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Full Length Research Paper

Collective action for improved market access among smallholder maize farmers in Masindi District, Uganda

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Smallholder farmers dominate maize production in Uganda. They produce limited quantities of the crop and market individually. Collective action offers an opportunity of reducing transaction costs, increasing bargaining power thus making it possible to contract with large buyers for better prices. Masindi Seed and Grain Growers Association Limited (MSGGL) with help from Uganda Development Trust (UDET), African Development Bank (ADB) and Masindi District Local Government constructed a 3000 metric tons store to help farmers bulk and get better prices. However, the store has been underutilized since 1999 leaving out farmers on the benefits of collective marketing. A survey of 253 maize farmers forming two strata of participants and non-participants was employed. Descriptive statistics are used to explain preference for each marketing option while the Tobit model analyzed factors for intensity of participation. Lack of trust, stringent requirements, delayed payments, absence of groups, lack of information, high costs of marketing, lack of interest, low price incentive and time consumption explain poor participation in collective marketing. Better prices, reliable markets, availability of training and extension, availability of credit and availability of input loans encourage collective marketing. Price of maize offered at the collective centre, distance to the marketing centre, land size, income of the farmer and age of the farmer influence the intensity of participation in collective marketing. There is need to establish more collection centres, improve road networks and quality regulation to ensure price incentives for better quality maize grain.

Key words: Collective action, market access, smallholder maize farmers.

INTRODUCTION

Marketing is a prime mover and stimulator of production as it gives point and purpose to the production process. The provision of secured market outlets gives an incentive to increased and diversified production and also a shift from subsistence to market oriented farming (Bibangambah, 2002). Thus, the opportunity for smallholder farmers to increase their incomes from agricultural undertakings, natural resource management

and other enterprises largely depend on their ability to fully participate in the marketplace exchanges. However, several internal and external challenges are encountered by smallholder farmers making it complicated for them to participate in these market place exchanges. These challenges include pervasive imperfections that characterize markets in the developing countries, lack of information on technologies and prices, high transaction

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costs, credit constraints, the rising numbers of free trade arrangements affecting both national and international commodity markets and competition not only from local cohorts but also from farmers from other countries together with domestic and international agribusiness ventures (Markelova and Meinzen, 2006).

Smallholder farmers are usually isolated from markets, have limited selling alternatives, lack contact with downstream buyers, are unable to enter into contractual relationships due to lack of trust and are usually obliged to accept the price offered by the buyers (UNCTAD, 2015). These challenges can be addressed by use of collective action in agricultural markets by helping these farmers reduce transaction costs for their market exchanges, obtain necessary market information, secure access to new technologies and tap into high value markets which would offer them a competitive advantage over large farmers and agribusinesses (Markelova and Meinzen, 2006). Collective action offers a practical solution to smallholder farmers' marketing challenges. If well-coordinated, it would help smallholder farmers to meet quality and quantity requirements in modern markets through effective use of post-harvest technologies and mobilization of the majority smallholder farmers to participate thus enhancing access to better markets (Mango et al., 2017).

However, collective action has a problem of inherent contradictions that exist between members in the group and between the groups themselves ranging from trust problems and opportunistic tendencies within the groups which pose sustainability challenges (Ton, 2008). It has been reported that among the reasons as to why farmers do not act collectively include; lack of knowledge about who to collaborate with (29%), difficulty to agree as a group and thus collaboration being seen as a waste of time (22%) (Archambault, 2004). In a well-functioning rural market, smallholders like their better endowed peers, can opt to sell their produce in various forms of market exchanges such as local, emerging urban, regional and international, but smallholders encounter quite many entry barriers into any of these markets. Thus collective action is increasingly becoming an important production and marketing strategy for smallholder farmers in developing countries especially in ensuring that they are better placed and remain competitive in the agricultural sector (Mukundi et al., 2013). Farmer groups are important for capacity development, information sharing and rural innovation among smallholder farmers (Raya, 2014). Group contract arrangements help to improve smallholder market power and ensure more equitable distribution of benefits. Also peer pressure through farmer groups may reduce the likelihood of opportunistic behavior in contracting such as side-selling. However, farmer groups are not always successful and there is need to understand the conditions that make collective marketing more useful and viable (Fisher and Qaim, 2011).

Collective marketing has been reported among farmers of potato, coffee, barley, sunflower, rice and maize among the many other crops in Uganda (Mwendya, 2012). However, in most of these enterprises, the group functions are still at a very low level with majority of the farmers still preferring to market individually. Among the maize farmers, for example, progress of group marketing is still very minimal and in one case of supply to WFP which is the largest maize buyer in Uganda, smallholder farmers have only managed to contribute an average of 7% to the total maize procured by the organization yet the organization targets 20-30% in the next five years. It is argued that collective marketing would help farmers increase their market access (Markelova and Meinzen, 2006) and income by about 60% when they collaborate in groups (Naven, 2012). Masindi Seed and Grain Growers Association Limited (MSGGL) with help from Uganda Development Trust (UDET), African Development Bank (ADB) and Masindi District Local Government constructed a 3000 metric tons storage facility to help farmers bulk their produce and sell at better prices (Mwendya, 2012). However, since 1999, the facility has been underutilized with the maximum produce ever received from the farmers just filling slightly more than a half of the facility thus leaving out farmers on the benefits of bulking and collective marketing. Substantial research has been done on enhancing maize productivity, warehouse receipt system and its benefits to maize marketing, market opportunities for maize, institutional arrangements and collective marketing as a form of bulking for better market access by smallholder farmers (Archambault, 2004; UNCTAD, 2015; Mwendya, 2012). However, there is limited research on the determinants of the smallholder maize farmers' choice to market collectively. This study therefore seeks to assess the determinants of the farmers' choice to bulk their produce and market collectively in the maize growing district of Masindi. Specifically 1) To understand why facilities that are sought to be of benefit for collective action are underutilized. 2) To examine farmers' preferences for collective and individual maize marketing. 3) To identify factors that influences the intensity of participation in collective marketing.

LITERATURE REVIEW

For effective performance of smallholder farmer groups, there must be adequate capacity building, realistic demands on the group, voluntary group formation, good internal cohesion and a facilitative legal environment (Ampaire et al., 2013). Group support services from external agents should recognize the changing and diversified needs of smallholder farmers in their different locations (Nyikahadzoi et al., 2013). There is also need to promote greater role of farmers themselves in decision making and implementation of group activities rather than

public and private sector partners' roles exceeding farmer participation levels (Ampaire et al., 2013). Therefore, successful smallholder farmer groups require a strong business rationale and relationship with the private sector that the demands placed on such groups do not exceed the existing group management skills and financial capacities, the right internal cohesion and group dynamics and a supportive legal framework. Group dynamics include issues like small sized groups, homogeneity, face to face contact and accountability among members (Naven, 2012; Ampaire et al., 2013). Farmer groups have a greater role to play in smallholder agricultural production but do not provide an easy institutional response to the pressures facing smallholder farmers in a liberalized economy and they should not be seen as a panacea for rural development (Naven, 2012).

Collective marketing can help reduce barriers of entry into lucrative agricultural markets by lowering transaction cost of accessing input and produce markets especially for smallholder farmers who are characterized by producing small quantities of the output (Markelova and Meinzen-Dick, 2009). This form of marketing that involves bulking and collective marketing of the produce improves the share of the consumer price received by smallholder farmers through increased bargaining power and also reducing the share of profit that is available to other market chain players (Giuliani, 2006; Komarudin et al., 2006). According to Nyikahadzoi et al. (2013), smallholder farmers produce unsorted and ungraded outputs in small quantities which attract low prices from buyers who usually prefer large quantities of sorted and graded outputs. These small volumes of output together with transport costs limit smallholder farmers from accessing wholesale buyers and limit the bargaining power of smallholder farmers leaving them at the mercy of itinerant traders who are found of picking the produce from the homes of these farmers at low prices. This is because wholesale buyers are not willing to incur transaction costs that result from buying from many uncoordinated small sellers. Thus such smallholder farmers are caught up in a vicious cycle of semi-subsistence production characterized by low output, low incomes, low savings and low investment. This, therefore, requires smallholder farmers to seek new and innovative ways of competing and surviving in these present day markets which are characterized by borderless economic environment to improve their incomes through utilization of such opportunities (Dorward et al., 2004).

Collective marketing helps reduce cost of getting the product to the market and increases bargaining power of smallholder farmers (Ampaire et al., 2013). It also helps reduce transaction costs and enables smallholder farmers' access services that private sector and government may not be providing or are hard to access in their unitary state (Markelova and Meinzen-Dick, 2009). Collective marketing is one of the institutional

arrangements that can help farmers access production enhancing technologies and investment, agricultural and market information thus increasing their competitive advantage in markets that are increasingly becoming integrated and commercial especially through enabling smallholder farmers to produce the required quantity and quality for a specified market and also helps reduce the share of profit that is available to other market chain players in both output and input markets (Narro et al., 2009). This plays an important role in increasing the profit that smallholder farmers can earn from their production activities through collective marketing.

Theory of collective action

Collective action results from the need for people to collaborate, work and make decisions together so as to achieve a result that is of common interest and wellbeing (Ampaire et al., 2014). Collective action problems are usually of the nature of interdependency among the participants since the efforts of one individual influences the efforts of the other individuals in the group. This calls for the cooperation of all members otherwise if each seeks to maximize their own narrow interests the benefits are not realized and they all remain worse off (Kirsten et al., 2009). The economic theory of collective action is concerned with the provision of services that are collectively consumed. Despite many instances in which individuals would be better off if they worked collectively, the same does not usually emerge mainly because of free-rider problem. The theory of collective action is a useful tool to analyze how to overcome free-rider problems and come up with cooperative solutions for proper management of common use services (Ton, 2008; Kirsten et al., 2009). Local institutional arrangements such as customs and social conventions can help overcome the difficulties of collective action. Important determinants of success in collective action include group characteristics such as size, homogeneity and purpose (Ostrom, 2005). According to Gaspart and Plateau (2002), collective action depends on the characteristics of the people concerned which include; size of the group, the extent of heterogeneity in the group and the social capital of the group and on the characteristics of the environment which include; technical characteristics, economic characteristics and political characteristics. Transaction costs economics is useful in evaluation of collective action through assessing monitoring and enforcement costs together with the aspects of market power (Kirsten et al., 2009).

Factors that influence farmers' participation in collective marketing

Several factors have been reported to be responsible for

the farmers' choice on how to market their produce. These include; distance from household to the collection center, group cohesiveness, size of the executive, size of the group, training of leaders, availability of market at group level and time taken to receive the money after delivery (Fischer and Qaim, 2011; Ampaire et al., 2013). Also transaction costs charged on each farmer for marketing in a group has implications on collective marketing (Mwendya, 2012). Farmers' characteristics like age, level of education, gender, availability of credit and extension, off-farm income, experience in farming, land owned, area under the crop enterprise and distance to the market have also been reported to influence collective action (Omiti et al., 2009; Fischer and Qaim, 2011; Onoja et al., 2012; Mukundi et al., 2013; Raya, 2014).

According to Onoja et al. (2012), gender is a major determinant for the market strategy. The study found out that female farmers have higher chances of taking up new marketing channels because of their availability to attend training sessions that are specific subject oriented. However, Fischer and Qaim (2011) found out that more men embrace group marketing than women because of the fact that men always want to control all the finances from the sale of crops and other businesses. In the study on smallholder farmers and collective action: what determines the intensity of participation, age was found out to be inversely related to the choice of collective marketing. This was because older farmers come with more experience in the marketing process thus come with a lot of mistrust and skepticism towards other group members (Fischer and Qaim, 2011).

According to Omiti et al. (2009), education of the household head influences the decision to market the produce and how to market the same. This is because as education of the farmers increase, the level of commercialization also increases. However, Fischer and Qaim (2011) found out that as education increases, probability to sell under collective arrangement reduces due to increased mistrust and skepticism towards group members. Chirwa (2009) also found that the higher the level of education, the higher the chances of the farmer using more than one marketing channel. This is likely to be as result of the fact that such farmers are more willing to wait for more time in case money for the produce is not paid promptly as is the case for group marketing.

Distance has a profound effect on farm decisions. The distance to the marketing centre limits the choice of any marketing channel to be used by the farmer. Distance is inversely related to the decision to sell in the channel. When the distance to the centre is longer, farmers are discouraged from using the same centre for marketing and market outlets which are nearer to the farmers tend to get more farmers selling their produce to the same outlet (Onoja et al., 2012). According to Fischer and Qaim (2011), short distances to the marketing center lead to higher chances of participating in collective marketing.

This is because closeness to collective marketing center reduces transaction costs and results in better incomes for the enterprise.

Land area planted with the crop influences the decision to market collectively. Very large and very small producers are less likely to sell through groups. This is because very small producers find it not worthwhile to transport their produce to the marketing centers while very large farmers may have more profitable alternatives to sell (Fischer and Qaim, 2011). Time taken to pay for the produce after delivery influences the decision of the farmers to participate in collective marketing. This is because of the time value of money which makes farmers prefer money today rather than another day (Omiti et al., 2009).

Extension services create awareness about the existence of the different marketing strategies that farmers can choose from and the farmers assess which of the alternatives best suit their preferences and circumstances. According to Onoja et al. (2012) access to extension increases the probability of the farmer to participate in collective marketing because such farmers are much more informed about the benefits of collective marketing and the precautions needed to be taken into account. The size of the group is positively related to the level of participation in group marketing because of the higher expected benefits through economies of scale and the expectations of some members to free-ride and benefit from the activities of the group without losing much (Fischer and Qaim, 2011).

METHODOLOGY

Study area

The research was carried out in the major maize producing district of Uganda which is Masindi. In this area farmers have been trained on group marketing and a collection centre at MSGGL established with modern storage facilities to collect and store maize from farmers. However, despite all these efforts by the government and other development partners to get smallholder maize farmers market collectively and take advantage of large buyers and processors, like WFP, a majority of the farmers still market individually with the capacity of the storage facility not fully utilized. The district of Masindi is from mid-western Uganda. It is located in the Western Region of Uganda and lies between 1°22'20"N and 31°22'32"E. The district borders Buliisa in the North, Kiryandongo in the East, Nakasongola in the Southeast, Kiboga in the South, Hoima in the Southwest and the Democratic Republic of Congo in the West. The district lies at an altitude range of 621 to 1,158m above sea level and comprises a total area of 9,326 sq km, of which 8,087 sq km is land, 2,843 sq km is wildlife-protected area, 1,031 sq km is forest reserves, and 799.6 sq km is water. The district is divided into three major climatic (rainfall) zones: high rainfall (>1000 mm), medium rainfall (800-1000mm) and low rainfall (<800 mm). On average, the district receives about 1,304 mm of rainfall annually with annual average temperature of 25°C and soils are favorable for agriculture (Masindi District Environmental Policy, 2009). The district has a diverse ethnic composition of 55 tribes with a total population of 469,865 (50.1% males and 49.9% females), which is about 7.3% of the Western Region's population. The

annual population growth rate is estimated at 5.05% with a population density of 56 persons per sq km, which is much lower than the regional average of 129 persons per sq km. Masindi is relatively poor compared to other districts in Uganda. It is characterized by low household incomes and limited revenue base and agriculture is the core economic activity, with 73.1% of the population engaged in smallholder agricultural activities. About 6.2% of the total farmland is under large scale commercial farming. The district is the leading producer of maize in the region and the third after Iganga and Kapchorwa in the country. Maize also is the major cash crop. Traditional cash crops include tobacco, coffee and cotton (UBOS, 2017).

Sample size determination and sampling method

The sample size was determined using Cochran (1963) formulae;

$$n = (Z^2pq) / e^2 \quad (1)$$

Where n = Sample size; Z = the standard normal deviate at the selected confidence level which is 1.96 for 95% confidence interval. P = Proportion in the target population estimated to have characteristics being measured which is 0.8 for this study (80% of the farmers are smallholders in the district)

$$q = 1 - 0.8 = 0.2$$

e = the desired level of precision (5 to 10%); $n = (1.96^2 * 0.8 * 0.2) / 0.05^2; n = 245$

However, during the interview, more participants were encountered and interviewed resulting in a total sample of 253 smallholder maize farmers. The respondent selected was a household head in the family that produced and marketed maize either collectively or individually. Stratified sampling procedure was used to obtain the sample. The sampling frame was obtained from Masindi Seed and Grain Growers Limited which comprised farmers that were marketing collectively and those marketing individually. From the sampling frame, a sample was then obtained using pairwise matching technique of sample selection. The respondents were paired by virtue of collective and individual marketing. For every farmer selected for interview from the list of farmers participating in collective marketing with MSGGL, another farmer who markets individually would be obtained and interviewed using pairwise matching.

Data collection

Primary data were collected using questionnaires which were administered to selected smallholder maize farmers. The questionnaire was first pre-tested among smallholder maize farmers from Mirya Sub County in Masindi District to ensure that it captures reliable and relevant data. The final revised questionnaire was developed to collect the data required for the survey. The data were collected on farm and farmer characteristics, asset holding, income, marketing channels, forms of marketing and bulking, sale price per kilogram and many other variables at farm level between the months of August and September 2014. Close ended questions were used to capture numerical and quantitative data that link theory to research (quantitative method) and this also enabled the researcher to describe the magnitude of the findings statistically.

Open ended questions were used to record observations and qualitative attributes (qualitative method) also referred to as interpretive research methods, according to Erickson (1986). Qualitative data provided deeper meanings of the statistical data generated by quantitative methods thus enabled the researcher to better understand subjective realities of respondents. Additional

data were also obtained from key stakeholders, farmer organizations and other development organizations especially on collective maize marketing by smallholder farmers. Furthermore, according to Hejase and Hejase (2013), "descriptive statistics deals with describing a collection of data by condensing the amounts of data into simple representative numerical quantities or plots that can provide a better understanding of the collected data." Therefore, this study analyzed data collected with descriptive statistics such as frequencies and percentages supported with data tables for clarity. This is followed by inferential statistics.

Review of analytical model

Econometric models that have been used in the study of two-step approaches include; Heckman's sample selection model, the Two-stage/double hurdle models and switching regression model (Olwade and Mathenge, 2012). This study settled for the two-step sample selection model due to the fact of it being a relatively simple procedure for correcting sample selectivity bias and the comparison of participants and non-participants in collective marketing randomly to reduce selection bias. The Tobit model was then regressed to determine the factors that influence the level of participation in collective marketing. The model is appropriate when the dependent variable which in this study is the proportion of maize marketed collectively is censored at some upper or lower bounds as a product of how the data are collected. The first stage of the model assumes that the errors are homoscedastic.

Variables in the model are treated differently because initially such models were estimated using the Tobit model which would account for clustering of Zeros due to non-participation. However, a major limitation of the Tobit model is the assumption that the same set of parameters and variables determine both the probability of participation and the level of participation. A Tobit model relaxes the above assumptions by allowing different mechanisms and variables to determine the level of participation using the proportion of maize marketed collectively as the dependent variable of the censored Tobit model (Olwade and Mathenge, 2012).

The dependent variable (y) in the model is mixed in a sense that those who are selling all their produce individually and thus, having no produce sold collectively would have a value of zero (0) while those who are marketing all their maize collectively through a group would take up highest value of one. The model assumes normal distribution with constant variance (Greene, 2000). Thus, the dependent variable (proportion of maize marketed collectively) is censored with lower limit as 0 and upper limit as 1. According to (Greene, 2000), a generalized 2 tailed Tobit model is specified as;

$$y^* = \alpha x_i + \varepsilon \quad (2)$$

Where y^* is a latent variable (unobserved for values smaller than 0 and greater than 1), α is a vector of coefficients to be estimated and ε is a vector of independently normally distributed error terms with 0 mean and constant variance δ^2 , x is the vector of explanatory variables and i is the number of explanatory variables. Denoting y (proportion of maize marketed collectively) as the observed dependent censored variables we have:

$$y = 0 \text{ if } y^* \leq 0 \quad (3)$$

$$y = y^* \text{ if } 0 < y^* < 1 \quad (4)$$

$$y = 1 \text{ if } y^* \geq 1 \quad (5)$$

As indicated y^* is the unobserved latent variable with y as the proportion of maize surplus marketed by the smallholder farmers collectively, α is a vector of coefficients to be estimated, x_i is the vector of explanatory variables and ε is the error term. A zero value of y is observed when the smallholder maize farmer is not marketing any surplus produce collectively and $y^* = 1$ if the smallholder maize farmer markets all his surplus maize collectively. Specifically, the explanatory variables in the model will be;

x_1 = Gender of the farmer (Male = 1, Female = 0)

x_2 = Age of the farmer (measured in years)

x_3 = Education of the farmer (measured in years of schooling)

x_4 = Distance to the collection center (measured in kilometers)

x_5 = Land area farmed (measure in hectares under maize production)

x_6 = Land area owned (measured in hectares)

x_7 = Price per kilogram of maize offered at the collecting centre

x_8 = Access to extension services (number of trainings attended about maize production)

RESULTS AND DISCUSSION

Farmers' preferences for collective and individual maize marketing

Farmers showed varied preferences for collective marketing and individual marketing (Table 1). The reasons advanced by the farmers for not participating in collective marketing and thus continued embracing of individual marketing included; delayed payment (73%), lack of trust (10%), costs involved in group marketing and time consuming group activities like meeting and disagreements (5%), stringent quality and quantity requirements (4.5%), high cost of business especially due to activities like cleaning and re-bagging that finally reduce the price to a figure close to that offered in the open market (4.5), lack of groups and interest in group formation (1%), lack of information on existence of group marketing and the benefits associated (1%) and lack of privacy in group activities that can result in insecurity (1%). The findings also are in agreement with the findings of the survey done by Food and Agriculture Organization of the United Nations which revealed that only 13% of farmers were involved in collective marketing, with most farmers not involved in collective marketing due to lack of knowledge of who to collaborate with (29%), difficulty to agree as a group (23%) while 22% claimed collaborating for collective marketing is a waste of time (Naven, 2012). However, according to Robbins et al. (2004), farmers have to be willing to co-operate and work together with the help of service providers in a relationship where

farmers themselves realize the need to work together and achieve better prices for their products. This means that farmers also should have a role to play in looking for fellow farmers to collaborate with and achieve mutual objectives of the collaboration.

According to Table 2, farmers who were participating in collective marketing also gave reasons for their preference for this marketing arrangement which included the following; better prices (42%), training and extension services (16%), credit for ploughing and inputs (14%), reliable markets (26%), improved quality of the maize that attracts diverse markets (1%), availability of storage facilities (1%), and availability of money at the center for immediate needs when maize is brought to the store (2%). According to Ampaire et al. (2013), collective marketing helps farmers to invest in costly facilities, acquire specialized services such as training and storage in addition to enjoying the economies of scale. This, therefore, makes collective marketing a useful tool in overcoming majority of the challenges faced with the smallholder maize farmers in the region as regards to market access. There has also been a general belief that the future belongs to the organized since such organization helps farmers with small quantities of output to market at better prices and access services like storage. This, however, disagrees with Wennink et al. (2014)'s findings that collective marketing institutions in most developing countries lack beneficial and attractive services like those facilitating access to extension, credit, marketing and evidence based advocacy and lobbying which services are very beneficial to the farming process.

According to Mwendya (2012), the facility of collective marketing in the case of Masindi has helped farmers to earn a price that is 450/= higher than the prevailing market prices especially from World Food Programme in addition to training and credit from their partners especially Masindi District Farmers Association and the Saving Credit Co-operative. Naven (2012) also found out that farmers who collaborate in groups have incomes that are about 60% higher than non-collaborators. These findings, therefore, are largely in agreement with the reasons for farmers' participation in collective marketing. Ton et al. (2010) also noted that collective marketing in form of bulking provides additional services such as input provision, savings and credit and extension in addition to reliable markets and better prices that are achieved by ensuring a bigger voice that comes with higher bargaining powers. However, the above findings disagree with those of Wennink et al. (2014) who reported that farmer organizations in developing countries lack capacity to generate and analyze data as supportive evidence to enable them lobby, advocate and negotiate to influence policies and structures; thus providing conducive environment for the survival of smallholder farmers. Such environment should among others ensure stable prices and access to credit for farming activities such as ploughing, planting, input buying and harvesting

Table 1. Farmers reasons for preferring individual marketing.

Reason	Percent response (n=120)
Delayed payment	73
Lack of trust	10
Costs involved and time consuming	5
Almost same price	4.5
Requirements (Quality and Membership)	4.5
Lack of groups and interest	1
Lack of information	1
Lack of privacy	1

Source: Field data (2014).

Table 2. Farmers reasons for preferring collective marketing.

Reason	Percent response (n=133)
Better prices	42
Reliable markets	26
Training and extension services	16
Credit for ploughing and inputs	14
Availability of money for part payment	2
Improved maize quality	1
Availability of storage facilities	1

Source: Field data (2014).

Table 3. MASSGL activities that benefit farmers.

Activity	Percentage farmers' response (n= 133)
Training	96
Marketing	96
Bulking	92
Credit facility	87
Storage facilities	7
Input supply	3
Value addition	1

Source: Field data (2014).

among others.

Group activities

Farmers who belonged to the group reported different activities carried out at the group level to help in market access of maize as shown in Table 3. From the study, the activities of these groups were found out to include;

marketing, bulking, training, storage, savings and credit, value addition and provision of inputs such as fertilizers on credit. These, according to Ton (2008), are important attributes of a farmer group if the group is to ensure survival of the members in the liberal economy. The author further explains that savings and credit is an important ingredient since it helps the organization get immediate source of money for members who may require money to meet their immediate expenses

Table 4. Model estimates of determinants of the intensity of participation in collective marketing: A Censored Tobit.

Variables effects	Coefficients	Marginal
Land owned (Hectares) [^]	-0.075 (0.038)**	-0.075
Gender of the farmer (Male/Female)	0.117(0.065)*	0.118
Age of the farmer (Years)	0.009 (0.002)***	0.009
Years of schooling (Years)	-0.015(0.009)	-0.015
Area under maize (Acres) [^]	-24.458(22.968)	-24.458
Distance to the marketing center (Kms)	1.234(0.246)***	1.234
Number of extension visits (Number)	0.004(1.641)	0.004
Price offered at the collective centre (Uganda Shs) 0.002(0.0003) ***	-2335.4	0.002
Constant		
A censored Tobit		
Number of observations	186	
LR chi ² (9)	140.28	
Pseudo R ²	0.1009	
Prob> chi ²	0.0000	

*, **, *** Represents significance at 10, 5 and 1% levels respectively, in parentheses are standard errors and [^] shows transformed variables.

Source: Field data (2014).

especially medical and school fees.

Factors that influence the intensity of participation in collective marketing

In order to identify factors affecting the intensity of participation in collective marketing, the data on the proportion of maize sold under collective marketing were analysed using a censored Tobit Model. The model results indicated that 10.09% of the variations in the censored dependent variable of the proportion of maize marketed collectively was explained by the model. The price offered at the collective centre, distance to the marketing centre and land size significantly influenced the intensity of participation in collective marketing at 1% level significance and income of the farmer and age of the farmer significant at 10% (Table 4).

Results showed that a unit increase in the price of a kilogram of maize in the previous season at the collection centre increased the proportion of maize marketed by the participating farmer by 2 kilograms. This was due to the fact that farmers want to maximise profits from the maize production business. Thus when prices increase farmers who would sell some of the maize to individual traders rather take a loan and then sell the whole maize to the collection centre at better prices. The study further found out that the price of maize was Ugx 716.32 at the collection centre and Ugx 516 for farmers that sold individually in the previous season. These findings are consistent with Mwendya (2012) who found out that the price offered by Masindi Seed and Grain Growers limited

was above the prices offered by other traders especially when the group succeeds in getting a supply order with World Food Programme which usually gives the farmers good prices.

Results also showed that a one year increase in the age of the farmer, the proportion of maize supplied by the farmers to the collection centre increased by 48 kg of maize. This was because old age comes with experience and more asset base that can help the farmer supply his maize and wait for the payments at better prices which is usually the case with the Masindi Seed and Grain Growers limited. These findings are consistent with those of Yenealem (2006) who also found that age of the farmers is proportional with the asset base and both influence the decision of the farmers to take up a new strategy to improve on their income.

Consistent with the results on the factors that influence the choice of the marketing mode, the income of the farmer was also found to influence the intensity of participation in collective marketing. Income of the farmer was found to significantly influence the proportion of maize marketed collectively. The findings showed that a one shilling increase in income reduced the quantity of maize marketed collectively by 3 kg which is the logarithm of the marginal effect of 1092 kg. This was because as incomes increase, farmers tend to shift from subsistence farming to commercial farming which involves opening up more land and producing large quantities of maize which can be marketed individually at good prices without going through the hurdles of bulking with smallholder farmers. This is in agreement with the findings of Chirwa (2009) that the increase in farm

income prompts the farmer to use various marketing channels which may reduce the quantity of maize marketed collectively.

Results also showed that distance to the collection centre positively influenced the proportion of maize marketed collectively. It was revealed that a unit increase in the distance to the nearest marketing centre increased the quantity of maize marketed collectively by 123.4 km. This was because averagely all farmers who participated in collective marketing were getting transport to the collective centre at subsidized prices from Masindi Seed and Grain Growers Limited which made more sense for farmers from distant places to take advantage of the transport in order to benefit from the better prices offered at the collective centres. This is in agreement with Mwendya (2012), that after harvesting groups, of smallholder maize farmers bulk their maize and together choose the cheaper means of transport to the store from either private means or using the association to collect the maize.

Quantity of maize produced by the farmers was also found to negatively influence the proportion of maize marketed collectively. The findings showed that a unit increase in the quantity of maize produced by the farmer decreased the proportion of maize marketed collectively by 0.1 kg. The findings are consistent with Fischer and Qaim (2011) that farmers who produce more output have the opportunity of enjoying the economies of scale by marketing through many marketing channels thus reducing the chance of taking part in collective marketing and thus reducing the quantity of maize marketed collectively.

CONCLUSIONS AND RECOMMENDATIONS

Reasons like lack of trust, stringent requirements, delayed payments, lack of groups, lack of information, high costs, lack of interest, almost same price and time consuming were found to be responsible for continued reluctance of farmers to participate in collective marketing. On the other hand, reasons like better prices, reliable markets, availability of training and extension, availability of credit and availability of input loans were motivation to farmers' participation in collective marketing. Factors like age of the farmer, quantity of maize produced, income of the farmer, distance to the collective center and the price were found to significantly influence the intensity of collective marketing. It is thus recommended that central and local government should give priority to build and maintain a good rural road network that will reduce costs of transport for the farmers and traders and improve on the prices offered to farmers for their different products. In addition, collective marketing agencies should aim at building central collection and storage points in each participating sub-county or any other strategic point as nearer as possible to the farmers. It is recommended that agencies

that are involved in collective marketing should offer premium prices for good quality maize which in turn would encourage other farmers to get involved in bulking and collective marketing.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

The impact of M-banking quality service on customer's satisfaction during Covid-19 lock down: The case of Bank of Abyssinia, Ethiopia

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COVID-19 pandemic posed a great challenge for the financial industry in Ethiopia leading to an increase of mobile banking services which becomes a new normal and necessity for users of financial services. The study seeks empirically to test the impact of m-Banking quality service on Bank of Abyssinia customer's satisfaction during COVID-19. A quantitative study approach and a descriptive research design with survey research method were used. East Addis Ababa district office was selected as a sample using a non-probability design in the form of convenience sampling to collect data. Accordingly, 296 structured questionnaires were randomly distributed where 240 fully filled survey questioners were retrieved for analysis. The findings from the study showed that e-service quality dimensions are significant forerunner to customer satisfaction, and, among the dimensions, security, reliability and ease of use have a great influence on e-service quality and these dimensions are perceived critical by the Abyssinia Bank customers. All the six predictor variables reliability, efficiency, security, responsiveness, empathy, and ease of use were found to be positively influencing Abyssinia banks m-banking customer satisfaction, while the predictors ease of use and reliability were found to have a significant impact and the highest predictor in absolute numbers 0.2444595 and 0.2200381, respectively. Thus, the study recommends that Abyssinia bank management as a service provider should pay attention to the identified dimensions specifically, on ease of use and reliability of m-banking services while devising e-banking strategies to provide high service quality and satisfaction to its customers.

Key words: Abyssinia Bank, customer satisfaction, e-service quality, mobile banking.

INTRODUCTION

Advances in innovation sway service delivery alternatives and approaches within service industries. Accordingly, one of the early adopters of technology is financial institutions which greatly change the service landscape and business models of banks (De Leon, 2019). Within

the financial services sectors in different countries, banks are now effectively empowering clients towards utilizing online services (Al-Hawari et al., 2005). Furthermore, the developments also decrease workforce numbers and physical offices which may adversely affect client

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perception of service quality because of decreases in human communication in service exchanges (Jabnoun and Al-Tamimi, 2003).

Mobile banking, in solid terms, alludes to "a technology where a client is connected with a bank via their mobile devices allowing them to do financial transactions" (Alalwan et al., 2017; Laukkanen, 2016; Laukkanen and Kiviniemi, 2010) supplementing the current channels, for example, automatic teller machine and Internet banking including features of mobile payment capability and mobile wallet capacities (Moser, 2015; Wessels and Drennan, 2010). Brick and mortar bases banks are now forced to reinvent themselves to become more of digital banks since now that fintech firms are joining the banking industry easily (VISA, 2017).

Thus, in the current environment for banks to ensure success in the service delivery process providing a reliable mobile banking service is crucial (Shankar et al., 2019) through development in this fragment of the financial services industry proceeds nevertheless customer reservations towards various issues related to mobile banking services provided, for example, security/protection (Sreejesh et al., 2016), connection disappointments and the apparent danger of character/individual data theft (Rawashdeh, 2015).

Statement of the problem

Mobile options available to consumers have expanded considerably in only a few years in Ethiopia and bank of Abyssinia was one of the private banks in Ethiopia to adopt the use of mobile phone in conducting some banking transactions in 2014 in collaboration with TEMENOS AG CO. The bank introduces the service in 2015; since then the number of users keeps on rising. There were 15,000 mobile banking users in 2015, where the number of users raised to 58,359 in year 2016, consequently 132,103 users in years 2017, and 213,215 in the year 2018, now the bank's mobile banking users are 365,390 end of 2019 out of the total customers 1,283,300 the bank has (BA Annual Report, 2019).

The bank's mobile banking users will be expected to rise further considering the number of households in Ethiopia witnessing a marvellous influx of portable electronic devices; for example, mobile telephone penetration rate of Ethiopia (telecom density) was 41.8% in 2016/2017; while mobile density was 43% in 2017/2018. Correspondingly in the year 2018/2019, mobile subscribers were 42.92 million which increased to 44.4 million 2019/2020 (NBE, 2018). With adoption having immediately spread to a mass of users, even the financial business could not move away from the pattern. To be sure, surmising from the ever-extending number of cell phones devices with a web access, strikingly 3G, portable banking has developed quickly (Laukkanen, 2007).

In this way, progressing from conventional branch tasks and first-generation web-based solutions to the mobile web and portable applications, banks face new difficulties in managing and building noteworthy relation with their client base. Especially, the unprecedented Covid-19 virus has disrupted our life completely and caused over two hundred thousand deaths so far worldwide (WHO, 2020). Nonetheless, the virus has also presented banks with an opportunity to reassess their relationship with customers and come up with innovative solutions by devising a flexible business strategy to ensure business continuity. For instance, e-service is self-administration advances proposed to supplant human collaboration, a significant segment of relationship marketing of human/PC intelligent interactive system dialogue (Sang and Rono, 2015). On the other hand, m-banking additionally includes impressively improved adaptability, pervasiveness, connectivity (Ha et al., 2012), and comes loaded with proactive abilities such as alerts, short message pop-ups and geolocation for tweaking the service offer and capturing the advantage of social interaction in the service. With the coming of mobile banking services, new knowledge is required in order to understand completely the mind-boggling features of customer and banks relationships (Lu et al., 2014).

In the present serious condition, customers are progressively mindful of observing gaps among banks corresponding to their e-service quality and how utilizing proficient innovations and updating/redesigning its status intermittently when required. So, banks need to create powerful mobile strategies to draw in and hold mobile clients for example, advancing features advantages and value of the mobile services (Laukkanen, 2016). Be that as it may, service quality has additionally been explored in e-environment and keeping in mind that studies have uncovered fascinating new discoveries, they have gotten less consideration in e-banking (Ayo et al., 2016).

Moreover, much of the research has tended to focus mainly on factors which impact attitudes towards banking and m-banking adoption standpoint and from a relationship marketing perspective (De Wulf et al., 2001; Shaikh and Karjaluto, 2015). To date, few studies have probed the impact of mobile service quality on satisfaction (Sagib and Zapan, 2014; Thakur, 2014) in different countries where m-banking service is matured and to the researcher knowledge further studies are required studying the impact of m-service quality on satisfaction in late adopters environment such as in Ethiopia where basic set of services are provided and this study mainly feel that gap.

Furthermore, a great part of the research in general spotlight principally on factors which impact attitudes towards banking and mobile financial adoption outlook and from a relationship advertising point of view (De Wulf et al., 2001; Shaikh and Karjaluto, 2015). So, few studies have tested the effect of mobile service quality on satisfaction under normal circumstance (Sagib and

Zapan, 2014; Thakur, 2014) in various nations. To the researcher's knowledge, the impact of mobile service quality on customer's satisfaction during covid-19 lockdown in Ethiopian private banks perspective is yet to be surveyed. This study seeks to fill that gap.

LITERATURE REVIEW

Mobile banking initiatives in Ethiopia

Technology enabled finance landscape in Ethiopia is still in its early stages having great potential with the opening of regulations and subsequent innovation on the technological side. Generally, a few different models, from mobile network operators (MNO)-owned platforms, to independent third-party platforms and bank-managed platforms have prevailed to varying degrees of success in Ethiopia focusing around a bank-owned platform (CBE-birr) and a pair of third-party platforms: m-Birr and Hello-Cash. Beyond basic wallet functionality, all require partnerships with MFIs or banks as they are not able to provide financial services themselves (Busara Center, 2019).

Looking at the overall digital transaction volume (ATM, PoS, M-Banking, Internet Banking) Ethiopia has seen significant growth over the past 3 years. Digital transaction value growth per annum (128%) has outpaced digital transaction volume growth (105% per annum) indicating that average digital transaction value has been increasing over time (World Bank, 2019). In 2018, the average Ethiopian adult made a digital transaction 1.5 times in a year. In contrast, in 2015, Nigerians transacted digitally more than 4 times as often, South Africans more than 40 times as often and the average EU citizen more than 167 times as often. Looking at the data it can be said Ethiopia is clearly showing strong growth in digital transaction volume but the transaction volume per adult is still below regional and international benchmarks (World Bank, 2015; The Global Economy, 2016).

The regular m-banking services that all banks offer in Ethiopia today incorporate disbursement of inward remittances, cash in and out, person to business payments, business to person payments, person to government payments, government to person payments and person to person payments (Finextra, 2018). The most significant element of these services is that customers can access it through any model and brand of mobile phones in Ethiopia.

Mobile service quality

Lin (2013) characterizes m-banking quality as a worldwide consumer decision of the quality and greatness of mobile content delivery with regards to m-banking. Studies

investigating the components of mobile financial service quality (Sagip and Zapan, 2014; Jun and Palacios, 2016) and inspirations for utilizing/embracing mobile banking (Hanudin et al., 2012; Chemingui and lallouna, 2013; Ha et al., 2012) utilize measurements fundamentally connected with utilitarian consumer value, for example, perceived usefulness, perceived risk, perceived compatibility (with lifestyle or device), responsiveness, reliability, security, and perceived cost and ease of use. Curiously, a few authors have coordinated into their model a few measurements more with regards to decadent purchaser values, dimensions especially applicable to the mobile setting, for example, perceived enjoyment (Hanudinet al., 2012; Chemingui and lallouna, 2013), as well as a social dimension (Singh and Srivastava, 2014; Hanafizadeh et al., 2014).

Majorly, people utilize advanced mobile phones and mobile applications for most of their social online life communication (Kumari, 2016). Indulgent components, for example, perceived enjoyment and social aspects can assume a significant role in assessing the quality of expertise, data-based Web service which will in general dominate in e-banking (Bauer et al., 2005). An upgraded comprehension of the points of interest of mobile financial services quality and how the last identifies with responsibility, trust and satisfaction is expected to recognize the essential drivers of effective customer relationships in the financial segment. So as to hold the clients and continue developing in a virtual market, there is a need to gauge the consumer loyalty with service rendered from time to time (Hall, 1995; Saha and Nesa, 2011). Customer satisfaction is estimated by means of e-service quality (Loiacono et al., 2000; Yoo and Donthu, 2001; Abdullah, 2005; Parasuraman et al., 2005; Zeithaml et al., 2000; Nadiri et al., 2009) as it is viewed as a key contribution to customer satisfaction.

A few academic studies have been done on appraisal of e-service quality in various settings across various sectors. An investigation on web banking showed that clients put more accentuate on the nature of service if there should be an occurrence of picking a particular bank (Nandan and Upadhyay, 2008). Khalil (2011) thought about five measurements in his study: tangibility, assurance, empathy, reliability, and responsiveness to evaluate the satisfaction with online banking service. Additionally, Jun and Cai (2001) set forward seven measurements to survey the e-service quality and these measurements were ease of use, information, access, website design, courtesy, responsiveness, and reliability. Another study (Sohn and Tadisina, 2008) considered seven elements of e-service quality (trust, speed of delivery, reliability, ease of use, customized communication, web site content, and functionality) in their examination to gauge clients' perception about online financial institutions. However, Li et al. (2009), in their observational investigation on online travel service, considered nine measurements: ease of use, website

design, reliability, system responsiveness, availability, privacy, empathy, experience, and trust. They found that reliability, ease of use, trust, system availability and responsiveness contribute a lot to customer satisfaction.

Another study (Miran and Rasha, 2013) in Egypt explored customers' perception about e-quality measurements and their significance. They utilized triangulation approach and found that each of the nine measurements (usability, reliability, privacy, responsiveness, incentives, assurance, empathy, efficiency, and fulfilment) of e-service has noteworthy effect on customer satisfaction.

e-Service quality (e-SERVQUAL)

SERVQUAL was developed basically with regards to face to face experiences and has experienced development over the timeframe. In the advanced online condition, distinctive service quality measurements with new items become significant. To quantify electronic service quality, Parasuraman et al. (2005) created 22-item scale called E-S-QUAL. Zeithaml et al. (2002) created a 7-dimension scale in which, the initial four measurements establish the center e-SERVQUAL scale (efficiency, fulfilment, reliability, privacy, responsiveness, compensation, contact); however, the last 3 become an integral factor just when online clients have questions or run into problems (Zeithaml et al., 2002). Therefore, measuring the nature of e-service experience incorporates signs that happen previously, during and after the e-purchase transaction and it is plausible just through e-servqual. Therefore Zeithaml, et al. (2000) recommended that characteristics like efficiency, reliability, fulfilment, privacy, responsiveness, compensation are the appropriate measures to survey the e-service quality, or e-SERVQUAL.

Level of consumer satisfaction towards e-SERVQUAL as off late is essential for associations to decide if they have given a quality and successful services to their clients. For Sahadev and Purani (2008), more prominent infiltration of the internet and the development of new procedure to service purchasers through the electronic media, shoppers depend progressively on online venders and service providers for even the most essential errand and services. Rapp et al. (2008) expressed that numerous organizations have started the utilization of e-business to give e-services to their purchasers and business partners. Request from clients towards productive and quicker services has caused the organization to urge giving e-SERVQUAL to clients.

In a service industry like banking, there is a requirement for high client connection as a bank can win client trust just by fulfilling their necessities. Presently, decision is supplanted by online communication such as banks application or site; the organization needs to fulfil clients by giving the most significant level of service

quality (Schaupp and Belanger, 2005; Dai and Lee (2018); Salehi et al. (2014). Osman et al. (2006) looked at service quality and consumer satisfaction in Malaysia and reasoned that there is a noteworthy connection between the two. As needs be, this investigation is based on customary e-SERVQUAL model and includes one more measurement from Parasuraman (2005) and Zeithaml et al. (2000)'s study.

Mobile banking service quality scale

As no service quality scale for m-banking could be found in existing literature, a multi-dimensional scale including reliability, efficiency, security/privacy, responsiveness, empathy, and ease of use were drawn from the previous literature in seeking to assess bank of Abyssinia's mobile banking service quality.

Reliability

Reliability of the mobile financial service alludes to the likelihood that the banks will agreeably proceed as intended and reliably give a similar service through a cell phone as it did through physical branches (Sharma and Malviya, 2011). At the end of the day, at any point a client will endeavor to do banking transaction through mobile device; the service will have specialized accessibility and provides mistake free services (Ganguli and Roy, 2011). Regularly, customers' impression of unwavering quality for a service assumes an indispensable role in estimating the performance of that service (Munusamy et al., 2010). Especially, for nations like Ethiopia where the idea of m-banking is generally new, customers' impression of reliability with respect to such service should be examined. This study, therefore, proposes the following hypotheses:

H₀1: Reliability significantly influences satisfaction of mobile banking service customers.

Efficiency

From a customer's point of view, mobile banking service must be viewed as productive if the system is easy to utilize, organized appropriately, and requires least data to be input by the customers (Sharma and Malviya, 2011). To be exact, how rapidly customers can get to the mobile banking service, how adaptable is the user interface of the system and how rapidly or timely the system reacts to demands for banking data or transaction by the customers every one of these features characterizes the efficiency of the m-banking service (Ganguli and Roy, 2011). These characteristics by and large impact performance expectancy of a service as they control the view of system quality and at last influence the utilization

expectation of clients (Nelson et al., 2005). Thus, proficiency of the m-banking service can be an intriguing determinant for this study. As needs be, the study proposes the accompanying hypothesis:

H₀2: Efficiency significantly influences satisfaction of mobile banking services customers

Privacy/security

Security can be characterized as how much the mobile banking service is sheltered and shields clients' banking data from any intrusion (Sharma and Malviya, 2011). Nations like Bangladesh in general experience the ill effects of innovative deficiencies – a motivation behind why clients regularly object to the transmission of their own personal bank account or transactional data over some other interchange channels outside the physical branch of the banks (Ganguli and Roy, 2011). Consequently, if privacy issues identified with the mobile banking service can be guaranteed by the banks, client will naturally be persuaded of the performance of the service and in this manner, prompting an expanded utilization of m-banking services in Ethiopia (Angst and Agarwal, 2009). In such manner, security can be a significant quality determinant of the m-banking service. Thus, the study proposes the accompanying hypothesis:

H₀3: Privacy/Security of mobile banking service significantly influences customer satisfaction.

Responsiveness

Responsiveness can be characterized as the readiness to support clients and to offer prompt types of assistance (Lau et al., 2013). As far as m-banking services, it very well may be additionally clarified by the banks' capacity to comprehend the customers' issues and to offer exact financial related types of assistance (Bedi, 2010). Munusamy et al. (2010) and Lau et al. (2013) found a positive connection among responsiveness and consumer satisfaction, as the more responsive the service is the more fulfilled the customer will be for that service. In light of this proof, the study utilized responsiveness as a factor that will manage clients with respect to m-banking service appropriation and the study sets the accompanying hypothesis:

H₀4: Responsiveness significantly influences satisfaction of mobile banking service customers.

Empathy

The dimension of empathy for the most part includes care and customized consideration that a firm can give to its

clients as far as accessibility, communication and understanding of the service being given (Bedi, 2010). Especially for delicate services like banking transactions, clients consistently value an inviting and chivalrous condition. Consequently, if the banks show genuine interest, energy, and earnestness toward the clients' cutting-edge banking needs, it will naturally lead clients towards the utilization of alternate financial delivery services like mobile banking (Ganguli and Roy, 2011). In view of this point, past studies like Aghdaie and Faghani (2012) and Lau et al. (2013) contend that empathy from the service supplier can go about as a determinant of the performance of that service. Thus, empathy has been considered as an impacting factor in the model of this study. Therefore, the study hypothesizes as follows:

H₀5; Empathy significantly influences satisfaction of mobile banking service customers.

Ease of use

Ease of use alludes to that which is utilized and underpins intelligence to upgrade self-viability with the medium (Brangier et al., 2015). In an assessment of the m services segment in Korea, Kim and Lee (2001) indicated that perceived usefulness and ease of use essentially sway consumer satisfaction. In view of the discoveries of the study and considering the idea of the service moderately being new in Ethiopia the study hypothesizes as follows:

H₀6; Ease of use significantly influences satisfaction of mobile banking service customers

METHODOLOGY

Research approach

The study used quantitative approach, which is generally associated with positivism, especially since it uses predetermined and highly structured data collection techniques. A quantitative research examines relationships between variables, which are measured numerically and analyzed using a range of statistical and graphical techniques; it often ensures the validity of data, and typically involves collecting survey data (Cooper and Schindler, 2014) in a cross-sectional study (Fowler, 2009).

Research design

Causal research primarily explains why events occur by defining the cause-and-effect relationships amongst variables and suitable when the research problem is already well documented (Zikmund et al., 2003). The study is a casual research used in formalized studies that are typically structured with clearly stated investigative questions by assisting the estimates of the proportions of a population that have these characteristics and discovery of associations among different variables (Cooper and Schindler, 2014).

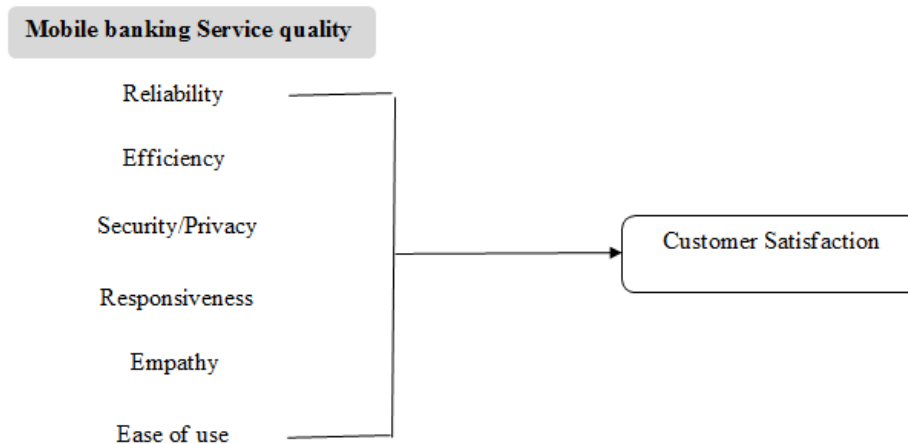


Figure 1. Conceptual framework of the study.

Source: Modified by the researcher – adopted from the studies by Zeithaml et al. (2002, 2000).

Population, sampling frame and sampling technique

For the present study, the target population comprises bank of Abyssinia, customers of east district branches in Addis Ababa; there were a total of 180,338 customers. However the study specifically focused on the five selected branches in east district, "Airport, Bole Medhaniale, Misrak, Moenco and Rwanda Mazoria" branches (total branch population of 10,520) in Addis Ababa, from March 5, 2020 to April 25, 2020. The selection of the 5 branches was based on proximity for data collection, and willingness of branch managers to cooperate for data collection by liaising with customers at the counter. For the purpose of this study, non-probability design in the form of convenience sampling was used (Sekaran, 2003). This enables the researcher to have the freedom to choose bank branches and random sampling probability design was used for customer from east district Addis Ababa.

Sample size

Salant and Dillman (1994) cited in Chuan (2006) point out that three of the most common factors influencing the size of the sample are the size of the population, tolerable sampling error, and variation of the variable of interest within the population. Using a confidence level of 90%, the margin error of 5% and an alpha level of 0.05 which are common in exploratory management studies, a sample of 264 was selected as per Kotrlík and Higgins (2001) table for this study (Annex 1).

Source and instruments of data collection

A survey questionnaire was adopted (self-administered) that uses a five-point Likert scale to measure the variables employed to obtain quantitative data. By reviewing the works of prominent researchers, Al-Hawari et al. (2005), Curran and Meuter (2005), Parasuraman et al. (2005) and Zeithaml et al. (2002), variables for assessment of mobile banking service quality were identified and incorporated into the structured questionnaire. In order to validate the reliability, the questionnaire was pilot tested using 30 respondents, representing 10% of the total sample size, who were not considered as the

representatives of the study population (Figure 1).

Procedure of data collection

Data were collected by using self-administered questionnaire from selected east district branches, Airport, bole medhaniale, Misrak, Moenco and Rwanda Mazoria branches. The questionnaire was distributed to the respondents with the help of branch managers before customers were briefed about the purpose of the research; then it was hard covered and the participants were requested to fill up the questionnaire following the instructions provided. Then the questionnaire was immediately collected at the service desk once the customers were done filling out.

Method of data analysis

Data analysis was carried out using the STATA version 16. For statistical analysis, descriptive statistics (frequency, mean and standard deviations) were used to analyze the perception of respondents towards mobile banking service and mobile banking service quality measurement items used in the study, while, inferential statistics (Pearson correlation, multiple regression and factor analysis statistical techniques) were used to analyze the respondents' level of agreement or disagreement in the differences between the variables employed in the study; to ensure internal consistency among the items included in each of the scales, they were estimated using a Cronbach's coefficient alpha.

RESULTS

Description of sample

From March 5, 2020 to April 25, 2020, a total of 296 (including 30 pilot participants) survey instruments were distributed and 240 fully filled survey questioners were obtained. Since the researcher has been an employee in one of the east district branch offices for long and already

Table 1. Questionnaire distribution and response rates.

Variable	Respondents size	Distributed (%)	Unreturned (%)	Response rate (%)
Population	10,520	-	-	-
Sample size	296	-	-	-
Hand delivered	-	296	-	81
Unreturned	-	9	3.1	-
Incomplete	-	47	15.9	-

has prior relationship with branch offices greatly helps to collect self-administered survey instruments from the participants (Table 1).

Factor analysis (Confirmatory factor analysis)

A factor analysis can be exploratory or confirmatory in nature. In this study, a confirmatory factor analysis (CFA) was used for confirmatory purpose in order to show only the relationships between a factor and specific item since the researcher has a clear expectation of the factor structure (since the proposed scale adapted in the study has been proposed by previous researchers) and the researcher wants to test for the expected structure. Furthermore, the varimax rotation, basically the default option for orthogonal rotation in Stata, is used for CFA, a procedure runs based on a few variables having a high loading; while the remaining variables' loadings will be considerably smaller to maximize the dispersion of loadings within factors (Kaiser, 1958, 1974; Mooi et al., 2018).

Preliminary analyses and checking assumptions

In order to conduct confirmatory factor analysis, the following assumptions are checked accordingly.

The variables that should be used to identify underlying dimensions (factor analysis) are identified, that is, Reliability, Efficiency, Security, and Responsiveness Empathy Ease of use Satisfaction.

Sample size

A "satisfactory" sample size is the primary data requirement needed. This means that a sample size that enables the analysis achieves a high degree of statistical power that can lead to finding significant results is greater, if they are possible. The easiest way to do this is to correlate all the dependent and independent variables.

The first line in Table 2 represents the number of observations (obs=240) and error rate Bonferroni-adjusted significance level. Green (1991) and VanVoorhis and Morgan (2007) rule of thumb proposes that at least

104 + k observations are desirable to test whether a coefficient is significant or not, where k is the number of independent variables (best practical when using less than 15 number of independent variables). Accordingly, the study has 6 independent variables that satisfy this criterion. Alternatively, the study has a sufficient sample size applying another strict criterion of VanVoorhis and Morgan (2007) that requires at least 30 observations per variable in order to sense smaller effects (an expected $R^2 \leq 0.10$).

In Table 2, to check whether there are highly correlated variables or not in the study pairwise correlations are examined. Hence, the study variables are found to be sufficiently correlated (p-values below 0.05); furthermore the relationship between each independent variables and dependent variable along their collinearity is indicated accordingly.

Independent variables need to vary

Determining if the independent variables in the study display some variation or not is important in order to make sure that regression model can be estimated. Thus, no variation in the dependent variable (that is, if a constant term is not included in the regression equation), R^2 can be negative, and fundamentally could lead to potentially severe biases in the slope coefficient estimates (Mooi et al., 2018).

Table 3 result indicates that the number of observations is 240 and the number of cases fully observed in the study where each variable displays a large number of non-missing observations:

Dependent variable scale type

The dependent and independent variables scale is interval scaled. Specifically, seven 5-point Likert scales create the mean of twenty-four items that form the variable used in the study which meets the OLS regression data assumptions.

Collinearity

No or little collinearity present among independent

Table 2. Pairwise correlation matrix.

Correlation	Reliability	Efficiency	Security	Responsiveness	Empathy	Ease of use	Satisfaction
	1.0000	-	-	-	-	-	-
Reliability	-	-	-	-	-	-	-
	240	-	-	-	-	-	-
	0.3299	1.0000	-	-	-	-	-
Efficiency	0.0000	-	-	-	-	-	-
	240	240	-	-	-	-	-
	-0.1948	-0.1842	1.0000	-	-	-	-
Security	0.0511	0.0882	-	-	-	-	-
	240	240	-	-	-	-	-
	0.5044	0.3955	0.0861	1.0000	-	-	-
Responsiveness	0.0000	0.0000	1.0000	-	-	-	-
	240	240	240	240	-	-	-
	0.4513	0.4376	-0.0684	0.5001	1.0000	-	-
Empathy	0.0000	0.0000	1.0000	0.0000	0.0000	-	-
	240	240	240	240	240	-	-
	0.2833	0.4801	0.0788	0.5387	0.4882	1.0000	-
Ease of use	0.0002	0.0000	1.0000	0.0000	0.0000	-	-
	240	240	240	240	240	240	-
	0.4197	0.3129	0.0926	0.4485	0.4111	0.5490	1.0000
Satisfaction	0.0000	0.0000	1.0000	0.0000	0.0000	0.0000	-
	240	240	240	240	240	240	240

Table 3. Descriptive statistics to determine variation.

Variable	Obs	Mean	Std. Dev.	Min	Max
Reliability	240	4.170833	0.7707949	1	5
Efficiency	240	3.879167	0.8714338	2	5
Security	240	3.7875	0.7603195	1	5
Responsive~s	240	4.204167	0.9216046	1	5
Empathy	240	3.766667	0.9570993	1	5
Easeofuse	240	4.445833	1.029473	1	5
Satisfaction	240	3.933333	0.6302465	1	5

variables is the last data requirement. Collinearity is a data issue that arises if two independent variables are highly correlated. Perfect collinearity occurs if two or more independent variables are entered containing exactly the same information, therefore yielding a correlation of 1 or -1 (that is, they are perfectly correlated) (Mooi et al., 2018).

In order to identify the collinearity variance inflation factor (VIF) calculation is required and the rule of thumb is that a VIF value ≥ 10 generally indicates the presence of multicollinearity problem (Hair et al., 2013).

As indicated in Table 4, all VIF values are below 10

indicating the absence of multicollinearity. Having met all the described requirements for factor analysis, CFA analysis with a varimax rotation is used to determine the number of factors where the minimum eigenvalues of one (1) are retained.

Internal consistency reliability test

Reliability is the ability of an instrument/system to maintain its quantity and quality under specified condition for a specified time and performs the intended function

Table 4. VIF calculation.

Variable	VIF	1/VIF
Responsive(s)	1.89	0.529789
Ease of use	1.73	0.579399
Empathy	1.64	0.608936
Reliability	1.55	0.644326
Efficiency	1.51	0.662269
Security	1.16	0.863499
Mean VIF	1.58	-

Table 5. Reliability statistics.

Item	Obs.	Sign	Item-test correlation	Item-rest correlation	Inter item corr.	Alpha
Reliability	240	+	0.6291	0.4611	0.3044	0.7242
Efficiency	240	+	0.6242	0.4548	0.3059	0.7256
Security	240	+	0.1824	-0.0435	0.4367	0.8230
Responsive(s)	240	+	0.7821	0.6664	0.2591	0.6773
Empathy	240	+	0.7251	0.5874	0.2760	0.6958
Ease of use	240	+	0.7697	0.6489	0.2628	0.6814
Satisfaction	240	+	0.7282	0.5917	0.2751	0.6948
Test scale	-	-	-	-	0.3029	0.7525 Mean (standardized items)

Alpha reliability efficiency security responsiveness empathy ease of use satisfaction, as is detail item la > bel std. Test scale = mean (standardized items).

adequately for a given period of the time under the stated operating condition or environment (Mooi et al., 2018). Cronbach's α (pronounced as alpha) is used to measure scales reliability in this study.

The alpha value is inflated by a larger number of variables and there is no set interpretation as to what an acceptable alpha value is but the alpha coefficient generally varies from 0 to 1. A rule of thumb that applies to most situations, 0.70, is an agreed lower limit for alpha but a value of 0.60 is acceptable mostly in exploratory studies; while in more advanced research a value of ≥ 0.80 is regarded as suitable (Hair et al., 2011).

The scale result shows a high degree of internal consistency with a value of 0.7525 is greater than that compared to the rule of thumb of Cronbach's Alpha value of 0.70 that applies for most general situations (Table 5).

Determining the number of factors

Table 6 output shows that 240 observations are used in the analysis and CFA analysis returned seven factors as expected since the eigenvalues for each factor returned generally are greater than the Kaiser criterion threshold (that is, eigenvalue >1). Accordingly, a larger portion of variance extracted by the first factor (eigenvalue of

7.20655) explained 34.79% of the total variance while factor two extracts an eigenvalue of 3.55608 explaining 17.17% of the variance (Annex IV).

Furthermore, the result in Table 6 indicates the cumulative variance extracted by the seven factors is 0.9366 or 93.66% of the variance; implying that the returned factors ability is highly satisfactory in explaining the variation. Factor loadings (pattern matrix) and unique variances show the result of rotation to achieve what is called simple structure, that is, high factor loadings on one factor and low loadings on all others (loadings vary between ± 1.0). As indicated, loading value ≥ 0.5 indicates the strength of relationship between a particular variable and a particular factor and variable variance are reproduced well as indicated by very low uniqueness values; while 0.4302 is found to be the highest uniqueness value, signifying a communality of $1 - 0.4302 = 0.6$ which is clearly above the 0.50 threshold.

Kaiser-Meyer-Olkin (KMO) test

KMO indicates the adequacy of the study variables for conducting factor analysis result and generally the threshold KMO value >0.50 is acceptable in order to interpret the CFA results with confidence. Accordingly, the result in Table 7 discloses a KMO value of 0.5645

Table 6. CFA Output.

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	7.20655	3.65047	0.3479	0.3479
Factor2	3.55608	0.90690	0.1717	0.5195
Factor3	2.64918	0.51929	0.1279	0.6474
Factor4	2.12989	0.52424	0.1028	0.7502
Factor5	1.60564	0.39583	0.0775	0.8277
Factor6	1.20981	0.16350	0.0584	0.8861
Factor7	1.04632	0.60823	0.0505	0.9366

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Uniqueness
Reliability1	0.5770	-	-	-	-	-	-	0.0911
Reliability2	0.5913	-	-	-	-	-	-	0.0573
Reliability3	0.6200	-	-	-	-	-	-	0.1220
Efficiency1	-	-	0.5730	-	-	-	-	0.2484
Efficiency2	-	-	0.5952	-	-	-	-	0.0684
Efficiency3	-	-	0.5708	-	-	-	-	0.4302
Security1	-	0.8488	-	-	-	-	-	0.0766
Security2	-	0.8350	-	-	-	-	-	0.0945
Security3	-	0.7621	-	-	-	-	-	0.1288
Responsive~1	-	-	-	0.6055	-	-	-	0.1445
Responsive~2	-	-	-	0.7063	-	-	-	0.2098
Responsive~3	-	-	-	0.5288	-	-	-	0.2450
Empathy1	-	-	-	-	0.6738	-	-	0.1847
Empathy2	-	-	-	-	0.6461	-	-	0.0264
Empathy3	-	-	-	-	0.5071	-	-	0.1391
Easeofuse1	-	-	-	-	-	0.7019	-	0.0109
Easeofuse2	-	-	-	-	-	0.7448	-	0.0267
Easeofuse3	-	-	-	-	-	0.7143	-	0.0991
Easeofuse4	-	-	-	-	-	0.8119	-	0.1479
Satisfacti~1	-	-	-	-	-	-	0.6389	0.1202
Satisfacti~2	-	-	-	-	-	-	0.5723	0.1464
Satisfacti~3	-	-	-	-	-	-	0.6431	0.1795
Satisfacti~4	-	-	-	-	-	-	0.6548	0.1591

LR test: independent vs. saturated: $\chi^2(253) = 7811.46$ Prob> $\chi^2 = 0.0000$. Factor loadings (pattern matrix) and unique variances.

(greater than the threshold 0.50) as well as the specific MSA values of most variable are all above the threshold value of 0.50 except R2, R3, EF1, EF2, RES3, and EOU1.

To interpret the factor solution, rotated factor loadings using Varimax under orthogonal rotation was conducted by applying the Kaiser normalization and the rotated factor loadings result obtained after rotation (Annex IV) is the same as the unrotated CFA output (Table 6). This

indicates the analysis extracts seven factors that jointly capture 93.66% of the variance drawn from a total of 240 observations.

Regression analysis data requirements

The relationships between the dependent variables and independent variables is analysed using regression

Table 7. The KMO statistic.

Variable KMO	Variable KMO
Reliability1 0.5083	Empathy1 0.7212
Reliability2 0.3554	Empathy2 0.5260
Reliability3 0.4434	Empathy3 0.4535
Efficiency1 0.4231	Easeofuse1 0.4761
Efficiency2 0.4235	Easeofuse2 0.5109
Efficiency3 0.5579	Easeofuse3 0.6634
Security1 0.6607	Easeofuse4 0.6825
Security2 0.6517	Satisfacti~1 0.6625
Security3 0.5866	Satisfacti~2 0.6935
Responsive~1 0.5882	Satisfacti~3 0.8604
Responsive~2 0.7503	Satisfacti~4 0.7214
Responsive~3 0.4287	Overall 0.5645

estat KMO. Kaiser-Meyer-Olkin measure of sampling adequacy.

analysis, specifically a multiple regression is conducted to determine if the independent variables have a significant effect on dependent variables to make predictions. Thus, there are prerequisites that need to be checked and fulfilled before undertaking a regression analysis (Mooi et al., 2018). These include: sample size (Table 2), independent variables need to vary (Table 3), dependent variable scale type (Table 4) and multicollinearity (Table 4).

Regression model specification and estimation

Model specification

The selected variables for this model are exactly known, *Satisfaction* as dependent variable, and *Reliability*, *Efficiency*, *Security*, *Responsiveness*, *Empathy*, and *Ease of use* as independent variable. Alternatively, the confirmatory factor analysis indicated that 24 items loaded exactly into seven factors as expected and the same factors were used in the regression model as independent variables and the regression models are generally denoted as follows:

$$Y = \alpha + B_1X_1 + B_2X_2 + \dots + e$$

Thus, the study includes multiple independent variables (six) and hence it is called multiple regression model. The regression model will be denoted as follows:

$$y = \alpha + B_1x_1 + B_2x_2 + B_3x_3 + B_4x_4 + B_5x_5 + B_6x_6 + e$$

where Y is the independent variable customer satisfaction, and x_1-x_6 representing the independent variables *Reliability*, *Efficiency*, *Security*, *Responsiveness*, *Empathy*, and *Ease of use*, the $\beta_1- \beta_6$ indicates the (regression) coefficients and e indicates the error term.

Model estimation

Model estimation refers to applying a technique in order to estimate a regression model. One of the most common methods of estimating linear regression models is ordinary least squares (OLS) which is a statistical technique used to estimate a linear regression models; it involves choosing the model that minimizes the residual sum of squares, with no constraints imposed. The best fit calculation between the regression line and a set of observation uses squared distances rule which is a random but effective way used for estimation (Hill et al., 2008).

Assumptions underlying classical linear regression model

A linear regression model analysis must meet the following list of assumptions stated and the violation can lead to an invalid estimation result. Accordingly, the four linear regression model assumptions violation need to be checked in order for the model to provide valid prediction results (Mooi et al., 2018):

- the regression model can be expressed linearly (Screen plot and Ramsey's RESET test)
- the average value of the errors is zero,
- variance of the errors is constant (homoscedasticity) (Breusch-Pagan test), and
- the covariance between the error terms (no autocorrelation).

Linearity assumption

The first assumption dictates that regression model must be linear and must be indicated as:

Table 8. Ramsey RESET test.

Ho: Model has no omitted variables
 $F(3, 230) = 1.26$
 $\text{Prob} > F = 0.2878$

estat ovtest. Ramsey RESET test using powers of the fitted values of Satisfaction. Test result indicated under Prob > F (0.2878>0.05) proposes no linearity assumption violation.

Table 9. Breusch-Pagan test.

Ho: Constant variance
 Variables: Fitted values of satisfaction
 $\text{Chi}^2(1) = 89.87$
 $\text{Prob} > \text{Chi}^2 = 0.0000$

estat hottest. Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

$$\text{Satisfaction} = \alpha + B_1 \text{Reliability} + B_2 \text{Efficiency} + B_3 \text{Security} + B_4 \text{Responsiveness} + B_5 \text{Empathy} + B_6 \text{Ease of use} + e$$

Meaning that, all non-linear relationships are unacceptable and the relationship between the independent and dependent variable must be linear and expressed mathematically as indicated earlier. So, statistically there is the presence of nonlinear relationships (linearity assumption violation) among the independent and dependent variable tested using the Ramsey's RESET test (Ramsey, 1969; Cook and Weisberg, 1983) (Table 8).

The average value of the errors is zero

This arises since the mean value of the dependent variable will not be equal to the mean of the fitted values from the model/expected dependent variable if there is no constance in the regression. There is no statistical test for this; in fact, if the constant term is included in the regression equation, this assumption will never be violated (Mooi et al., 2018).

Variance of the errors is constant

The variance of the errors is constant. This is known as the assumption of homoscedasticity and if the errors do not have a constant variance, they are said to be heteroscedastic and tested using the *White's test* and *Breusch-Pagan test* (1980). The test result is shown in the following.

The test result in Table 9 shows that p-value ($\text{Prob} > \text{Chi}^2$) is 0.0000, indicating that the null hypothesis is rejected and that the error variance is constant. Thus,

there is a significant degree of heteroskedasticity in the model. Accordingly, a robust regression remedy is applied in order to avoid unbiased but inefficient (that is, larger than minimum variance) estimates of the coefficients, as well as biased estimates of the standard errors (and, thus, incorrect statistical tests and confidence intervals).

No autocorrelation

When the error term in one time period is positively correlated with the error term in the previous time period, we face the problem of (positive first-order) autocorrelation. In other words, it is assumed that the errors are uncorrelated with one another. The presence of first-order autocorrelation is tested by utilizing the table of the Durbin-Watson statistic (Durbin and Watson, 1951) if there are variable components in the study that can show time component (common in time series or panel data).

Regression analysis results interpretation

After all the presumptions are tested, applying robust standard errors the regression analysis is completed since proof of heteroskedasticity has been found as shown earlier. Consequently, the regression model information and individual parameters data are presented in Table 10. The regression model result indicates that a total of 240 observations are taken and looking at the F-test, $p-0.000 < 0.05$ indicates that the regression model is

Table 10. Regression output.

Number of obs = 240						
F(6, 233) = 33.72						
Prob > F = 0.0000						
R-squared = 0.3968						
Root MSE = 0.49575						
Satisfaction	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
Reliability	0.2200381	0.05738	3.83	0.000	0.1069881	0.333088
Efficiency	0.0000272	0.0439915	0.00	1.000	-0.0866447	0.0866991
Security	0.0950674	0.079528	1.20	0.233	-0.0616185	0.2517534
Responsiveness	0.0333183	0.0546823	0.61	0.543	-0.0744167	0.1410533
Empathy	0.0514784	0.0590376	0.87	0.384	-0.0648374	0.1677943
Ease of use	0.2444595	0.0727429	3.36	0.001	0.1011415	0.3877775
_cons	1.234614	0.5716764	2.16	0.032	0.1082983	2.360929

Table 11. Regression output.

Number of obs = 240					
F(6, 233) = 33.72					
Prob > F = 0.0000					
R-squared = 0.3968					
Root MSE = 0.49575					
Satisfaction	Coef.	Robust Std. Err.	t	P> t	Beta
Reliability	0.2200381	0.05738	3.83	0.000	0.2691078
Efficiency	0.0000272	0.0439915	0.00	1.000	0.0000376
Security	0.0950674	0.079528	1.20	0.233	0.1146879
Responsiveness	0.0333183	0.0546823	0.61	0.543	0.0487211
Empathy	0.0514784	0.0590376	0.87	0.384	0.0781757
Ease of use	0.2444595	0.0727429	3.36	0.001	0.3993113
_cons	1.234614	0.5716764	2.16	0.032	-

regress Satisfaction Reliability Efficiency Security Responsiveness Empathy Ease of use, vce(robust). Linear regression

Looking back the regression equation tested earlier (presented in model specification) had a constant of 1.234614, *reliability* coefficient of 0.2200381, and *ease of use* coefficient of 0.2200381 affecting the dependent variable satisfaction significantly since the p-value is smaller 0.00 is less than 0.05 ($P > |t|$). Similarly, looking at the output variables *efficiency*, *security*, *responsiveness*, and *empathy* have a positive insignificant effect on the dependent variable satisfaction where the variable *security* has a coefficient of 0.0950674, indicating having relatively higher impact on the dependent variable satisfaction. Standardized coefficients and effect sizes (the standardized β coefficients) are important indicators to identify the most important variables in the model rather than the t-values or p-values.

Table 11 provides interpretation of the standardized β

coefficients and looking at the variable *ease of use* coefficient 0.2444595 is largest while the next highest coefficient value relates to *reliability* (0.2200381). The variable *security* coefficient 0.0950674 is found to be the third highest contributor in the model; however, the effect is statistically insignificant.

Hypothesis test

Table 12 shows the test hypothesis.

DISCUSSION

The results of the study found to align with Aghdaie and Faghani (2012) research focus on measuring the

Table 12. Tests hypothesis.

Hypothesis	Coef.	P> t	Remark	Effect
H ₀ 1; Reliability significantly influences satisfaction of mobile banking service customers	0.2200381	0.000	Accepted	Significant
H ₀ 2; Efficiency significantly influences satisfaction of mobile banking services customers	0.0000272	1.000	Rejected	Insignificant
H ₀ 3: Privacy/Security of mobile banking service significantly influences customer satisfaction	0.0950674	0.233	Rejected	Insignificant
H ₀ 4; Responsiveness significantly influences satisfaction of mobile banking service customers	0.0333183	0.543	Rejected	Insignificant
H ₀ 5; Empathy significantly influences satisfaction of mobile banking service customers	0.0514784	0.384	Rejected	Insignificant
H ₀ 6; Ease of use significantly influences satisfaction of mobile banking service customers	0.2444595	0.001	Accepted	Significant

customer satisfaction in m-banking services in Iran using the SERVQUAL. The study found that the four variables, tangibility, reliability, responsiveness, and empathy correlated significantly with customer satisfaction. A similar study was conducted by Rahman et al. (2017) on Bangladesh customer satisfaction of m-banking using the SERVQUAL dimensions; the results revealed that only four variables implemented in the study, tangibility, reliability, responsiveness, and empathy have a significant positive impact on customer satisfaction. Conversely, the study result indicates that the dimensions efficiency, responsiveness, privacy/security, and empathy have insignificant impact even though they positively influence Abyssinia banks' customers' mobile banking satisfaction. This may probably has something to do with most banks in Ethiopia being late in adopting mobile banking and self-service technology; as a result Abyssinia banks customers are still getting used to the service and at this stage reliability and ease of use are found to be significant factors impacting Abyssinia banks' m-banking service for customers' satisfaction. Furthermore, especially in the financial services of industry and electronic environment, transaction privacy/security is found to be an important determinant and predictor of e-satisfaction (Liao and Cheung, 2008; Szymanski

and Hise, 2000). On the other hand, the study result also shows a similar positive influence of security/privacy on e-banking service but the impact is found to be insignificant for Abyssinia m-bank service users as the service is new to them plus the covid-19 pandemic that restricts customers from getting service in bank branch face to face. Abyssinia bank customers seem to be not worried about security issue of m-banking service at least at the moment but rather the dimensions reliability and ease of use are found to be important determinants of m-banking service satisfaction during the lockdown period. This may further indicate that the dimensions that affect customers' m-banking service satisfaction or any other e-service satisfaction under normal state of condition and state of emergency condition defiantly varies. Of course this is subject to similar further future studies in order to confirm the same.

Conclusions

It is obviously known that any business survival depends on customers and their satisfaction, especially in a service industry, wither customers are satisfied with the service provided by the firm or not. It is very crucial to monitor constantly the service rendered in a traditional face to face outlet

as well as online bases. Accordingly, utilizing the appropriate fitting instrument e-SERVQUAL the present study focuses on assessing the satisfaction of m-banking services customers of Abyssinia bank of Ethiopia. The result displays no significant difference from other countries banks m-bank services with respect to e-SERVQUAL dimensions.

The result of the study also implicates that dimensions of e-SERVQUAL influence e-service quality customer satisfaction of Abyssinia bank customers and among the dimensions, reliability and ease of use have great influence of m-bank service quality of customers of Abyssinia bank (Abyssinia bank, 2019). This indicates that these dimensions are perceived to be critical for Abyssinia bank customers. Similarly, the dimension security is another critical dimension for Abyssinia bank customers even though it has an insignificant impact. In a nutshell Abyssinia bank customers seem to be satisfied at the moment with the current m-bank services rendered by the bank, but it does not mean that the bank's m-banking service quality is at the desired level since the bank's customers are still indicating the importance of six dimensions for the satisfaction of m-banking service. This indicates important provident areas in order to increase the mobile service quality.

All the six dimension variables *reliability*, *efficiency*, *security*, *responsiveness*, *empathy*, and *ease of use* were found to be positively influencing Abyssinia banks m-banking customer satisfaction; although, only the dimensions *reliability* and *ease of use* have a significant positive impact while the remaining predictor variables (*efficiency*, *security*, *responsiveness*, *empathy*) were found to have insignificant impact on Abyssinia bank m-bank service customers. Furthermore, according to the customers, the predictor variable *ease of use* was highest predictor (in absolute number, 0.2444595) and the variable *reliability* (0.2200381) was the second highest predictor; while, the third-highest predictor variable was *security* (0.0950674). These variables contribute the most in this order in this study.

Recommendations

The study findings implicate that not all e-service quality dimensions have significant impact on overall Abyssinia m-banking customer satisfaction during covid-19 lock down helping Abyssinia bank management in devising a strategy to make the service more appealing to customers. Specifically, ease of use and reliability dimensions are the strongest significant impact factors for customer satisfaction in East district of Abyssinia bank, whereas the efficiency ($\beta = 0.00000376$) has the lowest impact on e-service quality of m-banking customer satisfaction in east district of Abyssinia bank.

In addition, all the predictor variables *reliability*, *efficiency*, *security*, *responsiveness*, *empathy*, and *ease of use* have a positive impact of service quality, specifically reliability and ease of use have significant positive impact on service quality. So, customers are expecting to get highest services in reliability and ease of use during the pandemic. Even though *efficiency*, *security*, *responsiveness*, *empathy* predictor of service quality have insignificant impact on customer satisfaction but since they have a positive impact on customer satisfactions the bank is advised to work on these items as well further to increase m-bank service satisfaction of Abyssinia customers. Essentially, these outcomes will be useful for Abyssinia bank IT divisions, marketing division and customer service division to make business strategy for the related areas additionally to the execution and improvement of m-banking service quality. Besides, Abyssinia bank should pay attention to ease of use and reliability dimensions of m-banking services quality with the goal that this could assist with improving goodwill of m-banking services provided by the bank. Furthermore, bank management should device an effective risk-reducing strategy for m-banking services and create awareness and clear communication to increase customers' confidence towards using m-banking service and to feel more secure and safe when transacting with the system. This will make Abyssinia bank and its customers to reap the great benefit that can be derived

from implementing and using m-banking services. In this way, the bank board and management should give more consideration to the distinguished indicators particularly ease of use, and reliability while conceiving the m-banking service strategies to offer high quality of service in order to derive fulfilment by the bank m-bank service customers.

Directions for future research

As every study has limitation the study also has limitation related to the applied sampling technique; specifically a non-probability sampling technique was utilized and data were gathered from single district bank branch in Addis Ababa on a convenient basis; the sample size may not be adequate in order to generalize the findings to the whole Abyssinia bank m-banking service Populus. The study was also restricted to few east district Abyssinia bank branches only and did not include other banks in Ethiopia due to time and financial constraints. Additionally, few numbers of dimensions of e-SERVQUAL model were considered under the study to assess m-banking service quality provided; therefore by incorporating other dimensions of m-SERVQUAL model. Future studies may assess m-banking services quality from both the banks and customers perspective using interview and a survey questionnaire to increase generalizability of the study findings and to capture customer satisfaction of m-banking services quality provided by banks in Ethiopia under stringent environment similar to current pandemic. Lastly, the present study viewed m-banking service only from customer perspective and for future studies may be looked on other stakeholder perspectives as well.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

Linking market access to improved nutrition among smallholder maize farmers in Masindi and Kiryandongo Districts, Uganda

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Markets are stimuli for improved farm production and quality produce. Therefore, integrating rural households into market systems is essential for improved standard of living. Increased market access and commercialization makes households dependent on markets for services including food for consumption. This reduces dependency on own food consumption which in most cases offers limited variety foods as compared to market purchases. Paradoxically, increased production of cash crops displaces staple food crop production which compromises household consumption of the latter thus increasing vulnerability to food insecurity and malnutrition. Understanding the role of increased market access and participation to improved household nutrition through; increased consumption of nutritious foods, increased incomes, and increased nutrition value-addition transactions is crucial at this time when commercialization campaigns are at its highest. This study sought to determine the relationship between market access and nutritional security in addition to factors that influence farmers' market access and improved nutrition among smallholder maize farmers. The study employed a cross sectional survey design in the districts of Masindi and Kiryandongo. The target population was divided into two strata (market participants and non-participants). Descriptive statistics and the Binary Probit Model were used in analysis. The results indicate a significant relationship between nutrition status and market participation. Experience in maize production, formal education, household size, access to extension and access to credit significantly influenced market access and improved nutrition. The study recommends increased efforts on provision of extension services, mobilising farmers into saving groups for increased savings and credit availability for investment.

Key words: Market access, food and nutritional security and smallholder maize farmers.

INTRODUCTION

Rural households have a wide range of livelihood strategies which range from agriculture which forms the

majority, agro-processing, trading and other off-farm occupations from which they seek to derive their food

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requirements and income for consumption, social purposes and investments (IFAD, 2003). Integrating rural households into market systems have significantly changed their livelihoods with improved income earning, better standards of living and reduced poverty (Oraboune, 2008). However, women have in most cases been less visible and appreciated despite their crucial role in household nutrition and food security (WFP, 2011). The opportunity for rural households to increase their incomes and food security from any agricultural undertaking largely depends on their ability to fully participate in the market place exchanges where as producers, they buy their inputs and sell their products and as consumers, spend their income from the sale of crops, livestock and non-agricultural activities to buy their food and investment requirements and also other consumption goods (Markelova and Meinzen, 2006). The major reason for poor standards of living among the rural people in many parts of the world has been indicated to be serious difficulties in accessing markets for exchanging their produce (IFAD, 2003). Markets provide the opportunity for farm production to contribute to poverty reduction through the cash income realized from sales of farm produce making them an effective means of ensuring integration of smallholder producers of agricultural products into the mainstream of national economies. Markets thus also drive production since they stimulate farmers to strive to meet the demands of buyers in terms of quality and quantity (Ajuruchukwu et al., 2011). There is need to emphasize the role of market access to improved nutrition since it evens out distribution of foods and incomes thus generating opportunities for rural farmers to access more foods than what they produce (Orden et al., 2004). In Uganda, the International Fund for Agricultural Development (IFAD) through the Community Agricultural Improvement Programme (CAIIP) has been contributing to rural development and market access through information sharing aimed at empowering poor people in the process of production and marketing (IFAD, 2013).

Increased market access and commercialization has been linked to making households more dependent on markets for services and more food for consumption. This reduces dependency on own food consumption which in most cases lacks variety to consumption of variety foods that can be purchased in markets. However, increased production of cash crops displaces food crop production which in turn compromises household consumption of staple foods from own production thus increasing the household's vulnerability to food insecurity and malnutrition (Ng'endo et al., 2013).

Market access in literature

Market infrastructure influences rural economic growth

and employment through increased incomes and social development (ARDF, 2013). Provision of market infrastructure help improve the incomes of rural households thus reducing rural-urban migration and also help provide safety for farmers to produce in the process of selling (Olagunju et al., 2012). Improved market infrastructure leads to higher levels of commercialization thus ensuring better incomes for rural farmers mainly from agricultural activities (Oraboune, 2008). In addition, provision of connecting roads, agricultural extension and improvement of agricultural market information to help create awareness among rural farmers on the benefits of the market ensures better livelihoods among the rural system. Rural communities close to markets have more livelihood activities than their counterparts that lack or live far from market places. Markets reduce the cost of acquiring inputs, the impact of shocks and provide new opportunities for more profitable on-and off-farm activities (Jouanjean, 2013). Communities that have more market access have more non-agricultural and off-farm activities which are essential for capital accumulation to enhance monetary source of income. Linking farmers to the market helps to reduce costs associated with identification of serious buyers and activities that surround the market place offer diversified livelihood activities which result from opportunities for local people to develop and link into the livelihood value chain thus creating more income (Oraboune, 2008). Crop production and market access can help in achieving improved nutrition through three main channels: increased consumption of nutritious foods that can be produced in the household, increased incomes from value chain transactions which enables purchase of other crops in the markets and increased nutrition value-addition in the chain transactions (Gelli et al., 2015).

METHODOLOGY

Model and econometric issues

A binary Probit was used to determine the factors that influence the decision of smallholder maize farmers to participate in maize marketing. This resulted into two groups; the first group composed of farmers that market their maize and the second group composed of farmers who never sold their maize but rather consumed all their produced maize.

Taking Y_1 to represent the group of farmers who marketed their maize and Y_2 to represent the group of farmers who never marketed their maize, then the participation equation can be written as follows

$$Y_1^* = \beta_{xi} + \epsilon_i \quad (1)$$

Where, Y_1^* is a latent variable which is the utility the farmer gets from marketing their maize.

Specifically, the Probit model in stage one of estimation is stated as follows:

$$\Pr (Y_1) = f(X_1, X_2, \dots, X_{10}, \epsilon) \quad (2)$$

Where, $Pr(y)$ is the probability of a farmer making a decision to participate in maize markets.

$X_1 - X_{10}$ are variables that determine participation in maize marketing and ε is the normally distributed error term.

RESULTS AND DISCUSSION

Market access and nutritional security

Food security and market access were evaluated based on the four categories of food secure households in accordance with the USAID's Food and Nutrition Technical Assistance (Swindale and Bilinsky, 2006). These include; food secure, mildly food insecure, moderately food insecure and severely food insecure. Based on the number of questions, the households were categorized in accordance with the above four categories and the results summarized in the Table 1. According to the above categories, food secure households experience none of the food insecurity conditions. On the other hand, mildly food insecure households worry about not having enough food sometimes or often and are unable to eat preferred food and eat a more monotonous diet than desired or sometimes food considered undesirable but only rarely. These households do not cut back on quantity nor experience any three most severe conditions; running out of food, going to bed hungry or going a whole day and night without eating. Moderately food insecure households sacrifice quality more frequently by eating a monotonous diet or undesirable food sometimes or often and have started to cut back on quantity by reducing the size of meals or number of meals rarely or sometimes. But they do not experience any of the three most severe conditions named above. A severely food insecure households have graduated to cutting back on meal size or number of meals often and experiences any of the three most severe conditions even as infrequently as rarely. Therefore, any household that experiences any one of the three most severe conditions even once in the four weeks is considered severely food insecure (Swindale and Bilinsky, 2006).

The results of the study indicated a significant relationship between nutrition status as a scale and market access. All food secure households were participants in maize market with no food secure household among non-participants. Mildly food insecure households were found to be composed of 90.70% participants and 9.3% non-participants. Moderately food insecure households were composed of 71.23% participants and 28.77% non-participants and finally, severely food insecure households were composed of 61.4% market participants and 38.6% non-participants in the maize market. This finding is consistent with that of Demeke and Haji (2017) who reported that increased commercialization is a means of achieving dramatic effects on health and malnutrition through increased

access to better quality and nutritious foods in market exchanges.

Factors influencing farmers' market access among maize growing communities

Factors that influence farmers' market access among smallholder producers of maize in Masindi and Kiryandongo districts of mid-western Uganda were analysed using a binary Logit model. Results of the Logit model as presented in Table 2 indicates that experience of the farmer in maize production, years of formal education, household size of the farmer, access to extension and access to credit were significant in influencing market access among smallholder maize farmers in Masindi and Kiryandongo districts of mid-western Uganda.

Results from Table 2 show that increased experience in maize farming of the maize farmer increases the chances of the same farmer accessing market for maize and participating in market exchange for improved incomes and nutrition with the odd ratio 1.21. This indicates that increased farmers experience is most likely to increase participation in maize market. The probability of 0.002 further indicates that the relationship between experience of the farmer in maize production and participation in the market is significant at 1%. The odds ratio for the farmer's experience in maize farming was found to be 1.21 indicating that the increase in the experience of the farmer greatly increases the chances of participating in the maize markets by odds greater than one. This is because experience comes with more knowledge about the existence of different ways from where the farmer also gets to know the existence of better agronomic practices for improved yields and thus taking them over to see their performance. These results are consistent with those of Adesina and Baidu-Forson (1995) that experience positively influenced the adoption of sorghum in Burkina Faso.

Results also show that the education of the farmer increases the chances of a farmer participating in the maize market with the odd ratio of 1.39 which indicates that market participation is most likely to take place when the education of the farmer increases. The odds ratio for the education of the farmers was found to be 1.39. This indicates that an increase in the level of education of a farmer increases the chances of participating in the maize market odds greater than one. The probability of 0.002 further indicates that the relationship between years of formal education of the farmer and market participation at 1% level of significance. This is in agreement with the findings of Abay (2007) who found a positive relationship between education of the farmer and market participation of agricultural products. This can be explained by the fact that education increases the ability

Table 1. Relationship between market access and nutritional security.

Nutrition status	Participants (%)	Non-participants (%)	Overall (%)	X ² -value
Food secure	100.00	0.00	5.98	15.2427***
Mildly food insecure	90.70	9.30	23.37	
Moderately food insecure	71.23	28.77	39.67	
Severely food insecure	61.40	38.60	30.98	

Source: Survey data (2017). *** Represents significance at 1% level.

Table 2. Determinants of market access among smallholder maize farmers.

Variable	Odds ratio	P-value
Experience of farmer (years)	1.21	0.002
Sex of the farmer (male/female)	2.08	0.331
Age of the farmer (years)	0.95	0.25
Education of farmer (years of formal education)	1.39	0.002
Household size (number of household members)	0.48	0.000
Access to extension (yes/No)	12.69	0.006
Access to credit	16.52	0.082
Constant	0.003	0.000

Number of observations = 200. R chi2 (12) = 111.29; Prob > chi2 = 0.0000; Log likelihood = -250.90801;

Pseudo R2 = 0.1815.

Source: Primary field data (2016).

of the farmer to read and interpret any information available thus making the same farmer better positioned to learn more about market opportunities and the benefits of taking part in these markets. This is true especially for technologies that provide practical solutions to farmers' problems such as market participation and its contribution to improved food security and welfare improvement.

Model results still show that increased household size reduces the chances of the maize farmers' participation in the market with odds ratio 0.48. The probability of 0.000 confirms the relationship between household size and market participation. This relationship can be explained by the fact that when a crop is a staple, increased household reduces market participation due to the large quantities of the harvested being consumed by the household as a food security crop. However, this finding is in disagreement with those of Lubungu et al. (2012) Muricho et al. (2015), Sebatta et al. (2014) and Reyes et al. (2012) who reported a positive relationship between household size and market participation mainly due to the ability of large households to provide a steady source of labor to produce large quantities of the crop under study thus leaving some good quantity after consumption that thus requires to be marketed so as to get some income for the family. Also as the family demand for services, big families demand more services thus have to get such services from participating in the

market (Sebatta et al., 2014). Other studies also found household size to be positively related with the decision to participate in the market (Osmani and Hossain, 2015; Olwande and Mathenge, 2012). This they urged was mainly because family members provide a source cheap labor which can be utilized by the farmer to open up more land and increase production of the crop.

Access to extension was found to increase the chances of market participation with odds ratio 12.69 and probability 0.006. This indicates that households with access to extension were 12 times more likely to participate in the markets for maize as compared to their counterparts who have limited access to extension services. This can be explained by increased access to market information from extension staff. This finding is in agreement with those Muricho et al. (2015) together with Jari and Fraser (2013) who also reported a positive relationship between access to extension and market participation mainly due to increased access to market information as a result of increased access to extension. Access to market information is essential for market participation, therefore farmers that have access to extension services are expected to obtain more knowledge concerning production and market access. This information has a positive bearing on increased production, productivity and market participation.

In addition, access to credit was also found to increase

the chances of the maize farmer participating in the market with odds ratio 16.52 and probability 0.082. This indicates that farmers with access to credit are 16 times more likely to participate in the market as compared to their fellows with limited access to credit. This is in agreement with those of Xaba (2013) also found out that availability of credit to farmers improve participation of farmers in vegetable markets due to increased production and productivity in Swaziland. The author urged that the availability of credit facility to the farmer enables acquisition of improved seeds and other inputs like fertilizers which are highly productive thus improving the productivity and the need to dispose of surplus in the market. Credit offers an additional source of investment capital to farmers which are essential for increased production which in turn increases the probability of the farmer to participate in the market to sell any surplus output (Reyes et al., 2012).

CONCLUSION AND RECOMMENDATIONS

From the sample results, access to extension was found to be significant; therefore it is recommended that the government should continue the policy of putting more efforts on agricultural extension at all levels of Sub County, district and Ministry of Agriculture Animal Industry and Fisheries to ensure availability of market information to farmers. The extension system in both public and private arena should be strengthened and a section be established to ensure that active farmer groups are dealt with instead of only dealing with model farmers as the current status of operation wealth creation and NAADS is. This would equip farmers with post-harvest handling techniques that are vital for market participation.

Access to credit was also found to significantly influence market participation. Local governments should encourage formation of village savings groups to encourage more savings and credit to the farmers. In addition, more agricultural credit products should be developed by commercial banks to encourage smallholder access to credit for improved market participation and improved livelihoods.

Market access was found to be linked with food security among smallholder maize farmers. Policies and programs that promote food security should have a component of increased market access of the farmers so as to improve their incomes and develop their capacity to purchase more foods outside what they produce

Market access was found to contribute to the welfare of women and youth. It is therefore recommended that gender and youth promoting programs should look closely into issues of improved market participation for better incomes and job creation for women and youth along the agricultural value chain.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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