

# Enabling Banking for Rural Communities Using CAM ICT Framework

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## About ekgaon

Founded on the day before Mahatma Gandhi's birthday in 2002, ekgaon Technologies is a technology and management company believing in the ideal of community-centered development. In accordance with this philosophy, ekgaon has been working with community groups across south asia for enabling development processes and building systems increasing the efficiency and profitability of community enterprises. ekgaon, in partnership with Community Enterprise Forum International (CEFI), has taken up development of capacities for enabling supply chains and producer-owned enterprises in identified areas such as, medicinal, aromatic and dye plants, microfinance, ICT-enabled services, fisheries, community-based tourism and energy to bring communities to the core of development planning. ekgaon works with community groups in

identifying requirements and conduct knowledge development exercises to develop specifications of management and technology interventions.

## Activities

As per its mandate, ekgaon seeks to work in any appropriate technology domain for enabling development processes. ekgaon is working in open source and free software development, enabling Indic-languages support and working with development agencies on various Information Communication Technology (ICT) applications that would have direct impact on community development. ekgaon is also looking into various kinds of systems-level needs of development organisations and community institutions. Access to financial services (microfinance) and supporting community enterprises are both application areas where ekgaon is working on ICT-based solutions. Major intervention areas of the company are:

## Development Finance

The microfinance movement over the last two decades has provided new hope to developing communities for increased financial independence. However, many Micro-Finance Institutions (MFIs) and Community Based Financial Institutions (CBFIs) are struggling to meet the expectations of the communities they work with. One crucial stumbling block for the development of MFIs has been the capacity of the institution to handle the complicated accounting and information processing needs: acquiring and collating data from a variety of field sources, maintaining these records in a central database and periodic data analysis and reporting. Lack of affordable and customizable Management Information System (MIS) software to manage these needs has led to a number of compromises and failures in operations of MFIs. ekgaon has identified micro-finance as an important area for appropriate technology and

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systems interventions. ekgao is developing an open source, modular MIS for CBFIs. This MIS allows central tracking of the internal accounts, financial position, loan repayment performance and related account information for a number of CBFIs/MFIs. ekgao envisions linking this MIS with micro-enterprise data and other local economic activities to help local communities effectively mobilizing communities effectively mobilize, invest and save local cash flows for the development of a robust local economy. ekgao's innovations in microfinance MIS and operations are: (i) developing open source MIS framework for CBFIs/MFIs (ii) developing management and documentation standards (iii) linking micro-finance and micro-enterprise (iv) developing tools for rating CBFIs/MFIs and clients (v) developing a network of Local Service Providers (LSP) that can provide technical service and support to CBFIs/MFIs and (vi) enabling access to financial services to rural communities – SHG – bank linkage

### Products and Services

ekgao offers a wide variety of products and services to meet client needs. ekgao specialises in developing complete MIS that meet all of a client's information processing and reporting needs. Some of the products and services provided by ekgao include: (i) Systems Analysis (ii) User-centric Design (iii) Multi-lingual Database/system Development (iv) Multi-lingual Application Development (v) Software Development and E-commerce (vi) Training and Support and (vii) Strategic Consulting

### Synthesis

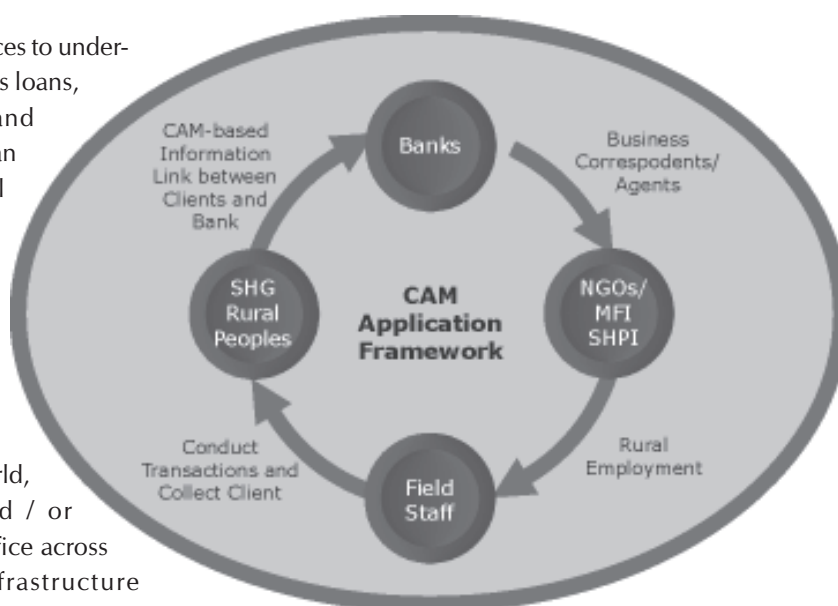
*Microfinance* is the provision of financial services to under-served communities. Including services such as loans, savings, investment, pension schemes and insurance, microfinance has proved to be an effective tool for supporting sustainable local socioeconomic development. Although mechanism for delivering loan products exist, viable and effective mechanism for delivery of other financial products, remains a daunting task for financial service providers. One of the biggest challenges facing microfinance service providers like banks, NGO's, MFI, SHPI are, particularly in rural areas of the developing world, the collection or access to the data and / or transactions that can interface with central office across a region with unreliable physical infrastructure (communication, power, transport, etc.) ekgao technologies provides a complete and flexible solution for capturing and aggregating rural financial and non-financial transactions,

built using the CAM Rural Information Services Framework; a low-cost, scalable and programmable mobile phone application platform. From the outset CAM has been specially designed to address rural user interface, hardware, networking and human resource constraints.

### RBI Circular on Business Facilitators and Correspondents

The Reserve Bank of India has permitted banks to appoint NGOs, micro finance agencies, post offices and NBFCs (not accepting deposits) to act as banks' business correspondents. To begin with, these agencies are allowed to disburse 'small-value credit', collection of 'small-value deposits', recovery of principal and interest and sale of mutual funds and pension products. Under this scheme, banks should enter into specific arrangements with business correspondents prescribing suitable limits on cash holding and on individual customer payments and receipts. The transactions done through business correspondents must be accounted for and reflected in the bank's books of accounts by the end of the day or the next working day. Any agreements entered into by the correspondents with the customer shall specify that the bank is responsible to the customer for the acts of omission and commission of the correspondent. The activities undertaken by the business correspondents would be within the normal course of the bank's banking business but conducted at places other than the bank premises.

### The MFI – Bank Agent Model



**Fig 1 : Example MFI-Agent CAM Application Framework**

### **An Example Solution: MIS for Self-help Groups (SHGs)**

In this section, we present how we are using the CAM framework for collecting data from Self-Help Groups (SHGs). There are estimated to be more than 1 million SHGs in India, with a total membership of more than 15 million (90% of whom are women). This constitutes one of the largest and fastest growing microfinance activities in the world. SHGs are supported by Self-Help Group Promoting Institutions (SHPIs). While most SHPIs are non-profit Non-Governmental Organizations (NGOs), some are government agencies, commercial banks, farmer's cooperatives, or even private individuals. SHPIs employ field staff to form and train groups. Field staff are recruited from villages and rural areas near the districts where they will work. They usually have at least a partial high school education and are paid a small salary or commission per group. Even for field staff with a basic education, the current accounting and documentation processes are onerous. For the past two years ekgaoon have been working with a NGO based in Tamil Nadu, India to make the SHGs' paper-based accounting processes simpler and easier to learn. Even using this simplified system, it has taken over six months to train field staff to produce basic reports and statements. These are still inconsistently prepared, and errors are frequent. Currently, very few SHPIs have succeeded in computerizing at the SHG level. ekgaoon has developed an application using a CAM-equipped mobile phone for collecting data from SHGs.

Field staff are equipped with a mobile phone to record member-level transactions. Transactions are entered on the phone using the CamBrowser application, at the time of the meeting or afterward from the paper records. This data is posted to an on-line server via an SMS message. The resulting reports and financial statements is printed from a secure access point, or faxed from the NGO head office to the field office, from where they are picked up by the group or delivered by the staff. These reports are used by the group for monitoring their portfolio and applying for loans and other services.

### **Institutional Challenges and Solutions**

#### **(i) Banks**

Under the new norms approved by RBI, commercial banks will be able to use the field presence of Non-Government Organisations (NGO's), Microfinance Institutions (MFI), farmer's clubs, individuals and other Self-Help Promoting Institutions (SHPI's) as correspondents for serving rural communities in a cost-effective way. Banks will be entering into agreements with these organizations as business correspondents and / or agents in conducting banking transactions. Though this system can be applied with the help of the aforesaid institutions, there will be a significant problem of collection of data detailing clients and financial transactions in a secure and controlled manner. The major challenges from the bank's perspective and solution possible under CAM framework are

<b>Sl. No</b>	<b>Challenges</b>	<b>Solutions</b>
1	Failure / difficulty to transfer the transactions at the end of day or next working day (as required by RBI)	Easy electronic update of each transaction
2	Lack of control over cash and chances for fraud / mishandling of money.	Effective control and monitoring as transaction data is transferred immediately to the bank.
3	Lack of fiscal discipline and clarity of accounting records – for example, accounting for member-wise or group-wise transactions as the case may be.	Automatic update to the appropriate ledgers & accounts by the system without human intervention
4	Human resource involvement in back office processing of transactions	Many information processes are automated, while retaining an auditable paper trail

**(ii) NGOs / MFIs / SHPIs**

The institutions acting as the rural agent in this model will employ the staff to travel in the field. The major challenges to be faced by these institutions include and process enabling using CAM are:

Sl. No	Challenges	Solutions
1.	Failure / difficulty to transfer the transactions at the end of day or next working day	Easy electronic update of each transaction
2.	Lack of control over the staff and cash handling	Effective control as the movement of staff can be tracked and data is updated for every transactions (Geo-positioning of cell-towers)
3.	Limited geographic area covered by each staff, resulting in increase in operational cost per client	Staff can spend more time in the field without having to travel back to the office to update records, thus covering larger client base

**(iii) Field Staff**

The field staff are the employed persons of the institution acting as agents who travel in rural areas, conducting financial transactions such as, savings, deposits, insurance schemes (life and general), collection of premium, investments in mutual funds, pension schemes, other programmes introduced by banks, repayment, monitoring and portfolio tracking.

Sl. No	Challenges	Solutions
1.	Recording of transactions and maintaining books of accounts	Easy recording of transaction using the CAM mobile phone technology
2.	Reliability / acceptance among rural members	Highly reliable as a stamped receipt is being issued for the transaction as evidence, verifiable through agent movement and real-time transactions.

**(iv) Rural Citizens / SHGs / Clubs / Other Models**

The rural clients practicing any model of microfinance are linked with commercial banking institutions. This helps the rural communities to access a wider variety of banking facilities at their doorsteps. The challenges faced at this level would be:

Sl. No	Challenges	Solutions
1.	Reliability	Ensure reliability as the data is directly communicated with the bank and receipt is issued for the same.
2.	Long-term attachment	Support a long-term attachment with the bank for financial and other services.

## CAM Framework

The CAM framework provides a way to efficiently aggregate data from paper-based records in the field using mobile phones. The mobile phone has been described as the most likely modern digital device to support economic development in developing nations. Being a mass market hardware with a developing country growth rate of over 20%, several of its features (battery operation, solid-state memory, wireless connectivity, affordable price) make it a better-suited device for rural developing world conditions than a conventional PC and other handheld or desktop devices. The lower cost of wireless infrastructure, deregulation in the telecommunications industry and the plummeting cost of handsets is putting mobile telephony in the hands of billions of people around the world. As seen in the example of Grameen Phone, if a mobile phone is shared by a group of people, it can be affordable for even the poorest communities. Mobile handset models developed by several manufacturers provide an open application development platform and significant computing capabilities. However, current mobile software platforms are difficult to use, difficult to develop for, and make the assumption of ubiquitous connectivity. Applications must be used by minimally educated users, developed by minimally trained developers and meant to work in a variety of connectivity and power environments. To address these requirements, we have developed CAM - a framework for developing and deploying mobile applications in the rural areas of developing world.

### System Overview

**CAM Browser :** The driving element of the CAM architecture is a mobile phone application called the

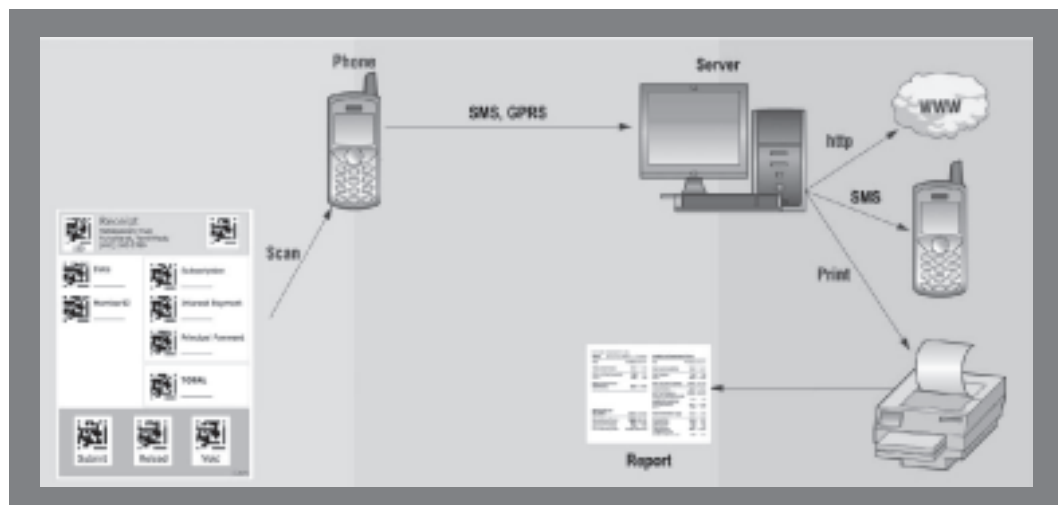
CAMBrowser, currently implemented for Nokia phones based on the Series 60 platform. Users navigate within and between CAM applications by capturing barcodes using the mobile phone camera or by entering numeric strings.

**CAM Forms :** Barcodes and numbers are printed directly on paper forms for ready access. CAMForm analogues of existing paper forms serve as offline clients for CAM applications. Data is first entered on paper, from where it is transcribed, validated and uploaded using the CAMBrowser.

**CAM Server :** A network application that communicates with the CamBrowser to collect and process incoming data. The server can be accessed via a mobile phone or a web browser to get all the relevant information about the transactions and generation of reports. Access is secured by means of user id and password.

**Navigation :** CAM software and application functions are indexed using numeric strings, encoded either as barcodes to be captured via the camera or as numbers to be entered via the keypad. Both are printed on paper forms. In this way navigation is directly tied to a paper representation of the task.

**Content :** The CAMBrowser downloads and executes applications written in an XML-based scripting language. CAM provides an API for accessing the mobile phone's user interface, networking and multimedia capabilities. Figure 2 shows a loan application. The barcode in the top right, when clicked, activates a function displaying a sequence of prompts for the user to transcribe the values from the form. Each CAM prompt can be associated with arbitrary audio and graphics. This increases the flexibility of the system for dealing with unsupported languages or semi-literate users. The audio makes



**Fig 2:**

**CAM Framework -  
A high-level  
architectural view**



**Fig 3 :**

### **CAMBrowser Interaction – Reviewing and editing an entered value**

the interaction proceed like a conversation between the user and the device. The device asks a question, and the user answers.

After data has been entered, the user can review the values before submitting them to the server. By focusing the camera on a barcode associated with a form field, the current value is displayed on the screen. This reinforces the binding between the written values on the form and those entered using the phone. If a value is not correct, the user can click on the barcode button, thereby displaying a prompt to edit the value.

**Networking :** In many rural places, a wireless connection is not available. Using SMS, MMS and other SMTP-based methods, CAM is able to communicate asynchronously. Whenever data is collected, the SMS is cached in the phone's outgoing message queue. The message will automatically be sent when the phone is connected (for example, when the field officer returns to the highway on her way to the next village). When the server receives the SMS, it sends back the appropriate response also as a message. The phone will automatically download the message when it is connected. The code for the application is cached on the phone for offline use. Application data is also stored in the phone's local memory, which serves as a cache of the server database.

### **Features**

The features of the CAM platform that make it uniquely suited for rural user interface, hardware and networking requirements are.

**Efficiency :** In microfinance where the cash value of individual transactions is very small, the only way to be profitable is to serve many clients efficiently. This is an important measure of efficiency in the industry. If we can make

an interface faster to use, it would allow each staff to serve more clients. In our experiments, an optimized CAM user interface performed as efficiently as an equivalent PC interface. On average, novice rural users were able to complete the task using the CAM interface only 44% slower than experienced technology users on a PC.

**Accuracy :** Obviously, in an application dealing with financial transactions, accuracy is of the utmost importance. During CAM field testing we observed error rates between 0.6-1.0%. During live experiments, users did not make a single error.

**Accessibility :** NGO field staff are entry-level employees recruited from rural areas. The lower the bar for this position, the more potential participants. While it had taken six months to train staff to prepare financial statements manually, the same staff learned to use CAM within four days. By preparing the reports and financial statements automatically we are well-positioned to deliver immediate benefits.

**Linkage to Paper Processes :** The paper receipt will be the only record that is immediately accessible to every member. Each CAM receipt will contain a persistent link to the corresponding database record. By reloading the data from the server, entered values can be confirmed using any CAM-equipped phone, not just the one belonging to the group or to a particular staff. As CAM tasks are triggered by paper documents, the user does not have to enter a URL, scroll for a link or traverse a menu to find the application corresponding to a particular process. This may not be an issue while there are a small number of applications, but it will become important when more paper-linked applications are developed. A URL is a good example of the power of an accessible, expressive indexing mechanism for applications and content. For CAM, either a visual code or a numeric identifier could be used as this index. For example, a phone number-like numeric string could be printed on the form that when entered starts the right interaction sequence.

**Voice Feedback :** Voice feedback ended up being more important than imagined. Earlier we found that audio helped functionally illiterate users interact with a user interface. In our latest experiments we found that local-language audio helped build a rapport even with literate users. This was particularly apparent for SHG members who otherwise had very little interaction with the system. Gaining the trust and confidence of SHG members will be an important requirement for acceptance of the system.

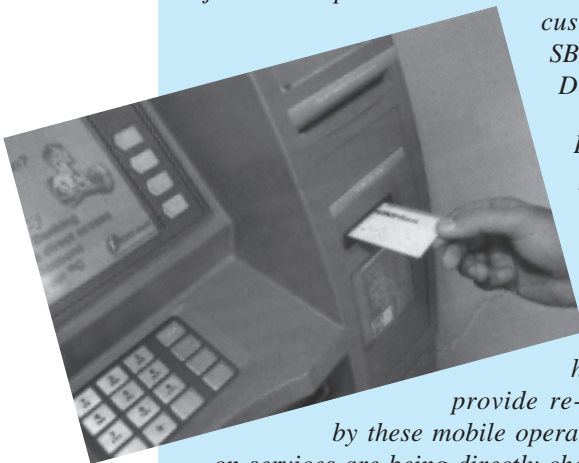
**Mobile Phones :** A mobile phone is a much more useful and familiar device in the rural context than a PC. Its communications facilities offer an immediate utility to any user. Solid state memory, extended battery-life and a compact, rugged form are all great design choices for the village environment. From a user interface perspective, a camera-equipped mobile phone has the ability to support both voice feedback and linkage with paper processes. The numeric keypad's long history makes it comfortable for billions of users. However, numeric data entry also constrains the data that is collected. This can be seen as a benefit. We have observed that it is difficult to maintain quality in free-form data entry with this user population, particularly for content in the local language. Inconsistent spelling and other mistakes are common. By restricting input to a discrete set of choices, consistency can be maintained. We have included image capture and audio recording as two ways to collect free-form data. This data can be processed further in the office (if at all).

**Cost-efficiency :** Mobile phones also offer an obvious cost benefit. Most institutions that have computerized at the SHG-level have PCs at the field office for entering data. From a price/performance perspective, CAM provides a clear advantage. The current market cost of the mobile phone used in our experiment is about half that of an entry-level Celeron PC. By reducing staff trips to the field office, travel costs can be reduced and field staff can spend more time in the field, allowing them to service more clients. There would also be less infrastructure required at the field office. Field offices might not be required at all — commercial banks without a rural branch infrastructure are already paying agents on a commission basis to form and manage SHGs. Using CAM this agent can operate using only a mobile phone and a printer or fax.

## State Bank of India - Beyond Mainstream Banking - Now, ATMs offer more than just cash option

*Students of a deemed engineering university in Tamilnadu paid their college fees through the SBI ATM in their campus close to midnight in May this year. No, they did not draw cash and pay the college, but simply transferred the money into the college account by keying in their admission numbers and a few other details into the ATM. This new facility allows students from around 10 universities to pay their fees through ATMs. Banks are luring customers to ATMs with more than just cash options.*

*Cashing in on their ATM network, banks are experimenting with customised applications that extend beyond mainstream banking. SBI offers Hundi deposit facility in a tie up with Tirumala Tirupati Devasthanam..*



*Rural ATMs can be operable without owning an ATM card. Small farmers can now use their kisan credit cards to access ATMs. The addition of such services has not affected the speed of transaction or jammed banking networks. One only has to modify the software to add another option to the ATM menu and this does not involve large expenses, say bankers. Banks offer a bunch of mobile and other connectivity services. They have tied up with private mobile operators in select areas to provide re-charge cards. Internet connection and renewal packs offered by these mobile operators are now only an ATM away. Currently, none of these add-on services are being directly charged to the customer. Banks have arrangements with institutions over charging a fee for such services.*

*[Source: The Business Line dated June 29, 2006]*