Original Research Article

Title: Use and Role of Mobile Phone for Information Services in Agricultural Activities

ABSTRACT

The main purpose of this study was to determine the use and role of mobile phone for information services in agricultural activities as well as to explore the relationship between the socio-economic characteristics of women farmers and their use of mobile phone in agricultural activities. Data were collected using pre-tested interview schedule from a sample of 85 women farmers during the month of August 2018. Besides descriptive statistics, Pearson's Product Moment Correlation Coefficient (r) was used to explore the significant influencing factors. Ten (10) different android mobile phone apps were identified which are most frequently used by the women farmers in the study area. Among the mobile apps, '*vutta* or maize app' was found as the top used mobile app for information services in agricultural activities. This might be because of rapidly spreading of maize cultivation as a highly benefited cereal crops against the climatic change situation in the study area. Findings indicated that among the women farmers, majority (64.7 percent) of the women farmers used mobile phone moderately for information services in agricultural activities followed by 23.5 percent high and only 11.8 percent low used of mobile phone. Among ten socio-economic characteristics of the women farmers, education, annual income, organizational participation, training received and ICT self-efficacy had positive significant relationship and influence of the use of mobile phone in agricultural activities. 'Insect and disease control measures' was found the 1st ranked agricultural activities in which mobile phone played highest role for information services.

Key words: Use, role, mobile phone, information services, and agricultural activities

1. INTRODUCTION

Bangladesh is mainly a rural based agricultural country. Agricultural development is mostly relying on the use of modem technologies. Farming production can be increased, if appropriate technologies are used by the farmers who are the primary unit of adoption. Diffusion of modern farming innovation demands effective communication and information dissemination system. But most of the farmers have not yet adopted improved technologies even they are available. Hence, improved technologies has not yet been properly reached to the farmers [1-2].

Information Communication and Technologies (ICTs) has created wide scopes in assisting reliable and rapid access to expert information support. ICT-based advisory systems can provide more in terms of quality, accurate, and timely information services [3]. Recently, coverage of mobile phone has increased rapidly in many developing countries of Africa, Asia, and Latin America [4] that was initially adopted by rich, urban and educated citizens, but in recent years, it has been widely used by the people of poorest countries. The mobile telephony offers several advantages over other alternatives in terms of cost, geographic coverage, and ease of use [5]. Mobile phone technology has provided opportunities for increasing productivity and reducing inequalities in Bangladesh [6].

Mobile app or mobile application is a computer program designed to run on mobile device such as tablet. The new smart phone could be nicknamed 'app phones' to distinguish them from earlier less-sophisticated smart phone. Apps can be installed manually by running an android application package [7]. It is reported that majority of the farmers agreed that mobile could be a useful source of agricultural information. The proper use mobile phone provides multi-dimensional benefits assisting in interaction and quick/timely information exchange [8]. A large coverage of rural people including farmers is now using mobile phones. The cheaper call rate and easy network accessibility affects the low earning farming community to use mobile phones for different agricultural information. Mobile phones have created farmers aware about the modern technologies, weather forecasting and present market price information [9]. In case of urgency, mobile phones seem very useful and effective tool for dissemination of information [10]. The climate or disaster vulnerable farmers can easily be informed in any challenging conditions via mobile phone [11]. Mobile phone-enabled technologies were also being used to monitor and disseminate information about crop disease outbreaks [12].

The most familiar approach of agricultural extension was Training and Visit (T&V) promoted by the World Bank and applied in more than 50 countries including Bangladesh until the mid 1990s [13]. For few decades, previous forms of communication channels (television or radio) are used to forecast weather and disseminate farming information [14]. Mobile telephony is very effective in accessing to information on agricultural innovations and extension services. It has facilitated greater communication and economic benefits and acted as agents of social mobilization. The use of mobile significantly reduces transaction costs for farmers to access information by replacing asymmetric and high cost of getting information via traditional T&V, radio or television [15].

Participatory Research and Ownership with Technology, Information and Change (PROTIC) project has been initiated by Oxfam (an international confederation) to begin specifically addressing women's economic empowerment. The project focuses on women farmers providing training on how to operate mobile device and receive information via mobile devise against anticipated risks of climate change. Since 2015, Oxfam in building partnership with NGOs like Pollisree and Shushilan has been implementing programme with women farmers to implement an interactive mobile phone through text or voice for isolated communities [16]. Hence, very few researchers investigated the use and role of mobile phone in agricultural activities. Keeping in view of the above circumstances, the research was undertaken considering the following objectives: i) to describe the selected socio-economic characteristics of women farmers; ii) to determine the use and role of mobile phone in agricultural activities; and iii) to explore the relationship between the selected characteristics of women farmers and the use of mobile phone for information services in agricultural activities.

2. MATERIALS AND METHODS

2.1 Study Area and Sampling Technique

The field research was conducted at Dakkhin Kharibari village in Tepa Kharibari union of Dimla Upazila under Nilphamari district of Bangladesh, where the information services programmme through mobile phone has been implementing for women farmers empowerment. An updated list

of 343 women farmers was collected from Pallishree office record. Therefore, the population size in the study area was composed of 343 women farmers. Among them a sample of 85 women farmers was selected random sampling technique.

2.2 Data collection and analysis

Data were collected by the researcher from the sampled respondents through personal interview by using structured questionnaire. Descriptive analysis such as range, number, percentage, mean, and standard deviation were determined in order to describe the socioeconomic characteristics of the women farmers. The Pearson's Product Moment Correlation Co-efficient (r) was used to examine the relationships between the socio-economic characteristics of the women farmers and their use of mobile phone for information services in agricultural activities. Statistical Package for Social Science (SPSS) computer package was used for performing data analysis.

2.3 Measurement of the use and role indices

In order to determine the use and role of mobile phone for information services, about 22 agricultural activities were recorded. Then each of the women farmers was asked to provide her opinion about the extent of perceived role of mobile phone against each of the agricultural activities expressed in four-point rating scales such as high (got information and full use), medium (got information and moderately use), low (got information and partial use) and not at all (got information and no use) and scores were assigned for the extent of role of mobile phone 3, 2, 1, and 0, respectively [17]. Thus, total score of the role of mobile phone for information services in agricultural activities was calculated by summing up all the obtaining scores against each agricultural activity. The score then could range from 0-66, where 0 indicated 'no effective role' and 66 indicated 'high effective role' of mobile phone in different agricultural activities. Role playing index of mobile phone was calculated by using the following formula which

$$RPI= R_h\times3+ R_m\times2+ R_l\times1+R_{not}\times0$$

Where,

RPI= Role Playing Index
R_h= Number of respondent opined role of mobile as 'high'
R_m= Number of respondent opined role of mobile as 'medium'
R_l= Number of respondent opined role of mobile as 'low'
R_{not}= Number of respondent opined role of mobile as 'not at all'

Therefore, Role Playing Index (RPI) of agricultural activities could range from 0 to 255, where 0 indicating no effective role and 255 indicating highest extent of effective role performance.

3. RESULTS AND DISCUSSION

3.1 Socio-economic characteristics of the women farmers

Finding showed in Table 1 that that majority (91.8 percent) of the respondents were young aged compared to 8.2 percent belonged to the middle aged categories. It meant that majority of the women farmers were young aged. The findings imply that android mobile phone is mostly used by the young categories of the respondents in the study area. Majority (60.0 percent) of the women farmers had secondary education and only 9.4 percent of them can sign only. It could be said that majority of the women farmers passed secondary education. The overall literacy rate of the study area was quite encouraging. Data revealed that highest proportion (44.7 percent) of the respondents had medium family size, 43.5 percent had small family and 11.8 percent had large family size. Therefore, majority of the women farmers had small to medium family size because of adopting family planning programme. Majority (69.4 percent) of the women farmers had medium income compared to 18.8 percent high income. It means that the overwhelming (81.2 percent) of the respondents were under low to medium income category. Income depends directly or indirectly on household farm size and also has a direct relationship with the adoption of modern technologies [18]. In addition, the highest proportion (49.4 percent) of the women farmers' household had small farm size, 38.8 percent marginal and only 2.4 percent had large farm size. This indicated that majority of the women household possessed marginal to small farm size because of day by day the lands are fragmented into smaller one [19].

The highest proportion (55.3 percent) of the women farmers received low credit and 22.4 percent did not receive any credit. It meant that more than half of the women farmers had low credit opportunities in the study area. Majority (54.1 percent) of the women farmers had medium organizational participation. The reason might be that more than half of the women farmers had high organizational access. Organizational participation can help facilitate farmers to explore and access helpful information sources. In term of training received, highest proportion (77.6 percent) of the women farmers had received medium training on different activities. It could be said that more than three-fourths rural women were brought under training facilities especially the in mobile information services. More than two-third (69.4 percent) of the women farmers had low deposit or saving for future use. This might be due to the lower to medium income level of the women farmers' household. ICT self-efficacy means the extent of efficacy and confident of the respondent in using ICT. In case of ICT self -efficacy, majority (49.4 percent) of the women farmers had medium self-efficacy followed by 24.7 percent low. Therefore, it means that near about half of the rural women farmers had medium ICT self-efficacy which might be induced mobile phone usage [20].

Table 1. Socio-economic characteristics of the women farmers (N=85)

Women farmers characteristics (Measuring unit)	Categories	Respondents		Mean	SD
		Frequency	Percent		
Age (No. of year)	Young aged (≤35)	78	91.8	27.44	5.56
	Middle aged (36-50)	7	8.2		
Education (Year of schooling)	Can sign only (0.5)	8	9.4	7.44	3.61
	Primary level (1-5)	15	17.6		
	Secondary level (6-10)	51	60.0		
	Above secondary (>10)	11	12.9		
Family size (No. of members)	Small (≤ 4)	37	43.5	5.16	1.83
	Medium (5-6)	38	44.7		
	Large (>6)	10	11.8		
Annual income ('000' Tk.)	Low (≤44)	10	11.8	115.82	72.08
	Medium (44.01-188.0)	59	69.4		
	High income (>188.0)	16	18.8		
Farm size (Hectare)	Marginal (0.02-0.20)	33	38.8	0.48	0.69
	Small (0.21-1.0)	42	49.4		
	Medium (1.01-3.0)	8	9.4		
	Large (>3.0)	2	2.4		
Credit received ('000' Tk.)	No (0)	19	22.4	23.70	22.17
	Low (≤33)	47	55.3		
	Medium (33.01-66.0)	12	14.1		
	High (>66.0)	7	8.2		
Organizational participation (Score)	Low (Up to 1)	34	40.0	1.86	0.98
	Medium (2-3)	46	54.1		
	High (>3)	5	5.9		
Training received (No. of days)	Short (≤3)	12	14.1	6.12	2.92
	Medium (4-9)	66	77.6		
	Long (>9)	7	8.2		
Deposit ('000' Tk.)	No (0)	7	8.2	16.00	17.69
	Low (≤0.01-26)	59	69.4		
	Medium (27-52)	16	18.8		
	High (>52)	3	3.5		
ICT self-efficacy (Score)	Low (≤10)	21	24.7	16.13	6.89
	Medium (11-20)	42	49.4		
	High (>20)	22	25.9		

3.2 Use of mobile phone in for information services in agricultural activities

Use of mobile phone in agricultural activities of the women farmers was measured on the basis of 22 specific agricultural activities. Use of mobile phone in agricultural activities ranged from 11 to 58 against the possible range of 0-66. On the basis of possible score [21], the use of mobile phone in agricultural activities were classified into three categories namely, 'low' (≤22), 'moderate' (23-44) and 'high (>44). The distribution of the respondents based on the role of mobile phone has been given in Figure 1. Data indicated that among the women farmers, the highest proportion (64.7 percent) had moderate use of mobile phone for information services in agricultural activities followed by 23.5 percent high and 11.8 percent low usage. It meant that majority of the women farmers use mobile phone moderate to highly in agricultural activities.

Hasan (2015) also found similar categories of results [17]. Therefore, Participatory Research and Ownership with Technology, Information and Change (PROTIC) project has effectively motivated women farmers in operating mobile and receiving agricultural information by using it. Only small segment respondents did not use mobile phone as the source of agricultural information. Possible reason could be that they don't know how to get agricultural information through mobile phones because of lack of education and technical knowledge [9].

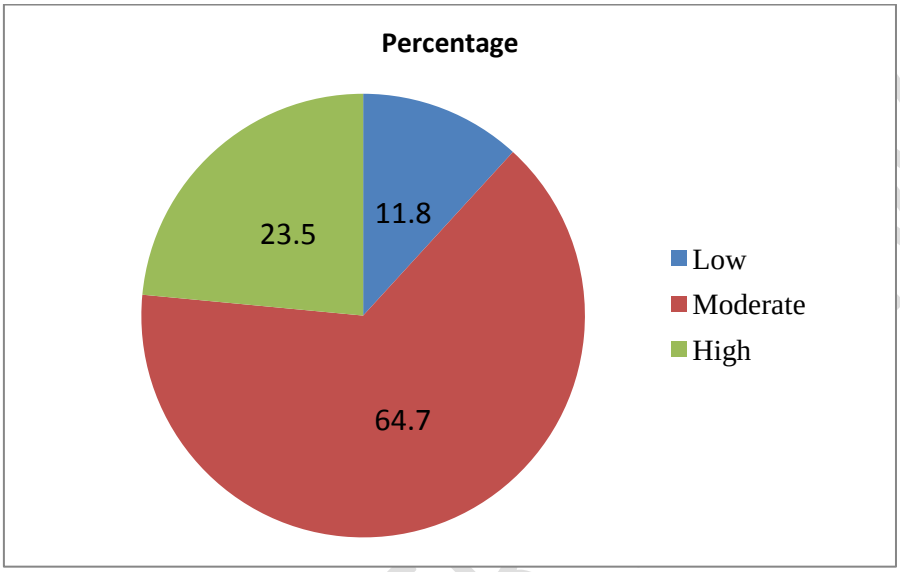

Figure 1. Distribution of women farmers based on their use of mobile phone

3.3 Mobile phone apps frequently use by the women farmers

Ten mobile apps are most frequently used by the women farmers for agricultural services. These mobile apps are *Krishoker jana*, *krishi sheba* app, *vutta* or maize app, calculator, messenger, IMO, plat store, facebook, e-mail, and youtube. The result contained in the Figure 2 that '*vutta* or maize app' (100.0 percent) were found as the top used mobile app for information services in agricultural activities. This might be because of rapidly spreading of maize cultivation as a highly benefited cereal crops against the climatic change situation. So, all the women farmers used '*vutta* or maize app' as the 1st ranked most frequently used mobile phone apps. The lowest frequency (44.7 percent) of women farmers used 'calculator' app which is ranked bottom in the rank table. This may be due to that for calculation women farmers may use another means.

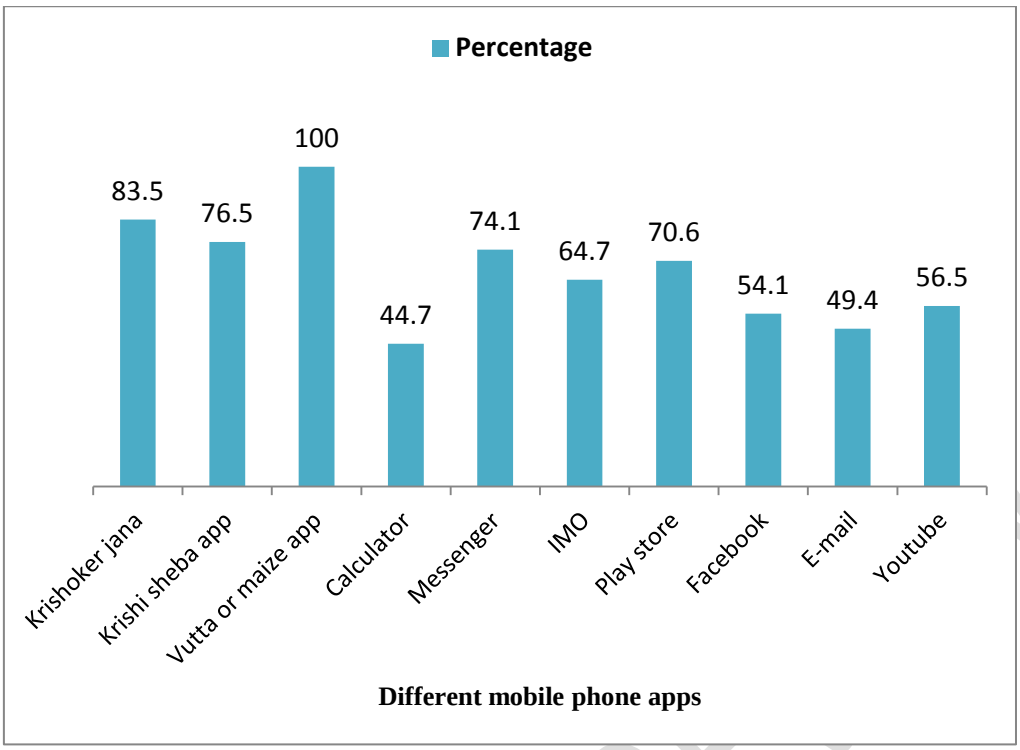

Figure 2. Mobile phone apps frequently used by women farmers

3.4 Socio-economic characteristics affecting the use of mobile phone

This section deals with the relationship between the 10 selected characteristics of the women farmers and the extent of use of mobile phone for information services in agricultural activities. The relationships were computed by using the Pearson's product moment correlation co-efficient(r). The co-efficient of correlation (5.0 percent level) was used to test the null hypothesis and analysis is presented in Table 2. Age of the women farmers had no significant relationships with the use of mobile phone. Talukder (2013) also observed similar type of relationship [22]. Education of the women farmers was positively significant with the use of mobile phone. Various research findings showed that respondents with higher the educational status increased the usage of mobile phone apps in agricultural activities. Education makes people more curious about innovations and literate person always wish to improve the existing condition. Higher educated people are better able to learn and use of new idea and technology [23]. It makes women farmers seeing more information and increases the use of mobile phone for agricultural information [20]. Family size of the women farmers had no significant relationship with the use of mobile phone. This relationship was found by various researchers [6,17]. The relationship between annual income and use of mobile phone was positively significant. Thus, it could be revealed that higher the annual income of the respondents, higher use of mobile phone in agricultural activities. Rahman (2010) also found such type of relationship [24]. Farm size of women farmers had no significant relationship with the use of mobile phone. Hasan (2015) also found similar findings [17]. Another factor credit received also had no significant relationship with the use of mobile phone. Asif *et al.* (2017) also observed similar type of relationship [9].

Organizational participation of the women farmers had significant relationship with the use of mobile phone. Organizational participation is another aspect that makes people aware and curious about much new technologies. Rural people participate in organizational activities by forming groups and

influence by their peer groups [9]. The social Peer group influence is much stronger than individual in adopting new technologies and using mobile phone [25]. When farmers participate in different social programs and visit their peer groups they come into know more on cultivation practices. This encourage them seeking information over the mobile phone as it is the easiest as well as quickest medium to get information [9]. In addition, training received also showed significant relationship with use of mobile phone. Because, higher training might be increased the mobile phone usage technically for getting agricultural information. ICT self-efficacy and role of mobile phone apps was positively significant. Thus, it could be revealed that higher ICT self-efficacy of the respondents, effectively mobile phone apps used as result, played higher role in agricultural activities [20].

Table 2. Relationship between focus issue and selected characteristics

Focus Issue	Selected Characteristics	Correlation Value of 'r'
Use of mobile phone for information services in agricultural activities	Age	-0.024
	Education	0.302**
	Family size	0.116
	Annual income	0.249*
	Farm size	0.099
	Credit received	0.031
	Organizational participation	0.245*
	Training received	0.241*
	Deposit	0.110
	ICT self-efficacy	0.285**

* = Correlation is significant at the 0.05 level, ** = Correlation is significant at the 0.01 level

3.5 Rank order agricultural activities based on role of mobile phone

The rank order of the agricultural activities according to the role of mobile phone is presented in Table 3. The Role Playing Index (RPI) score ranged from 30 to 222 against the possible range of 0 to 255. Result revealed that 'insect and disease control measures' (RPI=222) was found the 1st ranked agricultural activities in which mobile phone played highest role for information services. The result might be due to those women farmers face problem mostly insect and disease of crops, livestock and fish culture. When the women farmers face harmful insect and diseases oriented problem, they take remedy information via the mobile phone in this context which is supported by the previous finding [12]. 'Weather and climate warning' (RPI=215) obtained the 2nd position based on the role of information services played by mobile phone. It meant that mobile phone play vital role for forecasting of weather and climatic hazards that is also supported by the review of literature [11]. 'Fertilizer and irrigation management'; and 'collection quality seed varieties' were ranked 3rd and 4th position according to information services role received through mobile phone, respectively. In many cases farmers did not know about the improved and quality seed varieties and fertilizer and irrigation management of many crops. As a result, yield of that crops reduce drastically. But after access of mobile phone apps women farmers mostly use them for getting proper information in this regards [9-10]. 'Sales of cereal crops product' is ranked 5th where the mobile phone information services had active role on price searching of agricultural commodities which is also supported by the previous literature [9]. The bottom three agricultural activities in which mobile phone had less role for information services are 'sales of eggs', 'sales of poultry' and 'market information for selling fish' with RPI value of

30, 32 and 52, respectively. The seasons might be that mobile phone apps do not build up for giving proper information regarding these activities [20].

Table 3. Rank order of the agricultural activities according to the role of mobile phone

Agricultural activities	Role Playing Index (RPI)	Rank Order
Insect and disease control measures	222	1st
Weather and climate warning	215	2nd
Fertilizer and irrigation management	191	3rd
Collection quality seed varieties	189	4th
Sales of cereals crops product	188	5th
Selection of crops	184	6th
Determination of transplanting time	181	7th
Rearing of cow	171	8th
Weeding of crop field	170	9th
Rearing of goat	160	10th
Determination of seed sowing time	159	11th
Taking care of poultry	156	12th
Determination of harvesting time	154	13th
Feeding to poultry	144	14th
Collection of best goat variety	111	15th
Intercultural operation of fish culture	104	16th
Land preparation and management	83	17th
Selection of quality fingerling	73	18th
Sale of cow	54	19th
Marketing information for selling fish	52	20th
Sales of poultry	32	21st
Sales of eggs	30	22nd

4. CONCLUSIONS AND RECOMMENDATION

Based on the findings and their logical interpretations in the light of relevant facts the researcher has drawn the following conclusions. Majority women farmers low to moderately used mobile phone for information services in agricultural activities. Hence, it might be concluded that there is ample scope to increase the use of mobile phone in agricultural activities. So, proper initiative should be taken by government and non-government organization for increasing the extent of use of mobile phone in agricultural activities through making various mobile apps available and creating awareness and interest among the women farmers. During development of an app concerned authority should consider that it can operate in offline because mobile network may not available in the remote areas. The highest proportion of the women farmers received a low credit, low to medium training and majority of them had low deposit of money. Necessary activities should be undertaken by the concerned authority to increase the credit and training facilities in the study area. Some individual socio-economic characteristics of the women farmers had significant influence on mobile usage in agricultural activities. Therefore it is recommended that careful attention should be drawn for these characteristics when works to be done in future. Further, the issues related to economic impact of mobile phone, or effect of mobile phone on sustainable livelihood of rural farmers could be considered for future research to be undertaken.

CONSENT

As per international standard, respondents' opinions has been collected and preserved by the author(s).

COMPETING INTERESTS

The authors declare that there was no competing interest exists.

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