—while less than 1 percent pay bribes in the e-government system.

The share of respondents among KAVERI and CARD users who had to pay bribes continues to be high, despite computerization, at 22 and 24 percent, respectively (see figure 5.4). A more detailed study of one of KAVERI's delivery sites suggests that bribery tends to occur when the e-government system experiences a breakdown. In the specific case that was studied, there was a surge in property transactions in an area being developed as a residential estate. The e-government center had the capacity to handle 15–20 transactions a day, yet at peak load hundreds of clients a day were seeking to register their property—leading to a complete breakdown in e-government services and a surge in bribes for accelerated transactions. Computerized scheduling of property registration may have led to an orderly queue, but this feature was not part of the system design.

It is difficult to ascertain all the reasons for the sharp reduction in bribery in the Bhoomi project. But it appears that the introduction of a first-in-first-out system for handling service applications and an increase in transparency contributed to this success (box 5.1).

Though the frequency of bribe payments has declined, the average amount paid increased under every project (table 5.2). General inflation could be part of the reason, but higher bribes also suggest that the complexity of the favors requested through bribes may have increased under e-government.

A qualitative study of each project would provide better explanations for the variations in bribery across different projects. It should be noted here that estimates of bribes are less accurate than other results, because the sample of respondents paying bribes was small, resulting in higher standard errors in the bribe estimates.

The survey results presented in this section suggest that e-government services have generally lowered access costs for users. But the size of changes varies by project, and the differences are partly caused by project design. For example, travel costs increased significantly for users under the Bhoomi project, due to the change in location of service centers. This design was adopted in the initial phase until a reliable communication infrastructure could be built to provide services in rural areas—underscoring the binding nature of infrastructure limitations on the impact of electronic service delivery.

Quality of services. Users were asked to rate manual and computerized services on a five-point scale. They consistently rated the computerized service higher than manual service in overall quality, and the higher ratings were found to be statistically significant (figure 5.5). eSeva exhibited particularly significant improvement in service quality. Despite significant reductions in the number of trips, travel costs, and waiting times, KAVERI and CARD showed smaller improvement in perceived service quality.

Users were also asked to rate, using the same five-point scale, 18 common attributes encompassing broad aspects of service delivery for each project. These attributes included elements such as service delivery location, accessibility, convenience, cost, transparency, and service orientation.[3]

Box 5.1 Explaining the Bhoomi Project's Success in Reducing Corruption

The Bhoomi project recognized the existence of corruption (see Bhatnagar and Chawla 2007) and sought to reduce it by reengineering many processes. All mutation requests must be logged into the system by an operator, and such requests may subsequently be rejected after formally recording a reason. A first-in–first-out system was also introduced to handle mutation applications in the computerized system, thus removing the opportunity for officers to give an application priority that was available under the manual system. To minimize resistance from village accountants who stood to lose income from bribes, a fresh set of recruits was hired to operate the kiosks.

Bhoomi provides a complete audit trail—including biometric login—for any changes made to the database, to ensure that actions can be traced. Anyone can get the copy of the records of rights, tenancy, and crop inspection register (RTC) by paying a fee. Thus records become transparent, as it is easy for landowners to verify data on the landholdings of neighbors. In fact, farmers request nearly a quarter of RTCs, to verify the correctness of records for land they own. At some locations touch-screen terminals can be used to view records.

The Bhoomi project had a vision for how the scale and scope of services will expand over time. Although in the first phase farmers had to go to a specific Bhoomi kiosk to get the RTC, 11 centers have since been interconnected, and the data are also mirrored on a central server. In addition, the RTC can be issued by private kiosks authorized to connect to the central database. Bhoomi also exchanges information with KAVERI, making it mandatory for citizens who buy or sell rural land to get land records modified. It is expected that the enhanced data exchange will further increase transparency and accountability.

Source: Bhatnagar and Chawla 2007.

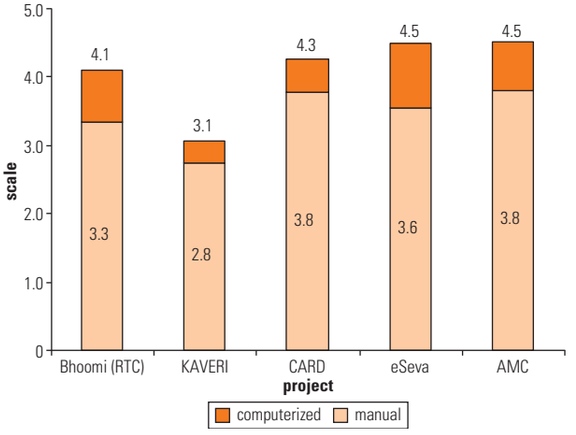
Table 5.2 User Reports of Bribes Paid to Functionaries and Intermediaries/Agents, by Project

	Bhoomi					
System	RTC	Mutation	KAVERI	CARD	eSeva	AMC
Amount of bribes paid to officials (rupees)						
Manual	48.7	39.6	215.1	726.8	200.0	83.3
Sample size	71	46	81	65	1	8
Standard error	5.13	1.95	26.96	137.98	n.a.	18.32
Computerized	50	200	576	1,094	0	150
Sample size	2	1	51	55	n.a.	2
Standard error	n.a.	n.a.	78.149	224.380	n.a.	50.000
Other amounts paid to intermediaries/agents (rupees)						
Manual	39.4	46.1	91.9	256.4	0	77.3
Sample size	62	53	24	78	n.a.	11
Standard error	1.71	3.58	11.43	23.76	n.a.	7.87
Computerized	78.8	50.0	200.8	398.6	0	60.0
Sample size	4	1	8	72	n.a.	1
Standard error	41.25	n.a.	74.72	40.79	n.a.	n.a.

Source: Data are from surveys.

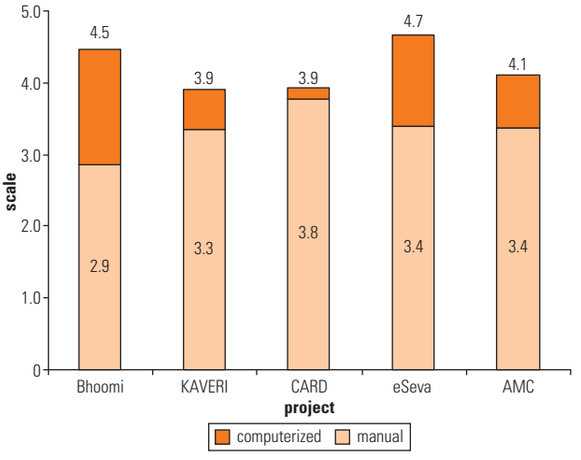
Note: n.a = not applicable.

Figure 5.5 User Perceptions of Increased Service Quality, by Project



Source: Data are from surveys.

Figure 5.6 Changes in User Perceptions of Overall Composite Score, by Project



Source: Data are from surveys.

A weight was assigned to each attribute based on the proportion of respondents who selected the attribute, and weighted scores were calculated for each attribute as the product of the weight and the difference between the average scores for the attributes under manual and computerized systems. The sum of these differences denotes the improvement in composite scores of computerized service delivery.

The results indicate that the Bhoomi project shows the greatest improvement, despite its manual version having the lowest score (figure 5.6). eSeva also shows a significant improvement, as its computerized service centers are rated close to "very good" in the composite score. KAVERI and CARD indicate only marginal improvements over manual systems, consistent with the low ratings they received for overall service quality.

Differences in user satisfaction among projects may be explained by a variety of internal and external factors. In some projects IT-enabled improvements were closely aligned with the attributes of public service delivery considered important by users. For example, the survey asked respondents to list the three factors they considered most important for the respective services. The most frequently cited attributes were related to transactional efficiency, such as increase in convenience, reductions in visits and waiting times, better governance (e.g., less corruption), and better quality of service (e.g., reduced error rates and increased convenience) (table 5.3).

Users of KAVERI showed a strong preference for less corruption, increased transparency, error-free transactions, and shorter waiting times. CARD users also showed a preference for less corruption as well as for increased convenience, shorter waiting times, and fair treatment by officials providing services. But the design of the KAVERI and CARD projects provided little focus on reducing corruption. Thus, it is not surprising that perceived improvements in service quality were small in these two projects.

In addition to differences among projects, the survey results suggest variations in performance within projects. Earlier analyses of client impacts were based on the total number of respondents, typically surveyed in eight locations. Data were analyzed to understand if there were differences by location of service facility on a few key dimensions across all projects. For improvements in composite scores, there is significant variation among the KAVERI, AMC, and Bhoomi projects. Variations in the CARD project are small because improvements were marginal. In eSeva, the overall improvement was significant, but variations among service delivery sites are small.

Variations in service quality are largest among Bhoomi service kiosks. The key indicators of surveyed Bhoomi service kiosks are shown in table 5.4. Kiosk 4 had the largest deterioration in composite score, with users indicating 0.58 point deterioration in overall performance relative to manual systems.

Table 5.3 Users' Top Four Desired Features of Services, by Project

Project	Features
Bhoomi	Error-free transactions, reduced delays in transactions, shorter waiting times, and fewer visits
KAVERI	Less corruption, increased transparency, error-free transactions, and shorter waiting times
CARD	Increased convenience, shorter waiting times, less corruption, and fair treatment
eSeva	Increased convenience, shorter waiting times, more convenient time schedules, and fair treatment
AMC	Increased convenience, less corruption, greater transparency, and good complaint handling system

Source: Data are from surveys.

Table 5.4 Variations in Service Quality across Seven Bhoomi Project Kiosks

	Location							
Indicator	Kiosk 1	Kiosk 2	Kiosk 3	Kiosk 4	Kiosk 5	Kiosk 6	Kiosk 7	Average
Number of mutations per year	4,860	6,880	9,888	15,564	54,132	11,491	32,050	16,861
Average distance of users to kiosk (kilometers)	21	15	23	21	12	15	12	17
Composite score difference (five-point scale)	0.14	1.17	–0.01	–0.58	2.14	2.68	1.92	1.60
Travel cost saved (rupees)	–148.9	–119.1	–140.0	–460.0	–79.6	–38.8	–33.8	–81.4
Waiting time saved (minutes)	–51.8	–30.0	45.0	–60.0	51.3	116.0	54.1	41.2
Preference for computerization (percent)	69.7	62.1	66.7	40.0	98.3	100.0	100.0	79.3
Power supply breakdown								
All the time	0	0	0	0	0	0	0	0
Often	42.9	0	50.0	33.3	0	0	0	20.8
Sometimes	28.6	100.0	50.0	66.7	100.0	75.0	100.0	66.7
Rarely	28.6	0	0	0	0	25.0	0	12.5
Never	0	0	0	0	0	0	0	0

Source: Data are from surveys.

Note: Data for kiosk 5 were collected from two centers located in the same district and a sample of 60 (twice that of the other kiosks).

The last row in table 5.4 shows the incidence of power supply breakdowns based on responses from three to four operators at each kiosk (half of all operators working at the kiosk). In kiosks 1, 3, and 4, which rate relatively poorly on composite scores and preference over manual systems, more operators reported that power supply breakdowns occur often. This suggests that variations in power supply contributed to the composite score rating and preference for e-government under the Bhoomi project.

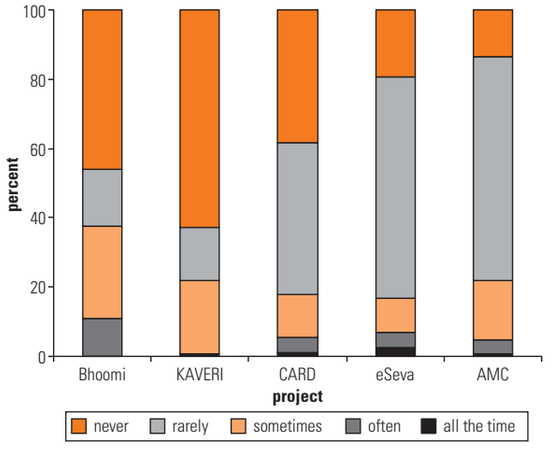
Recognizing the significance of the quality of available infrastructure to users' perceptions of services, service delivery site operators were surveyed to understand the quality of infrastructure in these projects. Operators were asked about the frequency of system breakdowns, such as failures in power supply, connectivity, hardware, and software. The results are predictable, with urban projects such as AMC and eSeva showing better infrastructure than the Bhoomi project where centers are in semiurban areas (figure 5.7). This implies that KAVERI and CARD, which were rated relatively low on all the aspects assessed, are not especially prone to system failures. The Bhoomi project, which substantially reduced the incidence of bribery and had the largest improvements in user perceptions, experienced more technical problems than KAVERI and CARD. Although the quality of infrastructure is important, its impact on user perceptions of service delivery was largely contained.

Implementing Agencies of E-Government Projects

For implementing agencies, a major expected outcome of e-government is increased operational efficiency. This chapter examines trends in the amount of fees and taxes collected, the number of transactions, and operating costs. Tracing accurate cost and revenue data before the computerization turned out to be an extremely difficult exercise, since only limited efforts had been made by implementing agencies to produce such data systematically. In addition, because computerization projects are implemented as part of larger portfolios of public services delivered by implementing agencies, it was often difficult for the agencies to separate costs of individual initiatives. This lack of baseline data made it impossible to accurately identify status before computerization.

Despite the limitations, the information available at the time of this study is summarized in table 5.5. It suggests that both the number of transactions and the revenues from taxes and fees increased quite substantially in most cases. The data for KAVERI and CARD, however, were more complete with respect to the situation before computerization. In both projects, considerable increases were recorded for the year when computerized services started. Though some of the transaction and revenue increases might be due to e-government, it was not possible to establish an unambiguous relationship. For example, eSeva's integrated service centers provide multiple services from different government departments at one location. This makes it more convenient for users to pay utility bills, which is why the number of transactions increased so quickly. Manual systems required citizens to visit different service centers operated by individual departments. Similarly, the increased revenues collected by CARD and KAVERI could be the result of improvements in the collection of stamp duties and the introduction of more transparent, rule-based processes for valuing property.

Figure 5.7 System Breakdowns, according to Service Delivery Site Operators, by Project



Source: Data are from surveys.

Given the lack of comprehensive data, the study tried to gauge the effects of computerization on implementing agencies through a survey of 85 supervisors of the five projects. These supervisors manage day-to-day operations of the service centers and are in a good position to track how e-government affects operational efficiency. The survey asked supervisors their perceptions of changes in costs, governance, and work efforts, using a five-point scale. The results suggest that the supervisors surveyed did not perceive a significant decrease in key components of operating costs, namely, those related to labor, facilities, and communications. More than half of the supervisors said that labor costs either remained the same or increased (figure 5.8)[4] and that labor is the major component of operating costs for these services.

A separate review of KAVERI and CARD, however, reveals a different picture, suggesting that operational efficiency has improved in both projects. Total costs as a percentage of fee revenue fell from 6.5 percent to 4.2 percent between 2003/04

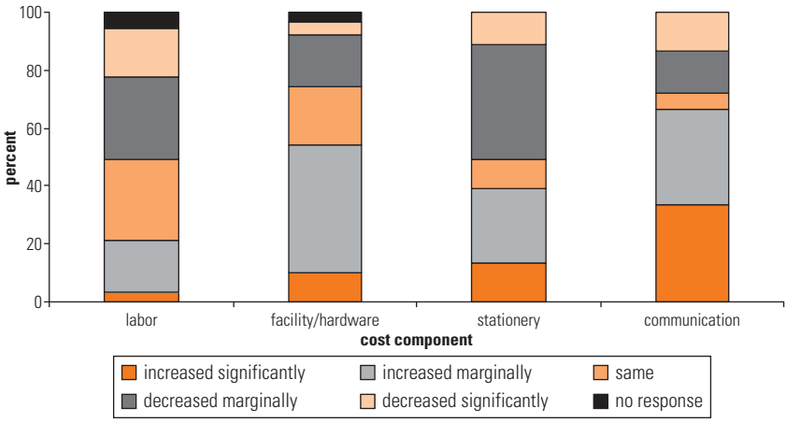
Table 5.5 Impact of Computerization on Agency, by Project
(percentage of annual growth)

	Bhoomi					
Indicator	RTC	Mutation	KAVERI	CARD	eSeva	AMC
Tax revenues	n.a.		28.7	24.0	n.a.	44.7
Transaction fees	22.2	87.8	11.6	24.7	120.2	17.5
Number of transactions	22.2	87.8	10.6	16.8	87.7	38.0

Source: Data are from surveys.

Note: The years for current and base figures for tax revenues, transaction fees, and number of transactions vary for each project according to project starting date and data availability. Growth rates are annualized. n.a.= Not applicable.

Figure 5.8 Computerization-Driven Changes in Operating Costs for Implementing Agencies



Source: Data are from surveys.

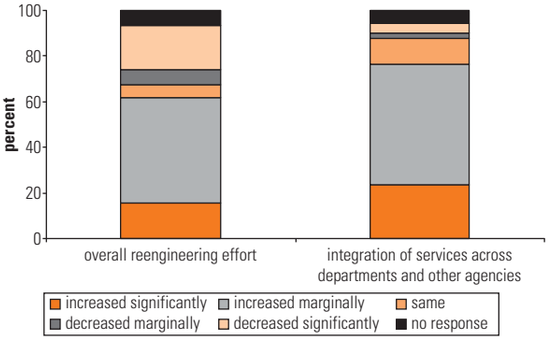
and 2005/06 for KAVERI, and from 5.2 percent to 3.7 percent between 2002/03 and 2004/05 for CARD. But available data are not sufficient to ascertain whether similar improvements occurred in the other projects.

Part of the ambiguous results in efficiency gain may be explained by the level of process changes implemented in these projects. Most supervisors reported that the extent of reengineering and integration of services was moderate during the computerization process (figure 5.9). Business process change is a challenging task for any organization, particularly when it involves workforce reductions. Moreover, public organizations generally have fewer incentives for cost efficiency than do private firms.

Still, process change is a key driver for increasing efficiency in any institution. It forces agencies to review workflow and approval procedures, with the goal of implementing better processes enabled by technology that was not available when existing processes were developed. Automating arcane, inefficient processes with IT would have little impact. The mixed efforts in business process change and the lack of systematic tracking of cost data may be rooted in the low priority that implementing agencies place on increasing operational efficiency.

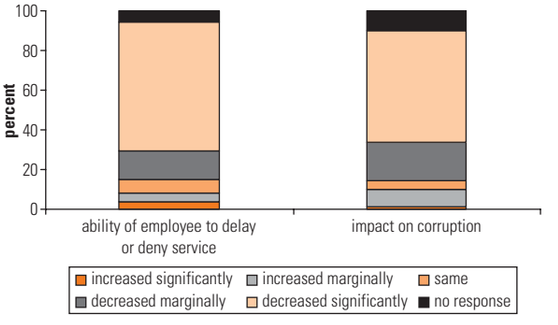
Supervisor perceptions on changes in rent-seeking behavior corroborate user perceptions on bribery. An overwhelming proportion of supervisors think that corruption has decreased since computerization. They sense that discretionary power—through means such as denying services to citizens—has narrowed (figure 5.10). They are also more

Figure 5.9 Impact of Computerization on Business Process Change



Source: Data are from surveys.
Note: For "overall reengineering effort," "increased significantly" implies significant reengineering and "decreased significantly" implies insignificant reengineering.

Figure 5.10 Impact of Computerization on Corruption and Service Denial



Source: Data are from surveys.

aware of the need to comply with service standards specified in citizen charters. Their perception of the increase in data accuracy is consistent with the reduction in error rates reported in the user survey.

Limitations of This Assessment and Areas for Further Research

This chapter assesses five e-government projects primarily through surveys of service users and providers. Though the study generated a rich data set providing insights on how these projects are functioning, there are limitations. First, the study of impacts on users relied on assessments of manual and computerized service delivery systems through a survey of users familiar with both systems. These users, however, had to rely on their memories when assessing the manual systems. In cases where computerized systems were introduced many years ago, memories could be inaccurate. And since four of the five projects have replaced manual delivery with computerized processes, most current users have no option of accessing services manually. Moreover, a lack of reliable baseline data on operational performance from implementing agencies prevented the study from identifying changes in the operational efficiency of the service providers. In addition, the surveys would have yielded more robust results had they used larger samples.

Second, a more detailed analysis of the overall enabling environment, which could influence the performance of the implementing agencies and delivery systems on the indicators used in this assessment, would have helped separate the effect of computerization from certain factors. These include the existence and quality of government strategies for e-government, the amount of political and popular support for improving public sector organizations, the overall macroeconomic situation, and access to telecommunication and IT services.

While recognizing these limitations, the study was able to establish that a very large number of users prefer computerized service delivery systems and provide some explanations for this preference. The five projects analyzed succeeded in reducing some key costs for users in accessing public services, including the number of trips to and length of waiting times at service delivery locations (table 5.6; see annex table 5A.2 for more detailed results). The frequency of paying bribes to service officials has also fallen. But in some cases, travel costs have increased substantially because the number of service delivery points fell after computerization.

Users appear to recognize the improvement of computerized over manual services, as they consistently rated the computerized services to be of higher quality. While users' desired attributes of services related to the five projects differed, the attributes cited most often were increased transactional efficiency and improved governance and quality. Although the revenues of implementing agencies increased, available information makes it uncertain whether this change is due to computerization. And based on the survey of agency supervisors, computerization has had an ambiguous effect on operational efficiency. Supervisor observations that room for discretion and corruption decreased since computerization corroborate the findings on user behavior—that is, fewer bribe payments.

Some of these benefits of computerization were achieved across all five projects, which were implemented independently in diverse environments. Although the results of the study should be interpreted with caution, they point to the potential of ICT use in improving public service delivery. For further confirmation of this potential, the costs and benefit of ICT investments need to be studied in more projects and in different countries.

Given the experiences and lessons from the assessment in this chapter, it is suggested that future attempts to measure

Table 5.6 Summary Results of User Survey, by Project

	Bhoomi					
Indicator	RTC	Mutation	KAVERI	CARD	eSeva	AMC
Number of trips saved	0.48	0.47	1.20	1.38	0.29	0.65
Travel costs saved (rupees)	–79.96	–81.38	116.68	39.63	9.34	21.85
Waiting times saved (minutes)	4.23	41.21	62.92	96.24	18.50	16.16
Difference in overall service quality score (five-point scale)	0.76	0.95	0.32	0.48	0.95	0.70

Source: Data are from surveys.

the impact of e-government explicitly incorporate two additional dimensions. First, they should include more comprehensive analysis of the enabling environment and the external factors that have potential effects on outcomes; and second, they should provide a thorough examination of project components to clarify interventions that generate positive outcomes. The proposed conceptual framework, summarized in table 5.7, is quite similar to the hierarchical layers used in the measurement frameworks developed by some governments presented in the research review of this chapter.

Conclusion

This chapter has tried to ascertain the size and direction of impacts of selected electronic service delivery projects in India. The literature review of impact assessments revealed that frameworks used by several governments should focus more on the impact that ICT can bring to implementing agencies. Yet the beneficiaries of electronic service projects are primarily citizens and businesses that use them. Thus, this chapter proposes a framework that reflects the benefits and costs for users as well as implementing agencies.

The assessment framework was used to undertake ex post assessment of ongoing projects. The basic concept should be applicable for ex ante evaluation, which aims to arrive at realistic estimates of the nature and scale of improvements anticipated from planned projects. Ex ante evaluation would require that certain assumptions be made. For example, the extent and adoption rate of user demand need to be estimated. Project designs and investment levels must be commensurate with anticipated benefits to users. In addition, the quality of the enabling environment should be assessed to gauge the expected impacts of planned projects (see table 5.6). Detailed surveys at the initial stages of project planning, to establish the preproject costs of accessing services and the quality of services, would eventually help establish a baseline from which improvements can be projected and future monitoring processes designed.

This chapter has identified several factors that could be critical for successful e-government projects in developing countries. First, it showed that service centers played an important role in determining success in the sample projects, due to the fact that most service users in the projects analyzed do not have Internet access at home. Thus, service delivery through computerized service centers is essential to reach

Table 5.7 An Assessment Framework for E-Government

Goal	Example of performance indicators	Key feature of the enabling environment
Outcomes		
Increased efficiency	Financial and time savings in government activities	Overall e-government strategies
Increased transparency and accountability	Public perceptions, such as user satisfaction and score cards	Political and popular support for cross-agency coordination and public sector reform
Higher-quality public services	Financial and time savings for citizens	Telecommunications infrastructure and cost structures for increasing ICT access
Better access to services	Increased public service timeliness and responsiveness	Supportive legal and regulatory frameworks
	Reduced errors	Balances with competing priorities (such as roads and education)
	Financial saving per transaction	Macroeconomic changes
Outputs		
Reengineered processes	Comparisons of old and new business processes	
New ICT systems	Technical reviews of IT infrastructure, applications, and performance	
Increased service coverage	Variety of available services	
	IT support capacity	
	Service training	

Source: Data are from surveys.

Annex: Information from User Surveys on E-Government Projects in India

Table 5A.1 Profile of Respondents to User Surveys on E-Government Projects

	Bhoomi	KAVERI	CARD	eSeva	AMC
Number of respondents	242	237	232	253	239
Nature of clients	Farmers	Property owners	Property owners	Urban dwellers	Urban dwellers
Education					
Illiterate	36.78	27.00	9.91	3.95	2.09
Schooled	52.07	55.70	58.62	57.71	63.18
Graduate	11.16	17.30	31.47	38.34	34.73
Profession					
Workers	90.91	69.20	38.79	33.99	17.15
Business	4.13	12.24	34.91	27.27	45.19
White collar	1.65	6.75	10.34	22.53	17.15
Supervisor	3.31	11.81	15.95	16.21	20.50
Average annual income (rupees)					
Less than 5,000	92.15	71.73	43.10	40.71	15.07
5,000–10,000	5.79	19.83	44.40	42.69	65.75
More than 10,000	2.07	8.44	12.50	16.60	19.18
Location					
Urban	28.93	32.49	70.26	100.00	100.00
Rural	71.07	67.51	29.74	0.00	0.00

Source: Data are from surveys.

Table 5A.2 Summary of Findings of User Surveys on E-Government Projects

	Bhoomi					
Indicator	RTC	Mutation	KAVERI	CARD	eSeva	AMC
Number of trips saved	0.479	0.473	1.200	1.384	0.285	0.654
Standard error	0.139	0.152	0.119	0.115	0.089	0.145
Significance	***	***	***	***	***	***
Travel cost saved (rupees)	–79.958	–81.381	116.684	39.632	9.342	21.853
Standard error	5.083	11.305	18.103	6.317	2.228	5.256
Waiting time saved (minutes)	4.230	41.206	62.915	96.240	18.498	16.164
Standard error	9.433	9.149	7.003	7.950	1.642	1.579
Significance	Not significant	***	***	***	***	***
Difference in overall service quality score (five-point scale)	0.756	0.946	0.316	0.475	0.947	0.700
Standard error	0.067	0.078	0.037	0.046	0.044	0.049
Significance	***	***	***	***	***	***

Source: Data are from surveys and authors' analysis.

Note: *** Significant at the 99 percent confidence level.

target audiences. This situation is similar in many other developing countries; how the service centers in the sample projects are operated might be a model that other countries should consider. India's government is implementing a National E-Government Program at an estimated cost of $5.5 billion to address the access issue (Seshadri 2007). Part of this ambitious plan is to create 100,000 citizen service centers in rural areas by expanding networking infrastructure.

This chapter's assessment also suggests that in order to ensure public support, e-government project design incorporate attributes considered important by users. Thus, efforts to analyze user needs and demand should precede e-government project design. The quality of supporting infrastructure—such as power supply—is also important to the success of e-government projects. In the five Indian projects studied, service centers with more frequent power outages were rated lower by users. Power supply capacity is often taken as a given by e-government project planners because it is not possible to dramatically improve it in a short period. Additionally, the level and quality of Internet service are fixed in many areas. Project design should be adjusted to such given conditions. If satisfactory outcomes from electronic services cannot be expected due to limited capacity of supporting infrastructure, alternative methods based on manual procedures should be explored.

Finally, data from users and service operators indicate that the five Indian e-government projects studied likely helped reduce corruption in service delivery centers. There can be many reasons for this outcome, but reductions in discretionary power appear to make a major contribution. Further studies on the extent of reengineering, improvements in supervision, and other environmental factors can help identify features that need to be built into the design of e-government systems to reduce bribery.

Notes

1. According to World Bank (2006), the United Nations Development Programme estimates the number to be 90, while McConnell International puts it at 70.
2. Directly accounting operating costs before and after computerization was the preferred approach for measuring cost reductions, though there was no reliable way to collect cost data before computerization. It was also difficult to properly account for the costs of different services.
3. Common attributes included convenience of the location of service delivery centers or offices; convenience of working hours; simplicity of the design and layout of forms; clarity of language used in forms and other written communication; clarity and simplicity of processes and procedures; time and effort required to receive service; courtesy, helpfulness, and knowledge of staff; cost of receiving service; incidence of error-free transactions; level of corruption; fair treatment; level of transparency; system for handling complaints; accountability of officers; quality of service area facilities; efficiency of queuing systems; and protection of confidential data.
4. About one-third said that labor costs have decreased, while a quarter said that they have increased. The remainder said that labor costs have not changed.

References and Other Resources

Accenture. 2002. "2002 eGovernment Leadership—Realizing the Vision." Third Annual eGovernment Benchmarking Report, Accenture, Dublin.

Ahuja, A., and A. P. Singh. 2006. "Evaluation of Computerization of Land Records in Karnataka." *Economic and Political Weekly* (January 7): 69–71.

Andhra Pradesh IT and Communications Department. 2004. "Profiles of IT Projects." Andhra Pradesh IT and Communications Department, Hyderabad.

Avgerou, C., and S. Madon. 2004. "Framing IS Studies: Understanding the Social Context of IS Innovation." In *The Social Study of Information and Communication Technology: Innovation, Actors, and Contexts*, eds. C. Avgerou, C. Ciborra, and F. Land, 162–84. Oxford, U.K.: Oxford University Press.

Bhatnagar, Subhash. 2006. "Electronic Delivery of Citizen Services: Andhra Pradesh's E-Seva Model." In *Reinventing Public Service Delivery in India*, ed. Vikram K. Chand, 95–124. New Delhi: Sage Publications.

———. 2007. "Impact Assessment Study of Computerized Service Delivery Projects from India and Chile." Working paper, World Bank, Washington, DC.

Bhatnagar, Subhash, and Rajeev Chawla. 2007. "Online Delivery of Land Titles to Rural Farmers in Karnataka." In *Ending Poverty in South Asia: Ideas That Work*, eds. Deepa Narayan and Elena Glinskaya, 219–43. Washington, DC: World Bank.

Bridges.org. 2005. "E-ready for What? E-readiness in Developing Countries: Current Status and Prospects Toward the Millennium Development Goals." http://www.bridges.org/publications/18.

Brown University. 2007. "Global E-Government 2007." Taubman Center for Public Policy, Brown University, Providence, RI.

Centre for Electronic Governance. 2004. "Evaluations of E-Governance Projects." IIMA (Indian Institute of Management), Ahmedabad. http://www.iimahd.ernet.in/egov/documents/evaluations-of-egovernance-projects-af.pdf.

Commonwealth of Australia. 2004. "Demand and Value Assessment Methodology for Better Government Services." Information Management Office, Canberra.

Delone, W. H., and E. R. McLean. 1992. "Information Systems Success: The Quest for the Dependent Variables." *Information Systems Research* 3: 60–95.

eGEP (eGovernment Economics Project). 2006. "Measurement Framework Final Version." Prepared for the eGovernment Unit, Directorate General, Information Society and Media, European Commission, Brussels.

Germany, Federal Ministry of the Interior. 2004. "WiBe 4.0—Recommendations on Economic Efficiency Assessments in the German Federal Administration, in Particular with Regard to the Use of Information Technology." Federal Ministry of Interior, Berlin, Germany.

Grant, G. 2005. "Realizing the Promise of Electronic Government." *Journal of Global Information Management* 13 (1): i–iv.

Harmon, E., S. C. Hensel, and T. E. Lukes. 2006. "Measuring Performance in Services." *The McKinsey Quarterly* 1: 1–6. http://www.mckinseyquarterly.com/Measuring_performance_in_services_1730_abstract.

Heeks, R. 2003a. "Most e-Government-for-Development Projects Fail: How Can Risks Be Reduced?" www.sed.manchester.ac.uk/idpm/research/publications/wp/igovernment/documents (accessed November 26, 2007).

———. 2003b. "Success and Failure Rates of E-Government in Developing/Transitional Countries: Overview." University of Manchester, IDPM (Institute of Development Policy and Management), U.K. http://www.egov4dev.org/sfoverview. htm.

Lanvin, B. 2005. "METER e-Strategies Monitoring and Evaluation Toolkit." In *E-Development: From Excitement to Effectiveness*, ed. Robert Schware. Prepared for the World Summit on the Information Society, Tunis, 16–18 November.

Lau, E. 2005. "Electronic Government and the Drive for Growth and Equity." Paris, Organisation for Economic Co-operation and Development.

Lobo, A., and S. Balakrishnan. 2002. "Draft Report Card on Service of Bhoomi Kiosks." Public Affairs Centre, Bangalore, India.

Madon, S., and G. R. Kiran. 2002. "Information Technology for Citizen-Government Interface: A Study of FRIENDS Project in Kerala." Department of Information Technology, Trivandrum, India.

OECD (Organisation for Economic Co-operation and Development). 2003. "The e-Government Imperative." OECD E-Government Studies, OECD, Paris.

Panneervel, P. 2005. "Urban e-Governance." In *E-Governance: A Change Management Tool*, 131–59. Jaipur, India: Rawat Publications.

Rama Rao, T. P., V. Rao, S. C. Venkata, Bhatnagar, and J. Satyanarayana. 2004. "E-Governance Assessment Frameworks." Center for Electronic Governance, Ahmenabad, and National Institute for Smart Governance, Hyderabad. http://www.mit.gov.in/download/NISG_EAF_18-05-04.pdf.

Satyanarayana, J. 2000. "Computer-aided Registration of Deeds and Stamp Duties." In *Information and Communication Technology in Rural Development*, eds. Subhash Bhatnagar and Robert Schware, 48–65. Washington, DC: World Bank.

Seddon, P. B., and M. Y. Kiew. 1996. "A Partial Test and Development of Delone and McLean's Model of IS Success." *Australian Journal of Information Systems* 1: 90–105.

Seshadri, T. K. 2007. "e-Governance: NeGP" (National E-Governance Action Plan). Department of Information Technology, Delhi. http://www.mit.gov.in/default.aspx?id=115.

3i Infotech Limited. "Summary Assessment Report of e-Governance Project: Bhoomi, Karnataka." Department of Information Technology, New Delhi, India.

Tripathy, R. K., and Dilip Mahajan. 2004. "City Civic Centres and E-Governance." Ahmedabad Municipal Corporation, Ahmedabad, India.

UNPAN (United Nations Online Network in Public Administration and Finance). 2005. *E-Government Readiness Report*. New York: United Nations.

World Bank. 2006. *Information and Communications for Development: Global Trends and Policies*. Washington, DC: World Bank.