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# Mobile Application for Research Knowledge Sharing and Dissemination: The Case of Nm-Aist Univeristy Tanzania

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## Abstract

The utilization of mobile and web applications has surpassed all other platforms in terms of disseminating researchers' knowledge among diverse communities throughout the world. The current method of disseminating researchers' knowledge to the communities in the Arusha region in Tanzania is through meetings, workshops, and focus group discussions held by researchers, agricultural extension officers and community members after every three months or during field study. Yet the strategy is inefficient and ineffective in practice. The purpose of this study was to determine the most efficient and successful method of disseminating knowledge in communities. The study began with a qualitative phase, utilizing an interpretive technique and a qualitative multiple case study research design. The Arusha region in Tanzania was selected as a case study where different social activities were undertaken, including farming, livestock keeping, tourism activities and fishing. Individual participants were interviewed by using a semi-structured questionnaire. In addition, focus group discussions were conducted to gather more information regarding the needs of the mobile application. Through the implementation of the application, the second phase of the study led to the development of a mobile application that includes community members, agricultural extension officers, and researchers that will enable anyone to install the application on their mobile phones to access knowledge regarding activities undertaken in Arusha. According to the findings of the first phase of the research, a substantial percentage of community members own mobile phones, and hence a mobile application would be sufficient. The research also found that most researcher-community interactions occur at the data collection and intervention assessment (field trials) stages. Hence, the mobile application will benefit community members, district agricultural, irrigation, and cooperative officers

(DAICO), and researchers.

## Keywords

Mobile Application, Knowledge Sharing, Knowledge Dissemination, Community Based Participatory Research

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## 1. Introduction

A link between the individual and the organization is made by transferring knowledge from the individual level to the organizational level, where it is turned into economic and competitive value for the organization [1]. Researchers currently engage with communities through focus groups, field study and meetings where the research objectives are explained and the communities participate to assist with the mapping and providing data through surveys. Connecting communities and industries to researchers is critical for socioeconomic development in Tanzania. The country faces several challenges, from food insecurity and malnutrition to soil erosion and the effects of climate change on weather patterns and agricultural productivity.

Community-based participatory research (CBPR) is a collaborative, action-oriented research methodology that aims to reduce health inequities by bringing together community members' firsthand knowledge of their neighborhoods with academic researchers' methodological competence [2]. Collaboration and partnership between communities and researchers are fundamental to this technique, as equitable power distribution, trust and mutual support, and an openness to knowledge garnered through participant experiences [3]. Relationships with researchers, government officials, and extension officers enabled the community members to participate as equal members of the research team in shaping the study's design and disseminating the findings. They also benefited by learning more about their community partners and gaining credibility, visibility, and validity in the work that the community was doing. Strong ties to community champions have aided in the development of trust between the community members and researchers [4].

[5] defined that dissemination of research findings outside of the academic community is an ethical responsibility of researchers and is essential in translational research to ensure that research findings are implemented in practice to improve patient health outcomes often, partnerships between community members and academicians do not include research dissemination plans, which may be due to researchers' lack of understanding of how to develop such plans [6]. Furthermore, it can contribute to the development of trust between the community and academic institutions. Scientific research into evidence-based interventions' dissemination and implementation (D&I) aims to understand successful strategies for the adoption and sustainability of evidence-based interventions, and it is closely linked to public policy [7].

Mobile technologies are an increasingly popular means of offering community services such as knowledge sharing and communication between two parties. The increasing usage of mobile applications for offering best practices to communities as a result of an improvement in social activity distribution, among other uses, is boosted by the increasing adoption of smartphones as well as 3G, 4G, and 5G networks [8]. Dissemination of knowledge-based interventions is primarily made up of researchers engaging the target audience (who are key stakeholders) through various channels using targeted strategies [6]. This study focused on developing a mobile application for research knowledge sharing and dissemination that helps the community members not waiting for the meeting, workshops and field activities with government officers and researchers which happened after several times or in data collection phase. Researchers' efforts are just as important in assisting community members in making decisions to avoid unsuitable options as they are in answering their questions and providing information to policymakers and other stakeholders on effective practices. Researchers must connect with communities in a variety of ways, including introducing research, obtaining consent, and providing feedback, as well as making knowledge easily disseminable [9].

NM-AIST is a public institution of higher learning in Tanzania, administered by the Ministry of Communication, Science, and Technology. NM-AIST operates in a contemporary environment that promotes information literacy; NM-AIST have number of projects, one of the projects is VLIR. This study focused on the VLIR project, vlir includes 5 projects spanning from agricultural research on soil fertility, ecology research, and AI research and many study already undertaken, what is missing is how those studies/research disseminated to the community and what platform is suitable in sharing and disseminated knowledge to the community. The purpose of this study is to create a cross-disciplinary application that can be used for both participatory research and research knowledge sharing and dissemination. NM-AIST recognized that knowledge sharing is critical to the institution's vision, mission, and values. The mobile research knowledge sharing and dissemination application used successfully in rural and distant locations to provide pertinent information to a population that is otherwise difficult to reach.

## **2. Related Work**

### **2.1. Research Knowledge Sharing and Dissemination**

Knowledge sharing is the process by which an individual's knowledge is transformed into a form that is understandable and usable by another individual [10]. The task of knowledge sharing and dissemination entails assisting others in acquiring knowledge and collaborating with them to solve problems, develop new ideas, or implement processes.

Research knowledge sharing and dissemination has been shown to be critical in bridging the gap between communities and researchers in the pursuit of social

and economic development. The goal of knowledge dissemination is to transfer knowledge that can be used for educational purposes, as well as for the modification or implementation of new practices. When knowledge is implemented, it aims to provide a better solution by delivering the findings and providing support for effective interventions through interactions between providers of services, organizations of service providers, and communities of interest.

According to [11] the introduction of social media tools has altered the way in which information is retrieved, communicated, and shared among groups of people. Knowledge management and knowledge sharing practices are made possible by social media tools, which facilitate the creation, sharing, and collaboration of knowledge among information workers. The findings of this study revealed that there are no clear sharing knowledge practices mentioned in the document content analysis. However, the university recognized that knowledge sharing is an important aspect of the fulfillment of the institution's vision, mission, and values. [12] found that Universities in Tanzania generally encouraged a culture of knowledge sharing among academics through a variety of means, including seminal presentations, publications, public lectures and conferences, as well as colloquia. The findings also revealed that universities lacked formal organizational structures and policies for promoting knowledge sharing, as revealed by the findings. In supporting knowledge sharing [13] conducted the study to identify both the area that researchers are concentrating their efforts on as well as the area that has not received a substantial amount of attention in developing countries. To support knowledge sharing and the agricultural community for the present and future [14] conducted the study on the importance of providing information about the land as one of the most important factors in agricultural productivity. As a consequence of this, efficient land use planning is absolutely necessary for the long-term production capability of the agricultural industry. The quality of land will deteriorate over time if it is not properly planned and managed. In the context of knowledge creation in open domain the study conducted by [15] suggested that creation of the knowledge not only for learning point but must ensure the long term viability of the knowledge.

## **2.2. Frameworks for Research Knowledge Dissemination**

Tabak, Khoong [7], developed a framework (model) that is used by a variety of stakeholders, including funders, practitioners, and researchers, to help them better understand the needs of all stakeholders and systems, the model can also be used to help improve efforts to get research findings out to practitioners and policymakers, as well, in particular, models from non-health fields may have been overlooked or under-represented. [16] provides agricultural development planners with a framework for integrating indigenous knowledge about traditional vegetables with scientific knowledge in local communities, with the goal of enhancing food security in Tanzania, the study recommends that there is a need to increase awareness and knowledge about the importance of traditional vegetables, particularly their nutritional value, among youth because they are unfam-

miliar with the production, consumption, and processing of traditional vegetables. [17] developed a theoretical framework for examining knowledge sharing behavior, which is critical for organizational change and national reforms, as well as for surviving in a world of intense competition. In addition, the study found that more research is needed to show how theory works in Tanzania, which will allow comparisons with other countries. [18] create a model (framework) to improve dissemination and implementation (D&I) research by making it more likely that evidence-based interventions will be adopted and used.

### 2.3. ICTs for Knowledge Disseminations

The study conducted by [19] was to conduct a review and identification of ICT-based information dissemination models in China, as well as to share knowledge and experience in utilizing emerging ICTs for agriculture information dissemination to communities to increase productivity and environmental sustainability, the findings point researchers and practitioners in the right direction as they design future ICT-based information dissemination systems for knowledge dissemination and knowledge transfer. The purpose of the study conducted by [20] was to explore the use of radio and TV as farming information sources in Tanzania, the study identified major sources of agricultural knowledge used by farmers; it identified the potential for radio and television stations to serve as sources of agricultural knowledge; it established access to and use of radio and television agriculture programs; and it examined and developed factors influencing access to and use of agricultural radio and television programs. [21] examined the research dissemination methods used by four Tanzanian institutions to determine their limitations and potential, the findings show that academic fraternities continue to benefit from academic dissemination practices, and that researchers increasingly believe research is conducted primarily for publication and academic qualification, rather than to directly impact society and development. The purpose of the study conducted by [22] was to determine possible technologies for delivering agriculture-related information to farmers in the Indian state of Punjab, the findings indicate that an agricultural information system should be created using mass communication technologies such as mobile systems. Social media is quickly becoming a critical tool for the dissemination of new scholarly material as well as resources for practitioners, and it is becoming increasingly important [23]. Researchers, research groups, and journals are increasingly expected to do more than simply publish findings; they are also being tasked with assisting in the dissemination and translation of their findings into other fields of knowledge. For emergency medicine, where social media tools such as Twitter, Facebook, blogs, and podcasts are frequently used by both students and practitioners, this is particularly important. [24]

## 3. Methodology

### 3.1. Overview

This study included villagers, extension officers, government officials, and re-

searchers from the Arusha region in Tanzania. The study's initial phase was qualitative, using an interpretative method and a qualitative multi-case study research design. To determine the needs for a mobile application, face-to-face interviews, focus group interviews, questionnaires, and document sampling were used as data gathering techniques.

### 3.2. Study Area

This study was based in Arusha Tanzania. Arusha was chosen because is the place where many studies from VLIR-UOS project at NM-AIST are implemented. Mto wa Mbu and Monduli District was used as the area for data collections and validation of the developed prototype since over the past 9 years the villagers was already familiar with ongoing research activities and had frequently interactions with researchers, and could give insights on what works, what doesn't work and how they could be involved more in future studies and how they want current findings to be disseminated and packages. Moreover, Arusha is the area of tourism which is a most developed city as far as ICT infrastructures are concerned, in addition to the highest usage of internet and mobile services (Ministry of Communications and Transport (The United Republic of Tanzania, 2019).

### 3.3. Participants

A total of 106 people participated in the study. In the first phase, 96 community members from two districts (Mto wa Mbu and Monduli) were involved in the study survey, including 42 females (43.8%) and 54 males (56.2%), Also 5 Researchers and 5 Extension officers from the projects and government participated in this study. In the second phase, 42 community members, 5 extension officers and 5 researchers participated in the validation. Participants were given information about the facts and benefits of the research before they agreed to participate.

### 3.4. System Design and Development

The results of the surveys and interviews were analyzed, and several conclusions were reached. According to the study, a sizable proportion of Tanzanians in the Arusha Region possess smartphones, implying that a mobile application for knowledge dissemination would suffice. The most often gathered data from the study is on key land uses, agricultural best practices, and livestock keeping activities. Therefore, the application will focus on knowledge dissemination for these topics. Due to the fact that the majority of the study sample group is literate, the application may handle both text-based and video-based information. Additionally, since a significant number of people visit government offices, the application will help not only those who possess smartphones but also those who work in government offices that have access to mobile technology. For usability reasons, the created program will be user pleasant. In other words, the program will be user-friendly. The developers verified that the program was bug-free before

launch. Users of the application will be able to download and install the program on their android phones since it's available to Google play store through <https://play.google.com/store/apps/details?id=co.record.cicapp>. The difficulties encountered will be resolved as they arise during application deployment, installation, and activation. The advantages of this application are significant in terms of making general information readily accessible to communities promptly.

## **4. Results**

### **4.1. Mobile Phones Ownership of the Respondents**

The results of the surveys and interviews were analyzed, and several conclusions were reached. According to the study, only 8.2% of respondents do not own a mobile phone, while 26.3% own two or more. Additionally, 65.5% of all respondents reported owning at least one smartphone with internet capability. The most often research conducted from the study is on key land uses, agricultural best practices, and livestock keeping activities. Therefore, the application will focus on knowledge dissemination for these topics. Almost (72.9%) of respondents indicated a proclivity for accessing and searching for various types of information via online media sources. Additionally, 82.6% of respondents believed they could access reliable information if there was an online platform, and 71.5% went even further, indicating they desired a mobile application platform. For usability reasons, the created program will be user pleasant. In other words, the program will be user-friendly. The developers verified that the program was bug-free before launch. Users of the application will be able to download and install the program on their android phones since it will be delivered to Google play store. The difficulties encountered will be resolved as they arise during application deployment, installation, and activation. The advantages of this application are significant in terms of making general information readily accessible to communities promptly.

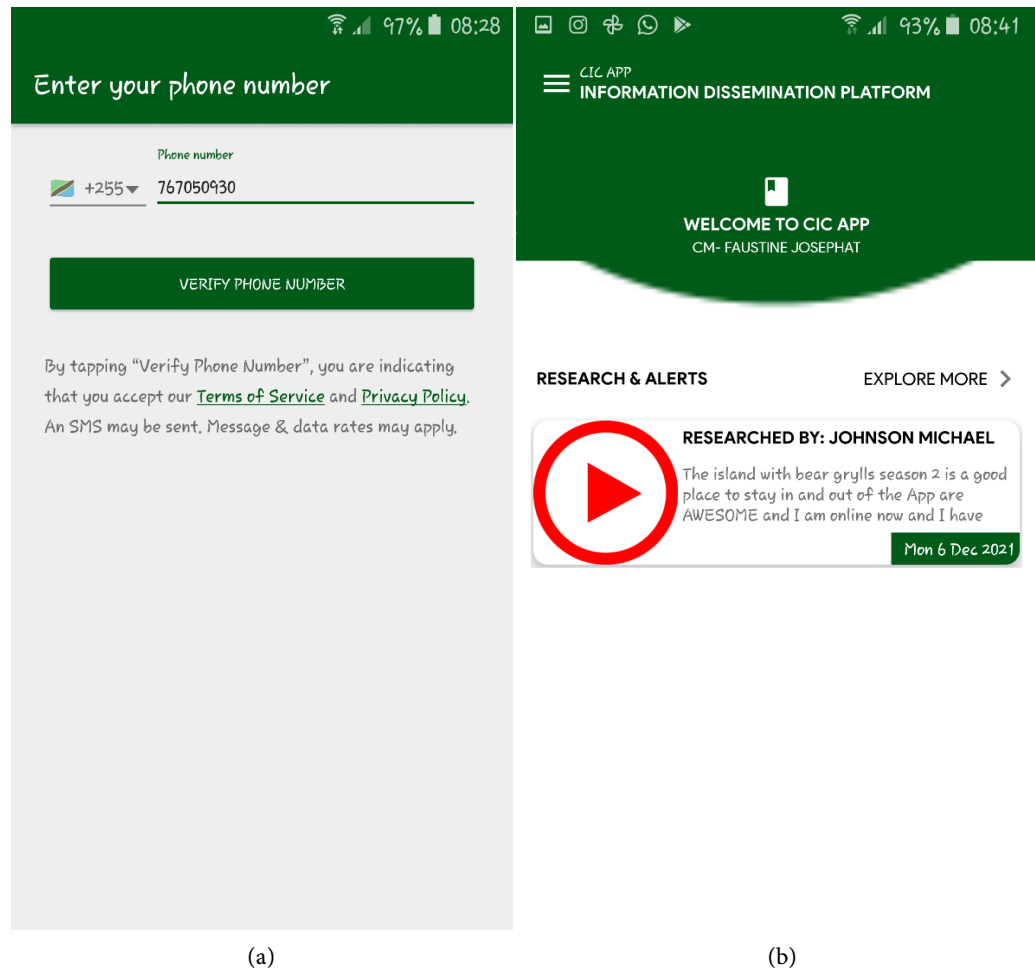
### **4.2. Mobile Application Description**

The mobile application was developed based on the Android platform. It includes simple and intuitive user interfaces that facilitate interaction between the user and the application. The illustration below depicts the system's user interface.

Before attempting to log into the system, the user must have an account that has been activated and registered. During the registration process, the client will be required to provide personal information that will be useful to the system. Some of these specifics, such as the person's name and phone number, are shown in **Figure 1** below.

After completing the registration process successfully, the client will be prompted to enter his/her unique display name. Following a successful login, the client will be presented with a menu containing all the disseminated information/knowledge.





**Figure 1.** Mobile application interfaces, (a) phone number verification interface; (b) home interface.

## 5. Discussion

The study's findings indicate that the majority of community members continue to obtain knowledge or access information by visiting government offices or meeting with government officials. Surprisingly, this study reveals a sharp decline in the use of traditional ICTs such as radio for information access. This is in contrast to previous research, which indicated that the majority of people obtained information about agricultural best practices through workshops and radio programs [20].

The study reveals that the majority of community members are aware of the existence of quarterly meetings with government officials. However, not everyone who is aware of these meetings is comfortable and willing to attend to obtain pertinent information, receive recommendations, or provide feedback. A sizable proportion of respondents indicated that they are uncomfortable attending meetings or visiting government offices, citing distance as a barrier. These findings corroborate several previous studies that demonstrated that when farmers abandon sound farming practices, poor yields and eventually low productivity result. Poor yields result in higher poverty rates, decreased government reve-

nues, and possible farmworker downsizing [14].

Furthermore, this study discovered a significant increase in the number of people seeking agricultural-related information via internet sources. According to [19], there is a significant amount of effort required for people to gain access to internet-based agricultural information. Several previous studies indicated that advancements in Internet technology significantly increased agricultural information access [25]. Additionally, the study reveals that the majority of respondents believed they could access knowledge distributed to them via the mobile application platform. Additionally, the study reveals that people's desire for a mobile application platform is strongly influenced by their education level and ownership of mobile phones. The researchers in this study even endorsed the need for a mobile application for knowledge sharing and dissemination. Additionally, the study's findings indicate that the majority of researchers are capable of disseminating knowledge to community members via online means.

Additionally, the results of this study demonstrate that the vast majority of people own mobile phones, and in particular at least one smartphone. These findings are consistent with the Communication Statistics Report published in July 2021, which shows a significant increase in the use of mobile communication and internet access penetration, which is equivalent to 80% and 40%, respectively, in comparison to the previous year [26].

## 6. Conclusions

With the use of mobile applications for research knowledge sharing and development still being high on the needs in Tanzania, community members need to know the best practices recommended by researchers. In this study, community members have shown a great interest in learning about the guidance on basic farming recommendations provided by researchers. In this study, we were able to collect requirements for research knowledge sharing and development applications from community members in the NM-AIST context. Based on the data we gathered, we found that mobile applications are ideal for knowledge sharing and development.

In the future, we aim to integrate AI tools to provide guidance on basic farming recommendations that are currently not being put in place, e.g., how to best apply fertilizer or use the stage of banana leaf growth to recommend when to irrigate and predict soil condition and cause.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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