



**NSE-IFMR**  
**‘Financial Inclusion’**  
**Research Initiative**

*NSE Working Paper Series<sup>1</sup>*

**Technology, Financial Inclusion,**  
**&**  
**Securities Markets**

*Lakshmi Kumar, G. Balasubramanian, Ramesh Subramanian*

---

<sup>1</sup> This working paper is part of a research initiative on ‘Financial Inclusion’ carried out jointly by NSE and the Institute for Financial Management and Research (IFMR), Chennai. The views expressed in this Working Paper are those of the author(s) and do not necessarily represent those of NSE or IFMR.

# Technology, Financial Inclusion, & Securities Markets

**Prepared by: Lakshmi Kumar,<sup>2</sup> G. Balasubramanian,<sup>3</sup> Ramesh Subramanian<sup>4</sup>**

## Abstract

Technology is considered an enabler for financial inclusion even though it has a more significant role—it has the power to reduce cost substantially and can reach out to the unbanked in the most effective manner. It is important to identify which technology has diffused to low-income families and leverage the same for their benefit. We find that in several underdeveloped African countries, changes in regulation and the permeation of the mobile has aided the substantial growth of financial inclusion. In India, technology assimilation among microfinance institutions (MFIs) is not all that simple as its immediate benefit is not clear to them; however, mobile penetration even among the lowest income group is very high. Since MFIs are so widely spread, they seem the best connected to the clients for understanding their needs both in terms of financial services as well as non-financial services. Making them the business correspondent and incentivising them through mobile technology would be the first step towards financial inclusion.

---

<sup>2</sup>Associate Professor & Program Director, IFMR ([lakshmik@ifmr.ac.in](mailto:lakshmik@ifmr.ac.in))

<sup>3</sup>Professor & Dean at IFMR ([bala@ifmr.ac.in](mailto:bala@ifmr.ac.in))

<sup>4</sup>Adjunct Professor, IFMR, ([ramesh.subramanian@ifmr.ac.in](mailto:ramesh.subramanian@ifmr.ac.in))

The authors would like to thank the National Stock Exchange (NSE), whose generous assistance and continuous support made this survey and report possible. We express our gratitude to all the participating institutions as well as the senior officials in these institutions for sparing their time, for sharing their data, and for accommodating our study in their operation areas,; without which it would not have been possible to fulfill the objectives of the project. The present version of the paper is enhanced thanks to the comments of Dr. Santadarshan Sadhu of CMF as well as the comments received from participants at the Round Table discussion conducted by IFMR-NSE on 20 November, 2012 in Chennai. We sincerely thank IFMR's dedicated doctoral student Ms. Swati Dutta for her able and patient research assistance throughout the project. We would also like to thank Vishwesh, Ramkartic, Asha, Kritika, Vatsala, and Shruti of IFMR; without their support and constant follow-up in conducting the survey, it would have been difficult to complete this study. Finally, we sincerely thank Mr. Ravi Shankar for his excellent assistance in secretarial and logistical arrangements.

## CONTENTS

|                           |   |  |    |
|---------------------------|---|--|----|
| <b>Executive Summary</b>  |   | <b>5</b>                                       |    |
| Section 1                 | Introduction  | 6  |    |
| Section 2                 | Defining Technology, Financial Inclusion, and the Securities Market   | 7  |    |
| Section 3                 | Objectives/Research Questions   | 9  |    |
| Section 4                 | Literature Survey   | 9  |    |
| Section 5                 | Framework for Analysis  | 16   |    |
| Section 6                 | Analysis of Results   | 19   |    |
|                           | 6.1   | Forms of technology used                       | 19 |
|                           | 6.2   | Technology status vs. legal standing of MFI    | 20 |
|                           | 6.3   | Technology understanding of MFIs               | 21 |
|                           | 6.4   | Constraints faced by MFIs                      | 21 |
|                           | 6.5   | Appropriate technology for financial inclusion | 23 |
|                           | 6.6   | Source for technology funding for MFIs         | 24 |
|                           | 6.7   | Financial literacy and the BC model            | 25 |
|                           | 6.8   | Technology and the securities market           | 26 |
| Section 7                 | Conclusions   | 28   |    |
| <b>References</b>         |   | <b>30</b>                                      |    |
| <b>List of Figures</b>    |   |  |    |
| Figure 1                  | Segmentation of MFIs  | 17   |    |
| <b>List of Tables</b>     |   |  |    |
| Table 1                   | Forms of Technology used in MFIs in Tamil Nadu (in percentage)        | 19   |    |
| Table 2                   | Forms of Technology vs. Legal Status of MFIs (in percentage)          | 20   |    |
| Table 3                   | MFIs' Understanding of Technology Use                                 | 21   |    |
| Table 4                   | Constraints Faced by MFIs   | 21   |    |
| <b>List of Appendices</b> |   |  |    |
| Appendix 1                | Questionnaire-Technology, FI & Securities Market                      | 34   |    |
| Appendix 2                | List of Institutions Related to MF Activities in TN that were studied | 37   |    |

## Executive Summary

We generally consider technology an enabler for financial inclusion even though it has a more significant role—it has the power to reduce cost substantially and can reach out to the unbanked in the most effective manner. It is important to identify what technology has diffused to low-income families and to leverage the same for their benefit. This research project tries to identify the most effective technology for financial inclusion. However, using technology and products that we already have may not bring about the change that is necessary. In India, most low-income families are illiterate, but a sizable segment of this population has mobile phones and can understand voice-based messages. Can we develop products for financial inclusion based on the needs of the clients instead of using those products that have already been developed?

In the extant literature, we find extensive evidence from Africa and Latin America about how the power of the mobile has aided not just financial inclusion but the growth of savings as well—both local and international remittances as well as insurance and pension products. This has been possible due to a tie-up with telecommunication companies thanks to regulatory changes in these countries. After the success of M-Pesa in Kenya, it has been implemented in Tanzania, Afghanistan, and Pakistan. Additionally, most of these countries use several other digital devices for loan tracking, fraud tracking, and so on, which are customized either on the mobile or through palmtop devices. Thus, organizations choose a specific technology for particular needs in order to maximize efficiency and control.

We categorize the institutions that offer microfinance (MF) in India into four tiers. A Tier 1 institution is also known as an NBFC-MFI. As of now, none of the non-banking financial companies (NBFCs) we analyzed have received this status. Tier 2 institutions are for-profit NBFCs, while Tier 3 institutions are non-profit MF Section 25 companies; Tier 4 institutions are non-profit trusts and/or societies working for local community development, with MF as one of their activities.

Tier 2 MFIs seem to assimilate technology very easily due to their size and scale of operations. They have a large size of operation and can tap the market easily and securitize a portion of their portfolio. Tier 3 MFIs are in the process of technology integration, but are still unconvinced of its return on investment. Additionally, many of them are unaware of the availability of special

capital (or Tier 2 capital) that they can use to upgrade technology. However, to get Tier 4 MFIs to think about technology seems a daunting task as they find it unviable and do not see its immediate benefits. Many of these institutions are involved in several community development activities. They are very local and important, but are sometimes skewed in their outlook (as they take up activities in line with the present political bias). Additionally, in Tamil Nadu all the MFIs face massive power problems; hence, there is confusion about the adoption of technology.

Whatever be the legal structure these institutions follow, they are so widely spread that they seem the best connected to the clients for understanding their needs both in terms of financial services as well as non-financial services. To make them the business correspondent and to incentivize them through the mobile technology would be the first steps towards financial inclusion and getting them to enter the securities market.

# Technology, Financial Inclusion, and Securities Markets

## I. Introduction

Globally, banking started off being elitist. In India, getting the poor to bank has been difficult, thereby leaving financial inclusion elusive. Technology is the key to financial inclusion—it can reduce costs significantly and can take banking to the masses. However, all technologies are not suitable for financial inclusion due to issues of affordability, accessibility, security, and privacy. In the last decade, mobile phone technology has emerged as the most promising and well-suited channel for financial inclusion. The use of mobile phones for inclusive finance is very popular in countries where most of the population is unbanked or underbanked. The Indian government has also realized that the mobile phone can be an important mode for the propagation of financial inclusion in the country. The deep penetration of the mobile to the poorest sections has opened up possibilities of their inclusion through this technology. Additionally, studies show that the poor do save in various forms as they have several financial needs.

An overwhelming majority of rural India and a significant portion of urban India do not benefit from financial services. While availing of any service is a matter of choice in a market economy, it is mandatory for society to allow access to all services for the entire population. Most people are aware of the benefits of the various basic financial services; however, only a few are able to partake in them because of the way these services are delivered in India. The transaction costs of availing financial services are simply too large for most of the population. Once the transaction costs are brought down to a minimum, the distribution of these services can then be determined by the pricing of such services, possibly by shifting from traditional banking to other modes of delivery. In any payment mechanism, the larger the volume of transactions, the lower is the cost per unit of transaction; further, the more the people who use the mechanism, the greater is the value generated through transactions. This is the so-called network effect. Building an electronic payment system that allows everyone to access it will add to the overall value creation in the economy. However, the value of the electronic payment system, like all such systems, is enhanced by its credibility. For this, a regulatory structure is a must; a properly regulated system must guarantee the authenticity of all transactions, and keep the transactions secure, confidential,

and stable. Without doubt, the securities market can catalyze the infrastructure for taking forward the best or the most popular technology towards financial inclusion.

The rest of the paper is organized as follows. Section 2 defines the topic of research, while Section 3 brings out the objectives of the study. Section 4 discusses the literature on technology assimilation in financial institutions, particularly in microfinance institutions (MFIs) around the world and in India. Section 5 provides a framework for the analysis and describes the evolution of the questionnaire. Section 6 analyses the results of our meeting with various MFIs in Tamil Nadu and Section 7 concludes the paper with a few policy suggestions.

## **2. Defining Technology, Financial Inclusion, and the Securities Market**

Information, Communication, and Technology (ICT) encompasses **technology** beyond mobile phone technology and offers various benefits to the clients of microfinance (MF) institutions in various countries. Various benefits to the clients have been identified—access to banking services, faster loan processing, reduced transaction costs, improved quality of information, increased outreach, reduction in operational costs, and increase in customer satisfaction (Hishigsuren, 2006). ICT has been used to create “branchless banks” through mobile banking, automated teller machines (ATM), point-of-sale (PoS) networks, and so on, where clients can access various financial services. According to Brynjolfsson and Hitt (2000), the use of ICT can be used to cut down the costs of coordination, communication, and information processing, and to enable efficient service provision at lower costs. ICT is a strategic tool that enables users to be efficient and effective. It promotes the dual objectives of microfinance—sustainability and outreach to the poor people. Although ICT can help MFIs to reduce transactional costs, expand their market, and provide affordable and flexible services to customers, many of them continue to rely on inefficient manual data processing systems that create disorganization, waste time, and lead to inefficiency (Parikh, 2006).

Most definitions of **financial inclusion** only talk about “access to finance,” implying the availability or the supply side of finance. This essentially means that by merely giving the right

to use of finance to the disadvantaged, one hopes that he/she will use the service irrespective of whether he/she knows about it, needs the service, or the service is suitable to him/her. However, defining financial inclusion from the perspective of “the use of financial services” would include both the supply as well as the demand side of finance.

Access to finance is defined by many in the extant literature. The Rangarajan Committee on Financial Inclusion (2008) defines it as “the process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low income groups at an affordable cost.” The Raghuram Rajan Committee (2008) refers to universal access to a wide range of financial services at a reasonable cost. These include not only banking products but other financial services as well, such as insurance and equity products. “Financial inclusion, or broad access to financial services, is defined as the absence of price or non-price barriers in the use of financial services” (World Bank Policy Research Report, 2008 ). Access essentially refers to the supply of services, whereas use is determined by demand as well as supply. Among the non-users of formal financial services, a clear distinction needs to be made between voluntary and involuntary exclusion. The problem of financial inclusion addresses the “involuntarily excluded” as they are the ones who, despite needing financial services, do not have access to them (NABARD ,2009).

In the light of these definitions, defining the extension of financial exclusion and redefining financial inclusion in terms of the use of financial services as opposed to the access to financial services is useful, as we will be able to understand the needs of the excluded and serve them according to their needs.

The mobilization of savings from surplus savers to deficit savers through the **securities market** expands the choice set for savers in an efficient manner, though it involves a certain amount of risk. While risk and return are inversely related in the securities market, the search for efficiency in the securities market through a range of complex products called “securities” is a portfolio choice. The definition of securities as per the Securities Contract (Regulations) Act, 1956 includes shares, bonds, scrips, stocks, or other marketable securities of similar nature in or of any incorporate company or body corporate, government securities, derivatives of securities, units of



collective investment scheme, interest and rights in securities, security receipt, or any other instruments so declared by the central government. The securities market has essentially three categories of participants, namely, the issuer of the securities, the investors in the securities, and the intermediaries. Issuers are the borrowers or deficit savers who issue securities to raise funds. Investors, who are surplus savers, deploy their savings by subscribing to these securities. Intermediaries are the agents who match the needs of the users and the suppliers of funds for a commission. These intermediaries pack and unpack securities to help both the issuers as well as the investors to achieve their respective goals. There is a large variety and number of intermediaries providing various services in the Indian securities market. The securities market has essentially three categories of participants, namely the issuer of securities, investors in securities and the intermediaries. The issuers are the borrowers or deficit savers, who issue securities to raise funds. The investors, who are surplus savers, deploy their savings by subscribing to these securities. The intermediaries are the agents who match the needs of users and suppliers of funds for a commission. These intermediaries pack and unpack securities to help both the issuers and investors to achieve their respective goals. There are a large variety and number of intermediaries providing various services in the Indian securities market.

### **3. Objectives/Research Questions**

1. What is the status of the use of technology in various countries for the delivery of MF products as discussed in the extant literature?
2. What are the different types of technology used by MF institutions in India and specifically in Tamil Nadu (TN) as gathered from their websites?
3. What are the various forms of technology used by the MF institutions and clients in TN (based on a primary survey of MFIs in TN)?
4. What is the opinion of experts on the viability of technology solutions in terms of cost and ease of uptake?
5. How can technology enable financial inclusion through the securities market?

#### **4. Literature Survey**

A question that often arises in many studies across the world is whether technology has brought about efficiency and improvement in productivity in an MFI's operation. If the answer is in the affirmative, then for what processes have these efficiency gains been seen? Often, these productivity gains are not easily adopted by other institutions. Why have these processes not been emulated? This study explores why a sense of triviality continues to exist in adopting best practices in using computers, mobile phones, personal digital assistants (PDAs), smart cards, automated teller machines (ATMs), and so on, as is evident from the studies on MF institutions in India and abroad.

Several international MFIs claim to use a degree of automation in their operations (as can be seen from the example of Egypt). Loan tracking and other components of the organization's management information system (MIS) are commonly computerized; in many cases, it added efficiency and productivity. Telephones, fax machines, and e-mail are considered as important instruments. They speed loan-processing time, facilitate communication between members, and allow the institution to connect with the outside world. In this sense, operations at many MFIs are partially automated. However, it has been found that many MFIs in India still use manual or very rudimentary MIS for several processes (Kline and Sadhu, 2011).

The Alexandria Business Association (ABA) is a small and microenterprise (SME) finance non-governmental organization (NGO) located in Alexandria, Egypt. The ABA operates two office computer networks to capture the efficiency gains that open-access communication can provide. The local area network (LAN) allows for information sharing between key members of the administration in the head office; the wide area network (WAN) is a data transfer system that uses modems to connect each of the 14 ABA branches to one other (Champion and Halpern, 2001).

Globe Telecom, a mobile service provider in the Philippines, provides an e-wallet facility to its customers (Wishart, 2006; Mendes and Alampay, 2007). The product turns the mobile phone into an e-wallet—customers can use their phones to transact business. Non-subscribers can send money electronically to Globe mobile subscribers. In the Philippines, more than 2 million people

use their phones as mobile wallets to receive and send payments, pay utility bills, and so on. The Smart Communications Money Card (SMART) in the Philippines provides for the transfer of funds to retailers as well as the transfer of spending rights to other individuals, while also functioning as an ATM/debit card. All account activity can be confirmed through text messaging. For SMART, seven MFI partnerships have already brought over 4,500 additional users specifically for the distribution and maintenance of MFI loans. SMART believes that the service will enable MFIs to expand their service areas, thereby increasing their membership base.

Prodem, a Bolivian MFI, introduced ATMs and smart cards in Bolivia (Hernandez and Mugica, 2003). ATMs provide financial services including depositing and withdrawing funds without filling forms, and facilitate funds transfer. It conducted a pilot project using smart cards to replace much of the paperwork that was previously needed for transactions. The smart card allows for withdrawals, deposits, currency exchanges, money orders, and other services. As a security precaution, fingerprint images are stored on the microchip and are compared with those taken by biometric scanners at the time of the transaction. The smart card can also act as a debit card, an account passbook, and even as a credit card.

ICT is also used by Voxiva to allow MFIs located in Peru to expand their reach (Global Envision, 2003). The company uses a phone-based system with voice prompts to expand microfinance networks into rural areas that have a high number of illiterate people. The service reduces operating and transaction costs, resulting in savings that can be passed on to the borrower.

In collaboration with CGAP, WIZZIT (in association with the South African Bank of Athens Limited) introduced a banking service for the unbanked and underbanked in South Africa through which cell phones can be linked to debit cards as well as bank accounts. It helps their clients to send and receive domestic and international payments. In East Africa, the telecom companies Safaricom, MTN Uganda, and Zain offer financial services such as sending and receiving domestic and international payments. Safaricom alone serves more than seven million users with an agent's network that exceeds the total number of bank branches in Kenya

(Kinyanjui, 2009). Pride Africa, a cluster of MFIs currently operating in five sub-Saharan African countries, uses ICT for increased efficiency and faster growth.

In Kenya, the agent-based M-Pesa system was introduced in March 2007 (Hughes and Lonie, 2007; Morawczynski, 2008; Mas and Morawczynski, 2009; Morawczynski, 2009; Morawczynski and Pickens 2009). M-Pesa is an agent-assisted, mobile phone-enabled, person-to-person payment and money transfer system. It allows users to store money on their mobile phones in an electronic account and deposit or withdraw money at one of M-Pesa's agent locations. While M-Pesa was not the first large-scale implementation, its rapid uptake is perhaps what differentiates it from Smart Money or G-Cash in the Philippines (Wishart, 2006; Mendes and Alampay, 2007). Morawczynski and her colleagues extensively studied M-Pesa, which is predominantly used for domestic money transfers between different parts of the country (Morawczynski, 2008; Morawczynski and Pickens, 2009). Some of the new features include international money transfers and a linkage with Equity Bank to provide MKesho—a bank account that links to M-Pesa, enabling users to transfer money between the two (Equity Bank, 2010). An interesting trend where users began to leverage M-Pesa as a savings vehicle was noticed (Morawczynski, 2009). M-Pesa has been replicated in Afghanistan, Tanzania, and more recently in Pakistan.

In Uganda, commonly used ICT implementations include management information systems (MIS), personal digital assistants (PDAs), automated teller machines (ATMs), mobile phones, and smart cards (Ssewanyana, 2008). MIS is important to MFIs as it constitutes the backbone of any ICT innovation for microfinance services, and can effectively support loan portfolio, transactions, operational growth, decision making, transparent and quality services to the client, time management, and increased outreach (Turaga, 2004).

Personal Digital Assistants (PDAs) are small, portable handheld computers that can allow loan officers to access his/her institution's MIS from the field (Turaga, 2004). Depending on his/her location, information can be updated by the loan officer to the head office instantaneously or once every day (which decreases the need for data entry clerks). For instance, Asociación Programa Compartamos—an MFI targeting very low-income women in Mexico—is

experimenting with using the Palm Pilot (a brand of PDA) in cases where greater productivity is predicted and integration with MIS is justified (Turaga, 2004).

In Bangladesh, the Grameen Foundation launched its much acclaimed microfinance program. The key objective of the program was to provide wide-spread access to loans to the unbanked women of Bangladesh. In this model, the beneficiary can procure a mobile phone from Grameen Phone with some pre-paid credit. The mobile phone can then be a source of income for the beneficiary as people in the village can use this phone to make telephone calls (Perspective, 2010).

In India, some rural farmers and MFIs are using mobile phones to do bookkeeping, to receive and send payments, and to pay utility bills (Rogers, 2007). In addition, handheld devices and smart card technology are used to automate loan processing and tracking. Biometric ATMs with smart cards are used for financial transactions without the need for personal identification. BASIX, India's largest microfinance organization, is experimenting with handhelds and smart card technology to automate the loan process and keep track of repayments, in order to reduce labor and cash handling costs. BASIX's Mobile Portfolio Management System also helps to minimize accounting errors (Global Envision, 2003).

While the studies discussed so far looked at the implementation of technology at the institution level, the studies that are discussed next deal with the exclusion of the poorest from formal banking and finance and how technology can play an important part in catalyzing the same.

Today, banks have centralized operations; banks and branches are increasingly moving to core banking solutions (CBS), network-based computing, new delivery channels such as networked ATMs, internet banking, smart card-based products, mobile access, and so on, and are using IT for customer relationship management, customer transaction pattern analysis, credit profiling, and risk management (Thorat, 2007). At the same time however, a large numbers of rural households continue to be excluded from formal banking services.

Geach (2007) studied financial exclusion and mobile phone technology. He found that the use of electronic communication throughout the world has not included everyone. He argues that the vast majority of the world's population is still unable to gain access to digital technology, especially the Internet. These people are located in rural or poor inner city areas that are less likely to have Internet access. Advances in mobile phone technology could provide the solution to this problem.

Medhi et al. (2009) studied the mobile banking adaptation and usage by low-literate and low-income users. Due to the increasing penetration of mobile phones even in poor communities, mobile-phone-enabled banking (m-banking) services are increasingly targeting the “unbanked” to bring formal financial services to the poor. However, more research is required to understand the issues that prevent low-income, low-literate populations from meaningfully adopting and using existing m-banking services in order to scale up financial inclusion through technology.

Das (2010) studied the scaling up of technology to build inclusive financial systems in India. The systems that provide connectivity need to be relatively inexpensive if they are to be commercially deployed, given the lower incomes in rural areas compared to those in urban areas. Recently, ICT implementations have emerged as a powerful tool to reduce operating costs, making it viable for financial institutions to expand into rural and low-income areas. Despite the success of microfinance services in many countries, access to financial services in remote rural areas remains a challenge in India.

Sangwan (2007) studied financial inclusion and self-help groups (SHGs), and found that over the last 15 years, India has witnessed unprecedented growth in financial services—unfolded by liberalization and the globalization of financial services—due to the adoption of information technology (IT) and the unlocking of the regulatory framework. However, alongside this positive development, there is evidence that the formal financial sector still excludes a large section of the population.

Gangopadhyay (2009) explored how technology facilitates financial inclusion in India. More than 50% of the adult population in India is excluded from the financial sector—not just people

in the rural areas but many lower-income categories of the urban population are also excluded. This is largely because of the way the supply of such services is organized. For instance, the transaction costs of financial services to the poor are exceedingly large in comparison to their potential exposure. From the demand side as well, there is financial illiteracy and the consequent fear of approaching formal institutions with the philosophy of business opportunity blended with social responsibility.

Charkraborty's 2009 study focused on technology, financial inclusion, and the role of banks showed that technology can operate on any platform. However, the technology solution to the business needs should be user-friendly without much third-party or IT vendor intervention or support requirement for operating the same. Banks need to redesign their business strategies to incorporate specific plans to promote financial inclusion of low-income groups, treating it as both a business opportunity as well social responsibility.

According to Ravichandran and Alkathlan (2009), very few people have access to banking services. There are a number of factors affecting access to financial services by the weaker sections of society in India. Lack of awareness, low incomes and assets, social exclusion, and illiteracy are the barriers from the demand side. Distance from the bank branch, branch timings, cumbersome banking procedure, requirement of documents for opening bank accounts, unsuitable banking products/schemes, language barriers, high transaction costs, and attitudes of bank officials are the barriers from the supply side. The authors discussed bank-SHG, bank-MFI, MFI-NBFC (with non-banking financial companies), and bank-post office linkage models and proposed new models such as rural students banking model and RBI-education institute linkage models.

Reddy (2010) suggested a new approach for banks to reach wider populations in rural areas—establish mobile-banks/representatives/agents who operate on a commercial basis rather than relying on self-help groups. These agents/representatives work on commission basis and hence, are self-motivated and cost-effective in assisting banks in service provision/deposit mobilization.

Ghosh (2007) suggests that the Post Office Savings Bank (POSB) can be used to cater to the financial needs of rural India where microfinance institutions (MFIs) have very little presence in the total demand for finance. To boost microfinancing initiatives and the financial inclusion program, banks are deploying biometric ATM solutions to its rural customers, helping illiterate or barely literate clients to become part of the banking user community (Biswas, 2010).

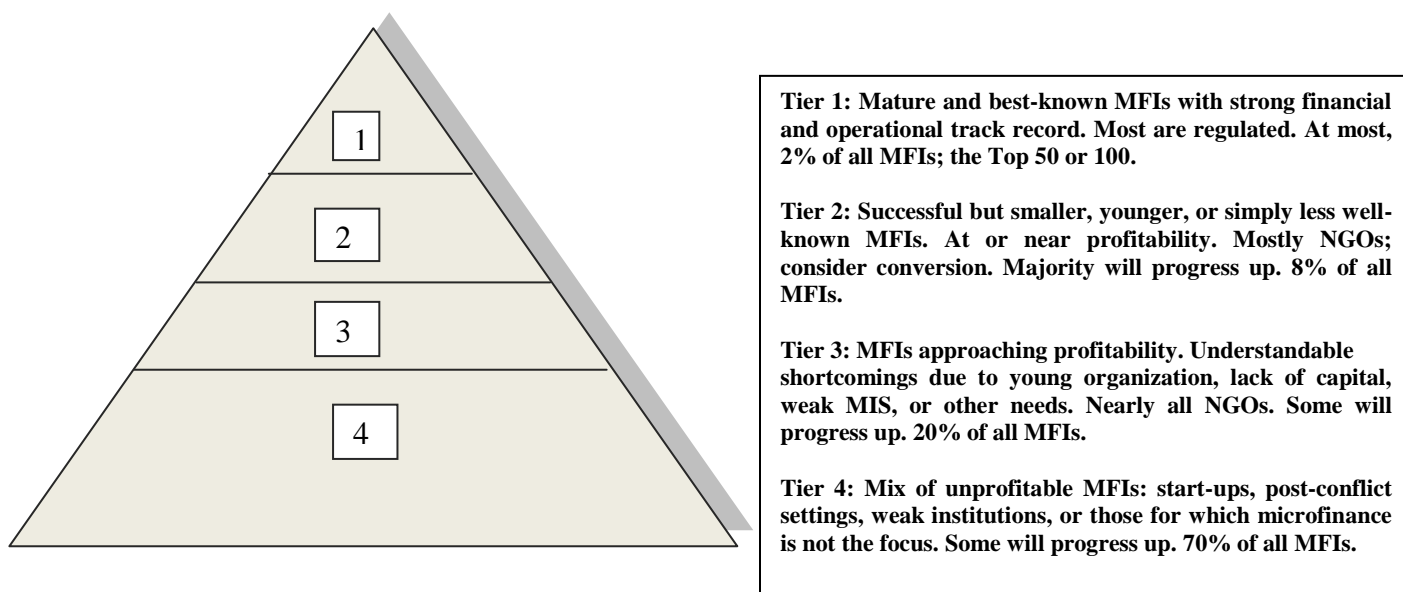
The diffusion of ICT in the operations of MFIs in developing countries is growing (CGAP, 2006). Despite the high diffusion, there are several challenges. Firstly, the infrastructure in terms of mobile network and Internet bandwidth is limited in most of these countries, which limits outreach to rural areas. Secondly, illiterate clients do not have personal identification or credit history and hence, MFIs would need to invest in more sophisticated technologies to serve them. Thirdly, computer illiteracy of the borrowers is a major barrier. Fourthly, there is limited funding to invest in infrastructure such as human resources and ICT. Finally, the high costs of administering small transactions on savings accounts, money transfer, and loans to the poor provide low profit margins (Amin, 2007; Hishigsuren, 2006; Mathison, 2005).

The RBI Circular dated 2 December, 2011 made an observation regarding the improvement in the efficiency of a new category of NBFC-MFIs: “NBFC-MFIs shall review their back office operations and make the necessary investments in Information Technology and systems to achieve better control, simplify procedures and reduce costs.” “Information Technology” is an extremely broad expression that could mean investment in computers (hardware), development of in-house software, or buying customised software, provision of mobiles to clients (like the Grameen foundation), provision of customised software to loan officers, provision of PDAs, and so on. As rightfully pointed out by the RBI, the key is to reduce cost. However, gaining efficiency is of prime importance; having technology for the sake of technology would be of no use. For the RBI, technology could be a way of control, but an institution needs substantial gains from its implementation. In the following sections, we identify the technologies that were used in Tamil Nadu as compared to what our counterparts abroad use (based on our survey).



## 5. Framework for Analysis

Despite recognizing microfinance as a tool to reduce poverty, less than 18% of the world's poor have access to financial services; 73% of the farm households in India do not have access to financial services (Rangarajan Committee Report, 2008). However, the MF industry the world over is rapidly transforming, particularly among institutions serving poor clients. There seems to be a growing divide between larger MFIs—commonly known as commercially-oriented MFIs, many of whom intend to become regulated financial intermediaries—and smaller, NGO-managed MFIs. Figure 1 illustrates the magnitude of the divide segmenting the sector into four tiers as discussed in Balasubramanian et al. (forthcoming).



**Figure 1: Segmentation of MFIs**  
(Source: Meehan, 2004)

If we try to map the framework in Figure 1 to the legal structure in India, we can get such a mapping based on the organization's corporate structure. If we try to map the broad framework of figure 1 to the legal structure in India we can more or less get the above mapping based basically on the justification of the organizations corporate structure. Does an organization's structure determine its ability to get the best technology, to use and leverage it for the financial inclusion of its clients? Does its corporate structure affect its technology selection, and hence its ability to restrict or access capital from the securities market for financial inclusion? These questions and

the literature review formed the basis for the development of the questionnaire (Appendix1). In brief, the salient points of the questionnaire are:

- MFIs' current type of technology and purpose of technology
- Technology available to clients
- Benefits and challenges of adopting technology
- Types of technology useful for financial inclusion
- Business correspondents and financial literacy programs
- Technology and the securities market

## **6. Analysis of Results**

The MFI was the unit of analysis. One of the main reasons for this choice was to understand the various kinds of technology these institutions used and benefited from. Moreover, we wanted to understand whether technology usage varied depending on the classification of the institution; we also wanted to understand the reasons why they adopted or did not assimilate a particular technology. With the list of MFIs available from National Bank for Agriculture and Rural Development (NABARD), we could only do convenience sampling as several MFIs were either unavailable or their contact details were not reachable. As our analysis involves only simple averages, we feel that the present sample of 49 institutions is representative of the population. The key questions in the questionnaire are analyzed below.

### **6.1 Forms of technology used**

As a first step, we looked at the branch office and the head office for technology use and assimilation in an MFI. The results are presented in Table 1.

**Table 1: Forms of Technology Used in MFIs in Tamil Nadu (in percentage)**

| <b>Forms of Technology</b>                      | <b>Branch Office</b> | <b>Head Office</b> |
|---|----------------------|--------------------|
| <b>Manual system</b>                            | 88%                  |                    |
| <b>Standalone computer</b>                      | -                    | 100%               |
| <b>Network connection</b>                       | -                    | 82%                |
| <b>Custom-built software/mobile application</b> | 12%                  | 53%                |

We found that in most MFIs (88%), manual systems were prevalent at the branch level while they were 100% computerized at the head office level. This is in line with the analysis presented by Kline and Sadhu (2011), who were interested in understanding the ICT usage of MFIs in India. In terms of the level of technology usage, we found that only 82% of the MFIs had network connection in their head office; 53% of them went for custom-built software applications or mobile-based applications. The touch point with the client is at the branch, but very little importance is given to upgrading technology at the branch level.

## **6.2 Technology status vs. legal standing of MFIs**

The matrix division of technology vs. legal structure presented in Table 2 gave a more holistic picture of the form of technology used by various kinds of MFIs compared to the previous section.

**Table 2: Forms of Technology vs. Legal Status of MFIs (in percentage)**

| <b>Legal Status</b>                 | <b>Manual system</b> | <b>Standalone computer</b> | <b>Network connection</b> | <b>Custom-built software/mobile application</b> |
|-------------------------------------|----------------------|----------------------------|---------------------------|---|
| <b>Tier 2: NBFC</b>                 | 25%                  | 75%                        | 58%                       | 42%   |
| <b>Tier 3: Section 25</b>           | 75%                  | 25%                        | 25%                       | 25%   |
| <b>Tier 4: Societies and Trusts</b> | 95%                  | 5%                         | 5%                        | 5%  |

At present, there are no Tier 1 institutions in India. Not surprisingly, the Tier 2 MFIs were the most technology savvy with both network connection as well as custom-built software. However, about 25% of them were still using a manual system and 75% of them were using standalone computers; 58% of them had network connection and 42% had custom-built software. Many of the Tier 2 MFIs used custom-built mobile software in their field officers' mobiles for several purposes. The assimilation of technology was the least in societies and trusts, which usually had only one office; almost all their transactions were manual.

In terms of sheer number and the spread in geography of institutions, Tier 4 institutions outnumber Tier 2; without doubt, technology absorption can help reduce their transaction costs. Why they have not assimilated the same despite its wide availability is a pertinent question in this context.

### 6.3 Technology understanding of MFIs

We wanted to understand from the MFIs reasons why they used technology. Our findings are summarized in Table 3.

**Table 3: MFIs' Understanding of Technology Use**

| <b>Major Benefit</b>                 | <b>Percentage</b> |
|--------------------------------------|-------------------|
| <b>Accuracy</b>                      | 88%               |
| <b>Greater outreach</b>              | 29%               |
| <b>Day-to-day transaction record</b> | 82%               |
| <b>Efficiency/Operation cost</b>     | 73%               |

The utility of technology seemed to be highest for its accuracy and for maintaining records of day-to-day transactions. On rechecking our records (about MFIs), we found that there seemed to be a link among the size of the operation, costs, and technology use. The greater the size of the operation (in terms of the MFI's portfolio size, branches, and so on), the greater the sophistication in technology, and the greater the need for accuracy of data (88%). Additionally, the need for technology to maintain accurate transactions on a daily basis was also greater (82%).

Surprisingly, outreach (29%) was the least important as a technology need among MFIs. Hence, technology seems more like an enabler for data accuracy than for reaching out to clients.

#### 6.4 Constraints faced by MFIs

Table 4 summarizes our findings related to the constraints faced by MFIs in adopting technology.

**Table 4: Constraints Faced by MFIs**

| <b>Major Constraint</b>       | <b>Percentage</b> |
|-------------------------------|-------------------|
| <b>Cost</b>                   | 94%               |
| <b>Technical person</b>       | 59%               |
| <b>Electricity problem</b>    | 74%               |
| <b>Appropriate technology</b> | 74%               |
| <b>Awareness</b>              | 82%               |

The MFIs in TN reported cost as one of the biggest constraints in adopting technology (94%). This was not surprising, given that technology for them was just an enabler (as discussed in the previous section) and not the model for their core activity. Often, the MFIs were in no position to judge which technology was right for them. They found developing technology in-house to be very expensive. In addition, they were apprehensive about deciding which technology to buy or develop.

In order to meet the needs of smaller MF institutions, the Financial Inclusion Department of NABARD provides two types of fund, namely, the Financial Inclusion Fund (FIF) and the Financial Inclusion Technology Fund (FITF). The purposes of these two funds are:

1. Funding support for capacity building inputs to business facilitators and business correspondents (BCs);
2. Providing funding support for promoting, nurturing, and credit linking of self-help groups (SHGs);
3. Capacity building of the personnel of NABARD, banks, post offices, state government departments, MFIs, NGOs, local-level associations, members of SHGs/ joint liability groups, and so on;

4. Funding support for the setting up of Rural Credit Bureaus and the credit rating of rural customers;
5. Supporting initiatives of local level associations/federations;
6. Supporting pilot projects for the development of innovative products, processes, and prototypes for financial inclusion; and
7. Any other developmental and promotional interventions recommended by the Advisory Board for the FIF.

The FIF can be particularly useful for Tier 4 institutions—they can use the latest technology for their technology enhancement as well as from a client-centric point of view.

However, a major issue that most MFIs pointed out was power problems (shortage and fluctuation), which is a significant problem, particularly in interior and rural Tamil Nadu where there is no electricity for the major part of the day. How is an MFI expected to use technology, Internet, and so on without power? While investments in expensive equipment are increasing, frequent power cuts and fluctuations in power supply exacerbate the problem and make the MFI want to move back to the old system.

## **6.5 Appropriate technology for financial inclusion**

The one technology that seems to have permeated to most MFI clients and field officers in TN is the mobile phone. Hence, we believe that the mobile can be tapped for financial inclusion.

1. **MFI's Perspective:** The MFIs felt that they could do away with manual systems in the field offices by using custom-built software in the field officers' mobiles. This helped in improving efficiency and accuracy and was less time consuming. Mobile phones are easy to carry around and the data could be easily fed back into the computers on the officers' return to their branches as compared to the cumbersome manual way of entering the data into books/ledgers. Additionally, this ensures instant transmission of data from the field to the head office. Several MFIs have either developed their own software on the mobile for this purpose or outsourced it from technology companies and found it efficient.

Tier 3 institutions are the only institutions that seem to be upgrading their system. Many

Tier 4 institutions still used manual systems. On deeper probing into why the simple mobile technology was not tapped into by Tier 4 institutions, we realized that it had more to do with an end-to-end solution. Capturing data from the client on to the mobile by field officers, transferring the same into the computer in the office, using this information and sending appropriated SMS to clients by the MFI all required a complete technological solution, which most MFIs were not ready for.

2. **Client's perspective:** Today, most rural clients already receive SMS from government departments—a few free and others paid—which they find useful. Most of these are related to agriculture. Additionally, the Indian Farmers Fertilizer Cooperative (IFFCO) along with Kisan Sanchar Limited provides green SIM cards to farmers in Tamil Nadu (and in other states). Through this, many women who are part of SHG groups receive five free voice-based SMS regarding farming/animal husbandry. Many of them are connected to the Spices Board of Tamil Nadu as well. The Spices Board is trying to do away with intermediaries. This shows the power of the mobile. In a similar manner, the MFIs could use voice-based SMS to connect with their clients in a number of ways. The MFIs can communicate details of transactions, reminder of payments, balance, and so on to the clients. This would give them greater comfort in managing their finances and involves little or no cost to the MFI as the clients already possess their own mobiles.

Regulation in India does not permit money transfer services through the mobile unlike in countries such as Kenya and Ghana, where financial inclusion has been successful. However, transferring a small amount (INR 5000) is allowed by a Airtel ([www.airtel.com](http://www.airtel.com)) which is being used by some MFIs as an experiment with the hope of expanding to larger amounts in the future (whenever regulation permits).

## **6.6 Source of technology funding for MFIs**

Most MFIs do not have specific capital for technology funding. When the source of funds is a bank, the money has to be used only for loan purposes. However, when grants are received, they can apportion parts of it to upgrade technology. Most often, MFIs claim that they are confused about technology choices and are not guided about the same. With a plethora of choices available

in the market and given that technology is expensive and funds are in short supply, it is inevitable that MFIs will postpone the upgradation of their technology. When an MFI decides to choose a specific technology, they source Tier 2 capital, which is a loan given by some institutions. There are many microfinance institutions (MFIs) in the country that are potential enablers of access to finance to the poor. However, not many of them have been able to raise adequate funds. This could be due to multiple reasons—the structure of the MFIs may not be conducive to attracting growth capital, or the promoter may have exhausted his/her sources to provide equity and is unable to attract further funds, or it could be a combination of these factors.

As the promoter tries to bring in outside investors to expand equity capital, the dilution of stake is inevitable. This dilution at an early stage might lead to a situation where the MFI is forced to adopt a strategy that maximizes returns to investors, thereby possibly not enabling real access to finance. On the other hand, the absence of capital severely affects the growth of the MFIs, since limited equity caps the leverage potential of the MFI. The IFMR Mezzanine Finance (IFMR MF) is an institution that believes enabling access to finance for small and medium microfinance institutions (MFIs) would allow a large number of individuals (who are currently excluded from this access) to benefit from it. IFMR MF aims to achieve this by providing long-term loans to MFIs to serve as growth capital in lieu of equity.

The objective of IFMR MF is to enable deserving MFIs to gain access to long-term funds without having to dilute their stake. It provides innovative debt funding through mezzanine products that help MFIs overcome some of the issues imposed by traditional debt funding. This innovative structuring allows the debt to be classified as Tier 2 capital. IFMR MF looks to work with MFIs operating under different legal structures, including trusts, societies, Section 25 companies, and NBFCs. Based on the needs of the MFIs and based on its evaluations of such needs, IFMR MF recommends different product structures.

The funds from IFMR MF can be used to build systems and strengthen the organization, to leverage with banks, and to meet regulatory norms.



## **6.7 Financial literacy and the BC model**

Most MFIs seem to be involved in corporate social responsibility (CSR) activities such as healthcare, educational, eye care, and heart check-up activities. However, specific financial literacy programs seem rare, except in a very few cases when MFIs handhold their clients into understanding their lifecycle needs. Often, CSR seems to be a cloak for a company—mandatory as per regulatory requirements but not necessarily bringing about the needed change. It looks like a one-off activity conducted in a village. An MFI's core activity is to enable access to financial services for low-income households and to monitor how they actively use these services. For this, financial literacy is a must. As per the regulation, MFIs cannot offer savings products; this led to the idea of the business correspondent (BC) model to tap into the segment of low-income clients using the No-Frills Accounts (NFAs) of banks. The NFAs by definition seem contradictory to the idea of financial inclusion since they offer no advantages to the saver and hence, there would be no urgency for the client to use this account. Unless the account offers any incentive, it is unlikely that the intended end user, namely, the low-income clients, will use the same on a regular basis.

Allowing MFIs to play the role of BCs seems to be a very good idea as they have the last mile connectivity with the client. Without doubt, MFIs understand the needs and the products that the low-income clients require. They are in a position to bring about the needed change through the mobile phone and through financial literacy programs, as several studies have shown that the poor do save. However, one of the stumbling blocks for the BC model in India is that MFIs have not been properly incentivized and motivated to bring about the change as was done in other developing countries like Brazil (Ujjawal et al., 2012).

## **6.8 Technology and the securities market**

The ubiquitous technology already in the hand of the client that can bring about financial inclusion in India without doubt seems to be the mobile. However, the assimilation of technology in most MFIs is slow and is related to the size and scale of operations. As discussed earlier, when an MFI has the Tier 2 legal structure, it often does think in terms of operations in larger

geographies; hence, its focus is on buying the best technology for bringing about efficiency of operation and not necessarily for financial inclusion. Once an MFI taps technology for all its purposes, it will move up the value chain and will think of tapping the securities market—maybe the bond market as the first step, and then the securities market or the equity market.

The money market mutual fund ( MMMF) is a savings product that can be very useful to the rural clients if mutual fund companies are able to develop it. This product is useful because most of the rural poor save down, not save up (Rutherford, 1999), and often save in gold. The MMMF can protect their principal, give a decent return, and provide the necessary liquidity. IFMR Holdings floated one such product with a great deal of success (Kumar and Chaudhary, 2009). The role of the securities market in connecting with the financially excluded segment of population through the right technology is critical to the encouragement and development of products in this area. Further research in this area and piloting products with a real-time terminal could build confidence for scaling up various MMMF products to the financially excluded depending on their needs.

Box 1 illustrates the case study of Equitas, an MFI headquartered at Chennai, where technology has been used to scale up its level of operation. Core banking, cloud computing, and the power of the mobile have been tapped seamlessly to integrate and comply with regulations. Product differentiation was another unique feature of their institution.

### Box 1: Equitas Micro Finance India Ltd.

Equitas Micro Finance India Ltd. was started in December 2007 with the goal of providing finance at a reasonable cost to women engaged in microenterprise activities under the Grameen banking model. Equitas is an NBFC and is registered under the Reserve Bank of India (RBI) as a loan company. Several distinctions that separate Equitas from other MFIs following the Grameen lending method include the allowance of fortnightly repayment collection (vs. weekly for most MFIs) and its promise to quickly disburse loans in 14 days from the day membership applications are collected (**product distinction**). Equitas Micro Finance contributes 5% of its profit to the Equitas Development Initiatives Trust, which provides free medical camps, tuition centres, and various training activities for skill building.

The key features of the Equitas MFI are transparency, fairness, and scalability.

- **Transparency and fairness:** Equitas emphasizes taking a clear stand of communicating the all-inclusive internal rate of return (IRR) interest rate by printing it on each member's passbook. It is the only MFI that informs its clients about the commission it earns from the insurance premium that the clients pay for their insurance. Equitas is very fair in all its transactions with its clients, investors, employees, and other stakeholders. Equitas deploys stylized stickers that are patented and delivers benefits through hand-held devices at very low costs.
- **Scalability:** The Equitas strategy is to operate a centralized back office. The company also positions itself as a technology leader, bringing the operational efficiencies of retail banking to the MFI sector to improve productivity and reduce cost to the customer. The company's branches are purely selling points for signing up members, disbursing loans, and collecting payments at centers. The branch managers, who are Equitas employees working in the field, can concentrate entirely on looking after members and their economic growth. The centralized back office takes care of all administration and cash is secured on a daily basis by a subcontractor.

With the core banking system, the Equitas head office has been able to automate most processes, cutting out most user intervention. Processes can, therefore, be scaled up without extra manpower. When a loan is taken, the loan form is filled out at the branch and the forms are couriered to Chennai for processing via automatic scanning and optical mark reading, followed by manual data entry of about 20% of the form. Branch managers and collection officers record the collections of cash payments towards outstanding loans and other information about meetings such as attendance levels, and send the data from their mobiles to Chennai via SMS. The Chennai office sends out reports to the branch managers, including information about payments due, and so on. It also uses the data received from branch managers to direct couriers to pick up and drop off cash at the branches at the beginning and end of each day.

With its rapid growth, Equitas has established simple and highly effective systems to track three parameters on a real-time basis: number of members who attend the center meeting, amount of money they have repaid, and time at which the meeting ended. Equitas is the only company to have such a system that helps all the people involved to closely track these critical parameters on a real-time basis. All this is possible thanks to cloud technology, and did not require investment into servers.

**Regulatory hurdles:** As far as the regulatory issues are concerned, NBFC-MFIs are prohibited from collecting deposits from the members. NBFC-MFIs are also not allowed to act as business correspondents (BCs) for banks. Therefore, Equitas lacks the facilities to provide real savings accounts for the poor. According to Equitas, this can be only overcome by allowing MFIs to operate as a mini-bank and offer basic banking services. As per the suggestion of the Raghuram Rajan Committee, Equitas looks forward to the government permitting NBFC-MFIs to function as small finance banks, so that MFIs can accept deposits from its members. Equitas believes that this model of turning NBFC-MFIs into small finance banks will help millions of financially excluded households to save money on a regular basis.

**Source:** Temenos (2011)

<http://www.nabard.org/departments/pdf/seminar/equitas%20micro%20finance%20india%20p%20Ltd.pdf>

## **7. Conclusion**

The legal structure of an MF institution was correlated to the level of technology assimilation in the institution. Tier 2 MFIs had the highest level of technology, which they used more for efficiency or scalability. They are systemically important and find it very important to track operations. In some sense, we can say that by replicating their model in different geographies, they are trying to bring about financial inclusion. They are also the ones tapping the securities market; with the passage of the MFI Bill, they will be in a position to offer saving products as well.

The Tier 3 institutions are also using some level of technology at the head office level as well as the field officers' level. They still feel confused about upgrading technology and are unaware about the availability of Tier 2 capital that can be used for technology upgradation. All in all, they are in a dilemma regarding the returns on technology investment. We could possibly see a wave of mergers and acquisitions over the next few years, since MFIs are trying to capture new geographies.

To get Tier 4 MFIs to think about technology seems a daunting task, as they find it unviable and do not see its immediate benefits. Many of these institutions are involved in several community development activities. They are very local and important (as they are many and widely spread), but are sometimes skewed in their outlook (as they take up activities in line with the present political bias). Additionally, in Tamil Nadu, all of them face massive power problems and hence, there is confusion regarding the adoption of technology.

Whatever be the legal structure these institutions follow, they are so widely spread that they seem the best connected to the clients to understand their needs both in terms of financial services as well as non-financial services. To make them the business correspondent and to incentivize them through the mobile technology would be the first steps towards financial inclusion for the poor and towards getting these MFIs to enter the securities market. The major question that then arises is: how best can we incentivize them? This could be the focus of future research in this area.

## References

1. Amin, N., 2007. *Enabling the Expansion of Microfinance using Information and Communication Technologies*. IGI Publishing.
2. Balasubramanian, G., Subramanian R., and Kumar L., (Forthcoming) Microfinance Products and the role of securities markets, *NSE-IFMR Research Paper*.
3. Beatriz, Armendáriz de Aghion and Jonathan Morduch (2005): *The Economics of Microfinance*, MIT Press.
4. Biswas, N., 2010. Biometric ATM: Boon to Indian Rural Bank Customers. *Southern Economist*. ISSN 0034 –4046, 48(14).
5. Brynjolfsson, E., and Hitt, L. M., 2000. Beyond Computation: Information, Technology, Organizational Transformation and Business Performance. *Journal of Economic Perspectives*, 14(4): 23–48.
6. CGAP, 2006, Using Technology to Build Inclusive Financial Systems. *Focus Note 32*, CGAP, January 2006.
7. Chakraborty, K. C., 2009. Technology, Financial Inclusion and the Role of Urban Cooperative Banks, RBI.
8. Champian, A., and Halpern, S., 2001. Automating Microfinance. *The Microfinance Network, Occasional Paper No.5*.
9. Das, P. K., 2010. The Up-Scaling of Technology to Build Inclusive Financial Systems in India. *Journal of Education Administration and Policy Studies*, 2(5): 67–70.
10. Equity Bank Group Annual Report, 2010.
11. FICCI, 2011. “Promoting Financial Inclusion: Can the constraints of political economy be overcome? <http://www.undp.org/content/india/en/home/library/poverty/promoting-financial-inclusion---can-the-constraints-of-political>.
12. Gangopadhyay, S., 2009. How Can Technology Facilitate Financial Inclusion in India? A Discussion Paper. *Review of Market Integration*, 1(2): 223–256.

13. Geach, N., 2007. The Digital Divide, Financial Exclusion and Mobile Phone Technology: Two problems, one solution? *Journal of International Trade Law and Policy*, 6(1): 21–29.
14. Ghosh, A., 2007. Financial Inclusion through Micro Finance in India and Emerging Role of POSB: An Analysis. [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1655737](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1655737).
15. Global Envision, 2003. Lessons from the Field: ICTs in Microfinance. <http://www.microfinancegateway.org/p/site/m/template.rc/1.26.6078/>.
16. Hernandez, R., and Mugica, Y., 2003. What Works: Prodem FFP’s Multilingual Smart ATMs for microfinance, innovative Solutions for delivering financial services to rural Bolivia. [http://pdf.wri.org/dd\\_prodem.pdf](http://pdf.wri.org/dd_prodem.pdf) .
17. Hishigsuren, G., 2006. Information and Communication Technology and Microfinance: Options for Mongolia, *ADB Institute Discussion Paper No. 42*.
18. Hughes, N., and Lonie S., 2007. M-PESA: Mobile Money for the “Unbanked” Turning Cellphones into 24-Hour Tellers in Kenya. *Innovations: Technology, Governance, Globalization*, 2(1-2): 63–81.
19. Kinyanjui, K., 2009. M-Pesa goes Global in Battle for Mobile Cash Transfer Pie. <http://allafrica.com/stories/200910121448.html>.
20. Kline, K., and Sadhu, S., 2011. Microfinance Management Information System. *Centre for Microfinance Working Paper*.
21. Kumar, A., and Chaudhary, C., 2009. Access to Micro-Savings for remote rural India. *IFMR Trust Technical Paper*. <http://foundation.ifmr.co.in/wp-content/uploads/2010/12/MMMF-technical-Note.pdf> .
22. Mas, I., and Morawczynski, O., 2009. Designing Mobile Money Services: Lessons from M-PESA. *Innovations: Technology, Governance, Globalization*, 4(2): 77–91.
23. Mathison, S., (Ed), 2005. Electronic Banking with the Poor: Increasing the outreach and sustainability of microfinance through ICT innovation. *The Foundation for Development Cooperation*. <http://www.microfinancegateway.org/gm/document-1.9.26128/11.pdf> .

24. Medhi, I., Ratan, A., and Toyama, K., 2009. Mobile Banking Adoption and Usage by Low-Literate, Low Income Users in the developing World. *Internationalization, Design and Global Development Lecture Notes in Computer Science*, Volume 5623/2009: 485-494.
25. Meehan, J., 2004. Tapping the Financial Markets for Microfinance: Grameen Foundation USA's Promotion of this Emerging Trend. *Grameen Foundation Working Paper Series*.
26. Mendes, S., and Alampay, E., 2007. The innovative use of mobile applications in the Philippines: Lessons for Africa. *Sida Publications, Sida*.
27. Morawczynski, O., 2008. Surviving in the 'dual system: How M-Pesa is Fostering Urban to Rural Remittances in a Kenyan Slum. *HCC8*, Pretoria, South Africa.
28. Morawczynski, O., 2009. Examining the Usage and Impact of Transformational M-Banking in Kenya. *Internationalization, Design and Global Development*. N. Aykin (Ed), Springer Berlin/Heidelberg. 5623: 495-504.
29. Morawczynski, O., and Pickens, M., 2009. Poor People Using Mobile Financial Services: Observations on Customer Usage and Impact from M-Pesa. *CGAP Brief*.
30. NABARD, 2009. Financial Inclusion: An overview. *Occasional Paper 48*.
31. Parikh, T., 2006. Rural Microfinance Service Delivery: Gaps, Inefficiencies and Emergingsolutions.<http://www.microfinancegateway.org/p/site/m/template.rc/1.9.27986/>.
32. Perspective, 2010. Achieving Financial Inclusion by Leveraging Mobile Technology". <http://www.infosys.com/finacle/solutions/thought-papers/Documents/Achieving-financial-inclusion-leveraging-mobile.pdf>.
33. Rangarajan Committee, 2008. *Report of the Committee on Financial Inclusion*. Government of India.
34. Ravichandran, K., and Alkhathlan, K., 2009. Financial Inclusion: A Path towards India's Future Economic Growth. [http://faculty.ksu.edu.sa/alkhathlan/Documents/SSRN-id1353125\[1\].pdf](http://faculty.ksu.edu.sa/alkhathlan/Documents/SSRN-id1353125[1].pdf).
35. Reddy, A., 2010. Rural Banking Strategies for Inclusive Growth. [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1532226](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1532226).

36. Rogers, A., 2007. Extending the Reach of Financial Services. *ICT Update: A Current Awareness Bulletin for ACP Agriculture*, Issue No. 36.
37. Rutherford, S., 1999. Savings and the Poor: The methods, use and impact of savings by the poor of East Africa. *MicroSave Research Paper*.  
[http://www.microsave.org/sites/default/files/research\\_papers/Savings%20and%20the%20Poor%20in%20East%20Africa%20-%20Rutherford%20et%20al.pdf](http://www.microsave.org/sites/default/files/research_papers/Savings%20and%20the%20Poor%20in%20East%20Africa%20-%20Rutherford%20et%20al.pdf).
38. Sangwan, S. S., 2007. Financial Inclusion and Self Help Group.  
<http://www.nabard.org/databank/IARD%20Web/csidfiles/Financial%20Inclusion%20and%20SHGs.pdf>.
39. Ssewanyana, J. K., 2008. The Role of Free and Open Source Software in the Microfinance Sector in Uganda, *IST-Africa 2008 Conference Proceedings*.  
<http://www.ist-africa.org/conference2008>.
40. Temenos(2011)<http://www.nabard.org/departments/pdf/seminar/equitas%20micro%20finance%20india%20p%20ltd.pdf>.
41. Thorat, U., 2007. Financial Inclusion and Information Technology.  
<http://www.bis.org/review/r080917d.pdf>.
42. Turaga, J., 2004. Opportunities and Challenges in India Kuch Apru Sock aur Kuch Jugaad”: Crafting the MFI/IT Paradigm – The Indian Experience.
43. Ujjawal, A., Champatiray, A. K., Sadhu, S., and Mendiratta, T., 2012. Business Correspondent Model: An Analysis of the Financial Viability of Customer Service Providers and Client Satisfaction. *CMF-IFMR Working Paper*.
44. Wishart, N., 2006. Micro-payment Systems and their Application to Mobile Networks: Examples of mobile enabled services in the Philippines. *Infodev publications*, IDRC.
45. World Bank Policy Research Report, 2008, Finance for All: Policies and Pitfalls in Expanding Access, Washington, DC.



## Appendix 1

### Questionnaire - Technology, FI & Securities Market

#### 1. Profile of the institution

- Name :
- Contact details :
- Legal status :
- Area of operation (rural or urban) :
- % Rural & % Urban :
- Year and place of inception :
- Eligibility (age/income/education) :
- Gender of your client :
- Head office :
- Number of clients :
- Number of branches :
- Number of states :
- In TN how many districts
- Have they offered savings? :

#### 2. Technology, Financial Inclusion and Securities Market

2.1 Has your institution adopted any of the following technologies?

- a) Standalone computers
- b) Networked computers
- c) Portable computers
- d) Mobile phones
- e) PDAs
- f) Others

2.2 Do you have cloud computing facility?

- a) Yes b) No

2.3 If yes, please explain the process?

2.4 How do you maintain records of transactions?

- a) Manual system/not computerized

- b) Spreadsheet/computer
- c) Custom-built software
- d) Others

2.5 What kind of network communication do you have?

- a) LAN
- b) Wireless LAN
- c) Wireless services to mobile device
- d) High-speed Internet
- e) Broadband Internet
- f) Dialup Internet
- g) Mobile phone coverage
- h) Landline connection
- i) Others
- j) None

2.6 What is your source for technology funding? What is its cost?

2.7 What technologies do you provide to the clients for cash transactions?

- a) Smart Card and PoS
- b) Facility through Internet
- c) Facility through mobile phones
- d) Facility through biometric cards
- e) Others
- f) None

2.8 Do your clients have individual bank accounts? If yes, what are the technologies that you provide to the clients for different products?

| <b>Technology</b> | <b>Deposit</b> | <b>Insurance</b> | <b>Remittance</b> | <b>Pension</b> | <b>Investment</b> |
|-------------------|----------------|------------------|-------------------|----------------|-------------------|
| Mobile phone      |                |                  |                   |                |                   |
| Network           |                |                  |                   |                |                   |
| Agent-based       |                |                  |                   |                |                   |
| Others            |                |                  |                   |                |                   |

2.9 Why do you want to use technology?

- a) Reduce cost and increase operational efficiency
- b) Compete with other institutions in the market
- c) Attract new clients
- d) Expand geographical outreach and reach underserved areas
- e) Others

2.10 Which technology do you think is most suitable for financial inclusion? Why?

2.11 Do you provide any financial literacy programs to your clients? Yes/No. If yes, explain why?

2.12 What percentage of your clients have mobile phones? \_\_\_\_\_%

2.13 Name the services you send by SMS.

2.14 What is the percentage/number of your customers who have biometric ATM cards? \_\_\_\_

2.15 How can FI be widened to cover the unbanked segments of society?

- a) BC through smart cards
- b) Popularizing no-frills accounts
- c) Banking education in rural areas
- d) Rural branch network

2.16 Are you a BC? If yes, explain your model.

2.17 What do you think are the main constraints in broadening the use of technology in your institution?

\*\*\*\*\*

## Appendix 2

### List of Institutions Related to MF Activities in TN that were studied

| Sl. No. | List of Institutions   | Status             |
|---------|--|--------------------|
| 1       | Arasan Rural Development Society (ARDS)                                  | Society            |
| 2       | Asirvad  | NBFC               |
| 3       | Association for Rural Community Development (ARCOD)                      | Society            |
| 4       | Activist for Social Alternatives (ASA)                                   | Trust              |
| 5       | Bullock-cart Workers Development Association (BWDA)                      | Society            |
| 6       | BWDA Finance Limited (BFL)   | NBFC               |
| 7       | Community Action for Rural Development (CARD)                            | Society            |
| 8       | Community Development Centre   | Trust              |
| 9       | Community Service Trust  | Society            |
| 10      | Ecumenical Church Loan Fund of India (ECLOF)                             | Section 25 Company |
| 11      | Equitas Microfinance India Private Limited                               | NBFC               |
| 12      | Guidance Society for Labour Orphans & Women (GLOW)                       | Society            |
| 13      | Grama Vidiyal Microfinance Limited (GVML)                                | NBFC               |
| 14      | Growing Opportunity Finance  | NBFC               |
| 15      | Hand in Hand   | Trust              |
| 16      | Impact (World Vision)  | Section 25 Company |
| 17      | Indian Association for Saving & Credit (IASC)                            | Section 25 Company |
| 18      | Integrated Village Development Project (IVDP)                            | Society            |
| 19      | Kalanjiam Development Financial Services (KDFS)                          | Section 25 Company |
| 20      | Karayan Hills ADP (KHADP)  | Society            |
| 21      | League for Education & Development (LEAD)                                | Society            |
| 22      | Madura Microfinance Limited  | NBFC               |
| 23      | Mahalir Association for Literacy, Awareness and Rights (MALAR)           | Society            |
| 24      | Mahasemam Trust  | Trust              |
| 25      | Micro-finance Consulting Group (MCG)                                     | NBFC               |
| 26      | Manidham Grameen Savings & Credit Services (MGSCS)                       | Section 25 Company |
| 27      | Nanayasarabhi Development Financial Services (NDFS)                      | Society            |
| 28      | NEW LIFE   | Society            |
| 29      | The Society for Development of Human Abilities and Environment (OAZOANE) | Society            |
| 30      | Omalar Block Women Welfare Uplift Organisation (OBWWUO)                  | Trust              |
| 31      | Pioneer Trad   | Society            |
| 32      | PREPARE  | Society            |
| 33      | People's Action for Transformation                                       | Trust              |
| 34      | People's Action for Development and Credit Union (PADACU)                | Trust              |
| 35      | People's Voluntary Integral Service Organization                         | Section 25 Company |
| 36      | Pudhuaaru Khasthriya Gramin Financial Services                           | NBFC               |

|    |  |                    |
|----|--|--------------------|
| 37 | Rural Education & Action Development (READ)                              | Society            |
| 38 | Rural Organization For Action and Development (ROAD)                     | Trust              |
| 39 | SEARCH-KOPSA   | Section 25 Company |
| 40 | Sarvodaya Nano Finance Ltd (SNF)   | NBFC               |
| 41 | Senam Micro Finance Investment Literacy & Empowerment Ltd. (SMILE)       | NBFC               |
| 42 | Serva Jana Seva Kosh Ltd. (SJSK)   | NBFC               |
| 43 | Sangamam Women's Multipurpose Thrift and Credit Co-operative Society Ltd | Society            |
| 44 | Shalom Trust   | NBFC               |
| 45 | Suryodaya  | NBFC               |
| 46 | Thirumalai Charity Trust (TCT)   | Trust              |
| 47 | Welfare Organization for Multipurpose Mass Awareness Network (WOMAN)     | Society            |
| 48 | Working Women's Forum (WWF)  | Society            |

## **About Institute for Financial Management and Research**

The Institute for Financial Management and Research (IFMR), Chennai, is one of India's most prestigious business schools and academic institutions. Established in 1970, it has been recognized as an Institution of National Importance by the Ministry of Finance. Since its inception, IFMR's mission has been to contribute to the growth and development efforts in India with an emphasis on finance and research. The IFMR also has several key partnerships with some of the leading academic institutions worldwide and offers a stimulating and world-class environment to faculty and students alike.

## **About National Stock Exchange of India**

The National Stock Exchange (NSE) is India's leading stock exchange covering various cities and towns across the country. The NSE was set up by leading institutions to provide a modern, fully-automated, screen-based trading system with national reach. The Exchange has brought about unparalleled transparency, speed and efficiency, safety, and market integrity. It has set up facilities that serve as a model for the securities industry in terms of systems, practices, and procedures. The NSE has played a catalytic role in reforming the Indian securities market in terms of microstructure, market practices, and trading volumes. The market today uses state-of-the-art information technology to provide an efficient and transparent trading, clearing, and settlement mechanism, and has witnessed several innovations in products and services, namely, the demutualization of stock exchange governance, the use of screen-based trading, the compression of settlement cycles, the dematerialization and electronic transfer of securities, securities lending and borrowing, the professionalization of trading members, the use of fine-tuned risk management systems, the emergence of clearing corporations to assume counterparty risks, the marketing of debt and derivative instruments, and the intensive use of information technology.