

Information and Communication Technology in Microfinance Sector: Case Study of Three Indian MFIs

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Abstract

Financial sector has witnessed transformation with the adoption of information and communication technology (ICT) in providing financial services that ensured financial services to distant customers and reduced cost of providing financial services. The advent of ICT in financial system in general and microfinance sector in particular would not only scale up the access to finance but also attempt to ensure provision of financial services to the remotest and far-flung areas. Adoption of technology by microfinance institutions (MFIs) has increased its outreach and achieved cost reduction but confronted numerous challenges especially with respect to regulatory issues and delivery channels used. In this context, this article aims to assess the impact of ICT in client management, risk management and work efficiency of MFIs based on the case study of three MFIs (Cashpor Microcredit, SKS Microfinance Ltd and Utkarsh Microfinance Pvt Ltd). The article finds that the use of ICT has succeeded in bringing efficiency in terms of cost and client management, yet ICT adoption in MFIs needs a policy overhaul especially in terms of regulatory and infrastructure issues taking into account the aspirations and problems of all the stakeholders to microfinance sector.

Keywords

Microfinance institutions, information and communication technology, point of sales, mobile banking, personal digital assistants, software

Microfinance refers to the provision of broad range of financial services, such as, deposit, loans, money transfers and insurance to the poor and low-income households and their microenterprises¹ (Asian Development Bank 2000). Microfinance is an alternative that can supplement the objective of financial inclusion by providing poor and unbanked with appropriately designed credit along with other financial products and services. Deployment of information and communication technology (ICT) in providing financial services by financial sector has facilitated financial services to the existing and potential customers in a cost-effective manner. The advent of ICT in financial sector in general and microfinance sector in particular will scale up the access to finance and ensure financial services to the remotest areas. The use of ICT in microfinance

rejuvenates the manner in which traditionally microfinance is provided to the customers in India, replacing the traditional brick and mortar model with technology-driven models which are faster and can reach economies of scale.

Financial sector has been the prime beneficiary of the technological innovations that have been registered by the ICT sector across the globe. As such the landscape of microfinance in India has transformed and is speedily heading towards electronic finance which assures cost-effective and speedy completion of transaction on a much larger scale. In this context, the article attempts to explore the role of ICT in microfinance sector within the context of work efficiency, client and risk management of MFIs. The rest of the article is organized as follows: The second section emphasizes on literature review pertaining to

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the study. The third section deals with data sources and methodology used in the study. The fourth section deals with findings from the case study. The fifth section deals with conclusion of the case study.

Review of Literature

The impact and role of ICT is diverse and cuts across various strand of human life and institutions. Following literature presents selected viewpoints that highlight the impact of ICT across different aspects of financial institution in general and microfinance institution (MFI) in particular.

ICT and Economic Growth

Investment in ICT promotes and accelerates economic growth. As the study of Gupta (2000) stressed that on a whole 1 per cent growth in telecommunication services stimulates 3 per cent growth in the economy. Other studies, such as, Roller and Waverman (2001) and Eggleston, Jensen and Zeckhauser (2002), pointed out that improvement in ICT infrastructure leads to reduction in transaction cost, and various sectors of the economy register increase in output and improve standard of living. Similarly, Pigato (2001) discussed direct and indirect impact that ICT casts on economy. Under the realism of direct impact, ICT does it in three ways, namely, through increase in education/literacy, improved health indicators and lastly through asset and employment generation in economy. Under the indirect impact mechanism, ICT has transformed the mode in which business is done. It enables the firms to improve communication with markets as well as with supply chain, also ameliorate internal information systems of firms (Duncombe & Heeks, 2005).

ICT and Outreach

ICT has twofold impacts on enhancing outreach by financial sector: first through reaching more number of customers, and second, more number of firms can enter financial markets, thus creating competitive markets. From customer's perspective, geographical inaccessibility hinders access to finance for those domiciling in rural and far-flung areas, but use of ICT assures them an access to financial services while addressing the issue of social exclusion, as it surpasses the geographical barriers, and provides them financial services (Warschauer, 2003; Diniz, Birochi & Pozzebon, 2012). From financial institutions'

perspective, technological improvement in banking sector results in declining entry barriers and increased contestability of banks leading to product/services unbundling and subcontracting of financial services. The sustainability outreach dilemma finds its solution in adopting technology at MFIs. Enhanced and effective outreach results in better client management as acquiring, retaining and providing various financial products and services becomes easier and faster for MFIs.

ICT and Organizational Efficiency

Organizational efficiency especially measured in terms of cost and work efficiency forms important pillar of organizational growth. The ICT facilitates alteration in organizational culture and structure. The studies by Moussa & Scwhare (1992) and Pigato (2001) has supported the contestation that ICT benefits/deployment to organisations should be coupled with structural and managerial changes in organisations more so in case of developing countries. Financial institutions can achieve economies of scale and provide bundle of products through a single avenue. Further emphasising upon role of ICT, Berger (2003) examining economic effects of technological progress on banks found that banks experience improvement in cost and lending capacity owing to improved back-end technologies and consumer are also benefited from improved front end technologies, and the overall productivity of banks increases in terms of improved quality and variety of banking services. While Bakos (1991)² has emphasised upon role of electronic marketplaces in reducing search cost for the buyers and resultant efficiency gains from that. Focusing the use of ICT in terms of cost efficiency, studies by Porteous (2006); Weissbourd & Perpetual Motion, Inc. (2002) and Cirasino et al. (2006) emphasized the role ICT in reducing cost and study by Humphrey et al. (2003) explained that adoption of electronic mode for financial services delivery reduces the cost by one-third to one-half to one-third in comparison to article-based alternatives. In another study, Ivatury (2006) also opined that adoption of technology reduces the cost across the banks (here for Bank Administration Institute (BAI) and ICICI Bank in India, see Figure 1).

Adoption of ICT by the financial institutions (here MFIs) facilitates economies of scale, while initial investment to be made for the deployment of ICT in an organization is substantially huge. However, marginal cost and average cost lower down once the business achieves its scale. Study by Orloff (2005) opined that MFIs should emphasize upon ICT because it increases productivity of

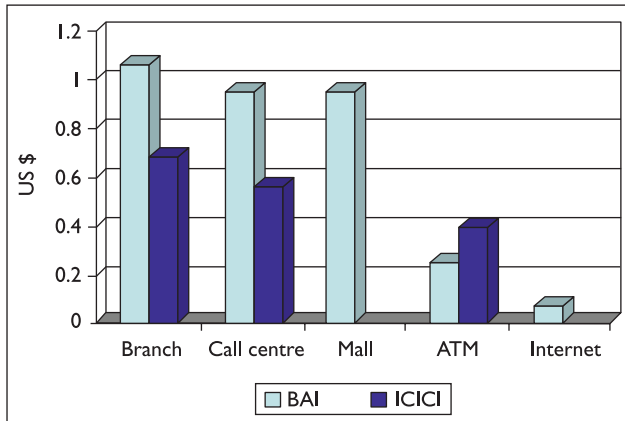


Figure 1. Cost per Transaction by Channel

Source: Ivatury (2006).

the employees, duplication of information and task, helps in speedy decision making and decreases transaction cost.

ICT and Risk Management

Technology-enabled banking aids banking institutions in accessing liquidity, transforming assets, and it helps in better risk management through risk monitoring which was rather little difficult in paper-based banking system. In this context, underscoring the relevance of ICT in risk management and cost reduction, Porteous (2006) focussing upon mobile banking stresses that mobile banking reduces transaction cost, enhances outreach, manages risk better in terms of agency relationship (with respect to use of technology) but should also focus on consumer protection issues. In addition to this, technology-based credit-scoring³ techniques information enables new entrants as well as existing firms to exploit/utilize the information about customer and assess the credit risk related to them and firms don't need to engage themselves in maintaining and managing borrower's account.

ICT and MFI: Theoretical Underpinning

There are two sets of theories that forms the theoretical background for this article. At the organizational level, the technology–organization–environment framework created by Tornatzky and Fleisher in 1990 and at the individual level (for clients), technology acceptance model (TAM) by Davis (1989) and Davis et al. (1989). finds relevance. The technology–organization–environment framework deals with factors leading to adoption of technology by the firms, while TAM deals with factors leading to adoption of

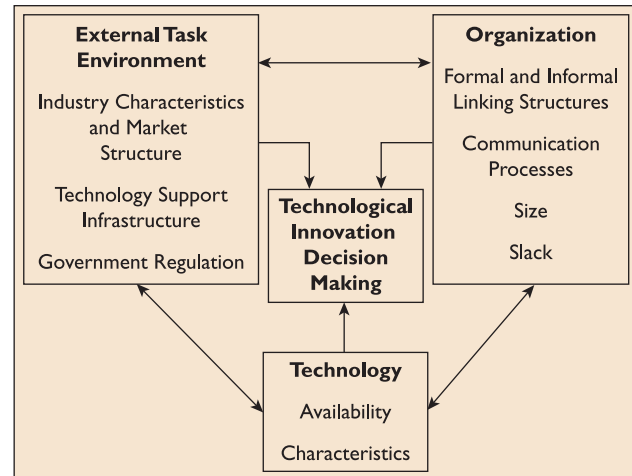


Figure 2. The Technology–Organization–Environment Framework

Source: Baker (2012), p. 236.

technology by the individuals. These two theoretical models have been discussed in brief as follows.

The Technology–Organization–Environment Framework

The technology–organization–environment framework was conceptualized by Tornatzky and Fleisher in 1990 (see Figure 2), which basically aimed at explaining the factors that influence technology adoption and its likelihood.⁴ This framework describes the processes by which a firm adopts and implements technological innovations and is influenced by the technological, organizational and environmental contexts (Tornatzky & Fliesher, 1990)⁵. Technological context comprises technologies (device as well as process technologies) relevant to firm—both internal and external, also includes technologies currently used by the firms and those technologies too that are available to firms but not used by the firms. As Baker (2012), stated ‘A firm’s existing technologies are important in the adoption process they set a broad limit on the scope and pace of technological change that a firm can undertake (Collins, Hage & Hull, 1988)’. Organizational context comprises of the characteristics and resources of the firm and includes size of the firm, complexity in its managerial structure, quality of human resources available, and amount of slack resources available internally to the firm while environmental context includes the size and structure of the industry (including competitors of firm, macroeconomic context and the regulatory environment (Tornatzky & Fleisher, 1990). Underscoring the relationship between TOE and industry structure, Baker (2012) states ‘industry structure has been investigated in several ways. For instance, intense competition stimulates the adoption of innovation (Mansfield 1968; Mansfield et al. 1977). Also, dominant

firms within the value chain can influence other value chain partners to innovate (Kamath and Liker 1994).

As mentioned in Baker (2012), ‘the Technology–Organization–Environment model has been utilized to explain the adoption of innovations in a host of industries, such as, manufacturing (Mishra, Konana & Barua, 2007), health care (Lee & Shim, 2007), retail, wholesale and financial services (Zhu, Kraemer, Gurbaxani & Xu, 2006)’. The Technology–Organization–Environment model finds its usefulness and utility in the investigation of a wide range of innovation and contexts and has garnered support in empirical work too (Baker, 2012).

Technology Acceptance Model

Technology Acceptance Model (TAM) is one the most important theory that finds relevance in context of ICT adoption in microfinance sector (see Figure 3). TAM is the extension of Theory of Reasoned Action (TRA) developed by (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975), which was concerned with the determinants of consciously intended behaviors. Using theoretical background of TRA, the basic goal of TAM was to provide an explanation of the determinants of technology acceptance that explains behavior of end-user, which is also parsimonious and theoretically relevant (Davis et al., 1989). Technology acceptance model basically emphasizes upon altitudinal explanation of the aim to employ a specific technology/service in organizations/institutions. However, main determinant that forms the cornerstone of TAM are ‘perceived usefulness’ and ‘perceived ease of use of technology’. Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989). The perceived ease of use is defined as the extent to which person would go for using technology/innovation/system at no effort to him (Davis et al., 1989; Gahatani, 2001; Gefen & Straub, 2000; Mathieson, 1991). ‘At first (Rogers, 1962) affirmed perceived ease of use is the term that represents the degree to which an innovation is perceived not to be difficult to understand, learn or operate. He further stated that perceived ease of use is the degree to which consumers

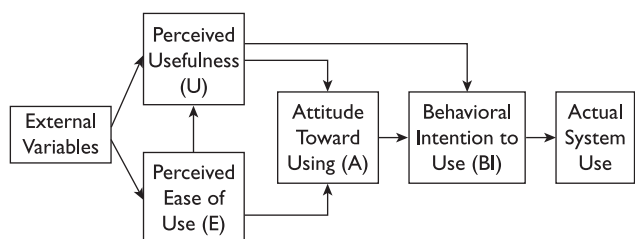


Figure 3. Technology Acceptance Model

Source: Davis et al. (1989), p. 985.

perceive a new product or service as better than its substitutes (Rogers, 1983)’ as stated in (Jahangir & Begum, 2008). Various models have been used to explain the user’s acceptance of technology. Individual’s acceptance and adoption of technology has to be studied in the context and character of individual (Compeau & Higgins, 1995; Davis et al., 1989), while some other studies have focussed on implementation issues at the organizational level (Barton & Deschamps, 1988) and task technology fit (Goodhue, 1995; Goodhue & Thompson, 1995).

Theory of TAM fits well in case of microfinance sector as it covers both client as well as MFIs perspective. Microfinance institution would not go for adopting any technology that does not find usefulness and ease of use with its customer, considering huge investment made by MFIs. This perspective gains importance especially when MFIs come up with technological innovation, such as, mobile banking services, where acceptability and adaptability of customer with particular technology device becomes key to its sustained growth. This is also the case with customers who would not like to be part of financial institutions (they may quit or move to other MFIs) if they do not find usefulness and easiness in having transactions considering fee and loan instalment it pays to MFIs.

Data Sources and Methodology

Data Sources and Sampling

The article uses primary and secondary data. Primary data have been collected from three MFIs (Cashpor Microcredit, Utkarsh Microfinance Private Limited and SKS Microfinance Limited⁶). Primary data take into account responses obtained from headquarters (for Cashpor Microcredit and Utkarsh Microfinance) and regional office (at Varanasi) for SKS Microfinance as well as branch and field level (only Cashpor Microcredit and Utkarsh Microfinance) for MFIs under survey. Besides, this primary data also take into account responses from the customers of MFIs⁷ who were availing mobile banking services from the respective MFIs to elicit their opinion about technology-enabled financial services to further argument. For data of individual MFIs, their respective websites have been explored along with data from the MIX⁸ website for financial data of the MFIs.

Research Techniques and Methodology

Two main research techniques were used for data collection in the survey, open-ended questionnaire and semi-structured interviews. Open-ended questionnaire was used

to collect relevant information about variables used in the study⁹. Semi-structured interviews were used for MFI officials and field staff to get their perspective about ICT-related aspects in MFI, while focussed group discussion with joint liability group members was conducted to get insights about their technology-related issues. With respect to methodology, the article uses a case study technique to derive the conclusion and findings from the data collected from three MFIs over various issues under consideration.

Findings from the Case Study

The case study was designed to know the impact and effect of introducing ICT in MFIs especially with respect to work efficiency, risk management and client management of MFIs, besides taking into account other considerations well to further the argument. Following are the findings from the case study of three MFIs which starts with brief introduction about surveyed MFIs.

Brief Introduction about MFIs

Cashpor Microcredit

Cashpor Microcredit is a poverty-focused MFI not for-profit MFI that provides microloans to below-poverty-line women in eastern Uttar Pradesh and Bihar. It provides microfinance services in Uttar Pradesh, Bihar and Chhattisgarh using the Grameen bank model of lending. Cashpor Microcredit also serves as banking correspondent to commercial banks and provides mobile banking services (see Annexure A for more details).

Utkarsh Microfinance Private Limited

Utkarsh Microfinance private limited is a non-banking finance company (for profit) MFI. It provides micro-loans under joint liability structure to unbanked and poor clients. It started operations with micro-loans but now has extended operations in terms of insurance, savings and solar power projects. Its target population is northern and central India (for further details see Annexure A).

SKS Microfinance Private Limited

SKS Microfinance is a non-banking finance company whose mission is to provide financial services to the poor under the joint liability lending approach. It is one of the largest MFIs in India and operates in 19 states of India. SKS Microfinance provides range of financial products and services to its clients (income generation, mid-term loans, mobile and housing loans and life insurance). SKS Microfinance is the only MFI in India that is listed on Bombay Stock Exchange (BSE) of India (for further details, see Annexure A).

Technological Infrastructure of the MFIs

MFIs under survey have well-established technological infrastructure (device and network technology) and have dedicated IT department for ICT issues (see Table 1). With respect to device technology, use of internet enabled personal computers (PCs) was confined at headquarters and to some extent regional offices, primarily because at the branch level connectivity and power is absent (with the exception of SKS microfinance which uses internet

Table 1. Device Technology Infrastructure for MFIs (All MFIs)

Device Technology	Headquarters	Branches	Field Staff
Internet PCs	Yes	No (except SKS Microfinance)	No
Laptop	Yes	No (except SKS Microfinance)	No
Personal digital assistants	No	No	No**
Mobile phones	Yes	Yes	Yes
Biometric technology	Yes (except Utkarsh Microfinance)	No (except SKS Microfinance)	No*
Standalone computers	No***	No (except SKS Microfinance)	No

Source: Survey data.

Note: * At the field level, both Cashpor Microcredit and Utkarsh Microfinance were not using biometrics technology. In case of SKS microfinance, Mr. Vikas Kumar replied that he was not aware if biometrics technology is used at field level across India. However in the survey area (Varanasi-Mirzapur district), SKS Microfinance was not using biometric technology at field level.

** Pertains to survey area of Varanasi-Mirzapur Districts only. Both Cashpor Microcredit and Utkarsh Microfinance were not using personal digital assistants at field level and SKS Microfinance at least in context of field area (Varanasi-Mirzapur) district was not using PDAs though SKS microfinance have made use of personal digital assistants for its operation as opined by (Vikas Kumar, Senior Regional Manager, Varanasi- SKS Microfinance).

*** With respect to Utkarsh Microfinance and Cashpor Microcredit standalone computers were not used at headquarters and most PCs were internet enabled, however with respect to SKS microfinance, respondent Mr. Vikas Kumar was not aware and sure if standalone computers are used at headquarter level.

Table 2. Availability of Network of Communications

Availability of Network Communication	Utkarsh Microfinance			Cashpor Microcredit			SKS Microfinance		
	Headquarters	Branch	Field Staff	Headquarters	Branch	Field Staff	Headquarters	Branch	Field Staff
Local area network	Yes	No	No	Yes	No	No	Yes	Yes	No
Wireless LAN	Yes	No	No	Yes	No	No	Yes	No	No
Broadband Internet	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dial up Internet	No	No	No	No	No	No	No	No	No

Source: Survey data.

enabled PCs/laptop/standalone computer in many of its branch offices and all regional offices). At the regional offices, only SKS Microfinance uses biometric card system for registering attendance of members/employees while both SKS Microfinance and Cashpor Microcredit have biometric card system for attendance of members/employees at their headquarters. At the field/branch level most of the task to be completed through internet mobile phones. None of the MFIs field staff under survey were using personal digital assistants (PDAs) and biometric/smart cards for the customers (though SKS microfinance uses biometric/smart card/PDAs in their other area of operation in India but not in the survey area of Varanasi and Mirzapur district of Uttar Pradesh). Cashpor Microcredit had pilot project using point of sales (POS) device but was abandoned owing to high cost of project and high consumption of electricity by the POS and maintenance-related issues. Also IT heads of Cashpor Microcredit stressed that biometric devices/biometric cards/smart cards are not being much successful as sometimes customers are not willing to do their transactions through biometric card/smart cards/biometric devices, and in many cases, cards are rejected while doing transaction causing frustration to field staff and customers.

In terms of availability of network communications, both internally as well as externally, MFIs under question were using wide-spread use of Internet (wired as well as wireless) (see Table 2 for details). In terms of use of Internet facilities at headquarter level, MFIs responded that they mostly rely upon wired local area network (LAN) as they consider it faster, secure and less interruptible in comparison to other alternatives available (in case of SKS microfinance LAN facility was also available at branch level). At headquarter level wireless internet facility is also available in MFIs. In case of Cashpor Microcredit leased line connections were used at their regional offices. While externally (mainly at the field level), MFIs have equipped their field staff basically with internet enabled mobile phones (in some cases with 3G connections to have faster operations).

MFIs when providing field staff with Internet facilities always consider the network and cost issues and allow field-level staff to choose Internet connection of their

choice rather than superimposing choice of the headquarters. This has been very helpful to field staff, as in some area, a particular choice of Internet connection may not work leaving staff with no options; however, freedom of choice relieves the staff from these issues.

Extent of ICT Usage in MFIs

The extent of ICT usage is reflected through various areas/functions in which ICT is used by MFIs (see Table 3). In case of microfinance, large volume and low transactions form regular features of MFIs, latter needs customized software to deal with such data and MFIs use specialized software meant for microfinance sector.

The decision to use ICT in MFIs forms subset of overall objectives of MFIs. IT heads of Cashpor Microcredit Ritesh Srivastava and Anjan Kumar Kar, while replying on motivating factor for using technology in MFIs, said:

The overall objective of introducing ICT in organisations depends upon our organisational objectives and strategic goals. Unless there is any benefit that our MFI gets from introducing any technology why we would invest in those technologies? We have tried various technologies at pilot level, of them some have been successful and some failures but we have carried forward successful ones as you can see in case of BC model of Cashpor-ICCI Bank in partnership with Eko foundation¹⁰ in case of mobile banking.

Table 3. Extent of ICT Usage in MFIs

Function/Areas	Cashpor Microcredit	Utkarsh Microfinance	SKS Microfinance
Internal accounting	✓	✓	✓
Payroll management	✓	✓	✓
Staff performance	✓	✓	✓
Financial statements	✓	✓	✓
Inventory management	✓	✓	✓
Asset and liability management	✓	✓	✓
Client database	✓	✓	✓
Field transactions	✓	✓	✓
Loan tracking	✓	✓	✓

Source: Survey data.

The MFIs under survey opined that given the scope of operations in which ICT is used by MFIs, the decision regarding the use of ICT is extremely important having implication on financial health of MFIs.

Type and Sourcing of Software and Hardware

With respect to type and sourcing of software, MFIs under case study use both proprietary software as well as free and open-source software depending upon their requirements. In case of proprietary software, Utkarsh microfinance uses Craftsilicon¹¹ (core banking solution software while Cashpor Microcredit uses track account software (TR a/c), apart from using Microsoft windows (2001, 2008) version for MFI-related purposes. With respect to SKS Microfinance, apart from using Microsoft windows, they also make use of software called 'Portfolio Track' for their transactions-related issues. In case of free and open source software, Utkarsh Microfinance and SKS Microfinance did not make use of free and open-source software (FOSS), but Cashpor Microcredit made use of FOSS called 'Open Office' which is replacement for MS Office. With respect to type and sourcing of software, MFIs in question laid importance to the needs of the MFIs and have been using customized software to carry out their transactions. According to Gonzalez-Barahona (2000)¹² and Ghosh (2005), use of FOSS in MFIs is rational one, which ranges from philosophical to practical reasons and many of the developing countries have adopted it because of low cost and its ability to have synergetic effect arose out of result of combination of its characteristics. FOSS delivers simplified licence management and customization of software (redistribution and modification in the software code).

With respect to procuring/sourcing of software and hardware, MFIs have varied arrangements. With respect to software systems MFIs as purchase from specified vendor,

develop it internally too and have their technology partners to meet their software needs (for example SKS Microfinance avails the services of Wipro and Tulip IT). Cashpor Microcredit uses the services of ATOM technologies and Eko Foundation for its MFI operations. For procuring hardware, MFIs follow diverse arrangements, ranging from purchasing from specified vendor to multiple vendors depending upon the hardware needs of the MFIs.

Cost of ICT Usage in MFIs

The amount of resources that IT budget (including IT staff pay) consumes differs across MFIs, as in the case of Utkarsh Microfinance, it is approximately ₹ 4.5 lakhs per annum (percentage of budget not available), while in case of Cashpor Microcredit, it is 5 per cent of their total budget/expenditure (₹ 15 lakhs per annum approximate). In case of SKS Microfinance, the share of IT budget was as high as 10–15 per cent approximately considering their vast expanse across India and volume of the customer base it serves. Microfinance institutions under study have unanimous opinion that while hardware acquisition cost is an outright expense and upfront cost, it is software acquisition and maintenance cost which consumes major chunk of ICT budget of MFIs. While deploying any technology, its likely impact on other operations of the firms is always taken into consideration, and MFIs go for the acquisition of technology only when they are confident that it will contribute to the revenue and cross the break-even mark.

Constraints in ICT Usage by MFIs

There are constraints (classified as major and minor) in the use of ICT in MFIs as has been spelled out by MFIs, which have been duly categorized into major and minor constraints (see Table 4 for details), and the extent to which constraints can be categorized into major/minor

Table 4. Constraints in ICT Usage by MFIs

Description	SKS Microfinance	Cashpor Microcredit	Utkarsh Microfinance
Cost of hardware	Major constraint	Major constraint	Major constraint
Cost of software	Major constraint	Major constraint	Major constraint
ICT literacy of field/branch staff	Minor constraint	Major constraint	Major constraint
Lack of expertise to maintain hardware and software systems	Major constraint	Minor constraint	Not a constraint
Reliability/authentication of ICT system	Minor constraint	Not a constraint	Not a constraint
Infrastructure issues	Major constraint	Major constraint	Major constraint
Regulatory issues	Major constraint	Major constraint	Major constraint
Ethical/moral issues	Minor constraint	Minor constraint	Minor constraint
Change Management	Major constraint	Major constraint	Major constraint

Source: Survey data.

constraints depends upon the MFIs and its regulation and ownership structure.

Cost of ICT adoption by the MFIs also identified as major constraints by the MFIs as it consumes substantial portion of their budget and takes time to achieve break-even mark and is risky venture, as it involves follow-up costs. However, to tackle the software-related issues, MFIs are coming up with internally built software customized to meet the specific needs of the firms; however, it is costly exercise and can be afforded by the bigger MFIs only.

Managing change for adopting ICT in MFIs is critical issue when it comes to adoption of technology by MFIs. Be it any technology introduction, there would be resistance as stated by (Quinn & Mueller, 1982) as 'human beings what they are, there tends to be resistance to change'. The study by Daniel (1999) found 'a high level of customer inertia in changing their established banking arrangements', and that is why bringing any change of whatsoever nature is a daunting task. In this context, MFIs have been fortunate especially with respect to branch/field staffs and acceptance of ICT applications. Microfinance institution staff feel that tech-enabled operations has reduced article work to a larger extent and productivity per staff increases as the field staff can handle more number of customers at the same time; additionally, there is better synchronization between MFI-branch-field staff as data dissemination and feedback are faster. However, field staffs opined that (Cashpor Microcredit and Utkarsh Microfinance) they would not prefer complicated technologies (e.g., PDAs/POS) and will prefer simpler technologies (e.g., mobile phones) since they are quite accustomed with that technology. When asked why PDAs/POS are seemed to be complicated, field staff emphasised that it takes longer time to learn it and execute functions with those technologies, moreover customer's need to be also taken into account. In case of mobile phones both customer and field staff are quite familiar with using mobile phones. Moreover, customer acceptance of particular technology is paramount to the success of the MFIs in their operational area. The field staffs of the MFIs stressed that customers are not very comfortable with technologies involving complex operations and resist from using such technologies. Commenting on whether MFIs would face resistance from client if they try some new technology or device, Vinod Kumar, field staff at Mirzamurad Branch of Cashpor Microcredit, said:

Hamare sanstha ko is baat ki poori jaankari hain ki hamare client kaise hain aur kahan rehte hain, who koi bhi aisi taknik ko client ke liye nahi use nahi karenge jise client sweekar na kare. Lekin kabhi kabhi aisi koi taknik jaroori hoti hain jo sanstha aur client ke liye accha ho tum client to convince karte hain uske prayog ke liye aur hamare pass bahut se tarike aisa karne ke.

[Our organization is in full knowledge of the fact who are our clients and from where they come. We would not use any technology that does not find acceptance among our clients and sometimes if some technology is necessary then we convince our clients and we have ample instruments to do that.]

Further, on the issue of resistance and fear among clients when some new technology or device is introduced to them, Maqsood, field staff at Kachwa Bajar branch of Cashpor Microcredit, opined:

Hamare client kabhi bhi virodh nahi karte hain madam, agar humlog koi nayi taknik laate hain toh. Haan lekin who chintint jaroor hote hain aur hamari koshish hoti hain ki hum unki bhay aur chinta door kare aur hum karte bhi hain. Hum sadasya ko gol ki meeting mein demo dete hain aur samay-samay par poster chart ka prayog karke bhi batate hain.

[Our clients never oppose us if we introduce some new technology but they are surely concerned about that. Our efforts remain to allay their fears and concerns and we do it. We do give demo of techniques (devices) in our group meetings and from time to time we use posters and charts to educate our clients.]

Acceptability of new technology is not contested by field staff, but they opine that training and ecosystem in which field staff works should be kept in mind before introducing new technology. With respect to issue whether staff opposes any technological changes (here field staff), the field staffs opine that they do not oppose but expect organization to be sensitive to the cause of field staff. As Sanjay Kumar, field staff of Utkarsh Microfinance at Harhua branch, said:

Madam, baat virodh karne ki nahi hain hum toh sirf staff hain humko apna kaam karna hi hain. Lekin hum is baat ki aasha rakhte hain ki hamari MFI is baat ka dhyan rakhe ki hamari aur client ki bhi kuch limit hain. Aur aap hamare aas paas ka mahaul toh aap dekh hi rahi hain. Dekhiye hum to jaise taise sikh lete hain aur apna kaam kar lete hain lekin har client ko samjhana bahut muskil hain. Hum poori koshish karte hain ki client samjah jaye lekin 100% safal nahi ho pate hain. Isliye hum hamesha chahte hain ki chahe card, mobile ya kuch bhi client ko usko use karne mein ghabrahat nahi honi chahiye.

[It's not about resistance we are only staff and we have to do our job but hope that our MFI understand that clients and staff have some limits. And you can see the environment around us. Look we manage to learn any new technology anyhow but it's very difficult to make it understand to customer. We try our best but don't succeed 100%. So we always want whether it is card or mobile or anything, client should not feel perturbed while using it.]

At the MFI level, expertise needed to maintain hardware and software systems installed at MFIs is identified as a major constraint for only SKS Microfinance, as according

to them given the vast operations they have, it is costly exercise for them to have separate IT department at each of their regional offices and sometimes they end up having sub-standard performance of the IT department, while in case of Cashpor Microcredit and Utkarsh Microfinance, it was not an issue that needed to be given much importance and they opined that IT department at their MFIs performed quite well.

Reliability of ICT systems¹³ for MFI operations affects performance of MFIs, as surveyed MFIs expressed their confidence in the reliability of the ICT systems in their organizations and opined that barring few instances, they believe in the authenticity of the ICT system deployed and MFIs have put in place proper check and balances to ensure that the ICT systems remains secure and leak proof (especially with respect to cases of hacking and stealing of confidential financial and client database).

Regulatory issues have been identified as major constraint as according to the MFIs under survey, regulatory stipulations put by RBI has affected their operations especially with respect to interest rates and in these circumstances before taking up any major IT investment MFIs are being very cautious/careful. According to the MFIs under survey, investment in ICT by MFIs comes with cost and even a slight change in the regulatory provision can distort the revenue–expenditure matrix of the MFIs. On the issue of regulation, Vikash Kumar, senior regional manager (Varanasi) at SKS Microfinance, commented:

Regulation either by RBI or government off-course is a major issue to MFIs. We expect stable and comprehensive policy especially over interest rates determination and over financing related issues from the government. Substantial investment of ours is in ICT infrastructure and we surely don't want to be jeopardized due to flip-flop in regulations.

Infrastructure (especially power, road and communication network) is recognized as major constraints by all the MFIs under survey. It is the field staffs who are most affected by the poor infrastructure as they are connecting link between customers and MFIs and have to visit far-off villages for their operations. Poor quality of roads and non-availability of power hampers the field staff and also operations at branch offices. On the issue of poor quality of roads and non-availability of power, Rahul, field staff at Rajatalab branch of Cashpor Microcredit, said:

Madam, road bahut hi kharab hain gaon mein, sadak adhiktar kacchi hain aur barish ke dino mein bahut dikkat hoti hain. Kitni baar hamari gaadi (bike) ka chakka mitti mein phas chukka hain. Isse durghatana ki bhi sambhawna hoti hain, lekin hum majboor hain. Gaon wale parashan hoker

shikyat karte hain par kuch hota nahi hain. Hum jis bike par jate hain sadke kharab hone ke wajah se uski servicing par accha-khasa kharcha aata hain aur hum apne jeb se dete hain usko.

[Roads are in utterly poor condition, most of the roads are kuccha and in rainy season it causes problem to us. Many times wheel of my motorcycle gets stuck in muddy roads. There are also chances of accidents due to this, but we are helpless. The village people complain to administration but nothing happens. My bike which I use for field visit gets damaged quite often and I have to give it for repairing, and cost of repairing is paid from my pocket.]

In another case, describing the poor state of infrastructure affecting field staff and branch operations, Rohit Singh, field staff of Kachwabazar at Cashpor Microcredit, said:

Sadak aur bijli ki samasya sabse zyada hain yahan par. Din mein 12–14 ghante light nahi hoti hain aur garmi ki dinon mein toh usse bhi zyada bijli katuati hain. Bijli ki samasya ke karan humara kaam prabhavit hota hain. Aur sadak ka toh poochiye hi mat, door-daraz ke gaon ke sadak ki halat bahut hi khasta hain.

[Roads and electricity are the biggest problem here. There is no power for 12–14 hours in a day and during summers power cuts are more. Due to power shortage our work is affected. And don't ask about roads in far-off villages, they are in very bad condition.]

Lastly, with respect to ICT literacy and ethical issues involved in adopting ICT in MFIs, ethical/moral issues are identified as minor constraint as technology in itself is a neutral concept and wherein proper use of ICT systems depends upon moral and ethical values of the individual handling the transaction. ICT staffs in particular and other staff in general need to be sensitized and be given training with respect to handling moral/ethical issues. ICT literacy of staff (field/branch) is also identified as constraint having effect on operations on MFI, more importantly in case of field staffs who come from rural background, are moderately educated and have low exposure to technology related issues.

Work Efficiency and ICT in MFIs

The introduction of ICT in MFIs has improved its work efficiency, which is measured in terms of deadline given for task execution, time for execution of transaction and service delivery time and number of customers handled by MFI staff/loan officers. The MFIs under case study reiterated the point that with the introduction of technology on an average there is 30–40 per cent reduction in time taken to execute transaction especially at the field staff level which handles client (personnel and financial) data.

On the issue of capacity and efficiency of MFIs particularly, field staff, Rajesh Yadav, branch manager at Mirzamurad branch of Cashpor Microcredit, said:

Madam, dekhiye taknik jitni saral aur fast ho to humko bhi aaram hai, kyunki kaam jaldi aur bina pareshani ke ho jata hain. Staff ki bhi kshamta badh jaati hain. Jaise ki jab se hum hamara client wala data online ho gaya hain tab se hamare kaam ka bojh bahut kam ho gaya aur paper work to 30%–40% tak kam ho gaya hain. Staff apna time aur dhyan Cashpor ke dusre kaam mein bhi laga sakta hain. Branch aur field ke level par toh bahut suvidha hui hain. Staff ko zyada kagaz-patri nahi dhona padta hain aur branch ka office mein ab zyada jagah bhi hain, warna pehle toh file aur register ka ambar laga rehta tha.

[Look, the more easier and faster the technology, the more comfort it provides to us because work is done in fast way without any problems. Capacity of staff also increases. For example, our client data has become online that has reduced our work pressure and paper work reduced by 30%–40%. Now our staff can devote their time and energy in other MFI works. At the branch and field level we have greatly benefited. Staff does not have to carry more of papers while going to field work and our branch office is more spacious now, otherwise earlier papers–registers used to occupy office space.]

With increased work efficiency, MFIs have been able to diversify and expand their operations horizontally as well as vertically. Tech-enabled operations have also improved employee/staff/loan officer productivity (measured through loan officer/staff per borrower or loan) over a period of time (see Chart 1); however, it could not be established empirically. According to Jawadi, Jawadi and Ziane (2010), microfinance professionals positively recognize the role played by ICT to enhance work efficiency by reducing time on work activities.

Risk Management and ICT in MFIs

All the MFIs under case study have reported that with the introduction of ICT, risk¹⁴ management by the MFIs have become easy, such as, gathering data about client's social–economic profile has become easy, the risk of unpaid loans (default risk) has decreased (see Chart 2), deposit/insurance of tracking of customers has improved and chances of fraud/misappropriation of cash/funds have decreased with instant information and that also propelled prompt decision making by higher management. Using ICT for client monitoring and supervision also reduces percentage of portfolio at risk for MFIs.

On the issue of risk management and technology, Dhananjay Singh,¹⁵ project manager business correspondent relations at Cashpor Microcredit, said:

We take the help of High Mark¹⁶ and Equifax¹⁷ to check the credit report and status of our clients. We have proper procedure to check credit status of our clients. It has made our task very easy and also client data has gone online which is updated on day-to-day basis. In any case our loan defaults are negligible.

However, SKS Microfinance does not believe fully on insularity of ICT against misappropriation/fraud of funds as tech-savvy staff can manipulate data and wipe off entire data and forge with transactions.

Using ICT, prediction about customer operations has become easier with the support of database from Credit Information Bureau Limited (CIBIL).¹⁸ It has become much easier to gather timely data about loan records of clients (though use of CIBIL facilities is voluntary).

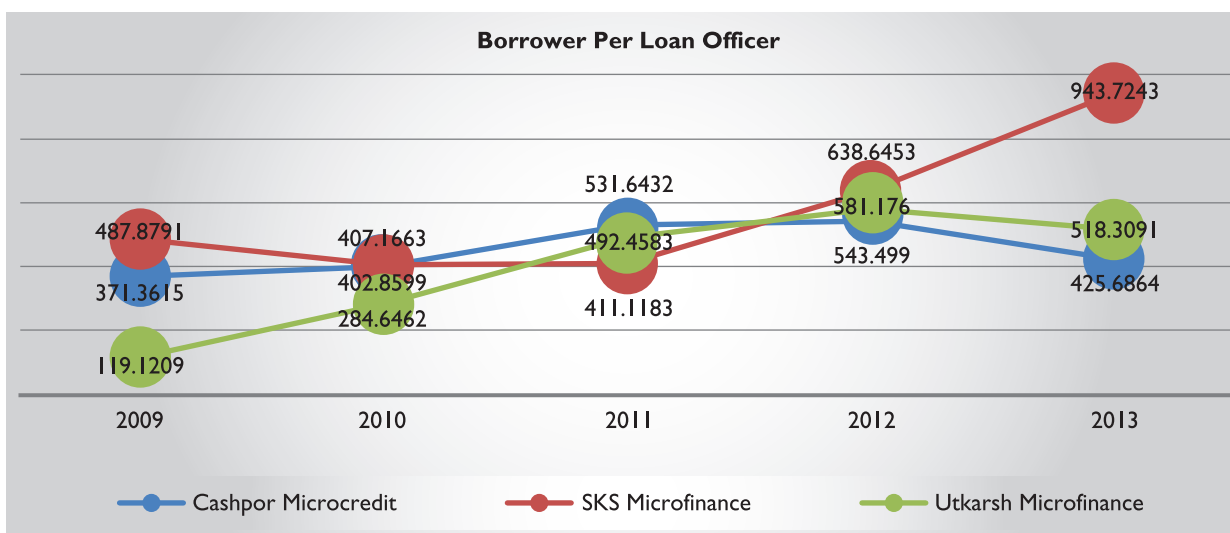


Chart 1. Work Efficiency of MFIs

Source: MIX Market.

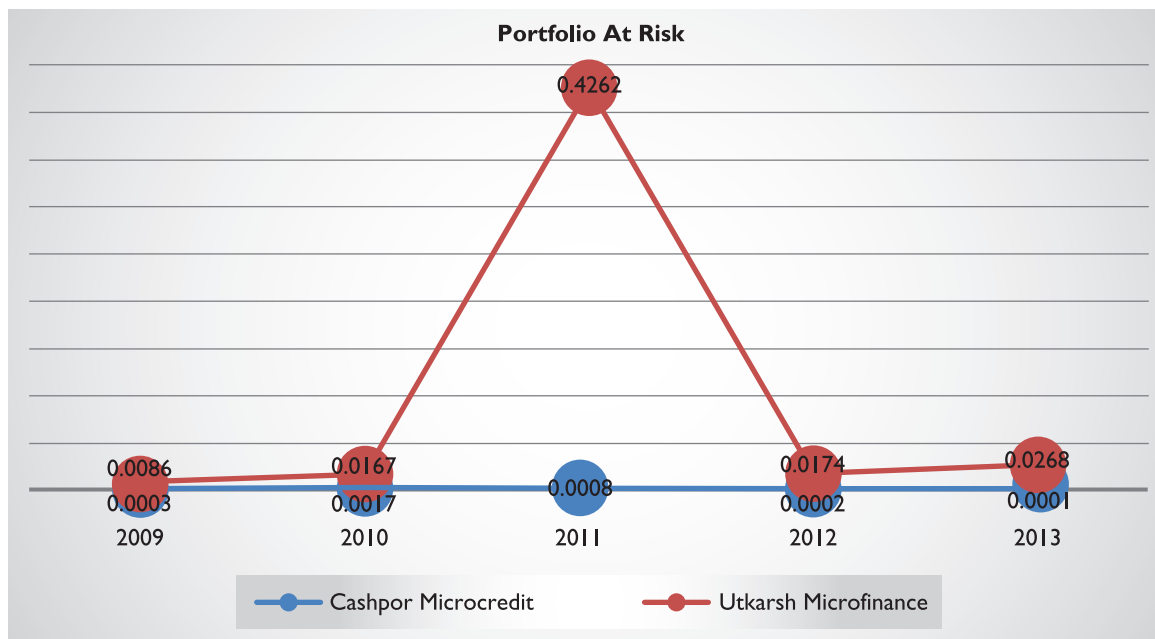


Chart 2. Portfolio at Risk for MFIs

Source: MIX Market.

Note: SKS Microfinance not included as data of PAR is not available.

Commenting on the issue of loan defaults and benefits of technology, Rahul Dey, head of audit, IT and loan at Utkarsh Microfinance, said:

No amount of infusion of technology in MFIs can check 100% loan default and you are well aware of those reason why, but I can say with surety that it (IT) has greatly improved risk management across all MFI not only ours especially in terms of client credit status reporting and also to some extent multiple borrowing by clients.

Highlighting on the issue how better credit reporting has infused financial discipline among Cashpor Microcredit clients, Pramod Kumar Singh, area manager for Mirzapur region at Cashpor Microcredit, said:

Aisa nahi hain ki sirf humko (MFI) fayda hua isse lekin client bhi ab jagrook ho gayi hain aur zyada chalaki nahi dikhati hain. Unko maloom hain ki unka poora hisab-kitab hamesha up-to-date hain aur bahana banane koi fayda hi nahi hain. Aise bhi aap dekhe toh hamara (MFI) loan arrear bahut hi kam hain.

[It's not that only we (MFIs) are benefitted but even the clients have become conscious and do not attempt to be clever. They know that their financial records are up-to-date and there is no point giving excuses. And anyway you see our (MFI) loan arrears are very low.]

However, vulnerabilities still remain there especially with respect to operational risk on the part of field staff and strategic default by borrowers. The issue of multiple

borrowing has not been handled by MFIs effectively as reporting to CIBIL is voluntary and many of the smaller MFIs do not report to MFIs and women avail loans from these MFIs without the knowledge of the other MFIs. Hence, tracking over-borrowing is contentious issue that could lead to credit risk affecting MFIs. In the context of SKS Microfinance, they opined that despite the intensive use of ICT by MFIs, there is a room for further reform for MFIs when it comes to handling credit risks and operational risks by using technology.

ICT and Client Management in MFIs

With the increased use of ICT facilities, it has become easy for the MFIs to expand its outreach (measured through number of active clients/gross loan portfolio) and access customers (see Chart 3). Moreover, time needed to get information about customer has decreased to a considerable extent. With respect to client management, MFIs register benefits in terms of handling large volume of transactions, reduced paper work, easy and speedy contact with clients and easier grievance-handling procedure. Offering of new products and services over a single platform helps in scaling up cost-effective technology. Further, with the use of toll-free numbers, customers can contact concerned authorities any time and settle their grievances and complains.

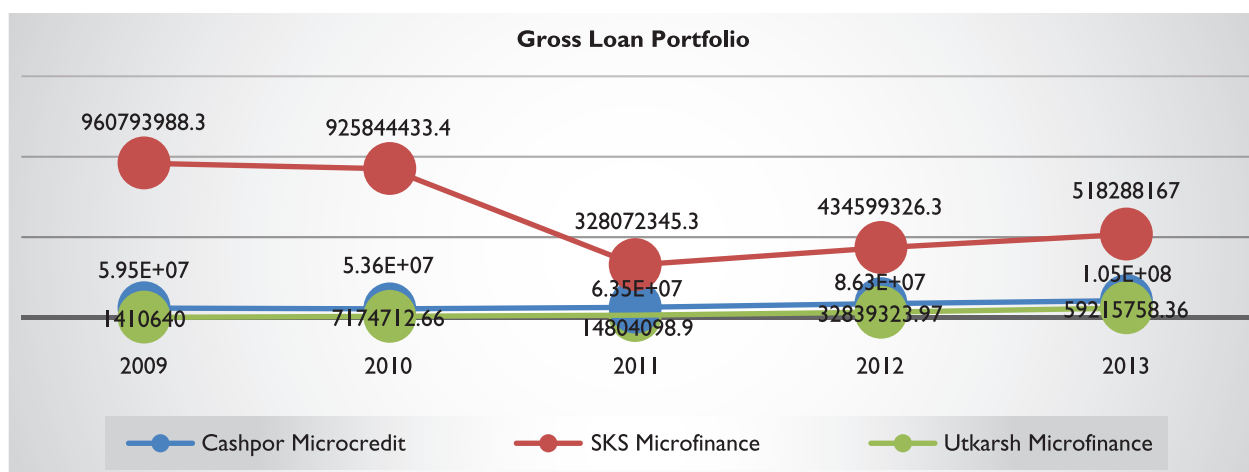


Chart 3. Outreach of MFIs

Source: MIX Market.

On the issue of accessibility of clients, Shailendra Singh, field staff of Cashpor Microcredit at Mirzamurad Branch, said:

Madam, client ko contact karna ab bahut hi aasaan hain kyunki lagbhag sabke paas mobile phone hota hi hain aur Cashpor wale toh toll free number bhi diye hain, sab client ko taki koi bhi kabhi bhi call kar le. Aksar client der-saber call karte hain apni samasya ke liye aur hum jawab bhi dete hain. Jis client ka pass mobile banking hain unko SMS bhi chala jata hain unke transaction ka aur unko intazar nahi karna padta hain. Isme toh sabka hi fayda hain.

[To contact client it's very easy now, as almost everyone has mobile phone now and Cashpor has given toll free number to all its clients so that latter can contact anytime. Often clients call us for their problems and we do respond too. Those clients who have mobile phones, they get SMSs for their transaction quickly and don't have to wait. Everybody is benefitted due to this.]

Microfinance institutions do believe that it takes considerable amount of time to authenticate the data received from clients, as there are lot of inconsistencies and cross-verification takes ample amount of time. It could also be well argued through measure of physical distance and impact of ICT on MFI operations. Microfinance institutions under survey have unanimous view that with the advent of technologies in MFIs, physical distance has withered away to a large extent, and reporting of data, dissemination and approvals have become faster. It becomes pertinent in case of large MFIs like SKS Microfinance that have pan-India operation and coordination of tasks across all branches, which is a daunting task. However, at the field level, distances do matter and constrains the outreach of MFIs, if the geography is rough and marred by lack of infrastructure.

ICT in MFIs: Perspective from the Field Staff and MFI Clients

Field staff and MFI clients have diverse opinion ranging from conflicting to agreement on various issues. Failure to connect to network with central servers is biggest problem for field staff, as 35 per cent of field staff under survey were not satisfied with network connections and central server facilities. Their discontent mainly comes from data backlog and increased work load as a result of network failures. Commenting on the network-related issues, Dina Nath Yadav, branch manager at Rajatalab Branch of Cashpor Microcredit, said:

Madam, network ka bahut problem yahan par, bahut hi zyada. Hamara office thoda sheher wale area mein hain to humko utni dikkat nahi hain, lekin hamare staff ko dur-daraz ka gaon mein jana hota hain, wahan network ka bahut issue hain, kabhi ek company ka network kaam karta hain to doosre ka nahi karta hain. Staff ko bahut pareshani hoti hain isse, lekin hum zyada kuch nahi kar sakte iske liye.

[Network (mobile and internet) is a big problem here. Our office is in sub-urban area so we don't face much problem but our staff has to go in far-off villages where network issues are there. Sometimes mobile network of one company works and then others don't work. Staffs are really hassled by this but we can't do much about it.]

In another instance, sharing his experiences over the network (mobile and Internet) woes, Satish Kumar, field staff of Cashpor Microcredit at Kachwa Bazar, said:

Mobile banking wala ya kabhi koi aur transaction agar woh nahi ho pata hain toh customer humko call karte hain, baar-baar poochte hain ki kya hua Hum unko aswasan dete hain dete hain lekin woh mane tab na. Nateeja yahi hain ki hamara bojh badh jata hain aur sabse zyada dimagi tension ho jata

hain. Madam, Hum unki dikkat samajhte hain kyunki who zyada padhe-likhe bhi nahi hain aur chote se chote paise ko bhi ahmiyat dete hain.

[In case of mobile banking or any other transaction, if it fails then customers call us multiple times and ask what happened to transaction. We do assure them but they are not satisfied. Result is that our workload increases and more than that it creates mental tension to us. We understand their problem as they are little educated and care about even for a small sum of money.]

Moreover, disagreement between clients and staff over non-issue of receipts for transaction (in case of mobile banking), non-acceptance/reluctance to accept biometric cards/smart cards by clients, non-working/compatibility of devices during field transactions affects the operations of field staff. Most of the respondents do not favour biometric cards/smart cards or hesitate to use even ATM cards on the issue of acceptability of mobile phones over other devices for banking/microcredit related purposes. According to Sita, Cashpor Microcredit client from village Katwarpur who favoured mobile phone banking over biometric cards/smart cards.

Madam, hum mobile phone se parichit aur chalana jante hain aur aaj toh har dusre-teesre ghar mein mein mobile phone hain hi. Doosri baat yeh hain ki mobile ek saath bahut saare kam karta hain, isliye humko mobile thik padta hain card nahi.

[We are familiar with mobile phones and know how to operate it and also it is household name now. Secondly mobile phone can be put to many uses this is why mobile phone suits us not card.]

Another client, Shital, Cashpor Microcredit client from village Deyipur, expressing her dislike over biometric/smart cards said:

Humko card se koi dushmani thode hi hain, hamare gaon mein kuch log iska prayog kar rahe hain, lekin hamare gol (group) mein koi bhi card ka prayog nahi pasand karta hain. Uske bahut karan hain jaise ki card kat-phat jana, ya phir hera jana aam baat hain. Uske baad bahut pareshani hoti hain aur logo mein jagrookta bhi kam hain. Are logo ko card seedha dale ki ulta who bhi bahut der se samajh mein aata hai ab aise mein kaun jhamela lega.

[I don't have any enmity with card (biometric card) as in our village some people are using it. But in our group nobody likes use of card. There are many reasons to it like cards are lost, cards getting torn and cut. We have to face problem with this and also there is less awareness about it among group people. They don't know how to insert card and learn it very late then who will take so much trouble.]

In another case, Chinta, Utkarsh Microfinance client from village Jaipal Madaiya, who despite of having debit card chose to have mobile banking, said:

Hamare pass bank ka khata hain aur card bhi mila hain (ATM), lekin hum chalana nahi jante aur doosri baat paisa nikalne wala machine bahut door hain, woh bhi bina kisi ki madad ke hi ho pata hain, isliye hum mobile wala khata kulwa liy, ye asaani bhi hain aur sasta bhi. Ab hum apna paisa isi mein jama karate hain.

[I have bank account with debit card but I don't know to operate through debit card. And secondly I have to travel far to take out money and that too with the help of other, that's why I have opened mobile banking account and I deposit my money in this only.]

On issue of whether MFI is sensitive about the needs of customers and imposition of technology or device by MFIs, there are divergent views from clients. As Dharma, Cashpor Microcredit client from village Uparwar who supported the MFIs' move to inject new technologies/devices, said:

Aisa nahi hain agar who kuch naya late hain toh kuch bhala hi hoga usme. Ab dekhiye mobile wala khata se bank jane ka jhanjhat nahi hain. Aisa nahi hain ki MFI (here cashpor) hamare jaroorat ke bare mein sochte nahi hain, woh hamari majaboori aur jaroorat dono ko jante aur samajhte hain. Aur jab koi bhi naya cheez aata hain toh humko manager sahab training jaroor dete hain ki kaise prayog karna hain machine ko.

[If they (MFIs) bring something new, then it is our advantage. Look due to mobile banking, no need to go to bank frequently anymore. It's not that our concerns and needs are not taken care about by MFIs (here Cashpor). They understand our compulsions and needs and if there is any new development with respect to technology (here device). Manager Sir gives training to us about its usage.]

But another women, Kamravati, Cashpor Microcredit client at village Gorai, resisted the idea of imposition of technology or device by MFIs without acceptability of clients. She said:

Koi hum logo par kuch bhi thoph nahi sakta hain, aakhir hamari bhi toh kuch jaroorat hain, dekhiye hum log zyada padhe likhe nahi hain agar koi machine jisko chalana mushkil ho aur humko samajh nahi aaye toh humko bahut pareshani hoti hain aur kisse kehne jaye bataiye.

[Nobody can impose anything on us as even we do have some needs. Look we are not much educated and if any machine (device) which is difficult to operate and understand puts us in trouble, and tell us whom do we say/ask.]

With respect to devices used in field operations (mobile phones/PDAs/POS), and specifically talking about use of POS devices at field level, IT head of Cashpor Microcredit opined that although POS devices ensure faster and quick operations, they are heavier in comparison to mobile phones, takes longer time to recharge its battery, face problem of instant heating, are small screened and have higher

repairing and maintenance cost. In contrast to this, field staff using mobile phones face fewer technological issues but customer often accuse of MFI staff adopting complex procedure in executing transactions (though that is not the case), non-issue of receipt upon completing transactions, sending short message service (SMS) in English language rather than vernacular one often irks customer. Taking viewpoint of MFI customers was to supplement the argument under consideration as 80 per cent of the group members surveyed complained of non-issue of receipt in case of mobile banking, procedural difficulties in conducting transactions, poor grievance redressal and customer care services are some of the issues that confront group members.

Complaining about the procedural difficulties in using mobile banking, Sunita, Utkarsh Microfinance client from village Khari Raswa, disagreed to the fact that there are no issues with respect to mobile banking. She stated:

Hum mobile wala khata liye hain, lekin pareshani yeh hain ki uska chalane ka tarika bahut muskil hain, aur passbook ka kitab samajh mein hi nahi aata hain, sir (staff/manager) se bhi jyada madad nahi mil pati hain.

[I have taken mobile banking account but it's difficult to operate it and passbook given to me I am not able to understand it. Even field staff/manager cannot help me much on this issue.]

Moreover, all the group member had less faith in technology-enabled transactions primarily because of misappropriation of funds and find it less secure. Negative perception basically comes out of lack of awareness and illiteracy of group members and occasional cases of frauds by field staff of MFIs. Technological frames theory forms perfect case for the viewpoints shared by customers as it basically calls for basic assumption, beliefs and expectation people have for specific technological application (Davidson, 2002), and also includes conditions, applications and consequences in particular context (Orlikowski & Gash, 1994).

Most of these issues arise out of ignorance of customers about specific technology/device; in this context, 'socialization of technology' introduced is paramount to the successful use of ICT in MFIs. This has been aptly pointed out through social shaping of technology emerging in 1990s (preceded by MacKenzie and Wajcman,¹⁹ 1985; Pinch and Bijker;²⁰ Callon and Latour²¹), which viewed social relationship and technology as interdependent phenomenon and refuted the notion of technological determinism which states that technology follows its own development path devoid of human influences, but affects society. It basically postulates that relationship between society and technology is mutual in nature instead of standalone process. In this context, MFIs must take proactive measures

and conduct training sessions to familiarize customers with technology adopted; however, not all times favourable results are expected. Rogers and Shoemaker (1971) opined that 'consumer undergoes process of knowledge, persuasion, decision and confirmation' before accepting/adopting any product/service or/idea. To be more specific, acceptance or rejection of innovation/system/technology begins when consumer becomes aware of that product/service/idea'.

Conclusion

Most of the earlier studies done so far focused only upon MFI-related issues mostly confined to managerial level issues but this study not only focuses upon the MFIs but also takes into account the viewpoint of MFI clients and attempts to explain what constrains/motivates client from adopting any technology/device or preferring one over another. It also addresses the behavioural issues concerning adoption of technology by MFI clients. In addition, focusing most importantly on field level issues with respect to technology introduction/adoption, the study brings out the technology-related field-level issues and perspective from the field staffs/managers who are connecting link between MFI and its clients, and their nature of interaction with technology and clients which affects the success and performance of MFIs. Getting perspective from the field staffs and clients would probably allow MFIs to have technology that meets the cost-benefit parameters concerning MFIs but also meets client satisfaction and utility criteria.

From the findings of the case study, it becomes amply clear that MFIs have benefitted from technology adoption in their organizations. With the onset of IT in MFIs, savings of MFI have increased (less paper work), efficiency has increased and service delivery has improved; besides this, the MFIs have registered lower transaction cost and have improved market performance (market portfolio has improved). However, it is only large MFIs that have adopted ICT as investment involved is huge with risky returns. Moreover, ICT does enhance the geographical footprints of MFIs and brings down cost but cannot insulate MFIs from strategic default and credit risks as in the case of SKS Microfinance. Much of the success of ICT adoption rests upon professional skills of field staff, regulatory environment, enabling infrastructure and fulfilling/meeting expectation of MFI customers. With the evolution of MFI sector, MFIs face an increasingly competitive environment forcing them to balance the dual goals of outreach and sustainability; in that case, ICT may be both instigator of this new

scenario and the potential solution to MFI survivability (Kauffman & Jiggins, 2012).

With respect to limitations of the present study, it basically focuses on only large MFIs, and number of MFIs covered under survey is small. In order to have more comprehensive and reflective findings, the present study could be extended on the basis of region-wise and also according to the size of the MFIs (large, medium and small). In addition to this, it is a cross sectional data study and in order to have more reflective and empirically sound results, longitudinal study would be more beneficial as it captures the

intervention of technologies by the firms and its impact over a period of time.

Acknowledgements

I offer my sincere thanks to Vikas Kumar (senior regional manager, Varanasi, SKS Microfinance Ltd), Rahul Dey (head; IT, audit and loan; Utkarsh Microfinance Pvt Ltd), Dhananjay Singh (project Manager, business correspondents relations, Cashpor microcredit), Mr Ritesh Srivastava and Mr Anjan Kumar Kar (IT head) at Cashpor Microcredit, branch managers and field staff, MFI clients of the respective MFIs for their cooperation in my survey work.

Annexure A. Brief Description of MFIs in Case Study

Description	SKS Microfinance	Cashpor Microcredit	Utkarsh Microfinance
Year of establishment	1998	1997	2009
Legal status	For-profit NBFC	Not-for profit NBFC (NGO)	For profit NBFC
Regulation	Regulated	Regulated	Regulated
Funding pattern	Mixed funding pattern	Mixed funding pattern	Mixed funding pattern
Lending method	Joint Liability Group Lending	Joint Liability Group Lending	Joint Liability Group Lending
Target group of customers	Women	Women	Women
Area of operation	Rural and urban	Rural and urban	Rural and urban
Number of branches on all India basis	1,100	341	230
Nature of branches	Brick and mortar branch as well as branchless banking	Brick and mortar as well as branchless banking	Brick and mortar as well as branchless banking
Number of districts wherein operation	294	15	64
Total number of staff	8,932	2,443	1,511

Source: website of three MFIs.²²

Annexure B. Financial Position and Performance of MFIs (As on 31st March 2014)

(in USD)

Description of Variables	SKS Microfinance	Utkarsh Microfinance	Cashpor Microcredit
Assets	381156125.7	77054963.54	114450367.4
Liabilities	304696975.51	64688117.53	105257944.6
Return on assets	0.0288	0.0235	0.0327
Return on equity	0.1652	0.1146	0.3783
Operational self-sufficiency	1.1528	1.2345	1.1659
Profit margin	0.1325	0.1899	0.1423
Yield on gross portfolio (real)	0.0531	0.1182	0.0803
Total expense/assets	0.1884	0.1675	0.1969

Source: MIX Market.

Annexure C. Technology Trials by MFIs in India

Institution/Project	Location of Project	Year	Technology used	Status
SKS Microfinance	India-nationwide	2006	Electronic Money	Pilot
CCD	Tamil Nadu	2005	Mobile phone imaging	Pilot
CASHPOR	Uttar Pradesh	2005	GPRS enabled PDA with printer	Pilot
BASIX	Andhra Pradesh	2005	STEMS- Internet kiosks	Pilot
BASIX	Andhra Pradesh	2005	Mobile phones	Pilot

(Annexure C continued)

(Annexure C continued)

Institution/Project	Location of Project	Year	Technology used	Status
BASIX	Andhra Pradesh	2005	POS	Pilot
BASIX	Andhra Pradesh	2005	VSAT	Pilot
SEWA bank	Gujarat	2005	Smart card reader and cash bag	Pilot
SEWA bank	Gujarat	2004	Internet kiosks	Pilot
CASHPOR	Uttar Pradesh	2003	Simputer	Failure
PRADAN	India, nationwide	2003	Computer munshi	Success
Akshaya, Kerala Government	Kerala	2003	Internet kiosks, e-governance	Success
SBI, ICICI, Bank of Patiala, J&K Bank	India, nationwide	2001	Mobile banks	Failure
BASIX	Andhra Pradesh	2001	BASIX POT, smart cards	Failure
BASIX	Andhra Pradesh	2001	Portfolio manager, PDA	Failure
DHAN foundation	Tamil Nadu	2001	PC kiosks using WLL technology	Success
SKS Microfinance	Andhra Pradesh	2000	Smart cards and POS	Failure
Gyandoot, n-logue communications	Madhya Pradesh	2000	Internet kiosks, e-governance	Failure
BASIX	Andhra Pradesh	2000	Simputer	Failure

Source: CARE (2012).

Notes

- The definition has been taken from <http://www.adb.org/sectors/finance/microfinance>.
- Here (Bakos, 1991) uses term electronic marketplaces as an acronym for ICT.
- Credit-scoring techniques are set of decision models and their underlying techniques that aid lenders in the granting of consumer credit. These techniques determine who will get credit, how much credit they should get and what operational strategies will enhance the profitability of the borrowers to the lenders. Further, they help to assess the risk in lending (source: <http://www.statsoft.com/textbook/credit-scoring>).
- Adopted from http://edutechwiki.unige.ch/en/Technology-organization-environment_framework
- This definition is sourced from http://edutechwiki.unige.ch/en/Technology-organization-environment_framework
- The data were collected in the year 2013 for 3 months (1 September to 24 November).
- Total sample stood at 25, of which 18 were from Cashpor Microcredit (Varanasi and Mirzapur clients) and rest 7 were from Utkarsh Microfinance (only Varanasi clients).
- MIX refers to the microfinance information exchange, provides data services, analysis and research on the institutions that provide financial services to the world's poor.
- Field Staffs and Branch Managers who were interviewed belonged to Cashpor Microcredit and Utkrash Microfinance only. Field staffs and branch managers interviewed at Cashpor Microcredit belonged to Rajatalab, Mirzamurad, Kachwabajar branch while in case of Utkarsh Microfinance field staffs and branch manager interviewed belonged to Harhua Branch only.
- Eko foundation is an Indian financial services company which provides low-cost infrastructure powered by innovation and technology to enable instant, secure and convenient financial transactions (definition adopted from <http://eko.co.in/about-us/>).
- Craft Silicon's MFI offering also provides its partners with alternate channels, such as, POS and mobile banking, which allow businesses to provide online, real time and secure services to customers even in remote areas. The limitless scope and convenience offered could be testified by over 200 satisfied MFIs in over 32 countries around the world (source: http://www.craftsilicon.com/br_mfs.php).
- Advantages of open-source software available at http://eu.connecta.it/paper/advantages_open_source_soft.html
- Reliability of ICT systems in this context has been defined as secure, leak proof and possesses authenticity.
- One of the indicators to measure risk management efficiency of MFIs is portfolio at risk which is proportion of MFIs total gross outstanding loan portfolio that is at the risk of default.
- Interviewed in April 2015 as follow-up to this study.
- High Mark Credit Information Services, a credit information company (CIC) based in Mumbai. It keeps a record of loan repayment history on credit facilities extended to an individual across the board. The service helps lenders to analyze the risk profile of individuals before extending credit (source: www.wikipedia.com).
- It is a joint venture between Equifax Inc., USA and seven leading Indian financial institutions which aims to provide range of solutions related to credit information, business analytics and risk management for clients across India (source: http://www.equifax.co.in/about_equifax/india/en_in).
- CIBIL is India's first CIC founded in August 2000. CIBIL collects and maintains records of an individual's payments pertaining to loans and credit cards (source: <https://en.wikipedia.org/wiki/CIBIL>).
- It is concerned to explore the material consequences of different technical choices, but criticizes technological determinism, which argues that technology follows its own developmental path, outside of human influences and, in turn, influences society (source: www.wikipedia.com).
- Social construction theory or social constructionism or the social construction of reality (also social concept) is a theory of knowledge in sociology and communication theory that examines the development of jointly constructed understandings of the world. It assumes that understanding, significance and meaning are developed not separately within

the individual, but in coordination with other human beings (source: www.wikipedia.com).

21. Actor–network theory (ANT) is an approach to social theory and research, originating in the field of science studies, which treats objects as part of social networks. Although it is best known for its controversial insistence on the capacity of non-humans to act or participate in systems or networks or both, ANT is also associated with forceful critiques of conventional and critical sociology (source: www.wikipedia.com).
22. Cashpor Microcredit, <http://www.cashpor.in/>; Utkarsh Microfinance, <http://www.utkarshmf.com/>; SKS Microfinance, <http://www.sksindia.com/>.

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