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# Mobile technology for record keeping by women entrepreneurs in Tanzania: User requirement assessment

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**Abstract.** Mobile phone technology is increasingly being used as a tool for communication among women entrepreneurs in Sub-Saharan Africa. However, little has been done in identifying user requirements for record keeping by the mobile applications among women business in Tanzania. The present study applied the design thinking approach in explored women entrepreneurs' user requirements for a mobile application for keeping record. Data were collected through focus group discussion and interview. The data were qualitatively coded into themes and were analyzed through descriptive statistics. The study established that women entrepreneurs need to keep records for purchases, sales, loan balance, amount due for payment, cost of goods sold, goods purchased, purchase cost, available stock, selling price, day sells information, customers, records, and market network. Similarly, they wanted an application that is easy to operate, using Swahili, a familiar language, outputting symbols and figures and producing specific records and reports. The findings underscore that design thinking can reliably be applied in user requirement definition stage of design science research to anticipate qualities for record-keeping using the mobile technology.

**Keywords:** Mobile technology, women entrepreneurs, record keeping, design thinking, user requirement, design science research.

## 1 Introduction

The number of women entrepreneurs' accessing capital, training, productive resources and technologies that can alleviate work burden is very low worldwide, and Tanzania in particular [1], [2]. Study made in Tanzania [3] attribute the observed low number of women benefitting from these opportunities to social-cultural challenges and patriarchy. In Tanzania, [4], observed that women are hindered from accessing resources and financial services, compared to men, irrespective of the fact that the ratio of females to males in a population is higher.

In realization of these problems, Tanzanian Savings and Credit Cooperative Societies (SACCOs) have shown great commitment to support women entrepreneurs (WEs) through services such as savings, loan services, training and other business opportunities [5], [6]. Consequently, several studies have investigated the role of SACCOs in supporting women entrepreneurs financially and socially [7]; challenges fac-

ing SACCOs microcredit programs, characteristics of SACCOs, and the importance of SACCOs on the economies of developing countries [8], [9].

Of all the studies on the role of SACCOs and other stakeholders in supporting women entrepreneurs' business development, the extent to which the mobile technology helps women entrepreneurs to keep records of their businesses has not been comprehensively studied. Mobile technology, among other things, can help women entrepreneurs to increase market efficiency, keep records of sales and purchases, promptly communicate business information, establish business networks, and improve productivity through a better supply chain management it offers [10], [11]. It can also help them to monitor profits, losses, expenses, and in determining a minimum selling price [12], [13].

Furthermore, the mobile technology can help institutions involved with women entrepreneurs, such as SACCOs to address socio-cultural constraints that bar women from attaining entrepreneurial excellence; in particular, in addressing the lack of or inadequate knowledge of record keeping among women entrepreneurs, which has quite often lead to failure in their businesses [14], [3].

In this backdrop, the present study felt the need to assess user requirement for a mobile record-keeping application for women in Tanzania. The main question that the study pursued was: "*What are the function and design requirements for a mobile application for record keeping by women entrepreneurs?*"

This study contributes to the creation of novel and true body of knowledge on how to apply the design thinking and DSR process in developing an application for record keeping. In addition, this study contributes to a new context for integrating an interdisciplinary approach in undertaking societal problems, such as the use of mobile technology in addressing business challenges. Furthermore, the study adds to the existing body of knowledge about mobile technology application in the domain of entrepreneurship and towards solving a real societal problem in the business arena, for instance, recordkeeping, and producing various reports for financial control.

## **2 Background Information**

### **2.1 The Increased Mobile Phone Usage in Tanzania**

Mobile phone ownership in Tanzania has remarkable grow in terms of the number of operators and subscribers over the past few years. There is over 40 million fixed landline and mobile cellular subscribers in Tanzania, as of December 2017 [15]. The significant growth is attributed to the widespread of cellular towers all over the country, positive perception of the society of the importance of the mobile phone, and the affordable price of purchasing mobile handsets [15]. The increased ownership of mobile phones implies an opportunity to improve business development of women entrepreneurs through enhancing record keeping.

## 2.2 Record-Keeping and its Importance in Business

Record keeping is an art of keeping records of all business undertakings in a regular and orderly manner for providing means by which an enterprise can be conducted in an orderly manner [14]. This is different from bookkeeping that only involves the recording of business transactions. Record keeping is very important for sustainability and growth of any enterprise, especially to WEs. This is because it increases chances of businesses survival, serves as a basis for planning, and keeping a business in a sound and healthy state in a competitive economy [16]. Further, record keeping gives background information, which can help women entrepreneurs to change or improve their business prosperity: i.e. business progress, obstacles, trend and so forth. The records help entrepreneurs to make informed decisions, and in so doing, avoid business failures.

Olukton et al. [14], summarize the objectives of record keeping as; 1) provision of an accurate or thorough picture of operating results, 2) allowing comparison of current information with prior years' operating results, 3) helping in seeking funds from financial institutions, 4) allowing fast, accurate, and reliable access to records, and 5) ensuring timely disposal of redundant information. Against this backdrop, women entrepreneurs have to keep proper and adequate records so that they can ensure the orderly conduct of business and the making of informed decisions about critical issues for the survival of their businesses. Similarly, they should abide by the principles of accuracy, authenticity, accessibility, completion, comprehensive, effectiveness and safety of the records.

## 2.3 The contribution of SACCOs service to the development of women's enterprises

According to the National Census of 2012, Tanzania estimated to have a total population of 60,151,311 people, out of which, 30,857,623 (51.3%) are women. Moreover, women constitute 53.3% of the whole Tanzanian work age of 23,466,616 people [17]. This implies that the socio-economic development of this country significantly depends on women.

Nonetheless, patriarchal cultural practices often bar these women to access information, opportunities, business networking, and finance potentials. As a result, they are less exposed and are underrepresented in many sectors [18], [19], [4]. This underscores the importance of all initiatives towards empowering this important group of the population. Financial empowerment of women, whether through lending, saving, remittances or other services – inevitably increases women success in their engagements [6], [16], [20].

Micro-credit institutions are thus strongly encouraged to provide Tanzania's women with loans and other services that can help them to grow their enterprises. Afrin et al. [21], write that “for the development of women entrepreneurship, stimulatory supports are essential as the women are unaware of their capabilities. They concluded in their study that Microcredit programme provides many stimulatory services along with loans for women entrepreneurship development.

In Tanzania, SACCOs are the microfinance institutions controlled by members with the aim of promoting savings, providing microcredits at competitive rates and assisting them in marketing their products and services. These financial and non-financial services are designed to help poor people who are excluded from formal banking services, in most developing countries to maximise benefits in their enterprises [8], [22], [7]. SACCOs offers credit to women for generating income for themselves and their families, creating jobs and making significant contributions to the country's economy [22].

### **3 Research Design**

#### **3.1 Design science research and design thinking**

The focus of this study was to identify user requirement for a mobile application that can help women entrepreneurs to keep records of their business activities. User requirement definition is one of the stages for designing artifacts for solving practical problems according to DSR framework [23], [24]. DSR framework encompasses stages such as problem explication, requirements definitions, design and development, demonstration, and evaluation [24] [25]. Moreover, DSR can be focused on three research cycles: i) the relevancy cycle, ii) the design cycle, and iii) rigor cycle. The relevancy cycle contributes to the identification of requirements and contributes to the design science activities. The rigor cycle connects the design science activities with the knowledge, whereas, the design cycle iterates between design and development of an artefact and process of the research [25].

The design thinking concept has been specifically applied in the stage of user requirement definition due to its richness in focusing on human and their working environment. It also ensures full participatory of expected end users in identifying the quality of anticipated output of the ongoing project [28]. The design thinking supplemented DSR at this stage due to the best interest of humankind and its unique way of approaching issues, problems and opportunities. Hence, it reduced the gap between the theory, local environment, and humankind, while maintaining the amount of rigor necessary for the reliable results [27].

In the context of our work, both design thinking and DSR approaches informed activities for transforming WEs' businesses through the mobile technological solution [23]. Additionally, the study employed a qualitative research design to establish inspiration space for technological innovation solution for record keeping by women entrepreneurs. The approach was chosen because of its effectiveness in soliciting in-depth user requirements [28], [29] using the limited available resources.

#### **3.2 Study area**

This study was conducted in Dar es Salaam, which is one of the regions in the Eastern part of Tanzania. Dar es Salaam Region was chosen because there is high level of interactions between WEs and SACCOs compared many regions of Tanzania; exactly, 405,907 urban MSEs, out of 1,220,464 urban MSEs in Tanzania [4]. This suggests

that conscientization of SACCOS business is higher in Dar es Salaam than in other regions of Tanzania.

### 3.3 Sampling strategy

The sample of the study was drawn from women entrepreneurs in Dar es Salaam Region who are the members of SACCOS. Women entrepreneurs were targeted in this study because their main source of capital is SACCOS. Purposive sampling strategy was adopted in this study in order to increase validity, reliability, and wide range of responses. Purposive sampling enabled the researchers to choose relevant respondents to address the research questions of this study [30].

### 3.4 Data collection methods.

This study employed eclectic approach in collecting data for this study due to the fact that one approach would compensate for the weaknesses of another approach. One approach would also capture information that would not be captured by another approach.

**Face-to-face interview.** The researchers conducted face-to-face interviews with 20 (twenty) women entrepreneurs and 5 (five) managers from different SACCOS. The interviews were recorded with the consent of the participants. Face-to-face interviews enable the researchers to obtain in-depth information and offered a great flexibility in data collection process [31]. Interview tends to bring higher responses as it establishes a rapport that motivates a respondent in question to answer questions [32]. The interviews employed unstructured and general open-ended questions to elicit views and opinion from the participants [33]. The use of interview inspired women entrepreneurs to provide trustful and precise answers [32].

**Exploratory focus group discussion.** Researchers conducted three exploratory focus group discussions with three groups of women entrepreneurs to define the problem precisely and to identify user requirements for record keeping by the women entrepreneurs

### 3.5 Analysis

The primary data were coded according to themes and were analyzed qualitatively. Additionally, descriptive statistics was applied in establishing the quantitative results concerning user requirement of the mobile application. Analyses focused on identifying an appropriate service in empowering women entrepreneurs offered by SACCOS and a potential of using a technological tool to strengthen such service.

### **3.6 Ethical consideration**

During the data collection, consent was sought and obtained from all participants. The agreement was to strictly use the information obtained for academic and research purposes only. Besides, it was agreed that participants' information and any material or pictures that could identify them would not be disclosed. Lastly, participants were free to withdraw from the study or were not forced to talk during the interviews and focus group discussions.

## **4 Results**

The study set out to identify user requirements that should be incorporated in the design of a mobile application for record-keeping by women entrepreneurs. The data were derived from face-to-face interview and exploratory focus group discussion. The majority of participants were 35-44 years old (21 out of the 25 participants), had completed secondary education (19 out of the 25 participants), and had six or more years of experience in business (22 out of the 25 participants). This part presents the attitude of participants towards record-keeping and the design requirements in a mobile application for helping WEs and SACCOs to keep business records.

### **4.1 Attitudes toward record-keeping by women entrepreneurs**

Most of the participants in this study exposed that they were keeping records of different activities of their businesses. However, they observed that their records were incomplete, inaccurate, in bad format and ephemeral. They attributed the poor record-keeping to lack of knowledge of record keeping, intensive time demand for record keeping exercise, lack of record keeping tools, and an assumption that SACCOs were liable to keep business records of its customers. A few of the respondents demonstrated through their answers that they did not see the importance of keeping records as long as they were the sole owners of the businesses they ran.

All the same, many respondents considered record keeping as an important service for their businesses, irrespective that they did not keep them properly. Most of them recognized the importance of retrieving the amount of loan balance, savings they have in SACCOs, the sells per day, cost of sales and the amount of remaining stock any time they want it.

### **4.2 Function requirements for the mobile application for the women entrepreneurs**

Women entrepreneurs considered record-keeping as an important service in their business undertakings. Respondents identified functions involved in their businesses as recording, purchasing, selling and marketing products. For each of these functions, they identified their preferred requirement in the proposed mobile application as follows.

Under recording function, users required that the application be able to record information regarding their contribution balances to SACCOs, loan balances, amount due for the installment pay, amount invested for their business and payment for transport, rent, water bills, electricity bills and other business expenses. As regarding purchasing function WEs would like the application to record number of units purchased, purchases cost, raw materials bought, available stock and cost of goods sold.

Moreover, for selling function, they required the application to records units of products sold, selling prices, and total sells per day. Moreover, for marketing function, they proposed that the application be able to record customers served, kind of products they bought, date of purchases, estimated time for serving a customer, and the debts that the customer owes the seller. Further, they wanted the application to offer market-networking services to its users. Table 1 summarizes key functions in women's enterprises and their attendant requirements in the proposed mobile application for record keeping among WEs in Tanzania.

**Table 1.** Functions in women's entrepreneurship and their attendant requirements in the mobile application for record-keeping.

S/N	Function	Ability Required in the record keeping mobile application for WEs
1	Recording	Ability to record contribution balance, loan balance, amount due for payment, amount invested for their business, payment for transport, rent, water bills electricity bills and other business expenses
2	Purchasing	Ability to record amount of goods purchased, purchases cost, available stock, cost of goods sold and raw materials bought
3	Selling	Ability to record units, selling prices, total sales per day
4	Marketing	Ability to record contact of customers served, kind of product bought, date of purchases, estimated time for another order, debts and market networks information

### 4.3 Design requirements for the mobile application for the women entrepreneurs

The study participants noticed that the mobile phone has a high potential to improve their record keeping procedures if tailored to their needs. They required a mobile application, which output symbols and figures the Swahili language, the familiar language to Tanzanians. Similarly, they asserted that "the application should have a direct connection with SACCOs for financial information and should produce specific business reports". They added that such reports should be realized in audio or word document formats for easy reference by different users. They also recommended that the application files be lightweight to ensure transferability.

**Table 2.** Recommended user requirement for the record Keeping App for WEs

User Requirements	Interviewees		FGD groups		Comment
	Mention	Not Men- tion	Mention	Not men- tion	
Ease of use	20/25 80%	5/25 20%	2/3 75%	1/3 25%	Preferred
Operation in Kiswahili language	19/25 76%	6/25 24%	3/3 100%	0/3 0%	Preferred
Symbol and figures output	18/25 72%	7/25 28%	3/3 100%	0/3 0%	Preferred
Specific record services and re- ports output	12/25 48%	13/25 52%	3/3 100%	0/3 0%	Preferred
Operation in non-smartphones	3/25 12%	22/25 88%	0/3 0%	3/3 100%	Not pre- ferred

As demonstrated in Table 2, the majority of the interviewees 80%, participants in FGDs (in 2 out of 3) required the application to be ease of use. This confirms that WEs prefer artifact that is simple to use. The analysis also indicates that the usage of Swahili, the native language, was highly recommended by participants, i.e. 78% of total WEs interviewed and the participants of all the 3 FGDs conducted. Further, the use of symbol and figures in the application was highly recommended by the users to accommodate users who cannot read and write – 72% of the interviewees and all participants in the 3 FGDs.

The contradictory results were on the output requirement of the proposed application. Whereas, only 12/25 (48%) of the interviewees needed the application to produce specific record services and reports, participants in all the FGDs (3out of 3 – 100%) wanted that the application be able to produce specific record services and reports. However, only 3 out of 25 interviewees (18%) proposed that the application be accessible in non-smartphones, likewise, none of the FGD i.e. 0/3 (0%) mentioned it as one of their requirement. This indicates that people with low education level can use any technology it is simplified and suited to different contexts.

## 5 Discussion

This study focused on the initial stages of DSR project development i.e. problem explication, and user requirements definition of technological intervention [24]. The design thinking approach in problem explication and user requirement stage of DSR is the best thought to supplement in developing an artefact because it overlapping spaces like inspiration, ideation and implementation than only a sequence of orderly steps [28]. DSR framework was integrated with design thinking for the sake of end-user involvement in the solution-making process, which could result in a more sustainable sense of ownership and acceptance of the artefact. The design thinking approach is a very important aspect to incorporate when researchers apply both DSR framework according to [24], and rigor design as stipulated by [26], especially at problem explica-

tion and user requirement definition stage. This is because it tends to yield unexpected benefits in establishing user requirements using small resources in DSR process [36], [24]. The main research question in this study was: What are the function and design requirements for a mobile application for record-keeping by women entrepreneurs? Consonantly, respondents aired their ideas, which were discussed and consensus reached.

The analysis shows that the respondents preferred an application, which is capable of recording their transactions, purchases, sells and marketing. They wanted the application to be able to record account balance of savings in SACCOs, loan balance, and amount due for payment, goods purchased, purchases cost, available stock, selling price, day sells information, units sold, selling prices, and total sells per day. Moreover, they required the application to save customers' contacts, products bought, date of purchases, estimated time for another order, debts and market networks information.

These records and information requirement were determined by the activities performed by WEs in their business undertakings. This implies that the design of an artefact should reflect the activities performed by its expected end users. Studies such as MBs training [34], bookkeeping for informal workers [12], and technological innovation for market application by WEs in Iringa Region [13] have confirmed this assertion in different contexts.

Moreover, we confirmed that WEs and SACCOs managers preferred an application that is easy to operate, using Swahili, the native language, outputting symbols and figures, and outputting specific record services and reports. Ease of use and native language medium were the most preferred attributes in the proposed application. The recommendation of Swahili as the main communication language of the application concurs with [35], whom in 2016, equally found that potential users of applications in informal sector preferred Swahili as the language of the applications. Moreover, the requirement that the application output symbols and figures concurred with the findings of [13], [12].

The results thus clearly show the need for an application that contextualizes business undertakings by WEs. The defined user requirements for mobile recordkeeping, reliably established a base for anticipated functional and non-functional qualities for artefact to be used by WE in record keeping centred on participant themselves. Moreover, due to small resources available, the participant came up with the viable solution on record keeping by using the existing mobile phone. This brings up the fundamental base of frugal innovation aim at producing good enough, affordable and relevant solution to existing solution mainly for the societies faced with extremely scarce resources. Usage of existence infrastructure in design and development is a fundamental base of the frugal innovation [36].

In this sense, the study contributes to research and practitioners that the design thinking can supplement the DSR framework, to accurately and economically establish the user requirements for an artefact that reliably solves their practical challenges.

## 6 Conclusions

This study came about in the backdrop that factors such as low income, social-cultural responsibilities and stereotypes barred women entrepreneurs from undertaking records of their business as required. It was based on the realization that women entrepreneurs needed to efficiently keep records of their financial transactions, sells, purchases, stock information and marketing, just to mention a few, to derive substantial benefits of their enterprises. The realization, underscores the need for a special, low technology application to help WEs with the keeping of records of their businesses efficiently.

The mobile application appeared ideal for the purpose because of their availability and efficiency in data management. However, contextualization of their functions was found necessary to ensure that they best serve the intended objectives among WEs in Tanzania.

This study analysed the general user requirement for WEs in mobile record keeping. However, user requirement done in a small group of people that only interact with SACCOs, hence, it limited with comparison to other group of people like men entrepreneurs. In addition, the study show very general user requirement of record keeping for many services and activities of the group analysed. Researchers encouraging that a user requirement study in a specific services and activity for a detailed analysis.

Moreover, the design thinking supplemented DSR framework to establish user requirement for a mobile application in record keeping by WEs. The user requirements defined are in terms of functions and the characteristics of the application. The next phase of the study will be to design and develop an artifact for record keeping by women entrepreneurs in Tanzania. In line with the DSR framework, the activity will involve the WEs, researchers and software engineers. The future studies will demonstrate, evaluate, and re-design the intervention according to the evaluation results.

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