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Information Systems to Support “Door-step Banking”: Enabling Scalability of Microfinance to Serve More of the Poor at the Bottom of the Pyramid

Lakshmi Mohan

IT Management, School of Business, State University of New York, University at Albany

l.mohan@albany.edu

Devendra Potnis

School of Information Sciences, University of Tennessee at Knoxville

Steven Alter

School of Management, University of San Francisco

Abstract:

Microfinance provides financial services to the extremely poor who are not served by banks. At the heart of microfinance is microcredit which provides small loans to the unbanked poor to seed small local businesses. Microfinance may help alleviate poverty because access to finance has a positive impact on economic development. The unmet need of the poor for financial services spawned over 11,000 microfinance institutions (MFIs) by 2010, but 90 percent of these MFIs are small with fewer than 10,000 clients. This article presents three case examples of MFIs in India that deployed information systems (IS) to increase the scale of their operations. Each example illustrates how IS helped MFIs achieve financial sustainability through scaling despite the necessity of using “door-step banking” which requires the MFI’s agents to visit clients in remote areas. By presenting microfinance examples that impact the economic empowerment of the poor, this article addresses the dearth of research on the use of IS to effect social change at the bottom of the pyramid. The article’s subject matter also provides engaging material for IS coursework and teaching.

Keywords: microfinance, information systems, applications in microfinance, scalability of microfinance, door-step banking, social impact of information systems

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I. INTRODUCTION

A 2007 CAIS article titled “Leveraging Information Technology to Support Agents of World Benefits” pointed out an important void in the information systems (IS) literature about the role that information technology (IT) can play in effecting social change. They presented several examples of leveraging IT to support agents of social innovation in underserved communities and urged scholars to break “away from the comfort zone of the beaten track ... work at the bottom of the pyramid ... [with] a broader view of human welfare ... [and] promote the exchange of ideas across the practitioner-scholar gap” [Avital, Lyytinen, King, Gordon, Granger-Happ, Mason, and Watson, 2007, p. 584]. In the same vein, a “Letter from the Editor” in the August 2010 issue of the *Academy of Management Perspectives* notes that “there is very limited research that examines ... topics such as the bottom billion or bottom of the pyramid in management journals” [Bruton, 2010, p. 7]. That observation was based on a review of poverty-related journal articles in the management literature that found only eleven articles in sixteen major journals between 1989 and 2010, the earliest of which was published in 2003.

This article addresses the dearth of such research in the IS literature by examining the contribution that IS innovations have made to microfinance, an industry that provides financial services to the “unbanked poor” at the bottom of the pyramid (BOP). The *bottom of the pyramid* refers to the poorest segment of three billion people living on less than \$2 a day [Prahalad and Hart, 2002]. The prefix *micro* indicates that the small amount of money involved is usually less than \$100. An empirical study based on data from 160 countries found that access to finance had a positive impact on economic development [Honohan, 2006]. Microfinance helps the unbanked poor to lift themselves out of poverty by providing access to financial services.

At the heart of microfinance is microcredit, the provision of small unsecured loans to the poor so that they can invest in small businesses in order to generate income and improve their livelihoods. A vast majority of loans go to women who tend to undertake small manageable activities rather than risky ventures and plough their earnings back into the household for the benefit of the entire family. An important element of microcredit is the recycling of funds. When loans are repaid, usually in six months to a year, they are re-loaned. Recent research reveals that the poor also turn to microcredit to smooth the ups and downs in their cash flows, such as the unexpected cost of healthcare, payment of school fees, and repayment of other loans [Collins, Morduch, Rutherford, Ruthven, 2009]. Without microcredit, the poor have no other recourse but unregulated moneylenders and pawnshops that often charge usurious rates of 10 to 15 percent per month, which translates to more than 120 to 180 percent per year [Rosenberg, Gonzalez, and Narain, 2009]. The unmet need of the poor for financial services spawned over 11,000 microfinance institutions (MFIs) by 2010 [MixMarket, 2012]. Nearly 90 percent are small enterprises serving fewer than 10,000 customers [Reed, 2011]. A major obstacle is the cost of delivering small loans to barely-literate borrowers in remote villages.

Our research was motivated by the fascination of studying the applications of IS in a nontraditional business setting involving social goals related to serving the poor. This article presents three case examples of MFIs from India that harnessed IS to increase their outreach among the unbanked poor. The primary reason for choosing India is its dominance as the largest market in the microfinance industry, with 32 million active borrowers in 2012 [MixMarket, 2012].

The MFIs in the three case examples use a common business model called “door-step banking model” as a means of reaching the poor. The use of the same business model by the three MFIs permits a comparative analysis where any variation due to use of different business models is controlled. . These MFIs, however, represent a diversity of business settings. They differed in size and faced different implementation challenges. One MFI was a pioneer that recognized the potential of IS to scale operations; another was a young MFI that found a new approach for using IS to achieve scale; the third was a small MFI that used hosted open-source software to scale its operations. All the MFIs met the goal of scaling their outreach to the poor at the BOP while trying to achieve two goals simultaneously: providing a financial return for its investors, a prerequisite for financial sustainability, and achieving social goals by serving the unbanked poor.

This article proceeds as follows: An overview of the microfinance industry provides the contextual background for the case examples. Next is a summary of a conceptual lens that facilitates a comparative analysis of the impact of IS in the three cases. The three cases are presented, including an assessment of the impact of IS in each case using the conceptual lens. Commonalities and differences in the three cases are discussed.

A brief outline of the methodology of our larger research project is in order before we discuss microfinance and the three cases. We began our research with an extensive review of the rich literature in microfinance, ranging from academic articles in journals of development economics to numerous studies by international organizations and their affiliated agencies. The literature review helped us understand the growth and dynamics of the microfinance industry. In the next phase, we studied published data for twenty leading MFIs. Over a period of five years, we tracked multiple sources that generated a wealth of information for the three selected cases. These cases were prominent enough to be covered not only by the business press in India, but also internationally over the five-year period. Case studies, dissertations, and reports from institutions that cover the microfinance industry in India provided multiple sources of evidence for data triangulation to achieve contextual validity, or dependability, of the data. Published interviews with knowledgeable observers and players in the microfinance industry were valuable to get first-hand views on various issues. An important source for assessing the social performance of MFIs was the annual State of the Microcredit Summit Campaign reports. Primary archival data was extracted from the periodic tracking reports and other documents posted on the websites of the three MFIs. The extensive secondary data research was complemented by primary data collected by the lead author, including interviews with the CEOs of two of the MFIs.

II. BACKGROUND OF THE MICROFINANCE INDUSTRY

Half the world is “unbanked,” with 2.5 billion adults lacking access to the banking services of the formal financial sector [Chaia, Dalal, Goland, Gonzalez, Morduch, and Schiff, 2009]. Around 90 percent of the unbanked adult population in the world is in developing countries, where there are only eight bank branches per 100,000 adults compared to twenty-four in developed countries [CGAP, 2009]. India is a case in point: despite the country having the fourth-largest banking network in the world, 94 percent of its 600,000 villages do not have a single branch, leaving 120 million households unbanked [CRISIL, 2009]. Lack of access to basic financial services is correlated with low incomes. In India, 42 percent of the total population, or 490 million people, live below the poverty benchmark of \$1.25 per day [United Nations Development Program, 2009]. Banks find it unprofitable to serve the unbanked poor due to the high cost of processing a large number of small transactions compared to the tiny profits from small loans or saving accounts. For example, the cost of establishing a bank network in remote locations in rural areas is 80 percent higher than similar costs in more accessible regions [IFAD, 2008]. Other inhibiting factors are lack of collateral for loans and difficulty of completing the paperwork due to low literacy levels.

Evolution of Microfinance Institutions

Microfinance emerged as a means of providing access to financial services for the unbanked poor, who traditionally had used informal sources such as moneylenders when they needed loans. One of the first widely recognized successes in microfinance was Grameen Bank of Bangladesh, whose founder, Muhammad Yunus, pioneered an ingenious method of providing credit without any collateral to self-selected groups of five women. The group provides social collateral for the loans given to individuals by taking collective responsibility for repayment of the loans by its members in weekly installments. Yunus believed that charity was not an answer to poverty. His experiment proved that the poor do not lack motivation, skill, or entrepreneurial spirit to make their small businesses successful. The Nobel Peace Prize of 2006 shared by Yunus with the Bank underscored the social impact of microfinance and sparked a global interest in microlending.

Microfinance institutions (MFIs) started as not-for-profits, funded by government agencies and charitable organizations. However, philanthropy alone cannot support scaling of MFIs. Pierre Omidyar, the founder of eBay, observed that there was not enough nonprofit capital for the microfinance industry to scale to even 500 million people [Greene, 2006]. JPMorgan estimated the unmet need for financial services at the BOP at \$300 billion in 2009 [Lowitt and Grinsley, 2009]. To attract private capital, many MFIs transitioned from a nonprofit to a for-profit model to fund their operations. The loan default rate of under 3 percent for many MFIs was better than the write-off of 5 percent of outstanding balances by U.S. credit card companies, implying that investments in microfinance were not an unusually risky proposition [Bellman, 2006]. The business opportunity to “do well and do good” attracted JPMorgan, for instance, to launch a new microfinance unit in November 2007 as part of its emerging markets strategy to “achieve a double bottom line of social benefit and financial returns” [Ishmael and Lapper, 2007].

The increase in commercial funding helped the MFI industry grow well beyond what would have been possible with just donor and government support. The surge in financial services to the poor at the BOP was analogous to what was happening in the mainstream financial services industry. The unbridled growth led to loan delinquency crises that erupted since 2008 in several countries, in particular, Nicaragua, Morocco, Bosnia, Herzegovina, and Pakistan. In October 2010, the problem flared up in India as well, which could potentially impact the global microfinance market because of the size of the Indian microfinance industry.

Door-step Banking Model to Reach the Unbanked Poor in Remote Areas

“Door-step banking” is a high-touch and, hence, a high-cost delivery channel which circumvents the difficulty of the poor in remote areas having to travel to a bank for financial services. With a door-step bank, the bank comes to the poor through the MFI’s loan officers, who travel to villages in order to disburse the initial loan to clients and collect repayments in periodic installments, usually weekly or fortnightly. The flowchart in Figure 1 captures the process-flow of activities in this model. First, the MFI has to select the area to launch operations, followed by recruiting and training of loan officers. “Field Operations” are the frontend operations of the MFI where loan officers interact with clients during periodic visits to the village center, a meeting point for a cluster of small villages. They first interview potential clients to assess their eligibility for a loan and then form self-selected groups of customers, who agree to provide social collateral for the loans given to individual members. The groups are then briefed about the policies and procedures for issuing loans and repayments. The loans are disbursed at the end of the briefing process and repayments collected in the next visit. The last two entities in the model, “Branch Office Operations” and “Head Office Operations,” deal respectively with the oversight of the MFI’s operations by management at the Branch Offices and Head Office. These include the backend operations of the MFI for transaction processing. MFIs have to address three common problems: collection of information from remote rural clients, availability of management information systems for transaction processing, and the conduct of financial transactions in remote rural areas [Parikh, 2006].

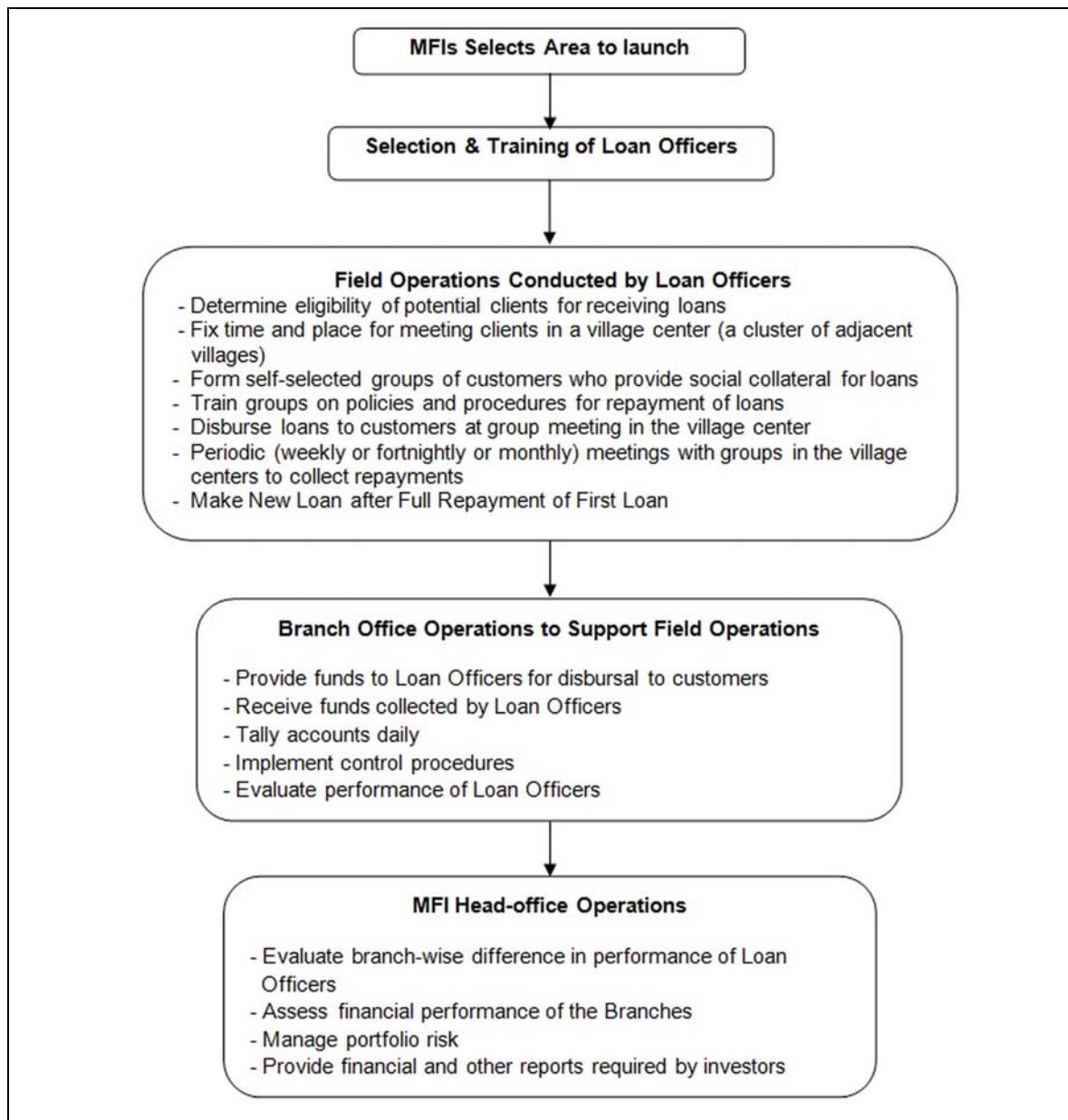


Figure 1. Door-step Banking Model for an MFIS to Reach the Unbanked Poor

Challenges of Implementing Door-step Banking

We distinguish between two broad categories of challenges faced by MFIs in implementing door-step banking: the first relates to “non-IT” issues while the second deals with IT issues. A number of the non-IT issues that impede an MFI’s efforts to reach the poor were identified by Hermes and Lensink [2011] and Honohan [2006]:

1. Voluntary self-exclusion by poor people who choose not to use financial services even if they have access. Reasons for voluntary self-exclusion include:
 - No need because other family members use financial services or they prefer to deal in cash
 - Cultural or religious reasons (e.g., Islamic Sharia law forbids interest payments)
 - Discomfort in using formal financial services due to lack of skills (e.g., financial literacy) and lack of self-confidence in understanding financial jargon
 - Too risk-averse to borrow for investments in the future
2. Exclusion of poor people from participating in group-lending programs because:
 - Other group members see them as a bad credit risk.
 - The MFI’s loan officers are also reluctant to include them due to risk of nonpayment.
3. Impact on empowerment of poor women is affected when women are forced to hand over the loan to men despite being responsible for its repayment.

The challenges in implementing IS/IT solutions in remote rural areas include “lack of reliable electronic connectivity, intermittent electrical power, maintenance difficulties and non-availability of skilled personnel” [De’ and Ratan, 2009, p. 261]. Two pilot implementations to overcome these problems were also reported in the aforementioned study. Our three case examples illustrate different approaches taken by the three MFIs to deal with these problems.

A Potential Danger of Scaling Access to Microfinance: Over-indebtedness of Borrowers

A February 2010 study of the delinquency crises by the Consultative Group to Assist the Poor (CGAP), the microfinance research arm of the World Bank, identified three vulnerabilities within the microfinance industry: concentrated market competition and multiple borrowing; overstretched systems and controls in MFIs; and erosion of MFI lending discipline [Chen, Rasmussen, and Reille, 2010]. The study warned that over-indebtedness of borrowers would be inevitable if these problems were not corrected. Their warning came to pass in India in October 2010 when over-indebtedness of borrowers nearly paralyzed the microfinance industry. The high growth rates of several of the large MFIs in India fueled by commercial funding created an untenable business scenario where the MFIs were competing for the same clients, leading to over-indebtedness [Reed, 2011]. Multiple borrowing, where clients are indebted to more than one MFI at the same time, is an early warning indicator of potential over-indebtedness. A borrower survey conducted during March–May 2010 in India revealed the highest incidence of borrowers with four or more loans in the region with the most dense network of MFIs. This finding confirms the earlier observation that MFIs were competing for the same clients [Mohan, Potnis, and Mattoo, 2013].

Use of IS in the Microfinance Industry

Information systems might not seem to be a priority for an industry composed of small players serving poor customers in areas with poor infrastructure. For example, the traditional thinking in the microfinance industry questioned the cost-effectiveness of IS investments for MFIs operating in remote villages in developing countries. The conventional wisdom was that only large MFIs with a client base of over 100,000 had “sufficient resources ... for the successful implementation of [technology].... This is not surprising considering that ... [these] MFIs’ institutional capacities in terms of human resources, technology infrastructure and availability of funds is much greater” [CARE, 2006, p. 29]. In the 1990s, only large MFIs like Grameen Bank were using computerized information systems for backend processing of transactions. A survey conducted in 2008 covering 243 MFIs from sixty-five countries showed that 76 percent did not have an IT department and that the biggest hurdles for using technology were high cost and staff training [Microfinance Insights, 2008]. Each of the three cases presented in this article shows how an MFI dealt with the challenges of using IS effectively.

III. A CONCEPTUAL LENS FOR ANALYSIS OF THE THREE CASES

The IS literature contains a number of frameworks for evaluating the value of IS and its effect on organizational performance. Reviewing various streams of research on this subject, Ravichandran and Lertwongsatien [2005] pointed out the need for research on elaborating how IS capabilities could benefit firms and for IS success models to more directly link IS activities with the performance of a firm. The use of information and communication

technologies (ICT) in the microfinance industry in India was studied by De' and Ratan [2009] using a framework developed from structuration theory, which was applied to two pilot ICT implementations.

For evaluating our three cases, we use a conceptual framework or lens from the literature on core IS capabilities for exploiting IT to achieve business success [Feeny and Willcocks, 1998; Willcocks, Feeny, and Olsen, 2006; Willcocks and Feeny, 2006]. The Feeny and Willcocks framework embodies a resource-based perspective, which postulates that a firm's resources include tangible and intangible assets such as "brand names, in-house knowledge of technology, employment of skilled personnel, efficient procedures, capital, etc." [Wernerfelt, 1984, p. 172]. The early applications of the resource-based perspective to evaluate the value of IT focused on its contribution to achieve competitive advantage [Mata, Fuers, and Berney, 1995; Powell and Dent-Micallef, 1997]. Another notable study based on this perspective found that IT has a positive effect on the performance of a firm [Bharadwaj, 2000].

Feeny and Willcocks developed their framework out of two streams of research, the first into characteristics of high performers in the IT function, and the other into capabilities needed to run effective IT outsourcing deals. A core IS capability is "a capability needed to facilitate the exploitation of IT, measurable in terms of IT activities supported, and resulting business performance" [Willcocks, Feeny, and Olsen, 2006, p. 29]. Five out of the nine core IS capabilities in their framework were relevant for analyzing the three cases. Table 1 presents brief descriptions of the five core IS capabilities that we selected for our conceptual lens.

#	IS capability	Description
1	Leadership	Integrate IS/IT effort with business purpose and activity
2	Business systems thinking	Ensure that business processes are envisioned by business thinking such as process reengineering
3	Architecture planning	Create a coherent blueprint for a technical platform which responds to present and future business needs
4	Making technology work	Rapidly trouble-shoot problems disowned by others across the technology supply chain
5	Vendor development	Identify the potential added value of IS/IT suppliers for outsourcing

IV. THE THREE CASE EXAMPLES

The MFIs and IS applications discussed in the three cases are:

- SKS Microfinance: A pioneer whose custom-built information system included operational and analytical capabilities for scaling operations to serve the rural poor.
- Equitas Microfinance: A young MFI that used a commercially available software package and added a real-time performance dashboard to improve productivity of loan operations.
- A small MFI that used hosted open-source software to scale its operations demonstrating that even small MFIs can use IS effectively.

Case 1: SKS Microfinance—A Pioneer in Using IS for Scaling Operations

SKS Microfinance was launched in 1998 as a not-for-profit with a social mission to "empower the poor to become economically self-reliant," as is stated in the mission on its website.¹ The initials SKS stand for "Swayam Krushi Sangam," a Sanskrit phrase for a self-help organization. SKS stands out in the microfinance industry because of its success in scaling from ten customers in 1998 to nearly 4.3 million in February 2009. One of the fastest growing MFIs in the world, it had an annual growth rate of 200 percent during that period. Vikram Akula, the founder of SKS, was a pioneer in recognizing the potential of IS to connect the backend operations with the frontend, as well as the value of analytical systems for managing portfolio risk, both of which were instrumental for scaling its operations. He was included in *Time* magazine's "Time 100: The People Who Shaped Our World" in 2006 for its IT innovation. The narrative for this case example traces the SKS story from its roots to the implementation of several IS innovations, including an assessment of whether SKS achieved a social goal of reaching the poor.

¹ An abridged version of the SKS case example with data as of December 2009 was included in an article on a catalytic innovation model in microfinance [Mohan and Potnis, 2010].

Roots of SKS

SKS was rooted in a childhood resolution of Vikram Akula to eradicate poverty. His parents moved from India to upstate New York in the early 1970s when he was only three years old. The jarring poverty that he saw when he visited India for the holidays shocked him, and he wanted to do something to alleviate it. Upon graduation from Tufts University in 1990, he came to India to work as a community organizer at a nongovernmental organization (NGO) which was involved in a range of development activities from health to education to microfinance. He found that microfinance had the greatest impact on poverty since it provided the base for improvements in health and education. After finishing graduate school at Yale University in 1995, he returned to India as a Fulbright scholar to coordinate a microfinance project at another NGO. He realized from this experience that the way microfinance was done by NGOs was extremely inefficient and would never scale to reach all of India's poor.

The SKS Approach to Overcome the Constraints that Inhibit Scaling

Akula returned to the U.S. to pursue a Ph.D. at the University of Chicago on the impact of microfinance, where he crystallized his ideas for creating a scalable business model. He identified three constraints to scaling: what he called the three "C's"—lack of *capital*, lack of *capacity*, and the high *cost* of delivery. His business model for dealing with the three constraints was as follows [Akula, 2008a]:

1. Change to a for-profit model to attract commercial capital
2. Standardize business processes to build capacity
3. Use IS to reduce transaction costs

Akula decided in 1997 to build his own microfinance company which would adapt the best practices of companies like McDonalds and Starbucks for building capacity and use IS to automate manual processes that drove up transaction costs. His business model did not impress the big microfinance funding organizations and donor agencies such as the Rockefeller Foundation and Ford Foundation which thought he was too young and lacked experience. He then raised \$52,000 from 357 relatives and friends, including \$10,000 from a small, volunteer Indian American Organization, to launch SKS as an NGO. SKS was converted to a for-profit company in August 2005 to make it possible to acquire more capital for expansion. By that time SKS had grown to over 100,000 borrowers with a default rate of less than 2 percent, two essential preconditions for attracting private capital. The 2007 equity investment of Sequoia Capital, a venture capital company reputed for its early-stage investments in Yahoo!, YouTube, and Google, among others showed that investors had confidence in the financial viability of the SKS business model.

Focus on Social Goal of Reaching the Poor

In Akula's words: "It was essential to design microfinance around the borrower rather than forcing the borrowers to adapt to microfinance.... We are a proponent of door-step banking. We conduct banking at the village itself, which is easier for our borrowers, who then do not have to go to a branch office in a nearby town. We also have products that can be paid in weekly installments, which makes it easy to repay out of weekly cash flows. These features contrast with traditional microfinance in India that requires borrowers to come to branches and to make monthly installments." [Srinivas, 2006, p. 2]. Akula adapted the group-lending approach pioneered by Grameen Bank of making loans without any collateral to self-selected groups of five women who serve as guarantors for one another. Groups are combined to form a Center (Sangam) in a village consisting of four to twelve groups or twenty to sixty borrowers. The Sangam is responsible for the repayment of all the groups, creating a dual joint-liability system where the Sangam members are held accountable for each other. This adaptation of the Grameen model enabled the loan officer assigned to each center to handle as many as sixty customers at the weekly meeting.

The customer-first philosophy of SKS necessitated door-step banking despite the high cost of loan officers traveling to villages on mopeds on rough dirt roads and braving the vagaries of the hot summer and monsoon seasons. The deliberate choice of the most impoverished region for launching SKS operations exacerbated the high travel cost. Also, the meetings had to be scheduled during the short window of time in the morning from 7 a.m. to 9:30 a.m. when the women were available so as to not disrupt their work schedule in the fields. This delivery model was part of a standardized field operations process designed to increase the efficiency of loan officers.

Process Reengineering for Developing Standardized Business Processes

Akula recognized the importance of standardizing business processes before launching IS initiatives to avoid the trap of automating an inefficient business process. He first found out how the Field Operations of the door-step banking model worked by putting a stopwatch on each step of the loan process. He found that time was wasted by loan officers in searching for borrowers in fields. Akula standardized this time-consuming activity of counting payments by fixing the standard weekly repayment in round numbers of twenty-five or thirty rupees, i.e., multiples of

five rupees (the smallest bill in India) to avoid coins. The Center meeting was at a fixed time and location in the village and was conducted by the loan officer according to the “Operations Manual,” which laid out the “how to” procedures for the tasks to be carried out before starting financial operations. These tasks included forming groups and Centers and conducting a five-day “Compulsory Group Training” program consisting of hour-long sessions to educate members on the processes of SKS. The manual also covered the procedures for conducting the weekly Center meetings, including disbursement of loans and collection of repayments, checks of loan utilization, and how to deal with problems of nonattendance and non-repayment or issues raised by customers. For example, if a customer raises a question on why she can’t borrow more money, the loan officer’s response suggested by the manual comes directly from Indian village culture: “It is like when a new bride comes into her husband’s home. The mother-in-law won’t give her all the keys to the house until she trusts her” [Bellman, 2006, p. A12].

The standardized approach enabled a loan officer to handle an average of fifty customers in a Center meeting instead of twenty and visit three villages instead of one in the limited open window in the morning. Other areas where Akula saw the potential of standardization to build capacity were drawn from the best practices of global giants. He adapted the factory-style training model for training SKS loan officers that McDonalds uses for the low-skilled workforce of its franchises. The standardized program cut the time for training loan officers to two months from the norm of four to six months in most MFIs, with the goal of cutting it to one month [Akula, 2008b]. The decentralized hub-and-spoke model of Starbucks was used in the expansion strategy of SKS, where Centers were created in clusters under the umbrella of Branches. Opening multiple centers in one Branch helped to build the SKS brand among customers and also enabled experienced staff from an existing center to train the staff in an adjacent new center.

The standardization of business procedures was a key factor in achieving the 200 percent annual growth of SKS, adding fifty Branches, 500 loan officers, and 160,000 new customers every month to scale its outreach to 4.3 million by February 2009. As a mark of recognition of the initiatives implemented in process innovation, SKS received the ABN-AMRO Microfinance Process Excellence Award in May 2006 and the Grameen Foundation USA Excellence Award in November 2005.

Use of IS After Process Reengineering to Reduce Transaction Costs

Akula was a pioneer in recognizing that effective IS is imperative for minimizing transaction costs, a significant barrier in scaling operations. SKS was the first MFI to implement an integrated system connecting the frontend with the backend operations in the door-step banking model, with analytical capabilities to manage portfolio risk. The IS had to be extremely user-friendly since the loan officers who entered data in the Branch PC were young people with only a tenth-grade education, who were recruited from the poor villages they covered. The training of these computer-illiterate loan officers to enter data into the system also had to be minimal. Otherwise the cost of training would negate the benefit of using the readily available low-wage staff for data entry. Since there was no readily available commercial off-the-shelf software (COTS) package available at the time, SKS had to build customized software in-house. An Internet-enabled Management Information System (MIS) was developed as early as 2000, within two years of the company’s launch, connecting the Head Office to the Branches. Loan officers entered the transaction data on loans, collections, etc. for each customer in the PC at each Branch after they completed their morning field meetings. Special attention was given to the design of the graphical user interface to make it simple so that a loan officer could enter all the daily transactions in less than thirty minutes. As part of its infrastructure, SKS also installed car batteries or gas powered generators as backup to deal with power outages. All Branch-level transactions were consolidated and compressed so that they could be sent over a dial-up connection in less than two minutes. Summary data was available in the Head Office within hours after the morning field meetings. Figure 2 depicts how the frontend operations of loan officers were connected to the backend operations at the Branches and, thereafter, to the Head Office.

A simple example of the benefit of standardizing the business process prior to the IT initiative was the ability to pre-populate the fields for collections in the Collection Sheets with data on the weekly loan repayments fixed for each client. Only exceptions had to be recorded by the loan officers at the village Center meetings, which, in turn, reduced the number of transactions to be entered in the Branch PC. The ability to pre-populate fields saved time for data-entry at both the village Center meetings and at the Branches. The incidence of data entry errors was also reduced.

The core of the MIS system, called MAPS (Monitoring, Accounts, Portfolio, and Smart cards), was the Portfolio Tracker module that captured all the transaction data inputted by the loan officers. Corporate staff used the analytical capability of the MIS to respond quickly to any potential problems in its portfolio quality. For example, it flagged a spike of 80 percent of loans in some Branches for buffalo purchases—a potential risk of huge defaults if there was an epidemic that killed off buffalos or a sharp decline in the price of buffalo milk. The portfolio was diversified by finding borrowers in other areas, like tea shops, brick-making, and tire retreading [Bellman, 2006]. The fully integrated MIS entailed an initial investment of over \$250,000, a significant outlay for an MFI in its early stages

of growth. But it delivered on the promise of reducing the cost of operations through automation of transactions and better management of portfolio quality. The low operational cost enabled SKS to drop the annual interest rate charged to borrowers from 36 percent in 1998 to 24 percent in 2006. The Consultative Group to Assist the Poor, a consortium affiliated to the World Bank, recognized the transparent mechanisms engendered by the MIS System by giving SKS their Financial Transparency Award in both 2005 and 2006.

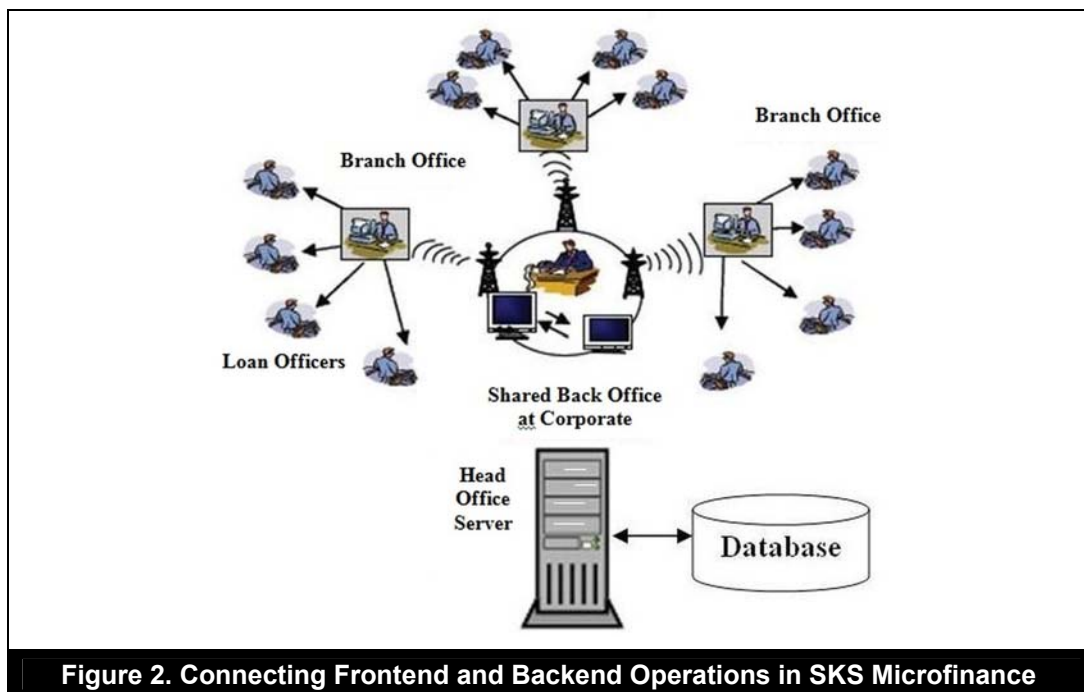


Figure 2. Connecting Frontend and Backend Operations in SKS Microfinance

Management of IS/IT Function

SKS realized in 2008 that its information systems had to be upgraded to support its aggressive expansion target of increasing its outreach to five million customers in 2009 and eight million in 2010. The company decided then to outsource the IS/IT function for two reasons. First, the core competence of SKS is not IT. More important, IT skills were at a premium in India because of the demand from the IT-enabled services industry, including the Indian subsidiaries of multinational giants like IBM, Accenture, and EDS. Given the problems inherent in managing an in-house IT group and the costs arising from high salaries and high attrition, even a leading telecom company, Bharti Airtel, outsourced the entire IT function to IBM in 2005. SKS selected local companies for outsourcing different components of the new IS/IT backbone because local companies were likely to be more price-competitive than international companies. The only exception was a software licensing partnership with Microsoft to support the expansion of its Branch network through 2011. The investment was of the order of \$2.5 million for deploying state-of-the-art technologies to upgrade its IT infrastructure [Business Standard, 2008].

Did SKS Achieve a Social Goal?

The exponential expansion of SKS was fueled in large measure by funding from venture capital firms, including two rounds from Sequoia Capital and Kismet Capital. Sandstone Capital invested \$50 million in November 2008, the largest investment in any MFI, in the midst of a global meltdown in the financial industry. SKS went public in mid-2010, with an initial public offering (IPO) that was oversubscribed thirteen times, and attracted \$358 million from George Soros and other blue-chip investors. The company that was launched with an initial capital outlay of \$50,000 in 1998 rose to a peak market value of \$2 billion in late 2010 [Rao, 2011]. The large infusion of equity capital in SKS raises a legitimate concern about the possibility of mission-drift from a social return to a financial return for its investors. According to the 2012 Microcredit Summit Campaign Report, 90 percent of the total SKS clientele as of December 2010 were verified as poor living below the poverty line of \$1 a day, indicating that SKS met a social goal [Maes and Reed, 2012].

Another pertinent question in assessing whether SKS met its social goal concerns interest rates. SKS charged an average annual percentage rate (APR) of 28 percent in 2008. The APR is not a flat interest rate on the loan, but the interest rate calculated on the declining balance of the loan, which takes repayments into account during the term of the loan. The SKS APR of 28 percent is based on the following cost factors: 12.5 percent for the cost of funds loaned by banks to SKS, staff cost of 8.5 percent, overhead and other administrative costs amounting to 3 percent, and 2 percent for loan loss provision. This left a balance of 2 percent for profit, which was fixed by SKS. In regions



where the scale of operations was higher, the interest rates were lowered to 24 percent. The interest rates charged by SKS were comparable to the effective rates borrowers would pay for bank loans. Although banks charge a lower interest rate of 12.5 percent for loans, a World Bank study on access to finance for India's rural poor showed that longer processing times for loans together with bribes varying from 10 to 20 percent raised the effective cost of the loan to much more than the interest rates [Basu and Srivastava, 2005].

In October 2010, a controversy about excessive microfinance lending in Andhra Pradesh (AP), a state which accounts for 40 percent of all microloans in India, impacted SKS and other MFIs based in AP. The AP government accused MFIs of charging usurious interest rates and clamped down on the operations of all the MFIs. SKS paid the price for the AP government's action with its market value plunging to a fifth of its peak market value in May 2011. The meteoric rise and subsequent fall of SKS does not, in our view, detract from the impact of the IS innovation pioneered by Akula because the root cause of the AP crisis in large part was political. In spite of the negative impact of the AP crisis on SKS operations, the number of borrowers reached by SKS as of January 2011 was 7.7 million spread over 2,403 branches across nineteen states in India. The default rate prior to the AP crisis for the fiscal year 2008–2009 was 0.34 percent, the latest available data in the SKS website [SKS, 2009]. Thus, the IS initiative pioneered by SKS helped in achieving the goal of scaling operations to reach a large number of customers and meeting a social goal as well, despite difficulties with the AP government.

Evaluation of SKS Using Our Conceptual Lens

1. Leadership: SKS was rooted in the mission to provide financial services to the unbanked rural poor: a social venture. Social entrepreneurs have to question the status quo, exploit new opportunities, and be driven to accomplish their mission. The founder of SKS, Akula, fits these requirements. His passion to serve the poor was a key factor that was pointed out by Sequoia Capital for investing in SKS in an interview with the lead author [Reference is held for review].
2. Business systems thinking: SKS implemented a process reengineering information system to avoid the trap of automating an inefficient system of doing work. The design of the IS after process reengineering resulted in an extremely user-friendly interface that allowed loan officers with only a tenth-grade education to enter the daily transactions in the Branch PC in less than thirty minutes.
3. Architecture planning: The IT infrastructure enabled all Branch-level transactions to be consolidated and compressed so that they could be transmitted over a dial-up connection in less than two minutes. Summary data was available in the Head Office within hours after the morning field meetings. Also, SKS installed car batteries or gas-powered generators as a backup to deal with power outages in remote Branch offices.
4. Making technology work: SKS was the first MFI to build an end-to-end integrated system linking backend to frontend operations, since no COTS software was available for MFIs at the time. The other IS innovation was to implement an analytical portfolio management system to diversify risk. SKS invested \$250,000 in developing the custom-built IS innovation that was instrumental for scaling.
5. Vendor development: Except for a software licensing partnership with Microsoft to support the expansion of its Branch network through 2011, SKS selected local companies for outsourcing various components of the new IS/IT backbone. The business rationale was that local companies were likely to be more price competitive than international companies. SKS invested \$2.5 million to upgrade the IT infrastructure through vendors.

Case 2: Equitas Microfinance—Addition of a Custom-designed Real-time Performance Dashboard to the COTS Software for Loan Operations

Equitas Microfinance, a young MFI launched in December 2007, also stands out for rapidly scaling its outreach, serving 1.26 million poor clients by September 2010. Start-up capital was not an issue since Equitas was sponsored by a finance company with deep pockets. The initial equity of \$3 million (at the then-prevailing currency exchange rate) was a record for a start-up MFI, over four times the earlier record. P.N. Vasudevan, a senior manager from the parent company, was appointed to head Equitas. He and two other members from the same finance company also invested in Equitas. Vasudevan had experience in retail banking, but was new to microfinance. He was enthused about the satisfaction of touching the lives of poor people through microfinance. After meeting with several knowledgeable people in the industry, he reached the same conclusion that Akula of SKS reached. The existing MFIs were inefficiently organized, made little use of technology, and did not have internal controls [Sharma, 2009]. Vasudevan believed that the MFIs were doing well despite their operational inefficiency because the potential demand was high, with only 15 percent of demand being met by the industry. He saw a major opportunity in improving operational efficiency. Accordingly, he installed an integrated end-to-end information system before Equitas made its first loan. His approach was different from that of SKS not only for implementing the end-to-end system but also in changing the business model to create a more accountable and transparent structure for door-

step banking. To support that model, Equitas developed a real-time performance dashboard for monitoring the efficiency of Field Operations.

The narrative of this case example begins with an overview of the structure devised by Equitas to implement door-step banking. IS initiatives are described next, including the integrated system connecting frontend and backend operations, and the real-time performance dashboard. The narrative concludes with an assessment of whether Equitas achieved a social goal.

Different Model for Implementing Door-step Banking

Equitas departed from the model of SKS and other MFIs who cater to rural poor borrowers, since it focused on women who lived in urban slums. Urban microfinance is more challenging than rural microfinance because this population migrates in search of employment opportunities. There is also a larger risk of borrowers borrowing from multiple lenders and becoming over-indebted.

Equitas—a Latin word which means “equitable” in English—was founded with the intent of providing fair and transparent financial services to poor urban women. Its aim was to bring the technological and operational efficiencies of mainstream retail banking to BOP customers by reducing the cost of service. Unlike other MFIs whose loan officers handled all contacts with borrowers, Equitas was the first MFI to borrow a common practice from the retail finance business by having two separate teams of field officers, one for loan origination and another for loan collection. The field officers for origination of loans were called *Sales Officers*; the field officers who collected repayments were called *Relationship Officers*. In the absence of a credit bureau for screening borrowers to check on the purpose of the loan and their ability to make repayments, this separation of roles resulted in a more rigorous procedure for screening potential clients. Loans in the range of \$200 to \$300 at 26 percent APR interest rate were disbursed within fourteen days of the loan application. Each client was given a passbook in which the APR interest rate was printed, making it transparent to the borrower. Pre-coded receipt stickers were pasted on the passbook when the repayment was collected. Separating loan origination from collection facilitated the Relationship Officers to handle a larger number of customers—2500 customers compared with the industry average of about 600. This model for door-step banking was shaped through interactions with functional experts from Unitus Advisors, a global microfinance accelerator.

Equitas adapted Grameen Bank's group-lending approach to create a dual joint-liability group, as SKS did, by clustering the self-selected groups of five members into a Center consisting of ten to twelve groups, (fifty to sixty borrowers) that was collectively responsible for the loan repayments of its members. Equitas also reduced delivery costs by opting for fortnightly meetings for collecting repayments instead of the weekly meetings used by SKS.

First to Implement Several Other Features in Door-step Banking

Equitas introduced other innovations to improve the effectiveness of its loan operations and meet its goal of providing fair and transparent services:

1. Guaranteed loan disbursement within fourteen days from day of application, a unique selling proposition for borrowers: the procedures for disbursing the loans were systematized with specific steps regarding who had to do what on which day in order to meet the guarantee.
2. Used a specialized agency, Thomas International, for profiling job candidates to assess behavioral fit to jobs, thus enhancing objectivity in staff selection and ensuring consistency, irrespective of who did the interview.
3. Trained employees on a custom-designed “5S” methodology for improving workflow efficiency and morale. The 5S methodology—Sort out, Systematic arrangement, Shine everything, Standardization, and Self-discipline—specified the details of the workflow regarding what should be kept and where, and how it should be stored. This methodology enabled employees to clearly understand how work is done and instilled ownership of the process in each employee.
4. Printed the all-inclusive APR interest rate in passbooks of borrowers to meet the goal of transparency.
5. Developed a proprietary system for pre-printed receipt stickers for pasting in the passbooks at the time of repayment: this innovation was more cost-effective than hand-held devices and cut the transaction time at the Center meetings from thirty minutes to twenty minutes.

Management of IS/IT Function

Equitas has a remarkably small corporate IT group of only ten members. It opted for a COTS software package from Craft Silicone that was implemented with the help of Crane Software, a local partner of the vendor. The system worked on a .Net platform and was selected because it was deemed to have the best features, including an



integrated accounting system, among the commercially available software products at the time. The initial \$2 million cost of the system was met from the start-up capital invested by the core promoters, including the CEO, who wanted an entire end-to-end system in place before giving out the first loan [Sharma, 2009]. The system could not, however, scale to handle Equitas's growth rate of thirty new branches opening per month.

Equitas sought a new scalable COTS package and in April 2009 selected TEMENOS T24, an extension of the T24 core banking system developed specifically for microfinance. This software was operational by December 2009 on IBM hardware that was chosen because it could scale horizontally with multiple applications running across different servers. Equitas was able to adapt the T24 software quickly to changes in its business process, such as switching the loan repayment cycle from fortnightly to monthly frequency when it became necessary after the AP crisis mentioned in the discussion of SKS. The high initial capital cost of using COTS software was offset by a reduction in recurring operational costs. Equitas also outsourced telecommunication operations and data centers, with the corporate IT office ensuring that everything hung together.

The new core banking system enabled Equitas to automate several processes in its head office operations for scaling up without extra manpower. Despite the growth in the client base from 500,000 in July 2009 to nearly 1.3 million by September 2010, the same number of staff could handle the backend processes. Equitas also bought a document management software (DMS) from Newgen Software to speed up the time-consuming process of checking the loan application forms filled by borrowers. The DMS software used technology based on optical mark readers for automatic scanning of data of the application forms. Staff productivity tripled from processing eighty to 250 applications in a single shift.

The Chief Technology Officer was a member of the board of directors, attesting to the importance that the CEO placed on IT and IS. In March 2008, just four months after the launch of Equitas, CRISIL, the ratings agency in India whose majority owner is Standard & Poor's, gave Equitas an mFR4 grade on an eight-point scale ranging from mFR1 (highest) to mFR8 (lowest). This was the highest rating given by CRISIL to a start-up MFI. The rating is a measure of overall performance based on a broad range of parameters, including the MFI's systems, processes and internal controls, and asset quality [CRISIL, 2008]. The rating was upgraded by CRISIL to mFR3 in April 2010.

Using a Real-time Performance Dashboard for Improving Productivity

In an exception from its policy of using COTS software, Equitas built a customized real-time performance monitoring dashboard that was designed to satisfy requirements of management for actionable, readily available information [Mohan, 2010]. A number of features in the dashboard, especially its real-time feature, were significant innovations in the microfinance industry. The core of the custom-designed system was a dashboard to alert corporate and branch management about problems in the efficiency of the Relationship Officers' fortnightly meetings in the field. The dashboard displayed three key metrics—meeting attendance at village centers, loan collections, and the ending time of the meeting, all based on data sent by Relationship Officers within fifteen minutes after the meeting by using SMS on their mobile phones. Exception reports by branches with regard to attendance rates, collection problems, and timely management of meetings alerted management to problems in the field for timely corrective action.

The CEO periodically checks the corporate dashboard screen on a wall just outside his office and sends SMS messages to branches and loan officers if he notices problems in the field operations, especially with regard to collections. The rationale for the real-time feature of the performance dashboard, analogous to the real-time system used by stockbrokers, is the action taken by the CEO within fifteen minutes of the close of a meeting. Corrective action can be taken without any delay in the meetings scheduled for the rest of the day. The fact that the CEO was himself using the dashboard sent a strong signal to branch management, as well as the frontlines, that Equitas was a company that used analysis of data to inform its decisions [Mohan, 2010].

Did Equitas Achieve a Social Goal?

Equitas began its operations in the southern state of Tamilnadu and expanded to neighboring Andhra Pradesh state and four states in central and northern India. Its early success led to an infusion of new equity amounting to \$12.5 million in April 2008 from a consortium, earning the distinction of having the largest equity capital for a start-up MFI and becoming the fourth-highest capitalized MFI in the country at that time [Syminvest, 2008]. As of March 2011, it had 293 branches with an outreach of over 1.3 million customers and a default rate of 0.67 percent. Gross income doubled from \$25 million in March 2010 to \$48 million by the end of March 2011, earning a net profit of 18.42 percent [Equitas Annual Report, 2011]. The financial performance of Equitas attracted additional investments from blue-chip private-equity institutions such as Sequoia Capital who made the first investment of \$9.4 million in January 2010 [MicroCapital, 2010] and followed with another investment of \$1.7 million in March 2010 [Equitas Annual Report, 2010]. International banks, such as the Royal Bank of Scotland and prominent Indian banks like State Bank

of India, HDFC Bank, and ICICI Bank, also made investments in Equitas, demonstrating the confidence of institutional investors in the Equitas business model.

With regard to the interest rate charged to the customers, Equitas factors in cost of borrowing, cost of operations, portfolio risk, profit margin, and prevailing market practices. As of the end of 2011, Equitas was charging an APR interest rate of 26 percent, with no processing fee—unlike other MFIs. The crisis in Andhra Pradesh in October 2010 sparked a considerable debate on fair interest rates of the microfinance industry. Equitas's pricing philosophy as stated in their annual report for the 2010–2011 financial year is noteworthy: the interest rate is linked to the long-term target operating costs instead of the prevailing operating costs, to ensure that the cost of expansion is not borne by existing borrowers. Further, the interest rate of 26 percent met the interest cap of 26 percent set by the central bank of India after the AP crisis. According to data available (December 2010) in the Microcredit Summit Campaign Report, 100 percent of Equitas's borrowers were certified to be the poorest women, showing that Equitas met the social goal of serving poor urban women [Maes and Reed, 2012].

Evaluation of Equitas Using Our Conceptual Lens

1. Leadership: Even though MFIs were doing well in India because of the potential high demand, the CEO of Equitas recognized the business opportunity in improving the operational efficiency of MFIs. He was also enthused about the satisfaction from touching real lives of poor people through microfinance. He recognized the importance of IS by investing \$2 million in an integrated system before even giving the first loan. His personal use of a real-time performance dashboard was instrumental in changing the management process of Equitas to that of a data-driven company.
2. Business systems thinking: Equitas acquired a comprehensive information system but did not follow the footsteps of the pioneer, SKS. Equitas devised a different model to create a more accountable and transparent structure for door-step banking.
3. Architecture planning: Equitas selected a COTS software package from the products available in 2007 for the microfinance industry. The initial package that was implemented was replaced in April 2009 by a more robust and scalable software package that kept pace with the rapid growth of Equitas. The new platform could also be adapted easily to changes in the business process of Equitas that became necessary after the Andhra Pradesh crisis in 2010.
4. Making technology work: The real-time performance dashboard was custom-designed to meet management requirements for actionable information. The dashboard displayed three key metrics within fifteen minutes after the conclusion of the meeting by loan officers with customers in the field. These metrics alerted corporate and branch management about problems in the field, especially with regards to collections. The CEO checked the dashboard screen on a wall outside his office periodically and sent an SMS message to branches and loan officers if he noticed problems in the field operations. His active involvement spurred the use of technology for improving business performance. Equally important was the inclusion of the Chief Technology Officer as a member of the Board of Directors to ensure that IS/IT was aligned with corporate strategy.
5. Vendor development: Equitas actively sought IS vendors to support its operations. The partnership with TEMENOS was key for implementing a scalable integrated system that kept pace with the rapid growth of Equitas, as it opened thirty new branches per month. The system was also easily adaptable to changes in the business process, such as changing the frequency of loan payments from fortnightly to monthly. The other partnership with Newgen Software tripled the productivity of back-office staff through the use of optical mark readers for automatic scanning of loan application forms. Equitas was able to manage the IS/IT function with a remarkably small corporate IT group of only ten members.

Case 3: Grameen Koota—A Small MFI Using Hosted Open Source Software to Scale Operations

Grameen Koota, an MFI based in Bangalore, popularly referred to as the IT capital of India, was founded in 1999 to provide credit to low-income households using the door-step banking model. As of January 2012, the MFI had nearly 350,000 members spread over 159 branches in three Indian states, Karnataka, Tamilnadu, and Maharashtra, with an extremely low default rate of 0.05 percent. It was one of the first MFIs to use Mifos, “microfinance open-source” software designed for MFI operations by Grameen Foundation, an NGO founded in Seattle in 1997. The software was developed with the support of Grameen Bank in Bangladesh to help MFIs through the use of technology. The project was conceived in 2004 and began in earnest in 2005 to provide the microfinance industry with robust, centralized, scalable, and affordable technology for managing operations. The open-source technology platform was free of license fees and allowed users to modify it to suit local needs. This Java-based system used the OSI-approved Apache License version 2.0 and leveraged open-source tools, including Apache Commons libraries. IBM teamed with Grameen Foundation in October 2007 in a pro-bono project to take the Foundation-developed version

to the next level. The project was part of an effort announced by IBM's CEO to find new ways to use technology to serve people. IBM engineers from three continents worked closely with Grameen developers to improve the architecture, security, stability, and feature set of the application. In keeping with the vendor-neutral, sustainable, and low-cost nature of the project, the team used the Eclipse Web Tools Platform development environment, an open-source toolkit developed by IBM.

When Mifos was first released in 2006, Grameen Foundation looked for initial customers to adopt the software and serve as important sources of learning for future releases. Grameen Koota was selected as a beta-test partner because its legacy information system from Grameen Communications, a Bangladeshi software vendor, could not scale to support its growth. The legacy system's simplicity, once regarded as a key factor in its success, turned out to be an obstacle to the MFI's ambitious plans for growth.

Limitations of the Legacy System in Grameen Koota

A major limitation of the pre-existing system in Grameen Koota was its inability to maintain transaction data. Whenever a payment occurred, the software calculated and stored the new loan balance but did not keep a record of the transaction date and time. Thus, the extreme simplicity of the legacy system left no history of payments. A loan officer working in a remote village could not tell when the last repayment was made, requiring tedious manual workarounds from the paper records of the transaction. The system did not also allow modifications to existing account records. For example, if the term of the loan's repayment was changed from sixty weeks to forty-eight weeks, the software forced the loan officer to create a new account. These workarounds were a major obstacle for handling the volumes needed to meet Grameen Koota's ambitious growth target. Further, since the software could handle only three loan products, it could not support the introduction of new loan products. The CEO of Grameen Koota and his team explored the option of using open-source software since that approach might be less expensive than a COTS package and would also make Grameen Koota less dependent on a specific vendor.

Business Impact of Using Mifos in Grameen Koota

The Web-based Mifos platform enabled Grameen Koota's loan officers to record transactions directly from the field meetings, thereby eliminating rekeying of data. Information that previously took weeks to compile became available in real-time to facilitate shifting of resources between locations. Accurate information about its cash position at the close of each day made it easier to allocate funds according to local needs. Loan officers carried less cash to the field meetings, reducing the risk of theft. Capital was also freed up to lend to more customers, since excess funds were not needed on-hand to cover open financial positions. The time required for loan approval processing decreased greatly, allowing Grameen Koota to expand its outreach from 70,000 to over 400,000 in less than three years. The open-source platform also reduced the rollout time of new branches to as little as one day. The CEO of Grameen Koota pointed out an additional strategic benefit of providing accurate and timely information to global financial institutions that were potential investors. To fuel its growth, Grameen Koota attracted \$20 million during December 2009–June 2010 from investors such as MicroVentures Investments in Luxembourg, MicroVentures SPA in Italy, and Incofin in Belgium.

Not a "Plug-and-Play" Solution

As a beta test site for MFIs, Grameen Koota faced significant implementation challenges. These were overcome with the help of IBM. That help was essential since the Grameen Foundation, the creator of Mifos, assumed that MFIs would be responsible for implementing the software with only limited technical support from Grameen Foundation to fix bugs and address usability issues. The process of implementation included:

1. Configuration of Mifos for the MFI
2. Migrating legacy data from existing system to Mifos
3. Testing of new system
4. Training of staff on new system

In addition, because Mifos is open-source, Grameen Koota could customize it to meet special requirements. However, since Grameen Koota lacked IS sophistication, it required assistance from local software developers and project management skills to oversee the customization.

Development of a reporting module illustrates the IS-related challenges faced by a small MFI. Grameen Koota contracted with a local vendor in November 2006 for developing a reporting module for Mifos and managing the deployment, including the data migration. By May 2007, the vendor had still not fulfilled the contract, and the project was stalled. The Grameen Foundation team intervened and appointed a project manager to oversee the deployment. It also got IBM to build additional functionality and robustness into the Mifos software. More importantly,

IBM helped Grameen Koota in dealing with the implementation challenges. The project was completed in the forty-four branches where Grameen Koota was operating at the time (November 2007).

The major implementation challenges were in two areas: data migration and training. According to the CEO of Grameen Koota, "Transforming all the data into the new format was really challenging.... Since the transaction history [of a loan] was not part of the earlier application, we had to run an intermediate script and get all the data in place, then put it into the format required for Mifos. Though nothing was lost, it took quite a bit of time to migrate" [Goswami, 2008, p. 34]. The problem arose since some loans in the old system showed up incorrectly as late payments, which necessitated the loan repayment schedules to be regenerated. There were 120,000 such deviations that had to be manually corrected before migrating them to Mifos. Grameen Koota personnel performed the training in a staggered manner, training staff members in different locations, clustering branches, and training one set of staff at a time. Half of the staff were trained during the five months time required to migrate data. Those staff members trained the other staff members subsequently. The success of the implementation was undoubtedly due to the valuable assistance given by IBM to tackle both the data migration and staff training challenges.

Ongoing Support Required for Mifos

Grameen Koota has a small IT group of two managers to oversee the IS/IT function and requires ongoing technical support for running Mifos. Grameen Foundation recognized in November 2011 that the challenges of running a global software business within a nonprofit from the United States, combined with the expense of maintaining a substantial software development team, were barriers to the goal of implementing Mifos in a large number of MFIs. At that time, Mifos software had been installed in only twenty-five MFIs serving 825,000 clients [Mifos, 2012]. To enable the diffusion of Mifos to many more MFIs, Grameen Foundation transferred the stewardship of Mifos to the Community for Open Source Microfinance (COSM) and The Software Freedom Conservancy, a not-for-profit organization dedicated to develop and support Free, Libre, and Open Source Software projects. The latter will be the home of Mifos assets and will provide a range of legal licensing services, as well as project oversight. COSM is a newly incorporated not-for-profit organization formed to unite and serve the open-source microfinance community. It will focus on software development, deployment, and community building. Continuity for the support of Mifos will be facilitated by the co-founder of COSM and Mifos Community Manager, Edward Cable, who was a member of the Mifos team since 2007. The formal transition of Mifos from Grameen Foundation to the Conservancy and COSM occurred in February 2012 [Software Freedom Conservancy, 2012]. Any small MFI, including Grameen Koota, can now use the services offered by the Conservancy and COSM for implementing Mifos, thus removing the hurdles that Grameen Koota faced initially for implementing Mifos.

Did Grameen Koota Achieve a Social Goal?

The latest available data as of December 2010 from the Microcredit Summit Campaign Report showed that 98.5 percent of the clientele of Grameen Koota were verified as poor living below the poverty line of \$1 per day supporting the conclusion that Grameen Koota achieved a social goal [Maes and Reed, 2012].

Evaluation of Grameen Koota Using Our Conceptual Lens

1. Leadership: With the help of his team, the CEO explored with the help of his team the option of using open-source software instead of a COTS package. The latter was deemed to be more expensive and would also make Grameen Koota dependent on a specific vendor.
2. Business systems thinking: The CEO recognized the strategic benefit of providing timely and accurate information to global financial institutions that were potential investors.
3. Architecture planning: Grameen Koota selected Mifos, an open-source software designed by Grameen foundation for microfinance operations. It became a beta test partner for further development of the software.
4. Making technology work: Grameen Foundation was able to get IBM to build additional functionality and robustness into the Mifos software. More important, IBM gave valuable assistance to Grameen Koota as a pro-bono service for tackling the data migration and staff training challenges during the implementation of Mifos.
5. Vendor development: Grameen Koota has only two managers to oversee the IS/IT function. The early adoption of Mifos enabled it to become a beta test partner for the further development of Mifos by Grameen Foundation in collaboration with IBM.

V. EVALUATION OF THREE CASES FROM A TEACHING PERSPECTIVE

Three questions are addressed in the evaluation presented in Table 2:

- What was the IS innovation?
- How was the application developed?
- What was the outcome of the IS innovation?

Table 2: Summary Evaluation of IS Innovations in the Three Case Examples

	What was the IS <i>innovation</i> ?	How was the IS <i>application</i> developed?	What was the <i>outcome</i> of the IS innovation?
SKS	Integration of frontend with backend systems and analytical capabilities to manage portfolio risk	Custom designed, since no COTS package was available in 1999	Scaled outreach from 10 customers in 1998 to over 6 million by August 2010, becoming the largest MFI in India at the time Default rate: 0.34% in 2008–2009, before the crisis in Andhra Pradesh that affected operations in a major market Met the social goal of providing financial services to the poor at the BOP
Equitas	Integration of frontend with backend systems and a real-time performance monitoring dashboard for assessing branch by branch performance of loan officers and alerting underperforming branches	COTS package for integrated frontend and backend system, but real-time performance, dashboard was custom designed to meet analytical information requirements of Equitas management.	A young MFI launched in December 2007 scaled its outreach in less than three years to 1.3 million poor clients by September 2010. Default rate: 0.67% for fiscal year ending March 2011 Met the social goal of providing financial services to the poor women in urban slums
Grameen Koota	Web-based open-source software that generates accurate reports for global investors for funding the MFI to fuel its growth	Advantage of being a beta test site for Mifos helped customization of the features of Mifos to meet its requirements	Expanded its outreach from 17,000 to 400,000 in three years—timely information provided to global financial institutions who invested \$20 million to fuel its growth Default rate: 0.5% for year ending 2011 Met the social goal of providing financial services to the poor at the BOP

While each of our three MFIs has its own story, several commonalities are worth noting:

- *IS as a strategic tool.* A common thread in all the cases was the use of IS, not just as a back-office processing function, but as a strategic tool to achieve business growth through scaling their operations.
- *Achieving social goals.* The three MFIs achieved the social goal of providing financial access to the unbanked poor with less than a 1 percent default rate.
- *Use of analytical systems.* Perhaps surprising from the humble beginnings of microfinance, SKS and Equitas were early adopters of analytical systems.
- *Different ways to manage the IS/IT function.* The IS/IT function was managed in different ways in the three cases. Both SKS and Equitas outsourced their IS/IT backbone, since that was more cost-effective than operating their infrastructure using in-house personnel. On the other hand, their analytical systems were custom-designed. Grameen Koota relies on the not-for-profit consortium that was set up in 2012 to support its hosted open-source software.
- *Success is not guaranteed.* The successful deployment of IS in our three examples does not imply that IS innovations by MFIs is guaranteed to be successful. An IS initiative with a quite different outcome was an IS for small MFIs that was spearheaded by Hewlett-Packard in the African nation of Uganda. That initiative failed to deliver business value. The IS solution, an open-source software package similar to Mifos, took two years to develop at a cost of \$3.5 million. The project was discontinued after piloting implementations at three MFIs in Uganda because it failed to streamline the loan process [Hewlett-Packard, 2005].

VI. CONCLUSIONS

Microfinance provides financial services that can help alleviate poverty for the unbanked poor at the bottom of the pyramid. Nearly 2.5 billion adults in the world are unbanked. Lack of access to financial services is correlated with low incomes. In India, for instance, nearly half of the total population lives under the poverty benchmark of \$1.25 per day. Door-step banking can be an effective means for reaching the extremely poor, but it is costly, since the MFI's agents have to visit clients in remote areas. Microfinance institutions using this model have to scale their outreach to attain financial sustainability. Scaling also meets a social goal through service to a large number of unbanked poor people at the bottom of the pyramid. This article presented three case studies of MFIs that deployed IS to enable scalability of door-step banking to reach the poor.

The narratives for the three cases are based on a five-year longitudinal study of archival data supplemented by personal interviews of key players in SKS and Equitas. All the MFIs deployed the door-step banking model to reach the unbanked poor, but they differed in size and faced different implementation challenges. A conceptual lens for evaluating the impact of IS in the three cases was drawn from the framework of Feeny and Willcocks, a derivative of the resource-based model. The three cases demonstrate the importance of IS for scaling operations and contributing to economic empowerment of the poor at the BOP, a grand challenge for society.

Aside from IS, two other factors also helped in scaling outreach: business process reengineering and development of human capital (e.g., loan officers) that is critical for implementing door-step banking. A potential pitfall of scaling should also be recognized, namely, the possibility of multiple borrowing by clients leading to their over-indebtedness. IS can play a role in mitigating this danger through surveys of the MFIs' clients to get first-hand data on their borrowing patterns before making loans. MFIs should also enforce lending discipline and set up controls to avoid loan delinquencies.

This article has addressed the dearth of IS research related to information systems directed at the less fortunate in society. It can also be applied in a number of different ways in teaching. The three case examples are quite different from the everyday examples that most university students encounter and that appear in IS textbooks. Despite their brevity, the cases illustrate many interesting issues related to implementation and tradeoffs between business and social goals. Comparisons between these examples and more traditional examples in large businesses could lead to highly engaging classroom discussions.

REFERENCES

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Akula, V. (2008a) "Interview with Knowledge@Wharton", <http://knowledge.wharton.upenn.edu/india/article.cfm?articleid=4284> (current Oct. 28, 2012).

Akula, V. (2008b) "Business Basics at the Base of the Pyramid", *Harvard Business Review*, June, pp. 53–57.

Avital, M., K. Lyytinen, J. King, M. Gordon, E. Granger-Happ, R. Mason and R. Watson (2007) "Leveraging Information Technology to Support Agents of World Benefit", *Communications of the Association for Information Systems*, (19) Article 25, pp. 567–588.

Basu, P. and P. Srivastava (2005) "Scaling Up Access to Finance for India's Poor", *World Bank Policy Research Working Paper 3646*.

Bellman, E. (2006) "Invisible Hand: Entrepreneur Gets Big Bags to Back Very Small Loans", *The Wall Street Journal*, May 15, pp. A-1 and A-12.

Bharadwaj, K. (2000) "A Resource-based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation", *MIS Quarterly*, (24)1, pp. 169–197.

Bruton, G. (2010) "Letter from the Editor: Business and the World's Poorest Billion—The Need for an Expanded Examination by Management Scholars", *Academy of Management Perspectives*, (24)3, pp. 6–10.

- Business Standard (2008) "SKS Micro to Upgrade Tech Infrastructure", *Business Standard*, February 6, p. 1.
- CARE (2006) "Evolution of Technology—Applications in Microfinance Report", New Delhi, India: CARE India.
- CGAP (2009) "Financial Access 2009: Measuring Access to Financial Services Around the World", *CGAP Report*, Washington, D.C.: World Bank.
- Chaia, A., A. Dalal, D. Goland, M. Gonzalez, J. Morduch and R. Schiff (2009) "Half the World Is Unbanked: Financial Access Initiative Framing Note", *McKinsey on Society Report*, McKinsey Financial Access, New York, pp. 1-17.
- Chen, G., S. Rasmussen and X. Reille (2010) "Growth and Vulnerabilities in Microfinance", *CGAP Focus Note 61*, Washington, D.C.: World Bank, p. 1-16.
- Collins, D., J. Morduch, S. Rutherford and O. Ruthven (2009) *Portfolios of the Poor: How the World's Poor Live on \$2 a Day*, Princeton, NJ: Princeton University Press.
- CRISIL (2008) *CRISIL Ratings: MFI Grading Report—Equitas Microfinance India Private Ltd.*, New Delhi, India.
- CRISIL (2009) "Top 50 Microfinance Institutions in India", *CRISIL Annual Report*, New Delhi, India.
- De', R. and A. Ratan (2009) "Whose Gain Is It Anyway? Structural Perspective on Deploying ICTs for Development in India's Microfinance Sector", *Information Technology for Development*, (15)4, pp. 259–282.
- Equitas Annual Report (2010) "Equitas Microfinance India Private Ltd.", *Third Annual Report 2009–10*, Chennai, India.
- Equitas Annual Report (2011) "Equitas Microfinance India Private Ltd.", *Fourth Annual Report 2010–11*, Chennai, India.
- Feeny, D. and L. Willcocks (1998) "Core IS Capabilities for Exploiting Information Technology", *Sloan Management Review*, (39)3, pp. 9–21.
- Goswami, K. (2008) "Small Doses of Hope", *Real CIO World*, (3)16, pp. 33–35.
- Greene, J. (2006) "Taking Tiny Loans to the Next Level", *BusinessWeek*, November 27, pp. 1–3.
- Hermes, M. and R. Lensink (2011) "Microfinance: It's Outreach, Impact, and Sustainability," *World Development*, (39)6, pp. 875–881.
- Hewlett-Packard (2005) "HP Consortium Releases Open Source Microfinance Banking Solution to Benefit Developing World", <http://www.hp.com/hpinfo/newsroom/press/2005/050623a.html> (current May 13, 2009).
- Honohan, P. (2006) "Household Financial Assets in the Process of Development", *World Bank Policy Research Working Paper 3965*.
- IFAD (2008) "Statistics and Key Facts About Rural Finance", http://www.ruralpovertyportal.org/english/topic/rural_finance/statistics.htm (current May 22, 2008).
- Ishmael, S. and R. Lapper (2007) "JP Morgan Enters Microfinance Field", *Financial Times*, November 15, p. 22.
- Lowitt, E. and J. Grinsley (2009) "JP Morgan: Partner in the Global Pursuit of Sustainability", *The Accenture Institute for High Performance Report*.
- Maes, J. and L. Reed (2012) "State of the Microcredit Summit Campaign Report 2012", *Microcredit Summit Campaign Report: A Project of RESULTS Educational Fund*, Microcredit Summit Campaign, Washington, D.C.
- Mata, F., W. Fuers and J. Berney (1995) "Information Technology and Sustained Competitive Advantage: A Resource-based Analysis", *MIS Quarterly*, (19)5, pp. 487–505.
- MicroCapital (2010) "Sequoia Capital Purchases 10% Stake in Equitas, a Microfinance Institution-based in India from Kalpathy Investments for Over 12 Times the Original Price", <http://www.microcapital.org/microcapital-brief-sequoia-capital-purchases-10-equity-stake-in-equitas-a-microfinance-institution-mfi-based-in-india-from-kalpathi-investments-for-over-12-times-the-original-price/> (current Sep. 23, 2012).
- Microfinance Insights (2008) "Technology and Microfinance: Making the Right Connections", Results of the Microfinance Insights Technology Survey, Microfinance Insights, Hague, Netherlands.
- Mifos (2012) "Mifos Transition Plan Finalized—Next Phase of Mifos Begins", <http://mifos.org/community/news/mifos-transition-plan-finalized-next-phase-mifos-begins> (current Apr. 7, 2012).

- MixMarket (2012) "Mix Market Reports", <http://www.mixmarket.org/mfi/country/Bangladesh> and <http://www.mixmarket.org/mfi/country/India> (current Feb. 13, 2012).
- Mohan, L. (2010) Interview with CEO of Equitas Microfinance at Corporate Office of Equitas in Chennai, India, January 20, 2010.
- Mohan, L. and D. Potnis (2010) "Catalytic Innovation in Microfinance for Inclusive Growth: Insights from SKS Microfinance", *Journal of Asia-Pacific Business*, (11)3, pp. 218-239.
- Mohan, L., D. Potnis and N. Mattoo (2013) "A Pan-India Footprint of Over-Indebtedness of Microfinance Borrowers from an Exploratory Survey", *Enterprise Development & Microfinance*, (24)1, pp. 55-71.
- Parikh, T. (2006) "Rural Microfinance Service Delivery: Gaps, Inefficiencies, and Emerging Solutions", *Proceedings of the International Conference on ICT and Development*, Berkley, CA, May 25–26.
- Powell, P. and A. Dent-Micallef (1997) "Information Technology as Competitive Advantage: The Role of Human Business and Technology Resources", *Strategic Management Journal*, (18)5, pp. 375–404.
- Prahalad, C. and S. Hart (2002) "The Fortune at the Bottom of the Pyramid", *Strategy + Business*, (First Quarter) 26, pp. 1–14.
- Rao, H. (2011) "Braced SKS Microfinance Investors Left Counting Losses", *The Economic Times*, August 30, pp. 1–4.
- Ravichandran, K. and C. Lertwongsatien (2005) "Effects of Information Systems Resources and Capabilities on Firm Performance: A Resource-based Perspective", *Journal of Management Information Systems*, (21)4, pp. 237–276.
- Reed, L. (2011) "State of the Microcredit Summit Campaign Report 2011", *Microcredit Summit Campaign Report*, A Project of RESULTS Educational Fund, Microcredit Campaign, Washington, D.C.
- Rosenberg, R., A. Gonzalez and S. Narain (2009) "The New Moneylenders: Are the Poor Being Exploited by High Microcredit Interest Rates?", *CGAP Occasional Paper 15*, Washington, D.C.: World Bank, pp. 1-28.
- Sharma, R.T. (2009) "Women Behind His Success—P.N. Vasudevan's Equitas Rode the 'Efficiency' Plank to Be a Top MFI", *The Economic Times*, July 24, pp. 1–4.
- SKS (2009) *Annual Report 2008–09*, SKS Microfinance Ltd., Hyderabad, India.
- Software Freedom Conservancy (2012) "The Software Freedom Conservancy and the Community for Open Source Microfinance Assume Leadership of the Mifos Project", <http://www.openmf.org/sfc-cosm-transition/> (current Apr. 7, 2012).
- Srinivas, V. (2006) "Microfinance Unleashes the Entrepreneurial Talent That Exists Among Poor", *Business World*, July 6, pp. 1–5.
- Syminvest (2008) "India: Equitas Gets \$12.5 M Fund Infusion from Three Funds", <http://www.syminvest.com/news/india-equitas-gets-125m-fund-infusion-from-three-funds/2008/8/22/1213> (current Sep. 23, 2012).
- United Nations Development Program (2009) *Human Development Report*, New York, NY: United Nations.
- Wernerfelt, B. (1984) "A Resource-based View of the Firm", *Strategic Management Journal*, (5), pp. 171–180.
- Willcocks, L., and B. Feeny (2006) "IT Outsourcing and Core IS Capabilities", *Information Systems Management*, Winter, pp. 49–56.
- Willcocks, L., B. Feeny and N. Olsen (2006) "Implementing Core IS Capabilities: Feeny-Willcocks IT Governance and Management Framework Revisited", *European Management Journal*, (24)1, pp. 28–37.

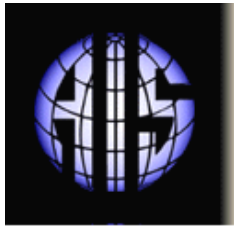
ABOUT THE AUTHORS

Lakshmi Mohan is Associate Professor of Information Technology Management at the University at Albany, State University of New York. She began her doctoral studies at the University of California, Berkeley, and received her Ph.D. degree from Columbia University. Before coming to Albany, she taught at the Sloan School of Management, MIT and the Indian Institute of Management, Calcutta. She has also taught at Nanyang Business School in Singapore and is a visiting faculty member at the S.P. Jain Institute of Management and Research in Mumbai. Her empirical research at SUNY on decision support systems and customer relationship management has been supported by over \$2 million in grants from Fortune 100 firms and government agencies. The findings have been published in refereed journals, including *MIS Quarterly*, *Decision Sciences*, *Transportation Research*, *The Journal of Behavioral Health Services and Research*, *Operational Research Quarterly*, *Journal of Asia–Pacific Business*, and *Enterprise Development & Microfinance*.

Devendra Potnis is Assistant Professor at the School of Information Sciences at the University of Tennessee at Knoxville. He completed his doctoral studies at the University at Albany, State University of New York. His doctoral research dealt with the impact of cell phones on poor females employed by a small business in India. His research and consulting focus on disadvantaged communities and small businesses. His articles have been published in *IEEE Technology and Society*, *Government Information Quarterly*, *Transforming Government: People, Process, and Policy Journal*, *Journal of Asia–Pacific Business*, *Enterprise Development & Microfinance*, and *International Journal of Information Studies*. He is a Quest Scholar and the recipient of the 2012 Faculty Enrichment Award at the University of Tennessee at Knoxville. He is a visiting professor at the S.P. Jain Institute of Management and Research, Mumbai, India.

Steven Alter is Professor of Information Systems at the University of San Francisco. He earned a Ph.D. from MIT and extended his thesis into one of the first books on decision support systems. He served for eight years as Vice President of Consilium, a manufacturing software firm that went public and later was acquired by Applied Materials. Since returning to academia, he has researched developing systems analysis concepts and methods that can be used by typical business professionals and can support communication with IT professionals. His book, *The Work System Method: Connecting People, Processes, and IT for Business Results*, is a distillation and extension of ideas in a series of information system textbooks (1992, 1996, 1999, 2002) that raised awareness of the essential role of IT in work systems in organizations. His 2013 article on work system theory summarizes much of his research and positions it in relation to other IS research. His articles have been published in many leading journals and conference proceedings.

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