



**INNOVATIVE TECHNOLOGIES IN MICROFINANCE
FOR LATIN AMERICA:
BUILDING EFFECTIVE DELIVERY CHANNELS**



Summary of the Microfinance Workshop on the use of information technology
to deliver financial services, San Jose, Costa Rica, October 16-17, 2003

Final Report

by

**Sergio A. Castello, Ph.D.
University of Mobile**

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EXECUTIVE SUMMARY

Microfinance has grown rapidly in developing countries over the past 15 years. The earliest microfinance institutions, (MFIs) appeared in Bolivia, Bangladesh and Indonesia during the 1980's. Today, the number of microfinance institutions worldwide exceeds 10,000. Microfinance is emerging as a pragmatic financial approach to provide financial services to micro-entrepreneurs, small and medium-size firms not able to secure credit in the formal financial system.

As profit margins continue to decline, financial institutions are forced to find new ways of providing better customer service while at the same time reducing transactions costs. Recent experiences suggest that the innovative use of existing technologies such as automated teller machines, (ATMs), smart cards and phones, personal digital assistants, (PDAs), mobile technologies, and remote transaction services can significantly improve quality of service and customer satisfaction, increase data collection and analysis, and reduce transactions costs.

Economic success is increasingly linked to *unconventional* new business models with the ability to control and manipulate *information*. This new economic milieu suggests a radical shift in company strategy and industry economics, particularly for the financial sector, which now must be part of the knowledge and information economy to survive and successfully compete in this new world of digital convergence. Financial corporations need to do more than just adapt, they need, to some considerable degree, redefine and re-architect themselves. The widespread use of information technology (IT) will increase when it becomes easier, more convenient, reliable, and secure for consumers. In this new IT world, technologies that will matter most will be *Web-based services* increasing the uninterrupted *interconnection and digitization* of businesses and consumers.

Latin America has experienced limited growth in microfinance particularly in larger countries like Argentina, Brazil, Mexico, and Venezuela, where there are almost seven million possible clients and less than half a million active customers. Smaller nations in Central and South America have reached higher levels of market penetration tapping already more than 50% of their actual markets. Challenges facing the industry in Latin America are three fold; first, finding a technology that can break the existing paradigm in larger nations; second, expanding the offering of other financial products, and finally re-evaluating the idea of serving the poorest and finding sustainable ways to serve them.

Two new and innovative delivery channel concepts are *mobile finance and remote transaction systems*. *M-finance* promises financial firms to better service their customers by providing the freedom to conduct financial transactions when and where users choose, in some instances it helps users overcome the shortcomings of physical infrastructure by introducing new products and services. Mobile finance allows users the ability to access financial information, manage financial transactions, and make choices related to

purchases via wireless or Internet enabled devices. *Remote transaction systems* allow third-parties to intermediate cash deposits and withdrawals thanks to the automation of the customer interface. This technology permits for safe cash disbursements, electronic data collection, transaction origination, and in-field distribution of information to customers and loan officers.

Microfinance delivery channels in Latin America contribute to the reduction of personal contact in branches favoring self-service transactions through mobile and virtual banking, ATMs, smart cards, and PDAs. Each delivery technology provides significant benefits for MFIs, but most have yet to be proven sustainable through in –depth cost-benefit analysis, especially when applied in rural areas that have limited usage and connectivity. These technologies cannot replace the human interaction that is so important to providing successful financial services, especially to the poor. Most customers prefer personal contact transactions, rather than automated or Internet based services; thus, financial institutions must carefully consider ease of use, client technology familiarity, language preferences and literacy when designing such costly technology-driven delivery channels.

The growth and success of MFIs in Latin America depend on first, the adoption of new technologies in delivery channels like ATMs, smart cards, and PDAs; second, the successful implementation of virtual delivery channels such as mobile finance and remote transaction systems, and third, the degree of cooperation and alliances among MFIs to reduce IT investment cost and to increase standardization reaping economies of scale and scope.

INNOVATIVE TECHNOLOGIES IN MICROFINANCE FOR LATIN AMERICA: BUILDING EFFECTIVE DELIVERY CHANNELS¹

I. INTRODUCTION

Microfinance has grown rapidly in developing countries over the past 15 years. The earliest microfinance institutions, (MFIs) appeared in Bolivia, Bangladesh and Indonesia during the 1980's. Today, the number of microfinance institutions worldwide exceeds 10,000. This industry is most developed in Latin America and Indonesia, less developed in Asia and just beginning in Africa (Holden, et. al., 2002).

While there is no universal definition of microfinance, the term generally refers to the provision of credit to low income clientele who own few physical or financial assets and have little access to conventional financial institutions. The size of microfinance loans is typically small, the term of the loan is short and the interest rate is high. Multilateral development institutions, national aid agencies and private foundations and corporations are increasingly providing support to microfinance institutions as a tool for alleviating poverty and promoting economic development (Holden, et. al., 2002).

Microfinance is emerging as a pragmatic financial approach to provide financial services to micro-entrepreneurs, small and medium-size firms not able to secure credit in the formal financial system. It seems as if microfinance is becoming a viable and permanent part of the financial system of many Latin American nations.

The playing field for financial institutions in Latin America has also become an increasingly competitive marketplace. Globalization, financial sector liberalization, falling profit margins, and ongoing industry consolidation have forced many financial

¹ This paper has been drafted from the microfinance workshop on the use of information technology to deliver financial services "Innovative Technologies in Microfinance for Latin America: Building Effective Delivery Channels," San Jose, Costa Rica, October 16-17, 2003 sponsored by CGAP, IADB/MIF, CAF, and Pro-Fund Internacional.

institutions to reconsider their strategies. Banks are challenged to reduce costs dramatically to maintain market share, many downscaling or moving down market putting additional pressure on MFIs to be more competitive and efficient. As profit margins continue to decline, financial institutions are forced to find new ways of providing better customer service while at the same time reducing transactions costs. Recent experiences suggest that the innovative use of existing technologies such as automated teller machines, (ATMs), smart cards and phones, personal digital assistants, (PDAs), mobile technologies, and remote transaction services can significantly improve quality of service and customer satisfaction, increase data collection and analysis, and reduce transactions costs.

The purpose of this paper is to focus on the use of innovative existing technologies to building effective delivery channels in the microfinance industry of Latin America; thus, enabling MFIs to use delivery channels, leveraging cutting-edge information and communication technologies, to reach a wider client base with more products and services while reducing costs. Consultative Group to Assist the Poor, (CGAP), Inter-American Development Bank, (IDB) and Multilateral Investment Fund, (MIF), Corporacion Andina de Fomento, (CAF), and Pro-Fund International, S.A. provide funding, guidance and knowledge dissemination to improve the success of the use of information technology, (IT) to effectively deliver financial services in microfinance for Latin America and other regions of the world. These institutions channel funding directly to projects that demonstrate the benefits and sustainability of innovative technologies to guide financial corporations determine the appropriate delivery channel technology and

reduce the total cost of implementing such technology. Pro-Fund International also acts as a private investor in financial institutions in Latin America and the Caribbean.

Section II will explore the evolution of the information technology revolution, its banking applications, and its economic potential linked to *unconventional* financial business models with the ability to control and manipulate *information*. Section III will look at the IT microfinance innovations and its trends in delivery channels of bringing technology and service to the customer's location by using PC kiosks, pension trucks, and mobile phones and will also examine the new and promising delivery channel of *mobile banking*. Section IV will analyze the integration of delivery of financial services and its remote transactions services solution to increase customer satisfaction and data analysis, and reduce transactions costs. Section V will shed some light to financial services and its delivery technologies such as ATMs, smart cards, and PDAs. Section VI will describe the experiences and challenges facing MFIs in their quest to building mobile, virtual and self-service effective delivery channels, and section VII will provide some concluding remarks and recommendations.

II. THE INFORMATION TECHNOLOGY REVOLUTION AND ITS BANKING APPLICATIONS²

A new economic paradigm continues to gather support in part to the explosive surge of technology and its effect on the globalization of nations and the transformation of industries and corporations thanks in part to the acceleration of the *information technology revolution, (ITR)*. This is happening not only in the industrialized nations of Western Europe, North America, and Japan but also in the developing world of Latin America.

² Ignacio Trejos (2003), "Introduction of Innovative Technologies in Microfinance for Latin America" workshop presentation (Cenfotec), San Jose, Costa Rica, October 16-17.

The evolution of the ITR means traditional factors of production-capital, labor, and natural resources-are no longer the main determinant of economic growth. Now, economic success is increasingly linked to *unconventional* new business models with the ability to control and manipulate *information*.

Simply put, the *new economy* seems to be in an accelerated state of continuous change in this global and technological business environment. Some of the most obvious signs of change are in fact among the root causes of it through the rise of a homogeneous global customers and the revolutionary technological advances in the last decade such as new powerful personal computers, high speed and wireless telecommunications, and the Internet. More importantly, this new economic concept seems to be focused on organizing work around this new environment, and not just producing these new technologies.

Business today encompasses a world in which people work with their brains instead of their hands, information and communication technology creates global competition; and mass customization and personalization has become critically important for the success of corporations. Simply put, the industrial economy has given way to an *information economy*.

Some economists argue that economic development is a spontaneous and discontinuous change in the channels of flow, which alters the equilibrium previous existing. For them technological change in the form of invention and innovation is the foundation for modern economic development.

2.1. The evolution of the information technology revolution

The ITR started in the 1940s and gained momentum with the microprocessor in the 1970s, exploded with the World Wide Web in the mid 1990s, and it has brought us the age of the *Internet* and the *digitalization* and *interconnectivity* of commerce in the 2000s.

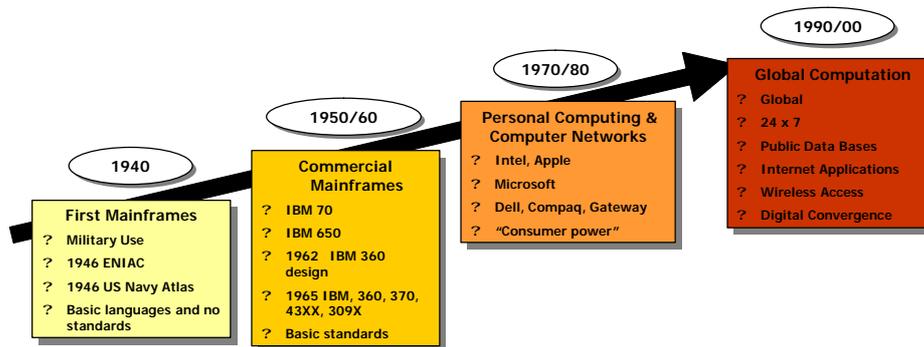
In the 1970s, mainframe computers were replaced by cheaper minicomputers (Intel introduced its 4004 microprocessor in 1971). In the 1980s, minicomputers declined as consumers shifted into cheaper, more flexible PCs and servers (IBM entered the market with its personal computer powered by the Intel 8800 chip and operated by Microsoft Disc Operating System, MS-DOS, in 1981, Compaq Computer cloned the IBM machines in 1982, and Apple introduced its Macintosh computer with its user-friendly icons, attached mouse, and preloaded software in 1984).

In the 1990s, Nokia revolutionized the wireless communications industry and millions of consumers with networked PCs gave rise to the World Wide Web in 1991, Intel introduced its first of several Pentium chips in 1993, Netscape Communications launched Netscape Navigator, the leading software browser for the emerging Internet, and Yahoo developed a system for locating material stored on the Internet in 1994), the ITR began and the Internet exploded in 1996.

In the 2000s, millions of people with laptops, handheld computers, PDAs, and cell-phones have spurred the rapid development of wireless networks and technologies thanks in part to Intel, Hewlett-Packard, Palm, Blackberry, Microsoft, Nokia, and others. Today, as fast Net access continues its rapid growth, it most likely will spark new ways of using the Internet that were not even imaginable a few years back.

The ITR has evolved from the mainframe with standard system of the 1940s to the digital convergence, wireless laptop, and open standard systems of the 2000s (see graph 2.1).

Graph 2.1: Information Technology Evolution



Marco Carvajal, 2003
I. Trejos, 2003 (adapted)

2.2. The adoption of the Internet and its explosion

The ITR does share parallels with previous new inventions such as electricity, railroads, and cars, but at the same time, it differs in the fact that the information technology industry enjoys increasing returns to scale. Thus, these underlying technologies not only are not slowing down instead they are accelerating. Computer-chip performance keeps doubling every 18 months (Moore's Law), and disk drive capacity and Internet connectivity speeds are improving even faster. The Internet has reached the same level of media adoption as the TV and radio, in only five years compared to 50 and 78 years

respectively; thus, spurring new products and services in all sectors from manufacturing to health care, education, banking, and microfinance.

The customer is now in the driver seat, consumer sovereignty continues to increase and firms continue to adapt to the new market realities. This new economic milieu suggests a radical shift in company strategy and industry economics, particularly for the financial sector, which now must be part of the knowledge and information economy to survive and successfully compete in this new world of digital convergence .

As Internet usage, led by the United States, Western Europe, and Japan, increases in Latin America and the Caribbean, this will require big transformations in corporate strategy and information technology spending. MFIs are still in the initial phases of implementing innovative technologies to building effective delivery channels; thus, they must continue investing in IT to become more efficient, and provide new products and superior customer service.

2.3. The Internet and its banking business applications

This new economic milieu has begun to fundamentally alter the way in which business models create economic value. Information technology, (IT) has brought new efficiencies in real-time information exchange, inventory management, and productivity growth, also translating into higher living standards and prosperity for consumers. It has also shed some new light in the way economists and business people look at economic systems. For example, physical products matter less, distance has vanished, time is collapsing, and brainpower is everything. Moreover, consumers continue to gain exciting new powers, producers have boundless new opportunities, and transactions are now a one-to-one game.

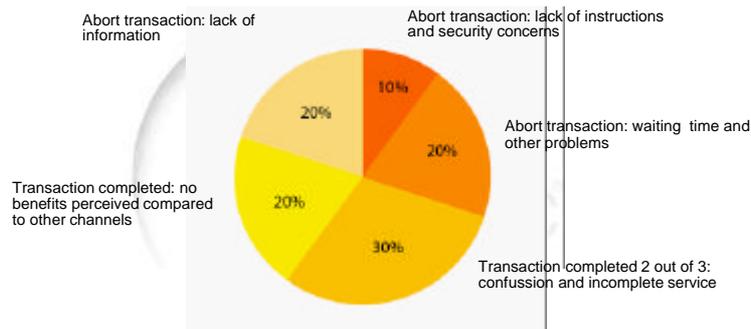
Some scholars say that *information* will be the currency of the 21st century. Physical products matter less because the processing and distribution of information is widespread and cost-effective. The world is one's customer and one's competitor. Geography and location have always played a key role in business and trade. Now businesses can connect instantly with customer around the globe. Instant interactivity is imperative for business success. It also creates a huge premium on instant response and the ability to process, learn, and adapt to the new market place in *real time*.

Moreover, knowledge is mobile and invisible. The creation of shareholder value is being leveraged from *ideas*. Value rises exponentially with market share. Products that help establish a new platform or standard become free. In this case, value does not come from scarcity but from abundance.

Internet usage has evolved from publishing information, to providing access and sharing information, to engaging in e-commerce transactions, but most importantly to creating new business models from the consumer's Internet experience. As shown below only 20% of consumers complete Internet transactions but experienced no extra benefits compared to other delivery channels. It is estimated improving the Internet consumer experience will result in an increase to 50% of more active and profitable customers (see chart 2.1).

Chart 2.1: Banking Sector Problems and Experience

Banking Sector: Problems and Experience



Improving the consumer experience, 50% will become active and profitable consumers.

Andrea Tanzi, 2002 (adapted)

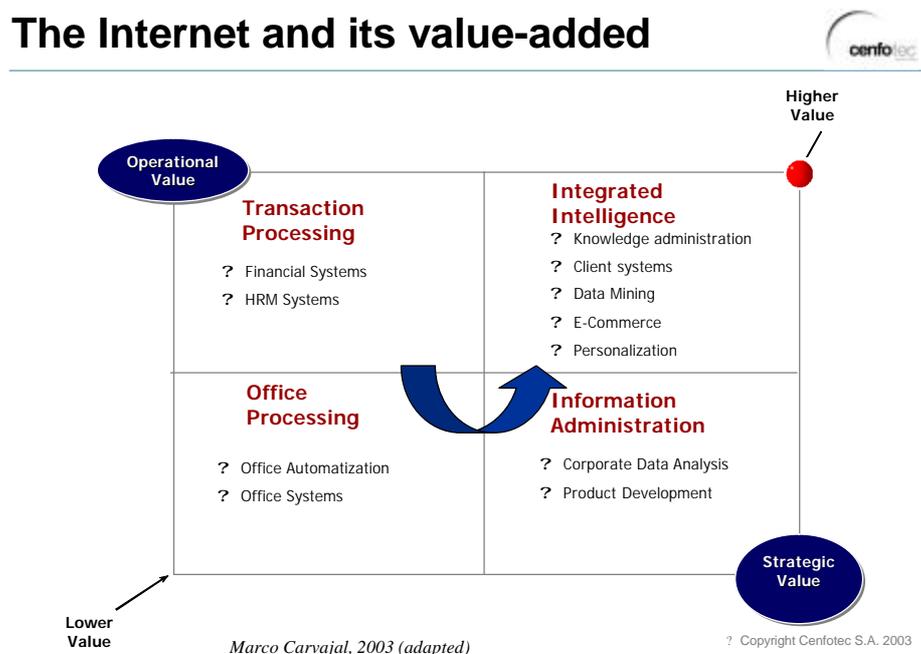
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Personalization of products and services is becoming even more important particularly in the microfinance sector. Companies are finding easier and more profitable to customize products and services, and consumers are beginning to demand price transparency and customization. The shelf space of the Internet is unlike any other in that it has no boundaries. Artificial constraints on choice are being replaced by the ability to demand customized products and services anytime anywhere. Banks and other financial institutions are now in the *knowledge* and *information* business, as well as, in the *customer satisfaction* business.

Information technology such as the Internet, cell phones, palm pilots, laptops, and simputers allow financial institutions to improve their business models and create value from an *operational* and *strategic* perspective through the integrated intelligence of

knowledge management and data mining, client systems, personalization, e-commerce and customer satisfaction (see chart 2.2).

Chart 2.2: The Internet and its Operational and Strategic Value-Added



IT cannot only create value-added through intelligence integration, but also it can assist financial institutions in the areas of improving and expanding the reach and richness of client relationships, increasing the level of client empowerment, better understanding of customers' financial needs and business opportunities, promoting financial communities supported by firms' open standards, and increasing the offering of complementary services for commercialization, procurement, logistics, payments, and communication.

In short, financial corporations need to do more than just adapt, they need, to some considerable degree, redefine and re-architect themselves. The widespread use of IT will increase when it becomes easier, more convenient, reliable, and secure for consumers. In this new IT world, technologies that will matter most will be *Web-based services*

increasing the uninterrupted *interconnection and digitization* of businesses and consumers.

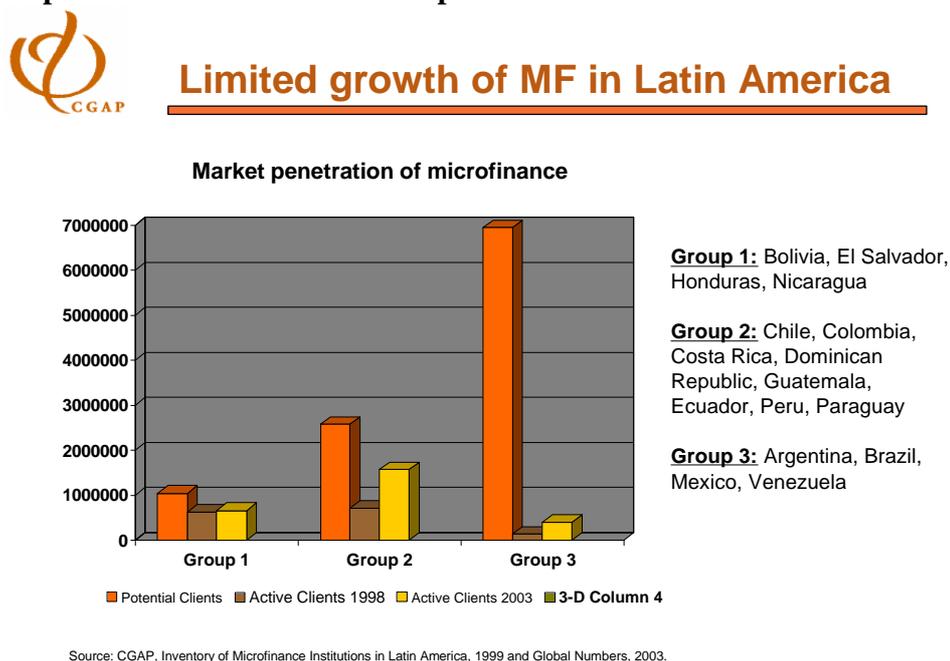
III. MICROFINANCE INNOVATIONS AND TRENDS IN DELIVERY CHANNELS³

MFIs increasingly regard IT as a means to expand outreach, improve efficiency, and provide high quality financial services to poor clients. In Latin America, some financial institutions aim to use IT services to compete with commercial banks that view microfinance as an attractive growth sector and are entering the field by *downscaling*. This region has also experienced limited growth in microfinance particularly in larger countries like Argentina, Brazil, Mexico, and Venezuela, where there are almost seven million possible clients and less than half a million active customers. Smaller nations in Central and South America have reached higher levels of market penetration tapping already more than 50% of their actual markets (see graph 3.1).

Some of the challenges facing the industry in Latin America are three fold; first, finding a technology that can break the existing paradigm in larger nations; second, expanding the offering of other financial products, and finally re-evaluating the idea of serving the poorest and finding sustainable ways to serve them.

³ Matthew Harvey (2003), "Innovations and Trends in Delivery Channels," (FIC), Xavier Reille and Gautam Ivatury (2003), "IT Innovations in Microfinance," (CGAP), and Hany Assad (2003), "Mobile Financial Services in Emerging Global Markets," (IFC) workshop presentations, San Jose, Costa Rica, October 16-17.

Graph 3.1: Microfinance market penetration in Latin America



3.1. Microfinance trends and delivery channels in developed and developing markets

Microfinance traditional channels continue to dominate in *developed markets* where the primary methods of conducting banking transactions are branches with 58% of channel delivery, and business bankers with 27%. These two channels comprised 85% of the primary methods of conducting financial transactions. Telephone and online banking delivery only comprised 12% and 3% respectively.

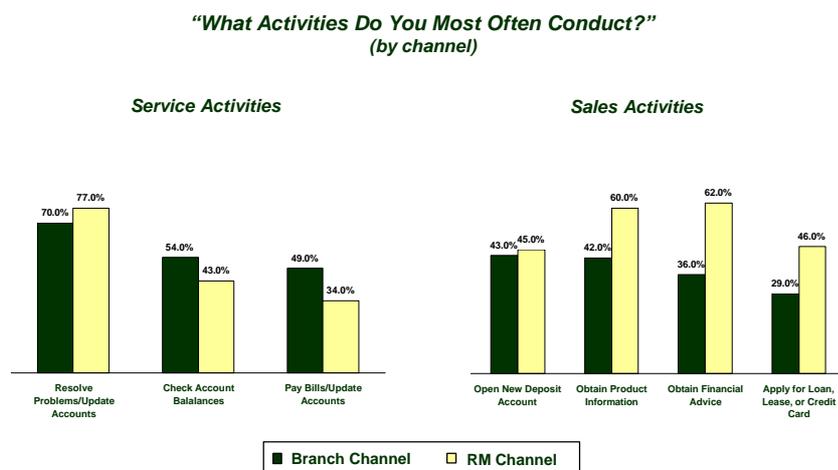
Small and medium enterprises, (SMEs) mainly rely on branches for service activities such as resolving problems, checking account balances, paying and updating bills, sales activities of opening new deposit accounts, obtaining information and financial advice, and applying for loans (see graph 3.2).

However, the effective delivery of micro-loans in developed markets require information and back-office technology to engage in activities such as direct mail

offering of pre-qualified credit, credit scoring and database marketing, and increase customer convenience and satisfaction.

Graph 3.2: Financial Service and Personal Contact

SMEs rely on personal contact for both service and sales



*As a percentage of small businesses using the branch
Source: FIC Analysis



(RM Channel refers to Relationship Managers or Personal Bankers Channel)

For example, Wells Fargo’s integration of IT has improved its customer service by offering pre-qualified moderate credit limits and a card platform with check access, signature-only application (no financial documentation needed), no application or closing fees, low introductory rate, fast cash disbursement, and Web-based service channel. It has also streamlined its back-office in terms of credit scoring by automating credit decisions, credit risk standardization, and database mining by leveraging third party databases, identifying target markets, engaging in risk pricing, generating mailing lists, and automating portfolio reviews.

The use of IT in Wells Fargo's lending practices has catapulted the firm into the largest US lender to SMEs, created a platform for cross-selling opportunities; commoditized unsecured lending, and pioneered national-scope lending.

At the same time, personal contact is critically important in *developing markets* because communication technology is less widespread and the microfinance industry relies mainly on human contact and word of mouth.

A leader in microfinance Banco Solidario in Ecuador uses mainly branches and bankers or loan-officers reaching 45% of its customers through bankers in the field and 45% of its new customers are referred by existing customers. Bank Dagang Bali in Indonesia sends its bankers in the field by sending a cashier and a teller to collect savings deposits and loan payments. Microfinance delivery in developing markets uses few IT channels, but instead it delivers mobile finance with human contact to customers' sites, where micro-lending in developed markets is channeled to their clients through the mail system in a non-personal manner.

MFI's in developing markets use IT in the back-office to reduce costs in application processing, Banco Solidario in Ecuador uses handheld computers to input loan applications, FinComun in Mexico provides Palm Pilots to bankers for on sight loan analysis, and other institutions process small loans through their credit card platforms.

In credit approval and loan disbursement, Banco Solidario leverages payment histories for prior and existing clients to approve new loans, other financial institutions have developed proprietary scorecards for use in loan approval, and Banco Bradesco in Brazil provides access to loan funds online through a virtual Visa card.

In portfolio management, Banco ADEMI in the Dominican Republic uses sophisticated information systems to track its micro-loan portfolio and other banks use early warning systems to notify them of delinquent accounts.

In short, customers in both developed and developing countries rely on branches and loan officers for their financial services needs, but MFIs in developing markets do bring human contact to customers' sites. Financial institutions in developing countries do use IT to reduce cost and improve efficiency in the areas of application processing, loan approval, cash disbursement and portfolio management.

3.2. New microfinance delivery channels

There are new microfinance delivery channels being used in India and African nations that bring technology and service to the customer's locations by using PC kiosks, pension trucks, and mobile phones (see table 3.1).

A new and promising delivery system is the concept of mobile banking discussed in the following section. As new technologies and new delivery channels are adopted by banks and consumers, such technologies span the value-chain in product development and marketing, account opening, transaction processing, account maintenance, and risk management.

Table 3.1: Microfinance and New Delivery Channels

New microfinance delivery channels

PC Kiosks in Villages (India)

- ✦ Operator is a secondary school graduate who pays ~US\$ 1,300 to start up
- ✦ Connectivity provided through wireless in local loop (WLL) technology
- ✦ Services: e-governance, agriculture info, video message and health diagnosis
- ✦ Banking and insurance services can be delivered through the operator

Pension “Trucks” (S. Africa)

- ✦ 300 vehicles with biometrics, smart cards, cash dispensers (1.7m clients)
- ✦ Deliver US\$ 150 million in pension and grant payments each month
- ✦ Banking and insurance services can be delivered through the vehicles

Mobile Phones (Nigeria, Kenya, S. Africa, Zambia, etc.)

- ✦ Anytime, anywhere using SMS – 38m mobile users in Africa by end-2003¹
- ✦ Mid-to-large banks across Africa installing mobile banking applications
- ✦ Balance inquiries, transactions, alerts, account service, promotions

1. Mediatoolbox, 11/02

3.2.1. Mobile Finance

A new and innovative delivery channel concept is *mobile finance* or *m-finance*, which promises financial firms to better service their customers by providing the freedom to conduct financial transactions when and where users choose, in some instances it helps users overcome the shortcomings of physical infrastructure by introducing new products and services. Mobile finance allows users the ability to access financial information, manage financial transactions, and make choices related to purchases via wireless or Internet enabled devices.

M-finance includes three main tasks; mobile banking, mobile payments, and remote banking. Mobile banking assists customers in balance inquiries, transfer requests, bill payments, buy/sell trading orders, and other service enquiries. Mobile payments occur via network of customer’s mobile operator through deduction from account, debit or

credit card, direct charge to mobile bill, and deduction from stored value on mobile device. Finally, remote banking is work-line financial services such as information, customer support, or transactional needs of financial services professional conducted using data capabilities of mobile/portable devices.

The value-added vision of mobile financial services is two fold. First, it enables the consumer to stay connected to relevant financial information, markets, or home office systems from any location where wireless coverage exists; such flexibility introduces a powerful element of freedom and control. Second, it gives the consumer an alternate channel through which to conduct transactions, particularly important in nations where bills are traditionally paid in person.

Moreover, it provides the financial services institutions, (FSIs) with an additional delivery channel maintaining closer contact with customers while reducing operational overhead. It strengthens the overall customer relationship with the potential to increase account activity or size, while ensuring that the customer's needs are met at anytime from any place. As supporting technologies evolve the viable concept of m-finance services will most likely improve as well.

Banks expect to increase spending on mobile financial solutions, (MFS) from \$232 million to \$1.7 billion over the next four years, or almost eight fold, but such investments alone will not ensure customer adoption, instead synergies between technology capabilities and population cultural/behavioral patterns must exist to ensure user acceptance.

Financial institutions are mainly allocating funds to MFS to enhance brand recognition and increase customer satisfaction. In the near term, mobile banking is more likely to

provide product and competitive differentiation and cross-selling opportunities rather than revenue generation.

For example, mobile payments have been successfully implemented in supply-chain management in Zambia (Celplay product offered by Fundamo), where a beverage distributor accepts payments transferred from customer's mobile devices upon delivery of supplies to small and large retail shops, reducing risks associated with cash handling and fraud.

On the retail side, Celplay has acquired 2,000 subscribers over four months who use mobile devices for payments at petrol kiosks and for pre-paid air-time. The product functionality includes money transfer, bill payment, B2B and B2C transactions, balance inquiry and wire transfer with user costs between 1.5-2.5% of transaction amount.

There are several limitations in today's remote mobile banking model. It is not ready for wireless yet, it is too costly, and the network is not available to support rural villages. The PDA-based model seems to be an effective cost-savings and productivity tool based but hard to implement due to both technology shortcomings and lack of organizational support, and smart card solutions require basic infrastructure, which currently does not exist in many developing nations and even some developed nations.

The growth in the microfinance sector in Latin America is still hampered by the low penetration rate in the use of the Internet and mobile phones. Large and small countries in the region will not achieve up-scaling unless the majority of customers become more familiar with the usage of the innovative technologies described above. Only then, Latin American microfinance institutions may enjoy increased growth from these three sources; first, by the adoption of new technologies and delivery channels such as PC kiosks,

pension trucks, smart phones, PDAs, ATMs, and smart cards; second, by providing customers the freedom to conduct financial transactions anytime anywhere thanks to mobile finance; and third, by developing and customizing new products and services targeted to meet the client's specific needs and to adapt to the country's e-readiness infrastructure.

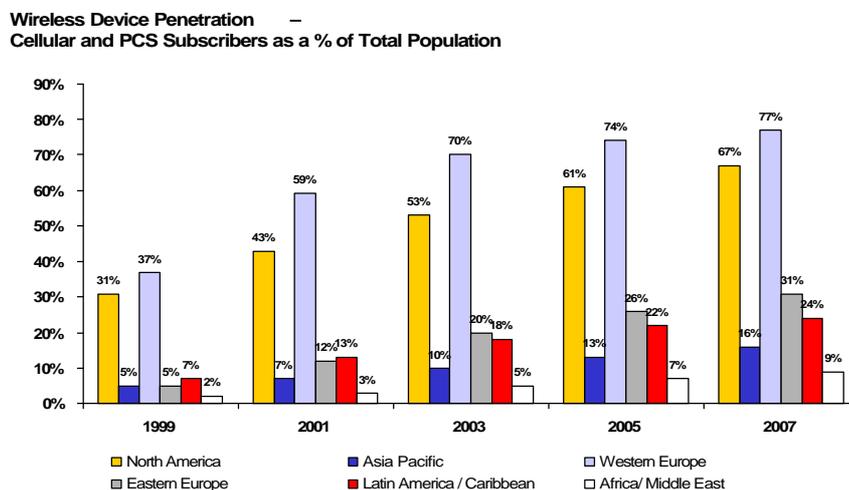
IV. INTEGRATED DELIVERY OF FINANCIAL SERVICES: REMOTE TRANSACTION SERVICES SOLUTION⁴

Mobile banking allows users the ability to access financial information, manage financial transactions, and make choices related to purchases via wireless or Internet enabled devices. Integrated systems combine hand-held computers, smart cards, and sophisticated back-end infrastructure to automate credit decisions and transactions. These systems can extend outreach by enabling remote transactions, improve customer service by facilitating on-demand credit approvals, and reduce transaction cost by freeing up branch staff to handle less routine transactions.

The IT sophistication and e-readiness of countries can be measured by wireless penetration and its usage in financial services. The wireless device penetration is highest in Western Europe and North America with rates of 70% and 53% respectively and lagging in Africa, Latin America and Caribbean nations with rates of 5% and 18% respectively as of 2003 (see graph 4.1).

⁴ Laura Frederick (2003), "Mainstream Microfinance: A Scalable Solution," (eChange), William Moss (2003), "Masificacion de Servicios Microfinancieros," (MicroBanx), Juan Carlos Ditmeyer (2003), "Innovative Technologies in Microfinance for Latin America: Innova Empresarial," and Assad (2003), "Mobile Financial Services in Emerging Global Markets," (IFC) workshop presentations, San Jose, Costa Rica, October 16-17.

Graph 4.1: Wireless Device Penetration Worldwide

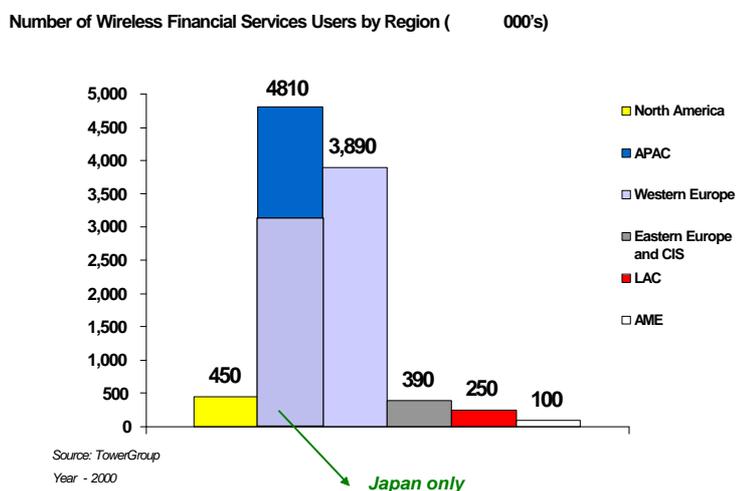


12/19/2003 December 11,
2001



The strength of the wireless infrastructure differs from one country to another impacting the decisions of financial institutions on what services to offer. Consumer receptivity and demand for wireless services also varies by country on existing user habits, their use of mobile and alternative technologies (i.e. the Internet), and the sophistication of the established payments and banking channels. The number of wireless financial users in Latin America and the Caribbean total 250,000, reflecting the low levels of information technology sophistication in these regions; thus, posing a huge impediment to the growth of integrated systems in the microfinance industry (see graph 4.2).

Graph 4.2: Financial Services and Wireless Users



12/19/2003 December 11,
2001



Key elements to growth in this sector may come from three areas: an increase in the points of access to the poorest customers, a reduction of transactions costs across core processes, and an improvement of data standards and information transparency.

Innova and Microbanx are leaders in the microfinance integration systems technology sector. Microbanx is an Internet Business Service provider, (IBSP) which focuses on revolutionizing the operating efficiency of financial institutions by solving their acute problem of inefficient workflow and business processing. It integrates banking software, information content, and support services with modern computing infrastructure, allowing microfinance institutions to use technology on an incremental subscription basis; thus, reducing transactions costs across core processes and improving productivity and data standards.

The next generation processing backbone for financial transactions can increase points of access, reduce transactions costs, and improve data collection by integrating the

functions of customer interface automation and data storage and processing; thus, allowing MFIs to engage in remote transaction services.

4.1. Remote transaction systems

Remote transaction systems, (RTS) allow third-parties to intermediate cash deposits and withdrawals thanks to the automation of the customer interface. This technology permits for safe cash disbursements, electronic data collection, transaction origination, and in-field distribution of information to customers and loan officers. It also increases customer satisfaction by letting clients manage their money more effectively, lower their transactions costs, and provide a greater degree of convenience and time management; moreover, it allows bankers to increase their credibility, improve their equipment reliability, and have a higher degree of transaction confidentiality.

In short, RTS capabilities can include loan repayments/disbursements, savings deposits and withdrawals, electronic capture of transaction data, electronic identification of clients, transaction/clients data analysis, and customization of group and individual lending models. For example, using a RTS platform a loan officer or a third party electronically captures client information and transmits it directly to headquarters eliminating the need for branches and data entry personnel; such information is reconciled immediately and financial firms know exactly how much loan capital they have on-hand.

Such innovative IT architecture yields several benefits to financial institutions and their clients. It is secure via smart card and data encryption, scalable and reliable, extensible and easily integrated with existing environments via web services, manageable and

operational by using standard PC infrastructure, and functions with IT constrained budgets.

The RTS value delivery chain spreads across participants and processes of microfinance from the customer, to the agent network and financial institution, to the clearing house and the financial system. The customer has access to secure and confidential means of payment. He or she saves time, travel, and opportunity cost and gains convenience of payment locations and transaction speed. The agent network attracts new customers, increases foot traffic and related sales, builds customer relationships, and generates fee revenue. The financial company increases data collection, improves data quality, reduces delinquency, expand clients services, reduces transactions costs, and secures expansion of delivery channels.

The clearing house gains data standardization and faster settlement with MFIs. It reaches new market segments, has more cash points, and increases transaction volume. The financial system builds important relationships with such corporations, has access to standard data and faster transaction settlement, and uses a cost-effective way to serve low-income clients.

In summary, RTS provides a solution to the integration of delivery of financial services in two fronts. First, the automation of the customer interface improves customer satisfaction and second the automation of data gathering, storage, and processing yields more reliable client information and lower transactions costs; thus, breaking through in the effectiveness, relevance, and scale of financial services geared to the world's urban and rural poor. As Latin America improves its wireless penetration and level of information technology sophistication its microfinance sector will experience new growth

by increasing points of access, improving data analysis and standards, and reducing transactions costs.

V. FINANCIAL SERVICES AND ITS DELIVERY TECHNOLOGIES ⁵

Microfinance delivery channels in Latin America contribute to the reduction of personal contact in branches favoring self-service transactions through mobile and virtual banking, ATMs, smart cards, and PDAs. The use of ATMs at branches or other existing locations reduces transactions costs for consumers and financial institutions. The client saves on transportation and other opportunity costs and gains on time and convenience. Financial institutions can leverage existing infrastructure such as stores, pharmacies, and supermarkets; thus reducing branch space and increasing customer base.

As financial institutions continue to be under intense pressure to reduce costs to compete with the traditional banking institutions, they are pushing direct access networks to expand client services and product offerings, to increase customers' database and data mining, to develop new or existing delivery channels, and most importantly to reduce operating costs. In short, they are repositioning their technology strategy from a physical to a virtual channel, where the client is inside the delivery process while adding value to customer service.

Mobile banking and self-service delivery channels can give MFIs in the future increased flexibility of what services to offer. Diebold and ATH provide ATM technologies using standard magnetic-stripe cards or smartcards within an existing ATM network or as part of the proprietary ATM network of a firm. This delivery channel

⁵ Cesar Lopez (2003), "Servicios Financieros Moviles," (ACCION Internacional), Emilio Segura (2003), "Self-Service: New Paradigm," (Diebold), Juan Yalinas (2003), "Technology and Personalized Service at a Regional Level," (FirstData International), and Luis Alfaro (2003), "A Toda Hora," (ATH) workshop presentations, San Jose, Costa Rica, October 16-17.

offers clients *anywhere* and *anytime* access to financial services, especially if the company's network is linked to a national or international payment network such as Visa International. These firms provide integrated technology solutions that enable financial institutions to maximize their self-service capabilities.

In the other hand, companies such as First Data can help MFIs in the *dissemination of information* in operational areas like authorizations, charge-backs, collections, and fraud, giving financial institutions an extension of their own internal departments without the cost of additional people. In other words, First Data makes global commerce happen by the processing of financial information. The sections below will look at specific technologies such as ATMs, smart cards, and PDAs used in Latin America and the Caribbean.

5.1. Automated Teller Machines, (ATMs)⁶

ATMs have a certain appeal to financial institutions seeking to channel capital to an underserved part of their customers. They can be efficient transaction handlers, freeing up scarce staff and possibly be vehicles for a broader range of financial products. But they are expensive to own and operate, most financial institutions are not in a position to acquire a \$30,000 machine, let alone operate them in a network.

In order to use ATMs in a microfinance environment, it may be necessary to make certain adaptations to the technology. Where literacy is an issue, supplementing written text with verbal instructions in the local language may help. Where most ATMs use a magnetic stripe card and PIN to identify account holders, other approaches may use smart cards with fingerprint validation to allow people with low levels of education to have access to such type financial technology.

⁶ Steven Whelan (2003), "Automated Teller Machines," CGAP IT Innovation Series.

The ATM forwards client information read from the card with the type of request to a host processor, which routes the transaction request to the cardholder's institution. If the cardholder is requesting cash, the host processor causes an electronic funds transfer to take place from the customer's bank account to the host processor's account. Once the funds are transferred to the host processor's bank account, the processor sends an approval code to the ATM authorizing the machine to dispense the cash. This process of communications, verification and authorization can take several forms. Links to a host system can be by leased line, dial-up or wireless, depending on the cost and reliability of infrastructure. The host systems can be at the issuing institution or via an Electronic Funds Transfer (EFT) network. Such networks often have a regional scope like 'A Toda Hora' (ATH) in Puerto Rico, which focuses on the Caribbean and Central America.

These are some of the benefits of using ATMs. The clients can access their accounts at their convenience. MFI personnel are not required to be present for transactions, while increasing hours of operation and fitting client schedules and having a broader access to clients, and lower cost funding source by attracting depositors.

The requirements are reliability of electrical power and communications infrastructure. Dial-up or leased line rates must be affordable for the microfinance institution. Client data must be stored in a central database in order to verify balances. Reliability of vendors' service and support. Processing and staffing capabilities for distributing cards and controlling pin numbers. But most importantly, currency supply in correct denominations and secure transfer to machines.

ATM costs will differ depending on the provider and the solution (either self-supported or partnering). General costs for implementing either solution include an initial

equipment acquisition cost or network participation fee, a set-up or installation fee to deploy and network devices, a usage fee (either per-transaction fee or monthly fee), a service fee for support (monthly or annual), and communications charges (modem dial-up, leased lines or V/SAT).

Initial costs for the technology are high, particularly if the approach is to establish a self-supported network. Individual ATM purchase prices are from \$20,000 to \$35,000. Card costs are \$0.25 to \$0.50, with smart cards costing \$5 to \$10. The smart card can reduce communication costs since balances can be reflected immediately on the card and daily transactions can be batched to the central processing site. This is in contrast to the real-time connection required for verification in the more widely seen magnetic-stripe card process. Where national communication systems are expensive or unreliable, innovations such as wireless service or smart cards can help.

5.2. Smart cards⁷

As applications multiply, smart cards in various forms are beginning to appear as a common mechanism to identify the cardholder and process transactions. In some instances, MFIs have found them a useful tool to replace paper transactions and improve the speed and accuracy of services. A smart card is a credit-card sized plastic card with an embedded computer chip. The chip can either be a microprocessor with internal memory or a memory chip with non-programmable logic.

Beyond the microprocessor/memory distinction, there are two general categories of smart cards: contact and contactless smart cards. A contact smart card requires insertion into a smart card reader with a direct connection to a conductive micro-module on the surface of the card (typically gold plated). Through these contact points, transmission of

⁷ Steve Whelan (2003), "Smart Cards," CGAP IT Innovation Series.

commands, data, and card status takes place between the card reader and an application typically running on a PC.

A contactless card requires only close proximity to a reader. Both the reader and the card have an antenna and it is via this contactless link that the two communicate. While this affords a very fast card interface, the cost of the cards and readers means they are used most often in transportation or high-volume access applications.

In financial applications, the smart card can be used for services such as managing savings accounts, disbursing loans or effecting transfers. At the time of enrollment all pertinent client information can be loaded onto the card through a recording device attached to a PC. The types of services a client can access would be identified along with account balances and any limits that may apply.

The benefits of smart cards are the improvement of convenience and security, intelligence and data controlled by customers, and tamper-proof storage of user and account identity. They also manage and control expenditures with automatic limits and reporting, avoid weak or costly communications infrastructure, reduce the need for repetitive form filing, and speed administrative functions and improve transaction accuracy.

The requirements for smart cards are reliable electrical power for card readers, dial-up facility to periodically update central processing site, reliable card and card-reader suppliers, processes, policies, 800 numbers and staff for handling lost, stolen or damaged cards and enrolling clients, and software integration between cards, readers and central management information system, (MIS).

The costs of implementation are driven by the sophistication of the smart card and its associated reader. Since microprocessor cards furnish the greatest potential and flexibility for MFI applications, the costs assume this type of card; contact cards are \$6 to \$10 per card; contactless cards are \$25 to \$50 per card, a set-up or installation fee to deploy card readers, a service fee for support (monthly or annual), communications charges (modem dial-up, leased lines), and an enrollment fee per client. In addition, Card Acceptance Device (CADs), or card reader/writers cost \$100 to \$300 per unit.

5.3. Personal Digital Assistants, PDAs⁸

PDAs are small, handheld digital computers that can run customer data and perform financial calculations. Using PDAs, loan officers work with little or no paper at all, they can consult an electronic list of borrowers in arrears to plan collection visits, review clients ready to apply for their next loans, and refer to historical client information, while working on the field. They also can fill out loan applications forms and calculate the indicators for loan review and approval. All client data and visit records are stored electronically and are immediately available. In short, PDAs create standardized credit methodology and operating policies, improves loan officer efficiency, and increase data accuracy and access; thus, complementing the MIS of financial institutions. Although some MFIs are researching wireless technology to transmit data, virtually all currently use a physical synchronization process which the PDA is connected to a personal computer.

The requirements for PDAs are a stable and well-functioning MIS infrastructure, high speed access to MIS data from branch office, and strong support from top management implementation. The benefits are the standardization of work procedures, increased

⁸ Charles Waterfield (2003), "Personal Digital Assistants," CGAP IT Innovations Series.

productivity, efficiency, and accuracy, improved monitoring the delinquent loans, improved time management, faster and more accurate credit approval process, and reduced volume of paper records.

The costs are software costs for implementation ranging from \$20,000 to \$80,000, hardware costs from \$100 to \$200 per PDA, and annual software maintenance costs ranging from \$3,000 to \$10,000 per year. Most MFIs use technology consultants to handle the development of the software and interface lasting anywhere from nine to 24 months.

Summarizing, each delivery technology provides significant benefits for MFIs, but most have yet to be proven sustainable through in –depth cost-benefit analysis, especially when applied in rural areas that have limited usage and connectivity. These technologies cannot replace the human interaction that is so important to providing successful financial services, especially to the poor. Most customers prefer personal contact transactions, rather than automated or Internet based services; thus, financial institutions must carefully consider ease of use, client technology familiarity, language preferences and literacy when designing such costly technology-driven delivery channels discussed above.

VI. THE EXPERIENCES AND CHALLENGES OF MFIs WITH INNOVATIVE TECHNOLOGIES

Latin America is the leader in terms of commercialization and institutional development of intermediaries focusing on the microfinance industry. There are more than 100 microfinance institutions worldwide, almost two thirds are financially stable, and more than 30 of operate in this region.

The experiences and challenges of MFIs in the implementation of innovative technologies to build effective delivery channels are many. This section focuses on those experiences and the IT challenges that financial institutions face in the region. Findesa in Nicaragua is committed to the integration of innovative technologies to build effective delivery channels by implementing an IT strategy using handheld devices smart cards, pen input systems, and biometric analysis to optimize the flow of data throughout its operational system. In Haiti, Sogesol's goal is to bring the bank to its clients. It has already surpassed 7,000 customers in only three years. Sogesol's innovative transaction processing system, which links to the back-office functions of Sogebank, its parent bank, has helped it become the largest MFI in the country.

Vision of Paraguay has a vision of becoming a mobile and virtual financial institution. It is the leader of using the delivery channel of credit and debit cards, pre-paid cards, smart cards, and ATMs (linked to Visa International and Credicard). For example, they offer a card called 'Tarjeta Mayorista', which is a joint effort with established vendors allowing deep discounts and other advantages to micro-enterprises. Vision's major competitor is cash transactions, and it is forcing the institution to build technology around customers and their financial transactions.

Vision, as a principal member of VISA international, is replacing the use of cash in its microfinance operations with debit and credit cards through ATMs and its point-of-sale network at 3,500 small businesses. Banco Solidario, a leader in microfinance in Ecuador, has the goal to transform itself into a virtual bank. It recently introduced a smart card called 'La Chauchera' allowing clients to use it as debit or credit card. This \$1.2 million

IT project developing a smart card point-of-sale system will eventually replace its entire branch infrastructure.

Prodem in Bolivia introduced smart cards and installed 20 smart automatic teller machines, (SATMs) operating its own network of ATMs through a solution provided by Innova to reduce operating costs of delivering services in rural areas. Smart cards offered highly secure, off-line processing while protecting the integrity of the data and the privacy of the cardholder. Smart cards now serve as an electronic passbook allowing Prodem's clients to transact money orders, currency exchanges, cash deposits and withdrawals. At the same time, Banco Ademi in the Dominican Republic participates in an exiting service network for ATMs, the 'A Toda Hora' (ATH) network and owns only a single ATM located in its main office. Prodem and Banco Ademi have enhanced customer service and convenience through broader access to funds and more effective use of staff, with the greatest benefit of the mobilization of savings by using ATMs and smart cards.

Banco Solidario of Ecuador and FinComun of Mexico have implemented PDAs in their IT strategy while improving workflow efficiency, reduce operational costs, and made better information available to loan officers; therefore, yielding better client retention, decreased in credit approval and cash disbursement time, and increased loan officer productivity. At the same time, Compartamos of Mexico recently suspended its use of PDAs acknowledging that the technology had not operated smoothly as anticipated.

Since smart cards contain all essential client financial information, transactions can be immediately reflected. There is no need for online access to a network for each transaction, only twice daily updates to the central processing site. Prodem saved

\$800,000 a year by avoiding frequent dial-up calls or fixed, leased line charges, and it also protected itself from fraud since the card carries the latest customer financial data. Innova delivered the ATM package keeping the price for each machine below \$20,000.

Initial implementation of the ATM product cost Banco Ademi less than \$70,000, ATH assessed a \$10,000 initial joining fee, along with \$2,400 annual membership fee. On the other hand, Banco Solidario purchased smart cards and point-of-sale devices in limited volumes, paying several times the competitive market rate. Mibanco in Peru purchased seven ATMs to start its network when existing ATM network operators refused it access. Mibanco was forced to pay a higher price per-unit by placing a low-volume order.

In short, while many MFIs have succeeded in using technology to streamline their business processes and to increase customer satisfaction and convenience, there remains a need to evaluate the costs and benefits of these innovations, reduce investment costs, standardize data, and ensure networks compatibility. The usage of these technologies by MFIs can be more productive and cost effective by using best-practice technology project management, taking advantage of industry support resources, and most importantly by collaborating to ensure the greatest economy and standardization of technology implementations thus reaping economies of scale and scope.

At the same time, the implementation of innovative technologies cannot be the only answer to achieving economies of scale in the industry when strong challenges persist such as poor electricity, wireless, Internet penetration, the current high costs of IT, MFI's lack of IT skills and their unwillingness to cooperate.

VII. CONCLUDING REMARKS AND RECOMMENDATIONS

Microfinance is truly emerging as a pragmatic financial approach to provide financial services to micro-entrepreneurs, small and medium-size firms not able to secure credit in the formal financial system. Microfinance is a viable and permanent part of the financial system of many Latin American nations.

Globalization, financial sector liberalization, falling profit margins, and ongoing industry consolidation have forced many MFIs to reconsider their strategic and operational objectives. Recent experiences suggest that the innovative use of existing technologies such as ATMs, smart cards and phones, PDAs, mobile technologies, and remote transaction services can significantly improve quality of service and customer satisfaction, increase data collection and analysis, improve loan-officers productivity, and reduce transactions costs.

Banks and other financial institutions are now in the *knowledge and information dissemination* business, as well as, in the *customer satisfaction* business. Financial corporations need to do more than just adapt, they need, to redefine and re-architect themselves to become virtual financial institutions. As the widespread use of IT increases, delivery channels that matter most will be *Web-based and virtual services* that increase the uninterrupted *interconnection and digitization* of financial transactions. Bankers must be risk-takers, company builders, and job creators. Microfinance is a business of manipulating customer data, knowledge, and information. MFIs must customize, change, and bring new products to markets fast. Financial institutions must be cooperative in nature, and foster partnerships with employees, vendors, competitors, and customers.

Traditional delivery channels like branches continue to dominate in the microfinance industry in both developed and developing countries. The adoption of innovative delivery channels such as ATMs, smarty cards, PDAs, and the implementation of new banking initiatives such as mobile finance and remote transaction systems should spur new growth opportunities for MFIs in Latin American markets.

New delivery channels and banking initiatives provide significant benefits for financial institutions and their customers, but most have yet to proven sustainable through cost-benefit analysis. They expand the reach and richness of client relations. They increase the level of customer empowerment. They foster financial communities with open standards, and they increase cross-selling opportunities. But, they cannot replace human interaction so important to providing financial services to the poor.

One of the most striking structural changes in the microfinance sector in Latin America is the degree to which dynamism, constant innovation, and speed have become the norm. A new breed of fast-growing and adaptive MFIs is becoming an important source for economic growth in this region. These financial institutions also have to be global, dynamic, and networked in scope. They must be entrepreneurial and innovative in their quest to become digital and virtual financial providers. They must forge cooperative alliances and find new partnerships, and collaborate with other financial institutions, particularly in the implementation of building effective delivery channels with innovative technologies that improve interconnectivity and digitization of financial and customer data and speed their re-structuring to become providers of contactless, mobile, and virtual financial services.

For a technology project to be successful, financial institutions must define their goals up-front and calculate how closely actual benefits matched expected benefits. They can also benefit from using best-practice project management techniques such as appointing a project champion and project dissenter, gaining and demonstrating management commitment and conducting pilot or phasing in implementation to keep costs down until the technology has proven to be successful at a small scale. Credible cost benefit analysis of pilot projects will help justify additional expenses for full deployment of innovative and or existing technologies.

Most importantly, MFIs must develop an alliance to help them avoid duplicating technology research, to reduce the costs of technology products and services, and to provide a forum for finding common technology standards. Such organization, inspired by the Visa International model, would include the equal participation of each member, regardless of size, and provide a forum for these institutions to agree on common standards while continuing to compete in their individual markets. The alliance could act as a focal point of negotiation with international payments networks such as Visa and MasterCard to integrate each MFI network into a wider financial system, or function as a regional node for a larger technology initiative such as the microfinance development project led by Hewlett-Packard and eChange.

Summarizing, the growth and success of MFIs in Latin America depend on first, the adoption of new technologies in delivery channels like ATMs, smart cards, and PDAs; second, the successful implementation of virtual delivery channels such as mobile finance and remote transaction systems, and third, the degree of cooperation and alliances among

MFIs to reduce IT investment cost and to increase standardization reaping economies of scale and scope.

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