

Factors affecting mobile phone usage by the farmers in receiving information on vegetable cultivation in Bangladesh

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ABSTRACT

Mobile phone can reduce the transaction cost resulted in increasing the farm productivity. This paper mainly focuses on identifying the factors affecting the use of mobile phone by the farmers and determining the extent of use of mobile phone by the farmers in receiving information on vegetable cultivation. The study was carried out at three villages under Mymensingh sub- district of Mymensingh district in Bangladesh. Seventy farmers were interviewed using structured questionnaire. Appropriate scales were used in order to measure the concerned variables. Both descriptive and inferential statistics were used to analyze the collected data. The majority (70 %) of the vegetable farmers were low user of mobile phone compared to 30 percent were medium user. None of them was found under high mobile phone user. Vegetable farmers' characteristics such as education and social participation had significant positive relationships with their use of mobile phone while age and farming experience had significant relationships with negative trend. Among them age alone explained 33.1 per cent of the variations to mobile phone usage was confirmed by the step-wise multiple regression model. However, age and social participation were the influential factors affecting the use of mobile phone by the farmers. Lack of mobile servicing centre, expensiveness and electricity problem were the major constraints that cause hindrance to the use of mobile phone in receiving information on vegetables cultivation. Government should take initiatives to ensure proper electricity supply in village area and provide subsidy to easily purchase of mobile phone by the farmers. Besides, field extension agents should encourage and assist the farmers to use mobile phone in receiving information on vegetable cultivation.

1. Introduction

As an agrarian country, the Government of Bangladesh always gives extra importance to agriculture sector of the country. Agriculture comprises almost 80 percent people's involvement contributing 15.5 percent of the GDP (BBS, 2014). About 70 percent of the total population lives in the rural areas, 62 percent of them directly and others are indirectly engaged in a wide range of

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agricultural activities (BBS, 2012). Therefore, socioeconomic improvement of the rural areas mostly depended on increasing farm productivity. But, like most of the developing countries, farming in Bangladesh is still not well organized because of poverty and scarcities of resources such as income, lack of farmers' need based policy and supports (Gerber, 2008). Besides, agricultural production can only be increased if appropriate technologies are used by the farmers who are the primary unit of adoption of improved practices. An increased agricultural production can play as an development engine for rural people that might have also contributed to economic development of the country. In connection to this, adoption of modern technologies by the farmers is essential. Where, technology is the "relationship between inputs and outputs" (Foster & Rosenzweig, 2010) and in agriculture inputs refer to improved cultivars (seeds), fertilizers and pesticides, whereas output refers to the agricultural production. Information of adequate quality is a necessary condition for improvement of all areas of agriculture (Mao, 2013). Information Communication Technology (ICT) could be one of helping solution to transfer information on new technologies, which depend on Information Technology (IT) infrastructure and network communications (Awuor et al., 2013). Improved information services through telecommunication technology have been proven to have a positive impact on rural incomes. In Peru, It was observed that per capita farm income was increased by 13 percent due to usage of mobile phone technology (Chong et al., 2005). Access to public telephones and especially individual mobile phones improves agricultural productivity, increases market access and expands marketing options for rural producers (Jansen et al., 2006). Donner distinguishes between different livelihood functions of mobile phones, including mediated agricultural extension, market information systems, virtual markets, financial services and direct livelihood support (Donner, 2008). Mobile applications can promote agricultural and rural development, including better access to extension services; better market links and distribution networks; and better access to finance, including credit, insurance and payment methods (Qiang, 2011). The role of mobile phones in supporting access to information about agricultural technologies and extension services is immense (Aker, 2011). Mobile phone technology has provided opportunities for increasing productivity and reducing socioeconomic inequalities in Bangladesh (Islam and Gronlund, 2011).

In recent years, the mobile industry in Bangladesh has dramatically developed both at urban and rural area. Bangladesh has 131.376 million mobile phone subscribers at the end of June, 2016 which is very high for a developing lower income country like Bangladesh. The Mobile Phone subscribers by the end of June, 2016 are shown in Table 1.

Table 1. Mobile phone operators and users in Bangladesh (up to June, 2016)

Operator	Subscriber (In Millions)
Grameen Phone Ltd. (GP)	56.909
Banglalink Digital Communications Limited	31.941
RobiAxiata Limited (Robi)	27.442
Airtel Bangladesh Limited (Air tel)	9.892
Pacific Bangladesh Telecom Limited (City cell)	0.702
Teletalk Bangladesh Ltd. (Tele talk)	4.490
Total	131.376

Source: BTRC, 2016

The majority of rural people especially farmers are now using mobile phones. The cheaper call rate and easy network availability influences the low earning farming community to use mobile phones for different agricultural information. Mobile phones have made the farmers aware about the modern technologies, weather forecasting, present market price information, which reduces the hiking of intermediaries in market value chain. The uses of mobile phones among farmers have played positive impact in their income and productivity. Farmers can communicate with the buyers before travelling and sell their product in good price (Fafchamps and Hill, 2005) and they can also communicate directly and sell their products over phone call. In this context they save their money, time and energy (Muto and Yamano, 2011; Lee and Bellemare, 2013). We can say that, mobile phones affected all stages of the farming cycle, including preparations, farming, harvesting and post-harvesting (Furuholt and Matotay, 2011). The move to mobile phone based information system is a natural and potentially more beneficial as mobile phone use reduce search time and cost for information as well as

information asymmetries (Overa, 2006). So, use of the mobile by the farmers may be the potential one for farm productivity. Several studies found that mobile phones reduced transportation costs where trips for social and business purposes were substituted with phone calls (Overa, 2006; Balasubramanian, 2010; Boadi, 2007; Frempong, et. al., 2007; Samuel, et al., 2005; Sife et al., 2010) which is beneficial for easily perishable crops like vegetables having less storage and market facilities (Kameswari et al., 2011). However, for better marketing of vegetable ensuring the bargaining capability of vegetable growers, they need to be connected with a greater ICT network specially the mobile based communication network for increasing their access to need based information on time (Jensen, 2007). But, very limited information about the factors affecting the mobile phone usage by the farmers in receiving agricultural information on vegetable cultivation was available. Hence, this study focuses the following objectives to accomplish its purpose: i) to determine the extent of use of mobile phone by the farmers in receiving information on vegetable cultivation, ii) to explore the influencing factors on the use of mobile phone in receiving information and iii) to identify the problems faced by the farmers in communicating through mobile phone in receiving information on vegetable cultivation.

2. Methodology

2.1 Study Area

The study was conducted at three villages of Mymensingh sub-district under Mymensingh district in Bangladesh. These three villages were purposively selected because of being newly accredited lands locally known as char area where vegetables are cultivated extensively. Mymensingh is the newest division of Bangladesh. It is one of the major vegetable growing areas of the country. Evidence of agro based researches is almost absent in this localities having poor transportation system was also the reason behind the chosen this area for this research.

2.2 Population and Sampling

Vegetable farmers of study area who were cultivated vegetables at least 0.1 hectare of land as well as use mobile phone as a communication media were considered as population of the study. The total numbers of the vegetable farmers using mobile phone in the study area were 280. Using the simple random selection method, 70 farmers were selected (25% of the population) as sample of the study assuming that this sample may be representing the whole vegetable growers of the study area.

2.3 Data Collection Technique

Both qualitative and quantitative means of data collection procedures were used in the study. Data were collected through the pre-tested questionnaire by face-to-face interview procedure during 1 April to 1 May, 2016. The interviews, lasting about one to two hours for each farmer, focused on the determination of extent of mobile phone use by the vegetable farmers. Cross-check interviews were conducted with Sub-Assistant Agriculture Officer (SAAO) and relevant non-government organization (NGO) workers. Data from questionnaire interviews were coded and entered into SPSS software package for analysis.

2.4 Measurement of Variables

There may be a lot of characters that can be considered for the study. But the variables were selected based on the consultation of experts and relevant personnel working in the study area and related issues. Age, level of formal education, family size, farm size, annual family income, farming experience, social participation, credit received and knowledge on vegetable cultivation were selected as the explanatory variables of the study. Use of mobile phone by the farmers in receiving information through mobile phone calls on vegetable cultivation was the focus variable of the study. The use of mobile phone was measured with four point rating scale weighing 1, 2, 3, 4 for Seldom (1 time/month), Occasionally (2-3 times/month), Frequently (4-5 times/month) and Regularly (6-7 times/month) respectively. Eleven sources related to vegetable cultivation were considered to measure the extent of mobile phone use. These information sources are: progressive farmers, union agricultural

information centre, pesticide dealer, seed dealer, fertilizer dealer, Sub-Assistant Agriculture Officer, Agricultural Extension officer, Upazila Agriculture Officer, NGO worker, Businessmen and mobile operator agricultural help desk. The study observed farmers use of mobile phone for getting vegetable cultivation related information from these sources. So, total possible score could range from 11 to 44, where '11' indicated lowest user and '44' indicates highest user of mobile phone in receiving information on vegetable cultivation. According to the possible score, the farmers were categorized into three groups considering equal score in each group i.e. Low usage group (up to score 22), moderate usage group (score 23 to 33) and high usage group (score above 33).

To identify the factors associated with the use of mobile phone for getting information on vegetable cultivation, coefficient of correlation and step-wise multiple regressions were used. The problems (mentioned in Table 7) faced by the farmers in using mobile phone were identified during pre-testing the questionnaire. Initially, twelve problems were included in the questionnaire. However, after analyzing the pre-tested questionnaire, nine possible problems were selected. A four point rating scale weighing 0, 1, 2, and 3 for not at all, low, moderate and high respectively was used to explore the extent of problems faced in using mobile phone. The possible scores of the respondent ranged from 0 to 27 where '0' indicates the respondent had no problem and '27' indicate his highest problem. According to the possible score, the farmers were categorized into three groups considering equal score in each group i.e. Low problem (up to score 9), medium problem (score 10 to 18) and high problem (score above 18).

For better understanding of the extent of problems faced, Computed Problem confrontation Score (CPCS) was developed to make rank order the problems by the following formula.

$$PCS = Ph \times 3 + Pm \times 2 + Pl \times 1 + Pn \times 0 \quad (1)$$

Where,

PCS= Problem confrontation Score

Ph= Number of farmers indicating high problem

Pm= Number of farmers indicating moderate problem

Pl= Number of farmers indicating low problem

Pn= Number of farmers indicating no problem at all

3. Results and Discussions

3.1 Use of Mobile Phone by the Farmers in Receiving Information on Vegetable Cultivation

The results indicated in the Table 2 and explained that majority of the respondents (70 per cent) fell into low use of mobile phone category and rest thirty per cent fell into moderate use category (Figure 1). While none of farmers were found under the categorized to high use of mobile phone group. Though the use of mobile phone is increasing with each passing day, farmers in the study area have not properly utilized mobile phone for getting information on vegetable cultivation purposes. This may be because of most of the farmers were found in the study area are the old aged, low rate of literacy, low communication exposure, less trust on information sources etc. Besides, lack of technical knowledge may be another important reason of getting lower usage of mobile phone by the farmers in the study area. There were some studies also indicated that similarities exist between the patterns of mobile phone use by the farmers. Furthermore, mobile phone uses by this group to access market information seems to be very low (Ashraf, et al., 2005; De Silva, 2008). Farmers might use the mobile phone other purposes than the agricultural information like communicating with relatives or emergency medical or other problems.

Table 2. Distribution of respondents according to their overall use of mobile phone

Characteristics	Farmer's Categories (scores)	No.	Percent	Mean	Standard deviation
Use of mobile phone	Low usage (up to 22)	49	70	21.19	2.683
	Moderate usage (23-33)	21	30		
	High usage (above 33)	0	0		
Total		70	100		

Source: Field Data, 2016

3.2. Relationship between the Selected Characteristics of the Vegetable Farmers and Their Use of Mobile Phone in Receiving Information on Vegetable Cultivation

To examine the relationships of each of the selected characteristics of vegetable farmers and their overall use of mobile phone in receiving information, a Pearson's product moment coefficient of correlation analysis was used. The results of the correlation analysis between the concerned variables have been presented in Table 3.

Table 3. Correlation between selected characteristics of vegetable farmers and their use of mobile phone in receiving information on vegetable cultivation (N=70)

Focus variable	Explanatory variables (selected characteristics)	Correlation coefficient (r) with 68 d.f.
Use of mobile phone by the farmers in receiving information on vegetable cultivation	Age	-.575**
	Education	.391**
	Family size	-.205
	Farm size	.092
	Annual income	.092
	Social participation	.511**
	Farming experience	-.511**
	Credit received	.126
	Knowledge on vegetable cultivation	-.054

** Significant at 0.01 level of probability (table value 0.325 with 68 df)

The results show (Table 3) that only age, level of formal education, social participation and farming experience were found significantly correlated at 1% level of probability with the focus variable. Among the four, age and farming experience were found negatively significant with the focus variable. It is indicated that both increases farmers' age and farming experience, the tendency to use mobile phone for getting vegetable cultivation related information decreases significantly. It is quite obvious that old person are more traditional in nature and they believe in their customary system of cultivation. Studies also showed that young (Richardson, et al., 2000) and middle aged people are more prone to mobile phone usage while as the age goes beyond 50, mobile phone usage remains far behind (Islam and Gronlund, 2011; Jain and Hundal, 2007). Besides, experienced farmers do not want to change their usual farming practices and they also have ample knowledge on the cultivation procedure. This makes the farmers less interested in seeking information.

The illiteracy is a cause of using any ICT among farmers because farmers could not contact with related officers and department and get information about market price, weather or pesticides even farmers was not knowledgeable about use of mobile phone to contact with their family and friends due to illiteracy (Samuel, et al., 2005; Musa, 2008). Education makes people more curious about new things and educated person always want to improve the existing condition. More educated people are better able to learn and use new technology (DiMaggio and Cohen, 2003). So, with the increase in educational level, farmers want to know more advance information about cultivation. It makes them seeing more information and increases the use of mobile phone for the same purpose. Social participation is another aspect that makes people curious about many new things. In a rural context, Jain and Hundal find that the rural people had been found more influenced by the neighbor's usage (Jain and Hundal, 2007). Rural people tend to influence by their peer groups. The social influence or

influence by the peer group is stronger than individual characteristics in adoption of any technology (Kargin and Basoglu, 2007). When farmers participate in different social programs and visit their peer groups they come to know more on cultivation practices. This encourages them seeking information over the mobile phone as it is the easiest as well as the quickest medium to get information.

3.3 Econometric Estimation on Identifying the Factors Affecting the Use of Mobile Phone by the Farmers

A step-wise multiple regression analysis was employed to identify the determinants of the use of mobile phone in receiving information on vegetables cultivation. The stepwise multiple regression analysis (Table 4) indicates that out of four explanatory variables (those showed significant relationship in correlation analysis) only two variables finally entered into the model and contributions of these variables (age of the respondents and social participation) which accounted for 41.1 per cent (adjusted $R^2 = 0.641$ and F-values, $p > .01$) of the total variation in the use of mobile phone for getting vegetable cultivation related information.

Table 4. Step-wise multiple regression analysis showing contribution of the selected characteristics to the use of mobile phone

Variables entered in the model	Coefficient of determination	Multiple R^2	Change in R^2	Variance explained (%)	Significant level	F-value	t-value
Age	0.575	0.331	0.331	33.1	0.000	33.645	-5.800
Social participation	0.641	0.411	0.080	8.0	0.004	23.413	3.025

The first variable to enter the step-wise multiple regressions was the age of the respondents which solely had the highest contribution of 33.1 percent in predicting the influence on mobile phone usage. It indicates that age of the respondents mainly regulates the use of mobile for getting information. Having a negative t-value suggests that age influences the mobile phone usage reversely while the age increases, use of mobile phone decreases significantly. It is very much understandable that mobile phone is a high technical device and old people do not understand how to use it properly. Besides, it requires technical knowledge to operate it comparing to the young people who found it quite easy to use, mobile phone use is rather difficult for the old village people who have less formal education and low exposure to technologies. They also like to stick to the traditional living and keep distance to different up to dated technologies.

The other variable to enter the step-wise multiple regressions was the social participation which had contribution of 8.0 per cent in predicting the influence on mobile phone usage. This variable has positive influences, which means that an increase in social participation will increase the use of mobile phone. Being members of a society, farmers have a tendency to be influenced by their social values, system, customs etc. When people see others in the society getting benefit from using mobile phone, it will encourage them to use mobile phone for their own purposes. Even the medium aged or old people will like to learn the use of mobile phone if he gets exposure of the benefit of using it seeing their peer groups. So, the farmers who participate more in different social activities encouraged them to use mobile phone more in receiving information on vegetable cultivation. For more accuracy, an equation can be formed from the stepwise multiple regression analysis showing the level of contribution of the two factors of age and social participation. Rashid and Khan were conducted similar study, subsequently found the similar results (Rashid et al., 2016; Khan, 2016).

Table 5. Step-wise multiple regression model showing coefficients of dependent variable with the contributing characters

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	29.742	1.499		19.847	.000
	Age of the Respondent	-.217	.037	-.575	-5.800	.000
2	(Constant)	21.086	3.193		6.605	.000
	Age of the Respondent	-.164	.040	-.434	-4.140	.000
	Social Participation	.552	.182	.317	3.025	.004
Dependent Variable: Use of Mobile Phone in Vegetable Cultivation						

The following predicted equation (i) was developed using the results found in the Table 5.

Mobile phone usage by the vegetable farmers = 21.086- 0.164 (Age) + 0.552 (Social participation)
(2)

The equation shows the probability of mobile phone usage by the farmers in receiving information. The contributing factors age and social participation will have influence on the usage as much as shown in the equation such as if social participation increases by one unit the mobile phone usage score will increase by 0.552 while age of the farmers increases one year, the mobile phone usage by the farmers will be decreased by 0.164. Besides, Standardized coefficient beta values shows that age of the respondents (-0.434) contributes more than the social participation (0.317) to the use of mobile phone for farm information. So we can say that if the social participation and communication of the farmers increase it is quite possible that farmers will be more interested in getting farm related information using mobile phones. Besides we should emphasis more on motivating the aged farmers as they are more involved in farming yet unwilling to use mobile phones. So we have to give more efforts to encourage the aged farmers than the young farmers to use mobile phones for agricultural purposes.

3.4 Problems Faced in Using Mobile Phone by the Farmers

The problem confrontation score of the farmers ranged from 10 to 19 against the possible range of 0 to 27 with an average of 14.11 and standard deviation of 1.975. Table 6 suggests that most of the farmers faced medium problems (97.1 per cent) in using mobile phone while only 2.9% farmers faced high problems. But, none of them belongs to low problems. This means that mobile phone use is not so problematic mainly because the cheap call rate, locally and easily repairable and easily available network of different mobile phone operators. Moreover, GOs and NGOs provide good service to mobile phone users at local level resulting no severe problems faced by the farmers.

Table 6. Categories of problems faced by the farmers in using mobile phone

Possible range	Observe Range	Categories	Farmers		Mean	SD
			No.	%		
0 - 27	10 - 19	Low problem (up to 9)	0	0.00	14.11	1.975
		Medium problem (10 to 18)	68	97.1		
		High problem (above 18)	02	2.9		
Total			70	100.0		

However, problem score for each statement was calculated by using problem confrontation score formula as stated earlier and it has been arranged in rank order according to their high problem and placed in Table 7.

Table 7. Problems of using mobile phone by the vegetable farmers with rank order

Problems	Number of respondents indicating constraints				PCS	Rank order
	High	Moderate	Low	Not at all		
Lack of servicing center	38	32	0	0	178	1
Expensive mobile set	15	47	8	0	147	2
Electricity problem	19	30	21	0	138	3
High cost of repairing	8	48	14	0	134	4
Mobile phone operating problem	9	31	27	3	116	5
Short length of battery Charge	7	28	35	0	112	6
Network problem	0	33	35	2	101	7
Technical problem of Phone	0	31	36	3	98	8
Unexpected calls	0	5	30	35	40	9

The results in the Table 7 revealed that among nine selected problem items lack of servicing centre ranked first followed by expensiveness and electricity problem of the mobile phone.

Lack of service centre was the severe problem and got ranked first while it makes difficult for the user to repair or check if the face any problem using the mobile phone. Most of the servicing centers were located at the city and far from the rural area, moreover poor communication hindrances the reaping of the mobile phone. As the people of the villages have less technological advancement they easily face complications in using mobile phone. Expensive mobile set got second ranked while electricity problem was the third problems faced as respond by the farmers. Mobile phone needs to be charged using electricity. But the inadequate electricity supply may hinder the use of mobile phone for the farmers. So, using an electronic device is very difficult for the village people. As most of the village people fall in the low earning group, buying a mobile phone set is sometime seems as a luxury to them. Therefore, they face problems to take their daily foodstuff. So, buying a mobile phone set terms as an expensive expenditure for them. Therefore, government may be providing subsidy to the farmers especially vegetables farmers for buying mobile phone. Besides, there is no significant difference between problem of third and fourth, fifth and sixth and even problems of seventh and eight based on the problems confrontation scores but of course having bit differences. On the other hand, unexpected call was the least problem faced by the farmers which may not be a big trouble for vegetables cultivation so far.

4. Conclusion and recommendations

The use of mobile phone in receiving information on vegetable cultivation was not satisfactory in the study area. Rather the use of mobile phone was very low in receiving agricultural information. This may be due to traditional mind set up of the farmers which restricts them using the new improved technologies like mobile phone. Besides, adequate electricity supply, lower farming experienced, low rate of literacy, low communication exposure, lack of technical knowledge etc. may be other important reasons of getting lower usage of mobile phone by the farmers in the study area. Farmers' characteristics such as education and social participation had significant and positive relationships with their use of mobile phone while age and farming experience had significant and negative relationships. Among them age and social participation explained 41.1 per cent of the variations to mobile phone usage was confirmed by the step-wise multiple regression model. Lack of mobile servicing centre, costly and electricity problem were the major constraints that cause hindrance to the use of mobile phone in receiving information on vegetables cultivation. Increased use of mobile phone can be ensured better solution to pest attack, proper marketing and earning more from the existing facilities. Therefore, Government should take initiatives to ensure proper electricity supply in village area and provide subsidy to easily purchase of mobile phone by the farmers. Besides, government field level extension agents for instance Sub-Assistant Agricultural Officer (SAAO) should encourage and assist the farmers to use mobile phone in not only receiving but also sending information on vegetable cultivation.

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