Indian Journal of Extension Education
Vol. 52, No. 1 & 2, 2016 (9-14)

Farmers' Attitude Towards e-Agriculture in Bangladesh

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ABSTRACT

e-Agriculture is being the utmost desire for the sustainable development of worldover. The research was designed to assess farmers' attitude towards e-Agriculture. The methodology of this study is an integration of quantitative and qualitative methods based on data collection in Bhatbour Block of Dhighi union under Sadar Upazila of Minikganj District. Data were collected from 133 e-Agriculture users. Descriptive statistics, multiple regression (B) were used for analysis. 73.7 percent of the respondents had moderately favorable attitude, 06 percent had low favorable attitude and 20.3 percent had high favorable attitude towards e-Agriculture. Variables such as effective farm size, annual household income, farming experience, participation in training, knowledge on e-Agriculture, organizational participation and cosmopoliteness had significant contribution on farmers' attitude towards e-Agriculture and these variables contributed total 61.9 percent in farmers' attitude towards e-Agriculture. Hence, it is high time prepare the farmers to use these e-Agriculture tools for their wellbeing through proper educational activities and to popularize this service, government should implement integrated marketing communication using the popular print and electronic media so that more and more people get aware of this service.

Key words: e-Agriculture, attitude; farm communication;

INTRODUCTION

e-Agriculture as an emerging field in the intersection of agricultural informatics, agricultural development, and entrepreneurship, referring to agricultural services, technology dissemination, and information delivered or enhanced through the Internet and related technologies. (FAO, 2005). Information Communication Technologies offering new ways for communicating and exchanging information and knowledge in recent days. E-Agriculture as well as ICT can be broadly understood as the technologies that facilitate communication, processing and transmission of information by electronic means (Zijp ,1994).The application of e-Agriculture is still in its elementary stage, evolving around the immense multiplier impact capability that can significantly change the farmer's economic and social condition i.e. empowerment. This ensures the effective and efficient use of information and communication technologies for analyzing, designing and implementing existing and innovative applications to help the agricultural sector. In 2008, Bangladesh Institute of ICT in Development (BIID), in collaboration with Katalyst (Partner of Swiss Contact & a local agro-based NGO) and Grameenphone launched the e-krishok initiative (New Agriculturist, 2015). The purpose of these project was to lessen the information inadequacy in the agriculture sector and thus enabling the farmers with up-to-date knowledge and advisory services which they often required. After that, Bangladesh government came up with the idea of "Digital Bangladesh" with a vision to leverage the power of ICT in each and every public sector and service (a2i, 2014). Keeping that in mind, Government Launched several projects to digitalize the agricultural services as well in empowering the farmers. Therefore, this idea of farmer's attitude towards e-Agriculture has been studied to find out whether the initial wave of e-Agriculture attempts made some productive impacts or not. By using e-Agriculture as well as ICT particularly the internet, mobile phones, e-mails and SMS, agricultural information is accessed more easily and coverage also expands Woods *et al;* (2002). It was found that application of ICT on e-learning in particular is an effective alternative in addressing the continuing educational needs of agricultural knowledge especially in the areas of sustainable agriculture and natural resource management (Abdon *et al;* 2006). The benefits of utilizing ICT as an e-learning tool for agricultural extension and training purposes are well

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documented (Hafkin & Odame; 2002, Asenso – Okyere, 2012). SheaShultz & Fogarty, (2002), pointed out that one of the significant reason for the increase in e-learning is related to cost of training, citing that Price Waterhouse Coopers reduced the cost of training per person by approximately 87 per cent through its e – learning initiative. The same authors state that e-learning is saving 33 per cent to 50 per cent from the cost of training while cutting 50per cent off the time invested and allowing better results. In addition to cost benefits, organizations prefer e-learning for its promises to increase employee retention, development, deploy and update content provide effective training anywhere and anytime (Minton, 2000). Chamala & Shingi, (1996, 2010), confirm that ICT use for extension activities will ultimately transform extension workers into catalysts who will play roles of empowering community organizations, human resource development, problem solving and educating farmers.

The role of the agricultural worker in bridging the technological gap between existing and evolving scientific knowledge and farmer's knowledge cannot be glossed over. It is therefore appropriate to state that the most critical target learners of ICT initiatives are knowledgeable, skilled and committed agricultural workers. The idea of e-Agriculture is still in the nascent stage in Bangladesh context, so does it in the academic arena.

In 2003, under the "Support to ICT" taskforce program the ministry of agriculture of Bangladesh did set up an agricultural information system. (MoA, 2003). In 2005, a group of researchers of D.Net (Development Research Network, Bangladesh) proposed the idea of "Pallitathya Help Center" and conducted a project on it.

The idea centered on the use of relatively less fashionable ICT, the mobile phone, as an effective 'last mile solution' to improve access to livelihood information for the rural people. They found it most challenging to understand the problems (related to health, agricultural, weather information) of rural people and to provide the appropriate information (Raihan *et. al,* 2005).Since this idea is brand new, this researcher has not come across any local literature that has made any qualitative attempt to measure the attitude of e-Agriculture among the farmers. So, this literature has been attempted in this Greenfield segment and perhaps the very begining of its kind in Bangladeshi context. Not to mention, the researcher has thoroughly gone through the other countries farmers' attitude towards e-Agriculture from which statistical the model used in the context, has been applied.

METHODOLOGY

Data Collection and Sampling Methodology

The researcher applied purposive sampling technique to determine the location form where the data were collected. The study was conducted at the Bhatbour block of Dighi union under Manikganj Sadar Upazila, Manikganj (One of the major districts of Bangladesh) where the government of Bangladesh has been implementing a numbers of e-Agriculture related development projects with the help of foreign aids through Department of Agricultural Extension (DAE). For the purpose of this study, the farmers (within this block) those who used e-Agriculture were considered as the study group and the farmers those who did not use such (within this block) were considered as the control group. According to the DAE database, in this area, approximately 1148 farmers used e-Agricultural facilities. To determine the sample size out of these 1148 study group farmers, the researcher used Yamane's (1967) formula:

$$n = \frac{z^2 P (1-P) N}{z^2 P (1-P) + N (e)^2}$$

Where, n = Sample size; N= Population size = 1148; e = The level of precision = 8per cent; z = the value of the standard normal variable given the chosen confidence level (e.g., z = 1.96 with a confidence level of 95 per cent) and P= The proportion or degree of variability = 50per cent. According to the formula, the desired sample size (n) was = 133. A reserve list was maintained to fill in the gaps if any respondent in the original list was found missing as the same respondent in two interviews (in September, 2015). To ensure the same respondents for the two phase interviews, 5per cent extra respondents were interviewed in the time interview period.

The definitions of the variables measured are shown in Table 2.

Table 2. Variable measurement techniques

Category	Scoring system				
Age	1 for each complete year of age of the respondent				
Education	1 for each year of school education				
Effective farm size	1 for each decimal area of land				
Annual household income	1 for each "thousand BDT" income in a year				
Farming experience	1 for each year experience				
Participation in training	1 for each day training				
Knowledge on e-Agriculture	1 for each question's correct answer and "0" for wrong answer				
	Extent of contact				
Extension contact	4 for frequently	3 for regularly	2 for occasionally	1 for rarely	O for not at all

	Nature of participation (years)				
Organizational Participation	4 for President/	3 for secretary	2 for executive member	1 for ordinary member	0 for no participation
	Places of visiting (years)				
Cosmopoliteness	4 for frequently	3 for regularly	2 for occasionally	1 for rarely	O for not at all

Measurement of farmers' attitude towards e-Agriculture

Attitude of farmers towards e-Agriculture was considered as dependent variable of the study. After through consultation with the extension experts and review of literature 29 statements were selected to measure the attitude of the respondents towards e-Agriculture. The respondents were asked to give their attitude regarding 29 statements related to e-Agriculture. Among the statements 15 were positive and 14 were negative. A five point likert-scale such as strongly agree, agree, no-opinion, disagree, strongly disagree were used to measure the level of agreement of the farmers towards e-Agriculture. In the statement a score of +2, +1, 0, -1, and -2 were assigned for responses reflected by the expressions- strongly agree, agree undecided, disagree, and strongly disagree, respectively. The attitude score of a respondent was computed by adding his scores for all the 29 statements.

Table 2: Attitude towards e-Agriculture measurement techniques

Statements	Extent of Opinion				
	Strongly agree (+2)	Agree (+1)	Undeci -ded (0)	Disagr -ee (-1)	Strongly Disagree (-2)
e-Agriculture system is a great step to improve socio-economic condition of farmers					
e-Agriculture system doesn't play important role to increase income of farmer					
e-Agriculture system farmers to enjoy quality life					
Cost of e-Agriculture system is higher than others					
e-Agriculture system creates an opportunity of self-employment					
Some beneficiaries leave this system due inefficient management of e-Agriculture center					
It is better to receive information from e-Agriculture system					
Insufficient information in terms of necessity of farmers					
Information from e-Agriculture system could be received without hazard					
e-Agriculture system is not fruitful in terms of information access than others					
e-Agriculture provide possible solutions of agricultural problem.					
e-Agriculture cannot meet location specific needs of the faarmes.					
e-Agriculture are potential tools to reach the needy farmers.					
Farmers feed back is fast through e-Agriculture than traditional methods					
Illiteracy will not deter farmers in availing e-Agriculture services.					
e-Agriculture cannot deliver personalized information.					
e-Agriculture based extension services assist the farmer in planning and decision making aspects in agriculture.					
e-Agriculture services' is a distant dream for resource poor farmers.					
Farmers can get remunerative prices to their produce through e-Agriculture based market intelligence					
Expert advice makes the farmers enterprise/activities productive.					
All kinds of information exchange are possible only through e-Agriculture.					
Existing infrastructure of e-Agriculture is not enough to meet the needs of the farming community.					
Only resourceful farmers can get the benefit of the e-Agriculture					
Access to information Centre at village level is boon to the farming community.					
Phone-in-live with scientists gives first-hand information about queries.					
e-Agriculture alone would solve the problems of farmers.					
e-Agriculture based Pest/disease outbreak warning system facilitate farmers to take preventive measures.					
e-Agriculture extension services avoid the personal extension contact.					
e-Agriculture based extension services provide new opportunity to build a skilled and knowledge community.					
e-Agriculture is a valuable tool, but it will never influence farmers' own decision making.					
Weather forecasting through e-Agriculture assists farmers in timely decisions.					
e-Agriculture based extension services are alternative to the present extension system.					

Statistical analysis

Data collected from the respondents were analyzed and interpreted in accordance with the objectives of the study. The analysis of data was performed using statistical treatment with SPSS (Statistical Package for Social Sciences) computer program, version 20. Statistical measures as a number, range, mean, standard deviation were used in describing the variables whenever applicable. In order to estimate the contribution of the selected characteristics of farmers' attitude towards e-Agriculture, Multiple regression analysis (B) analysis was used. Throughout the study, ten percent (0.1) level of significance was used as the basis for rejecting any null hypothesis. If the computed value of (B) was equal to or greater than the designated level of significance (p), the null hypothesis was rejected and it was concluded that there was a significant contribution between the concerned variable. Whenever the computed value of (B) was found to be smaller at the designated level of significance (p), the null hypothesis could not be rejected. Hence, it was concluded that there was no contribution of the concerned variables. The model used for this analysis can be explained as follows:

$Y = a + b1x1 + b2x2 + b3x3 + b4x4 + b5x5 + b6x6 + b7x7 + b8x8 + + b9x9 + b10x10 + e;$

Where, Y= Farmers' attitude towards e-Agriculture of the independent variables, x1 is the respondent's age, x2 is education, x3 is effective farm size, x4 is annual household income, x5 is the farming experience, x6 is participation in training, x7 is the knowledge on e-Agriculture,x8 is the extension contact, x9 is the organizational participation and x10 is cosmopoliteness, b1, b2, b3, b4, b5, b6, b7, b8, b9 and b10 are regression coefficients of the corresponding independent variables, and e is random error, which is normally and independently distributed with zero mean and constant variance.

RESULTS AND DISCUSSION

Farmers' attitude towards e-Agriculture

Farmers' attitude towards attitude towards e-Agriculture was the main focus of the study. Attitude scores of the respondents varied from (-16) to (+20) against the possible of (-28) to (+30). The mean being 6.47 and standard deviation of 1.619. The distribution of the respondents according to their score on attitude towards e-Agriculture is shown in Table 3.

Table 3: Distribution of the farmers according to their attitude towards e-Agriculture

Categories	Farmer Number	Percent	Mean	SD
Slightly favorable attitude	8	6.0		
Moderately favorable attitude	98	73.7	6.37	1.619
Highly favorable attitude	27	20.3		

On the basis of attitude towards e-Agriculture, the respondents were categorized into three classes' namely poorly favorable attitude, moderately favorable attitude and highly favorable attitude. The observed data showed that the most of the rural farmers (73.7 percent) had a medium attitude towards e-Agriculture while 20.3 and 6.0 percent of them had strong and poor attitude respectively. The attitude of the respondents expressed their perception about e-Agriculture. It helped the researcher to judge or measure the acceptance or rejection of e Agriculture in the rural area. To develop the farming activities, a favorable attitude towards e-Agriculture issue of the farmers is necessary.

Variables related farmers' attitude towards e-Agriculture

In order to estimate the attitude towards e-Agriculture from the independent variables, multiple regression analysis was used which is shown in the table 4.

Table 4: Multiple regression coefficients of contributing variables related in attitude towards e-Agriculture;

Dependent variable	Independent variables	B	P	R^2	Adj. R^2	F	p
Attitude towards e-Agriculture	Age	0.152	0.676				
	Education	0.049	0.986				
	Effective farm size	0.241	0.042**				
	Annual household income	1.071	0.026**				
	Farming experience	0.175	0.037**				
	Participation in training	0.068	0.000***	0.637	0.619	84.53	0.028**
	Knowledge on e-Agriculture	0.461	0.024**				
	Extension contact	0.192	0.384				
	Organizational Participation	0.042	0.051*				
	Cosmopoliteness	0.014	0.073*				

*** Significant at p<0.01. ** Significant at p<0.05. * Significant at p<0.1.

The data in Table 4. test the final null hypothesis: There is no contribution of the selected characteristics (age, education, effective farm size, annual household income, farming experience, participation in training, knowledge on e-Agriculture, extension contact, organizational participation and cosmopoliteness) of farmers on their attitude towards e-Agriculture.

In order to assess which factors contribute to empowerment, multiple regression analysis was used. Table 4. shows that there is a significant contribution of respondents' effective farm size, annual household income, farming experience, participation in training, knowledge on e-Agriculture, organizational participation and cosmopoliteness on farmers attitude towards e-Agriculture. Of these, Participation in training was the most important contributing factors (significant at the 1% level of significance). Effective farm size, annual household income, farming experience, and knowledge on e-Agriculture were also the important contributing factors (significant at the 5% level of significance) while coefficients of organizational participation and cosmopoliteness are also significant at the 10% level of significance. 63.7 per cent (R2 = 0.637) of the variation in the respondents' changed empowerment can be attributed to their effective farm size, annual household income, farming experience, participation in training, knowledge on e-Agriculture, organizational participation and cosmopoliteness, making this an excellent model (see 4). The F value indicates that the model is significant ($p<0.028$). However, each predictor may explain some of the variance in respondents' attitude towards e-Agriculture conditions simply by chance. The adjusted R-

square value penalizes the addition of extraneous predictors in the model, but values of 0.619 still show that the variance in respondents' attitude towards e-Agriculture can be attributed to the predictor variables rather than by chance, and that both are suitable models (Table 4.). In summary, the models suggest that the respective authority should consider the respondents' effective farm size, annual household income, farming experience, participation in training, knowledge on e-Agriculture, organizational participation and cosm-opoliteness.

CONCLUSION

This study suggested that farmers' had a favorable attitude towards e-Agriculture in Bangladesh. In addition to that, the study also revealed the factors that effective farm size, annual household income, farming experience, participation in training, knowledge on e-Agriculture, organizational participation and cosmopoliteness had significant contribution on farmers' attitude towards e-Agriculture. These variables contributed total 61.9 percent in farmers' attitude towards e-Agriculture. Based on these findings, the researcher would like to suggest that it is high time prepare the farmers to use these e-Agriculture tools for their wellbeing through proper educational activities and to popularize this service, government should implement integrated marketing communication using the popular print and electronic media so that more and more people get aware of this service.

Acknowledgements

The researcher takes an opportunity to express his boundless gratitude and heartfelt thanks to Dr. Mohummed Shofi Ullah Mazumder, Assoc. Prof. & Chairman, Department of Agricultural Extension & Information System, Sher-e-Bangla Agricultural University, for his cognitive suggestions, unprecedented co-operation and inspiration throughout the course of this research work.

The authors also thank to Ministry of Science and Technology, Government of Bangladesh for providing the National Science and Technology (NST) fellowship for this experiment.

Paper received on : April 24, 2016
Accepted on : May 10,2016

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