

Factors influencing Satisfaction with mobile phone use for Accessing Agricultural Marketing Information by grape smallholder farmers in Dodoma, Tanzania

Factors influencing satisfaction

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Abstract

Purpose – Despite the vast potential of mobile phone use, grape smallholder farmers' satisfaction with mobile phone use has attracted insufficient attention among scholars in Tanzania. The study examined factors influencing satisfaction with mobile phone use for accessing agricultural marketing information.

Design/methodology/approach – The study used a cross-sectional research design and a mixed research method. Structured questionnaire and focus group discussions were used to collect primary data from 400 sampled grape smallholder farmers. Data were analysed inferentially involving two-way analysis of variance, ordinal logistic regression and thematic analysis.

Findings – The findings indicate a statistically significant disparity in grape smallholder farmers' satisfaction across different types of agricultural marketing information. Grape smallholder farmers exhibited higher satisfaction levels concerning information on selling time compared to all other types of agricultural marketing information (price, buyers, quality and quantity). Factors influencing grape smallholder farmers' satisfaction with mobile phone use were related to perceived usefulness, ease of use, experience and cost.

Originality/value – This study contributes to scientific knowledge by providing actionable insights for formulating unique strategies for smallholder farmers' satisfaction with agricultural marketing information.

Keywords Mobile phone, Satisfaction, Agricultural marketing information, Grape smallholder farmers, Dodoma

Paper type Research paper



1. Introduction

Mobile phone is one of the most beneficial tools of information and communication technologies (ICTs). Mobile phone use has spread widely across all sectors of the economy, including agriculture. The increased penetration and use of mobile phones by smallholder

farmers in developing countries has been attributed to affordability, user friendliness, perceived usefulness and network connectivity (Sennuga *et al.*, 2023; Awuku *et al.*, 2023; Kabirigi *et al.*, 2023). The use of mobile phone by smallholder farmers often saves time, reduces costs and improves communication efficiency (Parlasca *et al.*, 2022; Khan *et al.*, 2020). Smallholder farmers have taken advantage of mobile phones to share and communicate agricultural marketing information. Gumbi *et al.* (2023), Hidalgo *et al.* (2023) and Kausar *et al.* (2023) asserted that the increased use of mobile phone by smallholder farmers has emerged from the fact that they often encounter difficulties in accessing timely and reliable agricultural marketing information. Mobile phone use has the potential benefit of improving access to agricultural marketing information among smallholder farmers.

The use of mobile phone enables smallholder farmers to increase access to agricultural marketing information. Studies (Gwelo *et al.*, 2023; Kamal and Bablu, 2023; Zheng and Ma, 2023) point out that mobile phone use enhances timely and reliable access to agricultural marketing information. Similarly, Kitole *et al.* (2023) and Akella *et al.* (2023) acknowledge the usefulness of mobile phones in reducing information asymmetry between smallholder farmers and traders. This enhances transparency, trust and informed decision-making by smallholder farmers. Studies (Wale and Mkuna, 2023; Ndimbo *et al.*, 2023; Hua *et al.*, 2023) call for smallholder farmers to get agricultural marketing information to make informed decisions. Studies by Ochago *et al.* (2023), Chikafa *et al.* (2023) and Selya *et al.* (2023) pointed out that some smallholder farmers are still challenged by untimely access to agricultural marketing information. Access to timely and reliable agricultural marketing information is one of the potential challenges facing commercial fruit crops such as grapes.

Access to agricultural marketing information has great importance for grape smallholder farmers living in the semi-arid region of Dodoma. According to Nyagango *et al.* (2023) and Ndauka and Matotola (2023), access to agricultural marketing information empowers grape smallholder farmers by improving knowledge about the prevailing market conditions. In turn this helps to make better and informed decisions with regard to the accessed agricultural marketing information. However, Mlay (2021) and Kulwijila (2021) argued that access to agricultural marketing information remains a critical challenge facing grape smallholder farmers in Dodoma. Nalyoto and Ngaruko (2022) and Mlay (2021) reported that grape smallholder farmers rely on friends, family members, relatives, farmer groups and neighbours to access agricultural marketing information. These channels have not been helpful in accessing timely agricultural marketing information. Moreover, Ciulli and Kolk (2023) and Awuku *et al.* (2023) proposed the use of mobile phone as a new approach for accessing timely and reliable agricultural marketing information. According to McCampbell *et al.* (2023) and Khan Tithi *et al.* (2021), the benefits of using mobile phones among smallholder farmers cannot be generalised and differ contextually. The increasing popularity of mobile phones presents opportunities for accessing agricultural marketing information, yet it also poses the challenge of ensuring satisfaction among smallholder farmers.

The satisfaction of smallholder farmers with mobile phone use for accessing agricultural marketing information is a topic of interest. Previous studies have shown mixed reactions, with some studies (Santoso *et al.*, 2023; Buruah *et al.*, 2023; Kabirigi *et al.*, 2023) indicating that farmers were satisfied with mobile phone use, and other studies (Mahindaratne, 2022; Chengalur-Smith *et al.*, 2021; Singh *et al.*, 2020) showed that farmers were not satisfied with mobile phone use. Smidt and Jokonya (2022) and Sigdel *et al.* (2022) argued that smallholder farmers' satisfaction with mobile phone use was related to real-time access to information, market connectivity and facilitating financial transactions. On the other hand, Kenny and Regan (2021) and Luqman *et al.* (2019) established that smallholder farmers were

dissatisfied with mobile phone use due to network problems, high costs, lack of agricultural-specific applications, lack of training and over-reliance on traditional communication strategies. It is evident that not all smallholder farmers are dissatisfied with mobile phone use because of the proven value associated with real-time and reliable access to agricultural marketing information. Therefore, an understanding of grape smallholder farmers' satisfaction with mobile phone use for accessing agricultural marketing information is the demand of time. However, previous studies (Ndauka and Matotola, 2023; Nalyoto and Ngaruko, 2022; Mlay, 2021; Kulwijila, 2021) on grape smallholder farmers paid inadequate insight into the subject matter. The study, therefore, determined the level of satisfaction with agricultural marketing information accessed via mobile phone among grape smallholder farmers and examined factors influencing grape smallholder farmers' satisfaction with mobile phone use for accessing agricultural marketing information.

2. Extended unified theory of acceptance and use of technology

The extended unified theory of acceptance and use of technology (UTAUT 2) provided guidance for this study. The theory is based on the modified version of the original UTAUT developed by Venkatesh *et al.* (2003). The theory is built on the assumption that performance expectancy, effort expectancy and social influence indirectly influence intention and use of information technology, while facilitating conditions directly influence intention and use of information technology (Tseng *et al.*, 2022; Osei *et al.*, 2022; Rudhumbu, 2022). Performance expectancy is the extent to which users believe that using information technology will help them attain performance. Effort expectancy describes the ease with which a technology can be used. Facilitating conditions entail users believing that the existing infrastructure supports the use of a technology. Social influence describes how users are perceived by others when using technology. If mobile phone technology draws the attention of peers, it motivates others to increase mobile phone usage.

The theory was further incorporated with additional constructs of hedonic motivation, price value and habit. According to Chauhan *et al.* (2022) and Arpaci *et al.* (2022), experience with new technology could be substantially affected by the role of intrinsic motivation. In this case, mobile phones with a wide range of applications could accelerate farmers' satisfaction for accessing agricultural marketing information. Schomakers *et al.* (2022) and Tseng *et al.* (2022) argued that satisfaction is linked with the financial cost of using a new technology. Bervell *et al.* (2022) and Hasyim (2022) asserted that habit is described as the degree to which people perform some behaviour automatically. Moreover, since its establishment, the theory has been successfully applied in various fields of study, including health, education, banking and agriculture (Owusu Kwateng *et al.*, 2023; Shi *et al.*, 2022; Tamilmani *et al.*, 2021). The theory is widely acknowledged because it has been empirically tested to predict users' satisfaction with new technologies (Butt *et al.*, 2022; Siyal *et al.*, 2021; Alalwan, 2020). The theory is chosen because of its comprehensiveness in understanding the interrelationship of multiple factors in predicting users' acceptance and use of technology (Tamilmani *et al.*, 2021; Jahanshahi *et al.*, 2020)

2.1 Hypotheses development

Previous studies on satisfaction with mobile phone use helped to develop hypotheses in this study. Suhartanto *et al.* (2020) and Albashrawi and Motiwalla (2019) illustrated that perceived usefulness and ease of use are the most important factors for mobile phone usage satisfaction. Franque *et al.* (2021) and McLean and Wilson (2019) demonstrated that perceived usefulness and ease of use influence mobile phone usage satisfaction. Alkhurshan and Rjoub (2020) and Hadi *et al.* (2019) found that network connectivity is an important

factor influencing mobile phone usage satisfaction. [Feroz et al. \(2020\)](#) and [Lee et al. \(2019\)](#) observed that better network connectivity increases mobile phone usage satisfaction. Studies ([Khatoon et al., 2020](#); [Cho et al., 2019](#)) showed that mobile phone reliability is associated with satisfaction. Studies ([Halim et al., 2021](#); [Esmaeili et al., 2021](#)) have shown that satisfaction is directly related to mobile phone usage cost. According to [Jahan and Shahria \(2022\)](#) and [Kar \(2021\)](#), high mobile phone usage cost is significantly associated with dissatisfaction.

[Yu et al. \(2022\)](#) and [Lu et al. \(2022\)](#) stated that mobile phone applications available in local language increases usability and satisfaction. [Elaish et al. \(2023\)](#) and [Ahn and Park \(2023\)](#) claimed that providing information in a local language is a crucial element contributing to farmers' satisfaction with mobile phone use. Along with language, [Rejman Petrović et al. \(2022\)](#) and [Purnama et al. \(2021\)](#) postulated that mobile phone usage experience significantly affects satisfaction. [Punj \(2022\)](#) and [Sharmin et al. \(2021\)](#) also revealed that mobile phone usage experience influences satisfaction. Timeliness of agricultural marketing information is treated as a necessary factor for satisfaction with mobile phone use. [Lai et al. \(2022\)](#) and [Geebren et al. \(2021\)](#) concluded a significant relationship between timeliness of the communicated information and mobile phone usage satisfaction. [Bender and Bender \(2021\)](#) and [Kassem et al. \(2020\)](#) confirmed a significant relationship between timeliness of information and mobile phone usage satisfaction. Based on the above literature, the study proposes the following hypotheses:

- H1.* Perceived usefulness does not influence grape smallholder farmers' satisfaction with mobile phone use for accessing agricultural marketing information.
- H2.* Perceived ease of use does not influence grape smallholder farmers' satisfaction with mobile phone use for accessing agricultural marketing information.
- H3.* The satisfaction of grape smallholder farmers with mobile phone use for accessing agricultural marketing information is not associated with network connectivity.
- H4.* Mobile phone reliability does not influence the satisfaction of grape smallholder farmers when accessing agricultural marketing information.
- H5.* The cost of using mobile phones does not affect the satisfaction of grape smallholder farmers in accessing agricultural marketing information.
- H6.* The language spoken by grape smallholder farmers does not determine their satisfaction in using a mobile phone to access agricultural marketing information.
- H7.* The level of experience in using mobile phones does not influence the satisfaction of grape smallholder farmers.
- H8.* The timeliness of agricultural marketing information communicated through mobile phones does not satisfy grape smallholder farmers.

3. Methodology

The study applied a cross-sectional research design to address the stated objectives at a single point in time. A mixed research method using both quantitative and qualitative approaches underpinned the study. These approaches were meant to widen and enrich a better understanding of multiple perspectives on the phenomenon ([Alharahsheh and Pius, 2020](#)). The study was conducted in the semi-arid region of Dodoma. Dodoma is the only region with agro-ecology suited for grape farming in Tanzania. The region has well-drained

soil, hot and dry conditions favourable for grape farming supporting the livelihood of grape smallholder farmers. Despite its vast potential, grape smallholder farmers have been challenged by untimely access to agricultural marketing information (Mlay, 2021; Kulwijila *et al.*, 2018). Therefore, the grape farming context in Dodoma seems to be an ideal area to understand grape smallholder farmers' satisfaction with mobile phone use.

The target population consisted of 2,914 active grape smallholder farmers from whom a sample size of 400 grape smallholder farmers was drawn. The sample size was calculated with the help of an online Raosoft sample size calculator at a confidence level of 96.86%, 5% precision and 50% skewness. According to Moraes *et al.* (2022) and Serdar *et al.* (2021), sample size calculations should take into account the confidence level, margin of error and level of skewness. The use of this software was deemed necessary due to its flexible power to produce adequate sample sizes for a finite population. Similarly, Alenazi *et al.* (2022) and Qazi *et al.* (2022) used a Raosoft sample size calculator when determining the sample sizes. Furthermore, Niebi *et al.* (2021) argued that a sample size ranging between 200 and 500 subjects is suitable for econometrical statistical analysis.

The study followed a multi-stage sampling procedure to select sampled respondents in the study area. Firstly, of all the regions in the country, Dodoma was purposively chosen because it is the only grape-producing region in the country. Secondly, out of seven districts, Dodoma district was also selected purposively due to high volume of grape production. Thirdly, the three villages, namely, Hombolo Bwawani, Mbabala and Mpunguzi, were purposefully selected based on the high volume of grape production. Fourthly, a systematic sampling procedure was applied in selecting the study respondents. The first respondent was randomly chosen and the subsequent respondents were selected based on the three-interval estimation method from the household list given by the village executive officers. The systematic sampling techniques were preferred because of their robustness for precise estimation of the population characteristics (Rahman *et al.*, 2022). Studies (Ouko *et al.*, 2023; Tesfahunegn and Gebru, 2022) also used systematic sampling techniques for the sampling of smallholder farmers.

Data were collected based on a self-administered structured questionnaire pre-tested to 30 respondents in Mvumi Mission village in Chamwino district. The village was chosen for pre-testing because the population is similar to where the actual data were collected. The pre-testing of the questionnaire was deemed critical to enhance the quality of the data collected (Teshome *et al.*, 2022; Jima'ain *et al.*, 2022). Yusoff *et al.* (2021) opined that pre-testing of the data collection instruments should be done for at least 30 units to increase accuracy. The questionnaire was preferred because it is commonly used with the survey strategy and encourages high response rates (Christensen *et al.*, 2022; Ali *et al.*, 2021). Two focus group discussions (FGDs), each comprising seven purposively selected participants based on gender balance, age, mobile phone usage experience and education level, were conducted. According to Mujeen *et al.* (2020), there is no limit for the number of FGDs, as it depends on the available resources, time and objectives of the specific study. Scheelbeek *et al.* (2020) argued that a FGD should comprise 6–12 participants based on shared experience. The discussions were moderated in convenient venues for an hour to allow maximum participation. The facilitating role was mainly limited to the researcher and trained assistants to ensure that the study objectives were clearly met. The use of FGDs is justified based on their potential to complement and cross-check data collected through other approaches (Cahyono *et al.*, 2020).

Quantitative data were analysed inferentially using a two-way analysis of variance (ANOVA) model to investigate the variability in grape smallholder farmers' satisfaction with agricultural marketing information accessed through mobile phones. The dependent

variable in the model was the level of farmers' satisfaction, while the independent variables comprised the types of agricultural marketing information accessed through mobile phones (price, buyer, quality, quantity and selling-time information). The model was adjusted for individual farmers' effects on their satisfaction with the agricultural marketing information they accessed. The formulation of the model is outlined in [equation \(1\)](#):

$$Y_{ij} = \mu + \alpha_i + \beta_j + \varepsilon_{ij} \tag{1}$$

where $i = 1, 2, \dots, 5$ (type of agricultural marketing information) and $j = 1, 2, \dots, 400$ (individual farmer).

Y_{ij} denotes the satisfaction level of farmer j regarding type i of the agricultural marketing information accessed. The parameter μ represents the overall mean satisfaction level, while α_i indicates the effect of the type of agricultural marketing information. The parameter β_j indicates the impact of individual farmers' satisfaction with the agricultural marketing information they access, and ε_{ij} represents the error term. Following the fitting of the ANOVA model, Tukey's honestly significant difference *post hoc* tests were used to conduct pairwise comparisons. These tests aimed to identify specific differences among the five types of agricultural marketing information accessed through mobile phones.

The ordinal logistic regression was useful in analysing factors influencing satisfaction with mobile phone use for accessing agricultural marketing information. Previous studies ([Thomas et al., 2021](#); [Ho et al., 2021](#); [Abrudan et al., 2020](#)) presented ordinal logistic regression as a suitable data analytical technique to explain satisfaction. Moreover, [Cantillo et al. \(2021\)](#) and [Güney and Giraldo \(2020\)](#) asserted that ordinal logistic regression is mostly used when the dependent variable has discrete categorical choices. Following this model, the dependent variable was captured as an ordinal value against a set of independent variables. The model was estimated in [equation \(2\)](#) as shown below:

$$\text{Logit } Y = \ln\left(\frac{\pi}{1 - \pi}\right) = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5 \dots \dots \dots \varepsilon \tag{2}$$

Therefore, Y was defined as a dependent variable reflecting the level of satisfaction (1 = very dissatisfied, 2 = dissatisfied, 3 = neutral, 4 = satisfied and 5 = very satisfied). π = probability of an event to occur, α = Y -intercept, β = logit regression coefficient, X_s = a set of predictor variables and ε = error term.

The following equation was fitted to the ordinal logistic regression as shown in [equation \(3\)](#):

$$\begin{aligned} \text{Level of satisfaction with mobile phone use} = & \alpha + \beta_1\text{usefulness} + \beta_2\text{ease of use} + \beta_3\text{network} \\ & + \beta_4\text{reliability} + \beta_5\text{language} + \beta_6\text{cost} + \beta_7\text{experience} + \beta_8\text{timeliness} \dots \dots \dots \varepsilon \end{aligned} \tag{3}$$

Qualitative data were subjected to thematic analysis, where the recordings were transcribed, then sorted, summarised and categorised into themes based on the level of similarities. The qualitative analysis was done to enrich the data collected through a quantitative approach. The technique has been widely applied in studies to evaluate farmers' satisfaction ([Balzani and Hanlon, 2020](#); [Gonzalvo et al., 2020](#)). Therefore, the technique is powerful enough to allow the discovery and reporting on the focus of individual farmers ([Braun and Clarke, 2023](#); [Robinson, 2022](#)).

3.1 Measurement of the study variables

Previous studies informed the choice of the variables in this study. The dependent variable was guided by the studies of [Zhang et al. \(2021\)](#), [Sritrakul and Hudakorn \(2020\)](#) and [Bouttes et al. \(2020\)](#), while studies ([Harry and Stanley, 2022](#); [Gunapala et al., 2022](#); [Diaz et al., 2021](#); [Landmann et al., 2021](#); [Daniso et al., 2020](#); [Michels et al., 2019](#); [Aldosari et al., 2019](#)) derived the choice of the independent variables as depicted in [Table 1](#).

3.2 Measurement of the inter-rater reliability

The inter-rater reliability on satisfaction was evaluated using a two-way mixed effects model, consistency and average measures to assess the level of agreement among different raters (coders). The findings in [Table 2](#) produced an excellent inter-class correlation coefficient of 0.94. According to [Tattan et al. \(2020\)](#) and [Leibovich et al. \(2020\)](#), the inter-class correlation coefficient ranging between 0.79 and 0.96 is considered excellent. The findings suggest that the coders demonstrated a strong level of agreement, and ratings of satisfaction were consistent among them. The findings imply that there was minimal measurement error introduced by independent raters. Therefore, the statistical power for subsequent analysis is not substantially diminished.

4. Findings and discussion

4.1 Farmers' satisfaction with agricultural marketing information accessed through mobile phones

Respondents were asked to indicate their level of satisfaction with agricultural marketing information accessed through mobile phones. This was necessary because it could affect the actual use of mobile phones for accessing agricultural marketing information. The findings in [Table 3](#) outline the descriptive statistics concerning farmers' satisfaction with agricultural marketing information accessed through mobile phones. The findings indicate discrepancies in satisfaction levels based on the type of agricultural marketing information accessed.

Moreover, the findings highlight that there is minimal variation (Std. dev = 0.79) among farmers when assessing their satisfaction with quantity information. This suggests a high level of consensus regarding satisfaction with quantity-related information. Conversely, the findings reveal the highest variation (Std. dev = 1.01) among farmers' satisfaction with price information. The FGDs confirmed that the available traders struggle to afford the produced grapes, leading to low prices and installment payments. The findings imply that grape smallholder farmers have been unable to bypass exploitative traders. Traders often visit grape smallholder farmers at their farms and engage in exploitative practices such as offering unfair prices, under weighing and making false quality claims. This has resulted in farmers' dissatisfaction because they negotiate prices based on what has been proposed by traders. This has also put grape smallholder farmers in a disadvantageous position when transacting with traders, causing dissatisfaction with the prices they receive. [Marson \(2022\)](#) and [Magesa and Mkasanga \(2021\)](#) argued that traders have better knowledge of market conditions and take advantage of the situation by exploiting smallholder farmers. The lack of price transparency has resulted in smallholder farmers' frustrations and confusion due to the unfair prices offered, hence the dominance of relational business practices in the study area.

[Table 4](#) presents the findings of a two-way ANOVA. The section titled "information type" investigates whether there is a significant difference in satisfaction levels based on the type of agricultural marketing information. The substantial *F*-statistic (2199.57) is

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| Variable(s) | Description | Measurement |
|--|---|--|
| Dependent variable Satisfaction (Y) | Level of satisfaction with mobile phone use | 1 = very dissatisfied, 2 = dissatisfied, 3 = neutral, 4 = satisfied and 5 = very satisfied |
| Independent variables (x) | | |
| Perceived usefulness | Perceived benefits of mobile phones | Likert1 = SD, 2 = D, 3 = N, 4 = A, 5 = SA |
| Perceived ease of use | Simplicity of mobile phone use | Likert1 = SD, 2 = D, 3 = N, 4 = A, 5 = SA |
| Network | Perceived network connections | Likert1 = SD, 2 = D, 3 = N, 4 = A, 5 = SA |
| Reliability | Dependability of mobile phone | Likert1 = SD, 2 = D, 3 = N, 4 = A, 5 = SA |
| Language | Perceived understanding of language | Likert1 = SD, 2 = D, 3 = N, 4 = A, 5 = SA |
| Cost | Perceived cost of using mobile phone | Tanzania shillings |
| Experience | Mobile phone usage experience | Number of years for mobile phone use |
| Timeliness | Mobile phone communicate timely information | Likert1 = SD, 2 = D, 3 = N, 4 = A, 5 = SA |

Table 1.

Variable description and measurement

Notes: SD = strongly disagree; D = disagree; N = neutral; A = agree; SA = strongly agree
Source: Authors' own construction

| Inter-class correlation | | 95% confidence interval | |
|-------------------------|-------|-------------------------|-------------|
| | | Lower bound | Upper bound |
| Simple measures | 0.756 | 0.725 | 0.786 |
| Average measures | 0.939 | 0.929 | 0.948 |

Table 2.

Inter-rater reliability

Source: Authors' own construction

| Information type | Mean | SD | Rank |
|------------------|------|------|------|
| Price | 1.63 | 1.01 | 5 |
| Buyers | 1.62 | 0.88 | 4 |
| Quality | 2.69 | 0.87 | 2 |
| Quantity | 2.32 | 0.79 | 3 |
| Selling time | 4.13 | 0.89 | 1 |

Table 3.

Variations in farmers' satisfaction based on the type of agricultural marketing information ($n = 400$)

Source: SPSS output

associated with a very low p -value (<0.001) indicating a statistically significant disparity in farmers' satisfaction across different types of agricultural marketing information.

In addition, the "farmers" section assesses the variability in information satisfaction attributed to individual differences. With an F -statistic of 16.48 and a corresponding p -value of <0.001 , the analysis reveals a statistically significant difference in satisfaction levels

among individual farmers, regardless of the specific type of agricultural marketing information being considered.

Table 5 shows the pairwise comparison of different types of information in relation to farmers' satisfaction. The contrasts, along with their respective *t*-statistics and *p*-values, show the magnitude and significance of the observed differences in satisfaction levels between the various types of information. Farmers exhibited notably higher satisfaction levels concerning information on selling time compared to all other types of information, including information on price, buyers, quantity and quality ($p < 0.001$).

Similarly, farmers demonstrated significantly higher satisfaction with information on quality compared to information on price, buyers and quantity ($p < 0.001$). In addition, farmers displayed greater satisfaction with information on quantity in comparison to information on price and buyers ($p < 0.001$). Furthermore, there was no significant difference in farmers' satisfaction levels when accessing information on price and buyers ($p = 1.000$).

4.2 Factors influencing satisfaction with mobile phone use for accessing agricultural marketing information

Table 6 presents the findings of the ordinal logistic regression meant to examine factors influencing grape smallholder farmers' satisfaction with mobile phone use for accessing agricultural marketing information. The model was generally standard for the analysis, with a proportional odds assumption test producing a chi-square value of 67.5 and a $p > 0.05$. With 43.2 Cos and Snell R^2 and 59.4 Nagelkerke R^2 it shows that 59% of the variation in the dependent variable is explained by the independent variables. The presented data shows a good fit to the model at an acceptable level with a chi-square value of 179.135 and $p < 0.05$.

Table 4.
ANOVA Results showing variation in farmers' satisfaction based on the type of agricultural marketing information ($n = 400$)

| Source of variation | Sum of square | Degree of freedom | Mean square | F-statistic | p-value |
|---------------------|---------------|-------------------|-------------|-------------|---------|
| Information type | 1697.987 | 4 | 424.4968 | 2199.57 | <0.001 |
| Farmers | 1268.6995 | 399 | 3.1797 | 16.48 | <0.001 |
| Residual | 308.0130 | 1,596 | 0.1930 | | |
| Total | 3274.6995 | 1,999 | | | |

Source: SPSS output

Table 5.
Pairwise comparison of agricultural marketing information type and farmers' satisfaction ($n = 400$)

| Information type | Contrast | T | P> t | 95% CI |
|--------------------------|----------|-------|--------|----------------|
| Selling-time vs buyers | 2.5075 | 39.89 | <0.001 | 2.3359, 2.6791 |
| Selling-time vs price | 2.4975 | 39.73 | <0.001 | 2.3259, 2.6691 |
| Selling-time vs quantity | 1.8075 | 28.75 | <0.001 | 1.6359, 1.9791 |
| Selling-time vs quality | 1.4400 | 22.91 | <0.001 | 1.2684, 1.6116 |
| Quality vs buyers | 1.0675 | 16.98 | <0.001 | 0.8959, 1.2391 |
| Quality vs price | 1.0575 | 16.82 | <0.001 | 0.8859, 1.2291 |
| Quantity vs buyers | 0.700 | 11.14 | <0.001 | 0.5284, 0.8716 |
| Quantity vs price | 0.6900 | 10.98 | <0.001 | 0.5184, 0.8616 |
| Quality vs quantity | 0.3675 | 5.85 | <0.001 | 0.1959, 0.5391 |
| Price vs buyers | 0.0100 | 0.16 | 1.0000 | 0.1616, 0.1816 |

Source: SPSS output

The model was also accurately fitting the data with Pearson and deviance chi-square values of (612.243 and 540.396 and $p > 0.05$). The findings also indicate that perceived usefulness, perceived ease of use, experience and cost were the contributing factors to grape smallholder farmers' satisfaction with mobile phone use.

The findings indicate that perceived usefulness is positively and statistically significant in influencing grape smallholder farmers' satisfaction with mobile phone use at $p < 0.05$, Wald = 9.953 and Exp (β) = 2.659. This means that perceived usefulness increases the degree of satisfaction by 2.659 with an odd ratio of 0.978, implying that farmers who perceived mobile phones as useful had a 0.978 more chance of being satisfied. This caused the rejection of the null hypothesis that perceived usefulness does not influence satisfaction with mobile phone use for accessing agricultural marketing information. This implies that if the use of mobile phone provides quick and convenient access to agricultural marketing information, it would increase grape smallholder farmers' satisfaction. The findings align with [Seo and Lee \(2021\)](#) and [Prasetyo et al. \(2021\)](#), who reported that perceived usefulness is significantly related to satisfaction with the use of new technologies. When farmers perceive mobile phone to have better functionality and capability aligning with their needs it increases satisfaction and intention to continue accessing agricultural marketing information.

Perceived ease of mobile phone use was also found to be statistically significant in influencing grape smallholder farmers' satisfaction at $p < 0.05$, Wald = 7.017 and Exp (β) = 2.328. The findings show that perceived ease of use increases the likelihood of satisfaction by 2.328 with an associated odd ratio of 0.845, implying that grape smallholder farmers who perceived mobile phones as easy to use were 0.845 highly satisfied. This resulted in the rejection of the null hypothesis that perceived ease of use is not associated with mobile phone usage satisfaction for accessing agricultural marketing information. This indicates that if mobile phone applications are user-friendly allowing farmers to navigate, it increases the likelihood of satisfaction with mobile phone experience for accessing agricultural marketing information. The findings are consistent with [Senthilkumar et al. \(2021\)](#) and [Caffaro et al. \(2020\)](#), who found that perceived ease of use is very crucial for smallholder farmers to be fully satisfied with mobile phone use. If farmers perceive mobile phone to have better interface and navigation it enhances their level of satisfaction with mobile phone experience for accessing agricultural marketing information.

| Variable | B | S.E | Wald | Df | Sig | Exp(β) |
|-----------------------|--------|-------|-------|----|-------|----------------|
| Perceived usefulness | 0.978 | 0.310 | 9.953 | 1 | 0.002 | 2.659 |
| Perceived ease of use | 0.845 | 0.319 | 7.017 | 1 | 0.008 | 2.328 |
| Network | 2.173 | 8.378 | 0.067 | 1 | 0.796 | 8.785 |
| Reliability | 0.032 | 0.522 | 0.004 | 1 | 0.950 | 1.033 |
| Language | 2.446 | 5.240 | 0.218 | 1 | 0.641 | 11.542 |
| Cost | -1.570 | 4.806 | 0.107 | 1 | 0.000 | 0.208 |
| Experience | 0.763 | 0.260 | 8.612 | 1 | 0.003 | 2.145 |
| Timeliness | 2.240 | 2.388 | 0.880 | 1 | 0.348 | 9.393 |

Table 6. Factors influencing satisfaction with mobile phone use for accessing agricultural marketing information ($n = 400$)

Notes: Model summary = Cos and Snell $R^2 = 43.2$; Negelkerke $R^2 = 59.4$; Model fit information Chi-square 179.135 ($p = 0.000$); Goodness of fit; Pearson and Deviance Chi-square (612.243 and 540.396; $p = 0.937$ and 0.748), parallel line, chi-square = 67.5 and $p = 0.089$

Source: SPSS output

The findings indicate that cost is negatively and statistically significant in influencing grape smallholder farmers' satisfaction with mobile phone use at $p < 0.05$, Wald = 0.107 and Exp (β) = 0.208. This demonstrates that when cost increases by 0.208 with an odd ratio of -1.570 , it reduces satisfaction with mobile phone use by -1.570 . The null hypothesis that cost of using mobile phones does not affect the satisfaction of grape smallholder farmers in accessing agricultural marketing information was therefore rejected. The findings might be attributed to the fact that income poverty poses a serious impediment to the use of mobile phones for accessing agricultural marketing information. The findings are in line with UTAUT 2, which postulates that cost decreases satisfaction of new technological innovations such as mobile phones. The findings imply that an increase in cost often reduces the possibility of smallholder farmers' satisfaction with mobile phone use for accessing agricultural marketing information. The findings tally with those of [Kouadio *et al.* \(2023\)](#) and [Dey *et al.* \(2022\)](#), who observed that cost is negatively associated with smallholder farmers' satisfaction with mobile phone use. If the cost of using mobile phone by smallholder farmers does not meet their expectations, it reduces the level of satisfaction for accessing agricultural marketing information.

The findings show that experience had a positive statistically significant relationship with grape smallholder farmers' satisfaction with mobile phone use at $p < 0.05$, Wald = 8.612 and Exp (β) = 2.145. This indicates that as experience increases by 2.145 with an odd ratio of 0.763, it also increases the chance of experienced mobile phone users' satisfaction by 0.763. This resulted in the rejection of the null hypothesis that experience is not related to grape smallholder farmers' satisfaction with mobile phone use for accessing agricultural marketing information. With experience grape smallholder farmers become aware of navigating through menus and customised setting leading to higher satisfaction with mobile phone use for accessing agricultural marketing information. The findings reflect UTAUT 2, highlighting the habitual behaviour of users based on accumulated experience, which improves satisfaction with mobile phone use. The findings are in conformance with [Siddiqua *et al.* \(2022\)](#) and [Muralidharan *et al.* \(2021\)](#), who concluded that experience improves farmers' satisfaction with mobile phones use. Mobile phone usage experience provides smallholder farmers with rich understanding of mobile phone enhancing the overall satisfaction for accessing agricultural marketing information.

5. Conclusion and recommendation

5.1 Conclusion

Satisfaction with mobile phone use for accessing agricultural marketing information is an important part for the success of the grape sub-sector in Tanzania. It was therefore intriguing to understand grape smallholder farmers' satisfaction with mobile phone use for accessing agricultural marketing information. The study found significant variation in the level of farmers' satisfaction with regard to the accessed agricultural marketing information. Furthermore, the study revealed that grape smallholder farmers were highly satisfied with information on selling time compared to price and buyers' information. This underscores the fact that grape smallholder farmers hardly get fair prices from bulk farm gate buyers. Moreover, perceived usefulness, perceived ease of use and usage experience positively and significantly influenced satisfaction with mobile phone use. This suggests that well-knowledge and experienced smallholder farmers can evaluate the perceived usefulness of mobile phones, which enhances satisfaction. The study did not support the positive effect of cost on grape smallholder farmers' satisfaction with mobile phone use for accessing agricultural marketing information. The study concludes that any significant change in perceived satisfaction with mobile phone use would result in continued usage intentions for accessing agricultural marketing information.

5.2 Recommendations

The study recommends to developers and designers to continue developing more user-friendly mobile phone applications which are easy to navigate to provide relevant and current agricultural marketing information for smallholder farmers. The study recommends to developers and designers to create mobile phone platforms that will enable smallholder farmers to connect to each other for sharing experience and ideas. The farmer-to-farmer communication platform will enhance satisfaction and a sense of collaboration for accessing agricultural marketing information. Since cost has negative consequences for satisfaction with mobile phone use, it is recommended for the telecommunication companies in Tanzania to reduce the cost by considering the unique needs of smallholder farmers. This will help the companies create relevant, personalised and contextual value for a group of farmers' segments. By meeting the needs of smallholder farmers, the companies will support their purposes and ensure that farmers are fully connected to the digital world.

6. Implications, limitations and direction for future research

6.1 Theoretical and practical implications

Previous studies on grape smallholder farmers in Tanzania did not address the notion of satisfaction with mobile phone use for accessing agricultural marketing information. In line with this argument, firstly, the study adds to the literature by diving deeper to investigate grape smallholder farmers' satisfaction with mobile phone use for accessing agricultural marketing information. Secondly, the study provides empirical support for UTAUT 2 by reflecting the specific added constructs (price value and habit) that were not previously tested in the grape farming context in Tanzania. This has formed a base for new knowledge creation and enriches generalisability when the theory is rigorously broken down and tested in different contexts.

6.2 Practical implications

The study is valuable in particular to ICT designers and developers as it demonstrates the influence of perceived usefulness and perceived ease of mobile phone use on satisfaction. This provides insights to develop more user-friendly mobile phone applications to improve the positive experience for smallholder farmers. Such experience may have a significant role in improving mobile phone usage intentions in the future. Thus, in developing mobile phone applications, developers and designers need to fulfil the expectations of users in terms of usefulness and ease of use. The study provides significant managerial implications for the telecommunication companies in Tanzania to formulate segmented pricing strategies to allow smallholder farmers to afford mobile phone services.

6.3 Limitation and direction for future studies

The current study has considerable limitations that set direction for future research. The study was cross-sectional in nature, conducted only in Tanzania and focused entirely on grape smallholder farmers who used mobile phones. Thus, generalising the study findings to other countries with different conditions should be done cautiously. Future studies are suggested to be longitudinal to capture how satisfaction with mobile phone use changes with time. The sampled respondents can be expanded by including large-scale grape farmers with different experiences to manifest satisfaction in different contexts. Future studies may also think of incorporating other theories rather than UTAUT 2 to explain smallholder farmers' satisfaction with mobile phone use.

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