Bangladesh Journal of Extension Education *ISSN 1011-3916*
Volume 28, No. 1&2, 2016: 13-19 *Research Article*
Journal website:bjee.com.bd
Published by: Bangladesh Agricultural Extension Society

Factors Influencing Farmers' Knowledge on Information and Communication Technology in Receiving Agricultural Information in Bangladesh

M. Hammadur Rahman[1], M. Nasir Uddin[2] and M. Suzan Khan[3]

[1&2]Professor and [3]Research Fellow, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh

Correspondence: M. Hamamdur Rahman (hammad@bau.edu.bd)

Abstract

Success of popularizing Information Communication Technology (ICT) based media in agriculutural extension works largely depends on farmers' knowldege on ICT. Thus, The study was undertaken mainly identifies the factors influencing the farmers' knowledge on Information and Communication Technologies in receiving agricultural information. The study was conducted in five upazilas (sub-districts) of Mymensingh district in Bangladesh. One hundred farmers were interviewed using a structured questionnaire to collect the data while both descriptive and inferential analyses were used to analyze the collected data. Results of the study indicates that majority (55 per cent) of the farmers had low knowledge compared to 27 per cent having medium knowledge, 10 per cent having high knowledge and 8 per cent of the farmers had no knowledge on ICTs in receiving agricultural information. Besides, education, farm size, annual family income, organizational participation, extension media contact, awareness on ICT facilities, access to ICT facilities and training received on ICT were positively correlated with farmers' knowledge on ICT. On the other hand, only farmers' age was negatively correlated with their knowledge on ICTs. Results of multiple regressions identified five influential variables, namely education, annual family income, extension contact, awareness on ICT facilities and training received on ICT. These four variables explained 80.2 per cent of the total variation in their knowledge on ICTs. Policymakers should emphasize these aforementioned four factors to shape the policy measures in increasing the knowledge on ICTs.

Keywords: Farmers, knowledge, ICT, agriculture, Bangladesh, DAE

Introduction

The economy of Bangladesh depends mainly on agriculture. The main challenge of agriculture is to feed the increasing population with limited resources. A number of approaches are taken to provide farmers required information to support their farming operations. Traditional public-sector extension services use a variety of extension programmes to overcome barriers to technological adoption without much success (Anderson and Feder, 2004; Aker 2011). It is found that ICT allows efficient and transparent storage, processing and communication of information and that entrepreneurial innovation in this field may affect economic and social change (Kaushik and Singh, 2004). In general, ICT includes computer, internet, phone, television, radio, and other offline and online communication devices (Hasan and Sharif, 2007). ICT would enable farmers to gather a broad range of information needed by small producers such as information on best practices, new technologies, better prices of inputs and outputs, better storage facilities, improved transportation links, collective negotiations with buyers, and information on weather. Information centers are used in Bangladesh recognized as information centers, knowledge centers, and information resource centers (Hasan et al., 2009). Agricultural extension system in Bangladesh are entering into ICT based technology dissemination system as a need of time. Success of ICT based media implementation in

agriculutural extension works largely depends on farmers' knowldege on ICT while its facilities are some crucial issue to furnish extension activities. Knowledge on ICT is a preconditon to have their access to the ICT facilities that farmers require to increase the productivity that ultimately aims at improving the quality of their livelihoods. Thus it is necessary to provide facilities to farmers for educational programmes and information system, so that they could increase their knowledge and get information on time. "Poor infrastructures may be the obstacles of the farmers to get information and take part education programmes resulted low information access and low knowledge" (UN, 2005). The Bangladesh government took a programme of "Digital Bangladesh" with a vision to influence the power of ICT in each and every public sector and service (a2i, 2014). Considering this idea, the government launched several projects to digitize the agricultural services as well in empowering the farmers.

Several studies were conducted on use of ICT based media (mainly internet and mobile phone) in agricultural technology transfer (Osman, 2014; Katalyst, 2012; Sife et al., 2010; Siraj, 2011), awareness on ICT use (Moon et al, 2016), and access to ICT use in agriculture (Hasan et al., 2009; Nnenna, 2013). Some studies were also available on attitude towards e-agriculture (Islam and Rashid, 2016) and role of ICTs in agriculture (Faroque, 2010). But no available studies were found on factors affecting the farmers' knowledge on ICTs in receiving agricultural information in Bangladesh. Thus, this study was taken mainly to identify the factors influencing the farmers' knowledge on ICTs in receiving agricultural information. In addition, determination of farmers' knowledge on ICTs in receiving agricultural information was also considered.

Methodology

Study Area, Population and Sampe

The study was conducted in five upazilas (sub-districts) under Mymensingh district of Bangladesh. The study areas were selected randomly for investigation. The total list of the farmers was obtained from the concerned Sub-Assistant Agricultural Officers (SAAO), the grassroots level extension agents of the Department of Agricultural Extension (DAE) under the Ministry of Agriculture. Simple random sampling method was used for selecting the respondents from the list of the farmers. A total of 263 farmers constituted the population from where 100 farmers were randomly selected as the sample of the study.

Measurement of Variables

Various socio-economic characteristics of the farmers such as age, education, household size, farm size, annual family income, organizational participation, extension contact, awareness on ICT facilities, access to ICT facilities and training received on ICT were considered as the independent variables of the study. Most of the explanatory variables were measured by developing scales based on the field scores. The dependent variable was the farmers' knowledge on ICT in receiving agricultural information. To measure the variable, (knowledge on ICT of a respondent), a knowledge score was developed. Each respondent was asked 13 questions covering the different aspects of ICTs in receiving agricultural information. Each question had predetermined assigned scores making a total score of 25. For correct responses to all the 13 questions, a respondent could get a total score of 25; otherwise for wrong responses to all the questions he/she could get a total score of zero (0). Partial scores were awarded for a question on the basis of the correctness of answer of a respondent.

Data Collection and Analysis

The empirical data were collected using a pretested questionnaire through face to face interview during the period from March to April, 2016. The collected data were managed through SPSS software, while correlation and regression analyses were conducted along with descriptive statistical measures.

Results and Discussion

Farmers' Knowledge on ICT

The results presented in the Table 3 indicated that observed scores on ICT knowledge of the farmers ranged from 0 to 25 having possible range from 0 to 25. The average and standard deviation of data distribution were found 7.56 and 5.65, respectively. Based on the knowledge score, the farmers were classified into four categories namely 'no knoledge' (0), 'low knowledge' (1-8), 'medium knowledge' (9-16), 'high knowledge' (above 16) according to knowledge scores and shown in Table 1.

Table 1: Distribution of farmers according to their knowledge on ICT

Categories of farmers (score)	Number and percent	Mean	Standard Deviation
No knowledge (0)	8	7.56	5.65
Low knowledge (1-8)	55		
Medium knowledge (9-16)	27		
High knowledge (above 16)	10		
Total	100		

Results indicated in Table 1 and revealed that the majority (55 per cent) of the farmers had low knowledge compared to 27 percent having medium knowledge, 10 percent having high knowledge while 8 percent of the farmers had no knowledge on ICT in agriculture. This is may be due to poor educational facilities, low income, inadequate government and non-government interventions for the farmers' wellbeing especially on ICTs issue in the study area. Osman (2014) also reported similar findings in his study about knowledge of rural farmers on ICTs. This low level of knowledge implies that ICT related programmes among the farmers of Bangladesh will not be successful if appropriate measures are not taken to increase farmers' awareness on the technology as well as increasing skills on ICTs.

Characteristics Profile of the Farmers

The individual characteristics of the farmers includes age, education, household size, farm size, annual family income, organizational participation, extension contact, awareness on ICT facilities, access to ICT facilities and training received on ICT. In addition, salient features of the characteristics and basic statistical value of respondents have been presented in Table 2 which is self-explanatory. However, it is indicated that the average families sized of the farmers were 5.17 which is more than national average of 4.50 (HIES, 2010). The average annual income of the farmers' in the study area was BDT 232,220 ($2902.75 US), which is more than the national average of BDT 112240 ($1403 US) (Uddin, 2015). Unfortunately, training received by the farmers in the study area was very low with average days of 0.24.

Relationships between of Selected Characteristics of the Farmers and Their Knowledge on ICT

A total of ten selected characteristics of the farmers were considered for understanding relationships between those characteristics and their knowledge on ICT. To test the relationship, Pearson's correlation coefficient was computed and results have been presented in Table 3.

Results presented in the Table 3 revealed that farmers' education, farm size, annual family income, organizational participation, extension contact, awareness on ICT facilities, access to

ICT facilities and training received on ICT positively correlated with the farmers' knowledge on ICT. While only age of the respondents was negatively correlated with farmers' knowledge on ICT. Moreover, education, awareness of ICT facilities and access to ICT facilities showed the relatively strong relationship with farmers' knowledge on ICT (see Table 3). Thus, these variables seem to be important factors that might influence the farmers' knowledge on ICT. Similar results found in the studies conducted by the Moon et al., 2016; Rashid and Islam, 2016.

Table 2: Descriptive statistics and salient features of respondents (n=100)

Characteristics	Scoring system	Range		Mean	SD*
		Possible	Possible		
Age	Years	Unknown	22-75	43.08	12.86
Education	Years of schooling	Unknown	0-18	6.75	4.57
Household size	No. of members	Unknown	2-11	5.17	1.86
Farm size	Hectares	Unknown	0.23-3.70	0.91	0.71
Annual family income	'000' Tk.(1BDT=0.0125$)	Unknown	78.92-680.00	232.22	98.61
Organizational participation	Scale score	Unknown	0-54	9.83	8.15
Extension contact	Scale score	0-36	0-26	9.46	5.37
Awareness on ICT facilities	Scale score	1-9	1-9	3.46	2.14
Access to ICT facilities	Scale score	0-27	0-18	7.25	3.87
Training received on ICT	Days of training	Unknown	0-3	0.24	0.82

*SD stands for standard deviation

Table 3: Correlation between farmers' characteristics and their knowledge on ICT

Focus variable	Selected characteristics	Correlation co-efficient (r) with 98 df
Farmers' knowledge on ICT in receiving agricultural information	Age	-.211*
	Education	.678**
	Household size	-.158
	Farm size	.252*
	Annual family income	.337**
	Organizational participation	.273**
	Extension contact	.472**
	Awareness on ICT facilities	.852**
	Access to ICT facilities	.659**
	Training received on ICT	.541**

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

Econometric Estimation of Factors affecting the Knowledge on ICT

Linear multiple regression analysis was computed in order to determine the influential factors that might affect farmers' extent of knowledge on ICT. A general full model regression analysis was run and the findings of the regression analysis are presented in Table 4. This analysis indicates that 80.2 per cent of the total variation in their knowledge on ICT was explained by five variables, namely knowledge, annual family income, extension contact,

awareness on ICT facilities and training received on ICT.

Table 4: Regression coefficient of farmers' ICT knowledge with their selected characteristics

Explanatory variable	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	.440	1.250		.352	.726
Age	-.044	.023	-.100	-1.873	.064
Education	.189	.085	.153	2.219	.029
Farm size	-.526	.427	-.066	-1.231	.222
Annual family income	.005	.001	.176	3.127	.002
Organizational participation	-.011	.037	-.016	-.292	.771
Extension contact	.248	.062	.235	4.007	.000
Awareness on ICT facilities	1.233	.271	.467	4.556	.000
Access to ICT facilities	.029	.117	.020	.251	.802
Training received on ICT	4.494	1.302	.217	3.451	.001
n = 100, Adjusted R^2 = .802, F-value = 40.559					

The multiple regression model (Table 4) results explain that education is positive and significantly (at 5% level) related to farmers' knowledge on ICTs. This means that the probability of increasing knowledge is higher for those who have higher literacy compared to less-educated or illiterate farmers. It is noticeable that educated farmers have more knowledge, high access to AICC, a greater ability to understand and respond to any changes, are better able to predict future scenarios than others, which might stimulate them to understand the application of ICTs in agriculture. The similar results were found in the studies conducted by the Rashid and Islam (2016) and Asif (2016). The result of the regression model shows that positive and significant (at 5%level) relationship between annual family income and farmers' knowledge on ICTs. This reveals that farmers having higher income influencing more knowledge on ICTs. Besides farmers having high income buying ICTs based tools like mobile, computer, internet modem etc. that might contribute to knowledge incensement on ICTs. Similar findings found in other study conducted in Bangladesh (Uddin, 2012).

Extension contact showed positive and significant relation to farmers' knowledge on ICTs at 1 per cent level. This means that the probability of the farmers' knowledge will be higher for farmers having higher extension contact as compared to farmers having less extension contact. Farmers should be more contacted with extension agent through meeting, demonstration, training on ICTs etc. which might accelerate them to acquire more knowledge about the ICTs. The regression model explained that a significant relationship found between awareness on ICTs facilities and farmers knowledge on ICTs at 1 per cent level while trend of this relation is positive. This kind of findings indicates that farmers having more awareness on ICTs facilities increasing the knowledge on ICTs. Farmers, who are more contacted with mass media creating awareness resulting more knowledgeable on ICTs. Training received on ICT is positive and significantly related to farmers' knowledge on ICTs. It can be interpreted that farmers having more skilled influencing the knowledge on ICTs compared farmers having less skilled for the same. Uddin et al. (2014) found similar results in their respective studies.

Conclusion and Recommendations

The majority (55 per cent) of the farmers had low knowledge compared to 27 percent having medium knowledge, 10 percent having high knowledge and 8 percent of the farmers had no knowledge. It may conclude that the farmers' knowledge about ICTs was not satisfactory in the study area. Therefore, farmers' knowledge on ICTs should increase through training facilities, group discussion, extension contact etc. Age, education, farm size, annual family income, organizational participation, extension contact, awareness on ICT facilities, access to ICT facilities and training received on ICT were significantly related to farmers' knowledge on ICTs. While only age is negatively correlated with farmers' knowledge on ICTs. The linear multiple regression model explained that 80.2 per cent of the total variation in their knowledge on ICT was explained by five variables, namely education, annual family income, extension contact, awareness on ICT facilities and training received on ICT Therefore, it can be concluded that these aforementioned four variable were identified as influential factors that affecting the farmers` knowledge on ICTs in receiving agricultural information. So, policy makers should emphasis these aforementioned four factors while generate the policy measures on increasing the knowledge on ICTs.

References

a2i (Access to Information Program). 2014. Digital Bangladesh E-Sheba Sobar Jonno, Access to Information Program. Prime Minister's Office, Dhaka, Bangladesh.

Anderson, J.R. and G. Feder. 2004. Agricultural Extension: Good Intentions and Hard Realities. *The World Bank Research Observer,* 19 (1), 41–60.

Aker, J.C. 2011. Dial 'A' for Agriculture: using information and communication technologies for agricultural extension in developing countries. Tufts University, Economics Department and Fletcher School, Medford MA-02155, p. 37.

Kaushik, P.D. and N. Singh. 2004. Information Technology and Broad-Based Development: Preliminary Lessons from North India. *World Development,* 32: 591-607.

Osman, S. M. 2014. Farmers' Use of ICT Based Media in Receiving Agricultural Information, master's thesis, Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Rashid, S. M. M. and M. R. Islam, 2016. Problems Faced by Farmers in Application of e-Agriculture in Bangladesh. *Journal of Agricultural Economics and Rural Development*, 3(1): 79-84.

Uddin, M.N. 2012. An Analysis of Farmers' Perception and Adaptation Strategies of Climate Change in Bangladesh. Master's Thesis, Humboldt University of Berlin, Berlin, Germany.

Uddin, M. N., W. Bokelmann and J.S. Entsminger. 2014. Factors Affecting Farmers' Adaptation Strategies to Environmental Degradation and Climate Change Effects: A Farm Level Study in Bangladesh. *Climate*, 2: 223-241.

U.N. (United Nations). 2005. Global E-government Readiness Report: from E-government to Inclusion, UNPAN/2005/14, United Nations, New York.

Islam, M, R. and S. M. M. Rashid. 2016. Farmers' Attitude towards e-Agriculture in Bangladesh. *American Journal of Social and Management Sciences,* 7(1): 12-18.

Moon, S. J., M.A.M. Miah and T. Berg. 2016. Farmers' Awareness on Effective Delivery of Farm Information through

ICT Mediated Extension Service in Bangladesh, European *Scientific Journal*, 12(21): 9-17.

Hasan, M.R. and A.R.M. Sharif. 2007. Study on the Tele-center Movement in Bangladesh: Obstacles and Opportunities, Presented in Rural ICT Development Conference, University Utara Malaysia, Kedah, Malaysia (November).

Hasan, R., S. Islam, M.S. Rahman and K.N.A. Jewel. 2009. Farmers' Access to Information for Agricultural Development in Bangladesh. *Bangladesh Research Publications Journal*, 2(1): 319-331.

Faroque, M.A.A., G. M. F. Ahmed and S.E. Bilkis. 2010. The Complementary Roles of Information and Communication Technology in Bangladesh Agriculture, *Journal of Science Foundation*, 8(1&2): 161-169.

Nnenna, E. A. 2013. Access and Application of Information and Communication Technology (ICT) among Farming Households of South East Nigeria, *Agriculture and Biology Journal of North America*, 4(6): 605-616.

Katalyst. 2012. Making ICT Work for Bangladesh's Farmers, The Katalyst Cases Number 6, November, Dhaka.

Sife, A.S., E. Kiondo and J.G. Lyimo-Macha. 2010. Contribution of Mobile phones to Rural Livelihoods and Poverty Reduction in Morogoro Region, Tanzania. *Electronic Journal of Information Systems in Developing Countries*, 42(3): 1-15.

Siraj, M. 2011. A Model for ICT based Services for Agriculture Extension in Pakistan. Retrieved from http://www.cabi.org on 25 September, 2015.