

Farmers' Use of Mobile Devices in Developing Countries

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Abstract: The introduction of mobile phone technology seems to have brought many benefits to many farmers, especially in developing countries, as it provides access relevant and reliable agricultural information to make more effective farming decisions. Many rural farmers face information asymmetry problems, which seem to emanate from pitfalls in the agriculture or farming extension services that could be solved through the use of mobile devices and technologies. To explore how farmers use mobile devices to access information to aid them in their agricultural practices, this study explored farmers use of mobile devices in the rural areas in Namibia, specifically, the Uukwiyu Uushona community in the Oshana Region for farming purposes. Applying a quantitative research method, data was collected from 140 participants using questionnaire. Thematic analyses to unearth trends were undertaken. The results show that farmers' use of mobile devices adds value and economic benefits to their practices. The study further found that farmers use mobile devices to get up to date information on input and output market transactions, weather information, and banking services. Based on the findings that some of the information on mobile phones are complex and hence difficult to comprehend, it is recommended that mobile agricultural information service providers team up with information systems experts to develop mobile applications or USSD applications that provide agriculture information in its simplest and comprehensive form so as for most farmers if not all, with all kinds of mobile devices will be able to access agriculture information. Having some of the mobile agricultural information in native or local languages will be helpful especially for the illiterate group of farmers. Considering that only scanty literature similar studies especially in rural Namibia exist, this study contributed to the body of knowledge of mobile device use by farmers in rural areas.

Keywords: Mobile devices, farmers, rural communities, mobile agricultural information services, extension services.

1. Introduction

According to [1], the dissemination of Information and Communication Technologies (ICTs) in developing countries provides much opportunity for the transfer of knowledge and information for both private companies and government departments and also amongst inhabitants of rural communities. Earlier studies on this include the study of [2, 3].

According to [2], mobile phones provide updated information on new farming approaches for farmers and hence aid them to make effective farming decisions. Aker & Mbiti (2010) study [3] found that mobile phones provide access to updated information on weather conditions, market trends and prices, and other resourceful significant information.

According to [4], mobile phone coverage in most African countries has been on the rise in recent years and as a result, more than 60% of the population of sub-Saharan Africa, has access to mobile phone coverage. Notwithstanding the fact that mobile phones used to be owned by high income earners (who mostly resided in urban areas) in the past, nowadays, it is owned and used by inhabitants of rural communities in developing countries, including farmers. The ownership and use of mobile phones in rural communities seem to result in greater improved social interconnection and relationships among farmers and business communities. The great social interconnection and relationships are made possible through mobile applications such as short message service (SMS) and voice recordings.

Farming in Namibia appears to be a big enterprise as more land is used for agricultural purposes than any other activity. About 64 million hectares (78%) of the country's land is used for farming while the remainder 22% consists of national parks, game farms, urban areas, mineral concessions and areas too dry or remote to be used for agricultural purposes [5]. About 1.2 million people in about 206,000 households live on farmlands, which is many more times than any other economic unit in the country. Most of the said households also derive some of their income from agricultural activities. Despite the high proportions of farmlands and households living on farms, agriculture contributes a comparatively low percentage to Namibia's Gross Domestic Product (GDP).

Rural farmers in northern Namibia seem to lack access to farm information such as market price, inputs availability, weather updates and improved cultivation practices, and this seems to be one of the factors why agriculture contributes low to the national GDP. Considering the essence of farming information to farms wellbeing [6] and its indirect influence on national GDP, doing without the up to date farm information, could be challenging for farmers and the nation [6]. According to [6], the use of mobile devices could conveniently assist in making available to farmers, farm information [7, 8]. The studies of [7, 8] found that mobile devices have the abilities to transform the agriculture sector and improve farm production and income respectively. Considering the usefulness of mobile devices to farmers to be able to access up to date farm information and also the possibility that, farmers in rural Namibia may not be aware of accessing rich farm information on mobile devices or/ and using it as such, this study explored farmers' awareness and use of mobile devices in the Uukwiyu Uushona in the Oshana Region in Namibia.

2. Literature Review

In 2014, the agriculture sector contributed only 6% of national GDP and was ranked sixth sector contributor to the Namibian economy. The agriculture sector contribution to GDP seems to have been maintained in the last five years [9] as its report indicated that, the sector's GDP contribution (excluding fishing) over the last five years has just been a little over 4%.

The inability of the sector to increase its contribution to GDP could be because of the lack of farming information, which largely runs on mobile device [10]. Mobile devices have a high possibility of aiding rural farmers in developing countries to boost the economy and food security as these devices serve as information platforms. The said information is referred to as, Mobile Agricultural Information Services (MAIS), in this study. MAIS refers to a collective series of activities to produce agricultural-related information and dissemination efforts through mobile phone platforms. As indicated by [11, 12], the use of mobile phones in developing countries, over the past decade, has shifted focus onto it as a

development instrument. Notwithstanding this, farmers in developing countries seem to struggle to annex the benefits of mobile phones / devices and this is confirmed in [21, 22, 23] findings that digital illiteracy is a major constraint to farmers use of mobile technology for farming practices.

Studies conducted in Sub-Saharan African countries such as Tanzania, Uganda, Kenya, Nigeria and Malawi provide evidence that the use of mobile phones is beneficial to rural farmers [14]. The types and capabilities of mobile phones possessed by farmers determine the type of agricultural information to be disseminated for effective use. The work of [18] demonstrates types and capabilities of mobile phones towards information dissemination. It also points out the potential mobile applications that farmers use and these include voice applications, Short Message Service (SMS) application, USSD application and other mobile services applications.

According to [2], SMS text messages are used extensively for communication because they are easy to create and customize, and they are cheap to distribute to large group of people simultaneously. Notwithstanding its ease to use feature and cheapness, studies of [15, 16] found that farmers prefer voice calls to SMS. This could be attributed to low literacy skills, complexity of retrieving information and incomplete messaging due to the 160-character limit of SMS [11]. Voice calls on the other hand, are costly and difficult to customize its content to match individual user's informational needs [2]. The above demonstrates the existence and use of different mobile services to access information and also their limitations. Amongst the limitations include the challenge of high illiteracy levels, which requires real-time interactions in terms of farmers-help lines and interactive voice systems [14]. Another obvious limitation from above is cost. Considering the said mobile devices services, their use and limitation and their potential use in rural Namibia for farming purposes, this study explored further the mobile devices services and their use in the Uukwiyu constituency in the Oshana Region in Namibia. Exploring the said devices, their communication channels and use for farming purposes in Namibia was necessary as evidence of its study in rural communities in some developing countries exists but little on it in Namibia exists.

3. Research Methodology

The study employed a quantitative method as it enabled the researchers to collect further data on existing variables as in the study literature. Applying the Slovin sample deterministic formula ($n=N/(1+N(e)^2)$) with an error margin of 8% on the 12,092 population of the Uukwiyu Uushona in the Oshana Region [17], a sample size of 154 was generated. Based on the variables generated from the reviewed literature, questionnaires were developed and distributed randomly amongst the community members. The first part of the questionnaire notified the community members of informed consent and that they could choose to stop responding to the online questionnaire or/and not submit at all. It was made clear that, opting out of the survey along the way had no consequences. Of the 154 distributed questionnaires, 140 completed questionnaires were returned and hence resulting in a high acceptable response rate of 91%, as response rates usually above 50% are considered acceptable. To ensure validity and reliability of the study questionnaire, four experts in the area of human computer interaction reviewed it and made inputs into the initial questionnaire and after modifications; it was submitted to the Research Ethics Committee of the International University of Management (IUM), Namibia for consideration and approval. The distribution of the questionnaire to participants was undertaken after the ethical clearance was granted.

4. Results

This section presents the research findings based on the analyzed data. The findings are presented in sections as, basic demographic information, further demographic information, awareness and use of agricultural information.

Figure 1 shows that, while 69% of the respondents were males, 31% were female. The higher number of male participants is a reflection of farming as a male dominated profession. 14% of the respondents were aged 18 to 25 years, 32% were aged 26 to 40, 39% aged 41 to 54, 10% aged 55 to 69 years and 5% aged above 69 years. This indicates a normal distribution on the age groups of farmers in the sample under study and also it constitutes much of the active groups who are most likely to use mobile devices to acquire agricultural information. While 39% of the respondents were living in small households, 45% were living in medium households and 16% in large households; 16% were single, 69% were married, 6% were divorced, 4% were widowed and 2% separated. Having large families and more married persons indicate that the households are most likely to be in need and demand of high agricultural outputs hence the high chances the need of agricultural information to increase production.

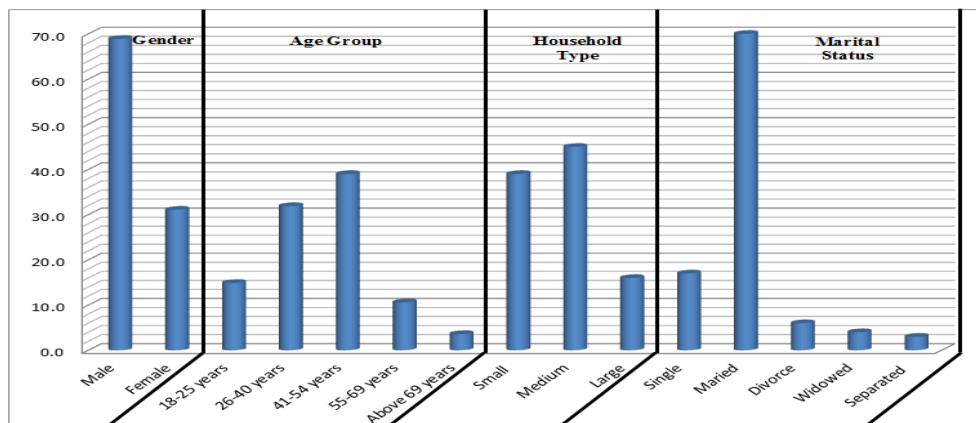


Figure 1: Gender, Age, Household and Marital Status

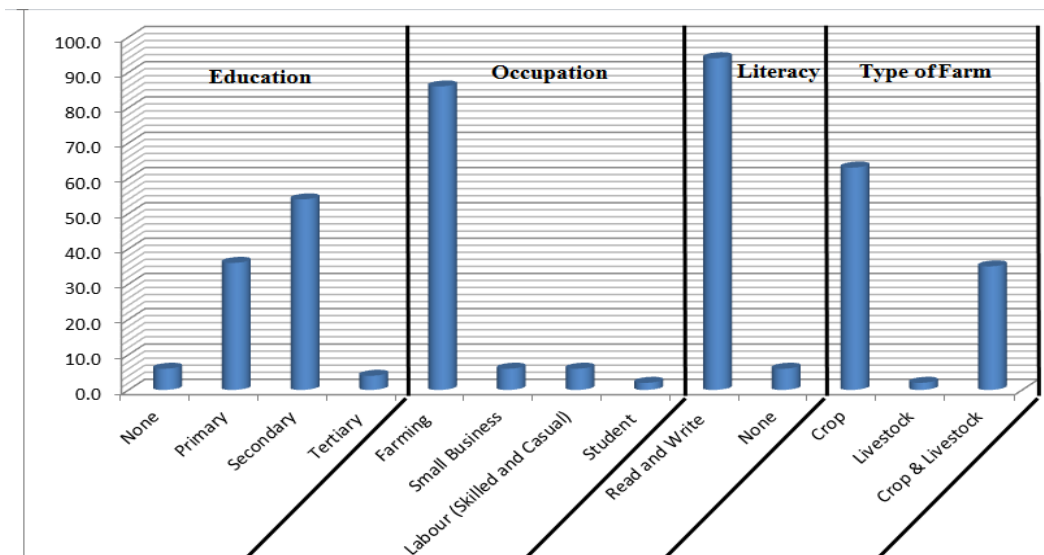


Figure 2: Education, Occupation, Literacy and Types of Farms

On the level of education, literacy rate, occupation, and type of farming, Figure 2 shows that, the majority of the respondents; 52% were secondary level educated, 92% were literate and hence could read and write, 84% were farmers by profession. Of the 84% that were farmers, 52% focuses on crop farming and 32% on crop & livestock farming. The high

levels of secondary education and literacy rate implied that the farmers were going to have little or no problem interpreting agricultural information on mobile devices. The majority of the research sample being farmers meant that the study could collect relevant and useful information from relevant persons.

On the brand, type and application used on mobile devices, as in Figure 3, majority of the participants (47%) indicated using Samsung mobile devices, 81% indicated using smart phone and amongst application that they had used on their phones include voice application, SMS, FM radio, Multimedia player, storage/memory card, camera, Bluetooth, internet and MMS. This confirms that the majorities of the participants had mobile devices in the form of mobile phones and were using mobile applications on it and hence could easily use mobile devices to access mobile agricultural information. This confirms the findings of [14, 18] on farmers possession of mobile phones and use of mobile applications on the phone.

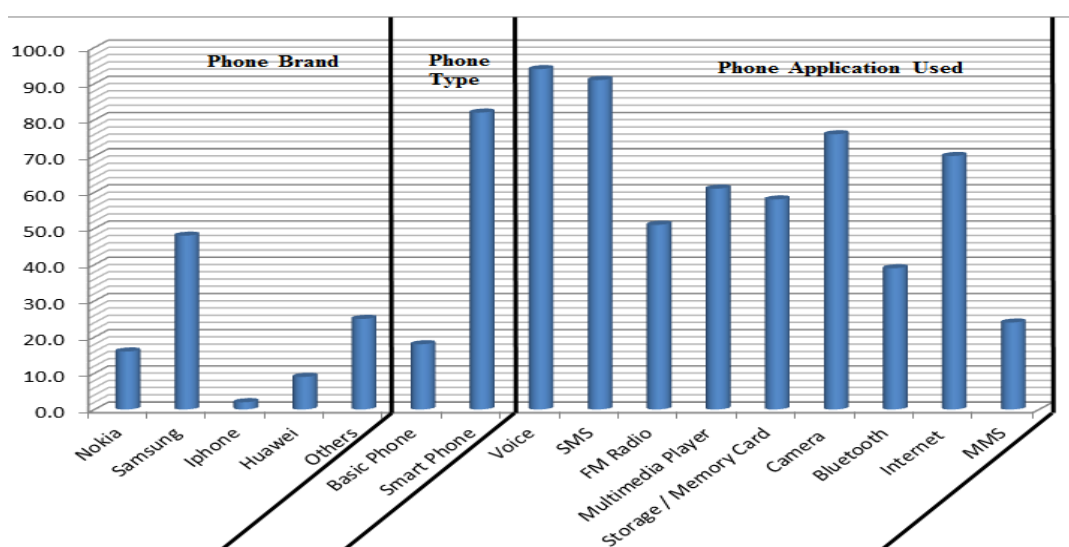


Figure 3: Phone Brand, Type and Application Used

Figure 4 demonstrates that, while 69% of the participants were aware of mobile agricultural information, 51% used it to inform their farming practices.

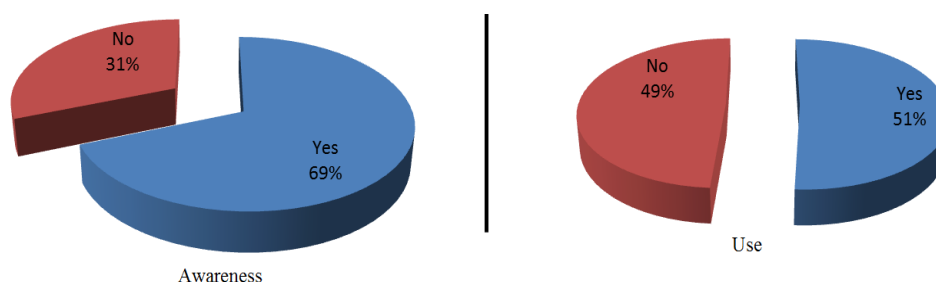


Figure 4: Awareness and Use of Mobile Agricultural Information

Figure 5 demonstrates the specific mobile applications used by the participants towards their farming practices. The most used amongst the applications is the one for weather updates. This confirms the findings of [2, 15, 16, 18] on the various mobile applications that farmers use on mobile phones. Major challenges faced by farmers in accessing agricultural information include the lack of awareness (57%), digital skills challenge (15%), limited power source (13%), poor-quality mobile phone networks (11%), and illiteracy (4%).

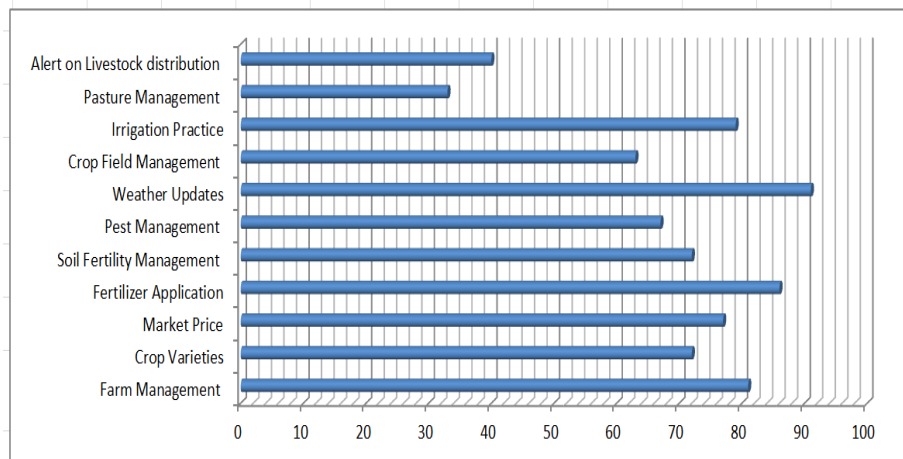


Figure 5: Specific Use of Agricultural Information

5. Conclusions and Recommendations

Considering the usefulness of mobile devices to farmers to be able to access up to date farm information and also the possibility that, farmers in rural Namibia may not be aware of accessing rich farm information on mobile devices or/ and using it as such, this study explored farmers' awareness and use of mobile devices in the Uukwiyu Uushona Constituency in the Oshana Region in Namibia. Based on the study's findings, it is concluded that farmers in rural areas possessed mobile devices of different types and that most of them have smartphones. Most of the farmers in the Uukwiyu Oshana constituency (Oshana Region) had a secondary level of education and were literate enough to be able to read and interpret mobile agriculture information. Among the mobile device applications that the farmers mostly use, include voice applications (especially voice calls), SMS, camera and Internet. The farmers are aware of and use mobile agriculture information. The most used mobile agriculture information is the information on weather updates, fertilizer application, farm management and irrigation practices.

Challenges faced by farmers in using the mobile agriculture information include lack of awareness of mobile agriculture information, digital skills challenges, limited power source, poor-quality network and illiteracy. It is recommended that awareness of mobile agriculture information be promoted amongst farmers.

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