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Extent to which Cell Phones Enhance Market Information Sharing for Beef Cattle Smallholders in Mpwapwa District, Tanzania

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Abstract:
Many studies worldwide indicate that cell phone is one of the channels that could facilitate rapid access to information even to smallholder farmers in low-income group; however, the extent to which cell phones technology enhances beef cattle market information sharing for smallholders in Tanzania is not well documented. To fill part of the information gap, this study examined the extent to which cell phone technology enhances beef cattle market information sharing among the actors in Mpwapwa District, Dodoma Region, in Tanzania. A sample of 120 respondents, 12 key informants and four focus groups of discussants were consulted. Quantitative data used Statistical Package for Social Sciences (SPSS) to compute descriptive statistics including means, frequencies, percentages and multiple responses. In addition, inferential analysis using Chi-square (χ^2) test at $p \leq 0.05$ was also computed. Qualitative data were analysed thematically through content analysis. Results showed significant association between access to beef cattle market information via cell phones and the numbers of cattle buyers consulted; buyers accessed; calls received for cattle orders per month; cattle buyer's phone numbers owned and cell phone's airtime expenditures per individual per week. This shows the extent to which cell phones enhance access to instant cattle market information from various stakeholders involved at any time. On the basis of these findings it is concluded that this innovative pathway enhances rapid consultations and access to cattle buyers when a critical need arises. Based on the above conclusion it is recommended that cell phone service providers in collaboration with relevant ministries/organs should plan for programmes that can convey market information to smallholder cattle producers on monthly basis in order to realize the efficacy of cell phones in beef cattle subsector's development.

Keywords: *Cell phones, market information sharing, beef cattle smallholders*

1. Introduction

The transformation of livestock sub sector specifically beef cattle owned by smallholders in developing countries inevitably depends on the route and channel by which information communicated or disseminated reaches the users. Knowing that information sharing is a vital resource in the development process, many studies have been carried out globally to ascertain the use of innovative pathways in communication and dissemination of information to smallholder farmers. An empirical study in Malaysia revealed that the use of cell phones has been vital and benefit fishermen in accessing information related to fishing location and market demands from their colleagues, agency officers and dealers in the fishing communities [1]. The same authors,[1] noted that this innovative technology enhances the safety of fishermen and is pertinent in widening their network and access to several fish markets for improved market performance.

Similar research findings from a study conducted in Bangladesh have shown that cell phone technology in rural areas has been significantly used even by farmers in the low-income group [2]. The evidence from the same research also shows that the use of cell phone technology helps to overcome barriers of time; location; access to market players; customers and improves productivity for smallholder farmers in the rural areas.

In India, a research by [3] on the use of cell phones in the fishing industry, noted that fishermen were able to discuss the price of their catches with dealers in advance via cell phones hence access to better price opportunities and prevention of catch wastes. Furthermore, a research in Nigeria has also shown that cell phones have been useful to farmers in faster dissemination of information related to livestock market prices, weather, security and disease prevention advice during the emergency of outbreaks hence critical decision-making by beef cattle keepers [4].

In Swaziland, cell phones have been reported to improve access to markets for beef cattle by enabling owners to trade their live animals effectively [5]. Furthermore, a study in Rwanda by [6] found that a rapid growth of micro entrepreneur's business is attributed by the link established between suppliers and their customers via cell phones. More studies on the use of cell phones among small-

scale farmers in Uganda and Kenya revealed that cell phones have been used to enhance access to agricultural inputs, crop market information, to monitor financial transaction and coordinating the consultation with agricultural experts for different technical assistance [7], [8]. The above examples explain the development of this innovative technology (cell phones) in promoting agricultural sector worldwide in terms of agricultural information sharing mainly for the smallholder farmers. While reporting on agricultural information needs in Tanzania, [9] pointed out that, the required information on agriculture including livestock marketing is available but the accessibility by the target group in need is limited due to inappropriate channels used in communication and knowledge sharing. Thus, the existing information asymmetries in marketing cause inefficiencies in system in-terms of pricing and condition set for increased efficiency of marketing in Tanzania [10]. The authors also suggest the use of innovative pathways available to facilitate information sharing among stakeholders.

Since the Tanzanian economy still depends on agriculture as its support, agricultural information is considered as a key factor for socio-economic development of small-scale farmers in the rural areas. [11] in their study conducted in Kilolo District, Iringa in Tanzania revealed that the use of cell phones in accessing agricultural information has shown a positive economic impact. Results have shown that most of the farmers in Kilolo District valued cell phones as an innovative communication pathway that is fast and convenient to access information related to their farming practices and crop markets. Thus, the adoption of cell phone technology in many rural areas of Tanzania can influence faster dissemination of variety of agricultural information to smallholder farmers for timely decision-making.

Likewise, a study in semi-arid areas of Tanzania revealed that cell phones are preferred by smallholder farmers for communicating assorted agricultural information including climate, markets and agricultural inputs from local dealers for critical decision making at farm-levels [12]. With climate change and variability, communication and dissemination of climate information to smallholder farmers are of paramount importance for crop and livestock production in the rural areas. Hence, the use of innovative communication devices enables flow of such information to farmers at any time for critical information communication and knowledge sharing among smallholder farmers in the rural areas. Although many studies worldwide conclude that cell phone is one of the channels that could facilitate rapid access to information even to smallholder farmers in low-income group, the extent to which cell phones enhance access to beef cattle market information sharing for smallholders in Tanzania is not clearly pointed out.

There is few documented evidence on the use of ICTs including cell phones in relation to agricultural information sharing in Tanzania [13],[14], [15], [12][11]. However, the information about the extent to which cell phones enhance access to beef cattle market information for smallholders in the agro-pastoral communities of Tanzania particularly in Mpwapwa District is still limited. Therefore, this study sought to examine the extent to which cell phone technology enhances beef cattle market information sharing among the involved stakeholders in Mpwapwa District, Dodoma region, in Tanzania.

2. Methodology

2.1. Description of the Study Area

The study was conducted in Mpwapwa District located in Dodoma Region in Tanzania. The district is divided into four divisions namely Mpwapwa, Mima, Kibakwe and Rudi, 30 wards, 93 villages and 430 sub-villages. The economy of Mpwapwa District depends on agriculture (crop and livestock production). The main livestock category kept in the district is the traditional beef cattle and population of traditional beef cattle in the district is 262 076[16]. Thus, the area was selected because it is one of the catchment areas for beef cattle marketing in the country. In addition, during this study the district had already been connected to various cell phone service providers including Halotel, Vodacom, Airtel, Tigo and Zantel [17].

2.2. Data for the Study

A cross-sectional research design was used to collect data once from individual beef cattle smallholders, an individual being the sampling unit. The study collected both primary and secondary data and used both quantitative and qualitative data collection methods. The sampling frame consisted of all beef cattle smallholders in Rudi and Mpwapwa divisions, in four wards namely Rudi, Chipogoro, Gulwe and Godegode where by four villages distinctively Chilendu, Gulwe Chipogoro and Godegode were surveyed. The surveyed villages were selected purposively based on the availability of cattle population and cell phones local network coverage. In addition, the study used systematic sampling to select 30 respondents from each village to get a sample of 120 respondents. Quantitative data were mainly collected using a structured questionnaire. Qualitative data were collected from key informant interview and focus group discussions. A prepared checklist of items was used for the interview with 12 key informants (three informants in each of the four villages); and a focus group discussion guide was used during discussions to gather information from 32 beef cattle smallholders who participated in four group discussions (eight participants in each of the four villages). The number of eight participants per session is the one recommended by [7]. Likewise, the secondary data about cattle population were obtained from the village/ward and district livestock offices.

2.3. Data Analysis

The quantitative data collected were coded, summarized and entered into the Statistical Package for Social Sciences (SPSS) whereby descriptive statistics including means, percentages, frequencies, multiple responses and cross-tabulations were computed. In addition, inferential analysis was done by using Chi-square test at $p \leq 0.05$ concomitantly with cross tabulations to analyze associations between some categorical variables such as the use of cell phones in access to beef cattle market information and the number of cattle buyers consulted/accessed to capture the extent to which cell phones enhance access to beef cattle market information. The Chi-square model used is:

$$\chi^2 = \sum \frac{(o - e)^2}{e}$$

Where:
χ^2= the value of Chi-Square statistics
o = Observed frequencies in the contingency table
e = expected frequencies in the contingency table

2.4. Qualitative Data Analysis
The qualitative data obtained were analysed thematically to highlight diversity among the individual experiences and results were reported concurrently with quantitative data.

3. Results and Discussion

3.1. The Extent to which Cell Phones Enhance Market Information Sharing for Smallholders Beef Cattle Producers
To examine the extent to which cell phones enhance smallholders towards access market information sharing, the statement about the extent does cell phones enhance access to cattle market information was posed, whereby respondents had various opinions on the statement including "not at all; to a small extent; moderately and to a large extent". The results in Table 1 showed that more than a half (55.8%) concurred that cell phones enhance access to beef cattle market information largely because most of them are not even going to the market places for cattle sales rather they do call buyers to buy cattle at their home places. Less than one-tenth (9.2%) reported that cell phones enhance moderately while only (0.8%) said they enhance to a small extent. It implies that many smallholder beef cattle producers were benefiting from the use of cell phones in market information sharing hence appropriate decision-making about the time type and volume of cattle to be harvested based on the market demands information shared. On top of that, smallholders can decide whether to sell their cattle at home or to a distant market hence they can save time and avoid unnecessary costs and travelling risks.
According to key informants, live beef cattle buyers reported that cell phones have contributed a lot on the market information sharing including access to information about the availability of cattle and price proposed by cattle owners before they travel for cattle buying in the villages. Thus, even cattle buyers can make decision on whether they should go to the villages to buy cattle or they should wait for the cattle to be brought to the market depending on the availability of cattle and the price proposed by the cattle owners.
In addition, cattle buyers agreed to be consulted by cattle producers to buy their cattle at their home places. [19] also indicated the same findings that the use of cell phones has reduced risks, time and financial cost associated with information gathering since the device could coordinate discussion on the orders to avoid travelling risks. Therefore, the use of cell phones has been useful for both by complimenting such interactions since both sellers and buyers of cattle can directly trace the situation by crosschecking the price of cattle in various market places and discuss the suitable prices prior to decision-making.

Extent	Frequency	Percent
To a small extent	1	0.8
Moderately	11	9.2
To a large extent	67	55.8

Table 1: Extent of cell phones in enhancing access to market information (n=120)

3.2. Types of Market Information Communicated by Using Cell phones
Findings in Table 2 revealed that respondents were using cell phones to share different types of cattle market information particularly on prices 29.6% and market demands including sales volumes and grades such as age of cattle and applicable size (23.1%). One-fifth (20%) reported to share information about the availability of cattle buyers; 17.7% were using cell phones to communicate auction dates; whereas about one-tenth (9.6%) used cell phones to share information about road condition inside and outside the district especially during rain seasons when many bridges are in a state disrepair, this was the case mainly in Gulwe, Rudi and Godegode villages.
In discussion with focus group, it was revealed that communication about availability of cattle buyers is very important because the experience has shown that when there are few buyers the price of cattle goes down as compared to when there are numerous buyers in place. Therefore, cell phones enabled smallholder cattle owners' benefit by selling when the price of cattle is favourable. The percentage of cases presented in Table 2 exceeds 100% because of multiple responses.

Types of market information	Count	Percent of responses	Percent of cases
Sales price	77	29.6	100.0
Seasonality and road conditions	25	9.6	32.5
Auction dates	46	17.7	59.7
Market demands (sales volume, age, size)	60	23.1	77.9
Availability of buyers	52	20.0	67.5
Total	**260***	**100.0**	**337.7***
NB: *Multiple responses			

Table 2: Types of market information communicated via cell phones (n=120)

3.3. Markets and Cattle Buyers Consulted in the Past 12 Months when Need Arose

According to discussion with respondents and observation made by the researcher it was revealed that most beef cattle smallholders were not selling their cattle frequently rather, they sold cattle when a critical need arose in the family. Some of the critical needs mentioned ware school fees, long-term illness, food shortage, disease outbreaks and death. Based on the chi-square results in Table 3, the number of buyers consulted and buyers accessed in the past 12 months when need the arose were highly and significantly associated with access to beef cattle market information by using cell phones (χ^2 =79.00; $p \leq 0.001$). This shows the extent to which cell phones are used in access to instant cattle market information and the way this innovative device enhances rapid consultation and access to cattle buyers when a need arises.

However, there was no significant association between the numbers of markets surveyed and access to beef cattle market information via cell phones probably because those who had access to buyers they were more likely to sell their cattle at their home places when the need arose.

					Access to beef cattle market information	
Item	**Minimum**	**Maximum**	**Mean**	**Std Deviation**	**χ^2**	**P-value**
Buyers consulted	1.00	30.00	4.15	4.80	79.000***	0.000
Buyers accessed	2.00	25.00	3.56	4.06	79.000***	0.000
Markets surveyed	1.00	8.00	2.56	1.82	12.685	0.012
Note: ***, **,* significant at 0.1, 1 and 5% levels respectively ($P \leq 0.001$, $P \leq 0.01$ and $P \leq 0.05$)						

Table 3: Number of markets and cattle buyers accessed via cell phones in the past 12 months (n=120)

3.4. Phone Numbers Registered in One's Phone Book

The study revealed that beef cattle smallholders had phone numbers, which enabled them to consult cattle buyers when the need arises. The buyer's phone numbers owned by respondents ranged from a minimum of one to the maximum of 100 phone numbers. The variation of phone numbers registered in one's phone book was due to the size of their herds whereby smallholders with big herds were likely to sell few cattle several times to cover some costs for veterinary services required thus they were likely to have many buyers phone numbers. However, those with small herds would like to multiply their herds rather than reducing them by selling.

According to cattle-producers and key informants a small herd size in the study area ranges from 2 - 15 cattle. Further analysis revealed that there was significant association between buyer's phone numbers in one's phone book and accesses to beef cattle market information (χ^2 = 85.262; $p \leq 0.001$). Similarly, the chi-square results reveal a significant association (χ^2 = 79.000; $p \leq 0.001$) between accesses to beef cattle market information and extent of calls received by beef cattle smallholders from cattle buyers who placed order of cattle per month. This implies that the smallholders with buyer's phone numbers interacted with many cattle buyers and they were likely to receive many calls from cattle buyers who would like to place cattle orders thus, it was easy for them to link buyers with their fellow cattle keepers once they did not have enough cattle for selling.

In addition, beef cattle smallholders also had access to their fellow cattle producer's phone numbers ranging from 1-150 numbers; nevertheless, there was no significant association between access to cattle market information and the ownership of fellow cattle producer's phone numbers. This was probably because smallholders had various information to share with their fellow cattle producers rather than cattle market information.

					Access to beef cattle market information	
Telephone numbers owned	**Minimum**	**Maximum**	**Mean**	**Std Deviation**	**χ^2**	**P-value**
Buyers contacts owned	1.00	100.00	7.80	12.42	85.262***	0.001
Fellows contacts	1.00	150.00	18.99	23.87		
Calls received for cattle orders per month	1.00	30.00	4.01	5.86	79.000***	0.000
Note: ***, **,* significant at 0.1, 1 and 5% levels respectively ($P \leq 0.001$, $P \leq 0.01$ and $P \leq 0.05$)						

Table 4: Phone numbers registered in one's phone book (n=120)

3.5. Cell phone helps to stay in Touch with other Stakeholders for Cattle Sales

The results revealed that more than three-quarters (76.7%) of respondents ranked cell phones as a very important tool that enables staying in touch with cattle buyers for future selling of beef cattle. However, very few respondents (3.3%) had no opinion about the importance of cell phones for future sales. This might be due to their little experience of using cell phones for market information sharing. Table 5 shows stakeholders who are connected to smallholder beef cattle producers via cell phones. More than a quarter (26.6%) of respondents reported that cell phones enabled them to stay in touch with their fellow beef cattle keepers who were the most reliable source of market information.

Likewise, more than a quarter (25.5%) said cell phones enabled them to stay in touch with extension agents for veterinary services; more than one-fifth (23.4%) reported to stay in touch with Village Executive Officers or Ward Executive Officers (VEO/WEOs) for cattle movement permit documents; whereas 15.6% reported that cell phones enabled them to stay in touch with their leaders of livestock keeper's association in the village (chairperson and secretary). Further findings indicated 4.7% of the respondents who

reported that cell phones enabled them to stay in touch with veterinary stockist outside their villages; and a further 3.2% of the respondents reported to stay in touch with transporters while 0.8% said that cell phones enabled them to stay in touch with auctioneers/market masters.

The same observation was reported by [7] who found that cell phones enabled cattle keepers to stay in touch with extension agents, community members and local leaders regarding the access to crop and livestock inputs. Similarly, respondents from Focus Group Discussions (FGDs) reported that cell phones were very important for staying in touch with buyers not only for cattle sales but also for crops and small stock considered as the first alternative as a source of cash when a need arises. [20] in their study conducted in Mpwapwa and Manyoni districts in Tanzania also reported that small stock was often sold to solve problems when emergency occurred in the family.

Likewise, during the interview with key informants, buyers reported to have five to ten (5-10) cell phone contacts from smallholder beef cattle producers thus, they were using cell phones to place order of cattle one day before the market day to ensure the availability of cattle and price agreement. Moreover, extension agents reported receiving frequently calls from smallholders for consultations with regard to the animal health and treatment for the sick animals. This implies that cell phones have created links among actors involved in the beef cattle subsector inside and outside rural areas.

Stakeholders involved	Count	Percent of responses	Percent of cases
Fellow beef cattle keepers	101	26.6	99.0
Village/Ward Executive Officer (VEO/WEO) for cattle movement permit documents	89	23.4	87.3
Transporters	12	3.2	11.8
Extension agent for veterinary services	97	25.5	95.1
Veterinary stockists	18	4.7	17.6
Auctioners/Market masters	3	0.8	2.9
Village livestock keepers association leaders	60	15.8	58.8
Total	**380***	**100.0**	**372.5***
NB: *Multiple responses			

Table 5: Stakeholders stay in touch via cell phones for cattle sales (n=120)

3.6. Cell phones and Average Airtime Expenditures per Week

The results in Table 6 indicate that the average expenditure for cell phones recharging airtime per individual was TZS 6 757.28 per week with a minimum of TZS 500.00 and maximum of TZS 40 000.00. The extent to which cell phones are used made smallholder's expenditure on cell phones airtime relatively higher. One possible reason for this might be due to the feeling that access to information has numerous benefits to them. Furuholt and Matotay (2011) argued that despite the poverty level in rural areas of Tanzania, people were willing to spend significant amount of cash on airtime. Likewise, chi-square results (χ^2 11.725; $P \leq 0.032$) indicated significant association between the use of cell phones in accessing cattle market information and cell phone's airtime expenditures per individual per week. This suggests that, beef cattle smallholders were likely to use cell phones to communicate market and social information instead of meeting transport cost.

Item	Access to market information Expenditure
Minimum	500.00
Maximum	40 000.00
Mean (Average)	6 757.28
Standard deviation	5 947.43
Pearson chi- square = 11.725 P= 0.032 ($p \leq 0.05$)	

Table 6: Cell phone's expenditure per week (n=120)

3.7. Other Services Accessed by Using Cell Phones Apart from Calling and Short Message Services (SMS)

Cell phone technology is a device that can allow variety of services to be utilized by the users apart from calling and short message services depending on the model of cell phone owned, individual capability and skills as well as preferences. To establish the use of other service applications enabled by cell phone, the study findings show that 17.5% of respondents use it as time monitoring device (clock); 16.1% use cell phones as a calendar including cattle auction dates and 15.7% were using the cell phone as torchlight. Other cell phone applications in use are the calculator (12.8%); access to radio (8.5%); access to music (7.2%) and as a camera (5.8%). Few respondents used for M-Pesa (5.6%); Tigo-Pesa (4.5%); games (3.1%); Airtel-money (2.5%) and 0.8% had access to internet services. The above responses reveal that cell phones enabled beef cattle smallholders to have access many other important services rather than just calling and text messaging as Fig. 1 shows. This means that, having a single device one can exploit other services including mobile-banking; radio; camera; music player; clock; calendar; calculator for cattle sales; torchlight; games for entertainment and internet services.

These findings confirm earlier findings by [14], [22],[21] [23]and [24] which indicated that the use of cell phones had built confidence in the users regarding the use of extra services allowed by the devices. The application of mobile banking is one way, which enhances electronic inclusion for smallholders in the rural areas. However, percentage of respondents who used advanced application was relatively low; this is probably due to lack of knowledge and skills on how to operate the features; lack of appropriate device models; low level of literacy and the higher price of complex cell phone devices.

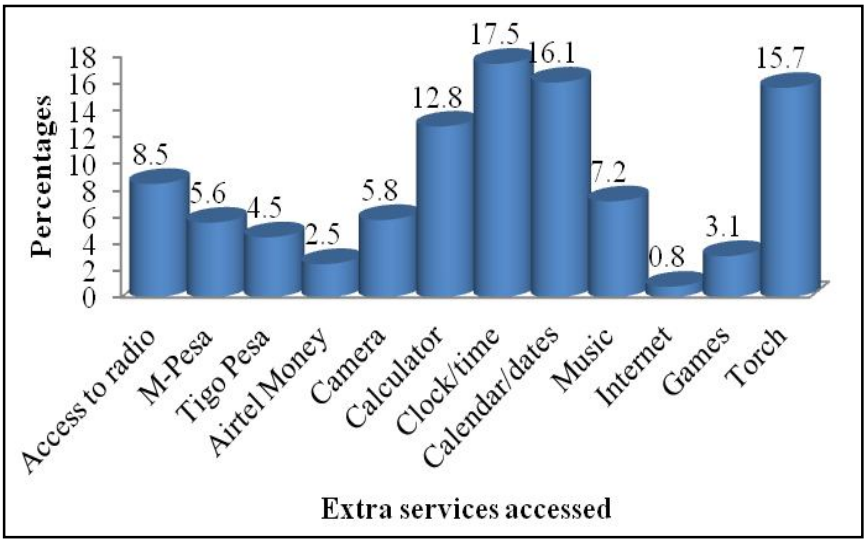

Figure 1: Proportion of smallholders using other services of cell phones

3.8. Methods Used to Communicate with Fellow Beef Cattle Keepers

The study revealed that beef cattle producers had various methods to communicate with their fellow beef cattle keepers to share some experiences and social issues. As indicated in Table 7 nearly a quarter (23%) of respondents communicated with their fellow beef cattle producers through home visits indicating that cell phones did not substitute face-to-face through home visits in rural areas rather complemented the technique. Moreover, 22% were likely to meet in the various market places while one-third (19.6%) were likely to meet in the livestock keepers group gatherings held occasionally. About 19% communicated with their fellow beef cattle keepers via cell phones; while 16% communicated with them at the village local meetings. Generally, respondents claimed to use other mentioned methods of communication rather than home visits and cell phones on issues that do not require urgent attention for decision-making. This implies that home visits (face-to-face) and cell phones are possibly reliable methods for communication that need instant responses including the dissemination of information about illness, deaths and cattle theft. A study by [25] also reported that the cell phones did not totally substitute face-to-face in the community; however, face-to-face was highly needed for communication since it allows forth and back dialog among stakeholders.

Methods used	**Count**	**Percent of responses**	**Percent of cases**
Village local meetings	80	16.0	66.7
Cell phones	97	19.4	80.8
Livestock keepers group gatherings	98	19.6	81.7
Market day visits	111	22.2	92.5
Home visits	115	23.0	95.8
Total	**501***	**100.0**	**417.5***
NB: *Multiple responses			

Table 7: Methods used to communicate with fellow farmers (n=120)

3.8.1. Beef Cattle Information to be Demanded via Cell Phones in Future

This research also looked at the future information needs which beef cattle smallholders would like to receive from extension agents or ward/village officials via cell phones. Results showed that more than four-fifths (82.5%) of the respondents reported that they would like to receive various information related to beef cattle. According to multiple responses indicated in Table 8, more than one-eighth (15.9%) said that they would like to have access to quarantine information during the notifiable disease outbreaks; 15.6% would like to receive information about beef cattle market prices available whereas 14.4% would like to receive information related to vaccination dates. Other information needs were information about livestock keepers group local gatherings (seminars/meetings) 13.9%; access to cattle movement permit documents 11.5%; beef cattle grades applicable in the market 11%; while 8.8% would like to receive information about the cause of low prices for beef cattle. This implies that information is a necessary resource for development of the beef cattle subsector in the rural areas.

Types of information demanded	Count	Percent of responses	Percent of cases
Beef cattle grades applicable	69	11.0	69.0
Beef cattle prices available	98	15.6	98.0
Cause of un-conducive prices	55	8.8	55.0
Quarantine during the notifiable disease outbreaks	100	15.9	100.0
Vaccination dates	90	14.4	90.0
Cattle dipping dates	56	8.9	56.0
Cattle keepers group gatherings (seminars/meetings)	87	13.9	87.0
Access to cattle movement permit documents	72	11.5	72.0
Total	**627***	**100.0**	**627.0***
NB: *Multiple responses			

Table 8: Demand for Beef cattle related information for the future (n=120)

3.8.2. Opinions on the Beef Cattle Market Information Desired in Future

The study went beyond to document future demands for market information and revealed that the nearly all respondents (95%) would like to have a regular source of assorted cattle market information in future. As multiple responses indicated in Table 9 about one-fifth (19.8%) of the respondents would like to regularly receive information about quarantine during livestock disease outbreaks; about one-fifth (19.7%) again would like to receive information about cattle market prices; and 16.7% would like to access information about cattle movement permit documents. More information demands in future include information about reliable cattle buyers (16.6%), access to information concerning beef cattle grades applicable in the market (15.3%) and information about auction dates (11.9%). Generally, access to relevant and accurate information from reliable source is one of the key solutions regarding the development of beef cattle subsector.

Type of market information needed	Count	Percent of responses	Percent of cases
Reliable buyers in place	96	16.6	83.5
Auction dates	69	11.9	60.0
Sales price	114	19.7	99.1
Beef cattle grades applicable	89	15.3	77.4
Quarantine information during disease outbreaks	115	19.8	100.0
Access to cattle movement permit documents	97	16.7	84.3
Total	**580***	**100.0**	**504.3***
NB: *Multiple responses			

Table 9: Beef cattle market information demands in future (n=120)

3.8.3. Time Interval and Language Preferred to Receive Market Information in Future

The results in Table 10 showed that more than two-thirds (66.7%) would like to receive cattle market information at the beginning of every month; more than one-fifth 22.5% would like to receive information on a weekly basis whereas 3.3% would like to receive information daily. On the other hand, very few respondents 1.7% would like to receive information after three months and once per year as well. One reason for this is that some respondents had a very small number of cattle so they are not interested on cattle selling unless when a critical problem arises. Further findings in Table 10 indicated that almost all respondents (95.8%) would prefer to get cattle market information in Kiswahili language. This implies that even rural dwellers in Tanzania can understand the information well when presented in the national language, which is Kiswahili.

Interval preferred	Frequency	Percent
Daily	4	3.3
Weekly	27	22.5
Monthly (at the beginning)	80	66.7
After three months	2	1.7
Once per year	2	1.7
Language preferred		
Kiswahili language	115	95.8

Table 10: Interval and language preferred to receive market information in future (n=120)

3.8.4. Mode of Communication Preferred with Regard to Future Information Dissemination

The results in Table 11 revealed that more than a quarter (29.6%) reported that annual calendar is a preferable mode for market information access in future mainly for auction dates because the calendar is distributed in form of posters and they are readily available in village executive or ward executive offices where accessibility is easy. Another more than one–fifth (21%) would prefer posters because at the time of livestock disease outbreaks the District Veterinary Doctor is mandated to impose quarantine in the areas

with outbreaks in form of stamped letter/posters, therefore, the off-lines and those who do not have cell phones can have access to an urgent information.

In addition, more than more than one–fifth (20.7%) once more would prefer cell phones via voice calling to access cattle market information. Voice calling was preferred because of prompt feedback when quick decision-making is essential, some respondents reported that they prefer voice calling because even illiterates can access the information and that one can ask questions for more clarification. Other modes of communication preferred are text messaging 14.5%, local village meetings 6.8%, face-to-face meetings with extension agent/WEOs/VEOs 5.6% and radio 1.2%. The use of SMS was preferable because it is a certain way of conveying information even when subscriber is not reachable. It is also useful to literate people and some illiterates who can seek assistance from their children and fellow literates because they can revisit the SMS to remind themselves on the contents.

However, some possible reasons for dismal preference on SMS mode include lack of knowledge and skills on how to deal with SMS, visual disabilities and the fact that SMS cannot be asked for more clarification in case of misunderstanding with regard to the received information. Generally, findings indicated dismal preference on other modes including local village meetings, face-to-face with extension agents WEOs/VEOs as well as radios in dissemination of cattle market information probably due to inadequate time and insufficient personnel to cover scattered grazing areas timely. Therefore, posters and innovative pathways including the use of cell phones could fill the gap not filled by extension agents, local meetings and radios modes in dissemination of cattle market information for smallholders in the rural areas to enhance the fast-growing beef cattle sub-sector in meeting the high demand of quality beef in the country.

Communication mode preferred	**Count**	**Percent of responses**	**Percent of cases**
Voice calling	67	20.7	58.3
Cell phone SMS	47	14.5	40.9
Posters	70	21.6	60.9
Radio	4	1.2	3.5
Face to face by extension agents/WEOs/VEOs	18	5.6	15.7
Local village meetings	22	6.8	19.1
Annual calendar	96	29.6	83.5
Total	**324***	**100.0**	**281.7***
NB: *Multiple responses			

Table 11: Mode of communication preferred with regard to future information dissemination (n=120)

4. Conclusions and Recommendations

The study examined the extent to which cell phones enhance access to beef cattle market information for smallholders. Findings have shown that there is significant association between the numbers of buyers consulted, buyers accessed and the use of cell phones in access to beef cattle market information indicating the extent to which cell phones enhanced access to instant cattle market information at any time when need arose. Other factors including calls received for cattle orders per month, cattle buyer's phone numbers owned and cell phone's airtime expenditures per individual per week also showed significant associations with the use of cell phones in access to market information for smallholders. This implies that, this innovative pathway enhances rapid consultation and access to cattle buyers when crucial need arises in the study area.

Moreover, the study found that cell phones had created a strong link in social and technical networking, and access to other advanced applications enabled by the cell phones including access to mobile banking. This provides evidence on the extent to which cell phones play roles in the day-to-day lives of beef cattle smallholders in the study villages. In addition, the study findings revealed that cattle smallholders would like to receive information related to beef cattle via cell phones in future thorough simple Kiswahili terms, implying that smallholder cattle producers prefer Kiswahili language in access to constructive information to enhance their decision making for increased production performance.

Therefore, it is recommended that the proper use of this innovative device can improve the economy in terms of access to market information and mobile banking for individual savings. In addition, cell phone service providers in collaboration with relevant ministries/organs should plan for programmes that can convey market information to smallholders on monthly basis via voice messages in simple Kiswahili language to realize the efficacy of cell phones in beef cattle subsector's development.

Realizing that farmers are also interested on mobile banking services, service providers should consider the establishment of mobile banking (M-Pesa, Tigo-Pesa and Airtel-money) agents with huge and sufficient amount to accommodate needs in the rural areas. The provision of convenient services will enable access to the mobile banking facilities within a short distance in the villages instead of accumulating service centres in the urban areas.

Since this study covered only four villages in Mpwapwa district located in the central Tanzania, similar studies can be extended to cover other agro-pastoral areas in other zones of Tanzania hence more knowledge regarding the use of cell phones and access to market information by the smallholders will be obtained. Moreover, seeing that the device had multiple roles to play in the community including financial transactions (mobile banking), further studies should focus on the extent to which these services reach community members in the rural areas on time.

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