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Role of Mobile Applications in Mitigating Challenges Faced by Informal Saving Groups

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Abstract: Existing literature shows that even though governments in developing countries have continued in their efforts with reforms and other actions to expand financial access and inclusion among citizens, a segment of the population remains excluded. This comprises of low income and middle-class people who end up relying on informal saving groups for their financial needs. Despite their prevalence and importance, the informal saving groups such as Rotating Saving and Credit Associations (ROSCAs) and Accumulating Savings and Credit Association (ASCAs) continue to face a myriad of challenges with many of them collapsing. The aim of this study is to explore the usage of mobile apps to overcome the challenges faced by the ROSCAs and ASCAs. Agile software methodology was used to develop a robust mobile application for use by informal saving groups. Adoption of mobile apps technologies is important to the informal financial sector and the formal financial sector that is linked to these informal saving groups such as banks and microfinance institutions. The study reveals that the use of mobile apps was a plausible solution to the challenges experienced by the members of the informal savings groups while handling monetary transactions.

Keywords: Mobile Apps, Informal Saving Groups, Technology Adoption in Informal Saving Groups.

1. Introduction

Financial inclusion in Kenya has risen to 82.9% owing to government interventions, developments in information and communications technology (ICT) but most fundamentally the growth is attributable to the growth of mobile money [1]. This report indicates that 11% of the Kenyan population, most of which comes from rural, remote and informal settlements remains financially excluded [1]. Despite this milestone towards financial inclusion, Kenyans who hold formal bank accounts do not consider formal financial access as a solution to real day-to-day problems and they continue to rely on the informal services offered by ROSCAs and ASCAs. ROSCAs have a basic structure; each member of any given group must contribute a certain amount of money periodically as agreed upon by all members at the beginning of the cycle. At each meeting, one member is entitled to receive the total amount collected from all the other members. Over the course of the whole cycle, each member receives the entire sum once [2]. ASCAs are savings and credit associations, which accumulate contributions from members for a specific period. At the end of the specified period the accumulated savings and any earned interest is given back to the members and then it starts again [3].

At least 70% of Kenyans had used *chamas* (informal name for informal saving groups in Kenya) in the last 12 months as a source of finance [1]. Even with the underscored importance, informal savings groups continue to face a myriad of challenges that threaten

their very existence. Despite the extensive research that identifies key problems faced by informal saving groups such as delayed payments, mismanagement, poor governance, defaulting, misuse of negotiable principle, book keeping and lack of financial knowledge [4], there is a paucity of research on use of technological tools to alleviate the implications of this hurdles on informal saving groups.

The aim of this paper is to investigate the potential for use of mobile apps to solve the challenges experienced by the members of the informal savings groups while handling monetary transactions. Further, through this research a mobile application hereafter referred to as *ChamaApp* was developed for informal savings groups. By the end of 2019, the number of mobile subscribers in Kenya stood at 52.2 million, representing a SIM card penetration level of 109.2 percent [5]. This level of penetration is a clear indication that opting to use mobile applications for informal saving groups in Kenya, is plausible, members can benefit from a mobile app installed in their mobile phones to manage and access their financial data.

2. Objectives

The study was guided by the following objectives:

1. Explore the use of mobile apps in overcoming problems faced by informal saving groups.
2. To develop a prototype mobile application for informal savings groups.
3. To validate the developed mobile application to confirm that it can provide a solution to the challenges facing informal savings groups in handling financial transactions.

3. Methodology

The research design used was experimentation, a prototype of the application was developed and given to 2 ASCAs based in Kenya as indicated in Table 1. Experimentation was preferred as it allows for proposed and developed solutions to be validated [6]. The study was conducted for a period of one year with app functionality added and refined when a need a rose. For both groups, members made monthly contribution (savings) of any amount, could borrow money and repay with interest. Members could key in their transactions such as loan request and monthly contributions. The administrator would get a notification, then approve or disapprove the transactions based on the supporting information provided. Once a transaction was approved, an alert message would be sent to all members notifying them of the member and type of the transaction they had performed. The 2 study groups here after referred to as *Pesa* and *Utajiri* for anonymity are illustrated in Table 1. The study participants gender distribution is given in Table 2, while Table 3 shows their age groups.

Table 1: Study Group participants

Group	Participants
Pesa	8
Utajiri	7

Table 2: Study Group Participants Gender Distribution

Gender	Number
Female	10
Male	5

Table 3: Study Group Age Group Distribution

Age Group	Number
30-40	12
20-30	2
40-50	1

All the members in the study group owned a smartphone, as showed in Table 4, an attestation of the high mobile phone penetration level as reported by [5], however 2 members owned other platforms different from Android and therefore could not participate in the study.

Table 4: Study Group Member Mobile Phone Platform Distribution

Platform	Number
Android	13
IOS (iPhone)	2

4. Technology Description

Mobile computing is a generic term describing the ability to use technology to wirelessly connect to and use centrally located information and application software through the application of small, portable, and wireless computing and communication devices. Mobile computing involves mobile communication, mobile hardware, and mobile software [7]. Users of mobile devices can access, edit or delete data that is stored in a centralized database at real-time. Members of informal saving groups need a mobile-based application from where they can check their current savings, request for loans, as well as follow the progress of their savings group.

4.1 Functional Requirements

The *ChamaApp* needed to implement the following functionalities as observed from the operations of informal saving groups as shown in Table 5.

Table 5: Functional Requirements

No.	Requirement
i.	Accessing of user's savings data
ii.	Provide access to information of the group in the form of a report.
iii.	Provide an accurate record of all members transactions.
iv.	Compute monthly interest earned by each member.
v.	Provide real time notification when members transact.
vi.	Provide reminders on when a member is supposed to remit their savings.
vii.	System administrators to be able to approve transactions fed in by members.

4.2 System Architecture

The three-tier architecture as shown in Figure 1 is used to develop the *ChamaApp.* Mobile computing faces a number of challenges such as low computing power and high power consumption since hand held computing devices rely on a battery [8]. Three-tier architecture allows for "off-loading" of resource intensive operations to the layer whose environment can best provide the required processing power.

First, *the presentation tier* which presents the user interface is implemented using Android and runs on a mobile phone allowing users to submit their contributions, request for reports as well as get notifications. The group administrator also accesses the system through the same application. The administrators have added functionality to enable them

approve transactions and generate reports. Mobile phones are resource strained and thus most of the computational work should go to the other tiers to improve the performance of the system. Resource-constrained in this case means the limitation due to battery capacity and also other computing resources such as processor speed and memory size [9].

Secondly, the *logic tier* which exists within the server enforces the business controls such as loan limit, member verification etc. The logic tier also generates appropriate reminders.

Lastly, *the data tier*, which has the database at the server side, acts as the central repository of all the groups information. The members can query the data at any time. Query language is used to retrieve required data views.

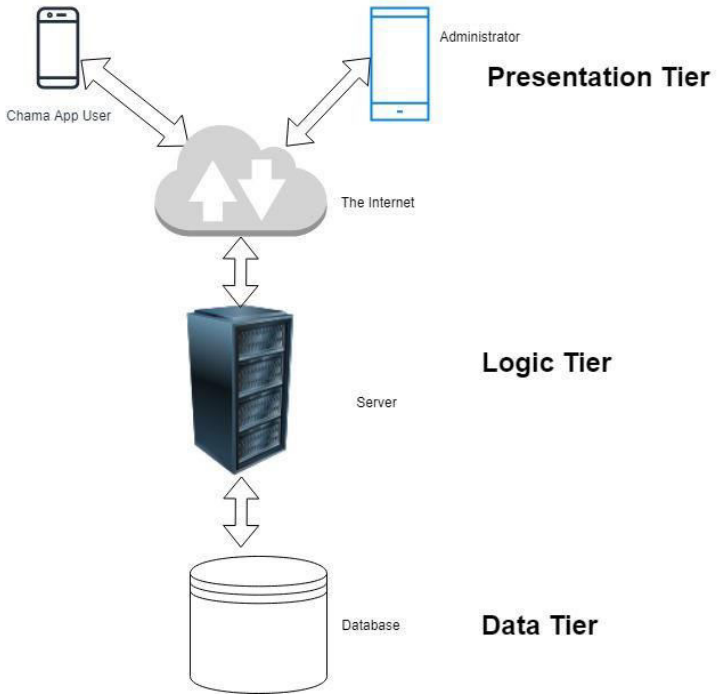

Figure 1: System Structure

The mobile app for the informal savings groups was developed using Agile Software Development Model. Software development models are various processes or methodologies, selected to develop the project according to its purpose and objectives [10]. Agile software development processes and methods have caught the attention of researchers and software engineers around the world and many studies consider the agile method as a natural fit for the mobile app industry [11]. The methodology is helpful where the user requirements are not fixed, and there exist budget and time constraints. It is evident that incorporating agility in the software development paradigm not only speeds up the development process, but it also eases the communication flow between the client and the development team [12]. The developer kept in touch with the users to ascertain where the user requirements changed, or continual improvement was required.

4.3 Development tools

To develop the *ChamaApp,* the following programming languages and platforms were used.

i. Android Studio, an integrated development environment (IDE) for Google's Android Studio, built on JetBrains' IntelliJ IDEAsoftware and designed specifically for Android development [13]. This was used for the development of the mobile application, the presentation tier.
ii. PHP Scripting, a popular general-purpose scripting language that is especially suited to web development [14].

iii. MySQL, an open-source relational database management system.

4.4 ChamaApp System Screenshots

The following four figures give an overview of the *ChamaApp* as captured through screenshots. Figure 2 shows the *Login Screen*, Figure 3 shows the *Dashboard of the ChamaAp,* while Figure 4 and Figure 5 show the *Menu Screen of the ChamaApp* and *Adding* a *Transaction* respectively.

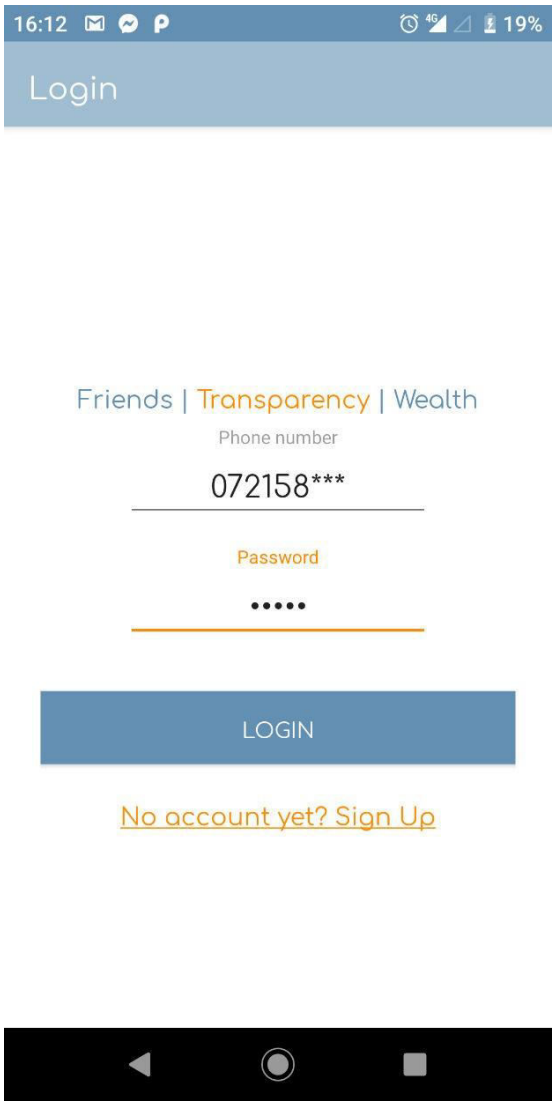

Figure 2: Login Screen of the ChamaApp

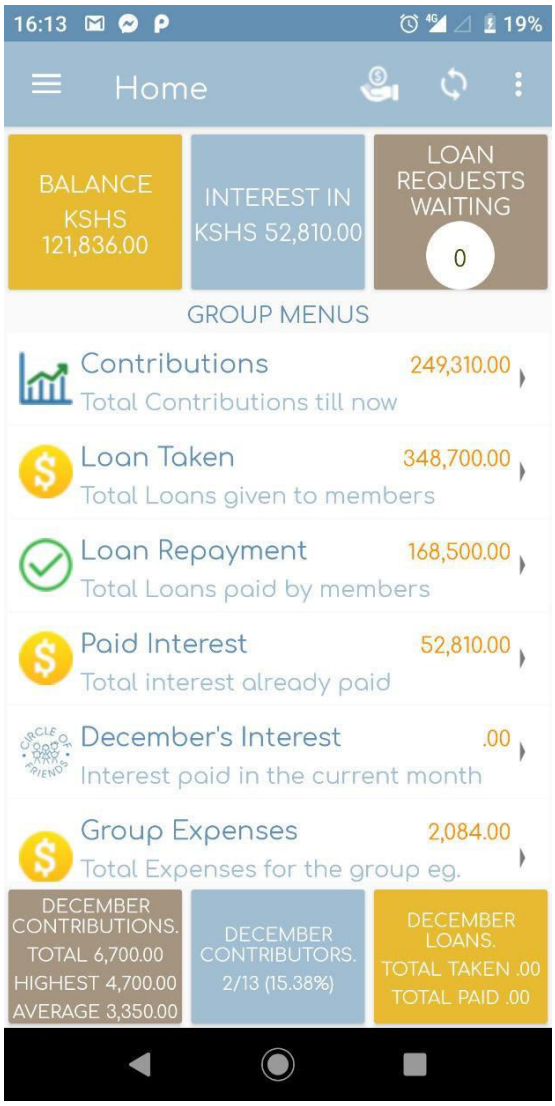

Figure 3: Dashboard of the ChamaApp

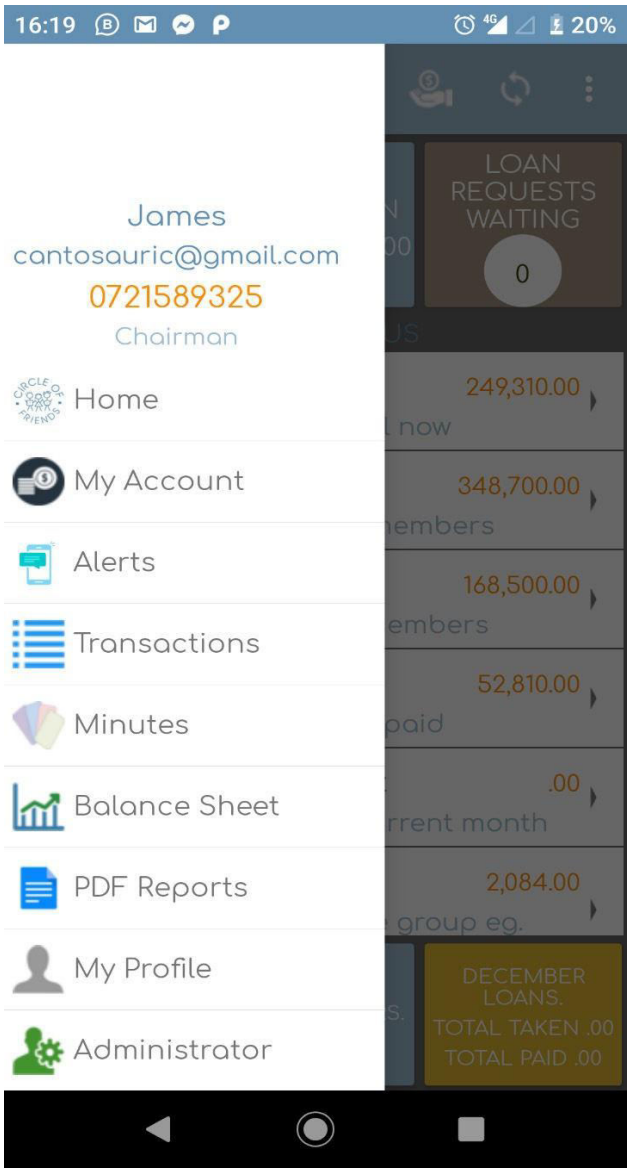

Figure 4: Menu Screen of the ChamaApp

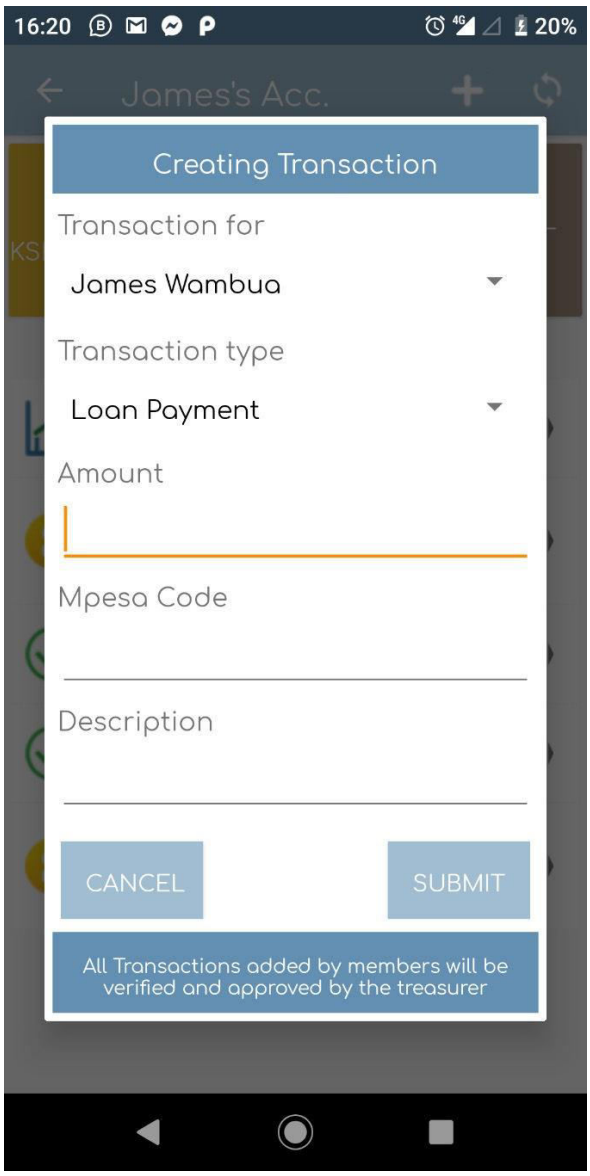

Figure 5: Adding Transaction

5. Results

The research was conducted with the aim to solve problems faced by informal saving groups identified from the review of existing literature as delayed payments, mismanagement, poor governance, defaulting, misuse of negotiable principle and bookkeeping. By providing the *ChamaApp* mobile application members of *Pesa* and *Utajir*i were able to carry out transactions such as request for loans, submit loan payments, submit monthly contribution etc. Group administrators could review and approve these transactions after which all members of the group could be notified. The rest of this section presents the validation carried out in order to ascertain the extent to which key challenges facing *Pesa* and *Utajiri* informal saving groups were addressed.

5.1 Record Keeping Challenge

The developed system, *ChamaApp,* sought to address this challenge. This study revealed that members of *Pesa* and *Utajiri* found that by using the *ChamaApp* their record keeping ability had improved significantly. Asked on how much they agreed or disagreed with the statement that "*ChamaApp solved the problem of record keeping*" in a rating scale of 5,

80% of the study participants strongly agreed that the problem had been solved, 13% somewhat agreed while 7% neither agree nor disagreed with that statement (Figure 6).

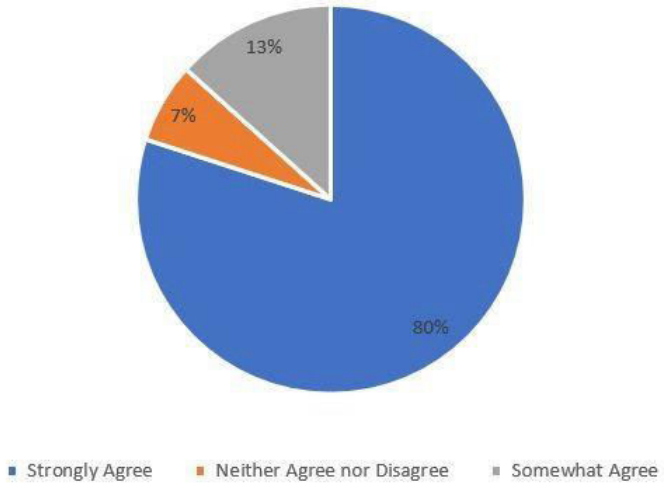

Figure 6: Responses to record keeping challenge

Traditionally, informal saving groups use memorization (where literacy level of members is low), passbook (only recording overall balances) or a central ledger able to track the financial transactions through a group secretary [15]. Introducing a distributed ledger curbs the problem of loss of information as well as boosts trust amongst group members.

5.2 Trust Challenge

Queried on their level of agreement or disagreement to the statement "*ChamaApp has increased the trust members have on the group*", most of the study participants, 73% strongly agreed, 13% somewhat agreed, 7% strongly disagreed while a further 7% neither agreed nor disagreed to the statement (Figure 7).

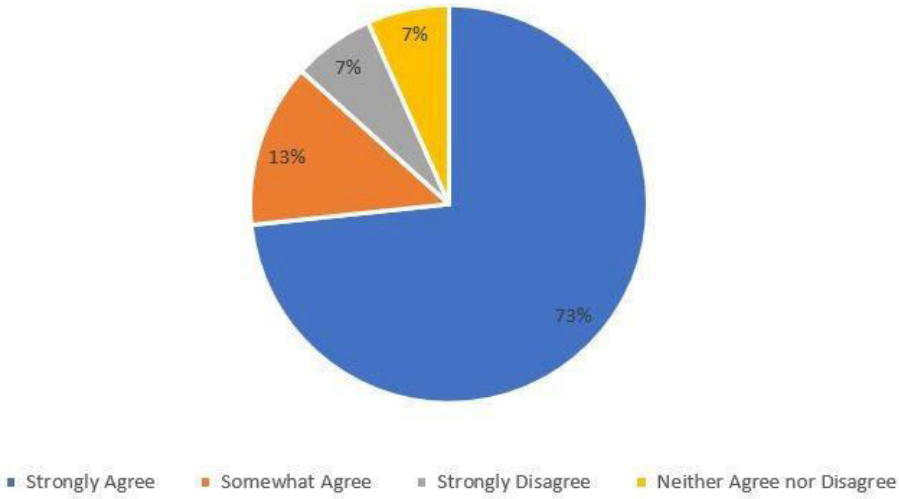

Figure 7: Responses to Trust Challenge

Trust is vital as it is the foundation on which informal groups are formed and loans advanced, a field study by [3] revealed that saving groups die when there is lack of trust.

5.3 Governance Challenge

Most of the study participants, 80% strongly agreed to the statement "*ChamaApp helped in the management (governance) of the group*", 7% somewhat agreed, 7% neither agreed nor disagreed while 6% Strongly disagreed (Figure 8).

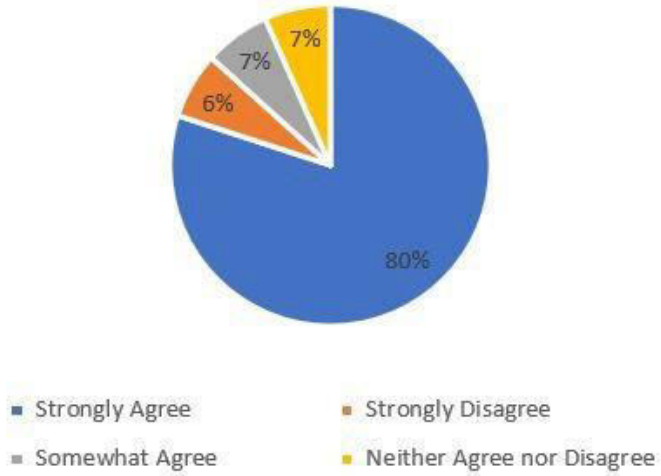

Figure 8: Responses to Governance challenge

5.4 Delayed Payments Challenge

The *ChamaApp* implemented monthly and periodical notifications to remind participants to either pay their loans or make their monthly contributions in time. From the study by Mwangi et al [4], delayed payments had been identified as one of the obstacles to successful running of informal saving groups. Participants level of agreement or disagreement to the statement "*ChamaApp solved the problem of delayed payments through notification"* though impressive revealed that reminders did not suffice (Figure 9).

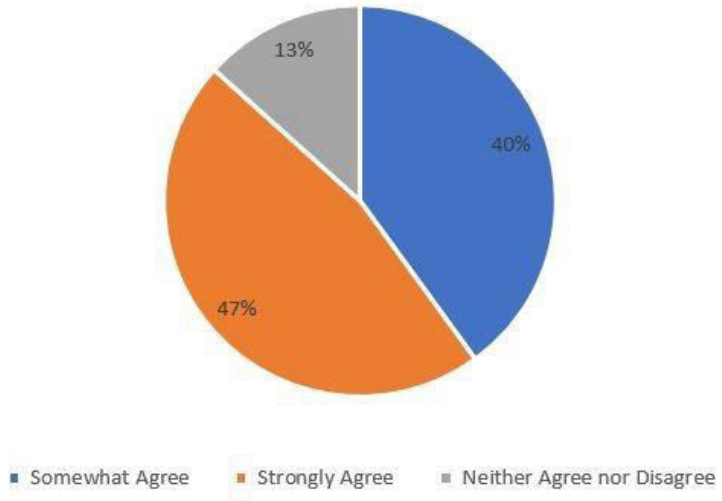

Figure 9 Responses to Delayed Payments Challenge

Only 47% of the participants strongly agreed, with 40% somewhat agreeing while 13% were indifferent, neither agreeing nor disagreeing. This is an indication that more technological and training solutions can be adopted to further tackle this problem.

5.5 Financial Knowledge Challenge

The last challenge that this research sought to solve was that of financial knowledge amongst members of the *Pesa* and *Utajiri* informal saving groups. Several periodical

messages with financial tips were sent through the *ChamaApp* to the members. Asked on the extend they agreed or disagreed with the statement "*ChamaApp helped increase member's financial knowledge*" 60% of the participants strongly agreed, 13% neither agreed nor disagreed while 27% somewhat agreed (Figure 10).

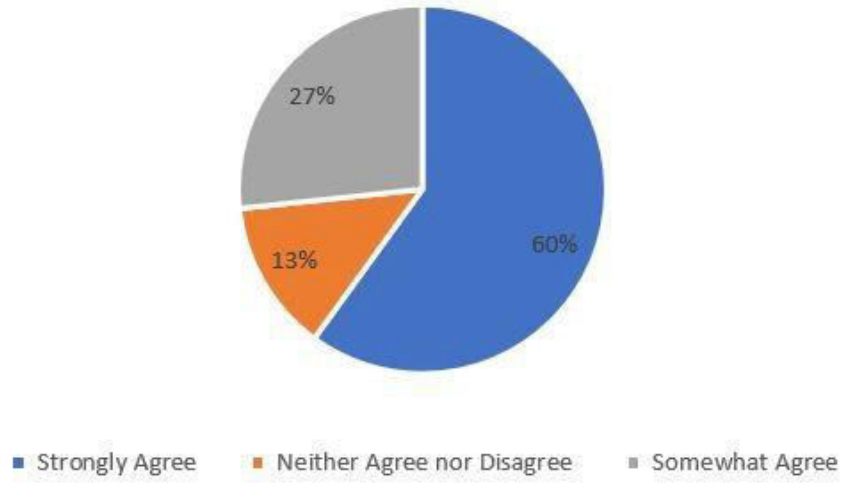

Figure 10 Responses to Financial Knowledge Challenge

The study attempted to solve key challenges facing informal saving groups. As evidenced in the results, there is huge potential on use of technological tools to mitigate the effect of all these challenges. For the participating groups, *Pesa* and *Utajiri* to a remarkable extent, these challenges were solved.

6. Business Benefits

Mobile money savings accounts have facilitated low income earners to save and borrow money with ease [16]. Most of these mobile money savings accounts are proprietary and managed by the major service providers including telecommunication service providers, banking financial service providers and lately the mobile digital lenders through the digital lending apps. However, over the years, efforts have been made to develop non-proprietary mobile applications to facilitate management of mobile financial services [17], [18], [19], [20], and [21].

To ensure informal savings groups overcome hurdles that threaten their existence, this study explored the viability of using mobile apps. The developed *ChamaApp* ensured that participants of the study could access information about their savings in a timely manner, request for loans, submit their contributions as well as get reminders on when to pay their loans. The overall effect of the system was improved confidence on the saving groups by members, records were better kept, members were always aware of what was happening in the group, improved financial knowledge and governance.

The developed *ChamaApp* is available and can be deployed among other informal savings groups. Stakeholders can benefit from the findings of this study, the government through the relevant ministry can provide mobile apps to manage transactions among informal savings groups, formal financial institution can be linked to the informal sector through such apps to provide much needed financial knowledge. Lastly, the major beneficiaries of this research would be the informal savings groups and their members.

7. Conclusions and Recommendations

This study explored the use of mobile apps to overcome the challenges faced by informal saving groups. The study developed a prototype mobile app for informal saving groups.

The key contribution of this research is that members of informal savings groups can store, organise and access their financial data at anywhere and anytime. In addition, members can follow the activities of the group and get reminders to make their contributions. This has the potential to greatly increase member's confidence on the group and thus the group cannot collapse.

The features of the app have been confirmed to work well among the study population. However, advanced features should be added before the final version is released for global adoption. Some of these features could include allowing the app to make peer-to-peer payments, having a killer switch to have the app automatically shut down if the device goes missing or is stolen and having a virtual assistant that can answer a wide range of table banking savings queries.

In terms of future work, it is recommended that the system uses Unstructured Supplementary Service Data (USSD), this would make the services accessible to members who might not have the advanced smartphones on which an installed mobile app can run. A study to evaluate the impact of use of mobile apps like *ChamaApp* by large informal savings groups is also recommended.

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