Smallholder Rice Farmers' Perceptions on Usefulness of Mobile-Phone Technology in Bahi District, Tanzania

Try to be specific on the topic, Is it usefulness of mobile phones on Rice production or just general utility as percieved by Rice farmers?

Abstract

Mobile Phone Technology is increasingly becoming a powerful method in interpersonal communication. This paper documents smallholder rice farmers' perception on the usefulness of this technology in communicating agricultural production and market information. Data were collected from 282 smallholder farmers who were selected randomly from rice farmers in Bahi District, Tanzania. The findings revealed that 97.2% of the sampled smallholder farmers owned phone for more than three years. All phones were able to perform the basic function of sending and receiving short messages, making and receiving calls; with very few (18.8%) capable of accessing internet. 48% and 78% of the respondents perceived the network coverage and costs of buying and running the technology respectively as moderate, whilst 54.3% perceived the technology as very useful in communicating agricultural production and market information. However, only less than 36% of the respondents confirmed to have used the technology to communicate agricultural production and market information, with very few (3.2%) communicated with extension officers. It is recommended that intervention intended to improve farming through mobile phone technology, should be configured around the basic functions of the mobile phones. More so, Extension Officers should increase the use of mobile phone technology in advising farmer, through automated short massages services or a stationed officer on calls.

Key words: *Mobile phone technology; smallholder farmers; rice farmers; Bahi District; and smallholder farmers' perception*

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1 Introduction

Information has always been an important component in agricultural development processes (Conley and Udry, 2010). Irrespective of their location and type of agricultural enterprises, the most commonly searched information by farmers has been the know-how aspects which gives them fundamental agricultural facts. For instance, farmers may want to know the best cultivation practices, sources of improved seeds and or animal feeds, amount and type of inputs to use, also contextual information such as weather, as well as market information including prices, demand indicators, and other logistical information (Gruber and Koutroumpis, 2011; Meyer, 2015).

Essentially, poor access to agricultural information has been one potential explanation that limit~~ing~~s agricultural performance in developing countries and has made farmers vulnerable to several risks, both during farming,

transportation as well as during marketing of their crops (Arokoyo, 2003; Foster and Rosenzweig, 2010; Lwoga et al., 2010).

Among others, one major explanation associated with farmers' poor access to agricultural information has been under-utilization of Information Communication Technologies (ICT) (URT, 2008, 2006; World Bank, 2008). Limited access to agricultural information affects the usefulness of various agricultural technologies which has direct relationship with agricultural performance.

Like in other developing countries, in Tanzania farmers are suffering from poor agricultural information accessibility (Haug, 1999; URT, 2008). Radio, newspaper, internet, email, mobile-phones or notice boards for a while have been recognized as the most useful methods for dissemination of agricultural information in Tanzania (Ferris, 2005). However, many of these options have their limitations; for instance, newspapers tend to be concentrated in urban areas and require literacy, internet access is low and TV and radio have limited information range and provide one-way communication (Aker and Mbiti, 2010; Hellstrom, 2010).

Of recent mobile-phone has been a reliable source of information among rural and urban dwellers in developing economies, some limitations from other methods have made this option more famous and accepted (Patel et al., 2012). In Tanzania, the uptake of mobile phones has been growing enormously and continues to grow, for instance, from 110 518 subscribers in the year 2000 to 25, 827 518 in 2011(TCRA, 2011).

Despite ~~of~~ the usefulness of mobile-phone technology (MPT) and its potential to foster agricultural development in Tanzania, there is an apparent inconsistency between mobile-phone subscriptions which is increasingly being adopted on one hand and their uptake into farming practices on the other hand. This might be due to unknown limitations that rural and urban dwellers face while using the technology that can be emanated from individuals' behaviour and perception towards the technology or can be from the technology-based challenges or

both. Regarding to that, this paper focuses on farmers' perception of Mobile Phone Technology.

Diffusion of innovation theory as postulated by Rogers (1962), outlines the importance of adopter's perceptions on an innovation and hence adoption of that particular innovation. Specifically, the adopter's perceptions of an innovation are categorized into five classes (Rogers, 1983): Being (1) relative advantage (the degree to which an innovation is perceived as being better than the idea it supersedes); (2) compatibility (the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of potential adopters); (3) complexity (the degree to which an innovation is perceived as relatively difficult to understand and use); (4) trialability (the degree to which an innovation may be experimented on a limited basis); and (5) observability (the degree to which the results of an innovation are visible to others). This paper focused on the three classes, namely; relative advantages, compatibility and complexity to measure the farmers' perception of Mobile Phone Technology (MPT). the introduction is too general and broad based, try and put this introductory part into context of RICE farmers in relation to the use of mobile technology.

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2 Methodology and Analytical Framework

To measure the degree of the aforementioned there classes, four groups of variables were developed. Group 1 examines and discusses three major variables; (i) Ownership of the mobile phone –whether the farmer owned a device or not, (ii) Period of mobile phone use –whether a farmer has been using the technology for a short or long period, and (iii) Technological aspect of the mobile phone technology among rice farmers –whether the device is able to receive and make calls, receive and send messages, connect to the internet, and able to take photos. Group 2 evaluates and discusses three main variables; (i) Perception on MPT network coverage –whether mobile phone network is strong, moderate or weak, (ii) Perception on the cost of using MPT –whether it is high, moderate or low, as well as (iii) Perception on the importance of using MPT in communicating agricultural production and marketing information –whether it is very important, fairly or not important. Group 3 examines two major

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variables that track the skills required when using MPT. These are: basic skills and specific skills–such as writing, reading, language and searching skills. Group 4 evaluates the information being communicated on these devices specifically that related to agricultural production and marketing activities.

Data to analyse the above four groups of variables were collected from 282 rice farmers who use MPT. Descriptive statistics such as frequencies and percentages as well as mean comparison were employed to address the desired objective. In addition, information gathered using focus group discussions was used to clarify and substantiate the findings.

3 Findings and Discussion

3.1 Ownership, period of use and technological aspect of mobile phone technology

It was observed that majority (97.2%) of the respondents own mobile phones, most (67.7%) of whom have been using the technology for a period of over 3 years (Table 1).

Table 1: Ownership, Period of Use & Technological Aspect of MPT (n=282)

Variable	No. of respondents	χ^2 values of mean difference
Mobile phone ownership		
Own	274(97.2%)	98.103***
Borrow	8(8.5%)	
Period been using Mobile phone		
3 or above years	191(67.7%)	24.286***
Less than 3 years	91(32.3%)	
Mobile phone ability to receive and make calls		
Able to receive and make calls	282 (100%)	N/A (as sd=0)
Not able	0(0.0%0	
Mobile phone ability to receive and send SHORT MASSEGE		
Able to receive and send SHORT MASSEGE	282(100%)	N/A (as sd=0)
Not able	0(0.0%)	
Mobile phone access to internet		
Have access to internet	53(18.8%)	8.064***
Have no access to internet	229(81.2%)	
Mobile phone ability to take photos		
Able to take photo	34(12.1%)	6.207***
Not able to take photo	248(87.9%)	

**** Significant at 1% level; MPT is Mobile Phone Technology*

Results in Table 1 further indicate that, all mobile phone were able to receive and make calls as well as receive and send short massage services, while very few (18.8% and 12.1%) had access to internet and were able ~~were~~ to take photos respectively. Reflecting on these results one may say that these famers have achieved the minimum requirements to tap technological advantage of the MPT innovation; that is having phones which are able to receive and make calls; and send and receive messages. However, the fact that having phones with access to internet and ability to take photos is likely to increase the farmers' possibility to tap technological advantage of the MPT innovation; gives an impression that most farmers are missing a lot by not possession phones with such characteristics.

Notwithstanding the above missed opportunity, information obtained from the Focus Groups Discussion revealed that Mobile Phone Technology is perceived as a useful innovation that allows communication among rice farmers. A comment from one of the FGD participants hinted that, *"we are better now with these mobile phones than previous years, where you have to physically visit a place to get information"*.

3.2 Perception on Network Coverage, Costs, & Importance of Using MPT

About 74% of the surveyed sample perceived that the mobile phone network coverage in the District is good, while about 25% believed the network is strong. The majority (90%) considered the cost of purchasing a mobile phone to be affordable. The findings also show that majority (95.4%) believed that the mobile phone technology is important in communicating production and marketing information (Table 2).

Table 2: Perception on network coverage, costs, & importance of MPT (n=282)

Variable	No. of Respondents
Perception of network coverage	
Strong	71(25.2%)
Moderate	138(48.9%)
Week	73(25.9%)
Perception on the cost of using MPT	
High	32(11.3%)
Moderate	220(78.0%)
Low	30(10.6%)
Perception on importance of using MPT	

Very important	153(54.3%)
Fairly important	116(41.1%)
Not important	13(4.6%)

Note: MPT is Mobile-phone Technology

Combining the three elements in Table 2 i.e. network coverage, cost of purchasing a mobile phone, and their importance in communication production and marketing information; the technology is perceived as useful and important to the smallholder rice farmers. This being the case it appears that there is great opportunity to improve smallholder farmers' production and marketing performance through improved utilization of the Mobile Phone Technology.

3.3 Perceptions of the skills required to Operate MPT

It was found that 59% of the sampled smallholder rice farmers believed that, Mobile Phone Technology does not require specialized skills to operate the mobile phone, while 41% thought otherwise. The difference is statistically significant at 1% level (Table 3).

Table 3: Perception of the Skills Required to Perform MPT (n=282)

Variable	No. of Respondents	χ^2 Values of Mean Difference
Perception of Skills Requirement to Operate Mobile Phone		
Required	115(40.8%)	13.911***
Not required	167(59.2%)	
Specific Skills Requirement		
Writing Skills		
Required	26(9.2%)	5.342***
Not required	256(90.8%)	
Reading Skills		
Required	43(15.2%)	7.110***
Not required	239(84.8%)	
Language Skills		
Required	17(6.0%)	4.246***
Not required	265(94.0%)	
Searching Skills		
Required	80(28.4%)	10.549***
Not required	208(71.6%)	

**** is significant at 1%; MPT is Mobile Phone Technology*

Furthermore, evaluation of the required specific skills showed that all specific skills such as writing, reading, language and searching, were perceived not necessary to make use of the MPT (Table 3). These results are somewhat surprising because one would expect that, with the ever increasing

advancement in Mobile Phone Technology, the smallholder rice farmers would perceive themselves as requiring specific skills to operate the technology.

The reasons associated to this farmers' surprising perception include the fact that majority (80.79%) of respondents had formal education which assures that these individuals possess basic skills which guarantees the minimum competence required to operate MPT. In addition, as indicated in Table 1, more than half of the respondents (67.7%) had an experience of using mobile phones for more than three years; an experience which might be the cause of the respondents' perception on the skills required.

3.4 Information communicated

To substantiate the usefulness of Mobile Phone Technology in communicating production and marketing information by rice producers, the farmers were asked to indicate kinds of information they communicate through the Technology. The results revealed that, for production the information included; weather forecast, diseases and pets, technologies and innovations, agro-inputs price, and good agricultural practice (Table 4).

Table 4: Production Information Communicated through MPT (n=282)

Message communicated	No. of Respondents	t-test
Weather forecast		
Communicated	100(35.5%)	12.426***
Not communicated	182(64.5%)	
Disease and pets		
Communicated	92(32.6%)	11.665***
Not communicated	190(67.4%)	
Technology and Innovation		
Communicated	47(16.7%)	7.497***
Not communicated	235(83.3%)	
Agro-inputs price		
Communicated	29(10.3%)	5.675***
Not communicated	253(89.7%)	
Good Agricultural Practice		
Communicated	95(33.7%)	11.948***
Not communicated	187(66.3%)	

**** is significant at 1%; MPT is Mobile-phone Technology*

Results in Table 4 further indicate that, very few (less than 36%) respondents communicate production information identified during the study. Even worse is the percent of the respondents who communicate technology and innovation; and agro-inputs price information; whereas, less than 17% of the respondents

communicate this type of information. This implies that, though the respondents acknowledge the usefulness of the Mobile Phone Technology, its use among them is very low; translating to the need for launching of special intervention to reverse the trend.

Results related to marketing information comprised of; price of produce, market of produce, transportation, processing, access to credit, and aggregation of rice produce (Table 5).

Table 5: Market Information Communicated through MPT (n=282)

Message communicated	No. of Respondents	t-test
Price of produce		
Communicated	158(56.0%)	18.922***
Not communicated	124(44.0%)	
Market of produce		
Communicated	166(58.9%)	
Not communicated	116(41.1%)	20.053***
Transportation		
Communicated	31(11.0%)	5.891***
Not communicated	251(89.0%)	
Processing		
Communicated	32(11.3%)	5.997***
Not communicated	250(88.7%)	
Access to credit		
Communicated	4(1.4%)	2.011**
Not communicated	278(98.6%)	
Aggregation of rice produce		
Communicated	37(13.1%)	6.514***
Not communicated	245(86.9%)	

**** and ** is significant at 1% and 5%, respectively; MPT is Mobile-phone Technology*

Results in Table 5 further show that, majority of the respondents communicate information related to price of produce (56%) and market of produce (58.9%), while very few (less than 14%) respondents communicate information related to transport, processing, and aggregation of rice produce. They further indicate that there are even fewer (1.4%) respondents who communicate information related to access to credit.

These results consistently support the earlier conclusion that, though the respondents acknowledge the usefulness of the Mobile Phone Technology, its

use among them is very low; translating to the need for launching of special intervention to reverse the trend.

Apart f~~or~~rom the above low usage of Mobile Phone Technology observed among the smallholder farmers, another shocking finding was that related to whom does the farmers communicate with about production and market information; whereby, very few indicated that they communicate with Extension Offers (Table 6).

Table 6: Whom does the Farmers Communicate With, through MPT (n=282)

Communicate with	No. of Respondents	t-test
Fellow Farmer		
Communicated	241(85.5%)	40.642***
Not communicated	41(14.5%)	
Extension Officer		
Communicated	9(3.2%)	
Not communicated	273(96.8%)	3.044***
Farmers Organization		
Communicated	19(6.7%)	4.506***
Not communicated	263(93.3%)	

**** is significant at 5%, respectively; MPT is Mobile-phone Technology*

Results in Table 6 indicate that majority (85.5%) of the respondents communicate rice production and market information to fellow farmers than they do to extension officers (3.2%) and to farmers organization. In a Focus Group Discussion (FGD) with these smallholder farmers, it was crystal clear that extension off~~ers~~icers rarely use Mobile Phone Technology to advise phones. On this one of the FGD participant said that *"Very few of us get advice from extension officer through telephone, after all how do you get the officers number, as a result we wait until they pay a visit"* This implies that most smallholder farmers located in remote areas are missing out necessary expertise likely to be obtained from extension officers and farmers organization.

4. Conclusion and Recommendations

4.1 Conclusion

This paper focuses on assessment of the perception of smallholder Rices farmers on usefulness of Mobile Phone Technology. The findings have revealed that majority of the sampled smallholder farmers own mobile for more than three years. Implying that mobile phone technology is widely used in the study area and it is likely that the technology is widely used by smallholder farmers in many places of the world.

All phones owned by the sampled smallholder farmers are able to send and receive Short Messages Service (SMS); and able to receive and make calls; with very few having access to internet and able to take photos. This imply that smallholder farmers who are normally located in remote areas can mainly benefit from the basic functions of the Mobile Phone Technology; giving an impression that effort to communicate with them through such technology should be configured around these basic function. Otherwise, advanced functions requiring internet access and photo taking are to be widely promoted.

Regarding respondents perception on network coverage, costs, and importance of Mobile Phone Technology in communicating agricultural information, the sampled smallholder farmers indicated that the network coverage and costs of the technology are moderate, whilst they perceived the technology to be very important in communicating both agricultural production and market information. Hence, it can be concluded that Mobile Phone Technology is increasingly becoming a powerful method in interpersonal communication and that smallholder farmers located in remote areas are widely realizing its importance in their livelihood.

Further findings show that, despite the fact that the sampled smallholder farmers have realized the importance of Mobile Phone Technology in communicating agricultural production and market information, yet the percentage of the sampled smallholder farmers who use the technology to communicate agricultural production and market information is very low by all standards. This lead to a conclusion that the perception of smallholder that

Mobile Phone Technology is very useful in communicating agricultural production and market information; has not been translated to equal level of usage of the technology. This may be associated to the common modus operand of agricultural extension officers in performing their duties, where in most cases these extension officers offer their expertise by physical visiting farmers, while not effectively harness the potentials that mobile phone technology has in promoting agriculture. This is why it is not surprising to find out that majority of the sampled smallholder farmers who indicated that they communicated agricultural production and market information they did it to their fellow farmers, not to extension nor to farmers organizations.

4.2 Recommendations

A positive perception of farmers on the mobile phone technology should be considered as an avenue to improve the farmers' capacity on the utilization of the mobile phone functionalities. This can be through encouraging the use of advanced mobile phone technology with internet and photos, which could be more intuitive??please explain! for farmers.

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It is high-time for Extension Officers and related actors to emphasize the usefulness of mobile phone technology as an alternative to physical visits – a common modus operand of providing extension services. Using MPT can not only fast truck the flow of information and rich majority of farmers in short period, but also can enhance extension service in the times of emergencies, for instances in cases of pandemic where social distancing is highly encouraged.

Mobile phone operating companies in collaboration with farmers' organizations in the area can as well develop special numbers with frequently asked questions that could on one hand help farmers to access quick production and marketing information, but on other hand help the companies to increase the revenues.

More collaborations between Local Government Authorities and mobile phone service providers on improving farmers related information that could be part of CSR, such intervention could include free toll number, where farmers in need can directly call an extension Officer to get instant advice.

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