Smart Cards

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Smart Cards can be used for financial services, such as managing savings accounts, disbursing loans, or making transfers. During enrollment, all relevant client information, account balances, and individual credit or other limits are loaded onto the card through a recording device attached to a PC. Some unique form of personal identification, such as the numeric markers of the client's fingerprint, may also be stored on the card. *(See the **Biometrics Technology** article of the CGAP IT Innovation Series for more information.)* During visits to a branch office, the Smart Card functions as an electronic passbook on which transactions can be recorded once, speeding up the process and improving accuracy.

Who Should Consider Smart Cards?

Microfinance institutions (MFIs) that seek to automate transactions for clients or are attempting to reduce the use of paper in operations may consider Smart Cards, using smart card readers. Smart Cards may be part of a fully-computerized information system that can transmit data from a central site to the client instantly. As part of an integrated system, however, implementing Smart Cards generally requires the purchase and implementation of associated technologies, such as automated teller machines (ATMs) or personal digital assistants (PDAs), and may function effectively only with reliable electric and communications networks. *(See the articles on **ATMs** and **PDAs** of the CGAP IT Innovation Series for more information.)*

How Do Smart Cards Work?

A Smart Card is a wallet-sized plastic card with an embedded computer chip that can process information (microprocessor chip) or simply store data (memory chip). Smart Cards also come in the "contact" and "contactless" varieties. A contact Smart Card is inserted into a smart card reader that connects to the card's conductive micromodule (typically a gold plated area on the surface). Through this connection, software on a personal computer (PC) or ATM may transmit commands and data to the reader and the Smart Card.

A contactless card can be held two to three inches away from the reader because the reader and the card are designed with antenna. Despite providing a very fast card interface, the cost of these cards and readers generally restricts their use to high-volume access applications, such as for automatic, no-stop highway toll plazas.

Smart card technology is partially standardized. Chip operating systems (COS) are typically proprietary to the card manufacturer, whereas reader interface systems follow standards such as Javacard, Open Platform, and PC/SC to ensure

that smart cards are compatible in various readers. The EMV (EuroPay, MasterCard, Visa) standard is becoming the norm in the financial services market, and most manufacturers plan to comply with this.

Requirements for Smart Cards

- Reliable electrical power for card readers
- Dial-up facility to periodically update central processing site
- Processes, policies, and staff resources for handling lost, stolen or damaged cards and enrolling clients
- Software integration between cards, readers, and central management information system (MIS)

Benefits and Costs of Smart Cards

Benefits

- Automated transactions
- More secure user identity and account information
- Built-in limits on credit and other accounts
- With stored data, less or no need for reader to access central server
- No repetitive form filing
- Quicker MFI administrative functions
- Improved transaction accuracy

Costs

The following are indicative costs for contact cards with microprocessor chips, since these are the most commonly used smart cards for microfinance applications.

- US$ 6–$ 10 per card.
- US$ 100–$ 300 for each card reader (Card Acceptance Device, or CAD)
- Set-up or installation fee to deploy card readers
- Monthly or annual service fee for support
- Communications charges (modem dial-up, leased lines)

Microfinance Implementations

Few microfinance institutions have adopted smart card technology but the following examples illustrate its potential.

Prodem FFP (Bolivia)

Prodem FFP in Bolivia introduced Smart Cards to reduce the operating costs of serving rural areas. Through Innova, a local integrator, Prodem FFP introduced Smart Cards in 2000 to prepare the way for an eventual Smart ATM (SATM) rollout. *(Details of the SATM and its use of fingerprint technology are covered in the* ***Automated Teller Machines*** *and* ***Biometrics Technology*** *articles of the CGAP IT Innovation Series.)* Using Smart Cards and readers furnished by GemPlus, Innova developed software to populate the Smart Card with client identification information, including three fingerprint templates, and with client financial data from Prodem FFP's transaction processing system. Clients are charged a US$ 10 enrollment fee and a US$ 7 annual usage fee for the card.

With both smart card and fingerprint readers at its 54 branches, Prodem FFP offers clients a quick means of conducting financial transactions. As an electronic passbook, the Smart Card eliminates paper transactions and enables customers to initiate money orders, currency exchanges, cash deposits, and withdrawals directly with MFI staff who use PCs. Prodem FFP has also introduced "balance checking only" stations to reduce wait

times for clients with information requests. All transactions are immediately reflected on the client's card, and Prodem FFP's central servers are updated twice daily rather than real-time, to save the cost of a permanent Internet connection.

Prodem FFP has realized a number of benefits from implementing Smart Cards. Waiting lines for tellers have dropped dramatically since many cardholders who wanted to check their balances can now do so without assistance. The integrated Smart Card, ATM, and fingerprint identification technology has given Prodem FFP a competitive advantage and attracted depositors who appreciated the system's speed and convenience. Although Prodem FFP's system now offers only savings, transfers, and loan disbursements, Smart Cards are flexible enough for Prodem to envision introducing and smoothly delivering additional financial services.

SKS Microfinance (India)

In a year-long pilot project completed in May 2002, SKS Microfinance in southern India coupled Smart Cards with personal digital assistants (PDAs). Using Smart Cards, SKS aimed to save loan-officer time at client center meetings, reduce error rates associated with manual record-keeping, and more rapidly obtain data for management reporting and monitoring. It also envisioned creating a technology infrastructure through which flexible services such as emergency loans, credit scoring, real-time application processing, and automated cash access could be delivered. The cost of Smart Cards at US$ 3.40 each was reasonable.

After using the smart card and PDA combination in two client centers for one year without experiencing technical problems, SKS achieved greater accuracy in recording transactions, and more efficient data delivery to the central MIS. But the key benefit of higher loan officer productivity was not as significant as expected. As loan officers became more efficient at manually processing transactions while conducting center meetings, the incremental benefit provided by the PDA and smart card system became less meaningful. *(See article on **PDAs** in the IT Innovations series for more information.)*

Although loan officers and clients had readily adopted the technology, SKS decided against further implementation in light of the high cost of the project and the limited benefit for loan officers. Up-front development costs had exceeded $125,000, and further investment of scarce resources was not merited. Nonetheless, SKS Microfinance's pilot demonstrated that poor, illiterate clients were able to use Smart Cards and to understand their benefits, making the technology a viable infrastructure for providing additional services in the future.

Lessons for Implementation

Define success up-front

During the planning stage, management must be clear about how the implementation will be judged, and have clear expectations about what benefits the technology will provide. For example, the team should set an objective of realizing 20% time savings in loan analysis or in group meetings, and err on the conservative side in working out cost-benefit estimates. Often, the technology does not reap the anticipated benefits, and if those benefits are marginal, the cost may not be justified.

Conduct phased implementations

For SKS, conducting a pilot project in two of its many client center meetings gave the organization a chance to evaluate client comfort with the technology, loan officer adaptation to new processes, and cultural or environmental factors that may not have been considered during the planning phase. A phased implementation will often reveal very clearly how effectively the technology solves problems, making decision-making easier.

General guidance

For an MFI contemplating a smart card program, the following guide from **www.smartcard-basics.com** may be helpful:

- Is there a clear business case, including financial and consumer behavior factors?
- What information is desired for storage on the cards?
- Will the system be single or multi-application?
- Will card data be obtained from a database? Or loaded every time?
- Will this data concurrently reside on a database?
- How many cards will be needed?
- Are card/infrastructure vendors identified? What are the lead times?
- What are the security requirements?
- Does all or only some of the data need to be secure?
- Who will have access to this information?
- Who will be allowed to change this information?
- In what manner shall this data be secured, i.e., encryption, host passwords, card passwords/PINs, biometrics or all of these?
- Should the keys/PINs be customer or system-activated?

To Learn More

Smart Card providers

Geisecke & Devrient, **http://www.gdm.de/**
Gemplus, **http://www.gemplus.com**
Keycorp, **http://www.keycorp.net/**
Oberthur, **http://www.oberthur.com**
Orga, **http://www.orga.com**
Schlumberger-SEMA, **http://www.slm.com**
TTI-Cardtech, **http://www.tti-cardtech.com**

CGAP has not reviewed their products nor does it endorse them in any way.

Organizations surveyed

SKS Microfinance, Vikram Akula,
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Industry resources

Smart Card Alliance,
http://www.smartcardalliance.org/
Global Platform,
http://www.globalplatform.org/
EuroSmart, **http://www.eurosmart.com/**
Java Card Forum,
http://www.javacardforum.org/
PC/SC Workgroup,
http://www.pcscworkgroup.com/
U.S. General Services Administration's eStrategy,
http://estrategy.gov/smartgov/tutorial/tutorial_t1/smartcard_t1.cfm
Smart Card Basics,
http://www.smartcardbasics.com

Other resources

World Resources Institute's *Digital Dividend Project,* **www.digitaldividend.org**