PUBLIC SERVICE DELIVERY: ROLE OF INFORMATION AND COMMUNIATION TECHNOLOGY IN IMPROVING GOVERNANCE AND DEVELOPMENT IMPACT

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ASIAN DEVELOPMENT BANK

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ABSTRACT

The focus of this paper is on improving governance through the use of information and communication technology (ICT) in the delivery of services to the poor, i.e., improving efficiency, accountability, and transparency, and reducing bribery. A number of papers recognize the potential benefits but they also point out that it has not been easy to harness this potential. This paper presents an analysis of effective case studies from developing countries where the benefits have reached a large number of poor citizens. It also identifies the critical success factors for wide-scale deployment.

The paper includes cases on the use of ICTs in the management of delivery of public services in health, education, and provision of subsidized food. Cases on electronic delivery of government services, such as providing certificates and licenses to rural populations, which in turn provide entitlements to the poor for subsidized food, fertilizer, and health services are also included. ICT-enabled provision of information to enhance rural income is also covered.

I. INTRODUCTION

The focus of this paper is on improving governance through the use of information and communication technology (ICT) in delivering services to the poor, i.e., improving efficiency, accountability, and transparency, and reducing bribes in delivery of services.

Large number of case studies have been published by different multilateral organizations, suggesting that ICT can be used in diverse applications to accelerate information dissemination, improve efficiency of public services, increase the transparency and accountability of government administration, to reduce corruption, and facilitate citizen participation in local governance.[1] However, there are few analytical studies or impact assessments that confirm that such benefits have been delivered in large-scale projects (Bhatnagar and Singh 2010). A recent book on fighting corruption (Bhatnagar 2013) recognized the important role of ICT in reducing corruption, but points out that it has not been easy to harness this potential. In assessing the status of e-governance (i.e., ICT use in delivering government services) the United Nations Public Administration Network (UNPAN) survey of 2012 noted that, while it is important to continue with service delivery, governments must increasingly begin to rethink in terms of e-government and e-governance. The scope of e-government should be widened for a transformative role of the government toward cohesive, coordinated, and integrated processes and institutions. Since the e-governance activity in developing countries in Asia is at best at a moderate level,[2] there is scope to expand the deployment of e-governance. It is important to understand the full potential of deploying ICT to improve the delivery of services. It is equally important to understand the challenges in harnessing this potential by identifying the critical success factors for wide-scale deployment.

There are many ways in which the potential benefit of deploying ICT within organizations has been conceptualized. The ability of ICT to improve the asymmetry in access to information and thereof better manage the principal–agent problem (Gurubaxani and Whang 1991) is one such benefit. Similarly expanding access to markets and suppliers, efficient processing of transactions with all types of stakeholders and enhancing access to knowledge through electronic publishing are other benefits applicable to all types of organizations. Figure 1 presents all of the above types of uses in the context of activities and processes that directly impact the rural and poor populations.

The first type of application consists of ICT intervention in an existing program of delivering public services, for example in health. In a pilot in Karnataka state in India, beneficiaries were given smart cards that hold their data and allow instant updating by the field workers upon delivery of a service by using a handheld device. The management information system reports generated by the workers in the new system are based on beneficiaries saying they have received a service rather than a worker saying that service was delivered. The local public health officials are better able to monitor service delivery, evaluate beneficiary experience, identify service delivery gaps, and respond promptly to concerns such as supply shortages, lack of community involvement, and needs for further training.[3] In an experiment in Ethiopia, mobile phone-based tools are being used by community health workers

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[1] For some examples, see case studies on empowerment at World Bank's PovertyNet website http://povlibrary.worldbank.org/library/topic/10143/13942/ and in Bhatnagar and Schware (2000).

[2] In the E-Government Development Index (ranging from 0 to 1), East Asia's was 0.6334 and South Asia's 0.3464 against a world average of 0.4872. See United Nations E-Government Survey 2012: E-Government for the People at http://unpan3.un.org/egovkb/.

[3] See Beneficiary Verification and Feedback Empowers Access to Health Services in Karnataka at http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:23301220~pagePK:64257043~piPK:437376~the SitePK:4607,00.html?cid=3001_7.

for registration of patients, appointment reminders, and management of inventory (Otto 2012).[4] In the program to provide subsidies for food and fertilizer to poor farmers in India, it is proposed to use e-banks in rural areas to transfer cash subsidies based on UID numbers and finger scans to identify the receivers. Such a transfer is expected to weed out ghost recipients for a variety of subsidies, which in turn will enable enhanced expenditure on development initiatives. Recently, the Government of Delhi launched its ambitious program Annashree Yojna in which Rs600 will be transferred into the bank account of the most senior female member of the beneficiary family as a monthly cash subsidy (Isthiyakh 2012). In many Indian states, pensions of the rural elderly, women, and people with disabilities are already being paid through e-banking.

Figure 1: Different Types of ICT Applications for Rural Poor
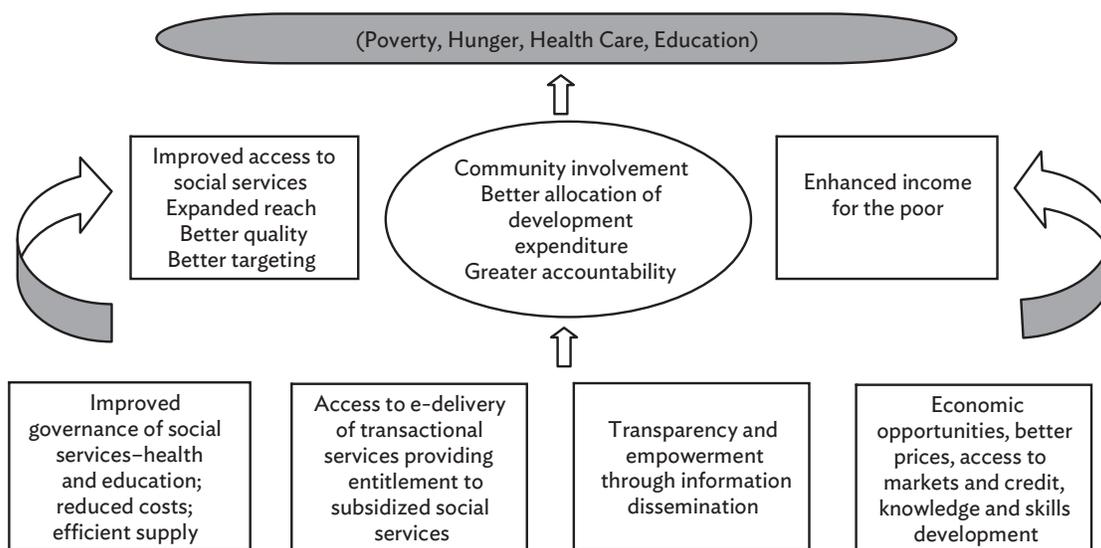
ICT = information and communication technology.

Source: Bhatnagar 2009, p. 121.

In the second type of application, ICT enables electronic delivery of government services such as caste and income certificates to the rural populations, which in turn provide entitlements to the poor for subsidized food, fertilizer, and health services. Copies of land titles are being e-delivered to facilitate access to farm loans and reduce the cost of land transactions. E-delivery improves access to such services and also reduces the cost of accessing such services (Gupta, Bagga, and Ayaluri 2010).

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[4] Kate Otto, 2012, Do m-Health tools really work? Testing the impact of mobile technology on maternal and child health care, mHealth, 1 March 2012, Available at http://www.mobileactive.org/case-studies/do-m-health-tools-really-work-testing-impact-mobile-technology-maternal-and-child-health

In the third type of application, ICT has been used to share information on development expenditure so that communities get involved in demanding allocation of development expenditure that best meets their needs. Similarly, information on performance of government agencies shared with citizens can promote community audit of project execution.[5]

The fourth type of application focuses on enhancing rural incomes by providing information on economic opportunities, knowledge of best practices, current prices of agriculture commodities through websites, call centers, and mobile phones. A multilingual government call center in Sri Lanka is working to provide citizens with fast and easy access to government services. By dialing 1919 from any phone, citizens are able to find out how to get a loan facility from a government bank or how to get their ID cards back. The number of government institutions using the service has grown from 20 to 120 over time and more than 2,500 services are available to date. The center works 365 days a year from 8 a.m. to 8 p.m., including major festival seasons (Basu2014).[6] A website[7] to match job announcements with job seekers in the informal sector in Bangalore has the potential to create employment for the urban poor and also enhance the incomes from such jobs (Ranganathan and Sarin 2009).

India and a few other developing nations are home to a very large number of experiments in the use of ICT for sustainable development. These initiatives have been launched by different types of organizations, including government organizations, private sector enterprises, civil society organizations, and cooperatives.[8] However, very few of these experiments have been scaled up and therefore the impact of such experiments on the broader society remains marginal. Policy makers need to identify scalable initiatives and design institutional mechanisms that can help in wider replication of successful experiments.

This paper analyzes some projects that are operational on a reasonably large scale and have contributed to the empowerment of the poor and inclusive development in the domains mentioned earlier. The paper draws lessons from the success of these projects.[9]

II. PAYMENT OF PENSIONS AND WAGES THROUGH ELECTRONIC BANKING

These examples[10] of the first type of application involve two important social services delivered by the Government of Andhra Pradesh in which ICT has completely revamped the system of payment to the poor. One scheme is the National Old Age Pension Scheme (NOAPS). With the aging of the population, old age social security assumes special significance. The scheme also covers widows and the people with physical disabilities. Under this scheme, monthly payments to the identified beneficiaries were made by panchayat functionaries.

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[5]   The website of the Ministry of Panchayati Raj has sparsely populated content on best practices. See http://www.panchayat.gov.in/home

[6]   See also article by Low (2009).

[7]   Full details available at http://www.babajob.com/

[8]   See Solution Exchange for ICT for Development Community in India at http://portal.unesco.org/geography/en/ev.php-URL_ID=14323&URL_DO=DO_TOPIC&URL_SECTION=201.html

[9]   Availability of extensive documentation on these projects facilitated the task of drawing lessons from these projects. Although an effort was made to select projects from different countries, because of the long history of ICT deployment in India, there is an overrepresentation of Indian projects.

[10] This example is abstracted from a case study by the author, commissioned by LIRNEasia (www.lirneasia.net), as a part of the Mobile 2.0@BOP research project. For the full case, see Bhatnagar (2008a).

The second scheme is the National Rural Employment Guarantee Scheme (NREGS) that guarantees wage employment on public works to any adult who is willing to do unskilled manual work, subject to a guaranteed employment for 100 days per household per financial year. The scheme has been implemented in 657 subdistricts across 13 districts of Andhra Pradesh. An end-to-end ICT solution is being used to help simplify activities such as issuance of job cards to rural households, identification of work to be undertaken, generation of work estimates, and monitoring of work execution. States need to pay wages through savings bank accounts opened by workers at their nearest post office. Prior to this mandate, when cash payments were made, there had been reports of reduced wages or nonpayment of wages to workers.

The new approach in making payments represents a partnership between the Government of Andhra Pradesh and a nongovernment organization (NGO) called Zero Mass Foundation (ZMF), which credits the monthly payments of rural payees into their bank account and facilitates the withdrawal of funds from the account without requiring the payees to go to a bank branch or panchayat office.

Figure 2: Payments Being Made to Pensioners by a Customer Service Point

Note: The kit for processing transactions includes a mobile phone, biometric scanner, and a printer.

Source: Photo captured by the author during a field visit.

It was possible to implement this project because the Reserve Bank of India under its financial inclusion program permitted scheduled banks to appoint business correspondents as bank agents who are authorized to open an account and to perform deposit and withdrawal transactions from a beneficiary account.

A.   Organizational Components of the System

ZMF acts as the business correspondent for the six banks that have been assigned specific districts for the purpose of making pension and NREGS payments. ZMF has set up offices in every district covered under the program. In each district, several customer service points (CSPs) have been created by selecting women from the local self-help groups who are given a kit consisting of a GPRS-enabled special mobile phone and accessories. Figure 2 shows a rural CSP and the kit supplied to CSP. These

kits can process banking transactions such as deposits and withdrawals electronically by real-time exchange of information with the bank's database at the back end. Customers are provided banking services at a specified location within each village. The self-help group acts as a guarantor for the member selected as the CSP.

ZMF offices handle the task of selecting and training CSPs, providing kits to CSPs, maintaining the kits in the field, collecting and storing enrollment forms, inputting data of information entered in the forms, liaising with the local bank branch for withdrawal of cash for disbursement, depositing excess cash after disbursement, and moving cash from the banks' branches to the CSPs.

Once the list of eligible beneficiaries is made available to the banks, a team consisting of bank employees, ZMF staff, and local government functionaries conduct enrollment camps in villages. Five fingerprints, a photo, and other personal details of the beneficiary are recorded. The enrollment data are stored on the mobile phone and later downloaded to the ZMF servers through a GPRS service. The data from the forms are digitized and transferred to the concerned bank's central branch in textual form as an electronic file. The central bank server passes the data to the link branch with the validated data of beneficiaries. The bank branch reviews the data and authorizes the opening of an account, which takes about 3 weeks.

The CSP needs to complete a biometric log-in by running her fingerprints through the fingerprint reader prior to starting transactions in a session. The CSP's mobile phone has the details of the beneficiaries' account. When the beneficiary comes to withdraw money, an index fingerprint is captured on the biometric device. The device also pulls up the stored photo of the beneficiary and the CSP generates a receipt in duplicate. ZMF operates in 127 districts across 26 states in India with nearly 6,000 CSPs serving a total of 1.5 million NREGS payees and 0.7 million pensioners.

The project demonstrates the potential of using GPRS-enabled mobile phones with low initial investment, low operating cost, not requiring regular electric supply, easy maintenance, and easy-to-learn operations. The project delivers services that offer greater convenience to pensioners and are free of bribes. The government saves nearly 30% of the pension payout every month by weeding out ghost pensioners.

The ZMF experiment almost collapsed in 2010 because the reimbursement fee from the government to ZMF for each transaction was not adequate for operations to be economically viable. Often, policy makers do not have an appreciation of the cost structure of running such operations, nor do they understand the need to make them economically viable.

ZMF illustrated the potential of transferring cash subsidies to the poor based on biometric identification so that leakage of funds to undeserving claimants can be rooted out. However, collection of biometric data for all poor in any country is a gigantic task that cannot be easily accomplished by an organization like ZMF. Perhaps the answer lies in providing unique identification to every citizen which can be verified easily. A few countries, such as the Republic of Korea and India, have tried to implement such a system.

III. INDIA'S UNIQUE IDENTIFICATION PROGRAM

The Unique Identification Authority of India (UIDAI) was created in 2009 to issue a 12-digit unique number called Aadhaar to residents. The Aadhaar is a unique number linked to each individual's basic demographic and biometric information. A photograph, 10 fingerprints, and an iris scan are stored in a central database for every individual who is issued an Aadhaar. The number is not classified by caste, creed, religion, or location. A citizen's identity can be verified using hand-held devices linked to the mobile phone network by sending the Aadhaar and a fingerprint to the central database. The UIDAI guarantees to give a "yes" or "no" response to verify the individual's identity within 8 seconds. Though possessing an Aadhaar is not mandatory, obtaining one requires proof of identity, address, and date of birth. Individuals without identification documents may obtain an Aadhaar if they are introduced to the issuing agency by an existing participant of the scheme.

The arguments for a system of establishing a unique identification (UID) for every resident were strong. Only a small fraction of the population was able to establish its identity through documentation. The inability to prove one's identity is a major handicap for the poor, as access to benefits under the government's antipoverty programs, such as old-age pensions, subsidized food grains, and rural employment, are often denied on this basis. Subsidized food grains, for example, are supplied through the Public Distribution System (PDS) to 180 million poor. This occurs through a network of half a million licensed shops at an annual subsidy of Rp400 billion ($8 billion). Nearly 40%-50% of the subsidy is wasted on undeserving people: "nonpoor" people who obtain a "card" entitling them to subsidized food; poor that inflate the number of members in their family; and cards that are made in the names of nonexistent people. Such fraudulent entitlement is often obtained by committing acts of bribery.

Two critical steps will determine the program's success in delivering its full potential. The first is the enrollment of a significant proportion of India's population and the collection of error-free information. About 340 million residents have been issued a UID as of 15 May 2013. Nearly 73.35% of enrolled residents fall between the ages of 16–45 and about half are female.[11] While a lot of checks have been built in within the application software to ensure that the quality of the biometric data captured is acceptable, the administrative structure to collect the data from a billion people has many layers. Each state has a registrar, an agency with overall responsibility for data capture, which in turn contracts the work to private companies that must invest in the equipment and create the organization to capture data in the field. Such companies in turn have subcontracted the work to small outfits that actually carry out the field data capture. Problems with the quality of data have been reported and will become more visible when the UID is actively used for service delivery.[12] Once accuracy in data capture is ensured, duplication will need to be eliminated. This is a difficult technical task but should not prove insurmountable given India's expertise in software and algorithm development.

The second is the use of the Aadhaar by various government departments to authenticate citizens who request a service. It is only recently that a few government agencies have begun to use the Aadhaar as a basis for delivering services. For delivery of services, the front-end delivery points will

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[11]   Data taken from UIDAI Portal at https://portal.uidai.gov.in/uidwebportal/dashboard.do

[12]   Discussion with a proprietor of a company responsible for the data capture in a few districts in a large state revealed that the compensation paid out for this work to different actors is not properly aligned with the tasks they perform. Whereas the bulk of the payment per transaction is kept by the agency, which has overall responsibility, the entrepreneur keeps enough to recover his or her investment in the equipment in 6–8 months. The bottom rung of people who capture the data are paid the least, i.e., Rs15 per transaction. The quality of the service provided by this bottom rung may vary across districts.

need to electronically capture the basic transactions. For example, half a million shops will need to seek fingerprint authentication from the central database through the PDS alone. Keeping the hand-held devices at the shops in working condition and training shopowners to use such a device are challenges that will need to be overcome.

Experience of electronic service delivery in rural India is a mixed bag. Nearly 90% of the approximately 100,000 internet kiosks created in rural areas to deliver certificates and licenses are not delivering any government services. The departments at the back end in districts and taluka offices where the basic data are maintained and the issuing of certificates is authorized have not been equipped with information and communication technology. Any procedural reform that reduces the lower bureaucracy's capacity to delay or deny services has been resisted. In the case of the Aadhaar, the departments, too, may resist its use on some pretext.

So far, there has been very limited pilot testing of the Aadhaar for end-to-end delivery of any service. After the launch of authentication services in February 2013, pilots for delivery of services using the Aadhaar have been launched in a few locations. For example, the delivery of food grains under the PDS in East Godavari district of Andhra Pradesh is based on Aadhaar authentication. A total of 75,000 cardholders were covered and 242,000 transactions had been processed. In other pilots, pension payments are being transacted through micro-ATMs in Jharkhand and liquefied petroleum gas is being delivered in Mysore, Karnataka. A major initiative of direct cash transfers in lieu of subsidized commodities in 51 districts has yet to take off. The critical role of a low-cost organization such as ZMF, which can support the operations in rural areas, needs to be highlighted. In the context of using UID for authenticating the identity of the beneficiary, policy makers ought to have recognized the need for institutions like ZMF to operate the cash subsidy scheme that was announced by the Government of India.[13]

Although, enrollment in the UID program is not mandatory, state agencies will make it mandatory for some groups by linking it to delivery of benefits to below-poverty-line (BPL) families. States such as Karnataka are planning to use the UID number as a record identifier in the resident databases maintained by different agencies. In fact, they plan to link the databases and analyze the number of different benefits of which different BPL residents are availing. There are many vocal critics of the Aadhaar who question the creation of a centralized database that may be open to abuse by police and security agencies (Bidwai 2010). It is well known that incumbent governments target political opponents by covertly mining data on landownership, income tax payments, and other records to discover acts of misdemeanor. Given the slow judicial processes, residents will have no relief even if strong legislation exists to prevent misuse. Concern about privacy of data has also been expressed.[14] At some enrollment centers, individuals have been tricked into agreeing that their personal data can be shared.

The Aadhaar is expected to be widely used for opening bank accounts, so that cash subsidies can be transferred to the poor, instead of distributing subsidized food grains and creating state-supported jobs in rural areas. Such a qualitatively different restructuring of the state's role in the social

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[13] If pension payment had been replicated all over the country, the use of UID to identify the beneficiary would have been easily accomplished and the scaling down of a modest plan for cash subsidies could have been avoided. See http://economictimes.indiatimes.com/opinion/editorial/pilot-schemes-must-stabilise-to-show-the-benefits-of-cash-transfer-system/articleshow/17850607.cms

[14] Similar reports have appeared on many websites. See, e.g.,http://kractivist.wordpress.com/2013/04/02/challenges-problems-of-aadhaar-uidai-systems-in-india-uid/

sector is unacceptable to many people. Moreover, media reports suggest that there is some confusion regarding the acceptance of the Aadhaar as proof of address by the banking system in India.

There have been major obstacles that the Aadhaar has had to overcome. Even as the Aadhaar was being rolled out, the Census Commissioner of India had proposed a parallel program of issuing smart identity cards to the entire population of India (*Times of India* 2011). With the strong backing of the ruling party, some of the problems have been resolved. The Aadhaar began with the promise of making delivery of government services to the poor efficient, convenient, and corruption-free. With so many implementation challenges and turf battles, such a promise may be harder to keep than originally anticipated.

Even in a technologically advanced country such as the Republic of Korea, the early attempts to create a unique citizen identification were not very successful. Unlike the Aadhaar's proposed developmental use, the Republic of Korea's 13-digit resident registration number (RRN) for every adult citizen was implemented for a different objective—to deny access to electronic services to noncitizens.[15] The RRN could profile a citizen in terms of age, place of birth, and gender. In its early non-biometric implementation, there were a number of instances of identity theft.

IV. COMPUTERIZED MANAGEMENT OF LAND RECORDS

Nearly 15 states in India have implemented an e-governance project to manage land records and issue copies of the record of ownership. Among other uses, this document is required for obtaining crop loans from banks. This service is used by millions of rural landowners within the span of a year. For example, nearly 10 million copies are issued in Karnataka every year. A study[16] commissioned by the Department of Information Technology (DIT) of India to ascertain the directly measurable and perceived impact of e-governance applications on citizens in the service delivery from seven key departments across ten states of India showed that computerized delivery reduced the citizens' cost of accessing such services by Rp100 per service transaction. A common measurement framework was used in the study, in which the costs to the citizen of accessing a service (number of trips to the delivery point, waiting time at the delivery point, and payment of bribes) were measured directly through a survey. Nearly 700 citizens distributed over 24 locations within a state were surveyed to capture their experiences of using each service before and after computerization.

The impact on key dimensions in the land record project across 10 states is given in Figure 3. Results indicate a poor state of delivery of services in the manual system. On average, users needed to make 3–4 trips to government offices, wait for 2 hours or more (up to 6 hours in some states) during each trip, and pay frequent bribes (20%–90% of all transactions) to obtain the service.

Figure 3 indicates that post computerization, a rural landowner experienced significant improvement in service delivery on all three parameters. Overall, the number of trips to offices was reduced by 1 from an average of 2.7. Computerization reduced waiting time by 30%. In five out of ten states, there was a significant reduction in the proportion of transactions in which a bribe was paid, suggesting that e-governance has the potential to significantly reduce corruption.

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[15] Some details are available at http://en.wikipedia.org/wiki/Resident_registration_number
[16] Full reports are available at Government of India (2008).

Figure 3: Impact of Land Record Computerization

Number of Trips to Delivery Point To Complete the Service

Manual
Computerized

Delhi | Gujarat | Haryana | HP | Orissa | Rajasthan | TN | Uttarakhand | WB | MP

Waiting Time in Minutes per Trip

Delhi | Gujarat | Haryana | HP | Orissa | Rajasthan | TN | WB | MP

Percentage of Respondents Paying Bribes to Complete the Transaction

Delhi | Gujarat | Haryana | HP | Orissa | Rajasthan | TN | Uttarakhand | WB | MP
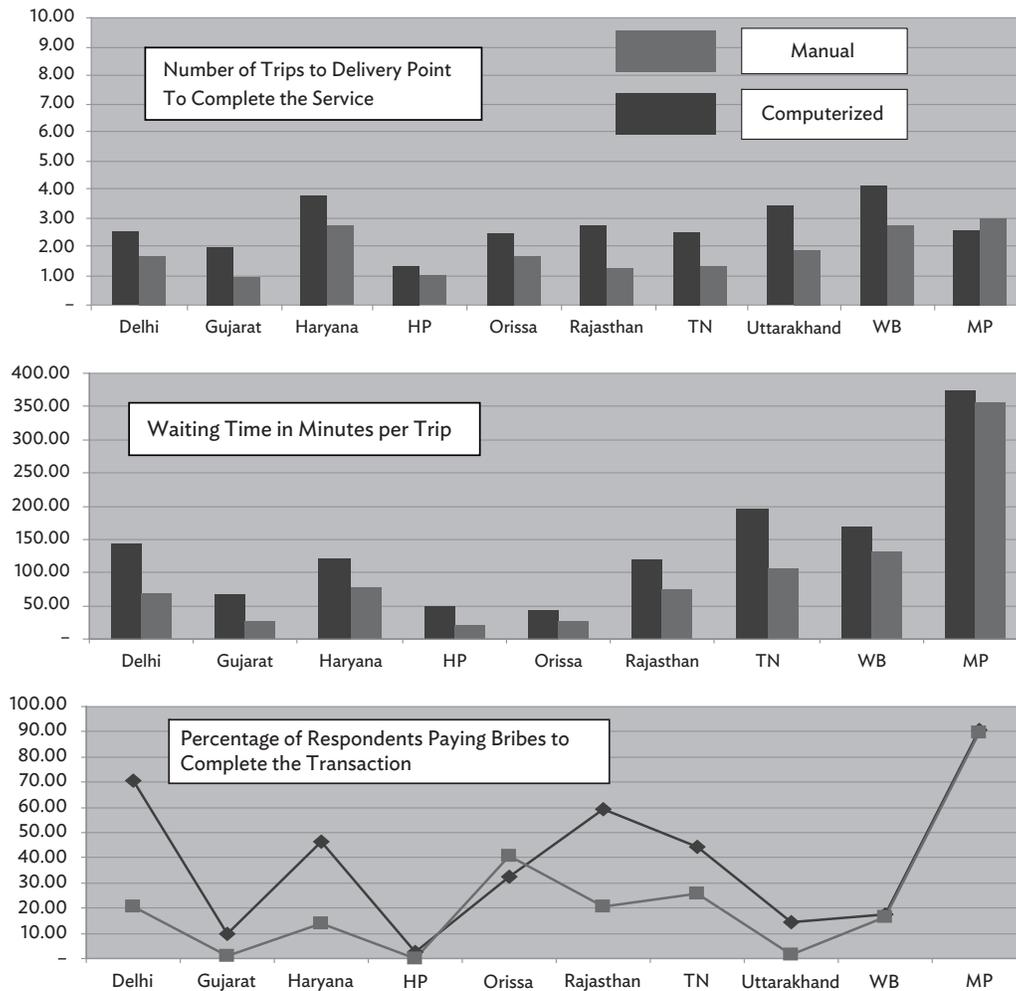
HP = Himachal Pradesh, MP = Madhya Pradesh, TN = Timilnadu, WB = West Bengal.

Source: Government of India, Ministry of Communication and Information Technology, Department of Information Technology. 2008. Impact Assessment of e-Governance Projects.

E-governance can help reduce corruption in a variety of ways. It takes away discretion from the government functionary, thereby curbing opportunities for arbitrary action, which often results in corruption. For example, in land records computerization in Karnataka (Bhoomi), a first-in first-out (FIFO) discipline is imposed on the order of processing applications for changes in records in the workflow system established to handle the task. Government employees cannot help anyone jump the queue. The date and time are automatically stamped on service requests and they cannot be rejected arbitrarily, as a reason must be recorded if an application is rejected. Biometric log-in by operators and audit trails make it possible to track and link any corrupt operator making illegitimate changes in data through wrongful acts. By making rules simple and more transparent, e-government emboldens citizens and businesses to question unreasonable rules and procedures and their arbitrary applications. Through kiosks, websites, and their mobile phones, citizens can check the status of their service request as well as highlight any error. Unlike the traditional system, reduced physical contact with government officials protects the vulnerable classes from bribe seekers.

Projects like Bhoomi demonstrate that well-designed ICT-enabled service delivery projects with process reforms that enhance transparency and accountability, reduce discretion vested with civil servants, and enhance efficiency can lower corruption. However, the DIT study showed a great deal of variation in project impact across states post-computerized delivery. In a few states, performance worsened after computerization. Further analysis suggested that different states were not following any best practice. The service delivery processes were neither standardized nor reengineered before computerization.

Implementation of ICT-enabled reforms is a long-drawn exercise that takes multiple years to deliver full value. The short tenure of project champions makes the implementation shortsighted. The success of the Bhoomi project can be traced to the 6-year tenure of the project leader. The second phase of the project has seen many deep reforms. The three agencies processing land transactions— the subregistrar's office, revenue department, and survey department—were integrated through sharing of information. Any registration of a land transaction in the subregistrar's office automatically triggers a mutation process in the revenue department's database. In registering a deed, the details of owners of a land parcel are automatically picked up from the land record database, preventing fraudulent registration. A private partner has established nearly 1,000 cybercafes in rural areas to offer a basket of services including online land-related services.

ICT-enabled improvement in service delivery and transparency may deliver different levels of benefits to different stakeholder groups. An analysis of the survey data collected for impact assessment of Bhoomi indicated that 94% of the small and marginal farmers preferred the Bhoomi system over the earlier manual system. On the other hand, among the large peri-urban farmer group, 39% preferred the manual system, perhaps because it allowed them to manipulate the data (Bhatnagar and Chawla 2007). An unintended consequence of Bhoomi was the ease with which land sharks could acquire large tracts of land on the periphery of urban areas as the ownership details are in the public domain.

V. INFORMATION AND COMMUNICATION TECHNOLOGY USE IN EDUCATION AND HEALTH PROGRAMS

There are a large number of initiatives that are using ICT in an attempt to improve the quality of school education. Whereas, children in urban areas have greater access to laptops and the internet in schools and at home, children in rural areas are faced with a severe digital divide. In an attempt to bridge the divide, there are many initiatives that distribute laptops to poor children and rural schools. First, it was the One Laptop per Child (OLPC) program whose objective was to ship millions of $100 laptops to developing countries (Quelch and Knoop 2008). In the beginning, OLPC only took orders in lots of 1 million, hoping to cut production costs on the basis of large volumes. However, developing nations did not cooperate. Some found the proposed content to be unsuitable to tackle their primary problems. With prices raised and order lots significantly lowered, there were not many takers. The laptops that were distributed malfunctioned or had no technical support, resulting in disuse. In Uruguay, "27.4 percent of machines were out of commission in a recent poll, or more than 100,000 out of the 400,000 in the country" (Warschauer and Ames 2010). India decided to develop its own less expensive "akaash tablet," which at $60 per tablet did not remain so inexpensive at the stage of actual production. With no tablets in the market, the akaash project too was deemed a failure. A

number of states in India have laptop distribution projects[17] to promote the government as pro-poor and tech-savvy.

Experiments with ICT use in education that have focused on improving the teaching–learning process have met with partial success in many pilots. The Digital Study Hall (DSH) initiative is a user-generated video-sharing system intended to overcome the shortage of qualified teachers in poor and remote rural schools.[18] DSH digitally records live classes by the best grassroots teachers, stores them in a large distributed database, and disseminates them to schools in rural and slum areas. Over 2,000 videos covering the curriculum in schools have been collected. Beyond the curriculum, videos also address issues of gender equity by covering topics such as child marriage, domestic violence, and sexual abuse. These videos have reached out to 3,800 adolescent girls from underserved communities in 41 schools. The project works on a hub-and-spoke principle, with four hubs in Lucknow, Kolkata, Pune, and Nepal serving over 6,000 students in more than 100 schools. DSH is also running a capacity-building project with 70 district institutes of education and training in the state of Uttar Pradesh in India with around 140 teacher educators and 140,000 teacher trainees.

In contrast to the approach of earlier "wire-the-schools" projects, DHS is conducting pilots in many states and countries to understand the cost structure and demonstrate concrete value by building systems that solve end-to-end education problems, developing technology and pedagogy in harmony with each other.

In other uses, ICT-enabled monitoring and incentives to reduce absenteeism have been tried. In chosen schools, teacher attendance was strictly monitored using cameras and their salaries were made a nonlinear function of attendance. Impact assessment of such initiatives through randomized experiments showed that teacher absenteeism fell 21 percentage points relative to the control group and children's test scores increased by 0.17 standard deviations (Duflo, Hanna, and Ryan 2012).

Based on case studies of ICT in teacher education compiled from more than a dozen countries in Asia and the Pacific (UNESCO 2007), an important lesson is that success of ICT use in education depends largely on teachers and their level of skill in integrating ICT into the teaching process and in utilizing ICT to provide learner-centered, interactive education. Therefore, training teachers to be able to use ICT and integrate ICT into teaching is crucial for achieving improved educational outcomes. While many projects aim to use ICT to improve the "quality of education," it is recommended to go beyond such terms and identify more specific goals so as to help clarify project objectives and better align monitoring and evaluation. It is important, however, to ensure that the specific targets are appropriate in terms of the overall aim of the project and that the targets are achievable within the given time frame, budget, and other constraining factors.

In a workshop organized by the World Bank[19] for Jordan and Indonesia, Jordan's education minister provided a succinct set of practical lessons and guidance for senior policy makers on the use of ICT in education systems:

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[17] See http://uplaptop-tabletdistribution.in/
[18] See http://www.digitalstudyhall.in/ and http://www.studyhallfoundation.org/
[19] See Trucano (2009).

- There is need for patience; it takes time to profit from ICT introduction.
- ICT cannot fix a bad education system.
- ICT in education is not about purchasing computers for schools but upgrading skills and knowledge of teachers.
- Education systems have to develop e-content materials. If no e-content is developed, it is like building roads without cars on the road.
- Change management is needed at the school level. Involvement of the school principal in training and all aspects of ICT integration is very important.

Recognizing the growing penetration of mobile phones among health workers and the population at large, many of the recent ICT initiatives in health have been in m-health. Examples of mobile technology in the health sector for administration and care delivery are well documented (UNDESA 2007). Interestingly, such initiatives have focused on empowering the field health worker by providing mobile phone-based aids to collect and manage client data efficiently, so as to spend less time on generating reports and enable systematic planning of field activities. That improvement in these areas could vastly improve the outcomes of public health programs had been recognized 3 decades earlier. However, the computational tools necessary for implementing the ideas were not available. As computers—desktops and laptops—became less expensive, many pilots were launched to improve the management information system and activity planning of health workers. Mobile phones, because of their low cost, easy maintenance, and non-dependence on electricity provide the ideal computational device to assist health workers. The fact that mobile phones allow health workers to communicate with their supervisors in case of emergencies improves the outcomes of many health activities. The Rural Extended Services and Care for Ultimate Emergency Relief (RESCUER) pilot project in eastern Uganda used a VHF radio and mobile walkie-talkie to enable a network of traditional birth attendants to partner with the public health service centers in order to deliver health care to pregnant women. RESCUER led to a reduction in maternal mortality from 500 deaths per 100,000 live births in 1996 to 271 in 1999 (Bhavnani et al. 2008). In some experiments being conducted now, the ability of mobile phones to store and display video images and textual data is being exploited as an interactive training tool for health workers. A few such experiments in developing countries are discussed briefly.

In 2010, Dimagi[20] launched the CommCare Accredited Social Health Activist (ASHA) project, which deploys an open source software product to send short messaging service (SMS) reminders to ASHA[21] workers for visits to clients and provides educational materials to improve the effectiveness of the workers. Given varied literacy rates among ASHAs and those of their clients, a variety of prompts such as prioritized checklists, danger sign monitoring, and educational prompts with multimedia clips provide the ASHA with tools to engage and educate clients. In Bangladesh, Dimagi and the Bangladesh Rural Advancement Committee developed short, interactive audio courses that can be taken over the phone by pressing numbers on the keypad to answer questions. Each course conveys a few important points, such as the importance of clinician-assisted births, proper hand-washing techniques and dangers, or HIV-transmission knowledge. Each course builds on prior courses to create an audio soap-opera with a consistent story and characters. There is a short quiz at the end of each call. As an incentive to take the courses, if the caller passes the quiz, free airtime is delivered to their phone which can be used to make personal calls.[22]

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[20] See http://www.dimagi.com/
[21] The National Rural Health Mission in India is training over 750,000 ASHA workers who have demonstrated the potential to substantially improve health outcomes in areas of extreme poverty, notably in maternal health.
[22] See http://www.dimagi.com/ivr-mobile-education/.

In a similar use of mobile phones for purposes of supporting the ASHA worker, IntraHealth International has developed mSakhi, which is a multimedia interpersonal communication tutorial application designed to improve ASHA workers' knowledge in critical maternal and newborn health issues through access to health messages that aid in retention of maternal and newborn care practices.[23] mSakhi, which means mobile friend in Hindi, is an interactive tutorial that offers 153 key health messages on prenatal and delivery care, postpartum mother and newborn care, immunization, and nutrition, using a combination of text and audio messages, all contextualized with localized illustrations and dialects. Preliminary results from mSakhi implementation with frontline health workers reported in a workshop[24] were positive with even first-time mobile users echoing strong views on ease of use and readily available and timely access to valid content.

Similarly, mobile phones have been used in public health programs in many Asian countries. Bangladesh has made significant progress in health care; still, 1 woman dies every hour due to pregnancy-related complications and 15 infants die every hour due to complications within 2 days of birth. Interestingly, 80% of these deaths are preventable. Most of these deaths are due to lack of information and knowledge. The MAMA Bangladesh[25] mobile information program known as Aponjon hopes to create mass awareness about good practices to contribute to the efforts of reducing maternal and child mortality. The messages delivered on a registered mobile phone will reach not only the expectant and new mothers, but also gatekeepers like husbands, mothers-in-laws, mothers, and other relatives.

During the project's pilot phase, Aponjon reached almost 1,500 mothers and household decision-makers within their families. The information is delivered twice a week in one of two forms: SMS; or short 60-second "mini-skit" voice messages, with local actors playing the roles of a doctor, pregnant woman, mother, and mother-in-law. The actors enact scenarios in an entertaining and educational format. Dialogues range from the doctor explaining the importance of iron-rich food to reminding the pregnant character that it is time for her medical checkup. In December 2012, Aponjon launched its service nationwide in Bangladesh, and women across the country are able to register. As of May 2013, there were 59,520 subscribers. The program hopes to reach 3 million subscribers. To achieve this target, the program is being advertised in print, radio, and television media. The service costs 2 taka (approximately 2.5 cents) per message and will provide the messages free of charge to at least 20% of the poorest subscribers.

The United Nations Children's Fund (UNICEF) in the Philippines, in cooperation with Globe Telecommunications, embarked on an initiative to leverage the use of ICT to achieve better health outcomes among women and children in geographically isolated and disadvantaged areas in the country's provinces and municipalities (Africa 2012). The aim is to achieve Millennium Development Goals 4 and 5, which is the reduction of child mortality and improvement of maternal health. The program is designed to gather real-time data on mother and child health indicators using mobile phones and consolidate the data to help the local government make informed and well-planned decisions on health issues in their provinces.

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[23] See http://www.intrahealth.org/page/mobile-application-reinforces-frontline-health-workers-knowledge-confidence-and-credibility-.
[24] Based on a presentation made at the ICT in Health for Uttar Pradesh: Opportunities and Challenges workshop in Lucknow on 20 February 2012.
[25] For more details, see http://www.aponjon.com.bd/index1.php.

The Bantul administration in Indonesia has recently launched an SMS for citizens to file complaints or suggestions regarding the public health service in Yogyakarta (Kunakornpaiboonsiri 2013). The local health authorities will use all suggestions to improve the services and become more responsive to the needs of poor citizens in shaping policies.

There are significant challenges in scaling up such projects. Often, the mobile devices that have been used in the pilots are high-end and expensive—the kind of devices that health workers do not use in the normal course. To provide the functionality and speed in the application software using inexpensive devices is one challenge. Most of the pilots have not been systematically assessed for the resulting benefits. In training programs, novelty may generate interest in the short run but would the interest sustain? Will the basic human resource practices need to be changed to effectively reward those who use the mobile-based tools to achieve better outcomes? To begin with, every pilot needs to be systematically assessed after it has attained some stability. Finally, one lesson that is evident from many projects discussed in this paper is that ICT cannot be seen merely as a technology solution. It will often have to be a part of other changes that will make the entire system work more effectively.

While poverty is typically the root cause of illness, and health-related information provided to clients may not produce the desired behavior change, there are some areas in which focused education can improve or even save lives.[26] Mobile phones are an extremely attractive channel for social messaging, because they offer a way to easily deliver an individualized educational session to billions of people. The sheer effort required to distribute information using paper or billboards as is done in many public health systems is a substantial obstacle, and updating the information or receiving feedback is prohibitively difficult and costly. In contrast, deploying and updating automated messages on a massive scale can be fast and simple on mobile phones.

VI. PROMOTING CITIZEN ENGAGEMENT THROUGH INFORMATION SHARING

Citizens engage with the government on a variety of issues, both at the individual level and at the community level, to file complaints, express their anger, demand services, and influence policy. In the past, governments at various levels have tried to share information to engage with the citizens, but most experiments were not successful. In recent years, several developed country governments have created websites to distribute a portion of the data they collect. It is a concept for a collaborative project in municipal government to create and organize a culture of open data or open government data.[27] Kenya is one of the few developing countries that are part of this effort and has launched the Kenya Open Data Initiative. It was expected that Kenya's vibrant ICT community would rapidly embrace open data, that there would be a rapid outpouring of open datasets from government agencies, and that open data would drive more informed development decision-making. However, although Kenya has a strong ICT sector, skilled development professionals, high cell-phone penetration, and a relatively open media, open data uptake has been slow. Traffic on Kenya's open data portal has been around 100,000 page views a month, mostly from Kenya. The number of datasets on the portal has doubled from 200 initially to more than 400 but still represents a tiny fraction of the data in Kenya (Finch 2013). Even if open data initiatives were to work well, they will largely serve the urban internet-savvy populations.

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[26] A profound example is the popularization of treating diarrhea with homemade oral rehydration therapy in the 1970s in Bangladesh.
[27] A list of over 200 local, regional, and national open data catalogs can be accessed through http://en.wikipedia.org/wiki/Open_data

A recent report on the rule of law index places most countries of East and South Asia in the middle, between a rank of 35 and 59 among 100 countries on open government (Agrast et al. 2013, 160). Indonesia is placed at the top in the region, and Pakistan and Bangladesh are ranked in the 90s. Whereas a decade earlier, the use of IT in Indonesia tended to support the existing structure of state domination over the public, internet access in recent years is widely available to the public and relatively independent of government rules and regulations (Pendit 2003).

A successful example of citizen engagement is the initiative in Chhattisgarh to involve the community in tracking pilferage of grains in the PDS. Members who register their mobile phones receive complete details of the truck carrying grains to their fair price shop. This information has helped in checking diversion of trucks (One World Foundation India 2011). A program called e-Panchayat is being implemented under the Government of India's National e-Governance Plan, which focuses on computerizing local government functions so that information on development expenditure and performance of executing contractors can be shared with communities. This is expected to empower such communities to demand a fair allocation of development expenditure that best meets their needs Upadhyay 2009).

In practice, the proportion of citizens who are willing to be constantly engaged with the Government is reportedly very small (Bhatnagar 2009). For example, Karnataka State introduced Pancha Tantra online, a robust system of double entry accounting introduced in Karnataka under the 2007 Amendment to the Panchayat Raj Act 1993 in all gram panchayats of the state. Under the traditional system, the gram panchayat would maintain accounts manually. The Pancha Tantra enables the government to electronically monitor and evaluate the work undertaken at the panchayat level. It also enables the public to view a variety of comparative performance reports of their panchayat.[28] However, the impact of such disclosure has been disappointing. While there are a dozen articles exalting its value, there is hardly any discussion of its contents in the media.[29]

Such experiments fail to yield the participation of the community in the process of planning and monitoring of work in rural areas unless an NGO actively catalyzes action within a community. The harnessing of ICT to meeting human development goals could be undertaken by combining them with community development initiatives (Banuri 2004). For example, Mazdoor Kisan Shakti Sangathan has recently organized a series of combined public hearings and grievance redress camps[30] in Rajasthan. These "Right to Hearing" camps were held in four panchayats to look at the delivery of services by 16 government departments. Government officials were present to receive complaints related to services and/or entitlements, such as health benefits, pensions (old age, widow, disability), MGNREGA, PDS, and electricity supply, and answer queries related to nonpayment or nondelivery of a particular service or entitlement.

In Rajasthan, the government has started a scheme by which the state departments are bound by law to receive complaints and give dated receipts. This is the first important step for a grievance redress mechanism as it represents the right of a person to be heard. The "Right to Hearing" camp hopes to take this government initiative forward by increasing awareness about the grievance redress mechanism and to provide a public platform where there can be participation in holding government accountable. Such camps provide a space where immediate action could be taken to right actionable

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[28] See http://stg2.kar.nic.in/gpportal/rpt_summary.aspx
[29] See One World Foundation India (2012).
[30] Camps were organized in Saarot, Taal, Kushalpura, and Barar panchayats of Rajsamand District in Rajasthan on 27 December 2012.

wrongs, correct flaws in the system, and charge corrupt officials. The camp is an exercise in making the system work from the bottom up, creating a space where people have the individual and collective power to demand their rights and push the state to deliver.

The Citizen Report Card is another initiative across many South Asian countries in which citizens are engaged in monitoring the performance of local bodies with the help of NGOs.[31]

With 60 million Facebook and 16 million Twitter users in India,[32] social media has emerged as a powerful platform for forming an opinion as well as generating mass support in urban India. It remains an urban phenomenon with limited potential for impacting rural citizens in any positive way. Like in other countries, its visible impact as a mobilizing force has recently been felt in India on two occasions, both representing a confrontation between citizens and the government (Singh 2012). The Ministry of Communications and Information Technology (2012) has prepared guidelines for using social media by government agencies for constructive citizen engagement. Government agencies are likely to use social media as a means to put forth their own point of view, rather than to seek feedback on policy and performance. A mindset change is needed within the upper echelons of government to become more accepting of any kind of feedback, whether positive or negative.

Government policies on regulating the use of the internet and social media have to be consistent with international practices and need to take a balanced view. Every type of communication media and the content being delivered can have a positive and a negative impact, which is often subjective. Therefore, any government intervention to curb the free flow of information has to be in the rarest of the rare cases when national security is at risk. The overriding consideration should be to encourage communication among stakeholders on social issues.

VII. EMPOWERING FARMERS AND FISHERS: SHARING KNOWLEDGE AND PRICE INFORMATION

Throughout the developing world, mobile phones are playing a significant part in trade and commerce. For example, the Kenya Agricultural Commodity Exchange sends a functionary to visit the Nairobi market, collect prices from the local traders, and then send them back to the office via SMS. The database of prices of fresh produce can be accessed by farmers through their mobile phones through SMS or a call center. Similarly, fishers in Kerala, India, use their mobile phones (operational within 6 kilometers from the shore) to check fish prices, ensuring that they land their catch at the most profitable quayside market. These simple uses of mobile technology create a high economic impact on individual producers by eliminating the intermediaries. Many tradespeople have doubled their income by simply using a mobile phone through which their services can be requisitioned directly by the consumers in a 24–7 time frame.[33]

In an initiative using the internet called e-Choupal started in 2000 by ITC, a large agri-business private sector firm, farmers are being empowered by sharing price information and improving the handling of procured food grains (Kumar 2004). Due to lack of information on prevalent prices for

[31] See Citizen Report Cards and Surveys: Asia Cases http://www.worldbank.org/socialaccountability_sourcebook/Regional%20database/crcas.htm.
[32] See http://www.socialbakers.com/facebook-statistics/india.
[33] See a film on How Mobiles are Helping Farmers and Fishermen, exclusive Telecom TV Report from Kenya and India filmed on 13 March 2009 as part of the Mobile Planet Project, in partnership with the GSMA. Available at http://web20.telecomtv.com/comspace_videoDetail.aspx?v=3261&id=e9381817-0593-417a-8639-c4c53e2a2a10.

their produce, farmers end up being exploited at the hands of intermediaries operating in traditional markets. ITC has set up 6,500 e-Choupals across eight states of India to procure 13 commodities including oilseeds, grains, and coffee.[34] Farmers visit the e-Choupals located in a nearby village and operated by one of the local farmers on behalf of ITC. They can get cost-free information on weather, prices in agricultural markets, and expert advice on agricultural practices. By bringing a sample of their produce to e-Choupals, they can also find out the price that ITC will offer. If ITC offers a competitive price for their produce, they choose to sell their produce to ITC instead of the government-controlled *mandis*. Over time, ITC has developed a loyal set of farmers who sell their produce to ITC and earn higher incomes through competitive prices, a transparent procurement process, and lower logistics costs. They have increased yields, improved the quality of their produce, and reduced their transaction costs.

Over time, these farmers have converted into customers of ITC-produced consumer goods and agri-processed goods sold by large ITC shops adjoining the warehouses. ITC further expanded its basket of services to include soil testing, tractor maintenance, medical services, and even a restaurant at its warehouse complexes. All these services are offered at a price that allows ITC to recover costs but does not include a profit margin. ITC then began to aggregate demand for other consumer goods and agricultural inputs and to supply such items at a competitive price and assured quality. It earned commissions from the suppliers of such goods and services. Currently, e-Choupal services reach more than 4 million farmers in about 40,000 villages.

A number of lessons can be drawn from the ITC experiment. The success of e-Choupal is attributed to the provision of free access to information and knowledge to the farmers; streamlining of logistics of procurement, which minimizes handling and transport costs of the farmers; and provision of complementary services to farmers so that ITC is seen as a one-stop shop for all major needs of the rural community. In an interesting contrast, the State of Madhya Pradesh computerized the operations of nearly 200 *mandis* to capture in real time the results of auctions of grain produced by farmers to traders in the mandi. The data are uploaded to a website in great granularity with the hope that farmers will access the data to make decisions on time and place for selling. Farmers use mobile phones and other ways to find out about prices. Except for introducing technology, no other changes were made in handling food grains. Poor weighing equipment and lack of transparency in testing quality continue to lead to wastage of grains and losses for the farmers.

Unlike e-Choupal, the Digital Green system[35]works with the existing agriculture extension system to improve cost-effectiveness and broaden community participation. Digital Green partners produce 8–10-minute segment videos capturing improved agricultural practices, market linkages, and government schemes. Videos are shot by community members using pocket cameras and then vetted by domain experts. The videos are screened to groups of 10–12 farmers using battery-operated pico projectors in which memory cards with the films can be inserted. The real value of this initiative does not come from the fact that farmers may cooperate just for the thrill of appearing onscreen, but the fact that farmers interact with experts of their own kind around the issues captured in the videos. Local social networks are tapped to connect farmers with experts. The Digital Green system has produced 2,600 videos and screened them to 150,000 viewers across six states in India. Supporting these activities, the Digital Green team includes 22 core team members, 102 partner staff, and 524 community intermediaries.

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[34] For a more detailed discussion, see http://www.echoupal.com/.
[35] A list of partners and investors and a description can be accessed from http://www.digitalgreen.org/projectprogress10.

VIII. EMPOWERING THE "UNBANKED" THROUGH MOBILE BANKING

Perhaps the most significant way in which ICT can help empower communities is to provide the poor a means to enhance incomes. Once out of the poverty trap through better education, without the burden of loans, the poor will be able to assert and demand their rights. The rights to education and to information will then be fully realized.

The Kenyan M-PESA initiative showed how mobile technology can be leveraged to enhance the incomes of the poor. The earlier example involving pension payments highlighted the potential of mobile phones as a low-cost substitute for processing the delivery of banking services. M-PESA highlights how simple low-cost mobile phones in the hands of the poor can be leveraged.

Preceding the launch of the very successful M-PESA initiative in Kenya, mobile banking initiatives were tried in the Philippines (Smart Money in 2003 and GCash in 2004) and in South Africa (WIZZIT in 2005) (Rangan and Lee 2011). In the Philippines, there were clearly defined regulations for m-banking which allowed mobile network operators to function as remittance agents without a banking license or a partnership with banking institution. Collectively, these initiatives offer many insights on how to make mobile banking a profitable and sustainable venture for the promoters and an effective means of financial inclusion for the unbanked poor.

Success of M-PESA can be traced to the fact that the three partners brought complementary skills to the table and learnt to work together in a give-and-take process. Vodafone provided the technology and application development inputs; Safaricom, the mobile service provider, had a ready-to-go sales and service network of their agents; and Faulu, a local microfinance institution with several thousand borrowers who typically run small businesses and repay a few dollars every week into the Faulu bank account, provided the initial customer base. Senior sponsorship within each organization, along with a committed project team, made it easier to work together.

An important catalyst for the venture was the Financial Deepening Challenge Fund (FDCF) established in 2000 by the Department for International Development of the United Kingdom (DFID). It made £15 million available for joint investments with the private sector on projects that helped improve access to financial services. Through DFID's matching challenge grant, corporations such as Vodafone were able to reduce internal competition for capital, thereby allowing socially beneficial projects that might hold higher risk or have lower returns on investment to go ahead.

The design of various components of the project had to be grounded in the specific context of Kenya. The consumer interface had to be a basic mobile phone model and with a local language menu. Instead of giving point-of-sale devices to dealers and magnetic stripe cards to customers, as was planned earlier, agents were given a mobile phone with a different M-PESA menu than consumers to keep the agents task simple. There was a great divide between people who were familiar with mobile phones and people who were not. The former tended to pick up M-PESA quickly. For the latter group, the first chunk of any training session was explaining the concept of a menu, showing them how to find M-PESA, how to find their SMS inbox, etc. Only an extended pilot phase could reveal all potential problems. M-PESA was able to offer a real value proposition to the client because physical transport of cash in Kenya can be a very risky proposition. Moreover, the repayment of loans was a time-consuming and cumbersome process.

Given the remarkable outreach and use of M-PESA, many policy makers and donors could be interested in supporting similar initiatives. For example in India, Vodafone and HDFC Bank have tied up to pilot mobile banking services to the rural masses in 10 villages in a district of Rajasthan (Bhattacharjee and Bhargava 2010). A total of 54 retailers from Vodafone's network have been appointed as business correspondents in these villages. It is a branchless banking service designed to enable users to complete basic banking transactions without the need for a bank branch. The Reserve Bank of India has allowed companies that have a large retail presence, excluding nonbanking financial companies, to act as business correspondents. Previously, only nonprofit companies and individuals could work as business correspondents. India's leading mobile operator Airtel also launched a money transfer service with Western Union and the State Bank of India.

Before advocating the relatively new system for other areas, donors and policy makers need to clearly understand the value proposition of M-PESA in its potential to affect households and communities at different socioeconomic levels. A study that explored the economic effects of M-PESA in Kenya at the community level identified 11 economic effects within the broad categories of local economic expansion, security, capital accumulation, and business environment after 2.5 years of M-PESA use in these communities (Plyler, Haas, and Nagarajan 2010). The research also showed that effects tended to be influenced by gender and geographic location of the communities. These effects could play out very differently in other countries.

IX. KEY LESSONS FROM SUCCESSFUL PROJECTS

Very few ICT projects in rural areas have scaled up. Therefore, the full potential of ICT as an enabler of empowerment and development is yet to be tapped. The projects discussed in this paper have been able to scale up despite many constraints. Analysis of these projects indicates that issues of choice of application, use of appropriate technologies, and the type of organizations that can implement large-scale projects are very important in execution of the projects. Often, the enabling role of policy, whether it is for financial inclusion or for private participation in commodity procurement, has encouraged ICT-based innovations to take place. In some cases, like M-PESA, funding support has helped a large company to innovate. Table 1 identifies some of the design features of ICT applications that help improve governance.

Table 1: Examples of Design Features to Improve Governance

Governance Dimension	Explanation	How to Prevent	Examples of Information and Communication Technology Support
Accountability	Traceability of actions and inactions	Intrinsic motivation	Pledge taken by kiosk operators in front of the entire village
		Monitoring	Biometric log-in of operators Cameras in schools Document reasons for actions: delay/denial/rejection
		Client feedback	Easy feedback, action, and escalation of unsettled complaints
Transparency	Data	Put out in public domain without violating privacy	
	Rules and procedures	Formulated in justifiable way, disseminated so clients understand, and simplified and standardized	
	Decisions	Published in public domain and right to information	
Corruption	Abuse of discretion to delay or deny service	Intrinsic values Fear of being caught Consequences	Public pledge of honesty Automate to remove discretion Workflow, so no action is outside the system Traceability through tracking Remove bottleneck in action, i.e., a single authority to sign a document Create multiple service points
	Collusive corruption		Prevent repeated contact between operators and citizens Rotate employees Use unique identification to identify recipient of service

Source: Author.

The broader lessons for policy and developing a strategy for deploying ICT in government are discussed next.

A.   Holistic Solutions

Do not treat "digital divide" as the only impediment to empowering poor citizens through ICT-enabled service delivery. This paper provides several examples in which, in spite of very low internet penetration in rural areas and limited availability of broadband connectivity, significant benefits have reached the poor through services delivered through mobile phones and community service centers.

Investments in rural electrification and enlarging the footprint of mobile phones are key to improved delivery of e-services. In countries where a unique citizen identification can be provided, a variety of social benefits can be delivered directly to each family in cash or in kind. Successful projects point to a useful approach in thinking about deploying ICT for development. The more useful way is to understand the needs of the poor in their context, analyze how the needs are being met currently, and then see if ICT can in any way help in fulfilling the needs in an improved manner. Invariably, in addition to ICT, other changes would be necessary to improve the existing system. For example, the quality of primary education cannot be improved by simply introducing e-learning or a biometric attendance system for teachers. A midday meal scheme to ensure attendance, recruitment, and training of teachers—new methodologies for teaching may all be necessary to make any impact. Often, technologists focus only on introduction of ICT, neglecting other aspects. In school education, constant attempts are made to provide laptops to rural children and enhance the access to broadband in rural areas. Given India's large population, poor coverage of electric supply, and a mammoth organization needed for maintenance, a better idea may be to empower the teachers by providing them convenient access to the web. Teachers who are more knowledgeable are likely to improve the quality of teaching. A European Union report on IT in schools reported that the technology used in

schools was meant not to change teaching–learning processes or to explore new possibilities but to enrich the existing curriculum. However, the teachers' ability to use ICT in an exploratory mode in the classroom was limited (Punie, Zinnbauer, and Cabrera 2006).

Similarly, other intermediaries in the flow of knowledge and information, such as health workers and extension workers, may need to be empowered by providing convenient access to technology and training as illustrated in examples provided in this paper.

The fact that many e-governance projects failed to curb bribery reinforces the need for extensive process reform that will take away the unnecessary discretion that is abused by the corrupt in favoring those who pay bribes. In such cases, new legislation may be necessary, rules and procedures need to be modified, and extensive training is needed to change attitudes.

The ICT project conceptualization phase defines the overall vision, mission, and objectives of the project; the outcomes to be achieved; and the scope and scale of the project. All stakeholders, particularly citizens for whose benefit the ICT is being deployed, need to be consulted during the conceptualization. The objective needs to be defined in the context of the overall development and governance agenda of the government. The outcomes need to be defined as measurable benefits to be delivered to different stakeholders. Successful implementation of projects requires that there is a clear focus on the purpose for which the application is being built.

B.   Focus on Mobile Technology

The conventional approach to development often witnesses obstacles in terms of geographic isolation, infrastructure resources, market information failure, and skills shortage. In such cases, ICT is seen as beneficial because it can assist in overcoming these hurdles in a cheaper and sustainable way. The internet enables people to get information on various topics from anywhere in the world. The use of radio facilitates faster dissemination of knowledge among people, instead of requiring an individual to make a personal visit to obtain advice. The ease of exchanging digital images over long distances aids delivery of health services in rural areas. The computer eases information management and storage, mobile phones enable text messaging services, and the internet connects the information world.

Most of the technologies can be used interchangeably and in different combinations to achieve a specific purpose. For example, for pension payments, the entire transaction process is completed through a mobile device that works like a computer. Data transfer takes place through a GPRS service rather than via internet connectivity. The data at the back end are processed on computers and there is seamless connectivity between the computers of all the partners-banks, ZMF, and the organization which developed and provided the technology and application software. In fact, 10 districts of Andhra Pradesh are running the rural e-banking application using internet kiosks.

Applications delivering agricultural commodity market prices use a variety of channels, such as radio broadcasts, SMS alerts, web portals accessed via the internet, and call centers accessed via phones of any kind. In the Bhoomi application, an SMS alert can be sent to a landowner whenever a document is ready for collection.

The high penetration of mobile phones among the poor remains largely unexploited.[36] The Kenyan M-PESA initiative showed how mobile technology was leveraged by a profit-making enterprise to enhance the incomes of the poor. Mobile-based service delivery can also be popularized by creating freely downloadable applications from a public store and providing a mobile service delivery gateway for any service provider serving rural populations. In Karnataka, a mobile-based service has been launched to offer services that are currently available via the internet (*The Hindu* 2013).

C. Public–Private–Non Government Organization Partnership Critical for Operating in Rural Areas

Development is a complex process and use of ICT for enabling development requires expertise of different kinds. Most successful projects are therefore implemented through partnerships where different kinds of agencies bring their skills to the table. In e-Choupal, ITC utilizes the weather forecasts developed by government agencies, commodity prices gathered from different government *mandis*, and expert advice from several universities. In the ZMF-run pension payments, there are six distinct actors involved: The social welfare department of Andhra Pradesh is the main user; pensioners are the key beneficiaries; banks hold the accounts of all pensioners and receive the monthly pension payment from the government; ALW provides the technology and equipment for which it collects a license fee; and ZMF manages the operations using members of self-help groups as CSPs who are guaranteed by the group. Unless the incentive structure is especially designed to ensure that every partner earns revenue that is greater than its cost, the entire ecosystem is not viable. The success of M-PESA can be traced to the fact that the three partners brought complementary skills to the table and learnt to work together.

Unlike a commercial contract which defines the government's partnership with the private sector and/or NGOs for service delivery for empowering communities through information disclosure, government agencies need to repose trust in NGOs/media and encourage them to analyze such information and present it to the citizens in an actionable form. In both cases, identifying SMEs/NGOs with a presence in rural areas is extremely important.

D. Emphasize Content: Do Not put the cart before the horse

In most countries, the e-delivery of services or useful content has lagged far behind the creation of infrastructure providing access points where services can be delivered. For example, the Government of Goa has a state data center, wide area connectivity up to panchayat level and a lap top distributed to class 11 students in almost every home. Yet there are very few services that are delivered through this infrastructure because at the backend in Government offices, the mind sets and methods of working have not changed. There is a lack of computerization and process reform. Also organizations that could deliver useful content do not exist. Therefore priorities in national IT plans have to be reversed. Reform of the back end and creation of useful content has to be emphasized.

The CSC initiative of Government of India is another example of the preoccupation with infrastructure and inadequate thought to its utilization resulting in wasted effort and missed opportunities. For delivering services (such as certificates and licenses) to rural population, a strategy followed by India to create a hundred thousand Citizen Service Centers (CSCs) was a pragmatic step. However, India faltered in not implementing its e-district program in time so that services could be

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[36] A study conducted by LIRNEasia in India reported that 45% of bottom-of-the-pyramid households had at least one family member owning a mobile phone.

delivered through the CSCs. As a result CSCs created 2 years earlier are starved of services and content, and nearly 70% have closed down. In spite of the poor record of existing CSCs, the government continues to push for creating another 150,000 CSCs. Similarly, in e-delivery of municipal services in South Africa, the emphasis was on connectivity and bandwidth rather than delivery of services (Averweg 2012). However, there are examples of organic growth of telecenters in other countries such as Peru (Averweg and Villanueva 2009) and Cambodia (Parks 2003).

Lack of content has been an age-old issue. Production of content that is current and useful for the poor is not economically viable in the short run. There are demand-side constraints. Demand for ICT-enabled services is fragmented (physically dispersed across small habitations) and is often latent. Low levels of basic literacy and ICT literacy act as barriers in acceptance of new modes of communication for accessing knowledge and information. However, the impact on the social services such as education and health depends on availability of useful content, as was shown by many examples discussed in section V. Therefore, the revenue generation potential from user fees for these services is limited, making rural projects economically unviable. A social venture fund may be needed to attract developers in this space. The contours of a Social eApplications Rollout Venture Fund were proposed in a workshop in 2004 (Rathore and Mukerji 2004).

X. CONCLUSION

ICT can, on the one hand, increase the efficiency, speed, and transparency in delivery of services and, on the other hand, assist in the generation and dissemination of knowledge. This paper has argued that both these attributes need to be exploited for the benefit of the poor.

Governments are the largest provider of information and services that are important for the poor. Methods of service delivery have not changed for decades, making them inefficient and corrupt. There is sufficient evidence that well-designed e-governance projects with process reforms that target enhanced transparency and accountability reduce discretion vested with civil servants, enhance efficiency, and can lower corruption. However, very few such projects have been implemented to their utmost potential. There is a necessity to accelerate the pace of implementation of e-governance and build capacity to reform the process of service delivery.

However, two caveats are in order. With the current levels of access to ICT among the poorest of the poor living in remote areas, the benefits are likely to trickle down very slowly. First, the functionaries who are responsible for community access centers need to be chosen so that they go the extra mile to help the poor. Second, it would be useful to design ICT application in a manner that ensures data security. As increasing amounts of are stored in large data centers, they become a target for sabotage and abuse. Individuals' and institutions' privacy can be compromised. When a large number of service delivery procedures are automated, it becomes difficult to deal with exceptions. In large and diverse countries with low levels of ICT literacy, larger numbers of citizens may face problems because their service requests do not conform to standard. Mechanisms need to be designed to handle such cases.

As repeatedly pointed out in this paper, the limited impact of ICT on governance and empowerment in developing countries is a result of the failure to scale up and replicate successful pilots (Harris and Rajora 2006). It is necessary to create a proactive organization that can spot scalable and successful innovations in the use of ICT and that can support the organizations involved in the innovation to replicate such experiments in areas that they deem as being ready.

Many valuable suggestions were made by a working group[37] on support for innovations in e-governance services and scaling up of such innovations and content development to disseminate knowledge that will empower the poor. A number of initiatives to define pro-poor ICT policies and strategies for Asia and the Pacific have been taken in the past (Sayo, Chacko, and Pradhan 2004).

Many ideas have been floated across developing nations in terms of deploying ICT for development. Pilots have also demonstrated the workability of some ideas. Perhaps governments, the private sector, and civil society need to engage in a dialogue to sift through these ideas and begin action to widely replicate some of them.

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[37] See Government of India (2011).

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Public Service Delivery: Role of Information and Communiation Technology in Improving Governance and Development Impact

The paper discusses the use of information and communication technology (ICT) for improving governance in the delivery of services to the poor. It provides examples from Asean countries where ICT use has improved efficiency, accountability, transparency, and has reduced bribery in service delivery in a variety of sectors such as health, education, food security, and issue of certificates/licenses. Learning from the examples, the paper identifies critical success factors for wide-scale deployment of ICTs in service delivery.

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