# A Mobile-Based Communication Adoption Model for agricultural market information dissemination in Uganda

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## Abstract

This study proposes a mobile-based communication adoption model for agricultural marketinformation dissemination in Uganda. An extended Unified Theory of Acceptance and Use of Technology model was used to guide the study.

A survey was conducted on 302 commercial farmers and agribusiness traders in Eastern Uganda using self-administered questionnaires. Data were analyzed using descriptive statistics; Structural Equation Modelling was also used to perform confirmatory tests analyses on study variable relationships and to develop the proposed model.

Findings reveal a positive significant relationship between Performance Expectancy and Behavioral Intentions to use; Effort Expectancy and Behavioral Intentions to use; Social influence and Behavioral intention to use; Behavioral intention to use and adoption of mobile-based communication technologies.

However, the relationship between affordability of mobile-based communication technologies and behavioral intentions to use and the relationship between facilitating conditions and adoption of mobile-based communication technologies were dropped by the structural equation model because they had negative path coefficients.

Effective adoption of Mobile-Based Communication Technologies for Agricultural Information Dissemination in Uganda can be achieved with stakeholders increasing on the functionality and the ease of use of these mobile-based communication technologies; provide nationwide sensitization campaigns on benefits of using mobile-based communication technologies; ensure provision ofaccurate and reliable agricultural market information by using mobile based communication technologies, provide benefits to members of society so as to convince others to use mobile-based communication technologies.

**Key Words:** Mobile-Basedcommunication Technologies (MBCTs); UTAUT;Agriculture; Market information; Adoption; SEM

## INTRODUCTION

Agriculture is believed to be the world's largest industry as it employs more than one billion people and generates over $1.3 trillion dollars, worth of food annually (Majumder, 2015). In many developing countries, agriculture is being viewed as a major contributor to social and economic development given that it is the major contributor to economic growth and stability (Aker, 2010; Munyua *et al.*, 2009). Most developing countries for instance in Africa produce a wide variety of agricultural and food products such as maize, beans, cassava, sweet potatoes, irish potatoes, ground nuts, soya beans, sunflowers, coffee, tea, green vegetables, flowers, fruits, as well as livestock. Hence there has been an increase in the total agricultural production in for instance in East Africa and South Africa from 47% and 55% in the 1960's to 110% and 105% respectively (Monty, 2011). Agriculture is also viewed as a great contributor towards reduction of poverty and hunger by 2030 in many developing countries as stated in the Sustainable development Goals of the United Nations (Loewe, 2015). Thus, sustainable poverty reduction can be possible through economic growth and development strategies with agriculture being a key driver (Awuor, 2013;Aker, 2010).

In Uganda, agriculture is viewed as the most important sector in the economy with a contribution of up to 20% to the GDP and 70% of the national population being employed in the sector both formally and informally and it is also seen as a contributor towards the reduction of poverty levels among the rural poor (Monitoring African Food and Agricultural Policies, 2013; Masuki, *et al.*, 2010; Ministry of Agriculture, 2010). Thus, improvement in the performance of agriculture is said to bring about an improvement in farmers' livelihood as well as the economic growth, hence alleviating poverty levels in Uganda (Masuki *et al.,* 2010). Despite its benefits, low agricultural productivity is being reported yet over 70% of all households in Uganda are engaged in Agricultural production for either domestic or commercial purposes (Monitoring African Food and Agricultural Policies, 2013). This can therefore affect the efforts to fight poverty and achieve the United Nations Sustainable Development Goal of eradicating extreme hunger in developing countries like Uganda. Low agricultural productivity has been attributed to several agricultural marketing constraints which in turn affects the productivity of the farmers as well as agriculture production (Nakasone*et al.*, 2014; Ministry of Agriculture, 2010).

According to Nkonya (2002), farmers in Uganda are faced with agricultural marketing constraints such as inadequate agricultural marketing information, lack of information on opportunities for value-addition, low and fluctuating prices of farm produce that do not allow farmers to sell their products at favourable prices and untimely access agricultural market information(Monitoring African Food and Agricultural Policies, 2013). These marketing constraints have been greatly attributed to limited adoption and use of mobile-based communication technologies (Masuki *et al.,* 2010; Ministry of Agriculture, 2010). For instance, a study conducted by Miwanda *et al.* (2014) shows that from the different ICT tools used to access agricultural information, only 0.5% of respondents were using mobile phones technologies to access agriculture market information in the western region of Uganda yet O'Donnell (2013) noted that mobile-based communication technologies(MBCTs) can offer better marketing strategies to commercial farmers and thus have the potential to improve access to and dissemination of agricultural marketing information. Factors such as infrastructural development, user training, and cost of the mobile-based communication technologies, social and economic factors like farmer's income, relatives and friends have been reported to influence farmers' intention to adopt mobile technologies (Nyamba *et al.,* 2012). With proper measures put in place for adoption of these technologies, governments in developing countries like Uganda will be in position to realize the full contribution of agriculture to poverty reduction and economic growth.

The purpose of this study was to develop a Mobile-based communication adoption model for agricultural market information dissemination in Uganda. This was achieved through employing Structural Equation Model (SEM) analysis. The objectives of the study were to examine the factors that influence the adoption of MBCTs in agricultural market information dissemination and to examine the relationships between the study variables.

## Agriculturalmarket Informationand Mobile Technologies

According to Nyareza *et al.* (2012), information is an important factor in the struggle to maintain the livelihood of farmers and gain a competitive edge in a rapidly changing economic and production environment. Agricultural marketing information is defined to include pricing information for agricultural products, information on weather, crop advisory, fertilizer availability, new technology, better farming practices, better management and updates on government schemes (O'Donnell, 2013; Nyareza *et al.,* 2012; Islam *et al.,* 2010). Vadivelu *et al*( 2013) states that Agricultural information plays a vital role in enabling farmers make important and timely decisions regarding when to produce, the best farming practices to adopt, when and where to sell their produce and what prices to charge on their produce thus leading to food security and sustainable development.However, Elly *et al.* (2013) note that there is limited agricultural marketing information that is accessible to farmers especially in rural areas in developing countries and accordingly it has created concerns as to whether the existing mechanisms used for information dissemination such as agricultural public extension services systems, community radio systems, print media, among others are effective enough, or the disseminated information matches with the information needs of the farmers. With the low levels of adequate knowledge, low levels of input, lack of market linkages, as well as uninformed decision making, productivity may be hampered with (Elly *et al.,* 2013).

According to O'Donnel (2013), mobile technologies have the potential to offer better service that can be used to better access to and dissemination of agricultural marketing information. Technologies such as voice and SMS platforms, custom made mobile/web applications, social media platforms can offer better marketing strategies to commercial farmers. Social media platforms such as Facebook, twitter, WhatsApp, LinkedIn among others are also said to be growing in their usage in developing countries (O'Donnell, 2013; Banks, 2012). Custom made mobile/web applications according to O'Donnell (2013) include but not limited to Google Docs, Google Trader, mFarm and Farmforce which are mobile apps for agricultural marketing. These mobile-based communication technologies(MBCTs)are reported to offer great benefits to the farmers such as finding new buyers, using market information to obtain higher prices, better traceability and compliance with quality and safety standards (O'Donnell, 2013).

Therefore, there is need to examine the factors that influence the adoption of these MBCTs for agricultural market information access and dissemination in developing countries like Uganda. Factors such as infrastructural development, user training, and cost of the mobile-based communication technologies, social and economic factors like farmer's income, relatives and friends have been reported to influence farmers' intention to adopt mobile technologies (Nyamba *et al.,* 2012). With proper measures put in place for adoption of these technologies, governments in developing countries like Uganda will be in position to realize the full contribution of agriculture to poverty reduction and economic growth.

## The case for Unified Theory of Acceptance and use of Technology Model

The conceptual framework adopted in this study was developed in modifying UTAUT model (Venkatesh *et al.*, 2003). UTAUT posits six constructs that informed our study. Theseinclude Performance expectancy, Effort expectancy, Facilitating conditions, Social influence, Affordability and Behavioral intention to use which affect the Adoption of MBCTs. UTAUT model as developed by Venkatesh *et al.* (2003) is therefore a comprehensive model for user acceptance that resulted from eight existing models and theories namely Theory of Reasoned Action (TRA), Technology acceptance model (TAM), Motivational Model, Model of PC utilization, Social Cognitive Theory, Combined TAM-TPB, Innovation of Diffusion Theory and the Theory of Planned Behaviour (TPB) (Attuquayefio*et al.,* 2014). According to Venkatesh *et al.* (2003), UTAUT is comprised of a range of factors which are taken into consideration when evaluating the Behavioral intension to use and the level of acceptance of a particular technology or system.

These factors are made up of four different constructs used in measuring user acceptance and user behaviour and these include *Performance expectancy*--degree to which an individual believes that using a system/ technology will help in enhancing his performance, *Effort expectancy*--degree to which an individual believes that a system is easy to use, *Social influence*-degree to which an individual feels that others encourage him to use the system and *Facilitating conditions*-degree to which an individual believes that technical, government and organizational infrastructures exist to enable him

use a particular technology. These four factors according to Venkatesh *et al.* (2003) are moderated by four factors of Age, Gender, Experience and voluntariness of use.

It is argued that the UTAUT is a widely used theory that has been applied in several studies to explain technology acceptance. A study conducted by Dwivedi *et al.* (2011) revealed that over 870 studies have applied the UTAUT theory of which 43 from the 450 studies analyzed used UTAUT and its constructs in their empirical studies whereas the rest simply cited the UTAUT article of Venkatesh *et al.* (2003). Justification for the wide adoption of UTAUT theory in several studies in different fields of IS adoption and use has been due to the fact that it is regarded as a more adequate model than others given that it has the ability to explain 70% of variance (adjusted $R^2$=70%) in usage Behavioral intention than other models (Venkatesh *et al.,* 2003; Zeinab *et al.,* 2014). This comes as a result of an empirical validation of the UTAUT model with six longitudinal studies from six different industries (Anderson*et al.*, 2004). UTAUT is also reported to have a global and integrative approach given that it incorporates a variety of explanatory variables derived from the main theoretical models that where earlier on developed to explain acceptance and use of technology (Attuquayefio *et al.,* 2014).

As earlier mentioned, UTAUT was used with modifications in consideration of the unique requirements of the Ugandan case. The study added a new construct of Affordability of MBCTs into the conceptual model. The new construct Affordability of mobile-based communication technologies was added because according to Jambulingam (2013), Affordability is a very significant driver of Behavioral intentions to adopt and use mobile technologies. Wagner (2007) also further argued that cost is the third significant factor considered by customers in choosing mobile services after ease-of-use and perceived usefulness and thus it is said to have a negative impact on Behavioral intentions to use a technology especially when the cost of the service providers and the cost of the mobile technology is significantly high. Figure 1 presents the conceptual framework.

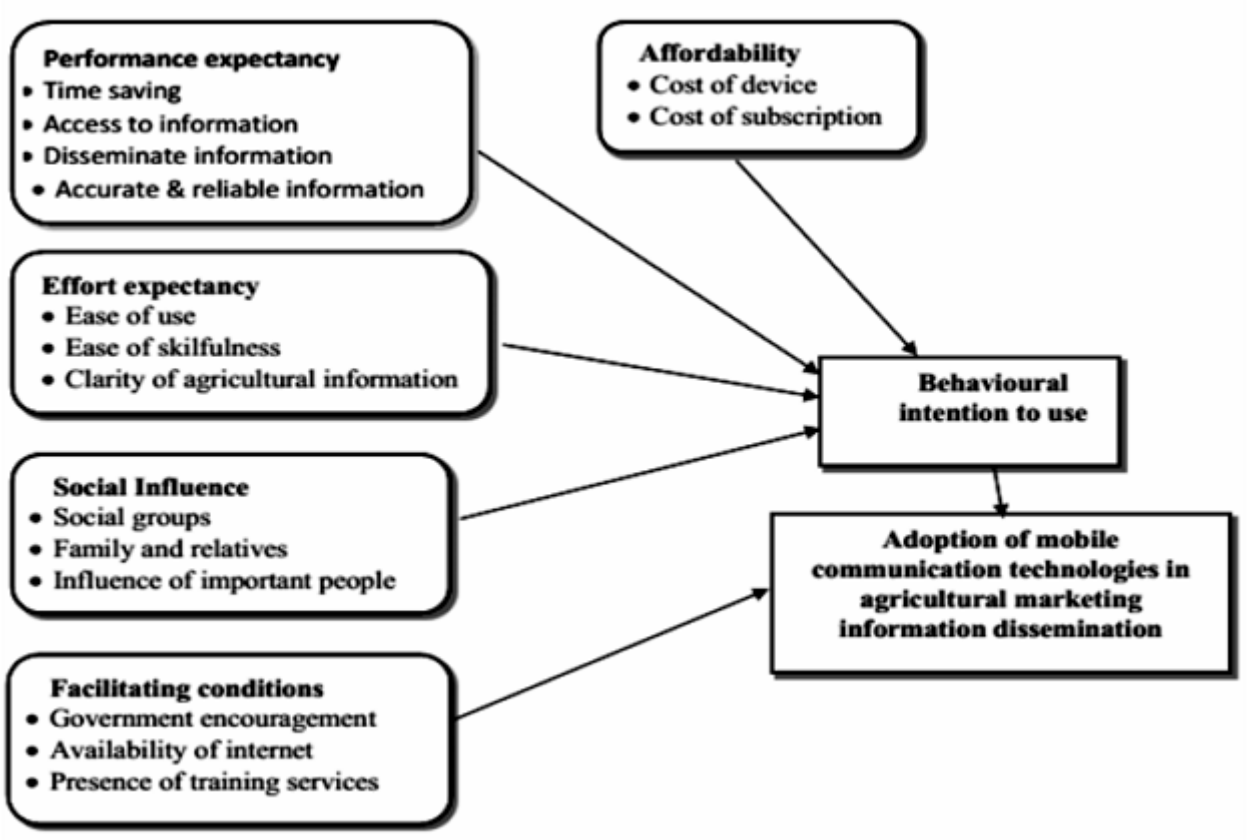


**Figure 1: Conceptual framework (Source: Venkatesh et al., 2003)**

## Research design

The study used a cross sectional field survey research design with the research methods being quantitative given that emphasis is put on collecting and analysing numerical data while concentrating on measuring the scale, range, frequency of phenomena (Neville, 2007). Cross sectional field survey research design was preferred because it enables researchers to gather data on beliefs, practices or situations from a random sample of subjects in the field using survey questionnaires which is most frequently used. And therefore, with this kind of research design, independent and dependent variables are measured at the same point in time using a single questionnaire (Bhattacherjee, 2012). Data was gathered from the respondents on their beliefs and practices of using MBCTs and later the dependent and independent variables were measured at the same point using a single structured questionnaire. Field surveys are popularly used because they enable researchers to measure study variables and test their effects using statistical methods (Bhattacherjee, 2012).

A quantitative survey method was used to collect data from five districts representing the Eastern region of Uganda. This is because the survey method can enable the researcher to collect data from a larger population more easily (Jackson, 2011). The survey method involved administering questions to the selected respondents using self-administered structured questionnaires. Self-administered questionnaires were used because they encourage consistency in asking questions and it is easy to analyse the yielded data (Bhattacherjee, 2012). Thesequestionnaires were distributed to commercial farmers and agribusiness traders in the five districts of Soroti, Mbale, Busia, Iganga and Jinja. Questionnaires were structured with background questions and study variable questions adopted from the UTAUT model with modification which was used to collect data on the factors influencing the adoption of MBCTs in agricultural market information dissemination.

## Reliability and validity of research instrument

Prior to the survey, a pilot study was conducted to test the validity and reliability of the research instrument. The questionnaire had 6 variables accruing from Venkatesh et al (2003) as seen in the conceptual framework. These include Performance Expectancy (PE) with 4 items, Effort Expectancy (EE) with 4 items, Social Influence (SI) with 3 items, Facilitating Conditions (FC) with 4items, Affordability (A) advanced by Jambulingam (2013) with 3 items, Behavioural Intentions to Use (BIU) with 3 items and Adoption (A) with 3 items. The questions tested for validity where presented on a five point likert scale of (1=Not relevant, 2=somewhat relevant, 3=Quite relevant, 4=Relevant and 5=Very relevant).Content Validity Index (CVI) was used to test for validity (Polit et al., 2007) while Cronbach Alpha Coefficients (CAC) were used to test for reliability of the questionnaire (Cronbach, 1951). Table 1 presents the results.

| Variable tested | No. of Items | CAC | CVI |
|---|---|---|---|
| Performance Expectancy | 4 | 0.72 | 0.62 |
| Effort Expectancy | 4 | 0.73 | 0.85 |
| Social Influence | 3 | 0.77 | 0.74 |
| Facilitating Conditions | 4 | 0.72 | 0.68 |
| Affordability | 3 | 0.8 | 0.66 |
| Behavioural Intentions to Use | 3 | 0.70 | 0.73 |
| Adoption | 3 | 0.88 | 0.74 |

**Table 1: Reliability and validity**

Results in Table 1 reveal that all variables scored a CAC>0.7. According to Cronbach (1951); Nunnaly (1978), a questionnaire with variables scoring a CAC>0.7 is considered valid. On the other hand, results in Table 1 show that all variables scored a CVI>0.6, which is in-line with Polit *et al.,* (2007) who post that a variable measuring CVI>0.6 meets the minimum acceptable standards.

## Sample size

A sample size of 384 respondents determined based on the formula by Cochran(1963) was chosen using purposive sampling while conducting the study and according to Roscoe (1975) rule of thumb, a minimum sample of 30 up to 500 respondents is appropriate enough for one to conduct a Behavioral research. The formula by Cochran (1963) was used given that statistics were lacking on how many farmers practice commercial farming activities in Eastern Uganda.

## Measurement of variables

The variables used in this study were measured using factorsadapted from Venkatesh *et al.*, 2003). The study variables included performance expectancy effort expectancy, social influence and facilitating conditions which influence behavioural intentions to use. Affordability of MBCTs was measured using items adapted from Jambulingam (2013).Table 2 presents the variable measurements;

| Variable | Measurement of variables | Source |
|---|---|---|
| **Performance Expectancy** | • time saving<br>• Access agricultural prices<br>• disseminate agricultural prices<br>• provide accurate and reliable information | UTAUT (Venkatesh *et al.*, 2003) |
| **Effort Expectancy** | • Ease of use<br>• Ease of getting skilled<br>• Clear and understandable<br>• Ease of learning to use | UTAUT (Venkatesh *et al.*, 2003) |
| **Social Influence** | • Family influence<br>• Social groups influence<br>• People influencing my behaviour | UTAUT (Venkatesh *et al.*, 2003) |
| **Facilitating Conditions** | • Government encouragement and involvement<br>• Government provision of training services<br>• Internet service provision<br>• knowledge on mobile technologies | UTAUT (Venkatesh *et al.*, 2003) |
| **Affordability of MBCTs** | • Cost of using mobile device<br>• Cost of subscriptions<br>• Cost of mobile acquisition | Jambulingam (2013), |
| **Behavioural Intentions to Use** | • I predict to use MBCTs<br>• I recommend others to use MBCTs<br>• Will Continue to use MBCTs in future | UTAUT (Venkatesh *et al.*, 2003) |
| **Adoption** | • Saves time than traditional methods<br>• Reliable than traditional methods<br>• Flexible than traditional methods | UTAUT (Venkatesh *et al.*, 2003) |

**Table 2: Measurement of variables**

Behavioral intentions to use was adopted as a mediating variable between adoption of MBCTs and performance expectancy, effort expectancy, social influence and affordability of MBCTs as presented in Table 2.

## Data analysis and presentation

Data collected was analyzed using the descriptive statistics analysis method which employs the use of percentages, means and frequencies (Janssens *et al*., 2008) and the data then presented in tables. This choice of analysis and presentation is influenced by the simplicity and ease of understanding of results. Analysis of Moments of Structures (AMOS) was used for the analysis of confirmative factor analysis (CFA) and Structural Equation Modelling (SEM) extracting composite reliability (CR), Average Extracted Variance (AVE) and path coefficients. Confirmatory factor analysis was employed to determine the Average Variance Extracted (AVE) for all the variables measured, SEM was further used to examine the causal relationships between different variables. SEM was preferred because it is a suitable statistical analysis strategy given that it is able to reduce measurement error, it is able to test the unobserved and manifest variables in independent relationships and it is also able to assess simultaneous overall tests of model fit (Zaremohzzabieh *et al.,* 2014).

## FINDINGS

The first section of findings presents background characteristics. After, we present descriptive statistics and then inferential statistics. The structural equation model comes last.

## Category of farmers

Data were collected to examine the respondents farming category and analyzed using frequencies and percentages as seen in Table 3.

| Farmer category | Frequency | Percent |
|---|---|---|
| Commercial farmer | 186 | 61.6 |
| Agribusiness trader | 89 | 29.4 |
| Both commercial and Agribusiness | 27 | 8.9 |
| **Total** | **302** | **100.0** |

**Table 3: Category of farmers**

The results in Table 3show that most of the farmers were practicing commercial farming/agriculture (Freq=186, 62%), followed by Agribusiness traders (Freq=89, 29%). Only 27 respondents constituting 9% were practicing both commercial agriculture and agribusiness trade.

This is an indication that most of the farmers concentrate on producing agricultural products and then later sell them to the buyers with some profit. These are followed by agribusiness traders who basically deal in buying and selling these agricultural products.

## Mobile communication devices held by the farmers

Data were also collected to examine the respondents' mobile communication devices held and analyzed using frequencies and percentages as seen in Table 4.

| Mobile devices held | Yes | | No | |
|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage |
| Cell phone | 221 | 73.2 | 81 | 26.8 |
| Smart phones | 122 | 40.4 | 180 | 59.6 |
| Tablet PC | 14 | 4.6 | 288 | 95.4 |
| Other mobile communication devices | 2 | 0.7 | - | - |

**Table 4: Mobile communication devices held by farmers**

The results in Table 4 indicate that majority of the respondents owned cell phones (Freq=221, 73.2%), these were followed by smart phones (Freq=122, 40.4%). A total of 14 respondents constituting 4.6% held tablet PCs and only 2 owned other unspecified mobile communication devices (0.7%).

## Use of the mobile communication devices

Data were collected to examine the use of mobile communication devices held by the respondents and analyzed using frequencies and percentages as seen in Table 5.

| Use of the mobile device | Yes | | No | |
|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage |
| Making calls | 302 | 100 | - | - |
| Texting/SMS | 173 | 57.3 | 129 | 42.7 |
| Surfing the internet | 126 | 41.7 | 176 | 58.2 |
| Other uses (calculation) | 6 | 2 | - | - |

**Table 5: Use of the mobile communication devices**

Results from Table 5 indicate that all the farmers used their mobile devices to make calls (Freq=302, 100%), followed by texting/SMS reported at (Freq=173, 57.3%), a total of 126 respondents constituting 41.7% used their mobile devices for surfing the internet and other uses constituted (Freq=6, 2%). These results therefore show that most commercial farmers use their mobile devices for making calls, texting and surfing than for other uses such as calculations.

## Agricultural Market Information Needs

Data were collected to examine the agricultural market information needs of respondents and analyzed using frequencies and percentages as seen in Table 6.

| Agricultural Information needs | Yes | | No | |
|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage |
| Agricultural product prices | 217 | 71.9 | 85 | 28.1 |
| Availability of market | 297 | 98.3 | 5 | 1.7 |
| Availability of fertilizers | 86 | 28.5 | 216 | 71.5 |
| Accessibility to storage facilities | 68 | 22.5 | 234 | 77.5 |
| Farm input availability | 76 | 25.2 | 226 | 74.8 |
| weather reports | 83 | 27.5 | 219 | 72.5 |
| Other agricultural information needs | 6 | 2 | | |

**Table 6: Farmer's agricultural marketing information needs**

The results in Table 6 indicate that most of the farmers reported the need for information on availability of market for their agricultural produce (Freq=297, 98.3%). This was followed by the need for information on agricultural product prices (Freq=71.9%, 72%). A total of 86 respondents constituting 29% needed information on availability of fertilizers. Only 83 respondents (27.5%), 76 respondents (25.2%), 68 respondents (22.5%) and 6 respondents (2%) needed weather reports, farm input availability, information on accessibility of storage facilities and other information needs respectively.

The results shown in Table 6 therefore indicate that the most sought out for information for the purposes of decision making by the commercial farmers is availability of market, followed by agricultural product prices, availability of fertilizers and weather reports respectively. Whereas the least sought out for information were other information needs specified by the farmers like available transport facilities, quality agriculture produce and quality seeds. This was followed by accessibility to storage facilities and availability of farm input respectively.

## MBCTs used to access agricultural market information

Data were collected to examine MBCTs used by the respondents to access agricultural market information. This data was analyzed using frequencies and percentages as seen in Table 7.

| MBCTs used | Yes | | No | |
|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage |
| SMS / text based channel | 129 | 42.7 | 173 | 57.3 |
| Social media channels (Facebook, twitter, WhatsApp) | 94 | 31.1 | 208 | 68.9 |
| Mobile Agricultural applications | 16 | 5.3 | 286 | 94.7 |
| I do not use the above technologies | 139 | 46 | 163 | 54 |

**Table 7: MBCTs used to access agricultural market information**

The results in Table 7 show that most of the farmers were reported not to be using the above mentioned MBCTs as seen in Table7 (Freq=139, 46%). 129 respondents constituting 42.7% were reported to be using the SMS/text based channel, followed by 94 respondents (31.1%) who indicated to be using social media channels like Facebook, twitter and WhatsApp. Only 16 respondents (5.3%) used mobile agricultural applications (mobile agricultural apps).

Results indicate that majority of the commercial farmers were not using mobile-based communication technologies. Other than SMS texting, few were using social media channels and the mobile agricultural applications.

## Descriptive statisticsof the study variables

Descriptive statistics for study variables Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Affordability, Behavioral Intentions and Adoption were performed using mean and standard deviation. Data was collected for each of the study variables in Tables 8-14 using a five point likert scale were where 1 = strongly disagree, 2 = disagree, 3 = not sure, 4 = agree and 5 = strongly agree. The questionnaire items in each study variable measured whose means are greater or equal to 4.5 implied that the responses are tending towardsstrongly agree. Those whose means are 3.5 and 4.5 imply that the responses are tending towardsagree; whereas those questionnaire items whose means are between 2.5 and 3.5 indicate uncertain responses meaning that respondents are not sure of certain questions asked. Questionnaire items whose means are less than 2.5 implies that responses are tending towards disagree and 1.5 below meaning responses are tending towards strongly disagree.

| Code | Factor | Mean | Std. Deviation | Meaning |
|---|---|---|---|---|
| PE1 | I believe using MBCTs is time saving | 4.33 | .504 | Agree |
| PE2 | I expect to access my agricultural product prices using MBCTs | 3.83 | .778 | Agree |
| PE3 | I expect to disseminate my agricultural product prices using MBCTs | 3.77 | .811 | Agree |
| PE4 | If I use MBCTs, I will increase my chances of getting accurate and reliable agricultural information | 3.90 | .829 | Agree |

*Analysis N=302*

**Table 8: Descriptive statistics for Performance expectancy**

The results in Table 8 indicate that the respondents agreed with the questionsPE1 (mean=4.33), PE2 (mean=3.81), PE3 (mean=3.77), PE4 (mean=3.90). Their response therefore implied MBCTs can enable farmers to access and disseminate accurate and reliable agricultural market informationin a very timely manner.

| Code | Factor | Mean | Std. Deviation | Meaning |
|---|---|---|---|---|
| EE1 | I think it is easy to use MBCTs to access agricultural market information | 4.23 | .508 | Agree |
| EE2 | I think it is easy for me to become skilful when using MBCTs | 3.76 | .787 | Agree |
| EE3 | I think using MBCTs is clear and understandable | 4.04 | .698 | Agree |
| EE4 | I expect that using MBCTs will be easy to learn | 4.02 | .546 | Agree |

*Analysis N=302*

**Table 9: Descriptive Statistics for effort expectancy**

The results in Table 9 indicate that the respondents agreed with the questions EE1 (mean=4.23), EE2 (mean=3.76), EE3 (mean=4.04) and EE4 (mean=4.02). It therefore implied that MBCTscan be used by the commercial farmers in a more effortless manner given that they are easy to use and easy to learn. Therefore, farmers can easily learn how to use mobile applications to perform their agricultural marketing transactions.

| Code | Factor | Mean | Std. Deviation | Meaning |
|---|---|---|---|---|
| SI1 | My social groups encourage me to use MBCTs | 4.17 | .552 | Agree |
| SI2 | My family and relatives encourage me to use MBCTs | 4.22 | .581 | Agree |
| SI3 | People who influence my behaviour think I should use MBCTs for agricultural information access | 3.97 | .649 | Agree |

*Analysis N=302*

**Table 10: Descriptive Statistics for social influence**

The results in Table 10 indicate that the respondents agreed with the questions SI1 (mean=4.17), SI2 (mean=4.22) and SI3 (mean=3.97). It therefore implied that important family, friends, relatives and those people who can influence the farmers' behaviour can easily inspire the commercial farmers to adopt MBCTs to perform their agricultural marketing transactions.

| Code | Factor | Mean | Std. Deviation | Meaning |
|---|---|---|---|---|
| FC1 | The government encourages the use of MBCTs for agricultural information access and dissemination | 3.16 | .871 | Not sure |
| FC2 | Having internet access will influence me to use MBCTs | 3.84 | .761 | Agree |
| FC3 | I believe the government provides training services for using MBCTs | 2.69 | .992 | Not sure |
| FC4 | I have the knowledge to use MBCTs | 2.01 | .226 | Disagree |

*Analysis N=302*

**Table 11: Descriptive Statistics for facilitating conditions**

The results in Table 11 indicate that the respondents were uncertain on questions FC1 (mean=3.16) and FC3 (mean=2.69) about facilitating conditions; meaning that they were not sure whether government encourages and provides training services in the use of MBCTs in agricultural information dissemination. The respondents also disagreed with question FC4 (mean=2.01) meaning that they are not knowledgeable with MBCTs. However, they agreed with question FC2 (mean=3.84) implying that with availability of internet services can influence them to adopt MBCTs.

| Code | Factor | Mean | Std. Deviation | Meaning |
|---|---|---|---|---|
| AF1 | I think service providers charge less when I use MBCTs to access agricultural information. | 2.23 | 1.032 | Disagree |
| AF2 | It is less costly to use MBCTs to access agricultural marketing information | 3.65 | 1.030 | Agree |
| AF3 | I think it is cheaper to acquire a mobile communication device | 2.91 | 1.020 | Not sure |

*Analysis N=302*

**Table 12: Descriptive Statistics for affordability of MBCTs**

The results in Table 12 indicate that the respondents disagreed with question AF1 (mean=2.23) meaning that service providers are charging high fees on using MBCTs. The respondents however agreed with question AF2 (mean=3.65) implying that MBCTs can be less costly if service providers consider to reduce on their charges. The respondents were uncertain on questions AFF3 (mean=2.91).

| Code | Factor | Mean | Std. Deviation | Meaning |
|---|---|---|---|---|
| BIU1 | I predict I would use MBCTs to access agricultural market information | 4.08 | .444 | Agree |
| BIU2 | I will recommend others to use MBCTs to access agricultural market information | 4.30 | .519 | Agree |
| BIU3 | I intend to continue using MBCTs to access agricultural market information in the future | 4.25 | .536 | Agree |

*Analysis N=302*

**Table 13: Descriptive Statistics for behavioural intention use**

The results in Table 13 indicate that the respondents agreed with the questions BIU1 (mean=4.08), BIU2 (mean=4.30) and BIU3 (mean=4.25).It therefore implied that commercial farmers are willing to use these MBCTsnow and in future and they would also recommend their friends to use these MBCTs.

| Code | Factor | Mean | Std. Deviation | Meaning |
|---|---|---|---|---|
| AD1 | It will be reliable to use MBCTs than using the traditional channels like radio, newspapers, magazines, friends, etc. | 4.39 | .604 | Agree |
| AD2 | Using MBCTs will be more flexible than the traditional agricultural information access channels | 4.33 | .532 | Agree |
| AD3 | Using MBCTs saves time | 4.38 | .365 | Agree |

*Analysis N=302*

**Table 14: Descriptive Statistics for adoption of MBCTs**

The results in Table 14 indicate that the respondents agreed with the questions AD1 (mean=4.39), AD2 (mean=4.33) and AD3 (mean=4.38). It therefore implied that commercial farmers agree that mobile-based communication technologies are more reliable, flexible to use and time saving than the traditional agricultural marketing channels like radios, newspapers, magazines, friends, among others. They would therefore, use the mobile communication platforms like SMS/messaging, social media platforms, custom made mobile applications for accessing and disseminating agricultural market information than the traditional means.

## Normality test of the study variables using Skewness and Kurtosis

Skewness and Kurtosis test was carried out on the study variables to test for normality as seen in Table 15.The Unified theory of acceptance and use of technology was built on linear relationships and it was also based on the dependent variable data being normally distributed. Therefore, normality test of the data was conducted so as to conform to the UTAUT theory.

| | N | Skewness | Standard Error | Kurtosis | Standard Error |
|---|---|---|---|---|---|
| Performance Expectancy | 302 | 0.001 | .140 | -0.577 | .280 |
| Effort Expectancy | 302 | 0.196 | .140 | -0.047 | .280 |
| Social Influence | 302 | -0.531 | .140 | 0.875 | .280 |
| Facilitating Conditions | 302 | -0.089 | .140 | -0.192 | .280 |
| Affordability | 302 | -0.112 | .140 | 0.419 | .280 |
| Behavioral Intentions | 302 | 0.124 | .140 | 0.384 | .280 |
| Adoption | 302 | -0.207 | .140 | -0.564 | .280 |

**Table 15: Skewness and Kurtosis**

The results in the Table 15 on skewness indicate statistics ranging from (-0.531 to 0.196) which are within the recommended range of (-1 to +1) implying that the study variables are fairly normally distributed. Kurtosis values range from (-0.577 to 0.875) which are within the range of (-1 to +1) Implying fairly normal distribution of the study variables. According to Cisar *et al.* (2010), when the skewness statistics are ranging within (-1 to +1), the variables are said to be in normal distribution.

## Normality test of the study variables using the Kolmogorov-Smirnov statistics

In addition to the skewness and kurtosis test, Kolmogorov-Smimov statistics was also used to test for normality since the sample was more than 200. This test was carried out with the aim of determining the level of significance of the differences from a normal distribution (Hair *et al.,* 2010). Results are shown in Table 16.

| Variable | Statistic | df | Sig. |
|---|---|---|---|
| Performance Expectancy | .130 | 302 | .000 |
| Effort Expectancy | .191 | 302 | .000 |
| Social Influence | .251 | 302 | .000 |
| Facilitating Conditions | .156 | 302 | .000 |
| Affordability | .198 | 302 | .000 |
| Behavioral Intentions | .291 | 302 | .000 |
| Adoption | .261 | 302 | .000 |

**Table 16: Kolmogorov-Smirnov statistics**

Results in the Table 16 indicate that the data is not fairly normally distributed since the sig. is < 0.05. Transformation of the data was carried out using the natural log transformation and other power functions like square root transformation, box cox power transformation, however, the data still remained insignificant (P<0.05) and thus not fairly normally distributed. It is noted that results from the skewness-kurtosis tests and Kolmogorov-Smimov statistics differ, therefore the skewness and kurtosis test results and graphical analysis were based on for further analysis. According to skewness and kurtosis tests, data were fairly normally distributed and appropriate for structural equation modelling

## The initial SEM model for the study variables

Figure 2 presents a model with all variables that were studied and how they influence adoption. These includeperformance expectancy; effort expectancy; social influence; affordability; behavioural intentions to use; facilitating conditions; adoption.

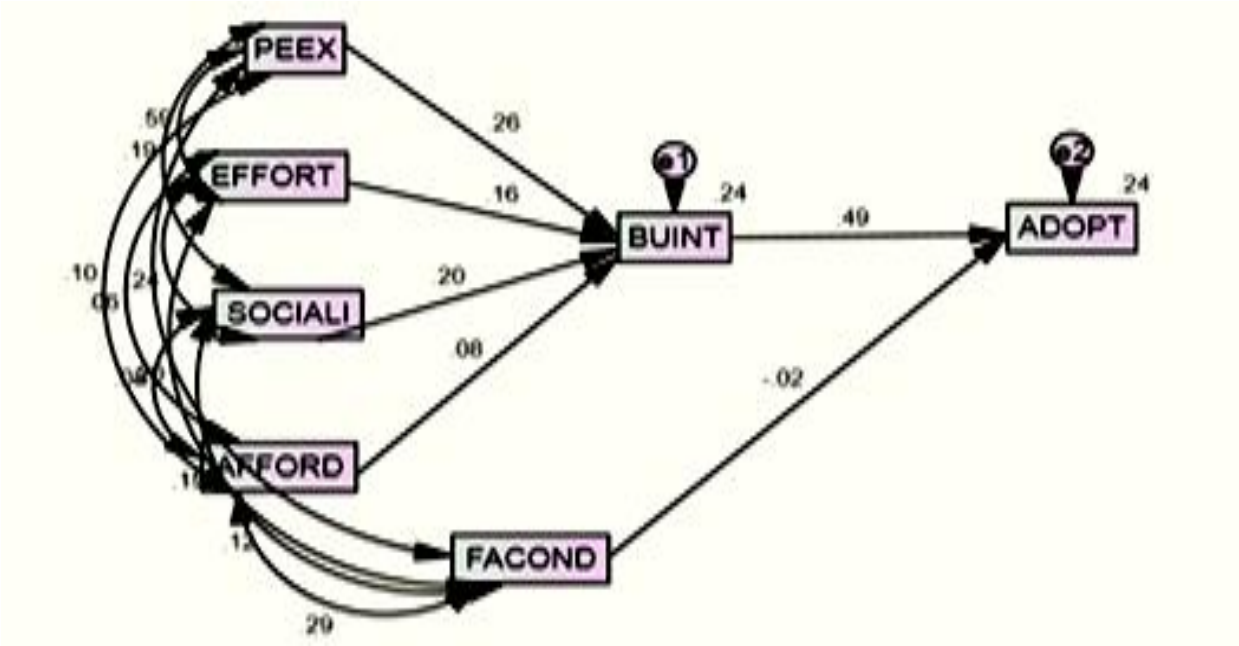


**Figure 2: Initial SEM Observed Model Variables**

***Note**; PEEX= Performance expectancy; EFFORT=Effort expectancy; SOCIALI=Social Influence; AFFORD=Affordability; FACOND=Facilitating conditions; BUINT=Behavioural Intentions to use; ADPT=Adoption*

From figure 2, the initial model generated a Chi-square of 40.490 at a probability level = 0.000 for 5 degrees of freedom suggesting poor and unacceptable model fit. However, from other model fit indices, the goodness of fit of the model (GFI) was 96.5% and the adjusted goodness of fit index (AGFI) was 80.6% implying that the SEM model fitted the data well. The Baseline Comparisons were NFI=0.897, RFI=0.569, IFI=0.909, TLI=0.601, CFI=0.905 and RMSEA=0.154, suggesting a fairly good model fit. It can be therefore be said that performance expectancy significantly influences behavioural intentions to use (path coefficient = 0.265, p<=0.01), effort expectancy significantly influences behavioural intentions to use (path coefficient = 0.163, p<=0.01), social influence positively influences behavioural intentions to use (path coefficient = 0.204, p<=0.01), affordability does not significantly influence behavioural intentions to use given its (path coefficient = 0.076, p>0.05), facilitating conditions also does not have a significant relationship with adoption with (path coefficient = -0.020, p>0.05) and finally behavioural intentions to use which acts a mediating variable has a significant influence on adoption with (path coefficient = 0.489, p<=0.01) as presented in Table 17.

| | | | Estimate | S.E. | C.R. | Standardized Regression Weights estimates | P |
|---|---|---|---|---|---|---|---|
| BUINT | <--- | EFFORT | .135 | .052 | 2.589 | .163 | .010 |
| BUINT | <--- | PEEX | .188 | .045 | 4.227 | .265 | *** |
| BUINT | <--- | SOCIALI | .171 | .044 | 3.916 | .204 | *** |
| BUINT | <--- | AFFORD | .040 | .027 | 1.499 | .076 | .134 |
| ADOPT | <--- | BUINT | .599 | .062 | 9.653 | .489 | *** |
| ADOPT | <--- | FACOND | -.013 | .033 | -.393 | -.020 | .694 |

*** *p<0.01*

**Table 17: Regression Weights: (Group number 1 - Default model)**

Table 17 presents regression weights and path coefficients on the relationships between behavioural intentions (BUINT) and effort expectancy (EFFORT); behavioural intentions (BUINT) and performance expectancy (PEEX); behavioural intentions (BUINT) and social influence (SOCIALI); behavioural intentions (BUINT) and Affordability (AFFORD); adoption (ADOPT) and behavioural intentions (BUINT); adoption (BUINT) and Facilitating conditions (FACOND).

## The final Mobile-based communication adoption model for agricultural market information dissemination

This model was obtained after removing the insignificant variables of affordability of MBCTs (p>0.05) and facilitating conditions (p>0.05) which were not significantly predictingBehavioral intention to use and adoption respectively as shown in Figure 3.

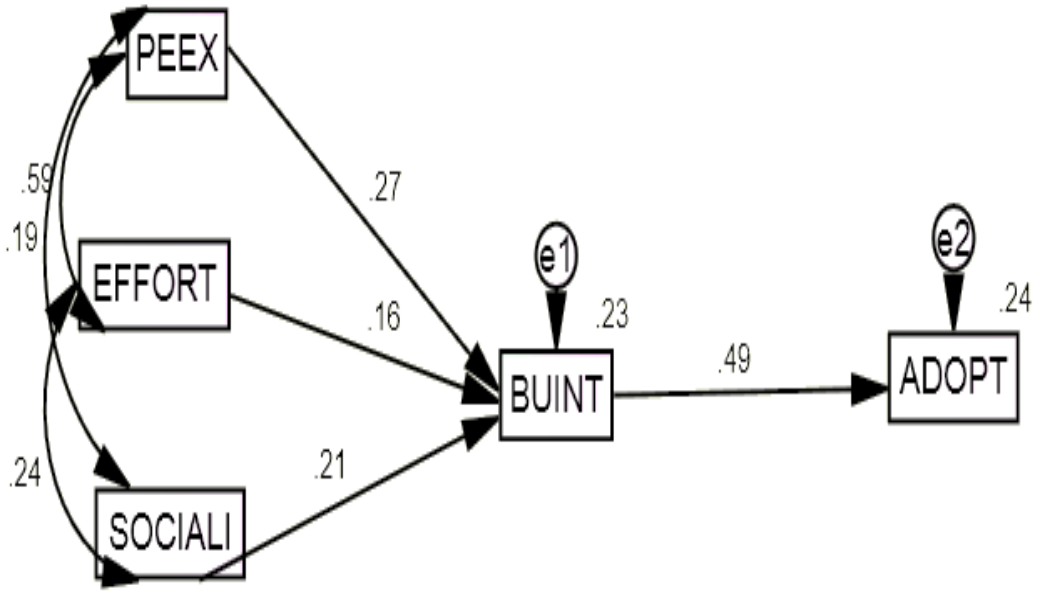


**Figure 3: Mobile-based agricultural marketing adoption model**

***Note***; *PEEX= Performance expectancy; EFFORT=Effort expectancy; SOCIALI=Social Influence; BUINT=Behavioural Intentions to use; ADPT=Adoption*

From Figure 3, the final model generated a Chi-square of 37.651 at a Probability level = 0.210 with 3 degrees of freedom. Probability value is >0.05 and this suggests a good model fit. The goodness of fit of the model (GFI) was 97.8% and the adjusted goodness of fit index (AGFI) was 96.5% implying that the SEM model fitted the data well. The Baseline Comparisons were NFI=0.962, RFI=0.949, IFI=0.957, TLI=0.958, CFI=0.977 and RMSEA=0.76 indicating very good and acceptable model.

From the model in Figure 3, it can be concluded that there was a positive significant relationship between Performance Expectancy and Behavioral Intentions to use (Path coefficient = 0.272, p<0.01) as shown in Table 18. This implied that Performance Expectancy influences Behavioral Intentions to use. Therefore, the more useful MBCTs is to the farmers, the more there behaviour is influenced to adopt these technologies. There was a positive significant relationship between Effort Expectancy and Behavioral Intentions to use (Path coefficient = 0.163, p<=0.01) as shown in Table 18. This implied that Effort Expectancy influences Behavioral Intentions to use. Therefore, the more effortless it is to use mobile-based communication technologies to the farmers, the more there behaviour is influenced to adopt these channels/ technologies. There was a positive significant relationship between social influence and Behavioral intention to use (Path coefficient =0.209, p<0.01) as shown in Table 18. This implied that social influence influences Behavioral intention to use. Therefore, the more farmers are socially influenced by the people important to them, the more their behaviour is influenced to adopt these MBCTs. There was a positive significant relationship between Behavioral intention to use and adoption of MBCTs (Path coefficient = 0.487, p<0.01) as shown in Table 18. This implied that Behavioral intention to use influences adoption of MBCTs. Therefore, the more farmers' behaviours are positive towards the use of MBCTs, the more they are influenced to adopt them.

| relationship | | | Estimate | S.E. | C.R. | Standardized Regression Weights estimates | P |
|---|---|---|---|---|---|---|---|
| BUINT | <--- | EFFORT | .134 | .052 | 2.566 | .163 | .010 |
| BUINT | <--- | PEEX | .194 | .045 | 4.345 | .272 | *** |
| BUINT | <--- | SOCIALI | .175 | .044 | 4.004 | .209 | *** |
| ADOPT | <--- | BUINT | .597 | .062 | 9.677 | .487 | *** |

*** *p<0.01*

**Table 18: Regression Weights: (Group number 1 - Default model)**

Table 18 presents regression weights and path coefficients on the relationships between behavioural intentions (BUINT) and effort expectancy (EFFORT); behavioural intentions (BUINT) and performance expectancy (PEEX); behavioural intentions (BUINT) and social influence (SOCIALI); adoption (ADOPT) and behavioural intentions (BUINT).

It can therefore be said that,

Eqn.1:- ADOPT= 0.49 BUINT+ 0.27 PEEX + 0.24

Eqn.2:- ADOPT = 0.49 BUINT+ 016 EFFORT + 0.24

Eqn.3:- ADOPT = 0.49 BUINT+ 0.21 SOCIALI + 0.24

Eqn.4:- BUINT= 0.27 PEEX + 0.21 SOCIALI + 0.16 EFFORT + 0.23

Eqn.5:- ADOPT = 0.49 BUINT+ 0.27 PEEX + 0.16 EFFORT + 0.21 SOCIALI + 0.24

## DISCUSSION OF FINDINGS

The study sought to establish the relationship between Performance Expectancy and Behavioral Intentions to use, Effort Expectancy and Behavioral intentions to use, Social Influence and Behavioral Intentions to use, Facilitating Conditions and Adoption of MBCTs, Affordability of MBCTs and Behavioral Intentions to use and finally Behavioral Intentions to use and Adoption of MBCTs.

### The relationship between Performance Expectancy and Behavioral Intention to use

The findings revealed a positive significant relationship between Performance Expectancy and Behavioral Intention to use MBCTs which implied that Performance Expectancy positivelyinfluences Behavioral Intention to use. This finding informs us of the important role that mobile-based communication technologies play in influencing people's behaviours. This finding is in line with earlier scholars who argued that expected benefits in the use ofmobile-based communication technologies could positively change people's behaviour towards using them (Malima *et al*. 2015; Alotaibi *et al.*, 2013). Zmijewska *et al.* (2005) in his study of mobile technology adoption asserts that users will be pulled towards using mobile technologies only if they perceive it to be beneficial in their daily lives, one respondent in his study for instance argued that she would use mobile technologies because they are time saving. Venkatesh *et al. (2003)* in his study of the UTAUT model particularly confirmed the theory that performance expectancy could positively and significantly influence Behavioral intentions to use a particular technology product.

### The relationship between Effort Expectancy and Behavioral Intention to use

SEM coefficient on the relationship between Effort Expectancy and Behavioral Intention to use were positive. This means that once users are able to use a technology with minimal effort, their behaviour will change in favour of adoption. This argument had been posited by Venkatesh *et al.* (2003) in his UTAUT model, and supported by Akbar (2013).It was also evidenced in Ramli *et al.* (2013)'s study of Influence of Behavioral factors on mobile phone usage that farmers will embark on using mobile phones only if they are easy to use and if it is joyous to use, however, they will avoid using them when they now become difficult to use and it is not enjoy full to use them anymore. Kang (2014) also noted that ease of use under Effort Expectancy is the top priority in the use of mobile applications.

### The relationship between Social Influence and Behavioral Intention to use

A positive significant relationship was also seen between social influence and Behavioral intention to use. This implied that users' behaviour can easily be influenced by their social environment and people close to them to easily adopt mobile-based communication technologies. This is in line with Venkatesh *et al.* (2003) UTAUT model and other scholars(Alotaibi *et al.*2013; Connolly*et al.* 2010; Davis1989)who found social influence to be a key factor in influencing Behavioral intention to use. Some studies however, have found social influence not to significantly affect Behavioral intentions to adopt and use mobile technologies and internet (Katz *et al.,* 2003)but these are just few of those studies given that majority of the studies conducted show social constructs/social pressures to significantly influence Behavioral intentions to use mobile technologies. In his study, Ramli *et al*(2013) pointed out that certain individuals will be influenced to adopt and use mobile technology products because of the perceptions they have that the people close to them will adopt or have adopted them and are going to use them.

### The effect of Behavioral Intention to use on Adoption of MBCTsin agricultural market information dissemination

The results also indicated a significant positive relationship between Behavioral intention to use and adoption of MBCTs. It therefore means that oncefarmers' behaviours are positive towards the use of MBCTs, they will be influenced to adopt MBCTs. The results are in agreement with Venkatesh *et al*. (2003).Similarly, scholars like (Malima *et al.,* 2015; Kahenya *et al.*,2014; Fishbein *et al.,* 1975) also agree with the findings of this study. Therefore, people who exhibit positive attitude towards adoption and use will definitely adopt and use technology products but those who show negative attitude will definitely hesitate to adopt and use technologies (Ramli*et al.*, 2013).Further, Binde *et al.* (2013) argue that BIUis positively influenced by PE, EE and SI.

### Affordability and Behavioral intentions to use; Facilitating conditions and adoption of MBCTs

Earlier studies had argued for the relationship between affordability of MBCTs and Behavioral intentions to use (Jambulingam 2013; Nyamba *et al*., 2012; Mallenius *et al*., 2007; Wagner, 2007) and facilitating conditions and adoption of

mobile-based communication technologies (Kahenya *et al*., 2014; Jambulingan 2013; Islam *et al*. 2011; Venkatesh *et al*., 2003).However, these relationships were dropped by the structural equation model. This therefore implied that despite the affordability of these MBCTs and the presence of facilitating conditions, commercial farmers' Behavioral intentions may not easily be influenced to adopt the mobile-based communication technologies for agricultural information access and dissemination.

## Conclusion

The study established a significant positive relationship between the independent variables of Performance Expectancy, Effort Expectancy, Social Influence and the dependent variable Behavioral Intentions to use as well as Behavioral intentions to use and adoption of MBCTs which is also a dependent variable. The study further found a confirmatory significant positive relationship between Performance expectancy and Behavioral intentions to use, Effort Expectancy and Behavioral Intentions to use, Social Influence and Behavioral intentions to use and finally behavioral intentions to use and the adoption of MBCTs.

For practical purposes, the strong influence of performance expectancy on behavioural intentions to use MBCTs for agricultural purposes therefore implies that governments and service providers have greatly improved on the functionality of the mobile technologies in that they are tailored for agricultural purposes, farmers are being communicated to about the perceived benefits of using the various MBCTs like SMS platforms on enhancing their agricultural marketing power. There is need for the benefits to be substantial as emphasised by Alaiad *et al.* (2013). Effort expectancy had a significant influence on behavioural intentions to use and therefore, it implied that service providers are shifting focus/ need to shift focus on making these MBCTs such as social media platforms, agricultural applications to be easier to use and transact. Farmers are finding these technologies less stressful in terms of learning to use them. Social influence also has a strong influence on behavioural intentions to use and therefore, there is need for service providers to identify individuals who have a strong personal influence on others and then motivate them to become advocates/promoters of their mobile technology products so as to ensure that farmers get to use them. Given that behavioural intentions to use is a strong predictor of adoption of MBCTs, service providers can employ better promotional strategies that can further strengthen influence offarmers' behavioural intentions to adopt these technologies in their agricultural transactions.

The variable affordability of MBCTs was used to extend UTAUT, however, it did not have a significant influence on behavioural intentions to use as discussed earlier in discussions. This implied that the MBCTs were costly to use and hence affordability could not influence commercial farmers' behavioural intentions to use these technologies. The findings also clearly indicate that there was no significant relationship between Facilitating conditions and Adoption of MBCTs for agricultural information access and dissemination by commercial farmers. This implied that there was limited government support rendered to the commercial farmersand therefore they could not be influenced to adopt MBCTs for their transactions.

Therefore, given that the commercial farmers disagree on the availability of facilitating conditions to enable adoption ofMBCTs in their agricultural marketing transactions, it implies that government and service providers are putting less emphasis on providing training services to farmers on how to use these technologies, internet access provision is still poor, service providers are not providing customer service representatives to answer to the questions of farmers when they are faced with problems in using MBCTs. Farmers also did not believe that MBCTs were affordable to them and hence they are costly in terms of usage. Therefore, service providers are not subsidising on their costs of sending SMS messages and the calling rates as well, internet costs are still high hence discouraging the commercial farmers from using social media platforms for their transactions. This is making MBCTs to be unaffordable to the farmers hence discouraging their adoption of these technologies in agricultural market information dissemination and access.

The study provides a model explaining the adoption of MBCTs for agricultural market information dissemination. This study expands on the applicability of UTAUT as a technology adoption theory to the domain of MBCTs in agricultural marketing. Empirical evidence for the efficacy of the constructs in MBCTs adoption in agricultural marketing is also provided and the UTAUT model was extended to include an additional variable "affordability of mobile-based communication technologies due to its significance in influencing peoples intentions to adopt as evidenced in prior studies of Jambulingam (2013), Nyamba *et al*. (2012), Mallenius *et al*. (2007), and Wagner (2007). It should also be noted that countries respond differently to adopting new innovative technologies and this difference is caused by the divergent macro-level economic indicators and the social-economic indicators in different countries (Indrawati *et al.,* 2010). It is due to this fact that this study was carried out in Uganda.

## Recommendations

This study provides baseline information on factors that influence the adoption of MBCTs for agricultural information access and dissemination by commercial farmers in Uganda. Performance expectancy and effort expectancy were found to significantly influence farmers' behavioural intentions to use mobile-based communication technologies. Therefore, increasing on the functionality and the ease of use of these MBCTs will help to improve on the Behavioral intentions to use these technologies for agricultural information access and dissemination. Developers and service providers can increase on the functionality of MBCTs by developing agricultural information access and dissemination tools on familiar devices like the cell phones and smart phones given that they were the most used and owned types of phones by the commercial farmers. Further, using these tools can be made easy for the commercial farmers by providing training programs to the farmers on how to effectively use these mobile-based communication technologies to their benefit.

Behavioral intention to use was found to be the strongest predictor of adoption of MBCTs in agricultural market information access and dissemination. Therefore, In order to increase on the rates of adoption of these MBCTs, there is need for service providers to provide nationwide sensitization campaigns on the benefits of using MBCTs like social media, SMS channels, custom made agricultural mobile applications, among others so that these farmers get to use them more often while transacting their trade and also use these channels/technologies for accessing accurate and reliable agricultural market information. It is also imperative that the government together with the mobile network service providers work towards reducing on the internet bundle tariffs so as to enhance the use of internet applications and social media in agricultural information access and dissemination.

Social influence was found to also have a significant positive influence on behavioural intentions to use MBCTs for accessing and disseminating agricultural marketing information. Therefore, promotion of MBCTs such as social media, mobile applications, SMS, and mobile internet should be intensified especially with the help of close relatives and family as well as close friends of the farmers, agricultural association leaders, among others. This is because social influence factors such as peers, close family friends, close family members can easily influence one's decision/ behavioural intentions to adopt MBCTs (Ramli *et al.,* 2013). In their study of social influence on mobile phone adoption, De-Silva *et al.* (2009) argued that coming up with social policies by the operators or even government which enhance network marketing can help to improve on the strength and relevance of social influence. Thus friends and families of commercial farmers can be given benefits by the service providers for bringing on board their friends to use the service/ technology or for promoting their services.

## Limitations of the study

While applying the Unified Theory of Acceptance and Use of technology, the study did not include the moderating factors of Age, Gender and Experience as moderators of Performance expectancy, Effort expectancy, Social influence and Facilitating conditions in studying the factors influencing adoption of MBCTs for agricultural market information access and dissemination. Future research can, however, build upon the findings of this research and bring on board the moderating factors to test as suggested by Venkatesh *et al*. (2003)

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