

Gender Perception Towards the Use of Mobile Phones for Accessing Information on Agriculture in Binga, Zimbabwe

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Abstract

In many African communities, gender disparities exist in how farmers access and use mobile phones for agricultural communication. Women in these communities often have limited access to mobile phones, despite playing a significant role in today's information-driven agriculture. This highlights the need for increased efforts to improve women's access to mobile technologies for agricultural purposes. Currently, no research has been conducted on gender-based mobile phone use for agricultural communication in Zimbabwe. This study aimed to compare mobile phone use among male and female farmers in the Binga District, Zimbabwe. The modified Rural Technology Acceptance Model served as the study's theoretical framework. Using a mixed-methods approach guided by pragmatic epistemology, the research aimed to generate practical knowledge to address real-world issues related to gender disparities in mobile phone use for agricultural communication in Binga. This approach helped researchers develop strategies to address challenges farmers face in using mobile phones. The survey covered 1659 households in the Lubu and Kariyangwe communities. Chi-square tests examined relationships between variables. Results showed that more women than men enjoyed using mobile phones and found them helpful for agricultural communication, whereas more men than women found mobile phones easy to use for this purpose. Additionally, behavioral intention to use mobile phones for agrarian communication was higher among women. The challenges women face in accessing these technologies highlight the need for increased investment in public-private initiatives to expand access in rural areas. Such programs should include training to improve women's skills in using mobile phones for agricultural information. Furthermore, reducing data costs or providing subsidized data and text services for rural farmers was also suggested.

Keywords: Mobile phones, perceived usefulness, perceived ease of use, social influence, facilitating conditions, tech-service attributes

Introduction

Throughout Sub-Saharan Africa, women are vital to agricultural production and maintaining family livelihoods. Despite this, women usually achieve lower yields than men. This is because their access to economic resources is limited, which makes it more difficult for them to obtain agricultural information. Research by Kihara and Masibo (2024) on participatory communication strategies in Machakos, Kenya, shows that climate message designers often assume that providing information alone will suffice to promote technology adoption, thereby ignoring the significant barriers faced by women farmers, who constitute a large share of the farming population. Equal access to information is crucial for effective adaptation, primarily through channels accessible to underrepresented groups, such as women. However, numerous obstacles hinder efforts to ensure global food security, including climate change, declining biodiversity, more frequent natural disasters, unstable food prices, and inefficient supply systems (Ireru et al., 2021). The low productivity of African agriculture is mainly linked to limited access to technological and market information. Knowledge and information are key drivers of global social and economic change. Few studies have examined gender disparities in rural farmers' access to agricultural information in many developing countries, including Zimbabwe, even though these issues disproportionately affect rural women.

Mobile phones offer an opportunity to improve access to and sharing of information across all sectors of the economy worldwide. These benefits also extend to the agricultural industry, which traditionally relied on oral culture and indigenous knowledge systems. Despite the rapid spread of these technologies, the gender gap in access to and use of them persists, particularly affecting rural farmers, with women as the primary actors in agriculture. According to a study by Quandt et al. (2021) on mobile phone use among farmers in Tanzania, nearly all male farmers used mobile phones for farming activities, whereas only about two-thirds of female farmers did so. The United Nations reports that gender gaps in mobile phone use for agricultural information range from 4% to 25%, depending on the country (Quandt et al., 2021). Such disparities have resulted in approximately 300 million fewer female mobile subscribers in low- and middle-income countries than males (Owusu, Yankson & Frimpong, 2017). This is mainly because women face various socio-economic challenges, including limited access to educational resources and high rates of illiteracy, due to restricted development opportunities (Owusu, Yankson & Frimpong, 2017).

The use of mobile phones for agricultural communication has been a topic of considerable interest across the developing world. This is mainly due to the rapid spread of mobile phones

in rural communities, which has led some countries, such as Zimbabwe, to achieve 100% teledensity. In Zimbabwe, mobile phone penetration extends beyond urban areas to rural communities, including Binga, a district in the western part of the Country along the Zambezi Valley. This region is inhabited by Tonga-speaking people and is characterized by low rainfall, which makes it suitable for drought-tolerant small-grain crops. Year after year, Binga communities face severe droughts, making Binga the most food-insecure region, as reported by IPC (2019), which estimates that about 30-40% of households are food-insecure.

For many farmers, transporting their products to markets is expensive, and relying on intermediaries exposes them to exploitation. These challenges faced by farmers indicate an information gap, underscoring the need for interventions to improve access to and dissemination of information among farmers who have traditionally relied on conventional agricultural extension systems. Such issues can be addressed through mobile technologies. In Zimbabwe, by the end of 2017, mobile phone penetration had reached 110%, and internet access had significantly improved across all regions due to 3G mobile broadband and the installation of fiber optic cables connecting Zimbabwe to neighboring countries. Despite these advancements, disparities persist in how males and females in Binga use ICTs to access and share agricultural information. Many studies on gender and ICT focus primarily on whether women are included or excluded, aiming to identify strategies to increase women's access to and use of ICTs (Braumok & Braimok, 2017).

In Binga, as in most Zimbabwean rural communities, in male-headed households, some men work from home, leaving women to assume additional responsibilities for household activities. However, these women and child-headed families often face challenges in accessing inputs, particularly those distributed through government or partner organizations (Mutami, 2015). Women in these communities usually find it difficult to negotiate with men, resulting in their exploitation by intermediaries and agro-dealers when bargaining for better prices for their agricultural products. In many African societies, customary laws often imposed by men undermine women's rights, whether as individuals or in female-headed households, restricting their ability to engage in social and economic activities. Despite this, governments seem reluctant to include women in intervention programs aimed at improving access to information and agricultural productivity (Maleka, 2011). This may be due to the lack of gender-disaggregated data showing the extent of women's participation in farming activities and their access to resources. Disparities in resource access have also extended to the acquisition, use, and access to digital technologies—tools that enable the development of a knowledge society.

Several studies have explored gender disparities in ICT ownership and usage. For example, Maleka (2011) in South Africa reported that being female in urban areas increased the likelihood of owning a mobile phone, whereas in rural areas it decreased that likelihood.

Numerous studies have used technology acceptance models to examine the adoption of new technologies among farmers. Among these models targeting rural farmers are the Farmers Technology Acceptance Model (FTAM) by Amin and Li (2014) and the Rural Technology Acceptance Model (RuTAM) by Islam and Gronlund (2011). This study adopted the RuTAM, which posits that external factors, such as facilitating conditions and tech-service promotion, influence users' perceptions of the usefulness and ease of use of new technologies. Additionally, individual factors such as personal characteristics, demographics, and social influence affect perceptions of usefulness, technology-service attributes, and ease of use. Collectively, these factors influence users' intentions to adopt new technologies.

Theoretical Framework

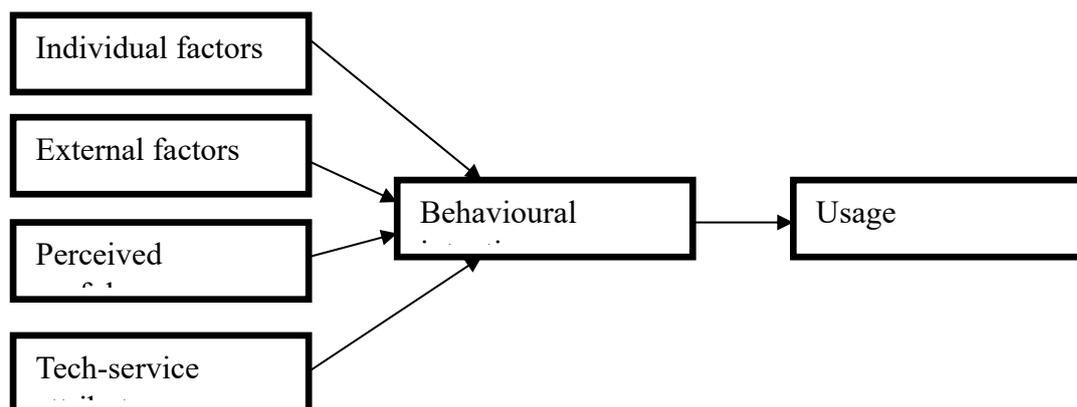


Figure 1: Theoretical Framework

This study was guided by the Rural Technology Acceptance Model (RuTAM), developed by Islam and Gronlund (2011), in their investigation of farmers' use of mobile phones in Bangladesh. The model draws on other technology acceptance frameworks. It includes key variables such as individual factors, external factors (facilitating conditions and tech-service promotion), perceived usefulness, tech-service attributes, and perceived ease of use. Both personal and external factors directly influence users' perceptions of a technology's effectiveness, its characteristics, and ease of use. Meanwhile, technology service attributes affect perceptions of usefulness and ease of use, which, in turn, influence behavioral intention

to adopt new technology. The integrated model derived from the Rural Technology Acceptance Model is shown in Figure 1 above.

Perceived usefulness refers to an individual's belief that using a technology can improve their job performance, while perceived ease of use relates to their belief in their ability to use new technologies with minimal effort. Concepts similar to perceived usefulness in other theories include performance expectancy (UTAUT), extrinsic motivation (MM), job fit (MPCU), relative advantage (IDT), and outcome expectations (SCT). These two factors are the most important in influencing the behavioral intention to adopt new technologies (Davis, Bagozzi, and Warshaw, 1989). Facilitating conditions generally refer to an individual's beliefs about whether technical and organizational infrastructure exists to support system use (Venkatesh et al., 2012). In the context of mobile phone communication, this refers to the presence of a network, mobile service quality, and ease of subscribing (Islam & Gronlund, 2011). Social influence refers to the extent to which a person believes that essential others think they should use the system, and, according to UTAUT, this directly affects behavioral intention. Tech-service attributes are technology characteristics that distinguish a technology from others. Users' attitudes toward these technological features influence their willingness to adopt new technologies (Islam & Gronlund, 2011). Individual and demographic characteristics are key determinants of technology adoption. Factors such as age, gender, culture, ethnicity, household income, and education level all influence the adoption and use of new technologies (Islam & Gronlund, 2011). Research indicates that perceived ease of use has both direct and indirect relationships with perceived usefulness (Kabir, Saidin, and Ahmi, 2017). This model hypothesizes that the comfort and convenience of using mobile phones impact users' perceptions of their usefulness. Previous studies on farmers' use and acceptance of technologies have often overlooked gender-based analysis of technology adoption.

Methodology

A pragmatic philosophy guided the study. It employed a concurrent mixed-methods approach, in which both quantitative and qualitative data were collected, analyzed, and interpreted simultaneously to derive generalizable meanings. The study population comprised 1659 households in the Lubu and Kariyangwe communities. A total of 313 questionnaires were distributed across the two wards of Kariyangwe and Lubu, and 193 were returned, yielding a 62% response rate. These wards generally shared similar characteristics, with farmers mainly focusing on small-grain drought-tolerant crop production and livestock farming. Interviews were conducted with one agricultural extension officer and one key informant farmer.

Kolmogorov-Smirnov tests were used to assess normality, and chi-square tests were used to examine associations between variables.

The researcher obtained permission from the Ministry of Agriculture, Mechanisation and Irrigation Development, and the Ministry of Information and Communication Technology, Postal and Courier Services. To secure this approval, the Department of Library and Information Science at the National University of Science and Technology submitted the application on the researcher's behalf.

The researcher first visited the Village Head and explained the purpose of the study. The Village Head granted the researcher verbal permission to visit homesteads. Issues of informed consent were addressed in the questionnaire, and only villagers who consented to the study participated.

Results And Discussion

Characteristics of Respondents

Among the 193 respondents who returned questionnaires, males accounted for 49.7% and females for 50.3%. Among these respondents, 45.6% were younger than 40 years, 32.6% were between 40 and 49 years, 12.4% were between 50 and 59 years, and 9.3% were 60 years or older. Among male respondents, 29.2% had completed primary education, 59.4% had completed high school, and 11.5% had completed tertiary education. Among female respondents, however, 44.3% had attained primary education, 55.7% had attained high school education, while none had attained tertiary education. This indicates that women in Binga had lower levels of education than men and that men had greater opportunities for tertiary education than women. These findings do not appear to be unique to the Binga context, as Johannes (2010) argued that, in most African countries, formal and higher education were traditionally reserved for men. However, this has changed gradually over time. Relating these findings to mobile phone use for agricultural communication, Okello et al. (2014), in their study on the adoption of market information systems in Kenya, reported that the likelihood of adoption increased with education level. These conclusions may be supported by a Chi-square test assessing the association between educational level and mobile phone ownership. The test results showed a value of 0.024 ($P < 0.05$), suggesting an association between educational level and mobile phone ownership.

Mobile Phone Access and Ownership

Male respondents accounted for 77.1% of those with mobile phone access, whereas 66% of females had access. This indicates a higher access rate among males than females. Overall,

34.4% of males reported never owning a mobile phone, with the rest owning one for less than 2 years, up to over 10 years. Similarly, 34% of female respondents reported never having owned a mobile phone, whereas the remainder had owned one for periods ranging from under 2 years to more than 10 years. Ownership and access rates among females appeared similar, suggesting that males may obtain mobile phones from other sources, whereas females were likely limited to their households.

An interview with a single farmer did not indicate that mobile phone ownership was determined by gender. This is what he said;

“I do not need to have access to the mobile phone always. What I need most is the radio so that I can listen to news broadcasts. My wife is the one who usually has the mobile phone”.

Applying the Chi-square test to determine if there was an association between gender and mobile phone ownership yielded a p-value of 0.044 ($p < 0.05$), indicating a potential link between the two variables. Although these results appear to support an association between gender and mobile phone ownership, ownership patterns in Binga appear to be the opposite of those reported in the literature. Some studies, such as Aker (2010) in Southern Africa from 2006 to 2009, have shown a gender gap in mobile phone ownership, with women being more disadvantaged; subsequent studies have confirmed this trend. Extensive literature discusses the challenges women farmers face in accessing digital technologies like mobile phones and smartphones. For example, Owusu et al. (2017) reported that in Uganda—and many other low-income countries—about 300 million fewer women than men had access to mobile phones and subscriptions. Mulungu (2024) in Uganda noted that mobile phones are among the most popular tools farmers use for accessing agricultural information, including markets, inputs, weather forecasts, and extension services. However, further findings revealed gender disparities in mobile phone ownership and usage among farmers. Gender norms often limit women’s access to technology, compounded by challenges related to infrastructure, telecommunications, funding, and electricity. Similar findings were reported by Zheng et al. (2021) in China, where women had less access to smartphones than men, and by Zegeye (2021) in Ethiopia, who observed the same pattern, which limited women’s access to agricultural information. Henriksson et al. (2021) also linked climate and environmental changes to social, economic, cultural, political, historical, and institutional barriers that hinder women’s access to digital and climate-related information. Their study in Malawi showed that current inequalities

and power imbalances expose women to adverse climate impacts and reduce their capacity to adapt. Conversely, in Binga, ownership was higher among women than among men, contradicting the literature, which typically reports lower ownership among women. Although a chi-square test for gender and mobile phone access yielded a p-value of 0.088 ($p > 0.05$), suggesting no significant association, these findings imply that gender influences mobile phone ownership and use. Similar research by Ogbeide and Ele (2015) found that in Sub-Saharan Africa, men dominate household decision-making and control assets, limiting women's access to mobile phones. Braimok and Braimok (2017) argued that in African societies, men often control women's use of mobile phones, particularly when women purchase the devices. Gender disparities in mobile access are not unique to Africa; studies in Asian countries, such as Tanzania, also report cultural practices that compel women to seek permission from men for various needs, and these issues tend to be worse for widows and divorcees (Agunga, Sanga, and Isaya, 2018). Such challenges are also documented outside Africa; Fox et al. (2021) found in Ireland that only 10.8% of female farmers used mobile phones for agricultural communication, compared with 82.2% of male farmers. The FAO (2016) study across many Asian countries indicated similar disparities, except in Thailand, where more women than men had access to mobile phones. However, gender differences in mobile ownership may be less pronounced when alternative access methods are available, as Sousa et al. (2016) suggested. Conversely, in Tanzania, Mtega (2021) found no significant gender differences in mobile phone use among farmers—93.1% of men and 91.8% of women reported using mobile phones to share agricultural information. While ownership was higher among women in this study, access rates among men still exceeded those of women overall. The literature generally states that women are often busy with household activities, limiting their time for socializing, as Braimok and Braimok (2017) noted. Studies also highlight several socio-cultural barriers that restrict women's access to modern ICTs, including norms discouraging women from using technology and limited control over its use (Barber, Magnus & Bitzer, 2016). Oladele (2015) also identified these cultural factors as barriers to mobile phone access for rural women in South Africa.

Perceived Usefulness

Among respondents who generally agreed that using mobile phones to access or share agricultural information improved their ability to do so, males accounted for 45.2%, whereas females accounted for 57.7%. When asked whether they believed that mobile phones enhanced the quality of agricultural information accessed or shared, 41.6% of male respondents agreed, compared with 46.4% of female respondents. These results indicate that females have a more

positive perception of the usefulness of mobile phones for accessing or sharing agricultural information compared to their male counterparts.

In an interview with a male farmer, the interviewee agreed that mobile phones have become helpful in accessing agricultural information and extension services. He said they no longer need to visit agricultural extension offices, as extension officers usually visit them upon being contacted via mobile phones. However, another female farmer noted that her husband usually calls the extension officers.

These results are consistent with those reported by Masuki, Tukahirwa, and Kamugisha (2010) in their study on the use of mobile phones by farmers in Uganda. They found that more women used mobile phones to access agricultural information because they perceived them as more helpful in obtaining or sharing such information. In contrast, men used mobile phones for social purposes. Similarly, in Uganda, Martin and Abbott (2011) identified differences in users' perceptions of the usefulness of mobile phones for agricultural communication. More women than men reported that mobile phones helped maintain kinship, whereas more men than women reported that they were helpful for agricultural communication. Additionally, Lubua and Kyobe (2019) observed a strong link between gender and mobile phone use among farmers in Tanzania, with 77% of female farmers reporting that they used mobile phones for agricultural communication, compared with 55% of male farmers. Across genders, Lubua and Kyobe (2019) concluded that perceived benefits of mobile phone use increased the likelihood of its use for agricultural communication. These findings appear to conflict with those of Goswammi and Dutta (2016), who studied the use of mobile chat services among farmers in Norway. They found that women perceived mobile chat services as more useful than men did. However, FAO (2016) found no evidence of a gender difference in perceptions of mobile phone usefulness, as usage was similar across genders. A study by Braimok and Braimok (2017) on Kenyan farmers' use of ICTs found that most women used mobile phones and radios constructively. Limited access to advanced mobile communication among women hampers their participation in development programs. For example, a comparative analysis of mobile phone ownership in Kenya by Krell et al. (21) found that most women owning mobile phones had basic models, whereas most men with mobile phones owned smartphones. This leaves women with fewer functional technologies compared to their male counterparts.

Perceived Ease of Use

Among males, 53.2% reported having the skills to use mobile phones, compared with 43.3% of females who reported being able to access or share agricultural information using mobile phones. Among male respondents, 53.1% found mobile phones easy and convenient for sharing agricultural information, while 48.4% of females reported the same. Therefore, females had less favorable perceptions of the ease of using mobile phones to access or share agricultural information than males. These findings also support previous research by Venkatesh and Morris (2000), who studied ICT use in the workplace and found that women tend to prefer technologies that require less effort and have higher levels of computer anxiety. Regarding skills, Kilima, Sife, and Sanga (2016) discovered that many women in Tanzania lack mobile phone skills compared to men. Other researchers, such as Moghaddam (2010), have argued that, in addition to culture, gender influences skill proficiency, with women generally having lower levels of computer literacy across sectors. However, this varies with factors such as education and occupation, as respondents from the working class and those with similar education levels exhibited identical usage patterns. Conversely, Lubua and Kyobe (2019) concluded that increased user experience among Tanzanian farmers raised their intention to use mobile phones for agricultural communication. The implication for female farmers, therefore, is a reduced likelihood of adopting new technologies, such as mobile phones, particularly advanced smartphones.

Facilitating Conditions

Among males, respondents who generally agreed that they had the resources to use mobile phones accounted for 53.1%, whereas among females, this proportion was 44.4%. When asked if they felt mobile phones were compatible with agricultural information sharing, 46.9% of males and 43.3% of females responded affirmatively. These results may be explained by Lubua and Kyobe (2019), who reported that, in Tanzania, more women than men owned basic phones. In contrast, most men owned smartphones capable of supporting multiple functions. The proportion of respondents who reported they would seek help when facing challenges with mobile phone use was 59.3% among males and 59.9% among females, indicating no significant difference between males and females in seeking assistance with mobile phone use for agricultural communication.

Among respondents who reported enjoying using mobile phones to share agricultural information, 48.9% were male and 56.7% were female. From these results, more women reported enjoying using mobile phones to share agricultural information and believed they

would receive help if they encountered challenges with mobile phone use. In contrast, males appeared to have stronger positive perceptions about the available facilitating conditions. These findings contradict those of Ninsiima (2015), who reported that one reason farmers, especially women, avoided using mobile phones was that they did not know how to text, were too old to learn, or could not read or write. Interviews with male and female respondents revealed no differences in their responses regarding resource availability. Both groups reported lacking sufficient resources to use mobile phones for voice calls or SMS, and could not afford smartphones capable of supporting social media. Lubua and Kyobe (2019) concluded that farmers' purchasing power influenced their intention to acquire and use mobile phones for agricultural communication. As a result, weaker purchasing power among women in developing communities reduces their chances of adopting new technologies.

Social Influence

Among male respondents, 45% generally agreed that important people thought they should use mobile phones to share agricultural information, whereas 52.6% of female respondents reported the same. This indicates that women tend to trust ideas and advice from those they consider necessary. These findings were similarly supported by Khoza et al. (2019) in Zambian and Malawian farming communities, who found that social-psychological factors—perceptions of utility, ease of use, and climatic risk—had varying levels of influence between male and female household heads. The results also suggest that women's adoption decisions are strongly affected by societal factors. These findings emphasize the urgent need for inclusive participatory engagement and gender-specific behavioral change communication strategies for practitioners and policymakers.

Nampijja and Birevu (2016), in a study on the use of ICTs by farmers in Uganda, showed that social influence was a strong determinant of mobile phone use and that the effect of gender on social influence was more substantial, as women tended to be obedient and to take advice from their female colleagues. When asked whether they felt friends' suggestions and recommendations affected their decisions to use mobile phones for agricultural communication, 44.8% of male respondents generally agreed, whereas 38.2% of female respondents generally agreed. These results suggest that males were more likely than females to trust their friends' advice. In a different context in Kenya, Braimok and Braimok (2017) found this to be true because social networks were stronger among men than among women, and men who participated in social networks tended to use ICTs as sources of agricultural information. Among male respondents, 44.8% agreed that they would use mobile phones

because their friends used them to communicate agricultural information, whereas 51.5% of females agreed. While women might not necessarily accept advice on using mobile phones for agricultural communication from their friends, women were more likely to use phones for agricultural communication only if those friends already used them for that purpose. This suggests that women were more cautious in their decision-making than men. When asked whether early adopters encouraged them to use mobile phones for agricultural communication, 40.6% of male respondents generally agreed, whereas 46.4% of female respondents agreed. This again indicates that women trusted only individuals with experience using mobile phones for agricultural communication. Overall, the influence of social factors on mobile phone use for agricultural communication appeared to be stronger among females. However, this was primarily attributable to the degree of trust they placed in their social circles. Lubua and Kyobe (2019) concluded that peer influence and perceived benefits of mobile phone use in agriculture played significant roles in their intention to acquire and use mobile phones for agricultural communication.

Tech-Service Attributes

When asked whether they believed mobile phones were reasonably priced, 52.1% of male respondents generally agreed, compared to 50.5% of female respondents. This indicates a slight difference between genders, suggesting most respondents agreed that mobile phones were reasonably priced. However, the question did not specify the type of mobile phone. Among males, 49% generally agreed that mobile network coverage was sufficient, while 43.3% of females shared this view. These results suggest that women's perceptions of the facilitating conditions for mobile phone use in agricultural communication were somewhat less favorable than men's. The higher percentage of men who agreed with the proposition may be explained by Mutale (2018), whose survey in the Lubu ward of Binga found that respondents walked long distances and sometimes climbed mountains to access mobile phone connectivity. However, this was done mainly by men, as it was dangerous for women to travel long distances in forests inhabited by wild animals like elephants, and such travel also exposed women to the risk of sexual abuse in the forests.

However, chi-square tests of the variables revealed no associations between gender and respondents' perceptions, as shown in the table below. This suggests that factors other than gender may influence respondents' perceptions. Although there appeared to be no gender-based differences in perceptions of tech-service attributes, Mutale (2018), in a survey conducted in the Lubu ward of Binga, found that although most respondents owned radios and mobile

phones, mobile phone connectivity remained poor. In some cases, respondents had to walk long distances to mountain tops to obtain connectivity, exposing them to dangers posed by wild animals. This problem was caused by the lack of mobile signal amplifiers, commonly referred to as boosters.

Tech-Service Promotion

The proportion of male respondents who generally agreed that the government supported the use of ICTs for agricultural communication was 63.5%, whereas among female respondents it was 58.8%. The lower percentage among women may indicate their exclusion from government agricultural and development programs. Braimok and Braimok (2017) cited stronger social interaction among men than among women as a factor facilitating technology transfer. In addition to potential government exclusion, this may reflect cultural barriers that prevent women from fully participating in agricultural and development programs. However, 21.9% of men reported that the government primarily used mobile phones to communicate agrarian information, while 22.7% of women reported the same, indicating a slight difference between genders. Overall, these results indicate reduced government use of mobile phones for agricultural communication, which may imply that, in addition to mobile phones, the government is using other communication tools to share agricultural information with farmers.

Behavioural Intention

When asked whether they intended to continue using mobile phones to share agricultural information, 52.1% of male respondents agreed, compared with 60.9% of female respondents. Those who generally agreed that others should use mobile phones to share agricultural information comprised 58.3% of males, whereas 58.8% of females held this view. These results suggest that females have stronger behavioral intentions to use mobile phones for sharing agricultural information than males. These findings are consistent with a study by Dunn and Dunn (2016) on mobile phone use in the Caribbean. The study indicates that factors such as education level, farm size, gender, farming experience, and electricity availability positively influence rural farmers' adoption of mobile phones (Ifeanyi-obi and Iferobia, 2024). It also reported that women are more avid mobile phone users than men, especially among unmarried women, who describe their mobile phones as their 'lifeline'.

Perceived Usefulness and Behavioural Intention

According to technology acceptance theories, perceived usefulness is directly related to behavioral intention to use technology. A Chi-square test was conducted to assess the

association between perceived usefulness and respondents' behavioral intention to use mobile phones for agricultural communication. The constructs evaluated included respondents' perceptions of whether using a mobile phone would improve access to and dissemination of information, as well as their intention to continue using mobile phones for agricultural communication. The test yielded a p-value of 0.046 ($P < 0.05$) for males and 0.017 ($P < 0.05$) for females. For both genders, there was a strong association between perceptions of the mobile phone's ability to enhance information access and dissemination and the intention to continue using it for agricultural communication. This association was slightly stronger among females. The results indicated a stronger link when mobile phone use was considered, suggesting that perceived device capabilities to improve information access and the quality of accessed information influenced behavioral intentions to use mobile phones. This implies that the perceived usefulness of the mobile phone was positively correlated with intentions to use it for agricultural communication. In contrast, perceived usefulness did not significantly influence intentions to use other technologies. These findings support those of Wims and Byrne (2015) regarding Irish farmers' use of mobile phones, although the results differ when applied to computer use. According to Wims and Byrne (2015), the relationship between behavioral intentions to use computers and mobile phones was stronger. The perceived usefulness construct was also applied to respondents' likelihood of recommending others to use mobile phones for agricultural communication. A p-value of 0.612 ($P > 0.05$) was obtained for males, and 0.003 ($P < 0.05$) for females, indicating an association. This suggests that women are more likely to recommend mobile phones for agricultural communication when they perceive them as helpful in facilitating access to or the dissemination of agricultural information.

Perceived Ease of Use and Behavioural Intention

Tested to determine whether there was an association between the respondents' views on whether they had the skills to use the mobile phone and their intention to continue using mobile phones, a p-value of 0.015 ($p < 0.05$) was obtained for males, and 0.013 ($p < 0.05$) was obtained for females. This indicates a relationship between respondents' perceptions of ease of use and their behavioural intention to use mobile phones for agricultural communication among both males and females. From this, it can be concluded that users tend to adopt and use technologies they feel skilled to operate. Tested to examine if there was an association between respondents' perceptions of their skills to use mobile phones and whether they would recommend others to use mobile phones, a p-value of 0.046 ($p < 0.05$) was obtained for males, and 0.033 for females.

This suggests that, across genders, respondents who believed they had the skills to use mobile phones were more likely to recommend their use for agricultural communication. This tendency was stronger among males, which explains the greater mobile phone access among males than among females. Tested to assess whether perceptions of mobile phones being easy and convenient to use were associated with intentions to continue using them, a p-value of 0.068 ($p > 0.05$) was found for males, while for females, it was 0.000. Associations between perceptions of convenience and ease of use and the likelihood to recommend others to use mobile phones yielded p-values of 0.005 ($p < 0.05$) for males and 0.00 for females, indicating significant associations. These findings suggest that, regardless of gender, respondents are willing to recommend mobile phone use because they find it easy and convenient for agricultural communication. The influence of perceived ease of use on behavioural intention appears to be gender-independent, and according to Chao (2019), among other UTAUT variables, perceived ease of use is a strong predictor of the intention to adopt mobile phones.

Perceived Ease of Use and Perceived Usefulness

Research on technology acceptance explored users' perceptions of perceived ease of use and perceived usefulness. It tested whether respondents' self-efficacy beliefs were associated with their perceptions of the effectiveness of mobile phones in improving information access and dissemination. For males, a p-value of 0.020 ($p < 0.05$) was found, and for females, 0.002 ($p < 0.05$), indicating a significant association between perceptions of ease of use and perceived usefulness of technology. This relationship varied across genders. These findings align with those of Zhang et al. (2009), who found that Chinese farmers' use of mobile phones to access agricultural information was strongly linked to perceptions of ease of use and usefulness, regardless of gender.

Tech-service Attributes and Perceived Usefulness

Associations between perceptions of mobile phones as reasonably priced and their ability to improve access to and dissemination of information were strong among females ($p = 0.000$) but weaker among males ($p = 0.23$). Perceptions of mobile phones as reasonably priced and their ability to enhance the quality of information accessed or disseminated were strongly linked among females (0.012) and weakly linked among males (0.142). These findings seem to contrast with some research by Witinok-Huber et al. (2021), who observed that women farmers in Malawi and Zambia had less access to agricultural resources, technology, and information; that their combined labor burdens were higher for both domestic and productive tasks; and that farmers of both sexes wanted more female extension officers. Perceptions of

mobile network coverage as sufficient and of mobile phones' ability to improve agricultural information access and dissemination are weak among both males (0.204) and females (0.106). Perceptions of sufficient mobile network coverage and the capability of mobile phones to improve the quality of agricultural information accessed or disseminated were closely related among both males (0.018) and females (0.042).

Tech-Service Attributes and Perceived Ease of Use

Perceptions that mobile phones are reasonably priced and that respondents have the skills to use them for agricultural communication were strongly associated among females ($p = 0.003$). Still, this association was weaker among males (0.187). Perceptions that mobile phones are reasonably priced and easy and convenient for agricultural communication were strongly related among both males (0.018) and females (0.001). Perceptions that network coverage is sufficient and respondents have the skills to use mobile phones for agricultural communication were weakly associated for both males (0.68) and females (0.243). Perceptions that mobile network coverage is sufficient and that they are easy and convenient for agricultural communication were strongly related for both males and females (0.000).

Conclusions

The use of mobile phones for agricultural communication in the wards of Kariyangwe and Lubu was influenced by both external and internal factors. However, some factors had no significant effect. When applied to the RuTAM, these factors appeared to influence respondents' perceptions of the usefulness of mobile phones for agricultural communication, perceived ease of use, and the intention to use mobile phones. However, this varied by gender, although only slightly. The study generally showed that males had better access to educational opportunities and mobile phones. Perceptions of the usefulness of mobile phones and the intention to use them for agricultural communication varied by gender. More women than men perceived mobile phones as applicable for agricultural communication and reported that they intended to continue using them and would recommend others do the same. However, women generally held negative perceptions of the ease of using mobile phones for agricultural communication, as well as of supporting conditions and technical service features. There are links between the intention to use mobile phones for agricultural communication and perceptions of usefulness and ease of use. The link between perceived usefulness and the intention to use was stronger for females than for males, and the same was true for perceived ease of use. Additionally, perceived usefulness was connected to perceived ease of use. The findings indicated that, owing to their ownership and control of land and agricultural support

services, men dominated household-level decision-making on climate adaptation. Compared with women and young farmers, older male farmers were more likely to adopt improved seeds, indicating greater resources and accumulated knowledge. Women farmers, who have less access to technology and lower levels of education, were more vulnerable to climate change because they adopted climate-smart technologies at lower rates. To help men, women, and young farmers enhance their adaptation and resilience to climate change, it is essential to strengthen inclusive access to land for women and to group-based methods for information sharing and capacity building. To boost farmers' resilience to climate change, gender considerations should be integrated into the development and implementation of climate-smart agriculture policies and programs.

Recommendations

Mobile phone ownership was lower among female farmers than among their male counterparts, despite fewer female farmers reporting access to agricultural extension officers. To enhance access to agricultural information for female farmers, collaboration between the private sector and government agencies is recommended to provide mobile phone access to rural women. The study also indicated that women face skills-related challenges and recommended the planning and implementation of training programs specifically for women. Female experts should conduct these training sessions, as communities in Binga tend to be conservative and women are generally more comfortable with female extension officers and specialists.

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