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CONTENTS

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- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio," Ohio State University.

Contributions to books

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

Journal and other articles

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

Conference papers

- Chandel K.S. (2009): "Ethics in Commerce Education." Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

Unpublished dissertations and theses

- Kumar S. (2006): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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- Kelkar V. (2009): Towards a New Natural Gas Policy, Economic and Political Weekly, Viewed on February 17, 2011 http://epw.in/epw/user/viewabstract.jsp

MICROFINANCE USING INFORMATION & COMMUNICATION TECHNOLOGIES

S. KUMAR CHANDAR
ASST. PROFESSOR (INFORMATION TECHNOLOGY)
SARDAR VALLABHBHAI PATEL INTERNATIONAL SCHOOL OF TEXTILES & MANAGEMENT
PEELAMEDU – 641 004

ABSTRACT

Microfinance is an idea that holds significant promise for changing the lives of the world's poor. Microfinance is the provision of a broad range of financial services such as deposits, loans, payment services, money transfers, insurance to poor and low-income households and their microenterprises. The NGOs and multilateral organizations have been working with both governments and financial institutions to set up almost 10,000 microfinance institutions (MFIs) to democratize financial services and thereby broaden the economic growth base. As a result, more poor people are now able to improve their incomes, save money outside the household and make loan payments. The paper discusses the technical implementation for enhancing the service in microfinance. Many technology partners are coming up with low cost solutions for microfinance sector, which can result in reduction of transaction cost. Microfinance industry will not be successful in achieving its aggressive goals of maximizing financial inclusion and delivering basic financial services down to the bottom of the population pyramid without the support of ICT. A technology based solution can ensure an expansion of the microfinance operations and long term sustainability.

KEYWORDS

Expert system, Data warehouse, Mobile Computing, Wireless Technologies.

INTRODUCTION

Microfinance involves more people than traditional banking and thus has to gather, store and analyze more data. It is very difficult to do microfinance operations and transactions manually considering the huge volume of data. There is a real need to support microfinance operations with technology to keep the operating cost as low as possible. The use of Information Communication Technology can improve efficiency and make it possible to reach services to the masses by using technology such as ATMs and Point of Sale (POS) devices. Providing microfinance services using ATM & POS is quite costly, because people usually have small amounts of money to invest and rarely document their credit histories.

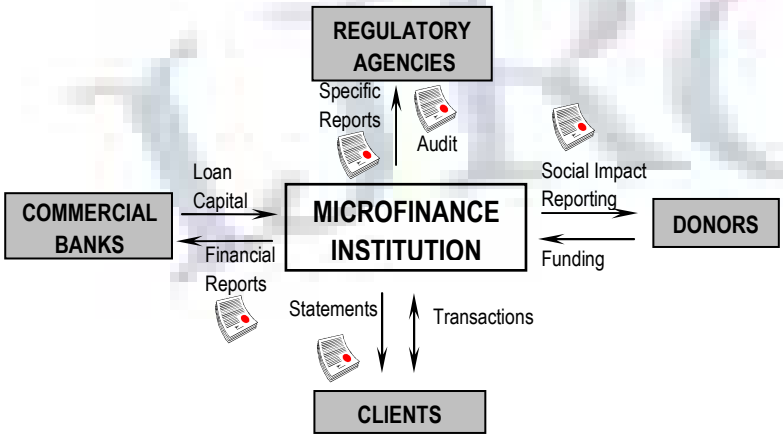
The technology transfer needs a common platform to coordinate requirements of lenders and. An improved delivery system reaches the remote areas, without adding a lot to the transaction costs by the proper utilization of technology. This technological platform maintains the borrower's requirement for credit, the credit score and other personal identification information. It acts as a merging point where the requirements of borrowers are linked to the microfinance institution / lenders. Information Technology enables operators of microfinance enterprises to use short messaging services for customer alerts. The GSMA estimate that there are 1 billion people in emerging markets around the world today, who do not have a bank account but do have a mobile phone. This represents a huge opportunity for collaborations between microenterprises and mobile operators for the harnessing the untapped consumer base. The microfinance institutions can use technology to

1. Reduce costs and improve operational efficiency.
2. Compete with other institutions in the market.
3. Attract new clients.
4. Retain existing clients.
5. Expand the geographic outreach and reach underserved areas
6. Improve the ability to report financial and operational information
7. Improve the ability to report on social performance

DATA WAREHOUSE IN MICROFINANCE

The Microfinance Institutions are expanding their operations by doing high volume of transaction in poor rural locations. The spread sheet based systems cannot provide accurate and comprehensive information needed. Data warehousing provides the architecture for microfinance management by reducing cost, improving efficiency and increase the outreach. The technologies such as Java and XML are employed to build flexibility into the data warehousing architecture. Java is used to maintain a platform neutral approach and XML is used for data transfer across many technologies, applications and platforms.

FIGURE 1: INFORMATION EXCHANGE REQUIREMENTS IN MICROFINANCE (SOURCE: JORDANE ROLLIN, GRAMEEN FOUNDATION USA)



The Data warehousing architecture links different types of stake holders like regulatory agencies, donors, clients and commercial banks and facilitates exchange of information via financial reporting. The important information requirements for microfinance institutions is the intra-institutional financial reporting, which includes loan officer/operational reports, portfolio reports, financial statements, cash flows and summary reports. The microfinance institutions often attract loan capital or grants that are used for specific purposes such as the betterment of a particular community or class of clients. It is very important for

microfinance institutions to monitor, track and communicate their client's performance with regard to certain social indicators. In the present scenario, most of the microfinance institutions do not have a computer system to perform their operations. The commercial software vendors choose to use an easily available database system such as Excel or Access as backend tool and Visual Basic as the front end tool. Table-1 specifies the comparative study of traditional packages with Data warehouse architecture in terms of cost, data reliability, scalability, data exchange capability and design flexibility.

TABLE 1: EXISTING MANAGEMENT INFORMATION SYSTEM SOLUTIONS

	Low Cost	*Data Reliability*	*Scalability*	*Data Exchange Capability*	*Design flexibility*
Excel / Spreadsheet	●	○	○	◐	○
Traditional Accounting and Portfolio Software	◐	◐	◐	○	○
Specialized Vendor Package	◐	●	◐	○	◐
Custom Made	○	●	●	◐	●
Data Warehouse		●	●	●	●

The Microfinance Data warehouse is a huge collection of data; it is a repository of an institution's data stored electronically. The Data warehouse consists of components such as data retrieval, ETL (Extract, Transform and Load) and data dictionary to convert the raw data into the standard format. The benefits of implementing the data warehouse are:

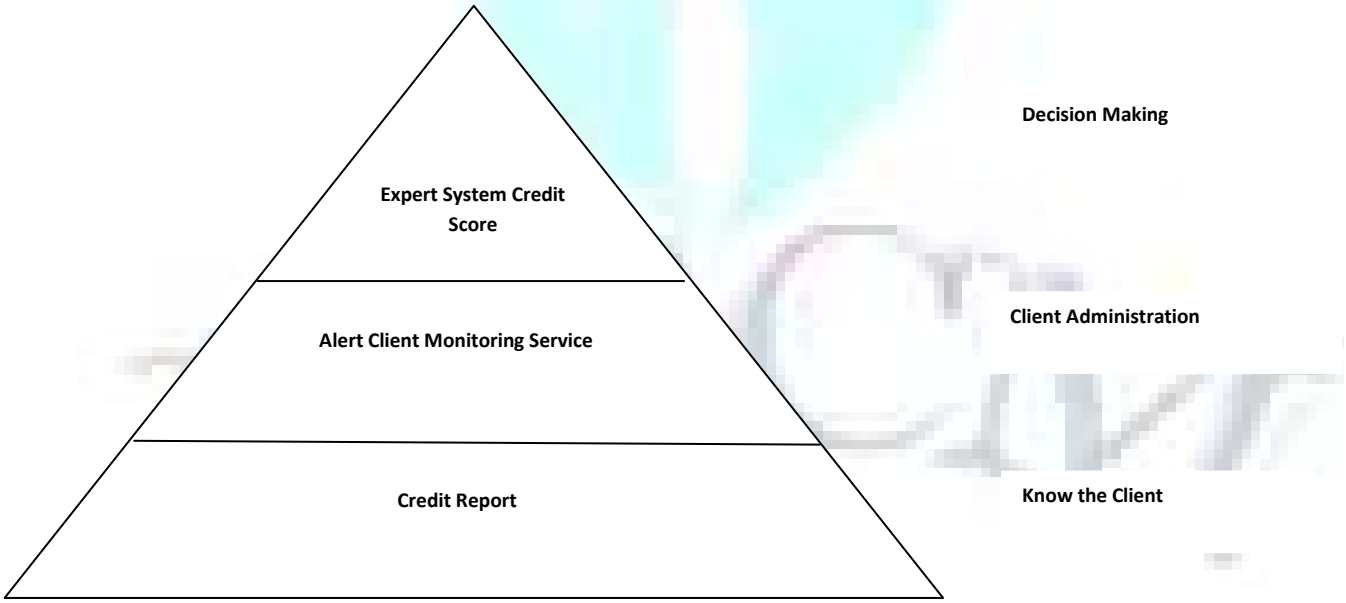
- It provides simplified reporting and analysis.
- The information stored in the data warehouse is separated from the original source data.
- Data retrieval does not slow the operating system.
- Identifying the dimension of the process (Example: time dimension-history)
- The Data warehouse architecture leads to the extension of Business Intelligence, Decision Support System and Expert System.

The commercial vendor (IBM Banking Data Warehouse) usually offers an enterprise wide view of real time information ranging from customer retention to credit risk. It is used to analyze collected data and identify opportunities such as product customization and cross selling.

EXPERT SYSTEMS IN MICROFINANCE

Expert Systems are part of a general category of computer application known as Artificial Intelligence. Expert Systems not only possess human knowledge in the form of coded tables, databases and programmed logic with the computer power available today; they are coming closer and closer to representing human systems that think. Medium to large microfinance institutions can face major problems in meeting schedules, while keeping the entire workforce in full employment and also significantly contribute to the customer. Expert System have been developed which advice the staff on a particular tasks to be completed within a given time frame.

FIGURE 2: CONCEPTUAL ARCHITECTURE OF EXPERT SYSTEM EVALUATION IN MICROFINANCE



IMPLEMENTATION OF EXPERT SYSTEM IN MICROFINANCE INSTITUTION

The Next Generation microfinance industry will reach the world's urban and rural poor by designing a technological framework that ensures demand-side distribution, service delivery scalability and lower cost-to-serve.

- Phase 1: Know the Client
  - Who is the Client?
  - How much does the client own?
  - How has the client paid?
- Phase 2: Client Administration

- Client Alert
- Change in the credit profile of the client
- Client follow-up

- Phase 3: Decision Making
- The Client fulfills the credit policy?
- Pre approval of credit
- Recommendation on what do with my client.
- For which offer of products does the client qualify?

HOW TO TRACK THE STATUS OF CREDIT APPROVAL PROCESS IN MICROFINANCE INSTITUTIONS?

1. Incorporation of information and decision in the applications of the microfinance organizations through web services.
2. Credit ratings take into account various factors like the financial history and the current assets and liabilities.
3. Other factors considered for credit ratings are payment history, amount owned, length of the credit history, new credit and types of credit used.
4. Implementation of Expert Systems and score.
5. Preapproval of credit by SMS message

BENEFITS & CHALLENGES OF CREDIT SCORE FOR MICROLENDING

1. Reduction of costs and time of the process.
2. Supply of services according to the risk level
3. Track credit history and personal background and assess honesty and reliability of the borrowers to pay off debts?
4. Accelerate the process of sharing information. Breaking the paradigm "If I post my client's information my competitors will take them away"

MOBILE APPLICATION IN MICRO FINANCE

Microfinance institutions (MFIs) face much higher cost-of service delivery cost because of the smaller transaction values they handle and the more remote and dispersed location of the customer. To achieve the goal of branchless banking through mobile banking, the institutions need to collaborate with GSM operators. Many banks and microfinance institutions in the developing world are interested in building relationship with rural microfinance groups. They hire field agents to interact with villagers, and access lending opportunities. Banks need to find a way to provide liquidity through a network of cash-in / cash-out agents, while on the field; agents distribute loan application forms to those people interested in obtaining a loan. The loan application includes field for the client's current account number, the desired loan amount, term of loan and the loan purpose. The loan purpose is a summary of the client's reason for availability the loan (buy livestock, start a small business, pay for health bills, etc.). The next time the field agent visits the village, he transcribes the loan applications using his bank-issued mobile phone. First he captures the application ID, which loads in the application. The agent captures the barcode in the top-right to enter all of the data from the loan application. Guided by the prompts, he enters the account number, the desired loan amount, the loan term and captures an audio clip of the client declaring the intended purpose of the loan. The client listens to the audio prompts to follow along in the process. If he wants to verify whether the data has been entered correctly, he can ask the agent to focus the camera on each of the fields to display the entered value. Only after the client is satisfied the agent captures the "Submit" barcode to generate an SMS / MMS message. The message contains an XML file with the entered data, and an audio recording of the loan purpose. The client keeps a copy of the audio clip for his own records. At the bank office, the manager reviews his incoming messages and sees the new loan application. Based on the purpose of the loan, and the client's past credit history, he decides which loan should be issued within one day. The decision are automatically packaged and sent to the field agent's phone as an MMS message. By reviewing the "ACCEPTED" field on each form, both the field agent and client know which loan has been approved. The client is then required to report to the bank to collect the money. For those clients who are denied loan, the bank manager includes an audio or textual comment indicating the reason. The whole loan application process is accomplished without the field agent ever having to return to the distant bank office.

FIGURE 3: A BANK FIELD AGENT PROCESSING LOAN APPLICATION

BRINGING MOBILE MONEY CLOSER TO MICROFINANCE

Mobile Money is defined as money that can be accessed and used via the mobile phone and using the mobile network. Mobile communication is the most inclusive and pervasive service in the world, with almost 2/3rd of the world's population currently uses the cell phone for daily communication. Next generation microfinance needs to fully leverage and ride the mobile money wave and use this as the primary user interface as well as the enabling last mile infrastructure. The benefits of Mobile Money are listed below.

- Best in terms of geographic and population reach and coverage and lower user-side transaction costs.
- SMS can be combined with IVRS options to address potential literacy hurdles in the target market at the bottom of the pyramid.
- Facilitates development of microfinance Open Network Exchanges" that drive financial efficiency and allows any microfinance product originator to serve any mobile user in the country.

- Enables the building of a financial "Interconnection" ubiquity across the target customers, so that they can send or pay money to anyone in that market whom they can call or SMS on their mobile phone.

CONCLUSION

Thus the implementation of technology in microfinance can help in bridging the demand-supply gap in microfinance institutions. The technological framework provides a sustainable system that can handle high a number of users, thereby ensuring, scalability as well as sustainability. The Expert System use credit ratings for the microfinance institutions and the clients to implement better repayment rates in the system. Consumers throughout rural India are beginning to experience the social and economic benefits of mobile technology. Technological infrastructure, a solid business model and dynamic partnerships in local markets can ensure the development of microfinance in the rural market. The Future research is used to investigate the return on investment and valuable extension of recent technologies such as service oriented architecture, software as a service and integrating wireless environment.

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Academically yours

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