Mobile phone and beef cattle marketing: The case of Girar Jarso district of Oromia region, Ethiopia

Yohannes Girma and Adi Kelil

Cogent Food & Agriculture (2021), 7: 1911032
Mobile phone and beef cattle marketing: The case of Girar Jarso district of Oromia region, Ethiopia

Yohannes Girma1* and Adi Kelil2

Abstract: Mobile phone serves as a means for the farmers to have access to beef cattle markets. This study is designed to assess the contributions, determinants, and constraints in the use of the mobile phone for beef cattle marketing. In this study, 59% of the respondents were mobile phone users and 41% were nonusers. Major contributions of mobile phone were to save time in search for the market, disseminate market information among farmers, and make informed marketing decisions. The logit model result indicated that gender, education level, total annual income, credit access, cattle market information access, and the number of beef cattle owned were significant determinants of mobile phone use in the study area. Moreover, poor extension service, lack of operating skill, poor network coverage, problem of electricity, and high cost of mobile phone were constraints to use a mobile phone. Thus, mobile phone is an essential ICT tool that enhances beef cattle marketing in the area even if it was not at full potential. Therefore, the government should fulfill essential infrastructures for farmers and also should promote training and education for extension agents and for the farmers, which is crucial to improve farmers’ beef cattle marketing process in the study area.

Subjects: ICTs and agricultural marketing; Information and knowledge management; e-agriculture

Keywords: Mobile phone; logistic model; contributions; constraints; Beef cattle marketing; Ethiopia

ABOUT THE AUTHOR
Yohannes Girma is a lecturer and researcher in the department of agricultural economics in Injibara University, Ethiopia. His research area includes Risk management strategies, operations research, marketing and technical efficiency.

PUBLIC INTEREST STATEMENT
Ethiopian agricultural marketing system is traditional. However, E-agricultural marketing is the way forward and can bring efficiency in marketing process, and also can increase the welfare of the farmers at large. Therefore, ICTs is the basis to bring sustainable agriculture in the country.
1. Introduction

Ethiopia is the leading country in livestock population in Africa. This livestock sector has been contributing a considerable portion to the economy of the country and still a promising area to support the economic development of the country (Shapiro et al., 2017). The economic contribution of the livestock sub-sector in Ethiopia is about 12% of the total GDP of the country and 33% of agricultural Gross Domestic Product (GDP). In addition, the sector also provides about 65% of the livelihood of the population (Ayele et al., 2003). Out of the available livestock populations in Ethiopia, cattle have a largest share. The total cattle population in Ethiopia is estimated to be 53.99 million, out of which 98.95% are local breeds whereas the remaining 0.94% and 0.11% are hybrid and exotic breeds, respectively (CSA (Central Statistical Agency of Ethiopia), 2012).

In Ethiopia, cattle serve as a drought power, source of farmyard manure, source of cash income, and play a great role in the reduction of food insecurity (Ayele et al., 2003). Among cattle populations, beef cattle are one of the few agricultural commodities in Ethiopia from which the country earns foreign currency through both live and processed forms of the commodity export, and also most of rural poor are engaged in rearing it to fulfill their daily needs and economic gaps (Halala, 2015). They are also a source of income from selling in the market for most smallholder farmers in Ethiopia (Jabbar & Gezahegn, 2003).

Marketing of beef cattle is carried out at varies places of livestock markets, which are dispersed in remote areas in which farmers go long distance with their cattle without price information. This effectively suppresses producers (farmers) prices since more traders are better informed on market prices through mobile phone. This better information combined with excess supply places the traders in a better position during price negotiation (Animal Health Yearbook, 2010). Thus, using mobile phone in the marketing of livestock is essential so as to connect farmers’ livestock production with the markets and to have access to updated market information from the remote market places, which have a significant role in their farm outcome (Dejene et al., 2016).

Nowadays, mobile phone is believed to have a potential to change the welfare of the rural societies by improving reliable information flow (Ansari & Pandey, 2013). A better flow of market information improves access to market, reduces the barriers to market participation, improves bargaining power, reduces searching costs, and gives farmers the option of traveling to farther markets if they have a good return (Aker & Mbiti, 2010). These advantages have a great role in improving the efficiency of farmers in a rural setting (Razaque & Sallah, 2013).

However, in Ethiopia, poor access of market information of the smallholders about demand, supply, and price of beef cattle in the market constrained their appropriate decision-making process to increase their farm income (Malede & Yilkal, 2013). Furthermore, the problem of “information asymmetry,” between buyers and sellers, brings about a lack of linkage between smallholder farmers and markets and also a lack of trust among trading partners. This obliged farmers to sell their products at low price in the market (Dereje, 2011).

Recent development interventions have been promoting information transfer through ICT-based innovations to make smallholder farmers beneficiary of the markets (Adégbidi, 2012). The Government of Ethiopia nowadays is conducting a great effort to expand and capitalize on the potential role of ICTs, particularly mobile phone, so as to improve the productivity and output of smallholder farmers. However, the present contribution of mobile phone in providing information for smallholder farmers on agricultural production, technology, weather, and agricultural marketing for smallholder farmers is poor (Seyoum, 2014). In Ethiopia, current knowledge on the livestock marketing activities and also the pricing is inadequate to design appropriate policies to avoid the problems that exist in the marketing system (Ayele et al., 2003).

Currently in Ethiopia, ICTs, particularly mobile phone, based livestock market information system is launched to provide general information about livestock marketing for the smallholders and also
to avoid the perceived problem in the sector. Despite the effort made being appreciable, little is known about the significant role of mobile phones in livestock marketing, in general, and in beef cattle marketing, in particular. In cognizance of such problems, this study was designed to fill the present gap of knowledge by assessing the uses of mobile phones in access of market information about beef cattle for smallholder farmers to increase their market participation and increase their economic return from the market. Therefore, this study focuses on the use of the mobile phone in beef cattle marketing in Girar Jarso district, Oromia region, Ethiopia. The specific objectives were to assess the contributions of mobile phones in beef cattle marketing, identify factors affecting the use of mobile phones in beef cattle marketing, and identify the constraints in the use of mobile phones in beef cattle marketing by smallholder farmers.

2. Methodology

2.1. Description of the study area
The study was conducted in Girar Jarso district, North Shoa Zone, Oromia National Regional state, Ethiopia. It is bordered on the south by Yaya Gulele and Debre Libanos, on the west by Degem, and on the east by the Amhara Region. The total area of the district is 401.9 sq. km. In the district, there are 17 rural kebeles administration with 12,264 households in the year of 2012 (NFEO, 2012). The agro-climate zones of the district are temperate, subtropical, and tropical. The average annual temperature ranges from 15 to 18°C, while the average annual rainfall varies between 1200 and 1400 mm and has an elevation of 2,088 m above sea level (NMA (National Meteorological agency), 2011). The livelihood of the majority of the population of Girar Jarso is based on agriculture within which crops and animal husbandry is the dominant activity. Livestock production contributes a significant amount to the livelihood of the rural population for food and as a source of income. Out of the total livestock population that existed in the district, cattle accounted for the largest share followed by sheep (GDARDO (Girara Jarso District Agricultural Office), 2016).

2.2. Sampling technique and sample size
Two-stage sampling technique was used to select representative sample households. In the first stage, 3 kebeles were selected purposively from the available 17 kebeles of the district based on their beef cattle population and marketing potential. In the second stage, sample respondents were selected for interview using a simple random sampling method applying lottery method so as to reduce bias in selecting the sample respondents. A total of 144 sample household farmers were selected from three kebeles of the district, which included Turban Ashe, Dire Doyu, and Koticho Safanni. Yamane (1967) formula was used to determine the sample size for the study. It was specified as

\[ n = \frac{N}{1 + N \times (e)^2} \]

where \( n \) is the sample size, \( N \) is the population size, and \( e \) is the acceptable sampling error.

2.3. Data collection methods
For this study, primary and secondary data sources were used. Primary data were collected from farmers, government officials of zonal and district-level agricultural office, and from focus group discussants. Data collection tools such as structured questionnaire and checklist, for focus group discussions and key informants interview, were employed. A structured questionnaire was used to collect quantitative data from sample respondents whereas a checklist was used to collect qualitative data. Moreover, secondary data regarding the total number of target population in the area were collected from zonal and district-level agricultural offices. Key informants interview and focus group discussion were used to gather supplementary information so as to enrich the data collected through questionnaire.
2.4. Data analysis
After the quantitative data obtained from the respondents were coded, cleaned, and edited using STATA version 14 software, they were analyzed through descriptive statistics, inferential statistics, and binary logit regression model. Descriptive statistics such as mean, percentage, frequency, and standard deviation were used to summarize the socioeconomic characteristics of the respondents. Qualitative data obtained through key informants interview and focus group discussions were analyzed using conceptual generalization, interpretation, narration, and triangulation. Moreover, Rank was used to make an ordering for the lists of contributions and constraints of mobile phone use. To make a rank order a score value was used (Cook & Kress, 1990). Based on the respondents’ preferences, a high score value was provided for the first preferred item. For the contributions of mobile phone, if the items are selected in order of first, second, third … and seven, it procured a score value of seven, six, five … and one, respectively. For the contributions of mobile phone use, high score value corresponds with very important items, whereas least score value corresponds with least in terms of contributions of mobile phone. Moreover, in connection to the constraints of mobile phone use the first preferred items correspond with severe constraints whereas the last selected items corresponded with the least constraints. Therefore, a score value of five, four, three, two, and one were given for the first, second, third, fourth, and fifth choice of preference. Finally, the total score value was computed by aggregating the value associated with each items and respondents. Then a rank order of items was done based on the total score value.

2.5. Theoretical framework
The diffusion of innovation theory was used to describe the theoretical framework of the study. This theory shows how, why, and at what rate new technologies and ideas spread through culture, operating at the individuals and firm level (Oliveira & Martins, 2011).

Rogers has postulated five innovation characteristics that may explicate the decision to adopt or not adopt an innovation. These are observability, trial ability, relative advantage, compatibility, and complexity. Among this relative advantage is often the most important factor that impacts adoption. “The greater the perceived relative advantage of an innovation, the more rapid its rate of adoption will be” (Rogers, 2003).

Like all technological devices, mobile phones may have a differential impact on peoples and societies. According to (Rogers, 2003), any member of the community that is higher in socioeconomic status, in particular, education level, will more likely receive information first and will therefore be benefited the most by the application of new technologies. This phenomenon leads to a knowledge gap between the “have” and the “have-nots” within a community. Rogers has defined the adopter’s characteristics under three categories: socioeconomic, personality values, and communication behavior (Bates et al., 2007).

2.6. Conceptual framework
Mobile phone is an essential ICT tool that enables the farmers to have access to timely market information for the farmers. Socioeconomic factors such as gender, education level, and income influence the farmers to use mobile phones. Institutional factors like access to cattle market information, access to credit, and distance from the nearest market enable or disable the farmers to use mobile phones in beef cattle marketing. Situational factors like information-seeking behavior enable farmers to be mobile phone user.

2.7. Analytical model
The binary logit regression model was applied in this study to analyze the factors affecting the use of mobile phones in beef cattle marketing in the study area.

The binary logit regression model is specified as

$$\ln \left( \frac{P_i}{1-P_i} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n$$
where

In \([P/1 - P]\) = 0 if smallholders did not use mobile phones in beef cattle marketing.

In \([P/1 - P]\) = 1 if smallholders use mobile phones in beef cattle marketing.

\(\beta_0\) = constant term of the equation

\(\beta_1, \beta_2, \ldots, \beta_n\) = logistic regression coefficients of the covariates.

\(X_1\) = age of respondent

\(X_2\) = gender

\(X_3\) = education level

\(X_4\) = family size

\(X_5\) = total annual income per year

\(X_6\) = credit access

\(X_7\) = number of beef cattle owned

\(X_8\) = information-seeking behavior

\(X_9\) = distance from the nearest market

\(X_{10}\) = cattle market information access

\(X_{11}\) = ownership of mobile phone

3. Results and discussion

3.1. Socioeconomic characteristics of respondents

Table 1 shows that the majority (70.8%) of the respondents were male with a mean age of 48 years. In relation to education level, 46.5% of respondents did not attain formal education, 41% attended primary education, and 12.5% attended secondary education. Furthermore, the mean of family size was 5.23 individuals and also the mean of total income of respondents was 56.465 birr. 54.9% of the respondents had access to credit. The mean of the number of beef cattle owned of the respondents was eight beef cattle with a standard deviation of 3.70, which means that the majority of them were smallholders. In connection to information-seeking behavior, 63.2% of respondents seek information and have a mean distance of 9.08 km from the nearest market. In the sample survey, 62.5% of the respondents have cattle market information access, and also out of the total (144) sample respondents 59% had their own mobile phone.

3.2. The contributions of mobile phone in beef cattle marketing

Mobile phone has vast contributions to enhance livestock marketing, in general, and beef cattle marketing, in particular. The data in Table 2 show the major contributions of mobile phones in beef cattle marketing given by 85 users of mobile phones. The result implied that the major contributions of mobile phones were (1) save time and minimize cost in search for the market; (2) get up-to-date price information; (3) easy disseminate market information among fellow beef cattle smallholders; (4) enables decision-making on where, when, and for whom to sell the cattle;
increase the income of the households; (6) enable the smallholders to negotiate price with cattle buyers; and (7) strengthen interaction and communication with many cattle buyers.

This implied the significant role of mobile phones in avoidance of unnecessary wastage of time, energy, and money in the search for the profitable market to sell their beef cattle since it enhances timely market information access. Timely information access in turn supported the farmers to make an informed marketing decision. Furthermore, it alleviated the problem of price cheating faced by the farmers, made the farmers well aware of the prevailing market price, and also enabled farmers to have access to high pricing markets. Mobile phones also improved farmers’ income since they facilitated access to a better price market. However, increment in income is not satisfactory since they were exposed to price cheating by the middlemen and traders due to a lack of formal information source.

Moreover, increased negotiation power of farmers and also strengthened interaction and communication with many cattle buyers were the least contributions of mobile phones because farmers mostly opt to go to the market place to observe the day-to-day beef cattle market activity rather than simply made negotiation and communication with buyers through mobile phone.

| Variables                  | Percentage | Mean   | Standard deviation |
|----------------------------|------------|--------|--------------------|
| Age                        | 48.34      | 12.18  |                    |
| Gender                     |            |        |                    |
| Male                       | 70.8       |        |                    |
| Female                     | 29.2       |        |                    |
| Education level            |            |        |                    |
| No formal education        | 46.5       |        |                    |
| Primary education          | 41         |        |                    |
| Secondary education        | 12.5       |        |                    |
| Family size                |            | 5.23   | 2.03               |
| Total annual income        |            | 56.46  | 24.73              |
| Credit access              |            |        |                    |
| Yes                        | 54.9       |        |                    |
| No                         | 45.1       |        |                    |
| Number of beef cattle owned|            | 7.99   | 3.70               |
| Information-seeking behavior|           |        |                    |
| Yes                        | 63.2       |        |                    |
| No                         | 36.8       |        |                    |
| Distance from the nearest market| 9.08 | 4.31 | |
| Cattle market information access| | | |
| Yes                        | 62.5       |        |                    |
| No                         | 37.5       |        |                    |
| Ownership of mobile phone  |            |        |                    |
| Have mobile phone          | 59         |        |                    |
| Have no mobile phone       | 41         |        |                    |
Table 2. Contributions of mobile phone in beef cattle marketing (n = 85)

| Contributions                                                                 | Total score | Rank order |
|-------------------------------------------------------------------------------|-------------|------------|
| Save time and minimize cost in search for the market                          | 402         | 1          |
| To get up-to-date price information                                           | 390         | 2          |
| Easy dissemination of market information among fellow cattle sellers           | 377         | 3          |
| Enables decision-making on when, when, and for whom to sell the cattle        | 362         | 4          |
| Increases income of the beef cattle smallholders                              | 352         | 5          |
| Enables the smallholders to negotiate price with cattle buyers                | 235         | 6          |
| Increase interaction and communication with many cattle buyers                | 224         | 7          |

3.3. Descriptive statistics results of respondents on status of mobile phone use

For the purpose of this study, chi-square test and independent t-test were used to know the association of each explanatory variable on the use of mobile phones in beef cattle marketing.

From the chi-square test result as shown in Table 3, gender of household head, education level, credit access, and cattle market information access have a statistically significant association with mobile phone use status at 1% significance level. Whereas ownership of mobile phone had a statistically significant association with mobile phone use status at a 5% level of significance. The significance of the chi-square result implied that there is a relationship between categorical covariates and mobile phone use in beef cattle marketing.

Furthermore, the t-test result in Table 4 displays that there is a mean difference in age, total income, number of beef cattle owned, and distance from the nearest market place of the sample respondents between the users and nonusers of mobile phone in the use of mobile phones at 1% significance level. The significance of the chi-square and t-test result has an implication for the subsequent regression result. This means that variables that were significant in the chi-square and t-test have a high chance of becoming significant in the regression output.

3.4. Factors affecting use of mobile phone in beef cattle marketing

The binary logit regression model result showed that gender of household head, education level, total annual income, credit access, cattle market information access, and the number of beef cattle owned significantly affect mobile phone use in beef cattle marketing.

The result of the marginal effect in Table 5 showed that male-headed household increases the probability to be a mobile phone user in beef cattle marketing by 25.6% as compared to those households who are female-headed, other factors being constant. The result is similar to the finding of the key informants interview and focus group discussions. The justification is that due to sociocultural impact, illiteracy, and poorness; the majority of women farmers were not mobile phone users. Moreover, the result also showed that secondary education level is positive and significant at 10% probability. The result depicted that secondary education level increases the probability of the respondents to be mobile phone users in beef cattle marketing by 41.9% as compared to respondents who have no formal education, ceteris paribus. This finding indicated that a higher level of education is essential to operate and to have awareness of the technology, and use all the mobile phone services appropriately.
The model result showed that total annual income is positive and significant at a 1% probability level. The result depicted that, as the total annual income increase by one unit, the probability to be mobile phone user increases by about 1.1%, *ceteris paribus*. The finding from key informants interview and focus group discussion also supports this finding, which portrayed that the majority of the beef cattle herders in the area were smallholders, thus they have no financial power to buy a mobile phone. Moreover, farmers who have financial power were mobile phone users. In addition to this, credit access is also positive and significant at a 1% probability level. The result depicted that as compared to farmers who have no access to credit, having credit access increases the probability of being a mobile phone user by 48.4%, at *ceteris paribus*.

Furthermore, the model result showed at *ceteris paribus*, as the number of beef cattle increases by one unit, the probability to be a mobile phone user increases by about 4.0%. This implied that having a high number of beef cattle used as an incentive to use the mobile phone so as to have access to beef cattle market information. In addition, having access to cattle market information increases the

| Table 3. Relationship between categorical independent variables and dependent variable |
|----------------------------------|---------|---------|----------------------------------|
| Mobile phone use status          | User    | Nonuser | Chi-square value                 |
|----------------------------------|---------|---------|----------------------------------|
| Gender                           |         |         |                                  |
| Male                             | 67.6    | 32.4    | 10.743***                        |
| Female                           | 38.1    | 61.1    |                                  |
| Education level                  |         |         |                                  |
| No formal education              | 35.2    | 64.8    | 27.08***                         |
| Primary education                | 71.6    | 28.4    |                                  |
| Secondary education              | 81.3    | 18.7    |                                  |
| Credit access                    |         |         |                                  |
| Yes                              | 75.     | 24.     | 20.721***                        |
| No                               | 38.5    | 61.5    |                                  |
| Information-seeking behavior     |         |         |                                  |
| Yes                              | 61.5    | 38.     | 0.644(NS)                        |
| No                               | 54.7    | 45.3    |                                  |
| Cattle market information access |         |         |                                  |
| Yes                              | 78.9    | 21.     | 39.145***                        |
| No                               | 25.9    | 74.1    |                                  |
| Ownership of mobile phone        |         |         |                                  |
| Have mobile phone                | 65.9    | 34.     | 4.0304**                         |
| Have no mobile phone             | 49.2    | 50.     |                                  |
| Age                              | 44.047 (9.683) | 54.525 (12.811) | 5.587*** |
| Family size                      | 5.00 (1.832) | 5.559 (2.253) | 1.638(NS) |
| Total income                     | 68.929 (20.147) | 38.508 (19.101) | −9.101*** |
| Number of beef cattle owned      | 9.188 (3.275) | 6.254 (3.627) | −5.058*** |
| Distance from the nearest market | 7.965 (3.974) | 10.678 (4.297) | 3.897*** |

Note: ***, ** display significance at 1% and 5% probability level respectively and also (NS) represents insignificance.
Table 4. Description of association between continuous independent variables and dependent variable (n = 144)

| Mobile phone use status | User          | Nonuser       | T-value |
|-------------------------|---------------|---------------|---------|
| Age                     | 44.047 (9.683)| 54.525 (12.811)| 5.587***|
| Family size             | 5.00 (1.832)  | 5.559 (2.253) | 1.638 (NS) |
| Total income            | 68.929 (20.147)| 38.508 (19.101)| −9.101***|
| Number of beef cattle owned | 9.188 (3.275)| 6.254 (3.627) | −5.058***|
| Distance from the nearest market | 7.965 (3.974) | 10.678 (4.297) | 3.897***|

Note: *** and (NS) represent significance at 1% probability level and insignificance, respectively.

Table 5. Determinants of mobile phone use in beef cattle marketing

| Variables                    | Coefficients | Standard error | Marginal effect |
|------------------------------|--------------|----------------|-----------------|
| Age                          | −0.035       | 0.030          | −0.0069078      |
| Gender                       | 1.285*       | 0.731          | 0.256053        |
| Education level              |              |                |                 |
| No formal education          |              |                |                 |
| Primary education            | 1.090        | 0.706          | 0.2378513       |
| Secondary education          | 2.967**      | 1.415          | 0.4194827       |
| Family size                  | −0.204       | 0.167          | −0.0407631      |
| Total annual income          | 0.056***     | 0.016          | 0.0111277       |
| Credit access                | 2.431***     | 0.733          | 0.484419        |
| Number of beef cattle owned  | 0.203**      | 0.085          | 0.0404986       |
| Information-seeking behavior | 0.400        | 0.686          | 0.0796422       |
| Distance from the nearest market | −0.017       | 0.069          | 0.0033849       |
| Cattle market information access | 2.172***    | 0.759          | 0.4328655       |
| Ownership of mobile phone    | 0.531        | 0.635          | 0.1058036       |
| Constant                     | −5.891       | 2.510          |                 |

Number of obs = 144
Log likelihood = −36.963261
LR chi²(11) = 120.98
Prob > chi² = 0.0000
Pseudo R² = 0.6207

Note: ***, **, and * denote significance at 1% probability level, 5% probability level, and 10% probability level.
The probability of use of mobile phones in beef cattle marketing by 43.3% as compared to respondents who have no cattle market information access, other factors being constant. This finding is in line with the findings of focus group discussions, which showed that access to market information via mobile phone is essential for farmers to make better marketing decisions for their agricultural marketing so as to gain higher benefit in the market.

3.5. Constraints in use of mobile phone in beef cattle marketing among smallholder farmers

The result from Table 6 shows major constraints that prohibit the respondents to use mobile phones in beef cattle marketing at full potential. The constraints include (1) poor extension service, (2) lack of operating skill, (3) poor network coverage, (4) problem of electricity, and (5) high cost of mobile phone.

| Constraint                        | Total score | Rank order |
|-----------------------------------|-------------|------------|
| Poor extension service            | 546         | 1          |
| Lack of operating skill           | 467         | 2          |
| Poor network coverage             | 386         | 3          |
| Problem of electricity            | 322         | 4          |
| High cost of mobile phone         | 319         | 5          |

Poor extension service was a serious constraint since there was a lack of extension facilities in the area. In the study area, training in connection to mobile phone utilization for the marketing purpose is not provided. Moreover, mobile phone-based livestock market information system, which is crucial to disseminate market information for a large number of farmers using local language (Oromic language), was not launched in the area. Thus, due to the failure of extension service the farmers were exposed to market risk. The problem of operating skill is also the other serious constraint caused associated with the low literacy level of farmers. The result from key informants and focus group discussion also solidify this finding. Most of the farmers in the area did not have the skill to operate their mobile phone and they did not read and understand text messages sent from extension agents and other farmers.

In addition to this, poor network coverage and problem of electricity were also another constrain due to physical infrastructure problem, which should be facilitated to improve farmers’ mobile phone use. High cost of mobile phone is another constraint since there were farmers who could not afford money to purchase mobile phone even if different mobile phones were available in the area at the least cost. Similar findings were obtained from key informants and focus group discussions, which portrayed that farmers in the study area were at the distant place that was difficult to have full electric and network coverage in the area.

4. Conclusions and recommendations

4.1. Conclusions

Mobile phones contributed a lot for farmers to have access to updated market information, which helped them to make informed marketing decision, to increase interaction among farmers, and between farmers and traders. However, constraints like poor extension service, lack of operating skill, poor network coverage, problem of electricity, and high cost of mobile phone hindered the farmers to make use of mobile phone at full potential. Mobile phone served as the means to get information from different sources such as fellow farmers, development agents, and traders. Such information reduces the time spent in the search for the marketplace and for the buyers. This intern reduces the intervention of middlemen in the marketing process. Therefore, mobile phones reduced the exposure of the farmers for cheating and supported them to get appropriate income from the marketing of beef cattle.
4.2. Recommendations

Based on the above findings of the study, the following recommendations are given:

- Livestock market information center should be established in the district to disseminate a wide range of formal beef cattle marketing information through mobile phones for smallholders based on their need of information and using the local language of the farmers, i.e., Oromic language.
- Appropriate training and technical education (through capacity building program) should be provided for the smallholders and development agents to increase their awareness of mobile phone use as an extension tool, which supports the farmers to get full benefit from it.
- The district agricultural office should make an educational campaign, which is targeted at promoting adult education to give training on basic mobile phone functions, service, and also on mobile phone operations. The office should also work with financial institutions (such as commercial bank and Oromia credit and saving institutions) to avoid the financial constraint of farmers and make them mobile phone users.
- Rural infrastructures such as electricity and network coverage should be improved by governmental and non-governmental organizations in the area. Installation of electricity is crucial to reduce mobile phone cost.
- Furthermore, mobile phones that are easily operated and compatible (like solar-powered mobile phone) to the area should be designed and distributed to the farmers by the district agricultural office.

Acknowledgements

We are indebted to all respondents who participate in providing data and Dr. Patrick and Dr. Yared for their constructive advice.

Funding

This paper is part of research work and was funded by Injibara University of Ethiopia.

Author details

Yohannes Girma1
E-mail: girmayohannes86@gmail.com
Adi Kelil2
1 Department of Agricultural Economics, Injibara University, Injibara, Ethiopia.
2 Department of Agricultural Economics, JinkaUniversity, Jinka, Ethiopia.

Competing interest

The author(s) have no competing interest.

Citation information

Cite this article as: Mobile phone and beef cattle marketing: The case of Girar Jarso district of Oromia region, Ethiopia. Yohannes Girma & Adi Kelil, Cogent Food & Agriculture (2021), 7: 1911032.

References

Adégbidi, A. B. (2012). Impact of ict use on access to markets of pineapple smallholder farmers in Benin. Journal of Research in International Business and Management, 2(9), 240–247.
Aker, J., & Mbiti, I. (2010). Mobile ghp phones and economic development in Africa. Journal of Economic Perspectives, 24(3), 207–232. https://doi.org/10.1257/jep.24.3.207
Animal Health Yearbook. (2010). Ethiopia animal health yearbook 2009/10. Addis Ababa.
Ansari, M., & Pandey. (2013). Assessing the potential and use of mobile phones in agriculture. Journal of Agricultural Science, 26(3), 388–392.
Ayale, S., Asseggid, W., Belachew, H., Jabbar, M., & Ahmed. (2003). Livestock marketing in Ethiopia: A review of structure, performance and development initia
tives. socio-economic and policy research working paper 52. ILRI (international livestock research institute).
Bates, M., Manuel, S., & Oppenheim, C. (2007). Models of early adoption ofict innovations in higher education.http://repository.libro.ac.uk/account/articles9413405
Cook, W. D., & Kress, M. (1990). A data envelopment model for aggregating preference rankings. Management Science, 36(11), 1302–1310. https://doi.org/10.1287/mnsc.36.11.1302
CSA (Central Statistical Agency of Ethiopia). (2012). Report on livestock and livestock characteristics in Ethiopia.
Dejene, N., Peter, D., Waktole, T., Anne, S., Guagliardo, & Kitron, U. (2016). Mobile phones for mobile people: The role of information and communication technol
yogy (ict) among livestock traders and borona pastoralists of southern Ethiopia.
Dereje, T. (2011). The effectiveness of marketing communication channels: The case of ethiopia commodity exchange. addis ababa university.http://localhost:80/xmnlui/handle/123456789/4090
GDARDO (Girar Jarso District Agricultural Office) (2016). Livestock production potential in girar jarso district.
Halale, H. (2015). Review of beef cattle value chain in ethiopia. Journal of Agricultural Perspective, 5(7), 11–22.
Jabbar, M. A., & Gezahign, A. (2003). Livestock marketing, food security and related issues in ethiopia. a paper prepared for the workshop on “towards sustainable food security in ethiopia: integrating the agri-food chain” held at ghon hotel, addis ababa, ethiopia, 15-16 may 2003.
Moleda, B., & Yilkal, M. (2013). Feeding strategies, challenge and marketing of beef cattle in north gonder zone, ethiopia. Academic Journal of Nutrition, 2(3), 25–30.
MoFED (Ethiopian Ministry of Finance and Economic Development). (2013). The contribution of the live
cost sector to the Ethiopian economy.
NMA (National Meteorological agency). (2011) . Annual climatic bulletin for the year 2011. Natio
tional meteorological agency of Ethiopia.
Oliveira, T., & Martins, M. (2011). Literature Review of Information Technology Adoption Models at Firm Level. Electronic Journal of Information, 14(1), 110–121.
Razaque, A., & Sallah, M. (2013). The use of mobile phone among farmers for agriculture Development. *International Journal of Scientific Research, 2*(6), 95–98.

Rogers, E. M. (2003). *Diffusion of Innovations* (pp. 519). Free press.

Seyoum, M. (2014). ICT for agriculture: A lesson for ethiopian research and extension system.

Agriculture, food security and climate change research and development in Ethiopia and Africa. Shapiro, B. I., Gebru, G., Desta, S., Negassa, A., Nigussie, K., Aboset, G., & Mechałe, H. (2017). Ethiopia livestock sector analysis. ILRI Project Report. International Livestock Research Institute (ILRI).

Yamane, T. (1967). *Statistics, an introductory analysis* (2nd ed.). harper and row.