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Information and communication technology and microfinance: Options for Mongolia

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ADB Institute Discussion Paper No. 42

Information and Communication Technology and Microfinance: Options for Mongolia

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Gaamaa Hishigsuren is Director of Research, Institute for Development, Evaluation, Assistance and Solutions. This paper was written when the author was a Visiting Researcher at ADBI. The author wishes to express special thanks to the staff of XacBank, who provided support during a short field visit.

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Introduction

The Millennium Development Goals call for reducing the proportion of people living on less than \$1 a day to half the 1990 level by 2015 i.e. from 28.3 percent of all people in low and middle income economies to 14.2 percent (World Bank, 2003). Yet, there are still an estimated 1,000 million people living on less than \$1 a day. One way of making progress in achieving the poverty reduction goal is by providing financial services to the poor. As Jonathon Morduch, the Chair of United Nations Expert Group on Poverty Statistics, stated, "Microfinance stands as one of the most promising and cost-effective tools in the fight against global poverty" (Daley-Harris, 2005). Furthermore, in their article, "*Is Microfinance an Effective Strategy to Reach the Millennium Development Goals?*" Littlefield, Murdoch & Hashemi (2003) conclude that microfinance services reduce poverty and its effects in multiple ways. Access to financial services forms a fundamental basis on which many of the other essential interventions depend. Moreover, improvements in health care, nutritional advice and education can be sustained only when households have increased earnings and greater control over financial resources (Littlefield, Murdoch & Hashemi, 2003). As of December 31, 2004, 3,164 microcredit institutions have reported reaching 92,270,289 clients, 66,614,871 of whom were among the poorest when they took their first loan (Daley-Harris, 2005). Assuming five persons per family, the 66.6 million poorest clients reached by the end of 2004 affected some 333 million family members.

Despite this success, about half a billion poor households remain without access (Ivatury, 2005). The gap is even larger in rural areas. One of the main factors that prevent microfinance institutions (MFIs) from going to rural areas is the large geographical spread, low population density and small volume of transactions, which makes it more costly to operate there. MFIs face a challenge to explore creative approaches to cut down cost while serving poor people, especially in remote rural areas. Because it is too costly to set up a physical branch, traditional bank branches, alone, do not seem to be the answer for reaching small rural depositors and borrowers (Hirschland, 2003). Alternative delivery systems need to be examined for their merits.

Recently, information and communication technologies (ICT) have emerged as a powerful tool to reduce operating costs, making it viable for financial institutions to expand into rural and low-income areas. ICT innovations such as a personal computer connected to the internet, a mobile phone, an automated teller machine (ATM) or a point-of-sale (POS) device located at a retail or postal outlet, may be less expensive to establish than branches located in rural areas and more convenient for customers (Ivatury, 2005). Unlike pure cash based transactions, ICT-based transactions can take place with less time or with no time required from a teller. Rather than hand over cash to a teller when making a deposit or loan repayment, a customer can give cash to a store clerk, swipe a debit card through a POS card reader, and input an identification number to authorize the transaction. The store's account at the financial institution would be debited by an amount equivalent to the cash deposit, and the customer's would be credited. Since the transaction is electronic, from the institution's perspective, it is less costly to process.

It is this possibility of ICT solutions for expanding the rural finance frontier that has stimulated this paper. The main objective is to review literature on the application of ICT solutions in microfinance and analyze the possible use of ICT solutions for expanding microfinance services to rural remote areas by looking at the challenges and issues in the case of Mongolia.

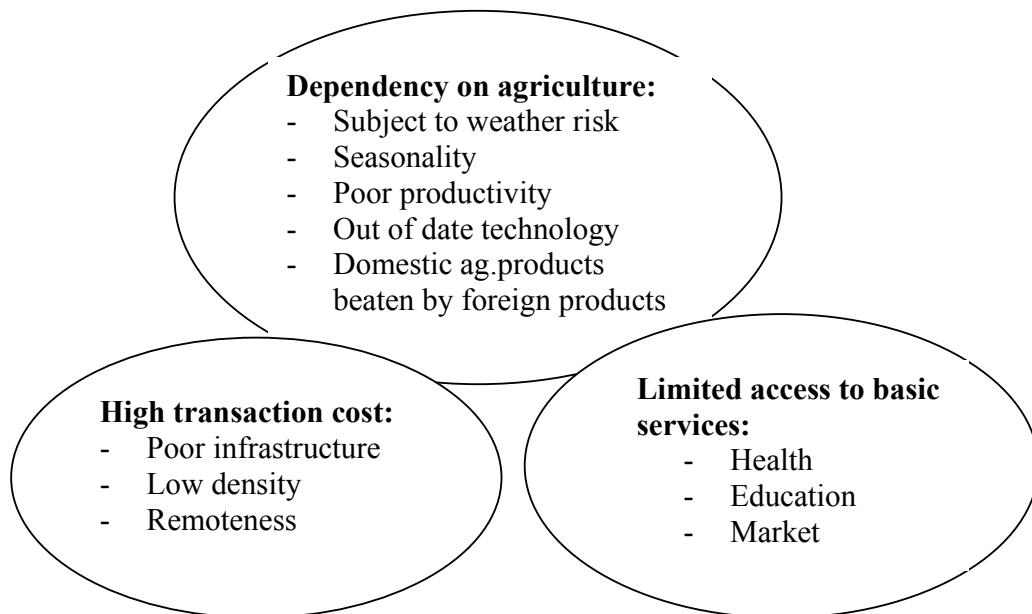
The data is drawn from an extensive literature review of both electronic and printed material. In addition, primary data was collected during a two-week fieldwork in Mongolia in September 2005. The main data collection method was an in-depth individual interview with key stakeholders, such as in the major financial institutions, internet service providers, private sector entities that supply ICT hardware, the government agency in charge of communication infrastructure, the Bank of Mongolia, and customers. In all cases, a snowball sampling technique was used.¹ In total, 25 individuals were interviewed (see Appendix 1 for the list of interviewees). The paper focuses on the case of XacBank, one of the leading microfinance institutions in Mongolia, for demonstrating feasible and appropriate applications of ICT in rural finance. In the last section, the paper summarizes the key challenges and issues for microfinance institutions, donors and governments to consider in applying ICT for expanding the rural finance frontier.

The literature indicates that ICT innovations have an exciting promise to improve the efficiency of microfinance operations and expand outreach by lowering transaction costs and bringing services closer to clients. However, many of the cases that used as examples of ICT application are either still in the pilot phase or are not really financial institutions whose main mission is to serve the poor and reduce poverty. The latter refers to cases of ICT application in mainstream financial institutions, which may not be necessarily serving the poor. The number of microfinance institutions that have gone beyond piloting ICT applications is still limited. They are primarily in countries which have economies of scale, a relatively developed financial services sector, and a more favorable communication infrastructure and regulatory environment. It is also found that it will be a while until MFIs will be able to fully utilize all the potential of ICT. It may be more realistic to take small steps in applying ICT in some functions of microfinance operations. For example, MFIs in many developing countries are not ready to make the full investment in complete ICT solutions. Rather, at least some of them may be able to invest in smaller-scale technology solutions that can result in concrete benefits worth the cost involved. This suggests the importance of detailed cost benefit analysis. There is no such analysis available to date. In the absence of a more rigorous cost benefit analysis, an examination of feasible ICT solutions based on a given context and institutional factors may be a good starting point. This paper presents an analysis of four possible ICT solutions in the case of Xacbank in Mongolia.

¹ Snowball sampling is a special non-probability method used when the desired sample characteristic is rare. It may be extremely difficult or cost prohibitive to locate respondents in these situations. Snowball sampling relies on referrals from initial subjects to generate additional subjects. While this technique can dramatically lower search costs, it comes at the expense of introducing bias because the technique itself reduces the likelihood that the sample will represent a good cross section of the population. See: <http://www.statpac.com/surveys/sampling.htm>

Challenges of rural finance

Despite the success of microfinance services in many countries, access to financial services in remote rural areas remains a challenge. The three main challenges that contribute to rural poverty are:



It has been repeatedly recognized that the majority of the people in rural areas depend on agriculture as a source of living. Agriculture is widely considered more risky economically than industry and trade. Weather, pests, disease and other natural calamities affect the yield of crops. Markets and prices are additional risks associated with agriculture. Many agricultural markets are imperfect, lacking information and communications infrastructure. Prices are also affected by the access to markets. Market and price risks can also be exacerbated by international market conditions and public policy decisions. For example, the creation or removal of tariff barriers in countries where goods are ultimately sold can dramatically change local prices, hence affecting rural farmers (Christen & Pearce, 2005). The precision of crop schedules generates a specific risk for agricultural finance. Loan disbursements need to be tailored to irregular cash flows, yet the timing of final crop income may vary, based on when farmers choose to sell. These characteristics require financial institutions to be efficient and physically close to their rural clients.

Yet, transaction costs are high and the volume of business in remote rural areas, where many poor people live, cannot support the cost of a bank branch. The problem is worsened by a low density of population and poor infrastructure in rural areas. From an institutional point of view, the main problems include:²

- Small size average farm size, low population density, higher loan servicing costs due to limited lending volume and high information costs

²For limitations from the customers' point of view, see Langenbucher, (2005).

- No branches or a limited branch network in rural areas
- Lack of collateral or adequate security among rural people
- Lack of technical knowledge at the bank level to evaluate and analyze the creditworthiness of rural customers
- Risk correlation when lending to farmers: all borrowers are affected by the same risk, such as low market prices and reduced yields due to the weather
- Underdeveloped communication and transportation infrastructure.

Furthermore, when exploring solutions for appropriate financial service delivery in rural areas, it must be noted that the transactions between various parties (banks, traders, input dealers and farmers/consumers) are predominantly cash based and are very low in value. The cost of cash based transactions is higher (as compared to electronic/non-cash based transactions) due to the following additional costs:

Cost of idle cash: Idle cash, lying either with the bank branch, a merchant or a consumer, does not earn any interest and the party holding it has to bear the cost of interest lost. Thus higher the idle cash, the higher the cost of interest lost.

Cost of cash handling infrastructure: This includes cost of branch set-up, cost of manpower and the cost of cash security. This cost increases with the decrease in value of transaction and the decrease in the denomination of currency transacted.

Geographical spread of customers: If the current structure of the bank branches were to be used to cater to the needs of the rural population, it would mean setting up a bank branch in virtually every village. The cost of such a large network would not justify the revenues generated from it, given the nature of the transactions. Thus, the challenge for banks is to develop a low-cost network/delivery channel with a high outreach and flexibility with respect to the timing of its operation.

It can be observed that the main constraint related to institutional design and delivery mechanisms that contributes to the absence of functioning rural financial markets and institutions is the high transaction and supervisory costs. There is a trade-off between minimizing loan default and supervisory costs, but the nature of rural lending, especially in agriculture, makes transaction costs and supervision costs disproportionately high relative to urban lending. The large geographical spread of customers, coupled with poor transportation and communication infrastructure, increases supervisory costs for financial institutions and compliance costs for customers. In addition, it is extremely difficult to attract qualified and trained loan officers to work in rural areas without much higher compensatory benefits.

In order to extend microfinance services in rural areas, technology solutions have to address these challenges. The following section will give an overview of ICT innovations that have emerged in microfinance.

Innovations of information and communication technology

There is an increasing recognition of ICT potential in contributing to income generation and poverty reduction. It enables people and enterprises to capture economic opportunities by increasing process efficiency, promoting participation in expanded economic networks and creating opportunities for employment. For example, online portals for are providing farmers with a variety of information including market prices, weather reports, and farming best-practices. They can also provide isolated communities with access to the latest health information and treatment and inform officials of rural public health issues.

Specifically in relation to microfinance the use of ICT began with the arrival of the Palm Pilot (or called, Personal Digital Assistant – PDA). These pocket computers allowed loan officers to fill out forms containing customer information and provide an initial indication of whether loan would be approved or not in the field, thereby automating the information gathering process (Silva, 2002). In a series of articles by Steve Whelan, for The Consultative Group to Assist the Poorest (CGAP), talks of the various technological devices that are currently being used around the world (Whelan, 2003). These articles highlight devices such as automated teller machines (ATMs), interactive voice response technology (IVRs), smart cards and personal digital assistants (PDAs). The series also has an article on how biometrics is used by MFIs in various parts of the world. These articles give the usage of these devices, their requirements and how they work, their costs and benefits, and who should use them.

Moreover, in recent years, with the coming of the digital age, there has been a growing awareness of the significance of information. MFIs have understood that poor information systems have an impact on every aspect of an institution's performance, from operational effectiveness to strategic management. As the scale of operations grows, MFIs feel the need for having an integrated and well developed information system to handle their portfolio and transactions. It is also necessary in taking appropriate policy decisions to provide efficient, effective, and transparent services to clients, while maintaining effective time management and increasing outreach. Gibbons and Meehan claim the use of a management information system (MIS) will improve efficiency and increase outreach (Gibson & Meehan, June 2000). Therefore, there is a need for the use of technology by the microfinance sector for both a greater outreach and efficiency at a lower cost to the people.

Below is the summary of most commonly used ICT applications in microfinance.³

Automated Teller Machines (ATMs) or Point of Sales (POS) devices– conduct many banking transactions that would otherwise require staff attention: they furnish account information, accept deposits, draw down on pre-approved loans and transfer funds. These are the main ICT applications in microfinance and we discuss them in more detail below

Interactive voice response (IVR) technology - refers to examples like using phones (either mobile or stationary phones) to check an account balance, make transfers, learn about products,

³ Discussion of information and communication technology, especially management information systems, in microfinance can be bewildering. This paper provides a brief description of various technologies. For more detailed descriptions, check at least the following three key websites that have compiled a collection of articles and publications to guide readers and provide more detailed descriptions of these technologies. They are: CGAP Technology Resource Center at www.cgap.org/technology/, Microfinance Gateway at www.microfinancegateway.org, and Microsave at www.microsave.org

and find the nearest branch location and its office hours. This saves time both for the clients and staff.

Internet banking –clients can make the same transactions as with phone banking (checking their account balance, making transfers, learning about products and finding the nearest branch location and its office hours) on the Internet.

Personal digital assistant (PDA) – can be used by loan officers to process loan applications by using the preset credit scoring model, to review a client's historical data, and to monitor loan performance by reviewing the list of borrowers and their loan repayment status. Virtually all client data and client visit records are stored electronically and are immediately available in this small device (like a palm pilot).

Management information system (MIS): - provides computerized data processing for management decision making; it is used primarily for portfolio management, accounting and financial performance management.⁴

Credit scoring – analyzes historical client data, identifies links between client characteristics and behavior; and assumes those links will persist to predict how clients will act. The technology can help a microfinance institution analyze how its clients have behaved in the past to make more reliable loan application decisions, devise more effective collection strategies, better target marketing efforts and increase client retention.

Complimentary devices:

Smart cards – can be used for financial services, such as managing savings accounts, disbursing loans, or making transfers. There are different forms of personal identification, such as biometric technology and fingerprinting. Smart cards function like an electronic passbook. There is also a lower cost card, which operates through a magnetic strip on the reverse side of the card. A smart card differs in that it operates through more expensive chips that can store information offline on the embedded chips. Both cards are used in conjunction with ATMs or POS.

Biometric technology – measures an individual's unique physical or behavioral characteristics, voice pattern and gait, to recognize and confirm identity. This is a supplementary technology used with ATMs or POS.

Each of these technologies can help microfinance operations in various functions, as illustrated in table1 (see also Reille & Ivatury, 2003)

⁴ There are comprehensive reviews of various software developed for management information system that are posted in Technology Resource Center of CGAP: <http://www.cgap.org/technology/>

Table 1:
ICT applications in microfinance operations

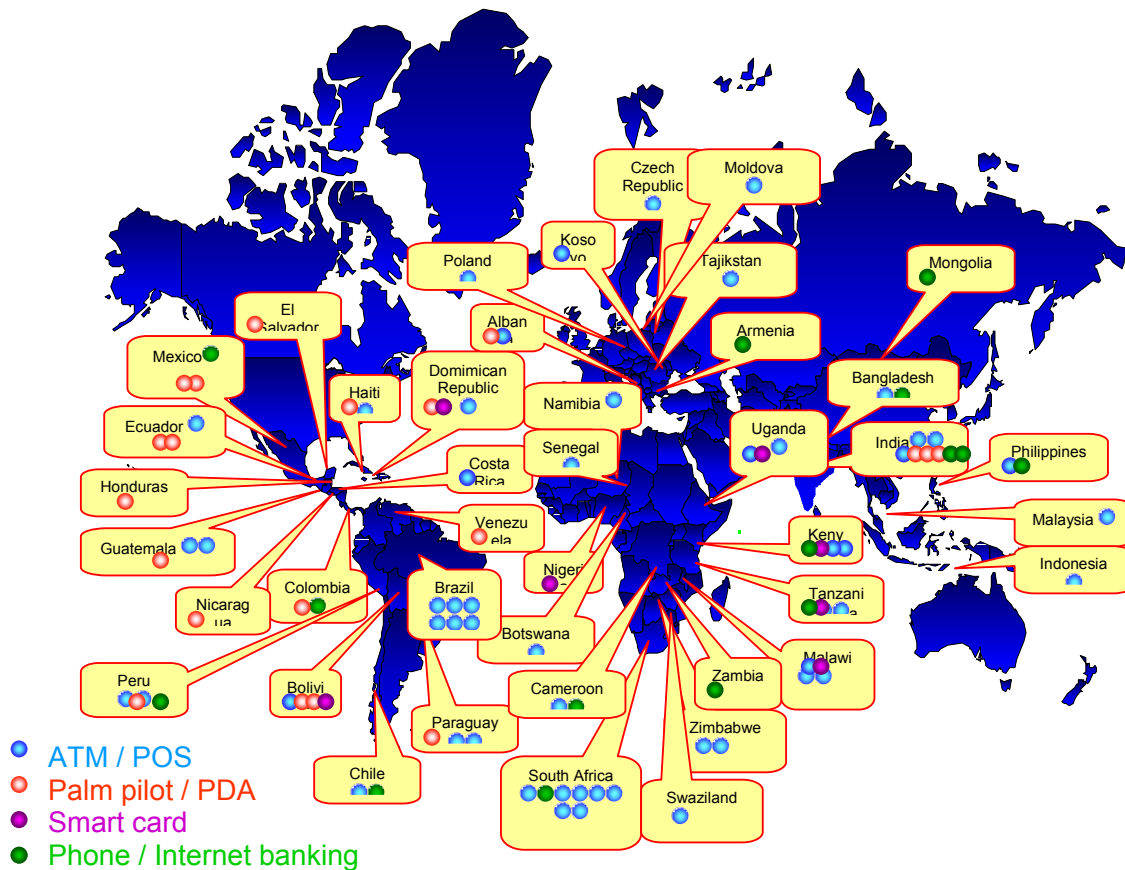
Functions	PDA/Palm Pilot	Cards (magnetic and smart cards)	Phone banking/Internet banking	ATM/POS	MIS	Credit scoring
Entering loan application data						
Recording payment transaction (e.g. passbook function)						
Disbursing cash						
Money transfer between accounts						
Taking deposits						
Checking account balance/other inquiries						
Managing loan portfolio/other financial analysis						
Credit risk assessment						

PDA/Palm Pilots are used for account opening and transactions, while phone banking and internet banking are primarily used in transactions. MIS and smart cards are of greater utility for the product development and marketing, account maintenance and risk management. On the other hand, ATMs and POS devices can be used in all aspects of operational chain, and hence are the most promising and comprehensive ICT solutions.

In terms of geographical spread of ICT applications in microfinance, Figure 2 demonstrates that there is still a very limited coverage.⁵ Clearly, the least innovations are applied in Asia, with the exception of India and the Philippines.

⁵ For a detailed list of ICT innovations in financial services, see Claessens, Glaessner and Klingebiel, (2001), Ivatury, (2005) and Waterfield, (2004). Note that some of these applications are implemented by commercial banks, hence not all users are necessarily all microfinance institutions serving poor people. Information on how many users are serving rural areas and how many of them reach poor people is not available.

Figure 2
Mapping of ICT applications in Microfinance



The main reasons that appear to influence the uptake of ICT applications in microfinance are:

- Direct and indirect cost of implementing ICT applications
- Policy and regulatory environment
- Infrastructure development (communications, connectivity, power, etc)
- Development stage of the financial sector, especially the microfinance sector
- Level of financial literacy (mentality towards using technology versus human interaction)
- Population density
- Language.

Dependent on these factors, ICT solutions have been applied mostly in countries that have a larger population density (such as India, Mexico and the Philippines), a more favorable regulatory and policy environment (such as South Africa and Brazil) and a more mature financial sector (such as South Africa). Cracknell (2004) reaffirms the importance of an enabling environment, that is well developed banking and retail sectors, a supportive central bank, good communications and a generally positive policy environment.

Figure 2 also demonstrates that there are many more application of ATM and POS compared to other innovations such as Palm Pilot, Smart card and Internet/Phone banking, with the exception of ACCION International which has implemented Palm Pilots (PDA) in all of its affiliates in Latin America.

Our literature review indicates that the most common benefits expected from the use of ICT in microfinance, for clients and for MFIs, are:

Clients:

- Access to banking services
- More convenient service – anytime to conduct transaction
- No time to wait in line
- Faster loan processing (with PDA) in the field

MFIs:

- Reduced transaction cost (by reducing staff time)
- Less fraud (better internal control and less cash transactions)
- Improved quality of financial information (better performance management due to faster and better quality data processing)
- Increased outreach (by making services available 24 hours and closer to clients)
- Reduction in expensive premises (if ATMs or POS devices are placed in off-site locations)
- More professional look
- Increase customer satisfaction and loyalty (by introducing new types of services, such as money transfers and direct deposits).

There is a tendency in the literature to generalize these benefits to any ICT application. However, not every application will result in the same benefits. Table 2 summarizes the benefits that may be associated with different ICT applications. PDA/Palm Pilots are likely to improve the efficiency of staff in recording transaction data and the quality of data entered. Smart cards also play similar roles in that they will allow transactions to be recorded electronically. PDAs are used by loan officers, while smart cards are used by clients.

Table 2
Benefits by type of ICT applications for an institution

PDA/PalmPilot	Save staff time entering loan transactions twice: on paper and on PC Improve accuracy of transaction data Allow MFIs to build electronic database of clients' profile and performance Allow loan officers to access the MIS from the field (better portfolio monitoring)
Smart card	Save staff time from entering loan transactions data, since it is electronically entered (no repetitive form filling) Improve transaction accuracy Allow MFIs to build electronic database of clients' profile and performance Strengthen account management due to built in limits on credit and other accounts Reduce possibility of fraud by eliminating cash transactions and using more secure user identity and account information

Phone banking/Internet banking	Save staff time to conduct transactions in person Provide electronic database of all transactions Improve quality of transaction data Improve client satisfaction by providing convenience
ATM/POS	Increase outreach and market coverage Improve client satisfaction by providing more convenient and faster services to clients Reduce expensive premises (if not installed in branch office) Minimize fraud by eliminating cash transactions by staff Reduce staff time to conduct transactions in person (in some cases, they still need staff person)
MIS	Improve quality of info management Streamline and shorten the decision making process Make it possible to perform analyses on clients, operations and products
Credit scoring	Streamline the loan processing (some decisions may still need more qualitative considerations) Establish credit history for clients

On the other hand, phone banking and internet banking allow clients to access their account information by phone or on the internet and transfer funds electronically, including making payment directly from their accounts. All transactions are recorded electronically and data are integrated to the MFI's MIS. This saves staff time, improves the quality of data, and provides an electronic database for all transactions of the MFI. In addition, the MFI improves its client satisfaction and loyalty by offering more convenient access to account information and allows clients to conduct transactions online or by phone without having to come to a branch office in person.

In addition to these benefits, ATM/POS devices offer more service delivery functions, some of which replace staff responsibilities. As these offer the greatest immediate scope for application we discuss them separately in more detail.

Automatic Teller Machines

Hirschland (2003) observes that ATMs provide 24-hour access to speedy transactions. ATMs, supplemented by smart cards and debit cards can provide flexible payment options and more convenient access to client accounts. They can also reduce branch infrastructure and employee costs, and facilitate financial services in areas with poor communications and electricity supplies. In particular, staff of MFIs could be relieved of some mundane functions like processing withdrawals and fund transfer over the counter, and rather, focus on personalized services. When fully utilized, ATMs can be used for balance inquiry, cash withdrawal, transfer of funds, bill payments and making deposits.

In Bolivia, PRODEM has extended its branch network by installing 20 ATMs. These machines have some unique features: they are equipped with fingerprint readers for client verification and they provide audio instructions in three languages, to make financial services more accessible to illiterate and semiliterate clients and to those who do not speak Spanish. Because ATMs are linked to smart cards (which contain information on client accounts and previous transactions), they only have to update data from the central processing site twice a day-saving about US\$800,000 a year in internet access charges. Smart cards cost clients \$10 to obtain, and \$7 a year in operating fees. PRODEM's ATMs cost less than \$20,000 each,

making their installation economical, when compared to the costs of setting up a branch office (Whelan, 2003).

In Ecuador, a network of ATMs enables poor and rural families to access remittances sent by relatives working in Spain. Banco Solidario, an Ecuadorian bank for poor people, offers a debit card that clients can use to withdraw money deposited in Spanish savings banks, including La Ciixa, Caja Madrid and Caja Murcia, as well as Banca Sella in Italy. Clients can access remittances at more than 800 ATMs nationwide, or at any of about 100 cooperatives with whom Banco Solidario has strategic alliance (Christen & Pearce, 2005).

The services provided by ATMs

The advent of the ATMs has enabled financial institutions to provide their customers with a wide variety of banking services twenty-four hours a day, seven days a week without a significant increase in personnel, when ATMs are utilized to their full capacity.

The most common service that ATMs are capable of offering is the withdrawal from checking or passbook accounts. The same result was found by the survey of banks conducted by the Office of the Comptroller of the Currency as early as 1975 (McLeod, 1979).

Expected Benefits:

- Reduces transaction cost: typical ATM transactions are a fraction of the cost of teller transactions (Ketley & Duminy, 2003)
- Provides more convenient access to customers: In its classic form, ATMs are able to offer 24-hour access for clients who want to withdraw, deposit, transfer funds or inquire about their account balance. However, the access will depend on how ATM is installed: whether it is placed in its own booth with access to clients, or in a banking hall which closes at certain times.
- Frees staff time to handle more personalized customer interactions, rather than routine deposit-taking and balance checking.
- Increases savings mobilization as a result of widened and any-time access points.

Limitations of ATMs

While an ATM offers a potential to provide a wider and easier access to poor people in rural areas as a delivery channel, it faces a number of issues that need to be addressed:

Cost: The cost of a smart card may be significantly higher than that of a conventional passbook making the former relevant only for the better-off poor.

Cash based economy: Most rural areas are still heavily based on cash transactions. Day laborers are unlikely to be able to use card-based cash. In order to expand the use of cards in rural areas, all merchants and service points will have to introduce card payment systems. At present, the roadside stalls and service points in rural areas are unlikely to be able to afford to buy or maintain a POS device.

Operating instructions: With a typical ATM, transactions are driven by language on a screen. This system excludes savers who are not literate. PRODEM in Bolivia has overcome this obstacle by developing an interactive “intelligent automatic teller machine” which identifies clients and their native language by their fingerprint. However, this will not be crucial in Mongolia, where the level of literacy is relatively high even in rural areas. However, it was noted that most

ATMs have instructions in the English language. This could raise a concern unless the instruction screen is translated into Mongolian.

Functionality: When fully utilized, ATM has a capacity to offer a wide range of functions. But in most developing countries, ATMs are not fully utilized primarily due to cost: the price gets higher the more functions are put into force. Furthermore, there are limitations as to what ATMs can do. For instance, ATMs cannot take a loan application, review it and approve a loan. The human touch is still necessary for fully-fledged banking services.

Currency recognition: Local currency has to be recognized by an international network of ATM manufacturers in order for ATMs to recognize and accept a local currency note. Furthermore, poor people usually have money in small units, most of which are not necessarily freshly printed. Yet, cash that can be accepted by ATMs will have to meet certain quality standard. If not, they will be rejected.

Customer trust: It was concluded during the virtual conference facilitated by CGAP and Microsave⁶ that physical presence and the bigger issue of building trust is essential in serving small depositors. This is even more so in rural areas, where formal financial services have been limited, if not absent. The conference participants indicated that building at least medium-sized full service branches that inspire people's trust is an important investment. Therefore, the use of ATMs cannot be assumed to be a complete substitute for a physical branch, at least in mobilizing savings.

Point of Sale terminals

Financial institutions are increasingly installing point-of-sale (POS) terminals in retail outlets. These terminals are typically used for authorizations of credit card and demand deposit transactions as well as for account balance inquiries. The purpose of a POS terminal system is to allow a customer to make payment for goods and services at a merchant location with the maximum ease and convenience and the minimum cost and expense to the merchant and the financial institution.

The cost of POS terminals is directly related to the number of functions the machine will perform and the degree of automation. While some institutions partner with others and jointly own and operate the switching and processing centers, others install and own POS terminals individually. There are three models that have been identified in using POS technology.⁷

Model 1: Customers use their debit or credit cards to make payments to vendors. The POS device does not allow withdrawals or deposits. Customers must visit bank branches to apply for loans, deposit cash, or open a new account. In this model, the POS technology requires no handling of cash by the customer or the retail outlet that has the POS device.

Model 2: Customers can deposit and withdraw cash, and possibly transfer money to other account-holders. The POS device identifies and authenticates the client and authorizes the transaction, but the cash counting, handling and storage are the responsibility of the retailer's staff or a store employee dedicated for this purpose. Clients have less need to visit

⁶ The virtual exchange was entitled "Serving small depositors: meeting demand while managing costs" and was carried out during December 5 – 9, 2005.

⁷ CGAP Technology Center: www.cgap.org/technology

bank branches, and can transact at more convenient times and places. However, they must still visit branches to open accounts and handle more complicated transactions, such as applying for credit cards or term loans. The bank must ensure that the retailer is properly handling cash on its behalf. Five of the seven institutions that provided detailed information to CGAP on their POS devices reported using this model.

Model 3: A full service channel provides the full range of banking services to retail or postal outlets that may be nearer to clients. Again, the POS handles the transaction processing and the human attendant performs basic cash handling and customer service functions. But in this case, customers are allowed to open new accounts and apply for loans. In some cases, an MFI or other third party may perform loan appraisal and follow up or monitoring functions.

It is this last model that brings the full range of financial services to the poor in rural areas, hence as discussed below it seems the most promising solution in the Mongolian context for XacBank. In Mongolia, as elsewhere, it is necessary to analyze the reactions of customers to advances in electronic payments systems in order to effectively eliminate the potential barriers in the early stages of development. Most surveys suggest that customers see the convenience that an electronic payments system provides. The major disadvantages for them are the fear of the machines, and a concern over an invasion of privacy and the possibility of errors.

The rest of the paper explores the feasibility of utilizing ICT solutions for microfinance services in rural areas of Mongolia.

Case of Mongolia

While many of these ICT applications are highly innovative, they often cannot overcome the specific barriers that limit the provision of microfinance in rural areas. Furthermore, some ICT applications require a certain level of infrastructure, an enabling environment, institutional capacity and human resources that may not be available in a developing country. An appropriate ICT solution needs to be identified through a detailed analysis of a context in which it will be applied. This section describes the socio-economic conditions in Mongolia, and the challenges and gaps in extending microfinance services in rural areas in the country.

Mongolia is one of world's most sparsely populated countries, with an area of 1.6 million square meters and a population of 2.5 million. The country is divided into 22 *aimags*, the second largest administrative division in the country, and the 22 aimags are sub-divided into 321 *soums*. 47% of the total population of Mongolia resides in soums (equal to a village); 11% are in aimag centers (provincial centers), and 42% are in the larger cities (Ulaanbaatar, Darhan and Erdenet).

One of the biggest challenges for financial development in Mongolia is the low population density. Mongolia has a population density of only 1.6 people per square kilometer, which is one of the lowest densities in the world.⁸ It is much lower in rural areas. 65% of the total population lives in urban areas⁹, while the total area for the rural market is 86 times larger than for the urban market. Due to the low population density and poor infrastructure, rural people have difficulties accessing basic services, including financial services.

⁸ Mongolian Statistical Yearbook 2003, National Statistical Office (NSO) of Mongolia

⁹ Population and development indicators 2002. For example, population density in the capital Ulaanbaatar and other major cities is 75 times higher than in Selenge, the highest density aimag.

Although the Mongolian economy has begun to stabilize after severe national crises during the early and mid 1990s, the transition from a controlled economy to a free market one has perpetuated wealth disparity and created unemployment. As in other formerly socialist countries, the transition left many state employees jobless. The social safety net made up of pensions, benefits, health care and education suffered severe cutbacks. As a result, large numbers of people in both small rural towns and more urban areas have only modest, informal and sporadic income opportunities. The section of the population that falls into this category has increased significantly since a series of winter disasters, or *dzuds*, between 1999 and 2002, during which over one third of all livestock (the mainstay of the rural and national economy) died. Tens of thousands of herders, especially those less experienced pastoralists, who only began practicing animal husbandry after losing government jobs, were entirely or almost entirely dispossessed, and moved, jobless, to villages (*bag* center), towns (*soum* center) and cities (*aimag* center, capital city). Recent estimates suggest that Mongolia's rural poverty ratio has increased (from 33% to 43% over the years 1999-2003).

The Mongolian banking sector, and in particular, the micro finance sector, has grown rapidly since the late 1990s, in the aftermath of the bankruptcy of a majority of the banks. Yet most of the fast emerging financial service providers are concentrated in urban areas. Only two banks in particular, XacBank and XAAN Bank, have outreach to rural areas at the *soum* level. They claim to serve around 100,000 micro clients between them. However, most of these micro loans are disbursed primarily through their branch offices in the capital city or at the provincial centers (*aimag*), excluding those in remote rural areas (in *soums* and *bags*).¹⁰

Financial institutions in Mongolia have been wary of rural and poverty lending. One of the primary reasons, among others, is attributed to higher transaction costs due to low population density and poor infrastructure. The market size and the density of clients are important factors for successful microfinance. When clients scattered over a large geographic area and financial institutions' local offices fully controlled and supervised by central offices in the capital, as is the case in Mongolia, transaction costs are obviously very high. Thus, MFIs must find a special delivery mechanism to provide services for people living in rural areas in a sustainable manner.

XacBank and its rural finance strategies

XacBank is a leading microfinance institution in Mongolia. It had its beginnings in the MicroStart Mongolia project funded by United Nations Development program (UNDP) in 1997. XAC, the finance company which grew out of the project, became a very dynamic and entrepreneurial MFI using a unique individual loan methodology.¹¹ In just 2 ½ years of operations, XAC demonstrated an impressive performance. The institution established a network of 13 branches, managing a loan portfolio of US\$854,000 and serving over 3,600 clients. Furthermore, XAC maintained excellent portfolio quality (Portfolio at Risk of 1 day or more late is 0.3% as of April 2001) and reached operational self-sufficiency after 8 months of operation. In October 1999, XAC registered as the nation's first non-bank financial institution. In

¹⁰ XAAN bank does have branch offices in all *soum* centers. However, their outreach has been limited to salaried employees, pensioners, businesses that are engaged in trade or service with quick turnover. There is a limited outreach to small scale herders (especially those with less than 300 head of livestock) and micro-enterprises that do not have collateral.

¹¹ XAC means "Golden Fund for Development" (pronounced HAS as in HAT)

the last quarter of 2001, XAC merged with Goviin Ehlel (Gobi Start)¹² and as a result, XacBank was created. The banking license was obtained in January 2002. Now, XacBank, the banking subsidiary of XAC-GE group, is incorporated as a limited liability commercial bank with a license to conduct banking activities. Headquartered in the country's capital Ulaanbaatar, XacBank operates branches in all of the provinces (*aimags*) of Mongolia.

As part of its mission, XacBank strives to continue its strategic focus on rural markets. In 2002, the Bank piloted an agricultural lending program in six *aimags* and disbursed loans of USD 42.5 – 12,755 primarily for agriculture. In 2003, it opened five new branch offices, making XacBank the third banking network with a nationwide presence. At the end of 2003, 21 branches (65 percent of all branches) were located in each of the *aimag* centers (Figure 3). The clients served through these branches comprise 62 percent of total borrowers.

Figure 3 Map of XacBank branches



In June of 2003, the Bank activated its facility under IFAD's Rural Poverty Program in collaboration with the Government of Mongolia. This program was targeted toward Arkhangai, Bulgan, Hovsgol and Hentii *aimags*, which are mainly agricultural and livestock breeding regions. 2, 435 loans totaling USD 1615.64 were disbursed in the four *aimags*.

Compared to the banking sector as a whole, XacBank has a larger share of the market in the rural areas (see Figure 4). When reviewed *aimag* by *aimag*, XacBank has gained an increasing share of the lending market. However the rural clients are currently served by branches located in the *aimag* centers. Yet, the majority of the rural population lives in *soums* outside the *aimag* centers. Only 1.4% of XacBank borrowers are herders, and loans for livestock account for only 0.8% of the total portfolio as of December 2003 (See Figure 5).

¹² Goviin Ehlel, then the second largest non-bank financial institution, was established by Mercy Corps in December 1999 with funding from USAID and received its license in March 2000.

Figure 4
Share of XacBank portfolio compared to banking system

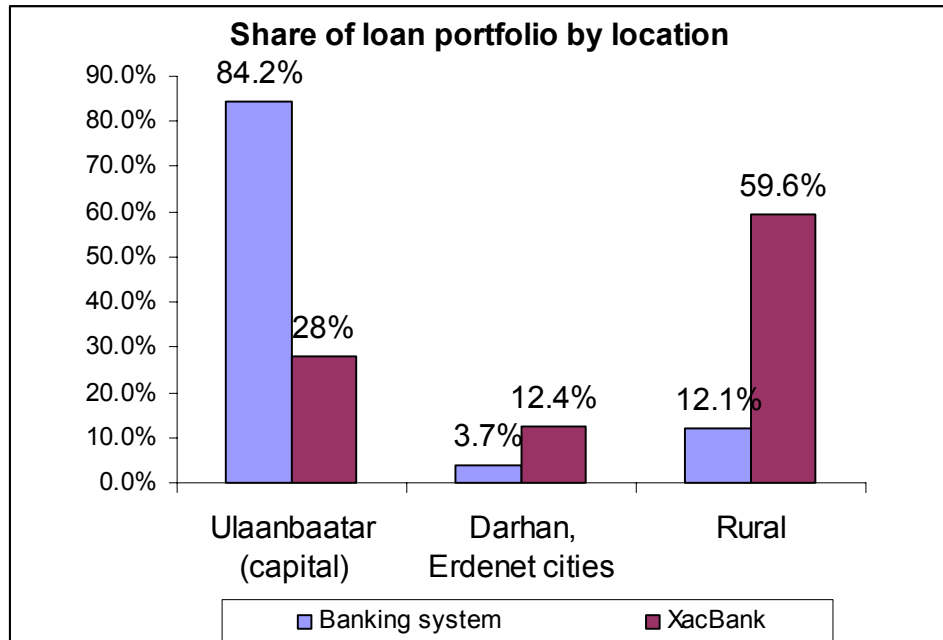
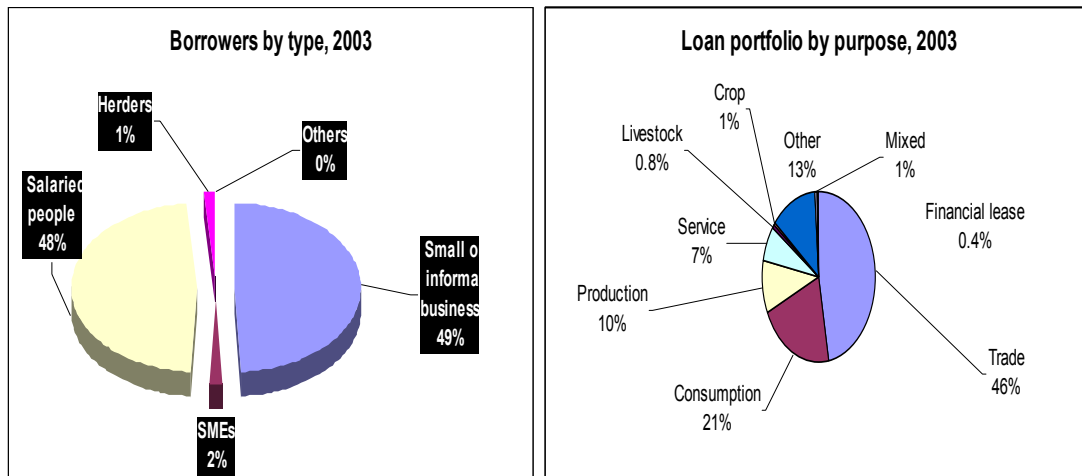


Figure 5
Portfolio segmentation



With the increasing competition in the financial sector and rapid growth of MFIs in urban areas, XacBank is feeling the pressure to expand its outreach into rural areas, especially to small farmers and herder families beyond *aimag* centers. Having attracted significant social investment, XacBank also feels the pressure to demonstrate its commitment to serving communities with little or no access to financial services in rural remote areas.

Traditional branch offices are established at the *aimag* center level. With an exception of three large soums, there is no branch operation at the *soum* level primarily due to the limited economies of scale, high transaction cost, limited connection to transfer transaction data and lack of qualified human resources to serve as a bank staff.¹³ In order to break even, it is estimated that a branch needs a population of at least 10-20 thousand. Yet, a typical *soum* has a population of 2500 people, of whom 600 are potential borrowers. Average *soum* is 150 km far away from the *aimag* (province) center.

In order to extend its financial services to the rural remote areas, XacBank is experimenting with two innovative approaches. They are described below.

Franchise model

In order to reach clients in *soums* where opening a full-fledged branch office is not justified economically, XacBank believes a local savings and credit cooperative (SCC) is the most feasible option. SCCs are important partners for expanding microfinance outreach as have a base in the local community and potentially have low administrative costs. However to become an effective outreach strategy in rural areas, limitations of SCCs need to be addressed: such as weak governance, limited financial management skills, and lack of experience in demand-driven product development. To address these limitations intensive capacity building is necessary at least at the beginning. XacBank has chosen to use a franchise model to support local SCCs as a vehicle to extend its financial services to rural remote areas.

¹³ Exceptions: three branches are opened at *soum* level because they are equal to *aimag* center in terms of market size, infrastructure development, likelihood to have a larger population concentration and ability to meet the outreach plan required for a branch office.

By using SCCs as its franchisees, XacBank will not need to establish fully-fledged branch offices in remote areas. Instead, the existing branch offices at the aimag (province) centers will provide monitoring and supervision, review financial statements and portfolio reports (similar to internal audit), and provide advice and guidance. On the other hand, the franchise SCC will review and approve loan applications on its own independent of XacBank branch staff. The SCC has an advantage in terms of having information on the behavior of potential clients and their capacity to absorb credit as well as enforcing loan repayment through informal mechanisms, such as peer pressure and a close follow up.

The start-up cost for establishing a franchise includes the salary and per diem for three staff persons for 5 days in the field: after this first time, the visits will be for two days once a quarter. Four days are spent on training and a local SCC, which is interested in becoming a XacBank franchise, is expected to start with a total asset of US\$2,000. In order to increase the loan capital of the franchise, XacBank provides a wholesale loan (initially US\$3,000). Usually, SCCs want to take more wholesale loans. To give an incentive, XacBank commits to lend 80% of the total equity. There are other incentives to increase the equity capital and expand the number of members.¹⁴

XacBank experience with the franchise model has demonstrated two key difficulties:

- Start up cost is high due to intensive capacity building, including promotion, training and technical assistance in establishing and strengthening the local Savings and Credit Cooperative who will become the franchise of XacBank. In Mongolia, the cooperative model is just emerging as a rural development strategy and it requires a national level effort to provide extensive support. The franchise model does not break-even in the short run, so there is a need for a subsidy to cover the capacity building costs.
- Commitment and buy-in from the local community members and key stakeholders is crucial. The final outcomes do not depend on XacBank alone, but also on the commitment and interest of local stakeholders and community members. There are also issues of politics, which can influence the running of the co-operative.

A short pilot of the franchise model has demonstrated that in Mongolia the franchise model would not be able to break-even within a year. Therefore currently mobile banking is being used as a transition strategy with a view to eventually introducing franchising after mobile banking breaks-even in a given soum.¹⁵

Mobile banking model

XacBank introduced mobile banking as a transition strategy before the franchise model becomes sustainable. There are mobile banking services in 120-130 soums as of September 2005.¹⁶ Most of them are operating profitably. Only those who have started recently (about 2 months ago) have not yet made a profit. On average, after 5-6 months, a mobile bank breaks even. A portfolio of \$40,000 in a given soum is a sufficient scale to break even. XacBank is

¹⁴ By law, a minimum number of 20 members are required to form a cooperative.

¹⁵ At the moment, financial projections have been made for up to one year. It is difficult to project beyond one year because the soum market conditions are not predictable.

¹⁶ In soums where there is no mobile banking, rural people come to receive services from the branch offices at the aimag center. In total, XacBank is serving people in 170 soums.

currently giving priority to introduce mobile banking in soums with a population of more than 3,000 with an initial portfolio of \$20,000.

A typical mobile banking crew consists of a driver and two credit officers (one for micro credit and one for SME loans). They travel by a Russian jeep from a branch in an *aymag* center to *soums*, usually 50-100 km in distance, once or twice a month. During their visit, the mobile banking crew meets the Loan Approval Committee (LAC) members, reviews the loan applications (which are received by the LAC members between the visits), evaluates the collateral, makes a final approval of the loans together with the LAC, and disburses the loans. Since the loan repayment is scheduled once a month, the mobile bank collects the repayment during their visit. Each visit takes about 1-2 days in each *soum*.

A loan approval committee (LAC) is formed at the *soum* level. It consists of three members. Criteria for selecting LAC members are:

- Age: 40 years or older
- Residency: many years of stable residency in the community
- Work experience: representatives from government agencies (such as school teachers and local officials) and representatives of the community
- Knowledge of and well-respected in the community.

LAC members are responsible for:

- ❖ Product promotion
- ❖ Distributing loan applications
- ❖ Distributing repayment schedule
- ❖ Monitoring loan performance
- ❖ Collecting late repayments and transferring to the branch through the Agriculture bank branch in the *soum* (Repayment, if paid on schedule, is collected by the mobile bank.)
- ❖ Receiving loan applications
- ❖ Calling and informing the branch about loan applications
- ❖ Reviewing loan applications and approving together with the mobile bank crew.

LAC members are paid based on their portfolio. Below is the current incentive chart:

Table 3
Incentive chart for LAC

Portfolio size	Monthly salary per LAC member
\$16,597 or less	\$ 12.80
\$16,598-33,195	\$ 21.30
\$33,196-49,792	\$ 38.30

The total cost for running a mobile banking crew (assuming two visits per month per *soum*) and hiring LAC members (3 members per *soum*, assuming an average portfolio of USD5652) is estimated to be USD 208 (approximately). It is estimated that using this approach XacBank, on average, generates revenue of approximately USD 479 per month (assuming two

visits, each approving 20 loans or USD 5,952 in loan portfolio, at an interest rate of 3.1-3.5% per month, charging 0.5% of the loan amount for loan fee, and a fee of 66 cents per loan application form). -

While the mobile banking approach appears to be an effective transition strategy, it poses a serious challenge regarding the security of the cash carried by the mobile banking unit, as the portfolio grows. Also, it is only a temporary strategy because the mobile bank visits any given soum only once a month, hence offers a limited access to clients. This limited presence in the local areas does not allow XacBank to mobilize savings. As concluded by Hirschland (2003) easy access and proximity are considered as one of the most important factors that poor people consider in making decisions on savings. Therefore, XacBank needs to find a solution that will allow them to have closer and more convenient access to financial services for the poor at the soum level and beyond, so as to increase its savings mobilization. Furthermore, in order to exit the mobile banking and transition to the franchise model, XacBank has to find solutions to cut down cost, improve efficiency of staff, and reduce cash transactions.

The next section explores some promising ICT solutions that may enable XacBank to extend its microfinance services to rural remote areas on a sustainable basis.

Promising solutions

This paper started with a premise that MFIs operate with a high ratio of administrative costs per dollar loaned, because (by definition) they make small loans. The cost is even higher in servicing rural remote areas. Proper application of ICT can reduce the burdensome bookkeeping and administrative cost, improve staff productivity and expand outreach. Technological innovations can significantly increase the efficiency and lower the costs of financial service providers operating in rural areas (Christen & Pearce, 2005). Reduction in costs is obtained in two ways – through lowering per unit costs and higher volume productivity (WorldBank, 2005).

Given these premises, and the review of the available ICT innovations in microfinance here we develop four scenarios as possible solutions for XacBank in extending microfinance services in rural areas of Mongolia

- Option 1: ATMs – operated as a stand-alone service center
- Option 2: ATMs placed in a Post Office or local XAAN bank branch
- Option 3: Wireless POS devices carried by a mobile banking team
- Option 4: Wireless POS devices placed in a XacBank franchise (local Savings and Credit Cooperative)

These ICT solutions take into consideration the problems that XacBank faces in rural areas: poor road and communication infrastructure, geographically dispersed clients, and a small volume of transactions.

The implications of these challenges are:

- a) Reaching rural clients is difficult and formal financial institutions reach those closest to the urban centers
- b) Close monitoring of the lending portfolio by financial institutions is difficult
- c) Mobilizing small savings is impossible without regular access

Furthermore, the interviews with key stakeholders in Mongolia and customers of XacBank helped to fine tune the identification of appropriate ICT solutions and the possible issues that need to be addressed in implementing them.

The key expected outcomes of these ICT solutions are:

Expanding the access points: By leveraging technology solutions such as POS devices and ATMs, a microfinance institution can extend access to their services in rural areas by creating flexible, far-reaching delivery channels.

Improving efficiency: By using technology to streamline microfinance operations, an institution could reduce the time required to disburse loans from 5 to 2 days, which translates into a 40 percent increase in the number of loans disbursed.

Strengthening risk management: Technology enables institutions to collect data in electronic format that can be synthesized and analyzed to identify trends, such as delinquency or yields, assess individual creditworthiness through payment histories, and develop scoring models and potentially insurance products.

Analysis of four ICT solutions

There are two options for operating ATMs in rural soums of Mongolia:

- 1) Operating as a stand-alone service center
- 2) Placing it in a Post office or XAAN bank branch.

Stand-alone: When placed as a stand-alone service center either outside or inside a building, ATMs can replace the need for an office or field staff, but require a strong security system and good instructions for customers to follow. In most cases, ATMs have not been operated as a stand-alone due to these two requirements. Rural clients will likely need customer service to guide them how to use ATMs. Therefore, XacBank will have to have at least one or two staff persons. Also, there is a need to have a physical building to house the ATM.

Post-office or XAAN bank branch: In many countries post offices have been traditionally favored by poorer people but have lost custom due to poor customer service, poor products and manual procedures. In Mongolia, there is a post-office branch in every rural soums. However, the post-offices serve as a branch of Post Bank, which is a major competitor of XacBank. While at present they do not have well-developed microfinance products, Post Bank is planning to enter the lower end market and is aggressively recruiting expertise in developing microfinance products. Another option is XAAN bank branches in rural soums. XAAN bank has a branch infrastructure in every rural soum. It will be to the benefit of both XAAN bank and XacBank to partner and share the cost of using ATM to offer a wide range of services. However, past experience of XacBank with XAAN bank has been rather unpromising in terms of partnership, as they see each other as direct competitors.

Considering the challenges with ATMs, two other options are identified using POS technology. As described in the previous section, the full service channel model of POS technology is the most promising solution. To operate such a model, XacBank will need a third party to provide customer services, handle transactions, perform loan appraisal and follow up functions. As we have seen two possibilities have been considered to perform these functions: one is a mobile banking unit of XacBank and the other is a XacBank franchise.

A simple ranking approach is used to compare these four solutions and assess which is most feasible and appropriate given the unique characteristics and challenges of the local context within which XacBank has to operate. In total, seven categories are used to rank the four solutions: three of them relate to client preferences and four of them relate to institutional preferences. These categories were identified based on the literature review and interviews with key stakeholders in Mongolia.¹⁷ The following table provides an outline of the ranking results of each ICT solution by each category from the perspective of both clients and institutions

Table 4
Simple Ranking of ICT solutions

	ATMs – operated as a stand-alone service center	ATMs placed in Post Office or local XAAN bank branch	Wireless POS devices placed in local Savings and Credit Cooperatives, a XacBank franchise	Wireless POS devices carried by a mobile banking
Clients:				
Accessibility	****	**	***	*
Features/service functions	*	**	***	****
Ease of use	*	**	***	****
MFI:				
Cost	*	***	****	**
Building volume	**	****	***	*
Liquidity	*	****	**	***
Requirements for communication infrastructure	*	**	***	****
Total score (Ranking)	11 (4 th)	19 (2 nd)	22 (1 st)	19 (3 rd)

Note * denotes one point score

Accessibility:

Use of ATM has the potential to provide accessible, convenient financial services because it no longer requires bricks and mortar operated by the permanent staff of a financial institution. However, due to security and infrastructure development in a given area, the actual applications of ATM differ in terms of location and accessibility. Not every ATM implemented by MFIs offer 24-hour service, as expected.

If the ATM were to be placed in a post office or a branch office of XAAN bank, the access will be limited to the office hours of Post Office and XAAN bank. They usually operate from 9am to 4pm.

¹⁷Two references are particularly useful, Cracknell, (2004) and Waterfield, (2004).

However, the above two options are better than carrying POS terminals in a mobile banking unit because it visits a given soum only once a month. Therefore, it is the least accessible option.

On the other hand, if a POS terminal is placed in a franchise of XacBank (SCC), rural clients will have better access, though not 24 hours. In general, local SCCs have longer operating hours than the post office and the XAAN bank branch.

Features/service functions:

When utilized fully, ATMs and POS devices offer a wide range of services: Withdrawal, Cashing Pre-approved loans, Deposits, Money transfer and Account inquiry. However, in many countries, ATMs provide only limited functions due to the acceptability of local currency notes, security of cash and so on. Also, the cost of an ATM depends on how many functions it can provide. Thus, most financial institutions start only with the basic function, that is to disburse cash.

However, if a POS terminal is carried by the mobile banking unit, there may be wider range of functions offered since there will be staff, who will operate it. For instance, there may be a possibility to not only disburse pre-approved loans and withdraw cash but also to make deposits, transfer funds and enquire about account balance. Also, POS terminals are generally cheaper even with additional functions. When the POS terminal is left with the local franchise, some of these functions may not be made available due to the limited capacity of a local franchise staff and security issues of cash handling by the franchise staff. In the case of an ATM machine in a post-office or XAAN bank branch, again there will be limited functions due to the possible reluctance by the staff of these agencies to collect deposits and provide other additional services on behalf of XacBank who is considered as a competitor.

Ease of use – convenience:

Systems should be simple to use, fast and user friendly. Service should be standardized so that wherever the solution is used the customer is familiar with the procedure followed. Customers should have ready sources of advice, whether this is through call centers, through publicity or through physical presence. Also, the screen and the buttons should be in the local language.

When a ATM machine is operating as a stand-alone service center, there will be no staff person to provide an assistance. Therefore, it is likely to be the least convenient in terms of ease of use. On the other hand, if a POS terminal is operated by a mobile banking staff of XacBank, the staff person is likely to have received training on how to operate it and will conduct transactions on behalf of clients by operating the POS terminal. Placing the POS terminal in the XacBank franchise will also be a relatively easier to use option than an ATM placed in the post office or XAAN bank branch, because the franchise staff will have received training from Xacbank, though may not be as good as the Xacbank branch staff, and also, the POS terminals are much easier to operate than ATM machine.

From an institutional perspective:

Cost:

If XacBank were to operate ATM machines as a stand-alone service center, it will bear the full cost of purchasing and maintaining them, hence this will be the most expensive option. If it were to partner with XAAN bank or the post office, they can share the cost, hence this will be a less expensive option. The cost will be cheapest if XacBank were to place a POS terminal in its franchise office and share the cost, since a POS terminal is much less expensive than an ATM machine. Carrying a POS terminal in a mobile bank unit is more expensive because there is no cost sharing.

Building volume:

One way to reduce the cost burden on the institution is to achieve economies of scale by building more volume of transactions. Using a POS terminal with mobile banking will have the least chance for building volume, since it will be used only once a month when the mobile bank visits a soum.

An ATM housed at a post office or XAAN bank branch will be able to build up the most volume by serving customers of both partners and providing a wider range of services. Operating a POS from XacBank's franchise office may not be able to achieve as much volume, but more than an ATM placed as a stand-alone due to the reasons mentioned, such as the limited functions and difficulties customers may face in operating the machine without human instructions.

Liquidity:

One of the major problems in using an ATM or POS is liquidity. Due to the great distance from a branch office and poor road infrastructure, it will be hard for XacBank staff to charge the machines with cash, especially if the ATM is operated as a stand-alone. A POS placed at a franchise may also face the same difficulty due to a limited volume of transactions, especially if they are a small SCC and have few members to begin with. On the other hand, a post office or XAAN bank branch will be the best option in this respect because they handle most transactions in a given soum; as all state benefits, pensions, salaries, money transfers and subscriptions to newspapers go through these local offices. A POS terminal carried by a mobile banking unit will have somewhat less difficulty with liquidity due to their ability to tap into cash at the branch office in a provincial center. However, when they travel a long distance without sufficient security, they have to be careful about carrying a large sum of cash.

Requirement for communication infrastructure

As was mentioned earlier, communication infrastructure is a must requirement for operating any of these ICT innovations. Rural soums in Mongolia do not have connectivity. The only means of communication is phone by a land line. Operating ATM as a stand-alone will be the most challenging. Xacbank will have to find a way to establish a connection through a phone line using a dial-up service, if that is available. If housed at a post office or XAAN bank branch, an ATM may have a better chance to get access to a connection because these outlets already have some communication infrastructure in place, although this may be poor and irregular.

The best solution in this case is to use wireless POS terminals that can be operated with smart cards (chip based). As explained earlier, smart cards can store transaction data offline. After a certain number of transactions, the data has to be uploaded. In this respect, the wireless POS using smart cards carried in the mobile banking unit is the most feasible.

Based on the above seven categories of clients' and institutional preferences, the most desirable option is placing a POS terminal in a XacBank franchise (SCC). In order to ensure successful implementation, it is important to take into consideration the current state of ICT deployment in the financial sector in the country, the supply of hardware and software, the regulatory environment and the experiences of clients with these new technologies.

Current state of ICT in the financial sector in Mongolia

During 1998-2001, with support from the Asian Development Bank, all regulated financial institutions converted their general ledger systems into a new system based on a Windows environment. Also, they all got online connection for their management information systems. As a result, all banks have started exploring technological advancements for further improvements in their systems and product offerings.

One of the most recent developments is the introduction of a card system. Currently, there are three networks issuing credit and debit cards: Anod bank, Golomt bank and Trade and Development Bank (TDB). Each of them issues their own credit and debit cards. All the commercial banks in Mongolia are using POS terminals and cards issued by one of these three banks. However, the cards issued by one network are not compatible with the other networks. In other words, POS terminals of Golomt bank do not recognize the cards issued by TDB or Anod bank. Some merchants had to install three different POS terminals in order to make sure they will be able to serve all customers regardless of which bank issued their cards. If they do not have POS terminals of all three networks, they will not be able to serve customers who have cards issued by a bank whose POS terminal is not installed. This causes inconvenience for customers and raises the cost for both merchants and banks. In a country of 2.7 million people (of whom, only a fraction currently uses a banking card), it is not economical to have three independent networks.

In response, the Bank of Mongolia (BoM) has recently set up a national Clearing and Switching Center (CSC). The main purpose of this center is to consolidate the independent networks and provide one channel for processing all card transactions. Once the CSC is in full operation in 2006, all 17 banks will be linked to this center. All the three individual POS networks will all go to this one switch clearing center. All cards can be processed through this center.

One of the challenges on the agenda for CSC is the connectivity in rural areas. Within each financial institution, data is transferred to the head office from branch offices. Limited access to online connection interrupts reliable and timely data transfer between the branches, which in turn affects the data transfer to the central CSC from the financial institution. To address this issue, CSC is examining the feasibility of wireless POS. There are two technologies for wireless POS. One of them, WiFi, can be used within a 50 km radius. At the time of the field research, this wireless POS was being piloted. This POS device uses a chip card, which can store up to 1000 transactions off-line. Then, wireless connectivity is used to transfer the data once the chip card has stored up to 1000 transactions. CSC will issue its own

smart cards. The software that will process the smart cards will be able to store transaction data off-line.

Use of POS

The sector respondents interviewed in this study envisioned that in three years all banks would have their own cards and all trade and shopping centers will have POS terminals to read cards. All salaries will be deposited directly into accounts, which can be accessed by cards.

Currently, mostly banks have bought POS terminals to install in their branches. After this stage, the clients will start to demand merchants to do transactions through POS. Maybe in 3-5 years, merchants will start to buy POS terminals. Initially, banks will start installing them in merchant's places. In the second stage, when the number of customers with cards grows into a significant scale, merchants will start to buy terminals themselves. Currently, there is no application of a card system in rural areas, except some bank branch offices at the provincial center level.

Regulatory issues

At the time of the field research, there is no regulatory requirement in terms of what infrastructure has to be in place before introducing an ATM or POS. Financial institutions are allowed to choose merchants and evaluate the potential risks. BoM only examines what requirements are in place for selecting merchants and whether they have been complied. However, there is a need for improvements in the regulatory environment in order to ensure sound implementation of ICT solutions in financial services:

- Contractual agreements need to be made with financial institutions and merchants.
- A more carefully thought regulation is necessary for protecting consumer privacy and confidentiality of data. BoM needs to review the policies and procedures in place for consumer protection and confidentiality.
- BoM has to examine technical adequacy (for example in relation to level of computerization and the adequacy of Management Information Systems) when granting a licenses to Banks and Non-Banking financial institutions.

At present, the BoM carries out no assessment of the potential risks which are heightened due to the use of ICT, whether transaction, credit, compliance or strategic risk.

Supply of hardware and software

There is no local capacity to develop software for ATM and POS. BeverTech is the only private company that supplies hardware for POS terminals as an official dealer of an international supplier.¹⁸ It was founded in 2003, and has developed a partnership with a Canadian supplier as its official dealer.¹⁹ The main products offered by BeverTech include:

¹⁸ There are few other smaller companies which sell POS terminals, but they are not the exclusive dealer of any international supplier and the size of their transactions is small.

¹⁹ The founder of the company had worked in DataCom, one of the two main internet service providers in Mongolia. She has a strong experience in IT and has been interested in applying IT for financial services. Her first product was internet banking model, which was developed while she was working in DataCom.

- *Internet Banking*: In 1990, the first internet banking model was developed and introduced to Capital Bank, a commercial bank, in partnership with InterActive, a local software developer. InterActive had experience in developing accounting software. It took two years to develop the complete banking system. Now, all the branches of Capital Bank are using this system. The package includes all financial management information system, as well as internet and phone banking software. Total cost was \$35,000-40,000. Maintenance is separate: based on need.

- *POS system*: It will take a lot of time to develop the software locally. Therefore, the company is exploring a possibility to purchase an international package and modify to the local context. The plan is to acquire the right to modify and customize the international package locally. At the time of field research, BeverTech had obtained the exclusive right to sell the hardware of VeriFone, a US-based company. The Bank of Mongolia was the first client to purchase these POS terminals. The purchase price for commercial banks is about \$350 (for the one that requires a phone line - Dial or local network - LAN) and \$580 (dial up or wireless connection like cell phone).²⁰ It includes training, installation, device, support, and warranty. BeverTech provides training to bank staff on basic maintenance and repair of the hardware. Maintenance support is free during the installation. The technical warranty is one year. Technical support after installation is around \$5-10 per visit. Banks have to cover the costs of communication, printer and stationary. In terms of communication, if they use their existing LAN connection, there is no additional cost. If they use a dial up or wireless connection through a cell phone, there will be an additional cost for communications.

ATM: There is only one commercial bank that has an ATM network. The hardware and software were purchased from a Russian company. Currently, these ATMs do not accept deposits due to the fact that Mongolian national currency is not recognized in the international network of ATM manufacturers. BeverTech does not think any individual company will be able to sponsor the process of getting the local currency recognized. The price of the existing ATM was around \$60,000.

Infrastructure

As noted already one of the major challenges in bringing in new technology solutions to rural areas is poor infrastructure. In particular, in many rural soums

- it is not possible to send a fax and or to have an email connection (phone connection is poor quality).
- roads are not well maintained, if they exist at all,
- power supplies are limited

In terms of communications infrastructure, currently, both the private sector and the government are working to improve connectivity in rural areas. In particular, three options are being explored:

- 1) Cable Optic
- 2) Satellite antenna (wireless)
- 3) Leased line.

²⁰ The price for a simple POS terminal (Vx510) supplied by other smaller companies is quoted as \$600 (one with dial up and LAN). Nobody is selling wireless POS.

Each of these has advantages and disadvantages. Banks usually use a combination of these three for connectivity depending on the location of branches, the availability of a leased line and the cost of a given option.

The least expensive is a leased line. However, the leased line is possible only if the distance between the two sites is between 2.5 and 3.5 kilometers (km). Also, if the underground is full and there is no room for launching an additional line, then a satellite antenna is the only option. The limitation with the satellite antenna is that the two connecting sites must be able to see each other. Usually, a connection through satellite antenna is possible when the distance is no more than 20 km. If it is more than 20 km, it is possible to connect via a VSAT antenna, but it is much more expensive.

Table 5
Cost estimates of infrastructure for online connection

Connection options	One-time cost	Re-occurring cost
Cable optic	\$3000-4000 per km	
Leased line	\$50 for up to 500 meter	\$0.20 per meter/per month
Satellite antenna	\$1400 for one antenna	Do not know
VSAT antenna	\$13,000 (approx.)	\$300 per month

In terms of coverage, at the time of field research, all banks online were using one of the above three main channels. However, the connectivity in rural areas was still poor. A representative of one of the main communication companies in Mongolia reported that: "Cost is too high to provide an internet service in rural areas by establishing infrastructure on our own due to the small scale of rural market demand. It is only worthwhile in major urban areas." He further stated that some subsidy is required for developing infrastructure in rural areas. However, previous experience with an infrastructure development project that was subsidized by the Soros Foundation indicates that more thought should be given for the sustainability of infrastructure maintenance. The start-up cost of the project was paid for by the Soros Foundation. It was agreed that the local government would cover the on-going maintenance cost by paying a monthly fee to the internet service provider. However, the local government failed to pay the monthly fee, so the internet service discontinued.

It became obvious from the interviews with private sector internet service providers that the private sector will not invest in creating infrastructure in rural areas. Their main suggestion for expanding the coverage in rural areas was that the government should install optic cables and lease them to private service providers. While this may be a promising approach, the number of years it will take to finally provide reliable internet connection in rural areas remains unanswered.

Voices of customers

A total of 8 customers were interviewed. The sampling was based on a snow-ball technique.²¹ All of them were XacBank customers. In addition, some of them had banking relationship with other financial institutions. Of the eight customers interviewed, three had had experience using a debit card: one of them had a card issued by Golomt bank, one by Trade

²¹ Customers who were waiting in the banking hall while their loan applications were reviewed, were invited for an interview. There was no refused case. It was in the banking hall of XacBank in the afternoon during a work day.

and Development Bank (TDB) and one by XacBank (which is in the same network as Golomt bank). All three card users acquired their cards due to their employers' arrangement with the respective banks for direct deposit of their monthly salaries. According to the interviewees, the advantages of using a card, as opposed to cash, included greater security, increased savings, faster service, improved access and faster money transfer. Disadvantages included some delays in accessing card accounts, and the incompatibility of cards at POS terminals. Customers not yet having a card raised concerns over account security and privacy and the difficulty of remembering pin numbers for ATM machines.

Conclusions

While microfinance has been embraced as an effective poverty reduction strategy, many poor people in rural areas have still been left behind with limited access to financial services. The main problems include poor infrastructure, low density, remoteness and dependency on agriculture, all of which increase transaction costs and make them less profitable. The rapidity with which advancements of information and communication technology are taking place presents many unique opportunities in expanding access to financial services in rural areas.

In terms of recent experience in Mongolia both stable supply of power and reliable, lower cost connectivity are essential for ensuring uninterrupted transactions. In Mongolia, like many other developing countries, there is a very poor connectivity in remote areas, though it is improving in more urban areas. In order to implement any of the ICT innovations, a MFI must have addressed this issue. However, in the case of our suggested ICT solution, a wireless POS device using smart card does not require real-time connection. The smart card can store up to 1000 transactions offline. After that, the data has to be uploaded.

Even if the infrastructure is ready, the obvious question would be whether the potential scale of customers is large enough to ensure a critical mass for the economic viability of providing e-banking. XacBank needs to find ways to build up volume using the POS device in its franchise. One solution is perhaps building in additional services, such as allowing members of SCC to use their cards for purchasing goods and selling their produce through the POS device placed at the SCC. Also, allowing non-members to conduct transactions using the POS device will help increasing economies of scale. Partnering with other financial institutions and merchants in the local soum would also be desirable.

The success of implementing the suggested ICT solution is dependent on the institution's ability to develop and institute a marketing plan which will attract sufficient numbers of users to justify the new system. There must be a clear understanding of who are the potential users. In the case of the proposed solution, the direct customers will be small scale herders and micro-entrepreneurs who live in and around soum centers in the rural areas of Mongolia. Other users will be merchants, partners and other financial institutions.

More generally, while ICT offers considerable potential in delivering financial services in rural areas, the number of microfinance institutions that have actually implemented ICT solutions is still very limited. This raises the question why MFIs are not taking up ICT applications as rapidly as expected? Our analysis suggests a few basic lessons for MFIs, donors and governments:

- **ITC is worth the investment only or for A critical mass.** Initiatives have emerged and are more or less successful in countries with dense population (India, the Philippines). Countries

with lower density may need to look for other options, or seek partnerships both within the country and within the region.

- **Regulation matters.** In order to make full use of ATMs and POS devices, an institution must have a license to accept deposits. For savings, if a merchant is not allowed to accept deposits, then the merchant can not act as the intermediary for placing POS of MFIs.
- **Careful cost benefit analysis is necessary.** To assess whether or not investment in ICT will be worth the investment, it is important to analyze costs and benefits and compare with other alternative strategies.
- **Financial education will make a big difference.** Initially, customers have a psychological barrier in using a new technology. Even merchants have a fear and try to avoid serving people with a payment card. If the printer gets jammed and does not produce the receipts, they do not know how to fix it. Education and training is critical to make it easier for customers and merchants learn how to use new technologies in financial services. It is important to remove the fear that it is complicated. Promotional campaigns should demonstrate that it is simple to operate the POS terminals.
- **Technology cannot be a complete substitute for a delivery mechanism.** It can work as a supplement to delivery mechanisms by reducing cost, fraud and improving staff productivity. Customers, especially at the lower end market, still prefer human interaction. Also, there are some functions such as a loan appraisal and approval that still need to be conducted by staff.
- **Appropriate ICT solutions are context-specific.** ICT applications that have been successful in other countries do not necessarily work in any country. The importance of the enabling environment cannot be underestimated.
- **Increase the network of points for using the card:** If all traders and service providers introduce a card system, all customers will buy the card. It is because not all merchants and retailers accept cards, there is less incentive for customers to use card as a means of payment.
- **ICT is no panacea:** There are many services poor people in rural areas need in order to move out of poverty. ICT solutions cannot address all the challenges that contribute to rural poverty. For example, poor farmers and herders lack collateral and suffer from a systematic risk due to their dependency on agriculture and seasonal income generating activities. These are not fully addressed by the use of ICT. Other supplementary measures are necessary to comprehensively address rural poverty.

Appendix 1

List of people interviewed

Financial institutions

XacBank

L. Soronzonbold, Director of Strategic Planning and Marketing Division
S. Naranbaatar, Director of Information Technology department
S. Munhbold, Director of Rural lending Department, Strategic Planning and Marketing Division
D. Erdenechimeg, Director of Internal Audit Department
Mr. Mujali, IT consultant

XAAN bank

D. Enhbold, Head of Information Technology Department

Trade and Development Bank

E. Enhbold, Head of Information Technology Department

Golomt bank

Mr. Bayarsaikhan, IT manager

Post Bank

B. Nyamsuren, Senior Specialist

Government agencies

Bank of Mongolia

Erdenechimeg, Director of National Clearing and Switching Center
O. Tsogtbileg, Payment instrument specialist
J. Ganbaatar, Director of Policy Regulation Division
J. Tsogtsaikhan, Auditor, Policy Regulation Division

Information and Communications Technology Authority

A. Munkhbat, Director General, Policy Implementation and Coordination department

Private sector providers

Magicnet, Ltd, internet service provider

Sh. Battsolmon, Marketing Manager

ZTE Corporation, a communications company

U. Otgontugs, Sales Manager

BeverTech, a hardware supplier

A. Amarjargal, CEO

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World Wide Web resources:

Asian Development Bank Institute: www.adbi.org

BASIX: www.basicindia.org

Technology resource center, Consultative Group to Assist the Poor: www.cgap.org/technology

Digital Dividend project: <http://www.digitaldividend.org/>

Microfinance Gateway: www.microfinancegateway.org

Microsave: www.microsave.org

Planet Finance: www.planetfinance.com

Prodem: www.prodemffp.org