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# Enabling Factors and User Requirements for Microcredit Services through Mobile Devices - Dar es Salaam Tanzania Context.

Research Paper

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## ABSTRACT

Microfinance institutions (MFIs) play a considerable role in providing capital to micro businesses (MBs) through microcredit services. However, the interplay between MFIs and MB owners has been hindered by several factors, such as challenges with information sharing. The current study aims at identifying the specific challenges of microcredit services in Dar es Salaam, Tanzania, and also at determining the enabling factors, preferred features, and general requirements for a mobile technology solution to support the interplay between MFIs and MBs. The participants in the study were 91 MB owners and 22 MFI officers, and the data for the study were collected via a questionnaire. The study confirmed that the interaction, communication, and relationship between MB owners and MFIs is affected by various challenges. It was confirmed that digital technology can be used to address the identified challenges, and that a tailor-made mobile technology solution would be appropriate for supporting the interaction, communication, and relationship between MFIs and MBs.

## Keywords

Microcredit services, information flow, mobile devices, mobile technology, micro business, micro finance institutions.

## INTRODUCTION

*Micro businesses* (MBs) play an important role in the economy of many countries, especially in Africa, Asia, and South America. They provide employment to people with a low level of education and a small household income (Kibassa, 2012; Rathore and Ilavarasan, 2014). However, most of the MBs have challenges in financing their operations and hence depend on capital from *microfinance institutions* (MFIs) through microcredit services. As a result, MFIs were established to satisfy the needs of low-income earners (Bada, 2012; Diniz, Pozzebon, Jayo, and Araujo, 2008; Ifelunini, and Wosowei, 2012; Okibo and Makanga, 2014; Svoboda, 2016). The most important activities of MFIs are pre- and post-loan training and the monitoring of clients as well as loan appraisals, which require clear and smooth information sharing and interaction between MFIs and their clients (Frank, Mbabazize, and Shukla, 2015; Uchida, Udell, and Yamori, 2012). Consequently, MFIs help MBs via microloans (Abedi, Mirdamadi, Hosseini, and Saleh, 2011; Gomera and Apiola, 2015), and offer training, business consultancy, and loan monitoring (Ajmera, Pandit, Borgaonkar, and Madhvanath, 2013; Gomera and Apiola, 2015; Ifelunini and Wosowei, 2012).

In Tanzania, the introduction of MFIs as part of the National Microfinance Policy in 2001 has been one of the key measures intended to alleviate poverty (Fox, 2016; United Republic of Tanzania [URT], 2003, 2014). Specifically, the policy has enabled low-income earners to receive microcredit services. The number of MFIs in Tanzania has grown from 655 MFIs in 2002 to 1,899 MFIs in 2005 (MFtransparency, 2011; Mori and Olomi, 2012). By 2013, the number had increased to over 6,000 MFIs (URT, 2014), with accumulated loans advanced for about 778.4 billion Tanzanian shillings (Kitala and Kayunze, 2014). Although the microfinance sector in Tanzania has gained importance, the outreach to the poorest households, such as MB owners, is still relatively minor (Marwa, 2014). To enhance the MFIs outreach to customers, the research world and practitioners found it necessary to focus their attention on various possible solutions to this challenge.

One of the solutions suggested and implemented by earlier researches is the usage of digital technology to support and enhance MFI services (Augburg, Schmidt, and Krishnaswainy, 2011; Bada, 2012; Ghosh and Vachery, 2016; Mbogo, 2010; Paruthi, Frias-Martinez, and Frias-Martinez, 2016; Sathe and Desai, 2006; Weber, Kulkarni, and Riggins, 2012). However, most of the existing solutions are not designed specifically to address the interaction, and information sharing challenges between MFIs and MB owners (Ajmera et al., 2013; Bada, 2012; Boekhoudt and Stappen, 2004; Rathore and Ilavarasan, 2014). Given the rapid adoption of mobile phones in developing countries, in particular Tanzania, MB owners are able to use mobile technologies to access MFI services (Ajmera et al., 2013; Addae-Korankye, 2014). Earlier studies envisaged that the use of mobile technology would be potentially applicable for minimizing costs and improving productivity, as most MB owners do not necessarily use other digital technologies, such as desktop computers and laptops (Okibo and Makanga, 2014; Paruthi et al., 2016; Rathore and Ilavarasan, 2014; Uchida et al., 2012).

As a result of the significant innovations that have taken hold in the business environment resulting from the adoption of mobile technologies, the rules of doing business have significantly shifted. Consequently, there is a clear need to design and implement mobile technology solutions to support

interaction and information sharing between MFIs and MBs. It is against this background that our research sought to answer the following specific research questions:

RQ1: What are the key services offered by MFIs to MBs in Dar es Salaam, Tanzania?

RQ2: What are the challenges related to the interaction, communication, and relationship between MFIs and MBs?

RQ3: What are the enabling factors, preferred features, and general requirements for a mobile technology solution to support the interaction, communication, and relationship between MFIs and MBs?

## **BACKGROUND AND THEORETICAL FRAMEWORK**

### **Micro Business and the Role of Microfinance Institutions in the Tanzanian Context**

The existing heterogeneity of definitions of micro business globally necessitates country-specific definitions tailored to local environments. For example, by using the World Bank definition in Tanzania, almost all enterprises fall under the category *micro, small, and medium enterprises* (MSMEs) (Marwa, 2014). Accordingly, the government of Tanzania uses the number of employees and/or total number of assets as parameters in its nomenclature of MSMEs. Most MSMEs are grouped as economic activities in manufacturing, services, commerce, and mining. The classification defines MBs as a type of MSMEs: engaging up to 4 people, in most cases family members or employing capital amounting up to Tanzania Shillings 5 million (URT, 2002). The majority of MBs in Tanzania are labor-intensive, relatively easy to start, and widely distributed across the country, including both rural and urban areas (Marwa, 2014). MBs operate mainly in areas with a high footfall, such as bus stops and market places, and they have permanent business premises and a larger amount of capital than street traders (Mramba, Sutinen, Haule, and Msami, 2014). MBs play a significant role in job creation, income generation, poverty alleviation, and income inequality reduction.

MFIs in Tanzania are the result of a financial sector reform which led to the liberalization of the financial sector and the establishment of private MFIs to support the low-income earners. MFIs provide microcredit services specifically to the disadvantaged members of society and MSMEs, even more so than the well-established financial institutions (Mori and Olomi, 2012). However, MFIs have not been able to reach the majority of low-income Tanzanians. Moreover, most MFI customers cannot produce financial statements for loan appraisals, have low education, and live in geographically dispersed areas (Addae-Korankye, 2014; Bwana and Mwakujonga, 2013). According to Mori and Olomi (2002) and Bwana and Mwakujonga (2013), MFIs have performed poorly due to high operating costs, low revenue generation ability, and small outreach to low-income earners.

### **Nature of the Interaction between Microfinance Institutions and Micro Businesses**

The interaction between MBs and MFIs is based mostly on relationship lending, which replaces the collateral need for low-income earners to qualify for loans (Ghosh and Vachery, 2016; Uchida et al., 2012). MFIs have a large number of microloan customers, making a small individual contribution to the MFIs' financial position (Makunyi and Rotich, 2017). MB owners who receive loans from MFIs are trained on how to conduct their business and in management financial skills. Therefore, the relationship between MFIs and MBs requires a smooth information flow as well as the provision of multiple services, even in distant geographical places (Presbitero and Rabellotti, 2014).

In addition, the geographical distance between MFIs and MBs increases information asymmetries, agency problems, and operational costs, which also affect interest rates and lead to a high risk of loan default (Makunyi and Rotich, 2017; Presbitero and Rabbellotti, 2014). An earlier study on MFIs identified the following challenges with the interaction between MBs and MFIs: the interaction is time consuming for MBs; the interaction can be ineffective due to absence of information flow between MFIs and MBs; and sometimes local authorities do not have accurate information on MBs (Gomera and Apiola, 2015). Furthermore, it is still a common practice for MFI loan officers to collect soft information from MBs manually, and also information sharing and communication within and outside of MFI institutions is ineffective (Bada, 2012; Tchouassi, 2012). Thus, the earlier research has clearly shown the need to enhance the interaction, communication, and relationship between MFIs and MBs (Diniz et al., 2008; Hajji, Mbarki, El Jasoul, and Jaara, 2016).

### **Digital Technology Solutions Used by MFIs**

MFIs adopt digital technology for various beneficial purposes, such as for reducing the impact of distance, time, and workload to reach low-earning clients, both rural and urban (Bada, 2012; Nyapati, 2011; Weber, Kulkarni and Riggins, 2012). Consequently, digital technology has been used to enhance the services provided by MFIs, such as KIVA, the world's first online lending platform connecting online lenders to entrepreneurs across the globe (Ghosh and Vachery, 2016; Paruthi et al., 2016; Weber et al., 2012). A widely used digital technology solution is Mifos - Microfinance Open Source software - which has been designed to help MFIs with client management, loans and savings portfolio tracking, business intelligence, and reporting (Bada, 2012). Another example of an existing digital technology solution is a risk assessment fuzzy clustering software, which was specifically developed for loan appraisals and making decisions on loan disbursement (Sathe and Desai, 2006). Finally, various digital technology solutions have been implemented to support the localization of MFI services, such as the Intensive Voice Response System and WiMax (Worldwide Interoperability for Microwave Access), a technology standard for long-range wireless networking for both mobile and fixed connections (Weber et al., 2012).

However, the use of digital technologies by MFIs is still low in Tanzania and requires improvement in the areas of facilities, stakeholders' perceptions, cost minimization, and convenience (Bada, 2012; Kevin, Benard, and Ronald, 2013; Melchioly and Sæbø, 2010; Mramba, Apiola, Kolog, and Sutinen, 2016; Mwela, 2014). The reasons for the low use of digital technology include a lack of digital skills, a need for a digital solution that supports two-way communication between MFIs and their clients, and the use of inappropriate devices (Bada, 2012; Mbogo, 2010). Moreover, most of the available digital technology solutions developed for MFIs are designed for large organizations, which makes them often unsuitable for small MFIs (Augburg et al., 2011).

### **Theoretical Framework**

The theoretical foundation of the study is based on interrelation of relationship lending theory, agency theory, and Information and Communication Technologies (ICT) enabled MFI outreach theory (Ang, 1991; Hajji et al., 2016; Jawadi, Jawadi, and Ziane, 2010; Uchida et al., 2012; Yan'an, 2013), as shown in Figure 1 below. The use of the theories is justified based on the nature of MBs (Ang, 1991; Berger, Klapper, and Udell, 2001), the nature of microcredit services offered to MBs (Gomera and Apiola, 2015), and the potentials of ICT for financial inclusion (Hellström, 2010).

The *relationship lending theory* is connected to RQ1 regarding the key services offered by MFIs to MBs. Within Dar es Salaam there are many MFIs which aim to facilitate MBs with different services targeted at capacity building and access to credit. Lenders provide these services based on soft information (Comeig, Fernández-Blanco, and Ramirez, 2015; Yan'an, 2013), since borrowers have no means of producing and presenting financial statements (Uchida et al., 2012). Moreover, the structure of MFIs in Tanzania consists of the different types of credit providers, and the competition between these institutions is very stiff (Presbitero and Rabellotti, 2014). Therefore, depending on the characteristics of the lending environment, relationship lending might be the most effective technique to MBs, especially for MFIs. Relationship lending is commonly defined as a long-term implicit contract between lenders (MFIs) and the borrower (MBs) (Ang, 1991). The theory on relationship lending suggests that it may be economically beneficial to form close relationships between the businesses and MFIs (Uchida et al., 2012). Thus, relationship lending theory is important in this study because of the characteristics of MBs and the need for collateral substitute services such as training, business consultancy, and aggressive loan monitoring. Moreover, the theory is considered relevant because it establishes how the interaction between MFIs and MBs takes place in Tanzania. Also, it provides a base for identifying the key services offered by MFIs to MBs and the information required thereon (Ang, 1991; Mahfuz, Khanam, and Hu, 2016; Uchida et al., 2012).

The *agency theory* is connected to RQ2 in regard to the challenges inherent in the interaction and sharing of information between MFIs and MBs. The geographical distance between MFIs and MBs increases information asymmetries, agency problems, and operational costs, which also affects interest rates and leads to a high risk of loan default, all of which is accommodated by the agency theory (Makunyi and Rotich, 2017; Presbitero and Rabellotti, 2014). The lending services offered by MFIs are usually done through loan officers acting as agents of MFIs, which increases costs, ethical considerations, and the risk of MFIs depending too much on loan officers (Ang, 1991). Agency theory sound appealing intuitively and relevant in the micro business situation. For example, it pertains to the effects of so-called information impactedness, such as high levels of asymmetric information in regards to market imperfection and capital structure, and how, in turn, entrepreneurs who capitalize on these market uncertainties might not want it to be disclosed because that information might be used against them (Comeig et al., 2015). Moreover, agency theory is related to the problem that occurs when cooperating parties have different goals and a division of labor (Yaron and Manos, 2010). Specifically, the agency theory focuses on the relationship in which one or more persons (the principal[s]) engage another person (the agent) to perform some work on their behalf. In this study, principles of agency theory advocate the understanding of the impact of loan officers to relationship lending (MF transparency, 2011). Moreover, the study aims to determine whether all interaction and information sharing challenges between MFIs and MBs are caused by agency (Berger et al., 2001).

The *ICT enabled MFI outreach theory* is connected to the RQ3, which aimed at identifying enabling factors, preferred features, and general requirements for a mobile technology solution to support interaction, communication, and relationship. Recently, digital technologies have emerged as a powerful tool to reduce operating costs, making it viable for financial institutions to expand into rural and low-income areas (Diniz et al., 2008; Mahfuz et al., 2016). Digital technology innovations, such as a personal computer connected to the internet, a mobile phone, an automated teller machine (ATM), or a point-of-sale (POS) device located at a retail or postal outlet may be less expensive to establish than branches located in rural areas and more convenient for MBs (Hajji et al., 2016; Jawadi et al., 2010). Unlike pure cash-based transactions, transactions using digital technology can take place with less time or with no time required from a teller. Rather than hand over cash to a teller when making a deposit or loan repayment, a customer can give cash to a store clerk, swipe a debit card through a POS card reader,

and input an identification number to authorize the transaction (Weber et al., 2012). Specifically, mobile technology can reduce the number of middlemen, as in peer-to-peer lending and KIVA, which eliminate intermediaries between MFIs and borrowers, and present a viable solution to the agency problem (Ghosh and Vachery, 2016; Paruthi et al., 2016). Hence, ICT-enabled theory is important in the study because: (1) it indicates how mobile devices can strengthen the interaction between MFIs and MBs by tackling challenges of the interaction; and (2) identifies enabling factors and user requirements that can be used potentially to design a solution to tackle the identified challenges. Figure 1 below shows the connection between the three theories and the research questions of the study.

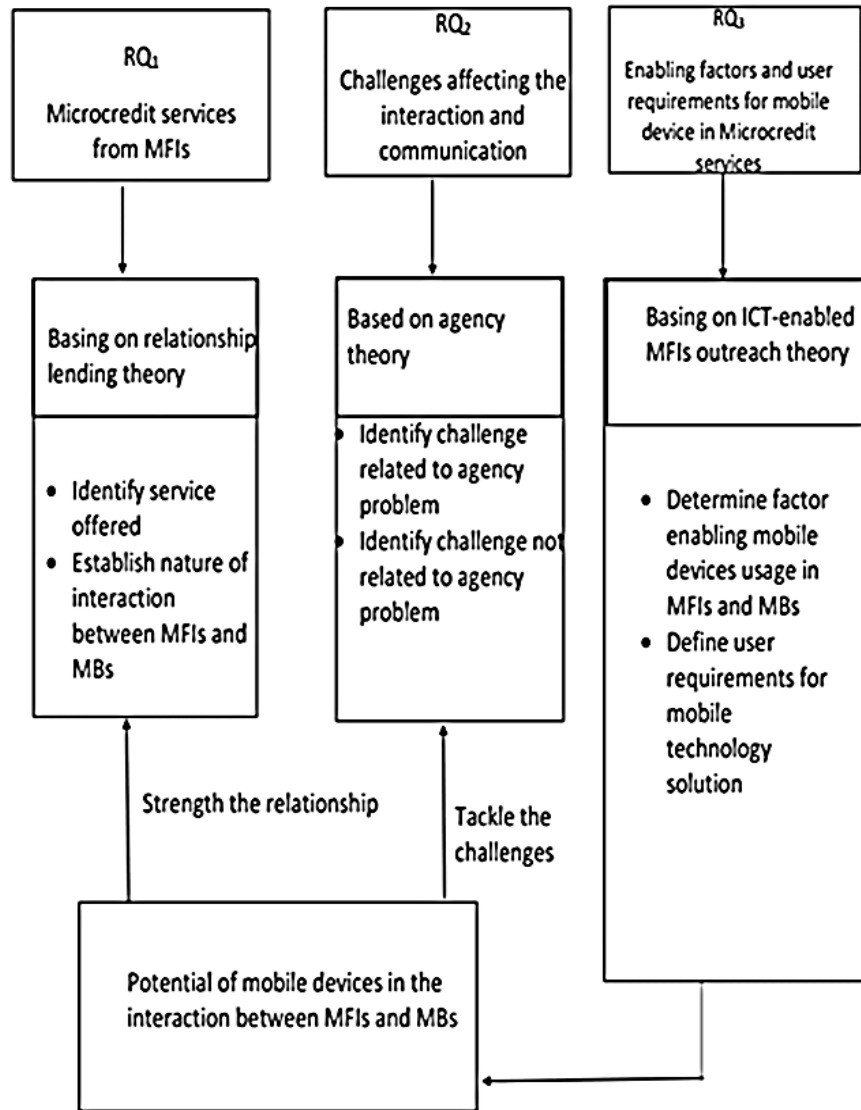


Figure 1: Theoretical Framework

## METHODOLOGY

### Research Design and Approach

The current study is part of a *design science research* (DSR) project, which aims at enhancing the interaction, communication, and relationship between MFIs and MB owners. DSR is a systematic approach toward developing a solution to practical but complex problems emerging from real-life settings (Johannesson and Perjons, 2014). The problem tackled within the DSR process can be a puzzling question or an identified need to improve the current situation for a specific groups of stakeholders. According to Hevner (2007), DSR involves different stages, providing both practical and scientific contributions. The current study was created on the basis of the DSR paradigm, which uses empirical research as a model to tackle a real-world problem (Hoadley, 2004) and hence contributes to theory building (Venable, 2006), problem explication, and requirement definition stages (Johannesson and Perjons, 2014). The empirical approach in DSR concurs with the design thinking aspects of a human-centered focus and the environment-centered concern of the targeted population (Owen, 2006).

According to Johannesson and Perjons (2014), the problem explication stage aims to identifying and defining the problem experienced by the stakeholders of a given practice, in this case, MFIs and MBs. The main aims of the problem explication stage are to explain the problem clearly, formulate the practical problem in a precise manner, and explore the significance of solving the problem (Johannesson and Perjons, 2014). The aim of the requirement definition stage is to concretize the requirements for the possible solution and also to outline the potential solutions. Various research methods can be used, both in the problem explication and requirement definition stages (Hevner 2007; Johannesson and Perjons, 2014). In this research, an empirical approach was used to both further explicate the interaction and information sharing challenges among MBs and MFIs, as well as to identify concrete user requirements and expectations for a mobile technology solution addressing the identified challenges.

### Data Collection Tool

The current study applied a descriptive research design (Creswell, 2014; Knupfer and McLellan, 2001) with the aim of: (1) understanding the existing services offered by MFIs; (2) identifying the challenges related to the interaction, communication, and relationship between MFIs and MB owners; and (3) mapping out potential enabling factors, preferred features, and general requirements for a mobile technology solution to support the interaction, communication, and relationship between MFIs and MB owners. A questionnaire was thought to be an appropriate data collection method based on the number of participants (Randolph, 2008). The questionnaire in the study included self-explanatory, yes/no, and Likert-scale questions (Creswell, 2014). The questionnaire (see Appendix 1) used in the study was developed based on the theoretical framework and literature review as shown in Figure 2. The questionnaire was pilot tested with five respondents before the final questionnaire was given to the participants.



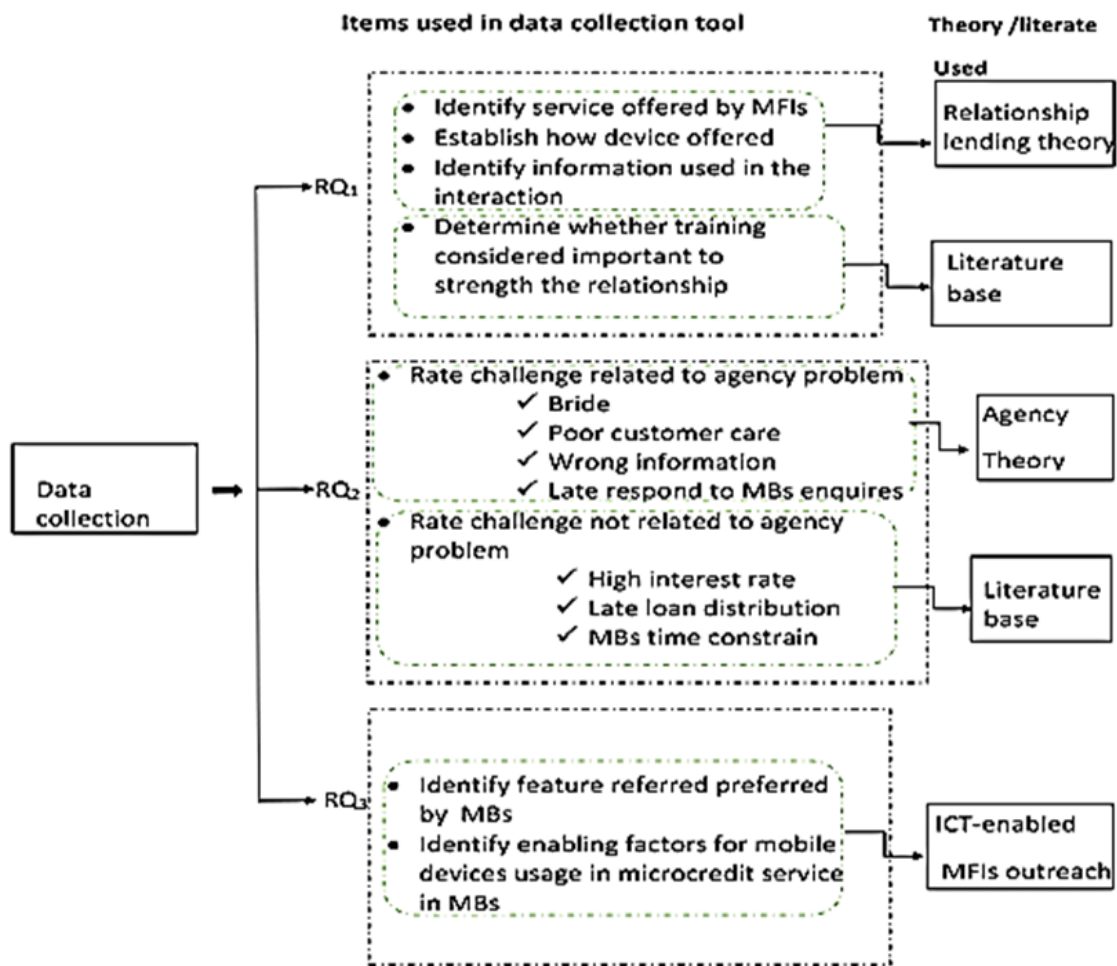


Figure 2: Data Collection Tool in Relation to the Theoretical Framework and Literature

### Research Participants and Sampling Strategy

The primary participants of the study were 120 MB owners in Dar es Salaam City. We purposefully chose MB owners based on: (1) the sector operations of MBs; and (2) the participation of MBs in microcredit services. Altogether, 91 MB owners filled out and returned the questionnaire. The participants were not paid in this particular study; however, a thorough explanation was delivered to clarify the long-term importance and benefit of the study in regard to their practical business environment. Table 1 shows the distribution of the participants according to the gender and education level of the MB owners.

		Education				Total
		Primary	Secondary	Higher education	No formal education	
Gender	Female	29	1	1	11	42
	Male	23	20	4	2	49
Total		52	21	5	13	91

**Table 1. Gender and Education of Participants**

The secondary participants in the study were MFI officers. To find suitable MFI officers for the study, we asked the MB owners participating in the study to identify MFI officers involved in microcredit services. We were able to find 28 potential MFI officers, of whom 22 agreed to participate in the study by filling in and returning the questionnaire. Therefore, altogether, 113 MB owners and MFI officers in Dar es Salaam City from various business sectors participated to the study. When considering the aims of the study, the sample size was satisfactory (Denscombe, 2010).

**Data Collection and Analysis Procedures**

The data collection from the MB owners was conducted by six undergraduate students from Dar es Salaam Institute of Technology (DIT). The six students were allocated to all five municipalities of Dar es Salaam City, and they began the data collection after taking part in a three-day training session. The students were suitable candidates for data collection because they were also participating in a project aimed at developing mobile application solutions to facilitate the relationship between MFIs and MBs. The data collection from the MFIs was conducted by the first author via direct communication with MFI officers after receiving their contact details from the MB owners. The data collected from the closed questions were analyzed using descriptive statistics (Bryman, 2012). The data from the open-ended questions were analyzed qualitatively by grouping and coding to identify relevant themes emanating from the responses.

**Ethical Considerations**

The MB owners and MFI officers participating in the study were each given a consent letter. The consent letter was attached to the questionnaire, and respondents were advised that by filling out and returning the questionnaires, they were simultaneously giving their consent for their answers to be analyzed and eventually published. The identities of the respondents have been hidden. Moreover, the information given by the MFI officers and MB owners was used only for the purpose of this single study. Finally, the data collected for the study will be destroyed after the first author has completed his doctoral studies. There were no direct benefits for the participants, but the study contributes to finding new solutions to the identified problems and challenges related to the interaction, communication, and relationship between MFIs and MB owners.

## FINDINGS

### The Key Services Provided by Microfinance Institutions

According to the MB owners, the main MFI services used by them are microloans (98.1%) and micro savings services (78%), followed by training related to microloans and savings. Other less frequently used services by the MB owners include business information, consultations, and networking for marketing. The MB owners considered the training service offered by MFIs to be important, since their low level of business and financial skills had a considerable effect on the MB owners’ ability to repay loans (mean 3.58, mode 4). In addition, the MB owners strongly agreed that improvement in business skills would have a positive effect on their business performance (mean 3.97, mode 5). Finally, the MB owners disagreed with the notion that business training would be useless for them.

We found that a clear majority (95%) of the MB owners receive services from MFIs through loan officers who play the role of agents. However, the MB owners were not satisfied with the services offered by MFIs (mean 1.8, mode 1) whereas the MFI loan officers themselves had a very positive opinion of their own services. Also, the MFI loan officers stated that they communicate effectively (mean 4.45, mode 5) with MB owners. Table 2 summarizes the services and respective information offered by MFIs to MBs.

Service	Information concerning
Loans	Amount of loan applied for and loan disbursed; Amount of interest; Collateral; Business size; Loan repayment due dates
Savings	Amount in customer’s savings account; Records of account transaction
Training	Importance of loan; Differences between business resources and personal resources; How to calculate interest and amount payable; Entrepreneurship issues; Business management issues
Insurance	Amount of loan insured
Business Network	Market; Suppliers; Price of the different services or products in the market

**Table 2: Services and Information Shared Between MFIs and MBs**

### Challenges Related to the Interaction, Communication, and Relationship between MBs and MFIs

The data collected revealed that there is an information flow problem which reduces satisfaction among the MB owners. Specifically, the MB owners felt that MFIs do not provide relevant information on time (mean 2.35, mode 1). Moreover, the MB owners indicated that there are problems in their communication with MFIs (mean 2.71, mode 1). Almost 50% of the MB owners indicated that they only met the MFI officers once during loan repayment, while less than 25% of the MB owners had more frequent contact with the MFI officers.

One clear factor hindering the interaction between MFIs and MBs was time constraints. The MB owners were not pleased with having to spend time receiving services from loan officers instead of concentrating on their business (mean 2.21, mode 1) and thought that time was the biggest constraint with regard to meeting loan officers (mean 3.54, mode 5). Also, the MB owners agreed that time constraints prevented them from participating regularly in the training offered by MFIs (mean 3.63, mode 4). The time constraint problem was confirmed by the MFI officers, who indicated that most of their customers did not have time for training (mean 4.27, mode 4). Finally, an analysis of the time spent by the MB owners on their businesses showed that a clear majority of the MB owners were working

nine or more hours each day up to six or even seven days a week. This suggests that they had no time for anything apart from concentrating on their businesses.

In addition, the MB owners pointed out various other challenges related to the microcredit services offered by MFIs, as listed in Table 3. The most problematic challenges the MB owners encountered regarding MFIs include bribery, receiving wrong information, poor customer care, and late response times. Other challenges that are not related specifically to the agency problem are high interest rates, late loan disbursements, and short loan repayment periods.

	Bribery (%)	Wrong information (%)	Unavailability at the right time (%)	Poor customer care (%)	Late response (%)	High interest (%)	Late loan disbursement (%)	Short loan repayment (%)
<b>Yes</b>	90.1	87.9	90.1	87.9	83.3	83	82.4	79
<b>No</b>	9.9	11.0	9.9	12.1	16.7	17	15.4	21

**Table 3: Challenges Faced by MBs with MFIs**

According to the MFI officers, the low education level among MB owners, poor record keeping, informal business operations, the lack of business skills, and the geographical distance between MFIs and MBs were also noted as challenges in providing services to MBs. Moreover, a lack of reliable information, poor facilities, and time issues were considered to be challenges as well.

**Enabling Factors, Preferred Features, and User Requirements for a Mobile Technology Solution**

*Enabling Factors*

As shown in Figure 2, Android was used by 74.7% of the MB owners, Apple iPhone by 6.6%, Apple iPad by 2.2%, and a Windows Tablet by 2.2%, while 14.3% of the participants did not own a smart phone. Most of the MB owners (93.4%) used mobile phones every day, and similarly, 93.4% of the participants used mobile phones for business activities. The mobile phones were mainly used for making phone calls; sending text messages; money transfers; personal alarm; Internet searches; a calculator; and social media communication, such as via Facebook, Instagram, or WhatsApp. The MB owners also indicated that they were interested in using a mobile phone for the following MFI services: training, loan balance information, loan processing, mobile money, marketing, business networking, and business information. However, only 3.3% of the respondents had a tailor-made mobile phone application designed specifically for business purposes. While the majority of the MB owners were satisfied with their mobile devices, most of them also mentioned that they encountered challenges in using mobile devices, mainly related to the high cost of an Internet connection and network problems.

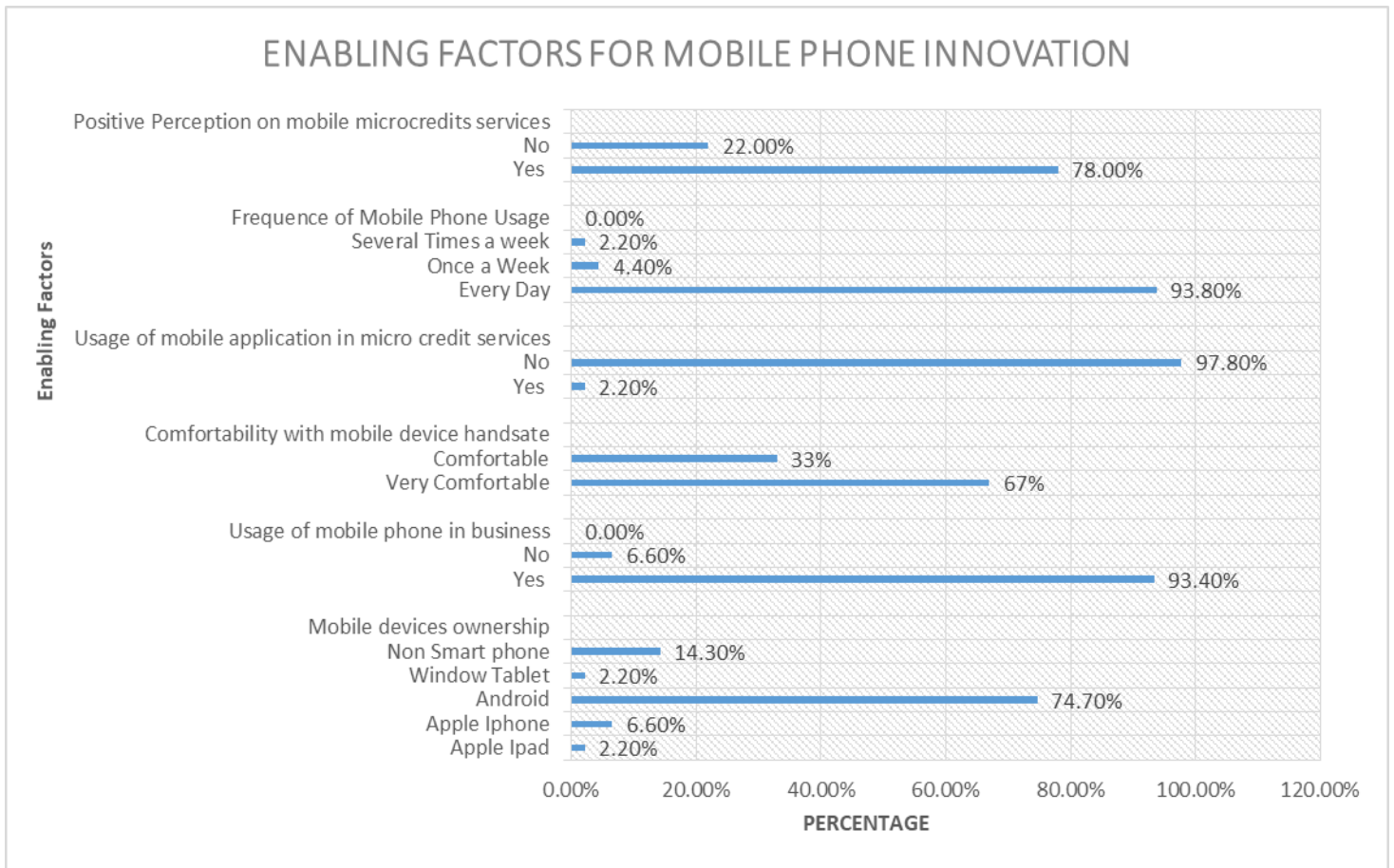


Figure 3: Enabling Factors for a Mobile Technology Solution

**Preferred Features for a Digital Technology Solution**

The MFI officers were asked to suggest a mobile technology solution to the challenges related to microcredit services. According to the MFI officers, the most preferred way to use mobile technology was to facilitate training, which will simplify the process of delivering training materials to MBs and eliminating the challenges of space and time constraints from MBs. Also, the mobile technology that can support transportation was mentioned as one of the preferences of MFIs to reduce costs which lead to high interest. Moreover, reference was made to the record keeping technology preferred by MFIs in order to assist in provision of accurate information for loan appraisal and other decisions.

**User Requirements**

The MB owners identified mobile phones as the preferred way to receive MFI services. Additionally, one of the most important requirements for supporting the interaction between MFIs and MBs was that the solution should be in the Kiswahili language. The MB owners preferred a mobile technology solution that is simple to use and has information readily available from various media, such as video, audio, and physical documents. Figure 4 summarizes the findings regarding the general user requirements.

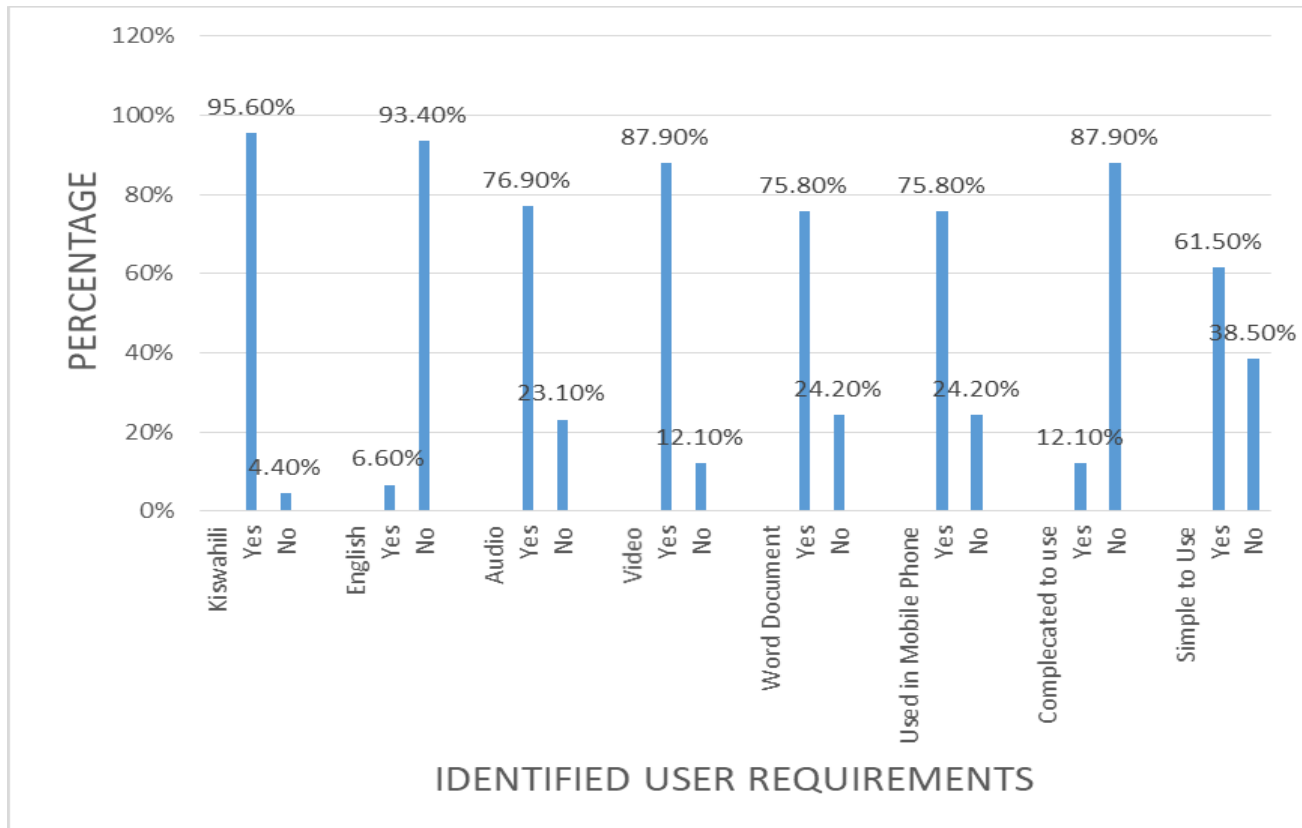


Figure 4: General user requirements

## DISCUSSION AND CONCLUSION

From our findings, interaction and relationship between MFIs and MBs can be looked at from three fronts: the service offered, challenges thereon, and enabling factors through using mobile technologies to strengthen the interaction; ultimately, this has led to the emanation of three theories which validate the concerns raised by the research questions.

### The Key Microcredit Services Offered by MFIs to MBs (RQ1)

The study confirmed that the main services offered by MFIs to MB owners are microloans and micro savings services. The study also revealed that MFIs do not offer other services that might be relevant to MB owners, such as business information, business networking, and marketing. Based on the literature, we also were able to identify that the MB owners receive services from MFIs through loan officers who play role of agents. The loan officers facilitate the provision of services offered by MFIs to MBs. With regard to a training service offered before and after loan disbursement, the study confirmed earlier findings that both MBs and MFIs considered training to be very important (Kessy and Temu, 2010). MFIs used training as a tool to understand customers, for loan monitoring, and to help build MBs’ capacity. The study also consolidated the earlier findings that distance and time affected the training process because it requires trainers and trainees to be located in the same place (Gomera and Apiola, 2015).

Our findings confirm that interactions based on relationship lending theory are enhanced by the use of mobile technology, as shown in Figure 5. Our study confirmed that most of the MBs consider training to

be very important, therefore, effective training process through technology can strength the relationship between MFIs and MBs. Also, we were able to confirm that's all services offered in the interaction between MFIs and MBs are offered through loan officers. This calls attention to the practices of loan officers on the interaction between MFIs and MBs.

We found that the services offered by MFIs to MB owners are accompanied by a large amount of information sharing between MFIs and MBs, which indicates the need for a solution that can reduce operating costs (Comeig et al., 2015). Moreover, the study confirmed that the microcredit services offered by MFIs were based on soft information from MB owners (Uchida et al., 2012). Thus, our study provided further evidence that the quality of soft information should be improved to improve the relationship between MFIs and MBs.

### **Challenges Related to the Interaction, Communication, and Relationship between MFIs and MBs (RQ2)**

The data analysis revealed that the main challenges related to the interaction, communication, and relationship between MFIs and MB owners were that loan officers take bribes during loan disbursement; there is a small number of loan officers compared to the number of customers being served; the geographical distance between MBs' business areas and MFIs' offices; wrong information given to MBs; and time constraints on regular meetings with loan officers. A previous study by Addae-Korankye (2014) identified that these kinds of challenges have a considerable impact on the interaction between MFIs and MBs.

The finding also confirmed that the problem of agents (loan officers) exists because of the nature of interaction between MFIs and MBs. As a result, loan officers cause some challenges that mostly affect the quality of information and services offered in relationship lending, such as bribery, poor customer care, inaccurate information, and late responses to customers' enquiries (Ang, 1991; Berger et al., 2001). Hence, the factors emanating from research findings regarding different requirements for mobile technology solutions to support the interaction, communication and relationship between MFIs and MBs have been considered. As a support variable, we will use the concept "active enabler," as identified in Figure 5.

The study also found several other issues affecting the interaction and communication between MFIs and MBs. These was wrong information provided by MFIs, an unavailability of loan officers at the desired time, poor customer care, late responses to customers' enquiries, and late loan disbursements as well as the geographical distance between MFIs and MBs. The study confirmed that some of the identified challenges are beyond the agency problem. Therefore, solutions that aim at addressing interaction, communication, and relationship challenges should also focus on issues other than merely the agency problem.

### **Preferred Features, Enabling Factors, and General Requirements for a Mobile Technology Solution (RQ3)**

According to the MFIs, the following mobile technology solutions would potentially support their work with MB owners: (1) communication platform; (2) technology that removes the challenges of geographical distance between the two parties; and (3) technology that will assist in training and record keeping. Other suggestions included setting a standardized time to respond to customers' queries and a reduction in the need for in-person contact between customers and loan officers. These measures would help loan officers to manage a large number of customers, reduce incidences of bribery since

unnecessary in-person contact between loan officers and MB owners would be reduced, and provide safer means to communicate with their customers.

The study also consolidated the findings of an earlier study done by Gomera and Apiola (2015) regarding the enabling factors for a mobile technology solution as follows: (1) the daily usage of a mobile phone by both MBs and MFI officers; and (2) the use of mobile phones for business and official purposes by both parties. The current usage of mobile phones by the MB owners was limited to phone calls, text messages, money transfers, personal alarm, Internet searches, a calculator, and social media communication. This finding concurred with the study by Mramba, Tulilahti, and Apiola (2016), which concluded that mobile phones are not fully utilized by informal business workers. However, we were encouraged to find that the users of mobile phones seemed to be comfortable in using their mobile devices.

Since most of the MB owners do not use a tailor-made mobile phone application for their interaction, communication, and relationship with MFIs, there is real potential for developing a mobile application for this particular purpose (Bada, 2012; Hellström, 2010), as suggested by ICT-enabled outreach theory (Diniz et al., 2008; Mahfuz et al., 2016). Our study found that while the current use of mobile devices is limited mainly to calls and normal text messages (Mramba et al., 2014; Kapinga, Montero, and Mbise, 2017), there is a positive perception toward the use of mobile devices among the MB owners if the solution is well designed based on the level of the MB owners' understanding.

Finally, we identified the following general user requirements for a mobile technology solution: it uses the Kiswahili language, has multiple media options, and is simple to use. Also, the solution should be affordable for both MFIs and MBs. The findings of the study are in line with the preliminary user requirements identified by Gomera and Oreku (2016) whose study focused on providing mobile training for MBs. As there is a clear need for a mature lending relationship, a simple and sophisticated mobile technological tool at the comprehension level of MBs is required. However, as suggested by Gomera and Apiola (2015), care should be taken to ensure that the suggested technological solution is well designed and with consideration of design thinking aspects (Owen, 2006), which will help to address the user requirements of potential end users. In Figure 5, we connect the findings of the study to the theoretical framework and research questions of the study, and justify our claim for the potential of mobile technology solutions to address the interaction and information sharing challenges between MBs and MFIs.



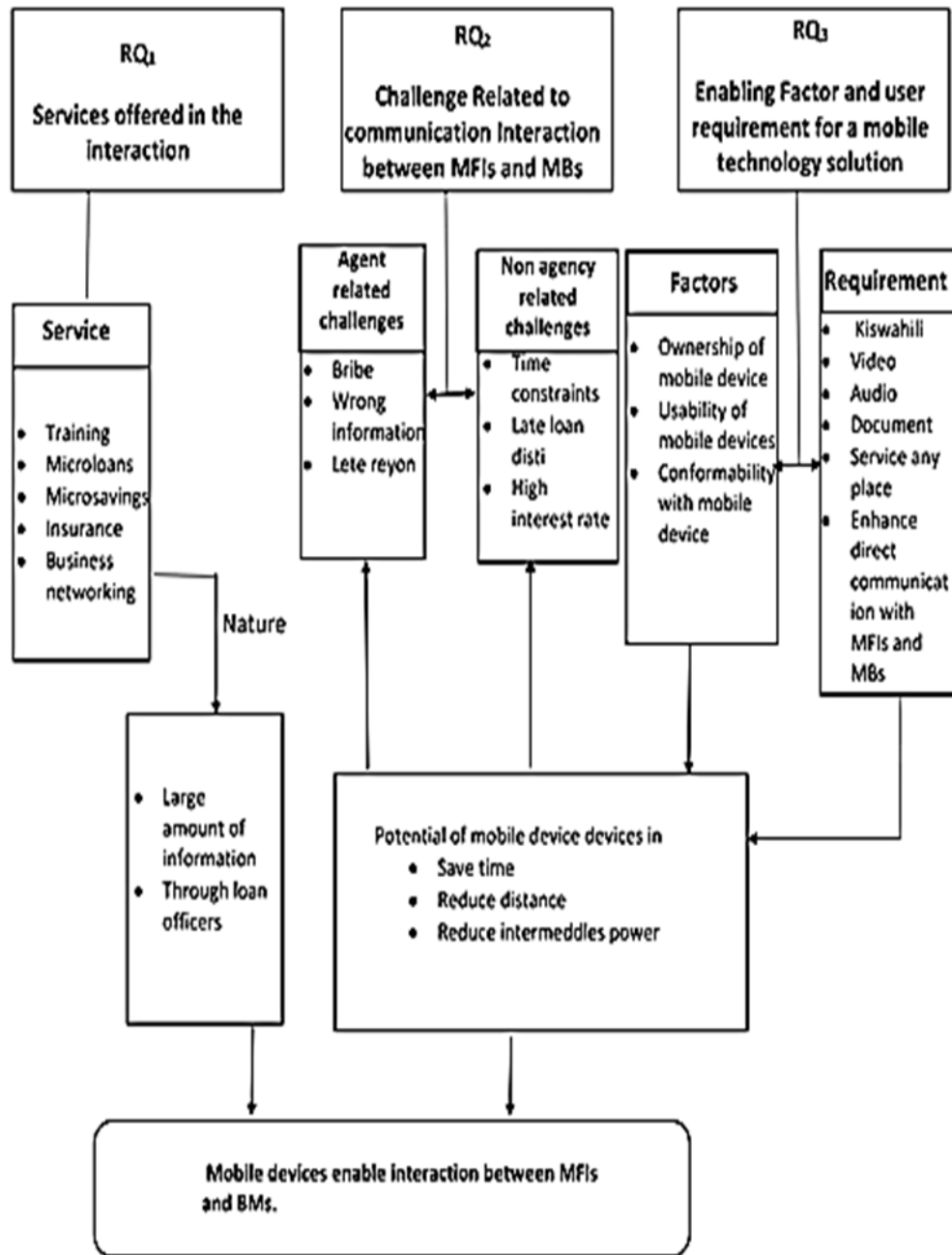


Figure 5: Mobile Devices Enabled Microcredit Services by Tackling Challenges Affecting Interaction between MFIs and MBs.

## FINAL OBSERVATIONS, LIMITATIONS OF THE STUDY, AND FUTURE WORK

Our study identified and confirmed the existence of various services and challenges related to the interaction, communication, and relationship between MFIs and MBs in the context of Dar es Salaam, Tanzania. For example, the lending relationship is a very important aspect in the services offered to MBs by MFIs (Uchida et al., 2012). Also, we were able show the potential of applying mobile technologies (affordable devices for MBs) in tackling identified challenges and strengthening the relationship between MFIs and MBs. We posit that through a tailor-made mobile technology solution, MFIs can improve their microcredit services offered to MBs by, for example, enhancing the lending relationship by means of a smooth information flow. Our findings are practical and in keeping with Tanzanian environmental laws and regulations on information security (URT, 2015). Security issues are crucial in a context in which financial inclusion involves the sharing of financial information (Nyamtiga, Sam, and Laizer, 2013; Oreku, Mtenzi and Ali, 2013).

The sample size of 91 MBs and 22 MFI officers meant that the study was limited in its diversification, which means the study was concentrated in only one area - Dar es Salaam, Tanzania. However, given the homogenous nature of the relationship between MFIs and MBs in different Dar es Salaam contexts, caution in regard to certain aspects should be taken in generalizing the study's findings. It is the role of researchers in the areas of finance and ICT for development to conduct additional studies related to how simple and sophisticated digital technologies, especially mobile applications, can be designed to meet the needs and requirements of MB owners.

The next step in the DSR process is to identify the detailed requirements and to design and develop mobile technology solutions in order to tackle the identified challenges as well as to demonstrate and evaluate the implemented solutions in close collaboration with MFIs and MBs. This study suggests that future development work should focus on the areas of training, loan monitoring, business networking, business information, record keeping and loan status. This will lead to improved performance on the part of both MB owners and MFIs, hence strengthening the relationship between them. Since the findings targeted a group consisting of low-income earners, a frugal application design of application is particularly envisaged as appropriate for further research.

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## APPENDIX 1 – DATA COLLECTION INSTRUMENTS IN THE STUDY

### Likert Scale Questions

We ask you to reflect your feelings and carefully answer following questions. Please TICK [√] on the appropriate box to show your feeling. (NOTE 1 tick for each question/statement.

How do you feel with the mobile training application to MBs	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
<b>Current situation on interaction</b>					
1. The MFIs effectively provide me with relevant information	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Leaders/ managers provide me with service I need	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. I am comfortable with time I spend on receiving services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. There is effective communication between ma and the institution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Time is the constrain factor for me to have a regular meeting with MFI management/ leaders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Perceived challenges of Interactions</b>					
1. Lack of business knowledge reduces my performance on loan repayment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Lack of on time loan status affect loan repayment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Time is a constraint in receiving regular business training	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. MFIs do not provide business skills and loan management skills before and after loan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Technological and Training Aspect</b>					
1. Business skills help proper business undertakings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Training does not add value to me so no need of wasting my time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Often I use my mobile phone for business undertakings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Mobile phone can be used to improve business performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Mobile services will improve information sharing with MFIs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Proper use of mobile phone will enhance services from MFIs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. I wish to use mobile application for information sharing between MFIs and MBs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Having a specific application for our activities will reduce time constraints challenging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Self-Explanatory Questions**

1. Sex and Education level please cycle an appropriate

SEX	Education Level
1. Female	1. Primary education
2. Male	2. Secondary
	3. Higher Education
	4. None

2. Mention kind of mobile device you own -----

3. Understanding the existing services offered by MFIs.

A: List down the current services offered by MFIs to MBs

B: In each service identified in 1.A above identify a relevant information shared between MFIs and MBs.

C: Does communication done through loan officers YES  NO

4. Identifying challenges facing the current relationship and interaction between MFIs and MB

5. Finding out how MBs are using mobile phones.

A: Do you use mobile device for business purposes YES  NO

B: Do you any mobile application to share information with MFI? YES  NO

C: Tick current business usage of your mobile phone

5. Making calls to customers	<input type="checkbox"/>
6. Mobile money usage	<input type="checkbox"/>
7. Social networks	<input type="checkbox"/>

8. Searching business information	
9. Send normal messages to customers and suppliers	
10. Market searching	
11. Calculator	
12. Online training	
13. Calendar	
14. Note keeping	

6. Mapping out potential design ideas and general requirements for mobile technology solutions to support relationship and interaction between MBs and MFIs

A: Would you like the idea of using mobile device for information sharing between MFIs and MBs?

YES  NO

B: List down Preferred features, and requirements for mobile technology.