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Digitization of Rotating Savings and Credit Associations in Pakistan



Final Report

Digitization of Rotating Savings and Credit Associations in Pakistan

Final Report



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About Fintech Center

Fintech Center, at Information Technology University is a research group working on the problems of financial inclusion for the bottom billion and conduct research in the areas of gender and financial inclusion through digital financial services, security & authentication, financial education, fraud prevention, data analytics, and customer experience studies in digital financial service.

About Information Technology University

ITU, located in Lahore, came into being in 2012 to advance scholarship and innovation in the areas of science, technology and engineering. ITU through focus on cross-disciplinary applied research, the cultivation of an entrepreneurial culture in teaching and research, the maintenance of a close collaboration with the Information and Communication Technology industry and the development of strong ties with government funding agencies. With a structure that combines the best features of both public and private sector universities, ITU aims to serve as a center for excellence in academia, research, entrepreneurship and innovation.

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Executive Summary

This research investigates the scope for digitization of Rotating and Savings Credit Association in Pakistan on the rails of Digital Financial Service and its potential to increase DFS uptake. 36% of the people in Pakistan save money, but only 4% of those save money with a formal financial institution, while 33% save through saving clubs called Kamaitis, the local version of Rotating Savings and Credit Associations (ROSCAs). Its digitization presents an opportunity to bring people to DFS by digitizing a behavior with which they are familiar.

We follow a Human Centered Design process in 3 phases namely inspiration, ideation and implementation.

INSPIRATION

This phase consisted of semi-structured qualitative interviews with 80 participants including ROSCA organizers, members and non-members. The sample was varied across gender, locality and ROSCA size. The purpose of the qualitative research was to investigate technology ownership and usage, understanding of and familiarity with mobile money and banking services, and how the overall ROSCA structure works including motivations for joining ROSCA, problems faced in managing and participating in ROSCAs and the functioning of ROSCAs.

We studied the functioning of and challenges encountered throughout the ROSCA cycle, which consists of motivation, group formation, formalization, collection and disbursement and assignment, and exchanges.

Following are the main findings from inspiration phase:

- **Social capital** is an important element in the functioning of ROSCAs, from group formation stage to disbursements, and in resolving problems which arise during ROSCA cycle.
- The main motivations for joining ROSCAs include forced saving (37.5%), purchasing durable goods (30%), buying or building a house (27.5%), starting or expanding a business (22.5%), wedding expenses (20%), religious obligations (17.5%), and educational expenses (15%).
- In group formation, organizer plays the key role and participants are recruited by the organizer. Social capital exists between organizers and individual members, but not between members.
- Formalization through rules is more prevalent in large ROSCAs (which require legal documentation) than in small ROSCAs (which rely on rules and verbal commitments).

- There are two popular methods of pot allocation: lucky draw and need-based assignments. Lucky draws are more common in small- and medium-sized ROSCAs, whereas large ROSCAs have need-based assignments. Turn exchange is a very common phenomenon facilitated by the organizer.
- Collection and disbursement are done in physical cash mostly. Either the organizer has to go to submit the amount or the organizer has to collect the amount. Collections take place daily or monthly. Women have problems in collection and disbursement due to mobility issues.
- Record keeping is done by the organizer, and is one of the core functions in managing of ROSCAs, increasing in complexity and sophistication with an increase in size of the group. Record keeping is challenging for the low literate organizers, who often seek help from intermediaries, hence compromising the privacy of the group. Women are more avid record keepers.
- Delayed payments are commonly reported, but there is no standard mechanism to handle it. Different groups have devised different penalties for delayed payments – monetary penalties proved to be dysfunctional due to the high social capital, therefore, non-monetary penalties were employed by the organizers to deal with these issues.
- Frauds were not experienced personally by any of the participants, but they had heard about instances of fraud.

IDEATION

This phase consisted of identifying opportunities for designing digital ROSCA from the inspiration phase. Our approach for digital ROSCA involved digitization of the prevalent ROSCA flow which works on social capital, with an aim to digitize payments. Modality for digital ROSCA was decided as a smartphone application, after assessing the complexity of the flow and the modality of our sample, particularly the organizers.

Application Design and Development

- The application interface is designed to be usable for low literate users with both English and Urdu language options.
- An iterative design process incorporating user feedback was used for icons design.
- ROSCA application has modules designed for both the organizer and members with the option to switch between the roles.
- **Organizer module** has the following use cases:
 - **Create Kamaiti** – Organizer can create Kamaiti group by filling group particulars like name, pot amount, number of members, groups rules, date of submission and disbursement and inviting members from his/her contact list.

- **Kamaiti Management** – There is a personalized home screen for managing activities for a particular Kamaiti group like adding and removing members, turn allocation and viewing group details.
 - Turn allocation is algorithmically performed by the system.
 - **Collection and Disbursement** – Kamaiti collection and disbursement are facilitated through the application and transactions are recorded. Two options have been provided for payments: 1) ITUPesa, a simulated mobile money environment, and 2) cash, the traditional payment method with proper recording to ensure transparency.
 - **Turn Exchange** – A feature of traditional ROSCAs enabled in digital ROSCA, with members requesting the change of turn for pot allocation and change of date for payments.
 - **Notifications** – Push notifications and SMS alerts are provided for all ROSCA activities.
- **Member Module** has the following use cases:
 - Member can see all the invitations and can also request to join the ROSCA group by searching for the group using the group ID.
 - **Turn and Date Exchange** – Member can initiate request for changing the allocated turn or the date of payment, which then goes to the organizer who can choose to accept or reject the request.
 - **Pot Submission** – Member can submit the pot contribution using cash or ITUPesa.

IMPLEMENTATION

Testing of the digital ROSCA application was carried out to evaluate the functionality and usability of the application. Two (02) ROSCA groups were selected based on the variables of gender (male, female), literacy (primary to intermediate education level), age (20 to 45 years), and smartphone ownership (because digital ROSCA is a smartphone-based application).

Testing was carried out in two phases. In the first phase, a face to face session was conducted with the participants, whereas in the second phase, the participants were given the application to complete a ROSCA cycle unsupervised, and a list of tasks to complete that ROSCA was provided to them.

Findings from Testing

- Textual terms and icons used in the application were found to be user friendly, as the users were able to navigate through the application easily.
- **Preference for Audio Help:** Low literate respondents preferred using the audio help available in the application wherever they found difficulty in reading or understanding the terms.
- **Cash as the preferred payment method:** Majority of the participants used cash as payment method instead of ITUPesa wallet account because of lack of understanding and knowledge about ITUPesa. Future testing can be done using real payment APIs of popular mobile money brand(s) to assess user preferences after overcoming the issue of familiarity.
- **Notifications:** The Digital ROSCA application's feature of sending push notifications and SMS alerts for all the activities in the application was appreciated by the participants because it reduced the efforts for group communication.
- **Pot Collection easier for female organizers:** The female organizers were very appreciative of the pot collection feature of the digital ROSCA application as it helped them overcoming the mobility issues and not having to chase members to make timely payments.
- **Record Keeping is a vital feature:** ROSCA organizers mentioned record keeping as a vital function of digital ROSCA application, because in traditional ROSCAs, the organizers have to maintain all the record on a notebook and keep that record updated, while digital ROSCA was managing everything on the application.
- **Demand for USSD:** We also observed a demand for a USSD-based digital ROSCA model as people shared their concerns about how the other members will use this application if they do not have a smartphone.

1. Introduction

Financial inclusion, defined as access to formal financial services of payments, savings, credit and risk protection, has been linked to overcoming poverty, narrowing income inequalities, and enabling economic growth.¹ The focus on formality draws from the limitations of informal financial practices arising from dependence on individuals or groups, with similar financial capacities and exposure to the similar types and levels of risks as the ones seeking assistance, resulting in frequent dysfunction and failures. Such failures only increase with increase in risk exposure and vulnerability of the groups involved.

Mobile money (or branchless banking), which provides financial services using the widespread cellular and distribution network of mobile operators, has been pursued as a means to expand financial inclusion. Our work focuses on Pakistan, which already has a well-established technological infrastructure for mobile money. This infrastructure entails a national identity and biometric database covering 90% of the population, 73% of the cellular subscriptions² having biometrically verified SIM cards, 61 million subscribers for 3G/4G, and mobile money friendly policies such as the facilitation of lower KYC requirement accounts, also known as Level-Zero accounts. Despite having the necessary elements for mobile money adoption, there has been a low uptake of mobile money but a high level of engagement in informal services³.

However, informality might not entirely be a bad thing and can serve as a starting point for introducing the unbanked to digital platforms, by digitally recreating behaviors which the unbanked population currently engages in while removing inefficiencies⁴. These propositions can further be strengthened by supplementing with features which can only be enabled by formal institutions. One widely prevalent and well-known phenomenon in informal financial practices is liquidity farming, which presents the opportunity for creating digital value propositions based on existing behavior. Group savings which have many variations (ROSCAs, ASCAs, Saving-up Groups), are one method of liquidity farming. According to Financial Inclusion Insights (FII) data, 36% of people in Pakistan save money but only 4% of those save money with a formal financial institution, while 33% save through saving clubs called Kamaitis, the local version of Rotating Savings and Credit Associations (ROSCAs).

This study explores the Digitization of ROSCA as a use case for introducing the unbanked to Digital Financial Services, by means of creation of a Digital ROSCA prototype after carefully studying the prevalent ROSCA dynamics in Pakistan. The design, creation and testing of Digital ROSCA has been carried out following the principles and methodologies of Human Computer Interaction and

¹ (Asli Demirgüç-Kunt, 2015)

² Pta.gov.pk

³ An Exploration of Smartphone Based Mobile Money Applications in Pakistan

⁴ Intermedia (2018)

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Human Centered Design and takes into consideration any effects of socio-cultural context, gender and religion on ROSCAs in Pakistan.

Motivations for Digitization of ROSCAs

- ROSCAs are highly prevalent in Pakistan and other countries with a low financial inclusion ratio. They are one of the most common ways of **liquidity farming**⁵. Considering how deeply ingrained this particular financial behavior is, digitizing it presents an opportunity to introduce the unbanked to the Digital Financial Services platform in a way which is familiar to them, thus improving the likelihood of adoption.
- Digitizing ROSCAs presents an opportunity to **digitize and record the financial discipline** (and transactions) of ROSCA participants, most of whom in Pakistan are women, to create a transaction history which can be used for credit rating.
- ROSCAs and other informal mechanisms work on social capital. Therefore, these mechanisms are likely to include members having more or less the same financial capacity as other members. When the need for capital becomes greater than the group's capacity, additional formal means of liquidity from financial institutions can complement ROSCAs. Digitizing the ROSCA transaction history as a means to assess credit risk for formal loans can qualify its participants for additional liquidity.
- ROSCAs represent a social good where groups come together to pool money to fulfill the financial needs of its members while enabling savings. Digitization can create efficiencies and transparencies in the management of such groups while removing inefficiencies associated with informality.

Research Objectives

Our work is guided by the following research questions:

- What is the scope for digitizing ROSCAs?
- How important of a role does social capital play in structuring and working of the ROSCAs?
- Is there any difference in the use of ROSCA by male and female members/organizers?

⁵ Ignacio Mas in his working paper Money resolution, Digital Simulations defines liquidity farming as a technique for developing potential sources for on-demand liquidity in case of a need or creating access to money you don't have. He goes ahead to say that digitizing a liquidity farm is a complex information management problem.

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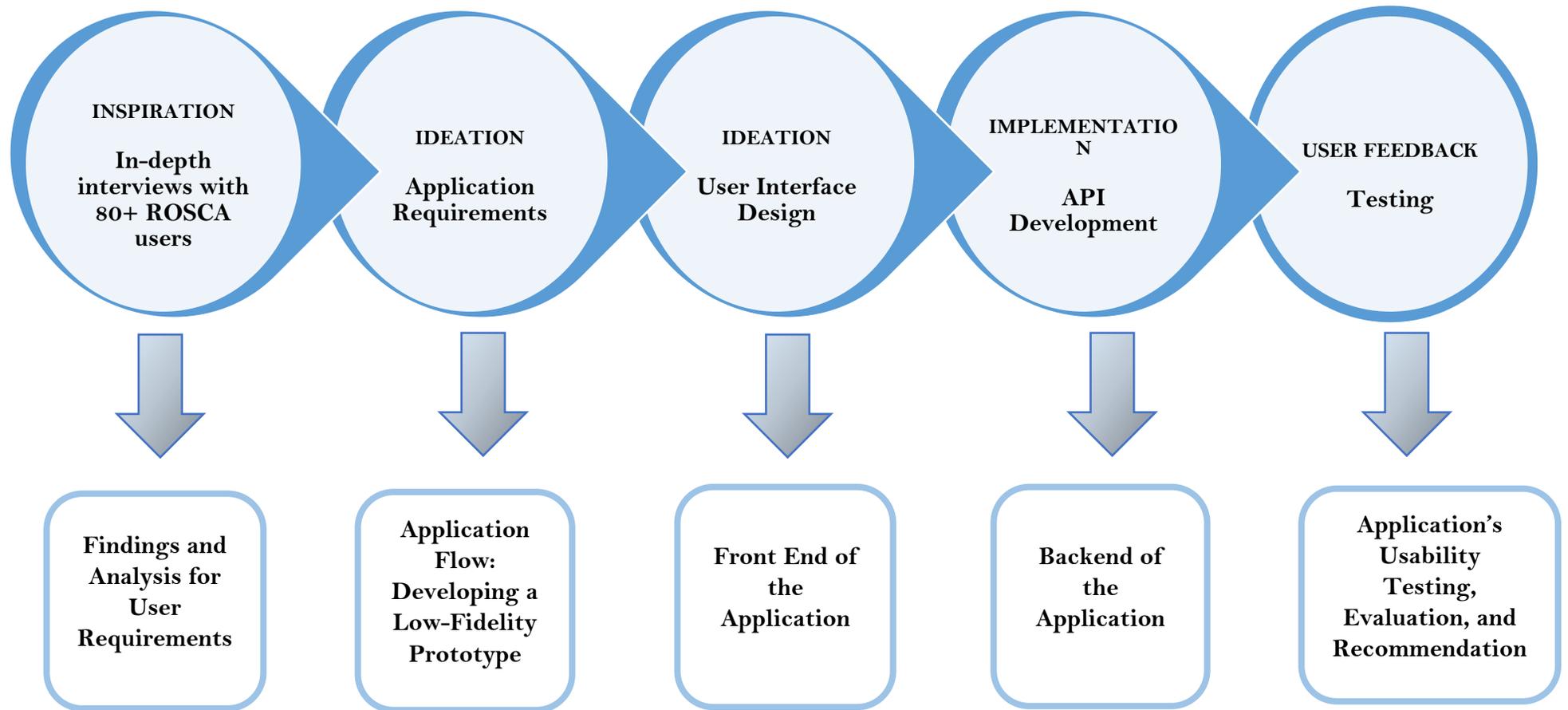
2. Our Approach: A Human-Centered Design Application Development Process

- Human-centered design (HCD) is an innovative problem-solving technique focusing on the people for whom we are designing. HCD consists of three phases.
 1. **Inspiration:** spending time with the people for whom we are designing to understand their needs
 2. **Ideation:** identifying the opportunities for design, based on our findings from users, and prototype the possible solutions
 3. **Implementation:** bringing our prototypes to life and knowing that this solution will be a success as engaging with the real users was at the heart of the process.
- Being usable and learnable is very important for the success and uptake of a system because if a user finds it difficult to use, they might switch to another application or quit using this system altogether⁶.
- Studies argue that financial service providers do not launch services based on well-defined insights. Instead, they go to market with a one-size- fits-all mobile wallet. Branchless banking needs design thinking⁷.

⁶ A survey of software learnability: Metrics, Methodologies and Guidelines

⁷ Designing customer centric branchless banking offerings

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INSPIRATION

3. Research Methodology

In the inspiration phase, we aimed to explore the opportunities for designing a Digital ROSCA system and the modality of users towards using that system. Through 80 qualitative interviews with ROSCA organizers, member and non-members varied across gender, locality and ROSCA size we explored the following:

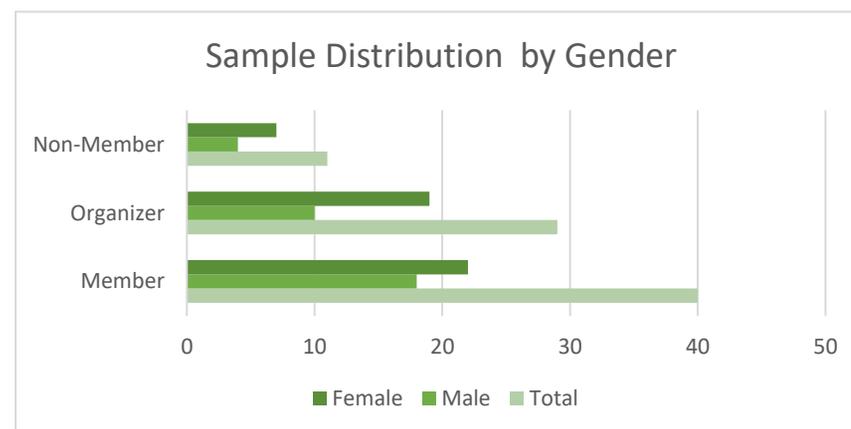
- Develop an understanding of the participants' usage of mobile phone and the internet, and their ability to learn new applications
- Develop an understanding of their familiarity with and usage of mobile money and other banking services
- Investigate the overall ROSCA structure, i.e. how ROSCAs work, what are the motivations to join ROSCAs, what are the problems associated with ROSCA operations, etc.
- Explore the social capital aspect in ROSCAs to establish its relative significance while designing the digital ROSCA.
- Explore the role of religion and gender in ROSCA group formations.

Sampling

Gender is a significant determinant in ROSCA group formation. Research ⁸ demonstrates that participation of women in ROSCAs is significantly higher than that of men, and women are more active than men in the informal financial sector. As per the FII Pakistan data, women are twice as inclined to participate in ROSCA savings as compared to men.



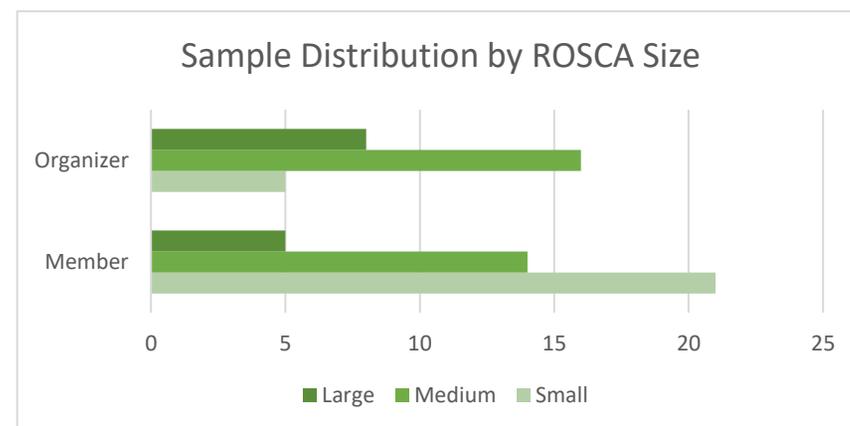
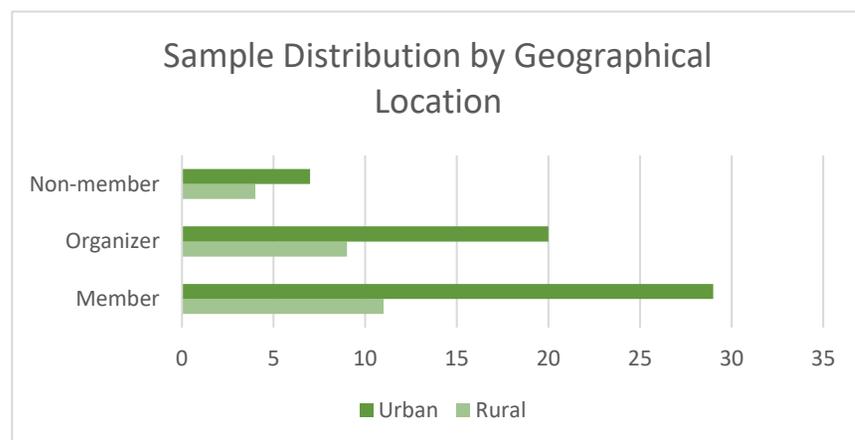
Interviews with 80 ROSCA organizers, members and non-members varied across gender, locality, and ROSCA size.



⁸ Intermedia (2018)

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- The sample was broken down according to the FII 2016 data:
 - ❖ Nearly 2/3rd of the respondents recruited were female
 - ❖ Nearly 2/3rd of the respondents recruited were from urban areas
 - ❖ With a focus on the low-income, low-literate population, 4/5th of the respondents participated in small – medium-sized ROSCAs.
- Detailed one-on-one interviews ranging from 25 – 40 minutes were conducted in the preferred language of the respondents.

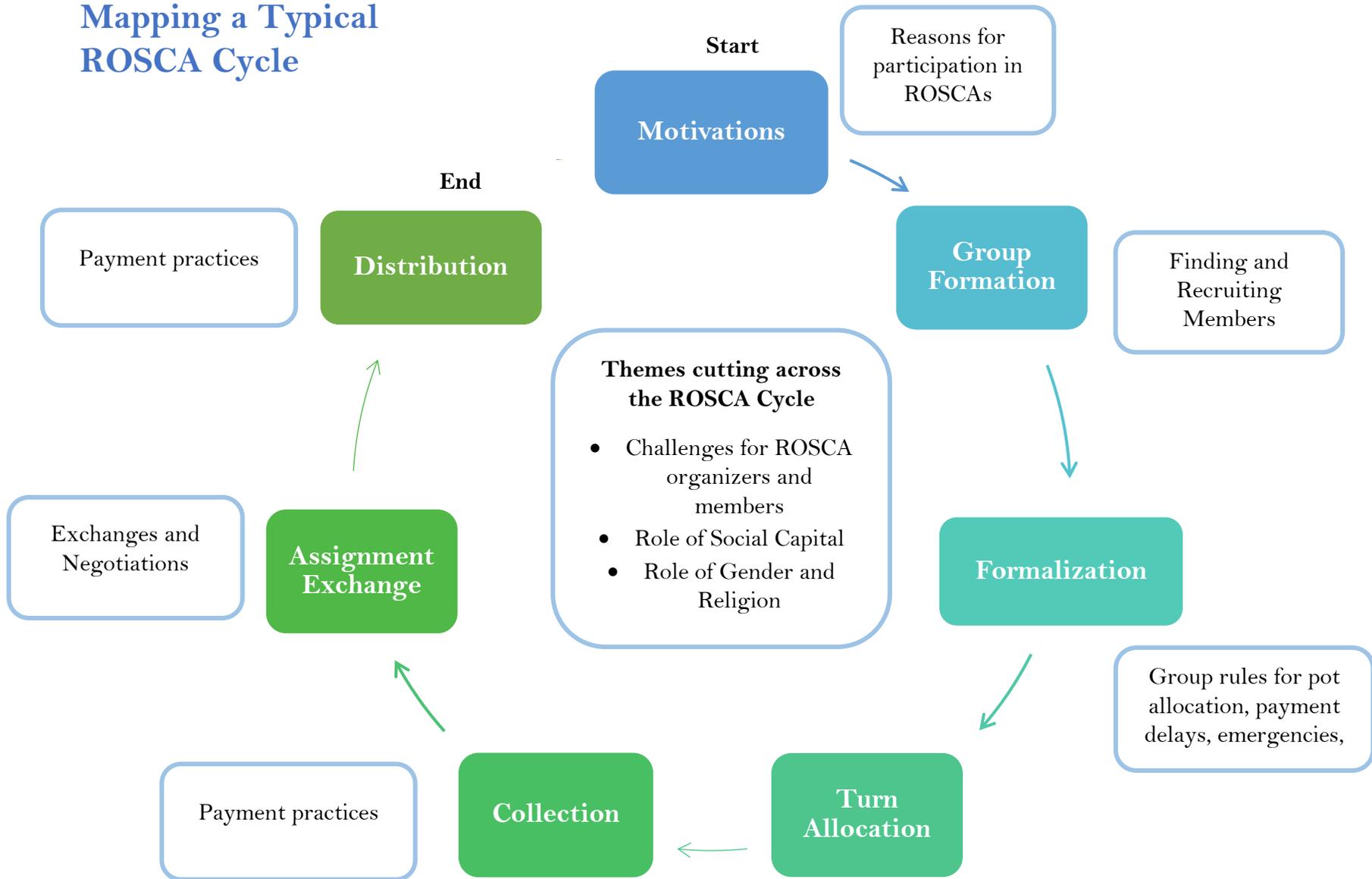


4. ROSCA Cycle Explored: Social Capital is Key to the ROSCA functioning

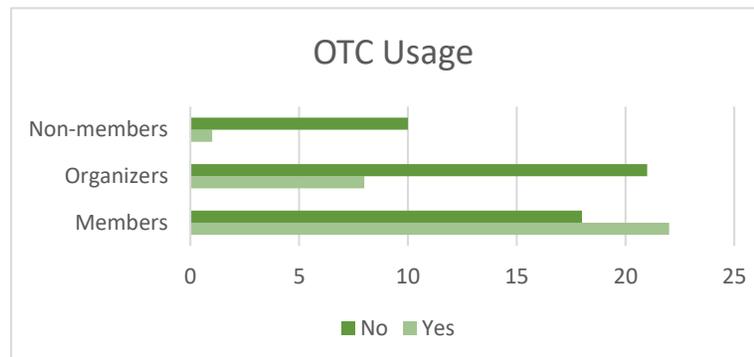
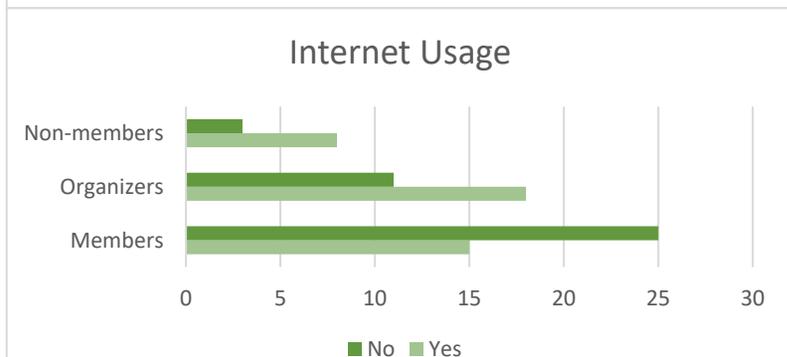
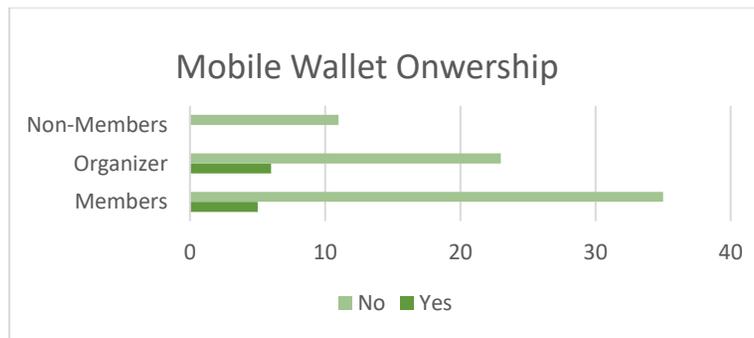
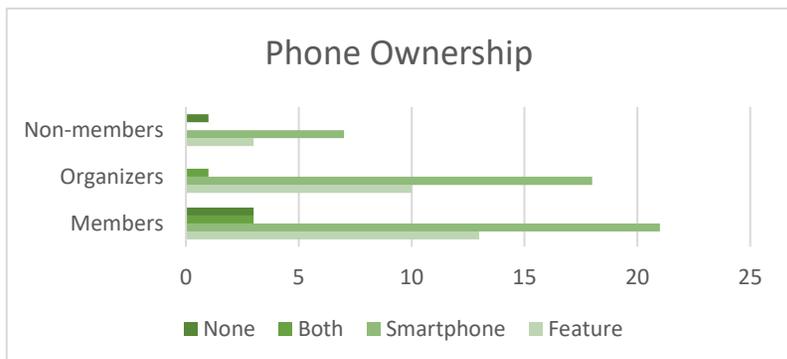
For developing a Digital ROSCA, we first lay out a typical ROSCA cycle. We follow this cycle for exploration, analysis and design.

- **Motivation:** Motivations are the reasons for creating a ROSCA group or participating in one. These reasons could be different for organizers and members.
- **Group Formation:** Group formation is the process of creating a ROSCA group. This includes recruiting members for the group and agreeing upon certain conditions to start the group.
- **Formalization:** Formalization refers to the terms and conditions that the ROSCA group members define for conflict free functioning of ROSCA groups. It includes due dates for collection and disbursement of ROSCA money, penalties on delaying payments, methods to allocate turns etc. Formalization also includes any documentation to create a formal agreement in a group.
- **Turn Allocation:** Turn allocation is the method used to decide which member receives the ROSCA pot amount in a particular month. There are different ways for this allocation which are discussed later in the report.
- **Collection and Disbursement:** This refers to the collection and distribution of money from and to the ROSCA members by the organizer
- **Exchange:** This refers to the process of exchanging turns for pot allocation among members of a group
- **Problems:** Issues faced by members and organizer in current ROSCA's such as frauds, delayed payments, finding reliable members etc. and the different techniques used to address these problems

Mapping a Typical ROSCA Cycle



5. Technological and Financial Service Usage in the Sample



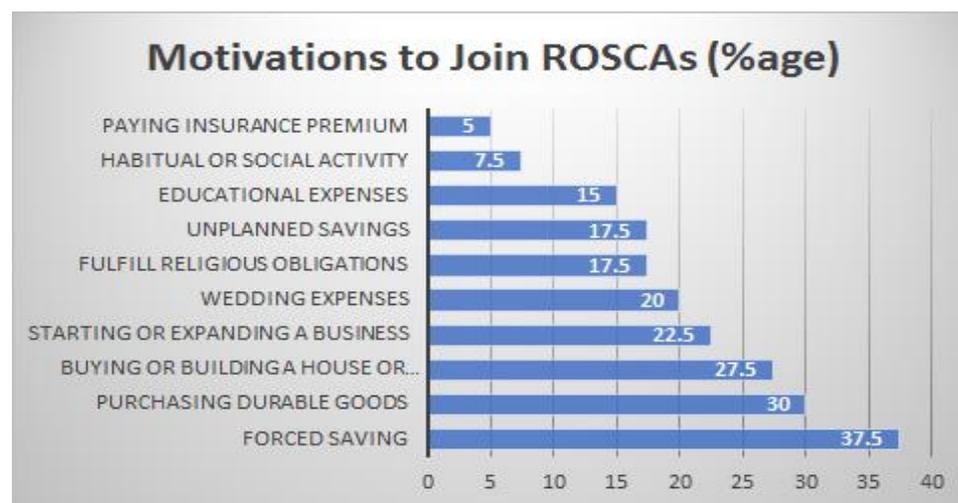
Finding: Based on our study, majority of the ROSCA members and organizers have mobile phones, and more than half of them use smartphones, while the remaining use feature phones. Even though members and organizers have smartphone ownership, but their usage is very limited or assisted.

Design implication: With the complexity of the ROSCA life cycle, and the fact that over half of our ROSCA sample were smartphone users, we propose that initially a smartphone-based application with a low literate interface should be considered for the ROSCA, with audio and visual aid, and language switching as per preference.



6. Motivation for Participation in ROSCAs

Motivations are important to explore as they can affect the flexibility of a member with respect to their turn in a group, flexibility towards exchanging turns and the opportunities to design products associated with ROSCAs. In some instances, they can also determine if a return can be generated for the industry on a digital ROSCA product under the current industry assumptions. Motivations to participate in ROSCAs can be categorized as following:



Design Considerations

Connecting goals and means:

- Flexible program options and prices: For individuals who participate in ROSCAs with a motive of purchasing durable goods like refrigerators, air conditioners, motor bikes, etc., could be matched with manufacturers offering these products. Flexible program options and prices for these items could act as **incentives for users to adopt the digital ROSCA.**
- Consultancy services: Individuals who use ROSCAs for unplanned savings could be provided investment options or consultancy on how they can make effective use of their money.

7. Group Formation: Key Findings

Findings from Organizers



- Organizers have an implicit selection criteria for recruiting members: Income levels and sources of income, and status of home ownership
- Induction into the group entails one of three processes: 66% of members recruited are from the organizer's social circle, 21% are recurrent members, and 13% are requests from members to join
- Organizers are reluctant to recruit individuals who are at risk of payment default or running away with pot amount: 1) Tenants, 2) Individuals from distant location, and 3) Unknown individuals
- Motivation to start ROSCAs: 1) Dissatisfaction with previous organizer (60%), and 2) Benefit of getting the first pot (40%)
- Organizer has the discretion to add a member to the group, who might be a stranger to other members, as long as the organizer is ensuring payments from each member and timely pot disbursements
- A member may join a group through a guarantor: In case of default, guarantor bears the responsibility of making payments which is a verbal promise
- Replacing Members: Organizer is responsible for managing payments of the quitting member, either by pitching in the amount himself/herself, or by finding a replacement

Findings from Members



- Introduction into ROSCAs is through the social circle: Community members or colleagues (44%), family members (41%), and friends (15%)
- Social capital and trust is integral only between the organizer and member, and not between members: 34 of 40 stated not knowing other members
- Members are mainly interested in the surety of payments, which the organizer is responsible for
- There are instances where an individual is a member of one ROSCA, and an organizer of another
- Individuals also participate in multiple ROSCAs at the same time

Group Formation: Key Trends

Finding groups/members – through social network: Individuals prefer to form or join groups among the people that exist in their social circles (family, relatives, friends, colleagues, etc.).

Groups are gendered: Our findings confirmed previous evidence around ROSCA groups being gendered. Men are often excluded from ROSCA groups which are dominated by females, because women feel more comfortable in grouping with other women and men are uncomfortable following the rules imposed by women and vice versa⁹. Thus, ROSCA groups with the members of same gender are more flexible and successful¹⁰.

Replacing members – the organizer’s burden: If a member exits in the middle of the ROSCA cycle, the organizer is responsible for managing payments of the quitting member, either by pitching in the amount himself/herself, or by finding a replacement.

Interaction between members: In most cases, there is no member to member-to-member interaction in ROSCA groups and all the interaction happens mostly between the member and the organizer.

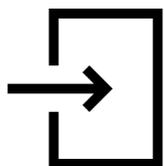
Social capital between organizer and member: Most members report not knowing other members, but they know and trust the organizer immensely.

⁹ Building new realities: African women and ROSCA's in urban South Africa

¹⁰ Social Capital as an incentive for participation and formation of women-dominant ROSCA's

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Group Formation: Design Considerations



Organizer as an entry point: It is evident from the field research that organizer has the authority and influence in ROSCA groups as members join groups mostly based on their trust on the organizers and follow the rules and instructions that organizers set for the group. Consequently, organizer could be used as an entry point for Digital ROSCA in ROSCA groups. Organizers can convince other members and the adoption of Digital ROSCA could be enhanced.



Recruiting members (Organizers): The organizer often announces, mostly in person, that s/he is starting a ROSCA within social circles. The ROSCA app can facilitate this process by allowing the user to make an announcement and send an invite digitally to all the contacts to whom s/he wishes to communicate the information.



Finding ROSCA groups (Members): ROSCA application can show all the contacts who are participating in ROSCA and people can request joining those groups.



Replacing members: ROSCA transactions as an indicator of credit history – People who successfully participate in ROSCAs exhibit a certain payment capacity and financial discipline. Digital ROSCA can build the credit history and social ratings of ROSCA users based on their performance in ROSCA groups. These ratings can be used for finding a member for replacement and for future group formations as well.

8. Formalization of ROSCA Groups: Rules and Code of Conduct

Group rules vary across ROSCA groups. However, certain patterns in rules can be observed by ROSCA sizes:

Turn assignment in ROSCA cycle:

- Common in small and medium-sized ROSCAs; members tend to quit a ROSCA group if they are not satisfied with the allocation method, hence, organizers mitigate this problem by communicating pot allocation methods in the very beginning.

Schedule of payments:

- Common in small and medium-sized ROSCAs; dates for payment collection period and pot allocation are decided

Delayed payments and penalties on habitual delays:

- Common in small and medium-sized ROSCAs; these groups have penalties for late payments to avoid delays in paying the winner. If the organizer is unable to collect the amount by the date committed to the pot winner, the organizer has to balance the pot amount from his own pocket.

Legal document as collateral:

- Common in large -sized ROSCAs as they constitute of large amounts; small/medium ROSCA groups do not have such a rule as trust is a crucial factor between a member and an organizer within a ROSCA group.

Exiting the group:

- Common in all group sizes; if a member leaves the group, either the organizer finds a replacement for the member, or the member does. If no replacement is found, the organizers has to fill the gap.

9. Pot Allocation: Findings

There are three ways of pot assignment. Usage of the method varies with ROSCA sizes.

1. Lucky draw

- The most common way of assigning pot turns is through lucky draw, with names of members written on paper and picked randomly to determine turns. There are two ways of doing this: 1) Lucky draw once at the start of the ROSCA cycle, and 2) Lucky draw at the start of every month
- Administratively, it is less burdensome for the organizer in comparison to the other methods.
- 58% of the respondents mention that they use lucky draws to determine pot turns in their ROSCA groups.

2. Need-based assignment

- Need-based assignment involves determining turns based on financial need, or on first come first served basis. 35% of the respondents mention that this method is used to determine pot turns in their ROSCA groups.
- If there is a clash on some particular month between two members; either the person with the bigger need is preferred, or they are asked to accommodate each other. The organizer makes a judgement on whose need is more crucial.
- This method is administratively more taxing for the organizer, and was more common in large-sized ROSCAs.

3. Priority-based assignment

- In this method, a person with more shares in the ROSCA group is prioritized to have turns in the start of the cycle. For example, if a person has four shares in one group, he will be given two share in the very beginning, one in the middle and the remaining one at the end of cycle.
- Only 6% of the respondents mention that this method is used to determine pot turns in their ROSCA groups.

Preferred method

- 54.5% of the respondents preferred having a lucky draw once at the start of the ROSCA cycle to determine turns, 45.4% preferred the need-based assignment, while none of the respondents stated priority-based assignment as their preference.

10. Turn Exchange: Findings

Exchanging of turns can be defined as swapping ROSCA turns between two members of the group with their mutual consent.

➤ **How common is this phenomenon?**

It was seen as a common pattern in ROSCA groups regardless of gender or locality, as 80 % of the respondents shared the trend of exchanging turns in their groups.

➤ **When does a member request a turn exchange?**

If a member is in urgent need of money but his/her turn is scheduled for later, he/she can request the group for an exchange of turn.

➤ **How does the exchange take place?**

The member, requesting exchange, contacts the organizer to exchange turns, who then talks to the relevant member. Members report exchanging their turns with other members if they (themselves) do not have an urgent need. Needs which are considered most important include daughter's or sister's wedding, death of some close relative or some medical emergency.

➤ **Are there differences in such an exchange across differently-sized ROSCA groups?**

Small and medium ROSCA members often inquire about the need of the other member, and exchange turns only if they believe that the other member's need takes precedence over their own. Members of high-income ROSCA groups do not inquire about the particular need of the other member and consider the request for a swap sufficient to exchange turns.

➤ **What happens if a member refuses to exchange turns?**

In such cases, members are asked by the organizer to share half of the pot amount with the other member if they can fulfill their need with the partial amount. If there is more than one exchange request, then either the person with more urgent need is preferred or they are asked to share amount of one pot among themselves.

➤ **Who is responsible for managing this exchange?**

Since in most cases, the group members do not know each other, the organizer has to intervene for a possible exchange.

Pot Allocation and Exchange: Key Trends

ROSCA members and pot shares: Aside from having a single pot turn and share in a ROSCA cycle, it is not uncommon for members to take more than one share in a ROSCA group, and hence have the same number of pots assigned as the number of shares they have. Additionally, while it was not common in our sample, sometimes multiple individuals also share one pot as it may be more affordable for them.

Common allocation methods: The two commonly practiced methods of pot allocation are need-based and lottery-based. Lottery-based allocation is preferred by some, as the sequence of pot winners is left on chance. While in need-based allocation, the organizers and members mutually decide about monthly pot winners, in which the members are assigned the pot for their preferred month, however, this method is administratively more taxing.

Organizer takes the first pot: Regardless of the pot allocation method, the first pot always goes to the organizer, and there is no conflict between the organizer and the member because of it.

Lack of transparency: In most cases, all members are rarely present at the time of pot allocation, due to which those who are absent feel the allocation may have been unfair.

Organizer is the link: Members approach the organizer to request a turn exchange and have no direct interaction with other members in this regard. Organizer, in turn, speaks to the member who has been assigned the pot for that month. Although these happen rarely, these instances add administrative burden on the organizer, who has to take out the time and mediate for turn exchange.

Pot Allocation and Exchange: Design Considerations

Save time and create transparency: Digital ROSCA can potentially save the time of both the members and organizers and should be designed in a way to create a transparent platform for pot allocation, that the members can trust.

Changes/Exchanges: Digital ROSCAs will facilitate the members in communicating their requests to organizers, especially in cases where members are hesitant or anxious to directly speak to the organizer:

- Flexibility in pot submission dates: Members may inform the organizer through the application that they wish to change the date for pot submission, hence making the interaction less stressful.

- **Exchanging turns:** Requesting a turn exchange through the application can potentially save time for members, as they may be able to conduct this interaction simply through a text or a voice message.

11. Pot Collection and Disbursement

The organizer is responsible for collecting the money from the members, and then disbursing it to the pot winner. Organizers report pot collection as one of the more time-consuming tasks during the ROSCA cycle. Some organizers have even mentioned pot collection as the most difficult part in organizing a ROSCA. There are two key elements in pot collection: the collection frequency and the mode of collection.

Collection Frequency: We observed pot collection being done on both monthly and daily basis, depending on type of group.

Daily

This collection model is mostly practiced in commercial ROSCA groups among businessmen.

The organizer collects the amount from each member at the day end, by visiting the members himself.

The organizer is able to invest the collected money into his business as working capital till the pot disbursement at the month end.

Organizers report it to be convenient for their members, who would rather prefer to pay daily in small amounts than pay a hefty amount once a month.

Monthly

Majority of ROSCAs follow a monthly collection model, with the 5th - 10th of every month being the deadline for submission in most cases, unless set otherwise.

In this collection model, majority of the members visit the organizer to submit their pot amount.

Reminder for payments: The organizer also has to remind members for the monthly/daily payments. The mode of reminder also varies - it is sometimes done through personal visits or through phone calls or text messages.

Disbursement Frequency: The payment from the organizer to the pot-winner is made once a month, regardless of the frequency of pot collection.

- Normally, there is a time lag of 5-15 days between pot collection from members and disbursement to the pot winner. During this time, the collected pot amount is at the disposal of organizers, and the organizers can use the collected money to fulfill their own needs and return it to the pot before paying the winner every month. This use can be personal or commercial depending upon the nature of the ROSCA.
- Some ROSCA groups have pot disbursement the same day as its collection. These ROSCAs are held among office colleagues, and due to the physical proximity and same salary cycle, the organizer collects and disburses the pot amount the same day.
- Some female organizers tend to use the pot money for domestic expenditures, like paying utility bills, while others fear the inability to replace the spent amount and choose not to do so.

Mode of Collection and Disbursement: We inquired the organizers about the mode of payment prevalent in their group, the associated reasons for the stated mode, and their preferred mode. We noticed variations in pot collection among groups of different ROSCA sizes.

Cash-based transactions

*“We do it in cash. Obviously, since us women receive the monthly pocket money from our husbands in cash, we pay in cash”
– Female, Rural*

Cash-based transactions are **preferred where members are in a close physical proximity** whereas the members who live in some other geographic location and it is difficult for them to visit the organizer for submitting the amount, they send the money through bank or mobile money transfer.

For low income groups, organizers reported that the members do not have formal bank accounts as they receive salary in cash as well, and hence do not perceive to have an alternate mode of transaction to cash. However, the organizers do know about mobile money but their knowledge is limited to brand recognition, but does not include the array of services offered. Therefore, they tend to prefer cash collection.

For groups constituting housewives, respondents mentioned that they do not prefer any other method of collection either. Since the female members receive money from their husbands in cash, they pay the pot amount from their household budget in cash as well.

The female respondents demonstrated limited knowledge about alternate mode of payments, for instance, through mobile wallets. According to them, the alternate to physical cash was payment through cheque, which they were reluctant to adopt as they had heard instances of fraud with payments through cheques.

Another reason for cash-based transactions was the **utility of having cash in hand**, and being free from the hassle of visiting banks or mobile money agents, and being free of transaction cost

Non-cash transactions

*“Currently, I have 8 ROSCA members, of which 2 directly deposit the amount in my bank account, one lives in WAPDA town, so obviously she can’t visit, and the other is nearby. Both are the first to submit the pot, it is very convenient!”
– Female, Urban*

Such transactions are mostly conducted when a member is living at a distance from the organizer and is unable to pay in person, or send the pot amount through a trusted individual.

Non-cash payments are made as a last resort.

In high income groups, regardless of the proximity, the organizers receive some pot payments through online transactions. They claim online transaction to be convenient and that such members are often the first to make their monthly payments.

In middle-high income groups, the organizer has to transfer money to the pot winner in phases, as transfers higher than a certain amount are subject to a tax deduction.

12. Pot Collection and Disbursement: Key trends

Mode of collection:

- **Mostly in cash;** 63% of the respondents were doing their collection purely in cash as compared to 36% of them, who were collecting pot in a combination of methods like cash, online transactions, and cheque.
- **In-person delivery:** When the transaction is cash-based, either the member or the organizer has to physically go to the other for payment.
- **Non-cash transactions:** The organizers, who collect pot money via online transactions, had members participating from distant locations, and these too, were a few members per group.
 - **Characteristics of individuals making non-cash payments:** All the organizers, who mentioned pot collection in modes other than cash, were from urban locality, organizing medium or large ROSCAs, literate, and has exposure to digital payments at some point in their lives, however, only through over-the-counter transactions.

Spending from pot amount:

- **Organizers of commercial ROSCAs** (which take place in market among shopkeepers) report to use the daily collected amount to increase the working capital of their business. The benefits of this increased liquidity are greater for organizers of commercial ROSCAs as compared to domestic ROSCAs, since the former not only receive the first pot, but are also able to invest the collected amount into their business every month and generate greater profits; whereas, the latter only have the benefit of receiving the first pot.
- **Rural vs. urban commercial ROSCAs:** This trend was observed in both rural and urban commercial ROSCAs. Nonetheless, the organizers of rural commercial ROSCAs only use the pot amount if they need it, while the organizers of urban commercial ROSCAs use it in their business every month.
- **Increased household liquidity:** Organizers also reported using the pot amount to manage their personal or household liquidity. They describe it as a personal credit line, which is more effective and easier than borrowing, as people do not tend to lend to others easily.
- **Gender dynamics:** Women are more likely to spend from the pot amount as compared to men. Most males reported not spending from the pot amount as they view the money as a member's wealth, and themselves as temporary custodians of it. The only male respondents who claimed to have spent from pot amount were organizers of commercial ROSCAs.

Challenge: Pot collection is an issue for two categories of stakeholders:

- **For female organizers:** Most female organizers sought a male counterpart's assistance in collecting pot money, as female members also had mobility constraints. This practice also compromises the privacy of funds for these females, especially due to the involvement of male counterparts.
- **For Commercial ROSCA organizers who follow the daily collection model:** These organizers collect pot amounts on daily basis and have to visit members multiple times for reminders and collecting payments. Cash based transactions are preferred because of the close physical proximity.

Pot Collection and Disbursement: Design Considerations

- **Digital ROSCA** can facilitate the organizers in fulfilling these responsibilities with lesser administrative burden, by automating the collection and distribution, and inducting trustworthy members based on their credit history.
- **Allowing multiple payment methods:**
 - Initially, both cash and digital payments should be enabled, in order to increase the adoption of the digital ROSCAs.
 - **Money management in ROSCAs** includes two types of transactions at both the organizer's end (pot collection, and pot disbursement), and the member's end (pot submission, and pot receipt).
 - While digitizing ROSCAs has the potential to facilitate money management for both organizers and members, currently the use cases for digital payments are limited. Hence the motivation for end users to shift to digital payments for only ROSCAs might also be limited.
 - The ultimate goal is to facilitate the organizer, by reducing visits for pot collection and disbursement, in the medium to long run. In the short-run, however, some members may have wallets, while others may not.
 - Overtime, the adoption of wallets is expected to increase as organizers encourage their members for its use.
- **Challenges with different modes of collection and disbursements:** Digital ROSCA model may increase the organizer's administrative burden, as s/he could be receiving pot submissions in cash, through OTC, or through wallet.

- The organizer may have to cash in, or cash out, from their wallet depending on the mode of payment the pot winner prefers.
- **Challenges with OTC Implementation:** Currently, any transaction from OTC to wallets is tagged as a deposit, and there is no way to verify who made the payment to the wallet and hence, no way for the app to generate a receipt of payment, unless it is manually tagged. However, even if the organizer chooses to manually tag OTC payments, s/he will be unable to match OTC payments to the members, as he will be receiving multiple payments within a short time span.
 - We considered the model of merchant OTC payments to enable OTC on ROSCAs, and if such features are enabled on the ROSCA organizer's account, these challenges can be mitigated. However, this remains out of the project's scope.
- **Organizers as entry points for mobile wallet adoption:** It is mandatory for the organizer to have a mobile wallet account, to facilitate his transactions remotely. However, the adoption and usage of mobile wallets is not a phenomenon that members will take up immediately, and the potential benefits of the app to the users will take time to materialize.
 - Since in Pakistan's context, social capital plays a vital role in the functioning of ROSCAs and organizers are often important figures in their groups, they can be influencers in their groups for mobile wallet adoption.
 - However, currently, the ROSCA organizer does not have an incentive to move towards digital transactions, and to make such a shift, incentives will have to be built in to the product such as qualification for digital credit for customers with a ROSCA digital payment history.

13. Record Keeping and Proof of Transactions: Key trends

Gender trends among members in record-keeping: Majority of the male members do not keep a record of their ROSCA transactions, and rely on the organizer for it, whereas majority of female members keep a record of their ROSCA transactions on some notebook or register. A major reason for not maintaining any record was the trust on the organizer. Also, none of these members reported any problems regarding record keeping.

Proof of payment and role of social capital: The organizers made pot winners sign receipts whenever they disburse the payment to them. However, the organizers reported that they do not give receipts of payment when members make their payments, nor do members ask for one. This, again, is evidence of the strength of the social capital between members and organizers.

- **Large ROSCAs:** More sophisticated record keeping was observed in one group, where the organizer distributed cards with monthly transaction history of the respective members, which also serves as proof of payment.
- **Medium and small ROSCAs:** Members do not get receipt of payment. However, they sign on receiving their payment or making their payment either on a white paper, the record on the organizer's notebook, or they receive pot amount in the presence of other members (with potential witnesses).

All organizers do maintain their record for monthly transactions, and manually update it each month.

Challenges with record keeping:

- **Assistance in record-keeping:** Some female organizers tend to seek assistance from another family member for keeping records, which compromises the privacy of the group.
- **The complexity of record keeping** can increase with group size or with literacy challenges of the organizer. Other aspects that may complicate record keeping include members trading turns or delays in payment collection and distribution.
- **Human error in record-keeping:** There are different issues related to record keeping which we observed on the organizer's end, for instance, updating records, and mistakes in record keeping, etc.

Record Keeping and Proof of Transactions: Design Considerations

- **Ease in record keeping:** Record keeping in digital ROSCA is automated, whether a member submits pot to organizer or disburse pot to the member. Users are not required to manually enter the record of these transactions. This not only facilitates the organizer but member as well. Automation also helps the organizers with literacy challenges by recording updates if a turn exchange scenario occurs.

14. Problems/Difficulties in ROSCAs

Frauds

- **Can occur at all levels but evidence is anecdotal:** Organizers and members, both, can perpetrate frauds. Organizers could abscond with the collected money, whereas members might delay their payments or stop making payments altogether once they receive a collection. Most of the incidences reported were based on second-hand information, and none of our respondents reported to be victims of fraud. The anecdotes included organizer or member falsely claiming to have paid taking advantage of lack of a record and organizers running away with money with no legal recourse due to lack of evidence and inefficient legal system.

Delayed Payments:

- **Request for allowance for delayed payment:** Over half of the respondents reported to have delayed their ROSCA payments at some point in time. However, these delays are not habitual, and members tend to inform the organizer beforehand about the expected delay in payment and request him/her to accommodate them for the particular month.
- **Organizer ensures timely payment to pot-winner:** Organizers act as a buffer and utilize their personal funds to contribute towards the pot to ensure timely pot allocation. However, some ROSCA groups have strict policies for delayed payments, and members delaying the payments are penalized accordingly.

Design Considerations:

- **Fraud:** Digital ROSCA can overcome such frauds by keeping track of payments and distributions. With a formal record of members, defaulters may be exposed or face legal action.

- *Delayed payments:*
 - A digital ROSCA could make use of social capital to handle the default and delay issues. For example, a member could receive a negative rating if s/he does not make timely payments.
 - In the case where a financial institution is operating the ROSCA app, a member's delayed payment can be bridged by the financial institution based on the transaction history of a member.
- *ROSCA transactions as an indicator of credit history:*
 - People who successfully participate in ROSCAs exhibit a certain payment capacity and financial discipline. Digital ROSCA can build the credit history and social ratings of ROSCA users based on their performance in ROSCA groups. These credit ratings may increase access to formal borrowing for individuals. Alternatively, those who default would risk receiving a poor credit rating, which may restrict them from future ROSCA participation.
 - For individuals saving through ROSCAs for major expenses, like house building, or weddings, a formalized ROSCA has the potential to increase the access to an additional credit line from the financial institution, based on their ROSCA history. However, the terms and conditions of such loans will matter, as some individuals might not want to use an interest-based product.
- *Privacy of members:* Some female members prefer to keep their involvement in the ROSCA and their identities hidden from other members. Through the digital ROSCA, members can themselves choose to hide their profiles/identities.
- *Secure ROSCA transaction:* ROSCAs do not ensure safety of the money that is being delivered or collected. There is a fear of theft in which case either the organizer or all of the ROSCA members have to bear the loss. Digital ROSCAs will overcome the issues of carrying and handling cash in physical form as the physical cash will be replaced with digital money.

15. Possible Model for Designing Digital ROSCA

Differentiating between Digitization and Formalization

Informality is almost always detested in financial services. Yet informal financial dealings like ROSCA exist and thrive because of the gaps left in the market by formal service providers. While the main motivation to digitize ROSCA for financial service provider might be commercial, the value addition for the customer needs to be weighed in to find the right balance between digitization and formalization, where the two are fairly but not entirely independent.

Previous literature on ROSCAs considers formalization as ROSCAs being offered through a bank or some other formal financial service provider¹¹, while bringing attention towards the pros and cons of such a model. ROSCAs are a simple way of raising funds which does not involve any interest or administration charges, however, the involvement of banks can give rise to administrative charges which may be unacceptable to individuals with lower income levels¹². A study¹³ recommends that policy makers should define and implement policies to improve the performance of the ROSCAs as they play a vital part in the economy of the country.

However, a deeper look into the characteristics which constitute formality indicates that formality is created through creation of records including transactions and their reporting, written contracts, and legal rules and hence inclusion in GDP and the tax net. We, therefore, posit that such formality can be introduced by offering ROSCA groups to use digital payment and management platforms to run and manage their groups and does not necessarily require involvement of an institution in functioning of ROSCA. The transaction record can serve as a proof and participation in the digital ROSCA can serve as a promise or agreement to fulfill payment obligations by organizers and members.

Based on literature and our analysis, we imagine four possible variations of the digital ROSCA, which progress from informal to formal. We define informal as completely based on social connections to enforce rules, whereas formal means involvement of a licensed entity to enforce rules.

1. Digitizing book keeping in a social model:

- The first model is connecting ROSCA groups through an app where the organizer uses the app for record keeping, generating a payment history.

¹¹ Modernizability and formalizability of rotating saving and credit associations through Islamic Banks

¹² ROSCA's alternative funding for sustainable enterprise

¹³ The role of rotating savings and credit associations in mobilizing domestic saving in Nigeria

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- In this case, the legitimacy of the payments can be questioned and subject to fraud, limiting usefulness for credit rating.
- Starting point for groups with low technology usage
- 2. **Social groups and Digital payments:**
 - The second model would include ROSCA groups formed through social networks, with payments conducted through mobile wallets.
 - This would create a payment history that could be used for assessing credit ratings.
 - In this model the risk of defaults resides with the group members.
- 3. **Digital Group formation and Digital payments:**
 - The third model would use a rating system to digitally connect members who are not part of the same social network, thus increasing the size and reach of ROSCA groups considerably.
 - This could also mean an increased flexibility in the size of individual contributions such that members who can contribute a fraction of the single contribution can participate in a group when paired with other such members to form one complete contribution. This could be enabled through algorithms.
- 4. **Institution lead ROSCA:**
 - A fourth model would establish institutional ROSCAs, which would allow individuals to connect with a bank to make periodic ROSCA payments. Here the risk of default will be borne by the bank.
 - Literature suggests a model for modernizing and formalizing the traditional ROSCAs, called FROSCA or Formal ROSCA, through Islamic banks.
 - Under this model, members can have a saving or current personal account in the bank as well as a SACA (Savings and Credit Account). Members will have to sign a standing order form to authorize bank to deduct a fix amount every month from their personal account and transfer it to SACA. At the end of month one of the members get the amount collected in SACA and this cycle keeps moving until all members receive their collective amount.

While formalization in financial services might be considered as the provision of services by financial institutions, in the case of digital ROSCAs, we propose formalization within the existing realm of informality by digitizing and recording of transactions occurring within social circles through a formal channel to address problems, such as frauds in ROSCAs, and create efficiencies.

Therefore, for our current prototype, we follow the second model.

16. Digital ROSCA Modality

Our design focuses on smartphone application for ROSCA organizers and members because:

- **Complexity in flow:**
 - The success of such complex interactions has also not been tested on feature phones, especially in DFS, and these may be difficult for end users. For example, with USSD, if the user makes a mistake, he/she may end up sending the money into someone else's account.
 - The ROSCA system is complex in terms of its functionality at the organizer end, hence making smartphones more suitable while keeping it easy for ROSCA organizers to use.
- In our sample, the smart phone ownership of organizers lies at 66% and 60% for members. However, for low-literate respondents, their smartphone usage was limited, for which we will be designing an interface for low-literacy.
- For feature phones, there are no DFS services until now that use IVR systems. It is not only difficult for the user to use such an app on a feature phone, but they may also be prone to mistakes in transactions.
- Time consuming and cumbersome: USSD is a cumbersome interaction when you have complex transactions. For a low literate consumer, smartphone interaction on an interface with appropriate usability will be much simpler to use than feature phone voice interaction which will require a lot of patience.

IDEATION

17. User Interface Design

This section explains the process of the ROSCA application interface design, based on the analysis of our user data for extracting the functional requirements for the ROSCA application. We mapped the requirements along the ROSCA cycle, defined them as core ROSCA features in a digital application, and made use cases for the flow of the application. We started the design process by conducting brainstorming sessions and reviewing the existing literature on interface design and the Karandaz UI toolkit.

- Indrani Medhi recommends using text-free designs over text-based designs to make the interfaces easier to use for low-literate and illiterate users. Mehdi et al. suggest that traditional text-based interfaces are completely unusable for illiterate users whereas very hard to use for novice literate users¹⁴.
- Video Kheti recommended using audio and graphical guidance for low-literate users in smartphone interfaces. Researchers have also introduced voice-based interfaces to make the applications easier to use for low-literate users.
- Studies also argue that the need for human intermediation in using mobile applications could be reduced by providing side-by-side audio help throughout the application¹⁵.

Initially, we designed the icons based on our assumptions and findings from previous studies and took them to the field to get the feedback from actual users. The process for user testing of icons is explained below.

Icon Design and Testing

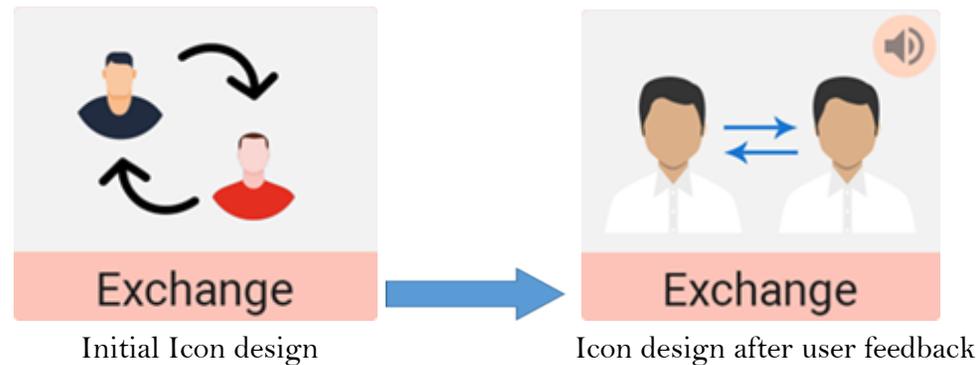
- *In-context* and *out-of-context testing* methods were employed for testing the icons designed for Digital ROSCA application.
- During the out-of-context testing, users were shown the icons in isolation and asked for their interpretation of the icon
- During the in-context testing, icons were shown as part of the actual interface and user feedback was collected.
- For icons which were not easily interpretable for the users, we asked the users about their thoughts for what the icons should be for that particular functionality or option.
- Icons were re-designed based on the user's feedback and were again tested for validation.

¹⁴ Text-free user interfaces for illiterate and semiliterate users

¹⁵ VideoKheti: making video content accessible to low-literate and novice users

- Following is the brief description of the testing icons and updated designs.

Turn Exchange Icon



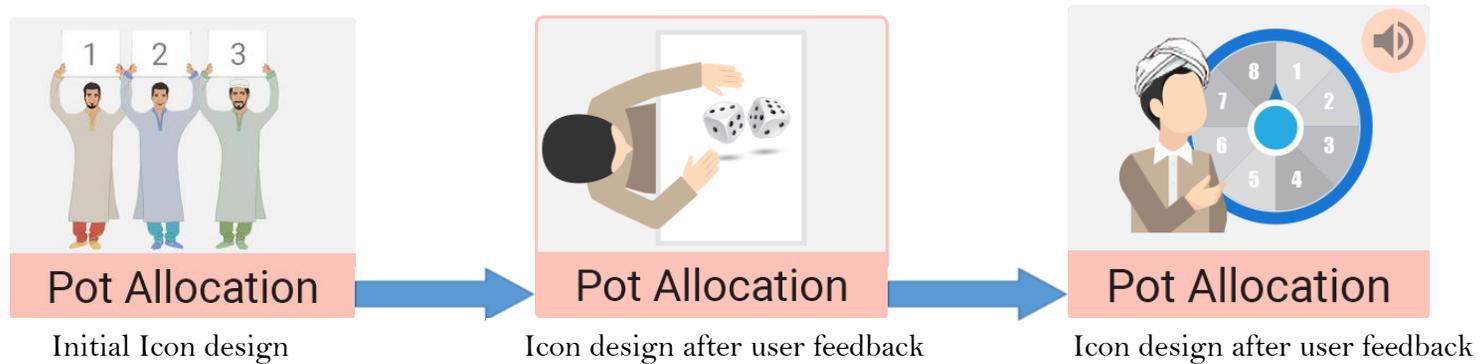
- Exchange of turns and date is a common phenomenon in ROSCAs.
- Users were unable to relate to the initial design shown on above (left) with the process of exchange, and instead, thought of it as an icon for ROSCA cycle because of arrows in a loop.
- Different colors for people shown in the icon were perceived as indicating that the two persons were somehow different hence the color was made uniform.
- Users suggested using straight arrows to show the exchange process.

Pot Collection Icon



- Pot collection involves organizer collecting monthly or daily pots from members.
- Initial design showed a culturally relevant jar (shown in images below) known for saving money (Galla), where multiple hands were contributing money in it.
- Test users interpreted this icon as a pot where you can donate money to a charity organization.
- Based on the feedback from users we came up with the second iteration of this icon which depicted a man sitting on a chair with a table setup in front, collecting cash from a single member. Majority of respondents were able to relate this icon with organizer collecting payments except a few.
- To add further clarity to the concept of pot collection, we added another member in the icon giving cash indicated by an arrow.
- To further facilitate the users, we added a speaker icon so that users can listen to the instruction about pot collection.

Pot Allocation Icon



- The pot allocation process involves assigning turns to the members of the ROSCA.
- Initially, we produced two designs shown above. During the testing process, these icons were not clearly recognizable by the users.
- Participants identified the first icon as individuals who have been assigned turns by the organizer, but could not relate it to the random pot allocation where turns are decided by draw, whereas the second icon was not recognizable at all. Based on users' feedback, we designed the third icon which was easily recognized in later testing.

18. Use Cases of Digital ROSCA

This section illustrates the flows for primary use cases of Digital ROSCA application for both the organizers and the members of ROSCA.

Organizer Use Cases



- Create Kamaiti
- Kamaiti Management
- Kamaiti Collection & Disbursement
- Turn Exchange and Notifications

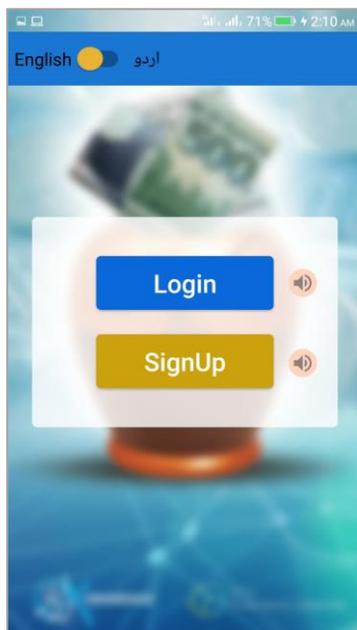
Member Use Cases



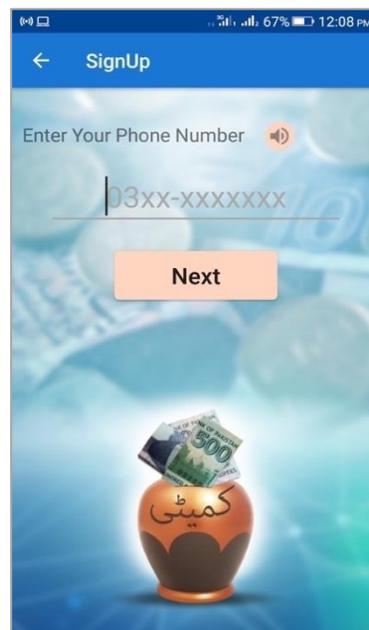
- Kamaiti Invitation and Search
- Turn & Date Exchange
- Kamaiti Submission & Turn Allocation

18.1 ROSCA Application

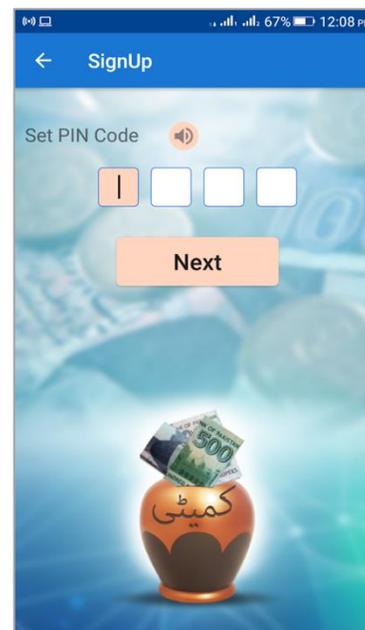
i. Signup/Login



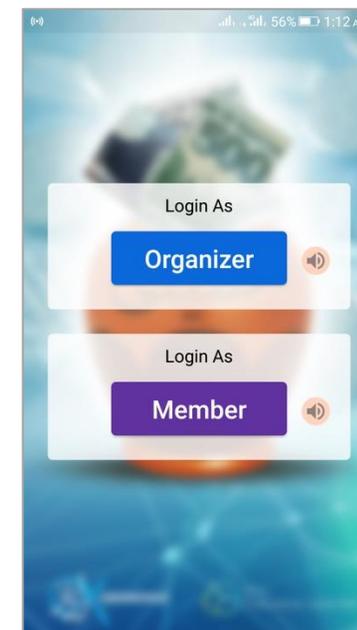
The flows of signup and login are same for both the members and the organizers



During the signup process, users are asked to enter their details like mobile number, name, CNIC and picture



Users are also required to set a PIN code to avoid the unauthorized access to the application



After signup, users are asked whether they want to use the application as an organizer or a member

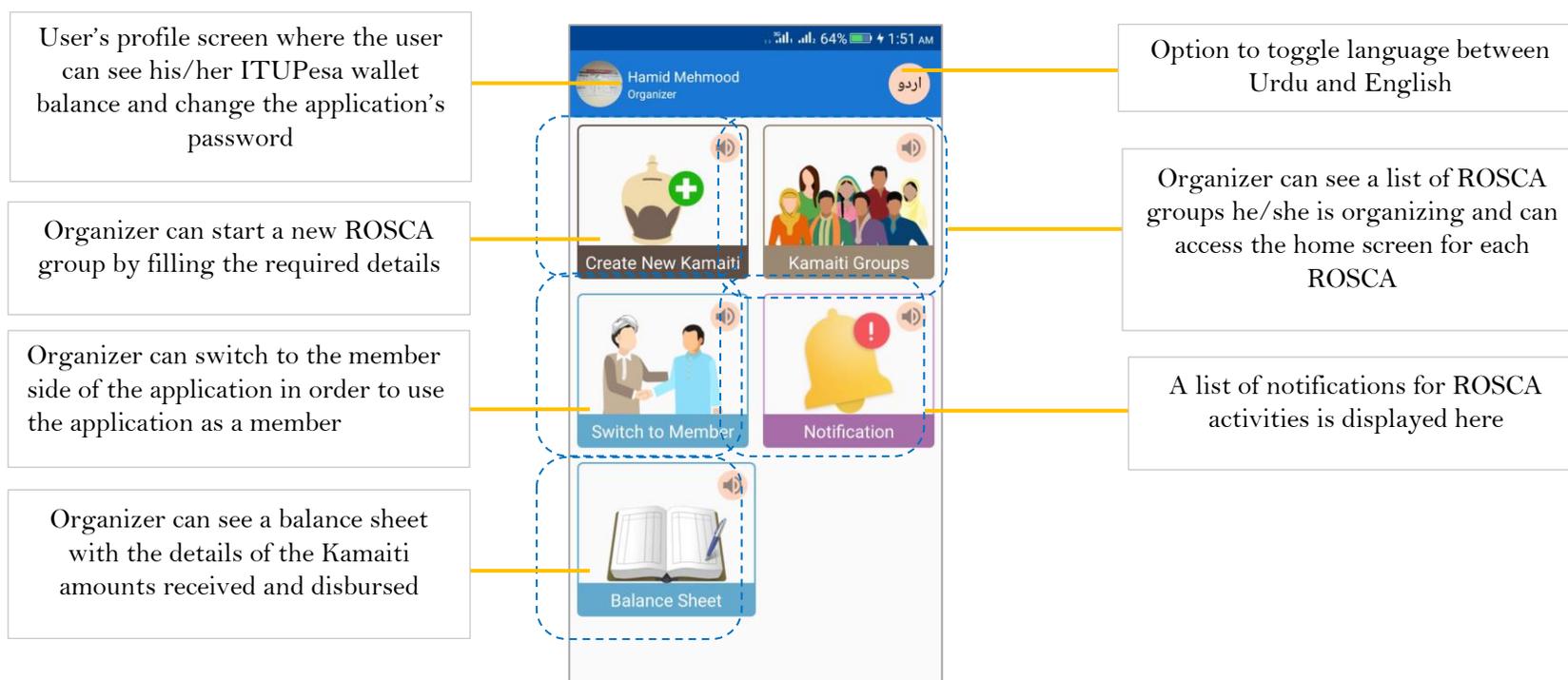
Switching roles in Digital ROSCA: This feature enables the organizer to switch between member and organizer roles. Our analysis shows that in some cases, an individual may be a member of one group and an organizer of another at the same time. This feature will enable users to manage both roles at the same time from their application

18.2 Organizer Module

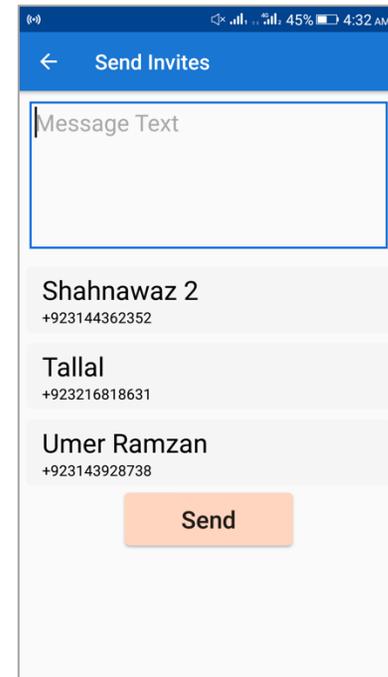
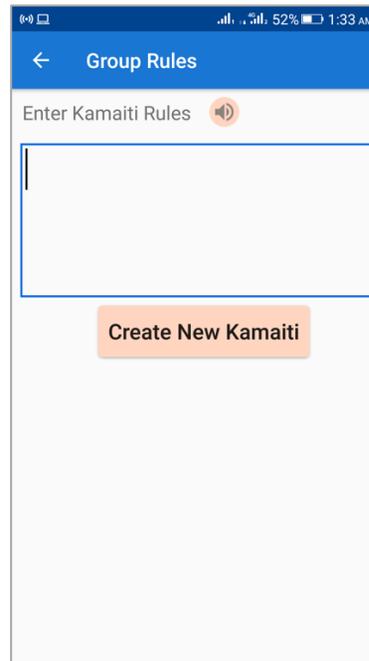
This section explains the use cases for the organizer module.

i. Organizer Home

After logging into organizer module, organizer's home screen appears showing all functions available to organizer.



ii. Create Kamaiti



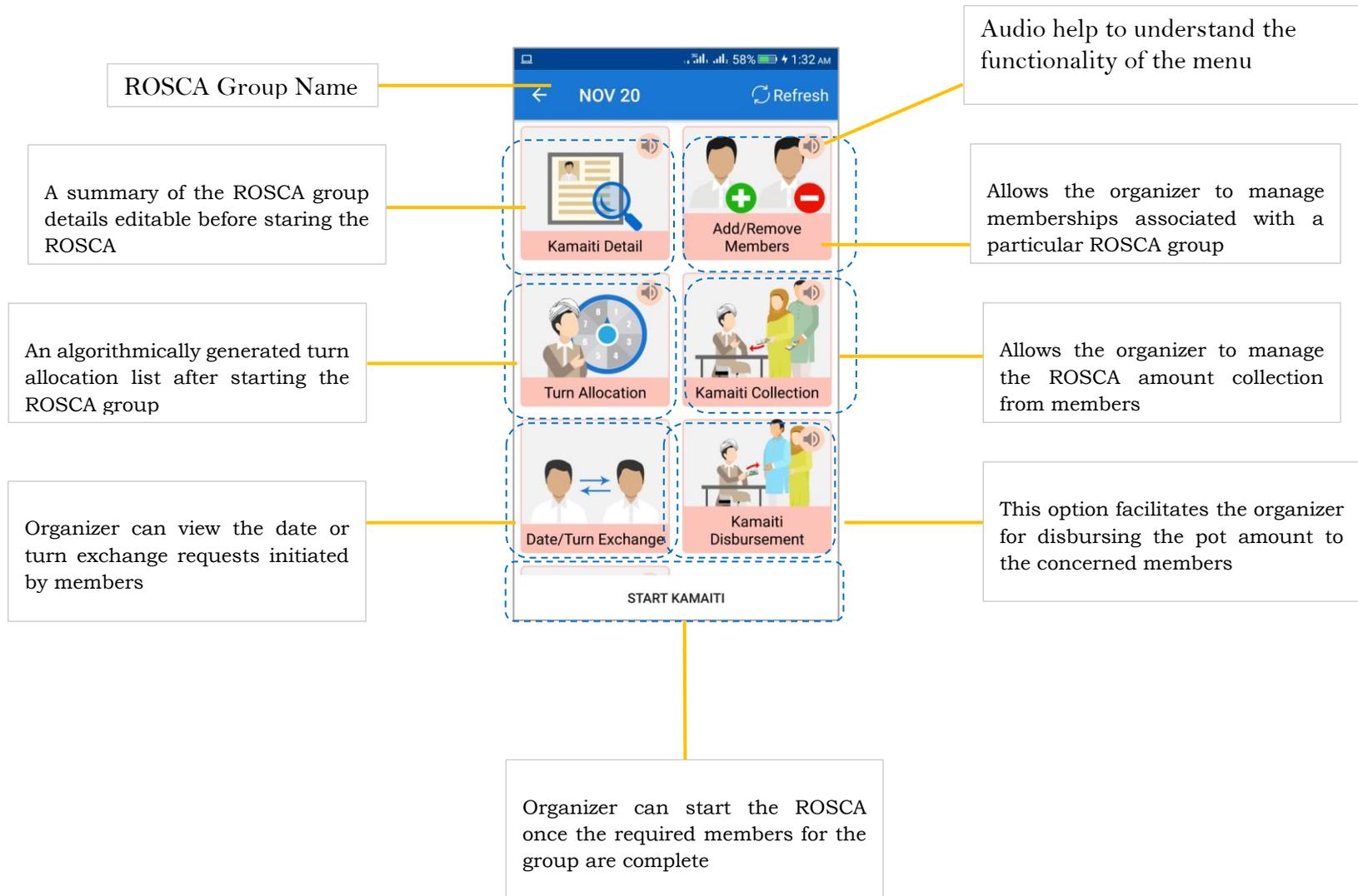
Organizer is required to fill the details like Kamaiti name, amount and number of members while creating a group

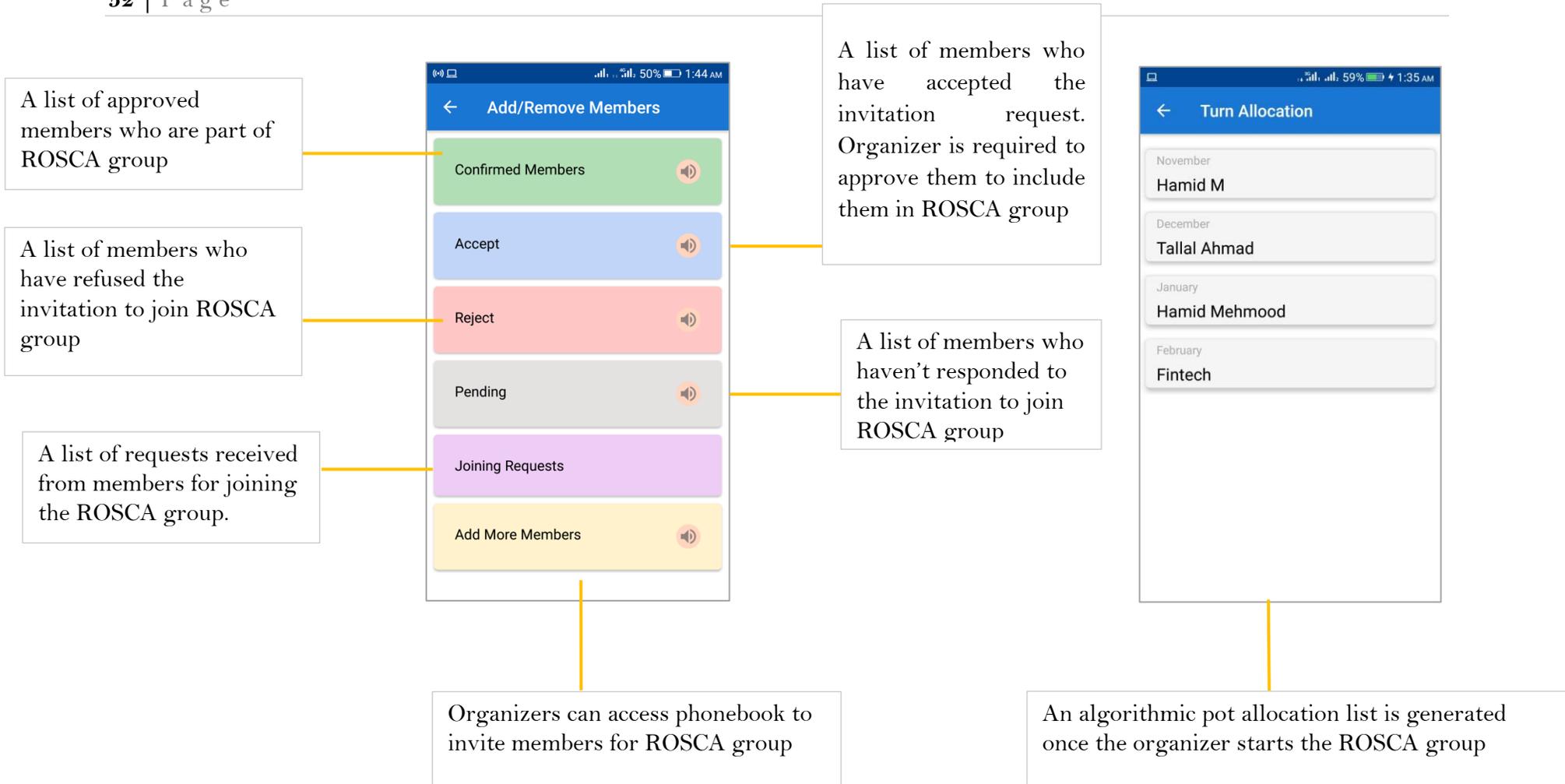
Organizer can enter the rules for the Kamaiti group before inviting members

Organizer can send the Kamaiti invites to members through phonebook

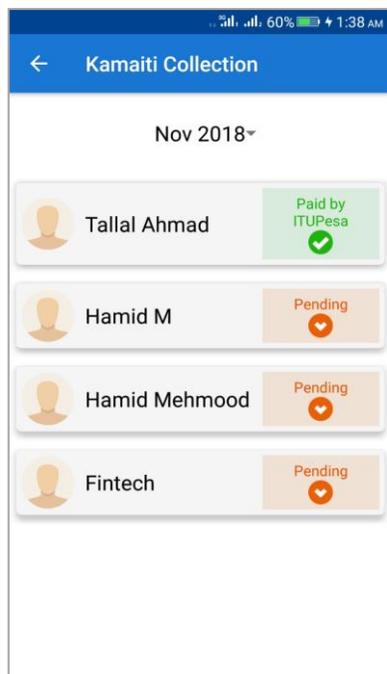
iii. Kamaiti Management

There is a Home screen for each ROSCA group where the organizer can manage all the activities of the group

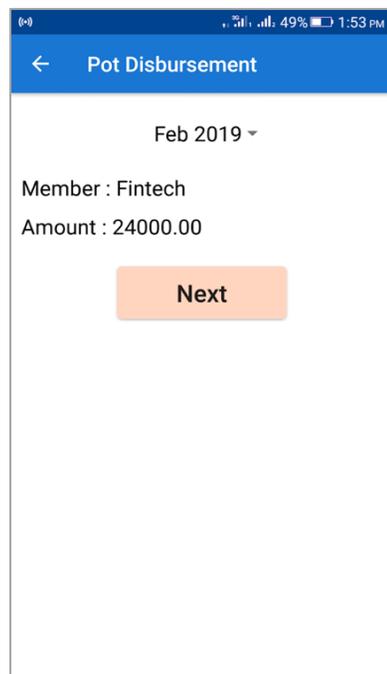




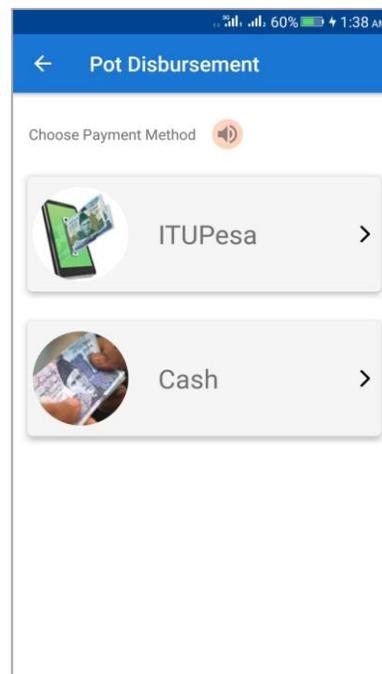
iv. Kamaiti Collection & Disbursement



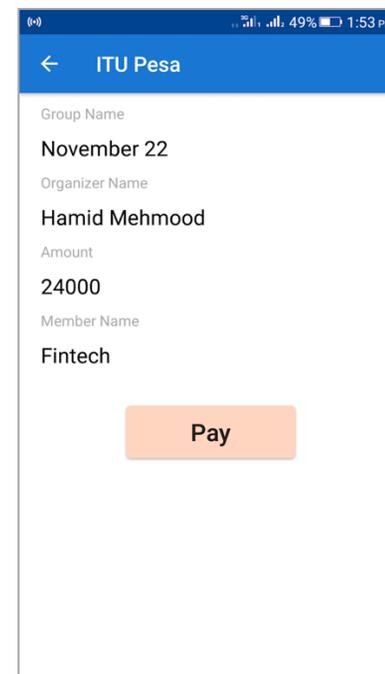
Organizers can see the details of the received payments against a particular ROSCA month and send payment reminders to the members who haven't made their payments



Organizers can disburse the ROSCA payments to members and the application keeps a track of all these payments

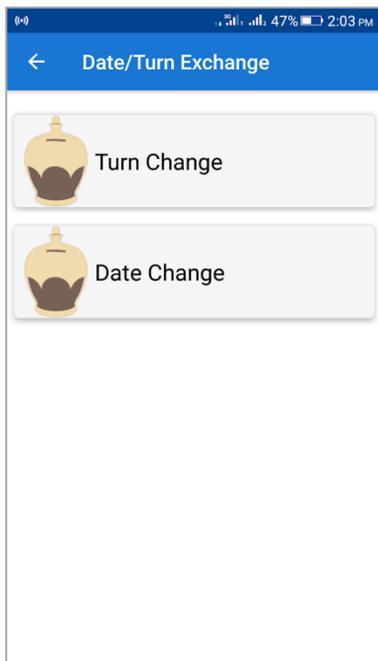


There are two payment methods in the app. Cash payment is traditional payment method whereas the ITUPesa is a simulated mobile money wallet

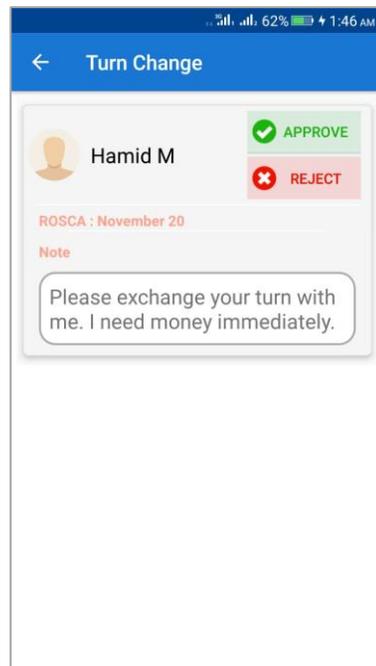


Application automatically provides the details for pot disbursement according to allocation list

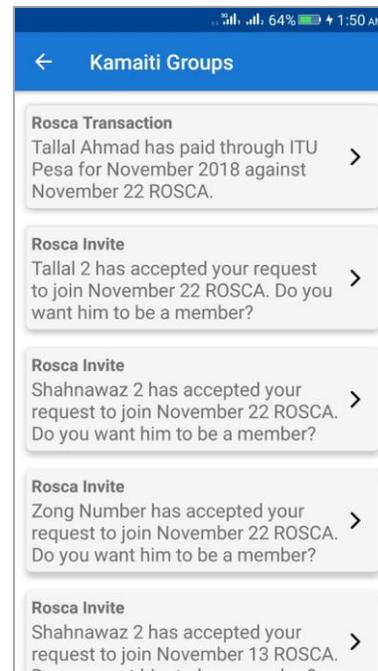
v. Turn Exchange and Notifications



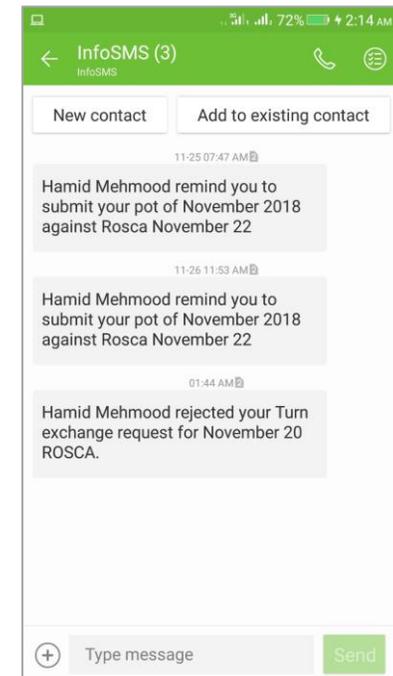
A feature of turn and date exchange is enabled in Digital ROSCA where a member can initiate a request to exchange the turn



The organizer can see the requests received from members and respond to them either by accepting or rejecting.



Digital ROSCA application sends push notifications against all the ROSCA activities



Along with push notifications, alerts are also sent via SMS

vi. Urdu Interface for Organizer:



Home Screen for ROSCA Organizer



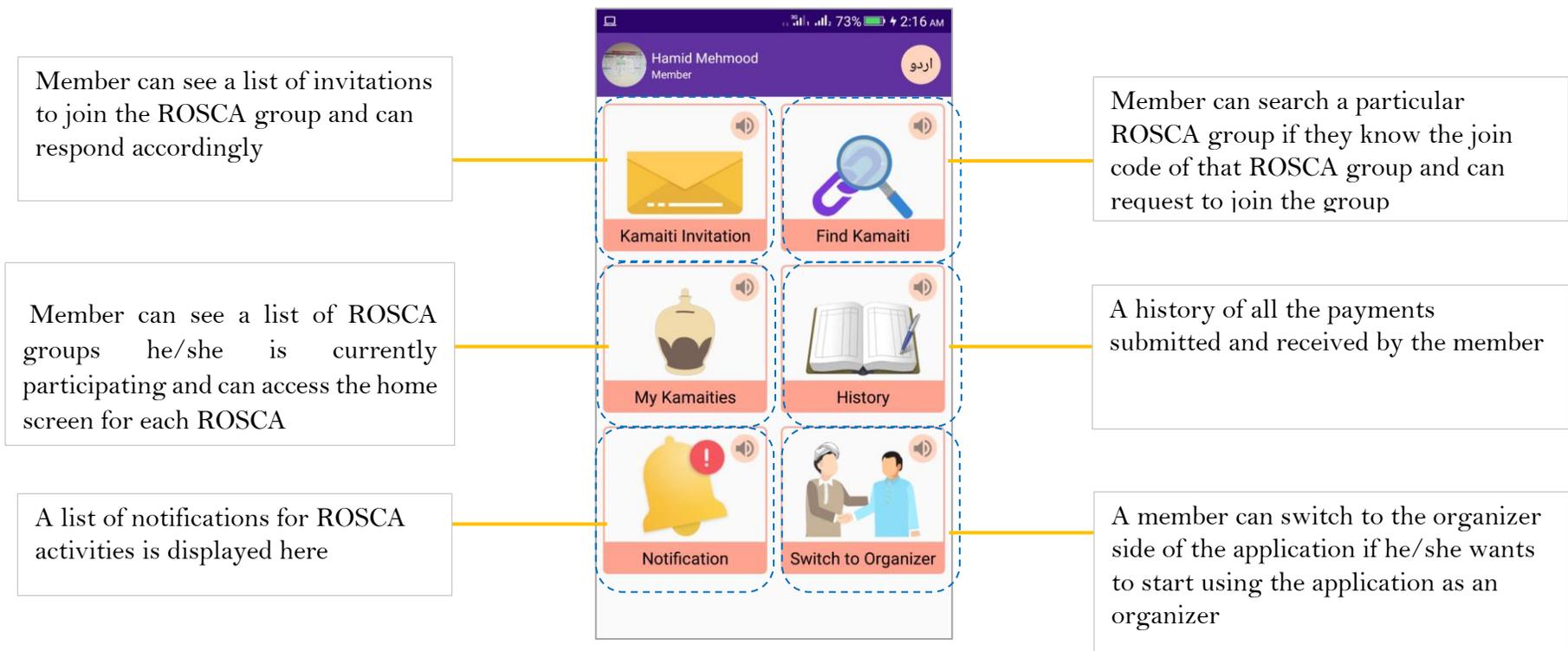
Home Screen for Individual ROSCA Group



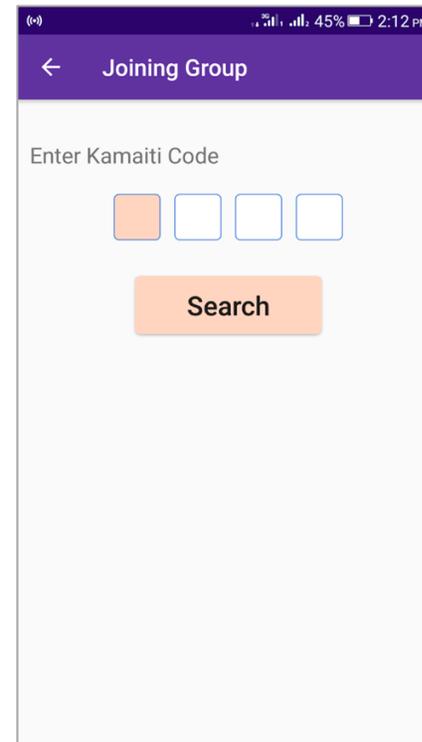
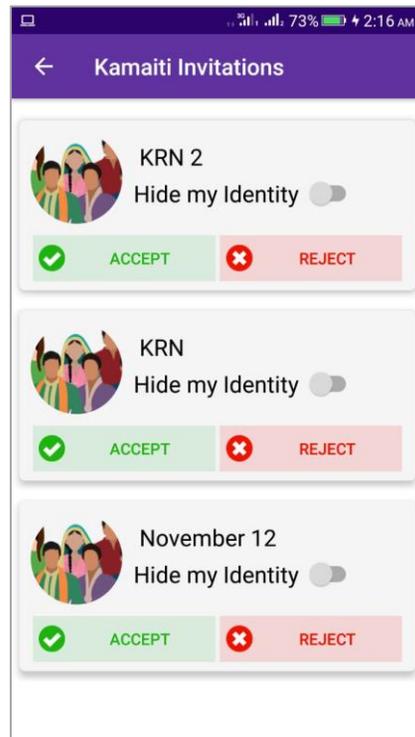
Screen with Turn and Date Change Requests

18.3 Member Module

i. Member Home



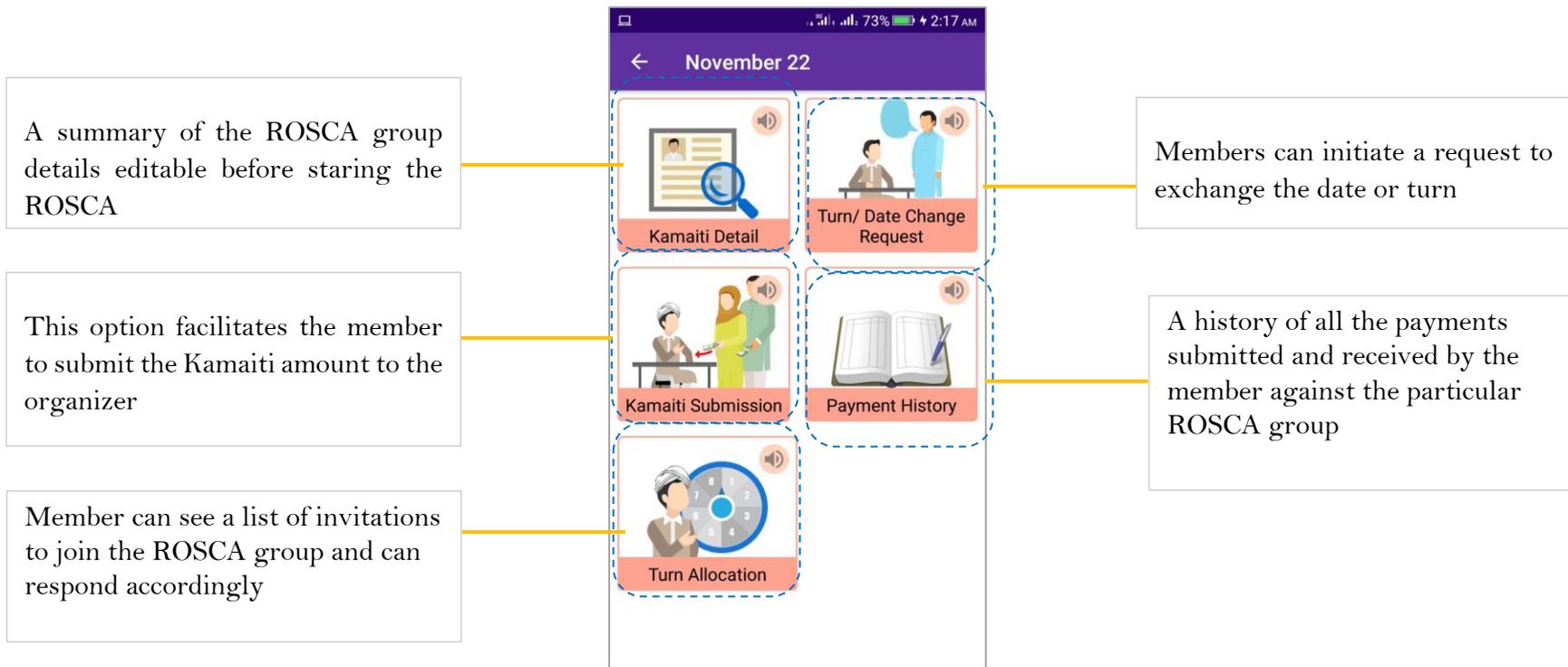
ii. Kamaiti Invitation and Search



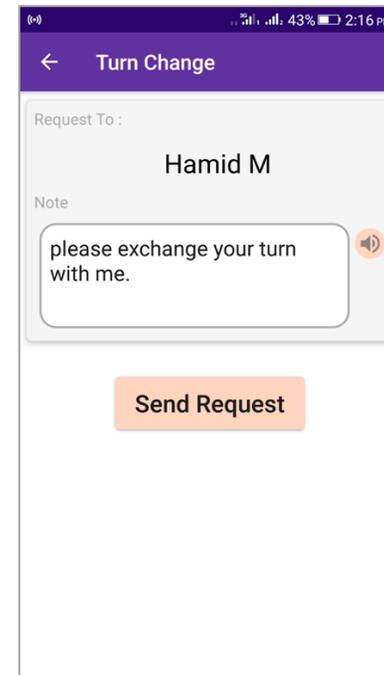
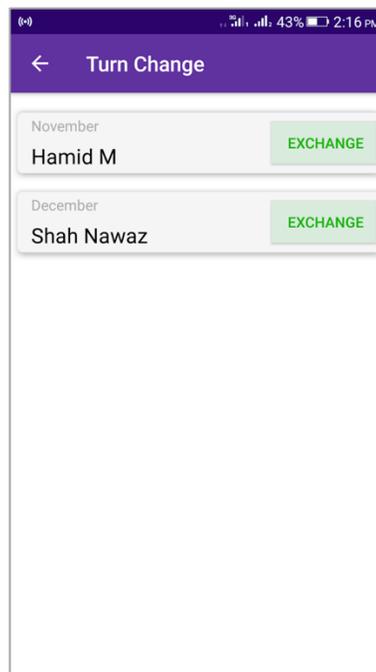
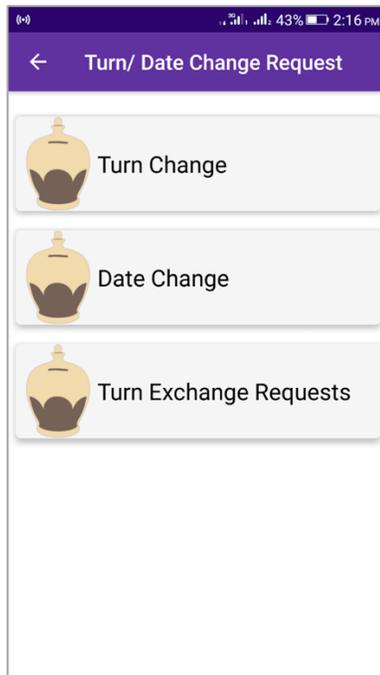
Member can see all the received invitations and respond to them. Members can also make their identity anonymous for all other members

A member can also initiate a request to join a ROSCA group if he/she has the joining code of that group

iii. ROSCA Group Details for member



iv. Turn & Date Exchange

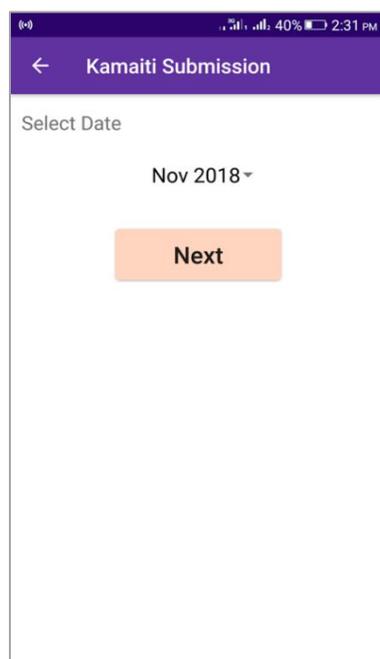


Turn and Date change feature is available for the members if they want to change their turn or change the date for ROSCA payment

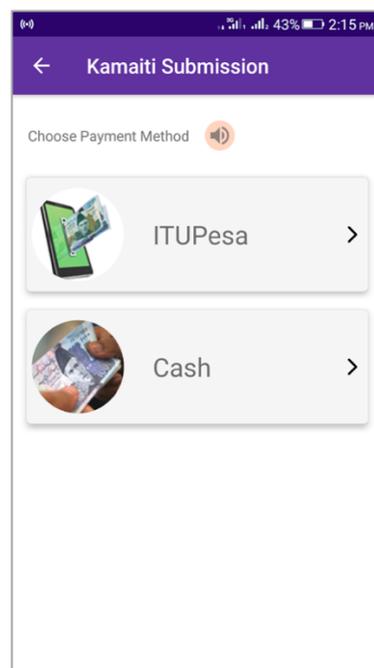
Members can initiate a turn exchange request with any other member of the group

Members are required to write a textual description for requesting the turn exchange and send it to the organizer

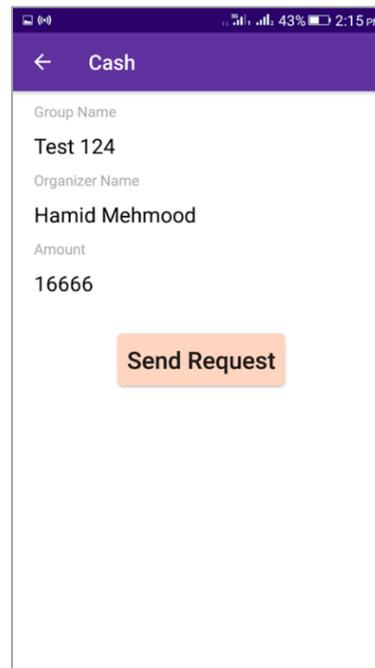
v. Kamaiti Submission & Turn Allocation



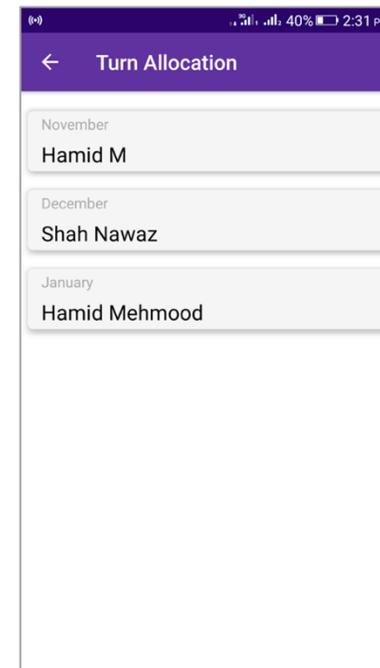
Members can make their ROSCA payment through the application against a particular month



There are two payment methods in the app. Cash payment is traditional payment method whereas the ITUPesa is a simulated mobile money wallet



Application automatically provides the details for Kamaiti submission



An algorithmic pot allocation list is generated once the organizer starts the ROSCA

vi. Urdu Interface for Member



Home Screen for ROSCA Member



Home Screen for Individual ROSCA Group



Screen for Initiating Turn and Date Change Requests

19. API Development and Integration

After finalizing the requirements for digital ROSCA, we initiated the development of backend APIs for ROSCA functioning. The digital ROSCA APIs were integrated within ITUPesa to give a complete experience of digital environment to target users. ITUPesa is a mobile money simulator or sandbox environment developed jointly by DFS Research Group at University of Washington, Seattle and FinTech Center at Information Technology University Lahore for testing purposes. We explicitly used payment API's of ITUPesa to support the payment process in digital ROSCA. Following is a brief description of some of API's of digital ROSCA:

- **Sign-Up:** Given a user credentials, and a connection, this endpoint will create a new user. This endpoint only works for database connections.
- **Log-In:** Given a user credential and a connection, this endpoint will allow the user to access application to existing user.
- **Create ROSCA:** Given the group credentials and a connection, this endpoint will create a new ROSCA group.
- **Pot Collection/Submission:** Given the account details and recipient information, this endpoint will allow organizer to collect pot from members and members to submit their pot to organizer.
- **Pot Disbursement:** Given the account detail and recipient information, this endpoint will allow organizer to disburse pot winner their amount.
- **Pot Allocation:** This endpoint randomly allocates the pot winners their month. This endpoint either works at the start of the ROSCA or this function
- **Exchange Request:** These requests are initiated by members, then the organizer validates them and sends to the relevant member for approval
- **Notifications:** This endpoint will send push notifications to users against the action performed. The appearance and functionality of notifications vary but generally they provide information to the user asynchronously.

- **Payment History:** This endpoint retrieves the information from the ITUPesa about the information of the user payment records.

IMPLEMENTATION

20. Application Testing

Testing Methodology

Testing of digital ROSCA application was carried out to test the functionality and usability of the application. User testing was carried out with 2 ROSCA groups where the participants were selected across gender (male, female), literacy (primary to intermediate education level), age (20 to 45 years) and smartphone ownership (because digital ROSCA is a smartphone-based application).

Testing was carried out in two phases. In the first phase, a face to face session was conducted with the participants, whereas in the second phase, the participants were given the application to complete a ROSCA cycle unsupervised, and a were provided with a list of tasks to complete.

Findings from Testing

Following is the summary of our findings from testing phase.

- **Convenient Navigation:** Textual terms and icons used in the application were found to be quite user friendly as the users were able to navigate through the application easily
- **Preference for Audio Help:** Low literate respondents preferred using the audio help available in the application wherever they found difficulty in reading or understanding the terms
- **Cash as the preferred payment method:** Majority of the participants used the cash payment option instead of the ITUPesa wallet account because of lack of understanding and knowledge about ITUPesa.
- **Notifications:** Digital ROSCA application's feature of sending push notifications and SMS alerts for all the activities in the application was appreciated by the participants because it reduced the efforts for group communication.
- **Pot Collection easier for female organizers:** The female organizers were very appreciative of the pot collection feature of the digital ROSCA application as it helped them overcoming the mobility issues and not having to chase members to make timely payments
- **Record Keeping is a vital feature:** ROSCA organizers mentioned record keeping as a vital function of digital ROSCA application because in traditional ROSCAs, the organizers have to maintain all the record on a notebook and keep that record updated, while digital ROSCA was managing everything on the application.

- **Demand for USSD:** We also observed a demand for a USSD based digital ROSCA model as people shared their concerns about how the other members will use this application if they do not have a smartphone.

21. Conclusion and Future Work

ROSCAs are a popular saving mechanism, highly prevalent in countries with low financial inclusion including Pakistan, where 33% of those who save do so through ROSCAs, a majority of them being women. ROSCAs serve as a means for self-insurance from risk, raising lump sums for fulfilling a variety of needs, and forcing oneself to save in the absence of formal financial services. Digitization of ROSCAs presents the potential of bringing the unbanked, especially women, to the Digital Financial Services platform, and hence increasing financial inclusion, by building digital service upon a behavior which is familiar to the population.

A lot has been talked about the motivation for participating in ROSCAs and their functioning in the social sciences but any empirical evidence or discussion on digitization is lacking. Some FinTechs like ChamaPesa, Chama Soft in Kenya, FinLok in India, and Tanda in the USA have attempted at digitizing ROSCAs, however, they are designed for their local context, for high literacy groups and work on interest-based models.

Our work follows a Human Centered Design approach for the design of Digital ROSCA in Pakistan, explores issues in the functioning of ROSCAs, opportunities for digitization and the technology usage profile of people participating in ROSCAs of different sizes. We have drawn a set of requirements from our exploration based on which we created a digital ROSCA prototype and tested it for functionality and usability to arrive at some important conclusions about the design of digital ROSCA in Pakistan.

Digital ROSCAs need to be designed around the organizers as they are central to the functioning of ROSCA groups. ROSCAs build and operate around social capital, but contradictory to common perception, in Pakistan, the social capital exists between the organizer and individual members only. Members most often do not know each other and rely on the organizer for the proper functioning of the group, including recruitment of reliable members, timely collection of payments, timely pot disbursements and exchanging turns. While this burdens the organizer significantly, it also gives them a lot of authority and influence over their group. Designing the digital ROSCA around organizers has two benefits. Firstly, considering the complicated management of a ROSCA group, organizers would benefit the most from the efficiencies resulting from digitization. Secondly, the organizer has influence and authority over the group, and therefore, they can act as the entry point for introducing groups to digital ROSCAs. That being said, members are catered too.

Although ROSCAs exist across socio-economic segments, the demand for digital ROSCA in a particular segment is hinged on its technology usage profile. As a starting point, the recommended modality for the digital ROSCA is smartphones, especially for the organizer considering the complexity of the flow and the modality of our sample. The ROSCA application interface follows design guidelines for low-literate users and overcomes literacy barriers in usage for existing smartphone users.

Some low hanging fruits of digitization include the resulting ease in group creation, record keeping, reminders, pot collection and disbursement, making management of groups easier for the organizers who use digital or paper-based record keeping, or make personal visits for collection and disbursement of payments, and frequent calls, messages and visits for reminders. Overall, we see that the sophistication in group management and formalization through rules and agreements varies across groups and depends on the sophistication of the individual organizers. Our application creates a minimum baseline for ROSCA group management and raises the organizers' capacity to better manage their groups.

Like all things informal, ROSCAs have limitations too. While there are multiple problems faced by ROSCA organizers and members, some of them can be addressed readily while others require a long-term approach. One quick win is the utility in digitization for women. In line with the socio-cultural context, ROSCA groups in Pakistan are gendered, which lead to a set of challenges faced specifically by women organizers owing to limitations in their mobility and literacy. Women organizers seek help from male relatives to collect payments and disburse pots as it requires visiting women members personally. Women organizers also tend to be more avid record keepers, but they face difficulty owing to lower literacy levels and seek help from others for the activity, compromising the privacy of their group and its members. Women members, on the other hand, tend to keep their involvement in ROSCAs hidden from their families (and others). Digital ROSCA helps organizers collect payments digitally and automate records over an interface suitable for operation by low literate users. It also allows for the privacy of individual members from the rest of the group. This allows overcoming challenges of mobility, literacy, and privacy (over owned devices). Other problems, such as preventing defaults and frauds over ROSCAs, require a longer-term approach of developing credit scoring mechanisms.

Digital ROSCAs present opportunities for extending customer engagement beyond simply saving in groups to investments by providing advisory for the investment of unplanned savings, connection with e-commerce platforms for purchasing durables, etc. Digital ROSCAs have the potential for encouraging digital payment behavior by extending liquidity farming in two ways – one is by creating groups with people outside of an individual's social circle, and the other is by qualifying for credit from a service provider based on the digital ROSCA transaction history. This requires the creation of a combination of social and credit rating mechanisms, which replace social trust by quantifying behavior in ROSCA groups. Our work, therefore, is simply a starting point in the digitization of ROSCAs with significant potential to build upon.

The focus on increasing financial inclusion is based on the arguments against informality, yet it is important to create a distinction between digitization and formalization in ROSCAs. We propose formalization only as a consequence of digitization, and to the extent that it adds value. Digitization creates formalization by creating a record of the dealings in ROSCAs to prevent fraudulent claims, while digital transactions occurring between members of a social circle and creating a reliable record of transactions for credit rating. We recommend adding features offered by financial institutions which can complement and reinforce digitization (e.g. increased liquidity through credit rating), but also warn institutions to be wary of the temptation to participate in risk of an actual ROSCA group without clear value addition. When we do recommend taking ROSCA groups outside of the social circles, we suggest doing so after alternate mechanisms of trust have been created. But above all, as researchers, we determine the potential benefits digitization has to offer to the organizers and participants of ROSCAs along with the optimal approach towards digitization.

Our testing of the application is limited to the evaluation of usability and functionality of the digital ROSCA application, which proved to be successful. However, to determine the uptake potential for the digital ROSCA application, piloting with a larger number of groups for longer durations is required to draw conclusions, thus indicating the future research direction for digital ROSCA. Testing has also highlighted the demand for future work on USSD-based ROSCA. Other avenues of future research include the creation and evaluation of social rating mechanisms on ROSCAs to expand them beyond immediate social circles.

22. Glossary

Term	Definition
ROSCAs	Rotating Savings and Credit Associations
Social Capital	Social capital is defined as the trust, information or benefits that people gain from their social networks
Member	A person participating in a ROSCA group
Non-Member	A person not taking part in ROSCA as an organizer or member
Organizer	A person organizing a ROSCA group
Pot	Aggregate amount disbursed at the end of the weekly or monthly ROSCA cycle
ROSCA Share	A share of ROSCA could be defined as the amount that a person contributes to ROSCA to get a cumulative pot amount. For example, if a ROSCA cycle length is 10 and every member has to contribute 5000 a month, then 5000 could be said as one share in ROSCA
Bidding ROSCA	It's a type of ROSCA where people bid to get the ROSCA turn and the person with highest bid gets the pot
Commercial ROSCA	ROSCAs operating in markets are called commercial ROSCAs. These ROSCAs could either be bidding or regular ones.
ROSCA Size	We defined ROSCA sizes as small, medium and large. Small ROSCA: A ROSCA group in which every member contributes 5000 PKR or less is a small ROSCA. Medium ROSCA: A ROSCA group in which every member contributes more than 5000 PKR and less than 15,000 PKR is a medium ROSCA.

	<i>Large ROSCA:</i> A ROSCA group in which every member contributes s more than 15000 PKR is a large ROSCA.
Fraud	If a person refuses to pay the ROSCA amount after receiving their pot amount.