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Article

Farmers' awareness on use of ICT in farm practices

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Abstract: The main purpose of the study was to understand the extent of awareness of farmers on use of ICT in farm practices. At the same time, important factors were identified those could contribute to farmers' awareness on use of ICT. The study was conducted in the existing CIG of Ishwarganj upazila in Mymensingh district. Data were collected from 110 CIG farmers in the selected upazila during the period from 03 October to 05 November, 2018 by using a pre-tested structured interview schedule. Farmers' awareness was measured by checking extent of their extent of awareness of seven selected ICT services as cell phone, smart phone, personal computer, services from AICC, services from UDC, Krishi Call Centre and mobile apps. A number of characteristics of the farmers were selected as the factors for explaining farmers' awareness on use of ICT. Appropriate scales were developed and used in order to measure the concerned variables. Correlation test was used to ascertain the relationships between the concerned variables, while multiple regression (enter method) analysis was also used to determine the contributions of the farmers' selected characteristics to their opinion on selected ICT based facilities. Results showed that 23.7 percent farmers had "moderate awareness" on use of ICT in farm practices while 60 percent and 12.7 percent of the farmers had "low" and "very low awareness" on use of ICT based facilities in their farm practices. Farmers' characteristics such as education, knowledge about ICTs, ability to use ICTs, access to ICT facilities, attitude towards ICT had significant positive relationship with their awareness on use of ICT; while age, household size and annual income had significant negative relationship with the awareness on use of ICT. Results of multiple regression analysis revealed that the influential factors on the farmers' awareness on use of ICT were household size, knowledge about ICT, ability to use ICT and attitude towards ICT. The R^2 value indicated that, four explanatory variables together explained 80.0 percent variation infarmers' awareness on use of ICT. The study also identified some constraints faced by the farmers while using ICT services in receiving agricultural information. The study revealed that an overwhelming majority of the farmers (97.3 percent) had high level problems in using ICTs while only 2.7 percent faced medium problems. Lack of training facilities on ICT, cost of using ICT services, low knowledge on availability of ICT based facilities, lack of operational knowledge of computer, low bandwidth speed of internet, limited availability of ICT services, poor level of education/ illiteracy, and so on were identified as the major constraints faced by the farmers.

Keywords: agriculture extension; modern communication technology; awareness; internet use in agriculture

1. Introduction

ICTs are electronic technologies for creating, acquiring, storing, processing, communicating, and using information (Tiamiyu, 2002). The ICTs in extension can lead to the emergence of knowledge workers that will result in the realization of a bottom-up, demand-driven paradigm for technology generation, assessment and transfer (Meera, 2003; Meera et al., 2004). The ICTs and its associated infrastructures help in the creation and dissemination of knowledge (Bhuiyan, 2010). Approximately 60 percent people of Bangladesh earn their livelihood from the agricultural sector (Kashem et al., 2010). In Bangladesh agriculture is still a major source of income for almost 15 million farming households (BBS, 2017). Economy of Bangladesh very much depends on agriculture. About 45.10 percent labors were directly or indirectly involved with agriculture (BBS, 2017). Contribution of agriculture to the GDP growth was 14.79 percent in 2016-17 (BBS, 2017). Therefore, the increase of productivity and income of farmers is a great concern. Lack of access to information along with various other factors demands immediate attention. Current ICT related initiatives were established Agricultural Information and Communication Centre, Fisheries Information and Communication Centre; Web-based price information dissemination by Department of Agricultural Marketing; Web-based Information Repository by Department of Agricultural Extension; Web-based soil testing database by Soil Resources Development Institute; Mobile accessible agriculture helpline run by private mobile operators (Karim, 2010). At present, the Agricultural Information Service (AIS) under the Ministry of Agriculture is running more than 300 Agricultural Information and Communication Center (AICC) throughout the country. The a2i (2018) supported Union Digital Centers were also providing supports for the clients of rural areas. Farmer Information and Advisory Centers (FIAC) have been established in all Union Parishad premises. The national research organizations like BARI, BRRI and SRDI developed a number of user friendly "Apps" that can be used both in online and offline. Under the a2i project, useful and users' friendly applications like "*Krishoker Janala*" and "*Krishoker Digital Thikana*" have been developed by agricultural extension practitioners of the country. Projects like, Agriculture Information Service, National Agricultural Technology Project, Bangladesh Institute of ICT in Development, Soil Resource Development Institute, OFRS (Online Fertilizer Recommendation Software), DFRS (Desktop Fertilizer Recommendation Software, Bangladesh Rice Knowledge Bank, Mobile Apps were already implemented in field level, from there farmer getting facilities. Information sources or media play very important roles, in creating awareness about new agricultural technologies among farmers. Researchers observed that mass media were spreading agricultural technologies to the farmers at a faster rate than personal contacts (Leeuwis and Van den Ban, 2004). The potency of modern electronic technology can be exploited for infotainment of farming community (Guenthner and Swan. 2011). There exists relationship between the selected characteristics of the farmers and their awareness on use of ICT in farm practices. In Bangladesh, apart from conventional mass media, at the age of information technology, a number of ICT based "new media" (term used by McQuail, 2000), namely internet and cellphone, have been emerged in the horizon of technology transfer. The government of Bangladesh, different research and extension organizations as well as development organizations (national and international NGOs, donor agencies and donor supported projects) also put emphasis for supporting the digitization of services in line of the government's Vision 2021 strategy. Although various ICT services exist, their usage is limited due to lack of farmers' awareness and may be some other related factors. Considering these prospects and challenges this present study was conducted to determine farmers' awareness on ICT related services in receiving technological information; to identify the factors influencing the awareness of farmers on use of ICT, and to identify the problems encountered by farmers while using ICTs in receiving farming information.

2. Materials and Methods

2.1. The study area and periods

The study was conducted in Mymensingh district of Bangladesh. Ishwarganj upazila was randomly selected from among thirteen upazila of the district (Figure 1). The data were collected from 3 October to 5 November, 2018.

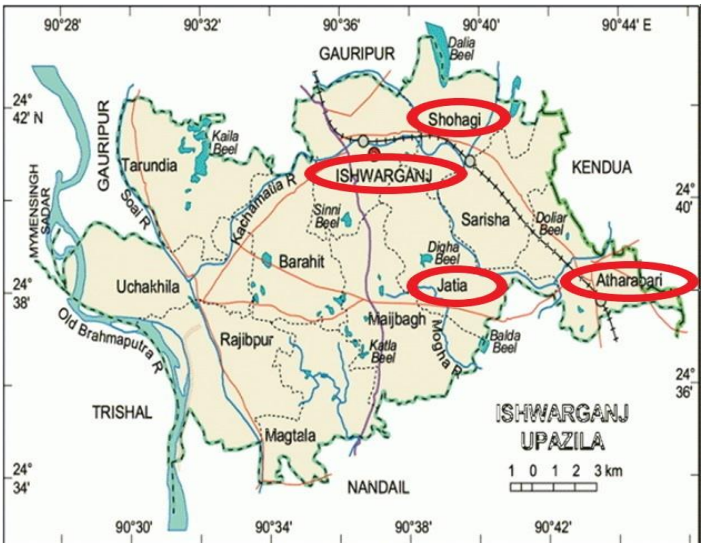

Figure 1. Map of Ishwarganj upazila showing the study area.

2.2. Population and sample

The primarily perceived population of the study was the farming community of the selected upazila. Therefore, the farmers who were involved with the Common Interest Groups (CIG) under the National Agricultural Technology Project (NATP) in the upazila were considered as the target population of the study. Five CIGs were randomly selected for the study and a total of 220 farmers were found to be the members of the selected CIGs. A proportion of 50% members of the selected CIGs were randomly selected as the sample of the study, thus the total of 110 farmers constituted the sample size (Table 1).

Table 1. Distribution of population and sample size of the respondents in selected CICs.

Sl. No.	Name of the CIG	Union	No. of CIG members (population)	No. of respondents (Sample)
1.	Mjhiakandi CIG Purush Foshol Shomobai Somiti	Jatia	45	23
2.	Kahedgram CIG Purush Foshol Shomobai Somiti	Jatia	40	20
3.	Hatulia CIG Purush Foshol Shomobai Somiti	Shohagi	45	23
4.	Itaulia CIG Purush Foshol Shomobai Somiti	Atharabari	45	23
5.	Joypur Khoyrati CIG Purush Foshol Shomobai Somiti	Ishwarganj	45	21
	Total		**220**	**110**

2.3. The research instrument

In case of age, level of education, household size, farm size, annual family income, knowledge about ICTs and training exposure direct questions were used but in case of ability to use of ICT services, access to ICT facilities, attitude towards ICT services, awareness on available ICT facilities, problem faced by the farmers in using ICT services etc. scales were used to obtain data.

2.4. Variables of the study

Awareness of farmers' on use of ICT services in farm practices constituted the dependent variable of the study. Nine selected characteristics of the farmers namely: age, education, household size, farm size, annual income, training exposure, knowledge on ICT, ability to use of ICT services, access to ICT facilities and attitude towards ICT services consisted the independent variables of the study.

2.5. Measurement of the variables

2.5.1. Measurement of explanatory variables (personal characteristics)

The explanatory variables of the study were ten selected characteristics of the farmers. These were age, education, household size, farm size, annual family income, training exposure, knowledge on ICT, ability to use ICT services, access to ICT facilities and attitude towards ICT services.

2.5.1.1. Age

The age of a respondent referred to the period of time from his birth to the time of interview. The age was measured in complete years as reported by the respondents. A score of one (1) was assigned for each year of age.

2.5.1.2. Level of education

Education was measured by the year of schooling. If a respondent did not attain formal education, his score was assigned as zero (0). If he/she can sign only then his score is 0.5. A score of one (1) was assigned for each year of schooling, i.e. 10 for S.S.C, 12 for H.S.C., and so on.

2.5.1.3. Household size

The household was measured by the total number of members in the family of a respondent. The family member included the respondent himself, spouse, children and parents.

2.5.1.4. Farm size

Farm size of a respondent include the areas of homestead, cropland, areas given and/or taken on sharecropping, lease, etc. and other like garden, pond, fallow land etc. which could give full benefit to the family and it was expressed in terms of hectares by using of the following formula:

$FS = a + b + 1/2 (c + d) + e – f + g$

Where,

FS = Farm Size
a = Cultivable land in and around homestead area
b = Cultivable land under own cultivation
c = Land taken from others on sharecropping/*borga*
d= Own land given to others on sharecropping/*borga*
e = Land taken from others on *borga*
f = Land given to others on lease/mortgage
g = Pond/Orchard/Timber land etc.

2.5.1.5. Annual income

This referred to the total earnings in taka of all family members of a respondent from agriculture (crop, livestock and fisheries), business, employment and other sources. A score of one (1) was assigned for each thousand taka.

2.5.1.6. Training exposure

Training received by farmers was measured by the total number of days he/she participated. A score of 0 was assigned for no training and 1 was assigned for each days of training received.

2.5.1.7. Knowledge on ICT services

For measuring knowledge on ICT services of a respondent, a knowledge score was computed. To do this each respondent was asked 10 questions covering the different aspects of Information and Communication Technologies (ICTs). Each question had predetermined assigned scores making a total score of 20. For correct responses to all the 10 questions, a respondent could get a total score of 20 otherwise for wrong responses to all the questions he could get a total score of zero (0).

2.5.1.8. Ability to use ICT facilities

Access to ICT facilities by a respondent was measured on the basis of his level of access with 6 different ICT based media and center. Each respondent was asked to indicate the frequency of uses with each of the selected 6 ICT based media. Score was assigned against each of the ICT based media as 0 for not at all, 1 for low use, 2 for average use, and 3 for good use.

2.5.1.9. Access to ICT facilities

Access to ICT facilities by a respondent was measured on the basis of his extent of access with 6 different ICT based media and center. Each respondent was asked to indicate the frequency of access with each of the selected 6 ICT based media. Score was assigned against each of the ICT based media as 0 for not at all, 1 for low access, 2 for medium access, and 3 for high access.

2.5.1.10. Attitude towards ICT services

The respondents' attitude was measured using the Likert scale with some modification which suits to the objectives of the study. Ten statements were selected and rated on a four point continuum 'Strongly Agree', ' Moderately Agree', 'No Opinion', 'Disagree', and 'Strongly Disagree' with scores of 5,4,3,2,1 respectively for positive statements and the reverse for negative statements.

2.5.2. Measurement of the focus variable

A respondent could get a score of 0, 1, 2 3, against their 'no at all', 'low awareness', 'moderate awareness' and 'high awareness' respectively. The summation of obtained scores represented the awareness level of a respondent on availability of ICT facilities. Awareness score of a respondent could vary from 0 to 18.

2.5.3. Measurement of Problems faced by the farmers in ICT Services

The farmers were asked to give their opinion on 12 selected problems. A four point rating scale was used for computing the problem score of a respondent. For each problem, score of 3, 2, 1 and 0 was assigned to indicate extent of problem confrontation as high problem, medium problem, low problem and no problem respectively.

2.6. Methods of data collection

The data were collected through Face to face interview, previous field data from SAAO of Ishwarganj Agricultural Office and president of the selected CIG from 3 October to 5 November, 2018.

2.7. Processing of data and analysis

The collected raw data were examined thoroughly to detect errors and omissions. Qualitative data were converted into quantitative data by means of suitable scoring whenever necessary. The collected primary data were coded, categorized, tabulated and analyzed scientifically. The local units were converted into standard units. The qualitative data were transferred into quantitative form by using appropriate scoring techniques. The SPSS computer programme was used for analyzing the data. Various descriptive statistical measures such as range, frequency, percentage, mean, standard deviation (SD), coefficient of variation (CV) and rank order were used for categorization and describing the variables. Pearson's product moment correlation coefficient (r) and multiple regression analysis were utilized to analysis the data.

3. Results and Discussion

3.1. Selected characteristics of the farmers

3.1.1. Age

The age of the respondents ranged from 28 to 65 years, with an average 40.43 years and standard deviation of 7.98. On the basis of their age, the respondents were classified into three categories i.e. young, middle aged and old. A good number of the farmers (33.6 percent) were in the young aged category, and 54.6 percent of them being middle aged and 11.4 percent of old (Table 2). Similar result were revealed by Islam *et al.*, (2015a); Sultana *et al.*, (2015); Razeim *et al.*, (2017); Islam *et al.* (2014); Asif *et al.* (2015); Hossain *et al.* (2015); Islam *et al.* (2015b); Sharif *et al.* (2015); Ali *et al.* (2016); Shabuj *et al.* (2016); Hossain *et al.* (2016); Vaumik *et al.* (2017); Zaman *et al.* (2017); Hossain *et al.* (2017); Sharif and Asif (2015); Islam *et al.* (2017) and Asif and Habib (2017).

Table 2. Characteristics profile of the respondent farmers.

Characteristics	Scoring system	Range		Respondent Categories	Respondent's Percentage (n=110)	Mean	SD*
		Possible	Observed				
Age	Years	Unknown	28-65	Young (up to 35)	33.6	40.43	7.98
				Middle aged (36-50)	54.6		
				Old (above 50)	11.4		
Education	Years of schooling	Unknown	0-18	Primary (1-5)	3.6	10.05	2.10
				Secondary (6-10)	66.4		
				Above secondary (above 10)	30		
Household size	No. of members	Unknown	4-8	Small (up to 4)	52.7	4.78	.98
				Medium (5-6)	44.6		
				Large (above 6)	2.7		
Farm size	Hectares	Unknown	0.35-0.87	Small (up to 0.99 ha)	100	0.48	.098
				Medium (1.00-2.99 ha)	0		
				Large (>3.0 ha)	0		
Annual family income	'000' Tk.	Unknown	102-283	Low (up to 120)	20.9	140.86	27.75
				Medium (120-233)	78.2		
				High (above 233)	0.9		
Training exposure	Days of training	Unknown	0-21	No training (0 day)	82.7	1.65	4.125
				Low (up to 7)	12.8		
				Medium (7-14)	2.7		
				High (above 14)	1.8		
Knowledge on ICT	Scale score	0-20	3-14	Low (1-6)	72.7	5.09	1.75
				Medium (7-12)	26.4		
				High (above 12)	0.9		
Ability to use of ICT	Scale score	0-18	2-10	Low (2-6)	82.7	5.09	1.69
				Medium (7-10)	17.3		
				High (above10)	0		
Access to ICT facilities	Scale score	0-18	2-6	Very Low (up to 3)	32.7	4.11	1.86
				Low (4-6)	67.3		
Attitude towards ICT	Scale score	1-50	21-38	Unfavorable (<30)	31.8	30.65	4.54
				Neutral (=30)	14.6		
				Favorable (>30)	53.6		

*SD = Standard Deviation

3.1.2. Education

Score of education of farmers ranged from 0 to 18, with an average of 10.5 years and standard deviation of 2.10. On the basis of their education, the respondents were classified into three categories i.e. primary, secondary and above secondary. About 3.6 percent, 66.4 percent and 30 percent of them were in the primary level, secondary level and above secondary level, respectively. Data shows that majority of the farmers (66.4 percent) had secondary education in the study area (Table 2). Literate farmers were comparatively innovative than the illiterate farmers, but due to the interventions of different ICT related activities illiterate farmers could be more innovative. Similar findings were stated by Islam *et al.*, (2015a); Sultana *et al.*, (2015); Razeim *et al.*, (2017); Asif *et al.* (2015); Sharif *et al.* (2015); Hossain *et al.* (2016); Vaumik *et al.* (2017); Hossain *et al.* (2017); Islam *et al.* (2017) and Asif and Habib (2017).

3.1.3. Household size

Household size of the respondents ranged from 4 to 8, with an average 4.78 and standard deviation of 0.98. On the basis of their household size, the respondents were classified into three categories i.e. small, medium and large. The highest proportions of the farmers (52.7 percent) were in the small sized household, compared to 44.6 percent of them being medium household size and 2.7 percent of them in the large household size (Table 2). The small and medium sized household heads always try to increase their productivity through their innovativeness

farming practices. This work is relevant with the work of Islam *et al.* (2014); Asif *et al.* (2014); Asif *et al.* (2015); Sharif and Asif (2015); Islam *et al.* (2017) and Asif and Habib (2017).

3.1.4. Farm size

Farm size of the respondents ranged from 0.35 to .87 ha with an average of 0.482 ha and standard deviation of 0.09 ha. On the basis of their farm size, the respondents were classified into three categories i.e. small, medium and large. All the farmers of the research population (100 percent) had small farm size, Landless and marginal farmer were not found in the study area (Table 2). Farmers having small size farm always try to improve farm production with their limited resources and appropriate technological information received from various information sources of ICT services. Similar work were done by Islam *et al.*, (2015a); Sultana *et al.*, (2015); Razeim *et al.*, (2017); Islam *et al.* (2014); Asif *et al.* (2014); Asif *et al.* (2015); Sharif and Asif (2015); Islam *et al.* (2017) and Asif and Habib (2017).

3.1.5. Annual income

The annual family income of the farmers ranged from 102.75 to 283.00 (000'Taka), with an average of 140.86 and standard deviation of 27.75. On the basis of their annual family income, the respondents were classified into three categories i.e. low, medium and high income. The highest proportion of the farmers (78.2 percent) were in medium income category, where 20.9 percent and 0.9 percent of them were in low and high income category, respectively (Table 2). Data indicates that farmer's socioeconomic condition is changing towards better condition in study area. Similar result were demonstrated by Asif *et al.* (2015); Islam *et al.* (2014); Vaumik *et al.* (2017) and Islam *et al.* (2017).

3.1.6. Training exposure

It was found that, training received on ICT scores of the farmers ranged from 0 to 21 with an average of 1.65 and standard deviation of 4.125. Based on the training received, the farmers were classified into four categories: 'no training' (0 day), 'low training' (up to 7) 'medium training' (7-14) and 'high (above 14). The majority (82.7 percent) of the farmers had no training12.8 percent having low training, 2.7 percent medium and 1.8 percent in high categories (Table 2). Asif *et al.* (2015); Islam *et al.* (2014); Vaumik *et al.* (2017) and Islam *et al.* (2017) found the similar findings.

3.1.7. Knowledge on ICT

Observed ICT knowledge scores of the farmers ranged from 3 to 14 against possible range from 0 to 20. The average and standard deviation of data distribution were found 5.99 and 1.69, respectively. Based on the knowledge score, the farmers were classified into three categories: 'low knowledge' (1-6), 'medium knowledge' (7-12), 'high knowledge' (above 12). The majority (72.7 percent) of the farmers had low knowledge compared to 26.4 percent having medium knowledge, 0.9 percent having high knowledge (Table 2). It reveals that the majority of the farmers in the study area were having low knowledge about ICTs. Osman, (2014) also reported similar findings in his study about knowledge of rural farmers on Information and Communication Technologies (ICTs).

3.1.8. Ability to use ICT services

Observed ability to use of ICT services ranged from 2-10 against possible range from (0-18). The average and standard deviation of data distribution were found 5.09 and 1.69 respectively. Based on ability to use ICT score respondents were classified into three categories: 'low' (2-6), 'medium' (7-10) and 'high' (above 10). The majority (82.7 percent) of the farmers had low ability to use ICT services compared to 17.3 percent had medium ability (Table 2).

3.1.9. Access to ICT services

Access to ICT facilities score of the respondents ranged from 2 to 6 against the possible scores ranged from 0 to 18. The mean and standard deviation of data distribution were found 4.11 and 1.76, respectively. It has been seen that the respondents of the research had low access to ICT facilities. On the basis of their access to use ICT scores, the farmers were classified into two categories, 'very low' (up to 3) and 'low' (4-6). The majority (67.3 percent) of the respondent had low access to ICT while 32.7 percent had very low access to ICT facilities (Table 2). There were no respondent in higher access category. Osman (2014) also reported similar findings in his study that conducted on farmers' use of ICT based media in receiving agricultural information.

3.1.10. Attitude towards ICT services

Attitude towards ICT facilities score of the respondents ranged from 21 to 38 against the possible scores ranged from 1 to 50. The mean and standard deviation of data distribution were found 30.65 and 4.54, respectively. On the basis of their attitude towards ICT scores, the farmers were classified into three categories, 'unfavorable' (less than 30) and 'neutral' (equal to 30) and 'favorable' (above 30). The majority (53.6 percent) of the respondent had favorable attitude towards ICT services while 31.8 percent had unfavorable attitude and 14.6 percent respondents had neutral attitude towards ICT services (Table 2). It is positive that most of the farmers having favorable attitude towards ICT services and they were interested to use ICT services in their farm practices.

3.2. Farmers' awareness on use of ICTs

Farmers' awareness on use of ICTs was measured by checking extent of their uses of seven selected ICT related facilities. The awareness scores ranged from 2 to 11 against the possible range from 0 to 21. The mean and standard deviation were 6.00 and 2.005, respectively (Table 3).

Table 3. Awareness of the respondent farmers on use of ICTs in Farm practices.

Categories of farmers (score)	Number	Percent	Mean	Standard Deviation
Very Low awareness (up to 3)	14	12.7	6.00	2.005
Low awareness (4-7)	66	60		
Moderate awareness (8-14)	30	27.3		
Total	**110**	**100**		

Here, 27.3% farmers have moderate awareness on available ICT services, while 60% farmers have low and 12.7% farmers have very low awareness on available ICT services. The findings indicate that most of the farmers of the study area were having low awareness on available ICT facilities. Khan (20016) also reported similar findings in his study that conducted on effectiveness of agricultural information and communication center in technology transfer to farmers. The following issues may be considered as part of the interpretations of the results. There were seven selected ICT based facilities included in interview schedule which were available ICT based services for farm practices. Farmers' awareness was measured by their extent of use these seven ICT based facilities (Table 4).

Table 4. Distribution of farmers according to the level of awareness on selected ICT services.

Sl. No.	ICT facilities	Number of responses (n=110) for extent of awareness (score)				Mean awareness score	Rank
		High (3)	Medium (2)	Low (1)	Not at all (0)		
1	Use of cell phone in receiving agricultural information	103	7	0	0	2.94	1
2	Use of smart phone in receiving agricultural information	18	38	40	14	1.55	2
3	Use of personal computer receiving agricultural information	0	15	52	43	0.75	3
4	Services available at Agricultural Information and Communication Center	0	0	0	110	0.00	6
5	Services available at Union Digital Center	0	13	45	52	0.65	4
6	Services available at Krishi Call Centre	0	0	18	92	0.16	5
7	Awareness about mobile apps	0	0	0	110	0.00	7

3.2.1. Awareness on use of cell phone

The level of awareness of the respondents on use of cell phone were ranged from 0-3, the mean value is 2.94 (Table 4).

3.2.2. Use of smart phone

The level of awareness of the respondents on use of smart phone were ranged from 0-3, the mean value is 1.55. The highest portion of the respondents,18responses were in 'high', 38 in 'medium', 40 in 'low' and 14 responses in 'not at all' category. Nowadays smartphone were replacing the use of cell phones, out of 110 responses 18 responses to 'high' and, 38 in 'medium' is a positive sign. It indicates that farmers were becoming aware about use of smart phone gradually and rest of the farmers 40 and 14 farmers out of 110 were in 'low' and 'not at all' awareness, it's because of either they were older or not having higher educational level (Table 4).

3.2.3. Use of personal computer

The level of awareness of the respondents on use of personal computer were ranged from 0-3, the mean value is 0.75. The highest portion 52 response out of 110 were in 'low' category as compared to 14 responses in 'medium' and 43 responses in 'not at all' category (Table 4). Data of this study would able to reveal that those farmers having medium and low awareness on use of personal computer is because of they were young and their educational level high among the respondents.

3.2.4. Use of AICC

The level of awareness of the respondents on use of AICC were ranged from 0-3, the mean value is 0.00. The percent of the respondents were in 'not at all' category (Table 4).

3.2.5. Use of UDC

The level of awareness of the respondents on use of UDC were ranged from 0-3, the mean value is 0.65. The highest portion of the respondents 52 out of 110 responses were in 'not at all' category as compared to 'low' (45 responses) and 'medium' (13 responses) category (Table 4). It indicates that most of the farmers do not aware about the services available at UDC because their age and educational level.

3.2.6. Krishi call center

The level of awareness of the respondents on use of Krishi call center were ranged from 0-3, the mean value is 0.16. The highest portion of the responses (92 responses) was in 'not at all' category compared to 'low' (18 responses) category (Table 4). 'Low' (18 responses) category responses because they were young and educated, they knew about Krishi call center from newspaper or from Facebook.

3.2.7. Mobile Apps

The level of awareness of the respondents on use of mobile apps were ranged from 0-3, the mean value is 0.00. The cent percent of the respondents were in 'not at all' category (Table 4). During data collection farmers reported that mobile apps for getting agricultural information is not introduced in the study area.

3.3. Relationship between farmers' awareness on ICT use and their selected characteristics

The focus variable was "farmers' awareness on use of ICT in farm practices". Pearson's Product Moment Co-efficient of Correlation (r) was used to test the null hypothesis concerning the relationships between two variables. Five percent (0.05) level of probability was used as the basis for rejecting the null hypothesis (Table 5).

Table 5. Correlations between farmers' selected characteristics and their awareness on use of ICT.

Focus variable	Farmers' characteristics	Correlation coefficient (r) with 108 d.f.
Farmers' Awareness on use of ICT	Age	-0.509**
	Education	0.515**
	Household size	-0.210*
	Farm Size	-0.305**
	Annual Income	-0.005
	Training Exposure	-0.016
	Knowledge on ICT	0.747**
	Access	0.796**
	Ability	0.580**
	Attitude	0.738**

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

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

3.3.1. Relationship between age and awareness on use of ICT

The correlation coefficient between age of the farmers and their awareness on use of ICT(-0.509**) was found greater than the tabulated value with 108 degrees of freedom at 1 percent level of probability (Table 5). The relationship between the concerned variables was significant and showed a negative trend. Therefore, the null hypothesis was rejected. Based on the above findings, it means that the increase of age of the farmers, their awareness on use of ICT based media was decreased. Osman (2014) and Khan (2016) also found similar relationship in their study between age and use of ICT based media by farmers.

3.3.2. Relationship between level of education and awareness on use of ICT

The correlation coefficient between level of education of farmers and their awareness on use of ICT (0.515**) was found greater than the tabulated value with 108 degrees of freedom at 1 percent level of probability (Table 5).So, the concerned null hypothesis was rejected. Thus, it may be concluded that there was significant and positive relationship between education level and awareness on use of ICT based media.

Actually, literate farmers have better knowledge about the importance of using ICT based media than the illiterate farmers. Therefore, awareness on use of ICT based media by the farmers was varied positively with the education. Education is the process of development of the mind of an individual it increases his power of observation, integration, understanding, decision making and adjustment of new situation. It helps individual to become rational, conscious and get useful information to solve their day to day problems through different communication media either interpersonal or mass media. Osman (2014) and Khan (2016) also found similar relationship in their study between age and use of ICT based media by farmers.

3.3.3. Relationship between household size and awareness on use of ICT

The correlation coefficient between level of education of farmers and their awareness on use of ICT (-0.210*) was found greater than the tabulated value with 108 degrees of freedom at 5 percent level of probability (Table 5).The relationship between the concerned variables was significant at 5 percent level of probability and showed a negative trend. Therefore the concerned null hypothesis was rejected. Based on the above findings, it means that with the increase of family members the awareness of farmers on use of ICT will increase.

Though the family members might not be a factor of the awareness of farmers' on use of ICT, but it may be explained as thus having high family they were not economically strong to use ICT services thus they were not aware about ICT facilities those having high family member in the study area.

3.3.4. Relationship between farm size and awareness on use of ICT

The correlation coefficient between farm size and farmers' awareness on use of ICT (-0.305**) was found greater than the tabulated value at 1 percent level of probability (Table 5). The relationship between the concerned variables was significant at 1 percent level of probability and showed a negative trend. Therefore the concerned null hypothesis was rejected. Based on the above findings, it means that with the increase of farm size the awareness of farmers on use of ICT will decrease.

Actually those having larger farm they do not feel the need of increase their farm production. So thus the farmers' having large farm size are not aware about use of ICT in their farm practices.

3.3.5. Relationship between annual income and awareness on use of ICT

The correlation coefficient between annual family income and awareness on use of ICT based media (-0.005) was less than the tabulated value at 5 percent level of probability (Table 5). So, the concerned null hypothesis was not rejected. Thus, it may be concluded that there was no significant relationship between annual family income and use of ICT based media. Thus, annual family income and use of ICT based media remain unrelated. Osman (2014) also found similar relationship between annual income and use of ICT based media.

3.3.6. Relationship between Training exposure and awareness on use of ICT

The correlation coefficient between training received and awareness on use of ICT based media (-0.016) was less than the tabulated value at 5 percent level of probability (Table 5). So, the concerned null hypothesis was not rejected. Based on the computed 'r' value the relationship between training received and farmers' awareness on use of ICT based media was not significant. Though they should have a significant relationship in this study it showed insignificant relationship. It may because of farmers not having participated in any training related to ICT knowledge in the study area.

3.3.7. Relationship between knowledge about ICT and awareness on use of ICT

The correlation coefficient between knowledge about ICT and farmers' awareness on use of ICT (0.747**) was found greater than the tabulated value at 1 percent level of probability (Table 5). The relationship between the concerned variables was significant at 1 percent level of probability and showed a positive trend. Therefore the concerned null hypothesis was rejected. Based on the above findings, it means with the increase of knowledge about ICT services the awareness on use of ICT will be increased. Osman (2014) also found similar relationship between knowledge on ICT and use of ICT based media in receiving agricultural information. Khan (2016) in his research also found similar relationship between knowledge on ICT and effectiveness of ICT media in receiving agricultural information.

3.3.8. Relationship between ability to use and awareness on use of ICT

The correlation coefficient between ability to use ICT services and farmers' awareness on use of ICT (0.796**) was found greater than the tabulated value at 1 percent level of probability (Table 5).The relationship between the concerned variables was significant at 1 percent level of probability and showed a positive trend. Therefore the concerned null hypothesis was rejected. Based on the above findings, it means, with the increase of ability to use ICT services the awareness on use of ICT will increase.

3.3.9. Relationship between access to ICT and awareness on use of ICT

The correlation coefficient between access to ICT services and farmers' awareness on use of ICT (0.580**) was found greater than the tabulated value at 1 percent level of probability (Table 5). The relationship between the concerned variables was significant at 1 percent level of probability and showed a positive relation with focus variable. Therefore the concerned null hypothesis was rejected. Based on the above findings, it means, with the increase of access to ICT services the awareness on use of ICT will increase.

3.3.10. Relationship between attitude towards ICT and awareness on use of ICT

The correlation coefficient between attitude towards ICT services and farmers' awareness on use of ICT (0.580**) was found greater than the tabulated value at 1 percent level of probability (Table 5). The relationship between the concerned variables was significant at 1 percent level of probability and showed a positive relation with focus variable. Therefore the concerned null hypothesis was rejected. Based on the above findings, it means, with the positive attitude towards ICT services the awareness on use of ICT will increase.

3.4. Determinants to the farmers' awareness on use of ICT

To determine the determinants or influential factors on the farmers' awareness on use of ICT in farm practices, multiple regression analysis (enter method) was conducted. Multicollinearity was checked among the independent variables. Ten independent variables age (X_1), education (X_2), household size (X_3), farm size (X_4), annual income (X_5), training received (X_6), knowledge on ICTs (X_7), ability to use ICTs (X_8), access to ICTs services (X_9) and attitude towards ICTs (X_{10}) were included in the model (Table 6).

Table 6. A summary of the regression analysis explaining the dependent variable.

Explanatory variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-3.381	1.273		-2.656	0.009
Age (X_1)	-0.012	0.015	-0.050	-0.820	0.414
Education (X_2)	-0.036	0.058	-0.037	-0.614	0.540
Household size (X_3)	0.240	0.110	0.117	2.184	0.031
Farm size (X_4)	-1.776	1.066	-0.088	-1.666	0.099
Annual income (X_5)	0.006	0.003	0.089	1.869	0.065
Training received (X_6)	-0.005	0.022	-0.011	-.236	0.814
Knowledge on ICTs (X_7)	0.455	0.078	0.398	5.838	0.000
Ability to use ICTs(X_8)	0.366	0.116	0.308	3.160	0.002
Access to ICT services (X_9)	0.055	0.138	0.032	0.399	0.691
Attitude towards ICTs (X_{10})	0.138	0.033	0.314	4.229	0.000
n = 110, R^2 = 0.800 , R = 0.780					

The multiple R and R^2 values found in the multiple regression were 0.780 and 0.800. The findings of multiple regression analysis indicated that the determinant factors of awareness were household size(X_3), knowledge on ICTs (X_7), ability to use ICTs (X_8) and attitude towards ICTs (X_{10}). These four independent variables were found significant in explaining the variation of farmers' awareness on use of ICT in farm practices. This R^2 value indicated that, four explanatory variables together explained 80.0 percent variance of the extent of farmers' awareness on use of ICT in farm practices. The regression equation obtained is as follows:

$y=-3.381-0.012X_1-0.036X_2+0.240X_3-1.776X_4+.006X_5-.005X_6+0.455X_7+0.366X_8+0.055X_9+.399X_{10}+€_i$

3.4.1. Household size on farmers' awareness on use of ICT

The results revealed that household size of the farmers had significant positive coefficient value which was 0.240 with their awareness on use of ICT in farm practices. The coefficient is statistically significant because significance level is lower than 0.05 (5%) t-value is greater than 2.00 and standard error (0.110) is less than half of the coefficient value. Regression coefficient indicates that if household size changes 1 unit (one member) then farmers' awareness on use of ICT changes by 0.240. That means larger household sized farmers are more aware about use of ICT in their farm practices to improve their production.

3.4.2. Knowledge about ICT on farmers' awareness on use of ICT

The results revealed that farmers' knowledge about ICT had significant positive coefficient value which was 0.455 with their awareness on use of ICT in farm practices. The coefficient is statistically significant because significance level is lower than 0.01 (1%) t-value is greater than 2.00 and standard error (0.078) is less than half of the coefficient value. Regression coefficient indicates that if knowledge level increases 1 unit then farmers' awareness on use of ICT increases by 0.455. That means farmers having more ICT knowledge were more aware about use of ICT in their farm practices.

3.4.3. Ability to use ICT on farmers' awareness on use of ICT

The results revealed that farmers' ability to use ICT had significant positive coefficient value which was 0.366 with their awareness on use of ICT in farm practices. The coefficient is statistically significant because significance level is lower than 0.05 (5%) t-value is greater than 2.00 and standard error (0.116) is less than half of the coefficient value. Regression coefficient indicates that with the changes 1 unit of attitude towards use of ICT farmers' awareness on use of ICT will be changed by 0.366. That means those farmers having more ability to use ICT were more aware about use of ICT in their farm practices.

3.4.4. Attitude towards ICT on farmers' awareness on use of ICT

The results revealed that farmers' attitude towards ICT had significant positive coefficient value which was 0.138 with their awareness on use of ICT in farm practices. The coefficient is statistically significant because significance level is lower than 0.01 (1%) t-value is greater than 2.00 and standard error (0.033) is less than half of the coefficient value. Regression coefficient indicates that if attitude level increases 1 unit then farmers' awareness on use of ICT increases by 0.455. That means those farmers like ICT facilities they were aware on use of ICT services in their farm practices.

3.5. Problems faced by farmers on use of ICT in farm practices

Ten selected problems were considered for the study. These problems were faced by the farmers while they were using ICT based media in farm practices. Problems faced by farmers in using ICTs were measured by checking their level of problems on selected problems. The problem scores ranged from 20 to 27 against the possible range from 0 to 30. The mean and standard deviation were 23.39 and 1.665, respectively.

Table 7. Distribution of farmers according to their overall problem faced in using ICTs.

Categories of the farmers	Frequency (n=110)	Percent	Mean	Standard Deviation
Low problems (up to 10)	0	0.0	23.39	1.665
Medium problems (11-20)	3	2.7		
High problems (above 20)	107	97.3		

An overwhelming majority of the farmers (97.3 percent) of the study area faced high problem, while only 2.7 percent farmers faced medium level problem in using ICT in farm practices (Table 7). Osman (2014) in his study also found "high cost as major problem in using ICT based media. Lack of knowledge on availability of

ICT based facilities is a problem in rural area. Farmers mostly dependent on others to get any kind of information mainly because of their limitation on educational level, not having the willingness to cope with the modern world. So, farmers of the study area thought "lack of knowledge on availability of ICT facilities" is another major problem which hinders them from using ICT based facilities and it is ranked in 3rd position (Table 8).

Table 8. Problems faced by farmers on using ICT services in farm practices with their rank.

Problems	Mean	Rank
Poor level of education/illiteracy	2.45	7
Cost of using ICT services	2.80	2
Limited availability of ICT tools and technology	2.54	6
Low awareness among rural farmers	2.28	8
Lack of operational knowledge of computer	2.63	4
Shyness/scared of using ICT based media	0.85	10
Low bandwidth speed of internet	2.55	5
Lack of training facilities on ICT among farmers	3.00	1
Lack of knowledge on availability of ICT based facilities	2.65	3
Lack of self interest	1.52	9

Training on ICT is not available in rural areas, so most of the farmers do not have the operational knowledge of computer and it was ranked in 4th position. Internet speed are very much slow in the rural area of the whole country, whereas most of the districts of the country are now under coverage of 3G internet. So, the farmers though that "low bandwidth speed of internet in rural area" was one of the biggest problems for them and it was ranked 5th position. On the other hand, farmers of the study area treated lack of self-interest and shyness as minor problem which was ranked in ninth and tenth position respectively.

4. Conclusions

Among the farmers, only 23.7 percent had moderate awareness on use of ICT in farm practices, while 60 percent and 12.7 percent of them had low and very low awareness, respectively. According to farmers' awareness on selected ICT based services it could be concluded that majority of the farmers were aware on use of cell phone. Age of the farmers had a significant and negative relationship with their awareness on use of ICT, while majority (54.6 percent) of the respondent farmers was middle aged. Education, household size, farm size, training exposure, knowledge on ICT, ability to use ICT, access to ICT facilities, attitude towards ICT had significant relationships with the farmers' awareness on use of ICT. Four characteristics of the farmers, namely household size, knowledge on ICT, ability to use ICT and attitude towards ICT were found determinants or influential factors to the farmers' awareness on use of ICT. An overwhelming majority of the farmers (97.3 percent) of the study area faced high problems followed by 2.7 percent having medium problem while no farmers were found having low problems.

Conflict of interest

None to declare.

References

A2I, 2018. Access to Information (a2i) Programme. Prime Minister's Office, Dhaka, Bangladesh. Retrieved from https://www.a2i.gov.bd/publication/union-digital-centre/ (accessed on 12 September 2018).

BBS, 2017. Statistical year book of Bangladesh. Bangladesh Bureau of Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

Bhuiyan M, 2010. Effect of information and communication technology in alleviating poverty in rural Bangladesh focused on mobile phone. MS Thesis, Department of General and Continuing Education, North South University, Bangladesh.

Guenthner JF and BG Swan, 2011. Extension farmers' use of electronic technology. Journal of Extension, 49: 13-25.

Karim MA, 2010. Digital Bangladesh for good governance. Prime Minister's Office, Dhaka, Bangladesh.

Kashem MA, MAA Faroque and SE Bilkis, 2010. The complementary roles of information and communication technology in Bangladesh. Agri. J. Sci. Found., 8: 161-169.

Khan MR, 2016. ICT opens up new prospects for Bangladesh. The Daily Star (Dhaka). Retrieved from https://www.thedailystar.net/drivers-economy/ict-opens-new-prospects-bangladesh-1364893 (accessed on 23 February 2017).

McQuail DM, 2000. Mass communication theory. 4th edition. London: SAGE Publications

Meera SN, 2003. A Critical Analysis of Information Technology in Agricultural Development: Impact and Implications. Ph.D. Thesis, IARI, New Delhi.

Meera SN, A Jhamtani and DUM Rao, 2004. Information and communication technologies in agricultural development: A comparative analysis of three projects from India. Agricultural Research and Extension Network. New Delhi, India. pp. 135.

Osman SM, 2014. Farmer's use of ICT based media in receiving agricultural information. MS thesis. Department of Agricultural Extension Education, Bangladesh Agricultural University, Mymensingh.

Tiamiyu MA, 2002. Information and Communication Technologies (ICTs) for social development issues: Options and strategies. African J. Lib. Arc. Info. Scie., 12 :12-40.

Islam MR, MJH Biswas, MGR Akanda, MR Amin, IM Hasan, AA Asif, S Sheheli and BMN Sharif, 2015a. Attitude of the farmers towards climate change effect on agriculture. Asian J. Med. Biol. Res., 1: 367-379.

Sultana N, AA Asif, MMI Dihider, SM Ahsan and FS Maraj, 2015. Usefulness of farm women training programmes in livelihood security. Int. J. Bus. Soc. Sci. Res., 4: 13-24.

Razeim MA, MG Farouque, MA Sarker, AA Asif and M Ahmed, 2017. Attitude of farmers towards Pangas farming for their livelihood improvement. Asian Australas. J. Biosci. Biotechnol., 2: 106-119.

Shabuj MAI, AA Asif, O Faruq, MR Bari and MA Rahman, 2016. Brood stock management and induced breeding of Thai Pangus (*Pangasius hypophthalmus*) practiced in the hatcheries of Jessore region, Bangladesh. Int. J. Bus. Soc. Sci. Res., 4: 235-246.

Sharif BMN, AA Asif, S Vaumik, MA Zafar, MM Islam and MA Samad, 2015. Socio-economic condition of fish farmer and trader at the village of Pitamborpur in Chaugachha upazilla in Jessore, Bangladesh. Int. J. Fish. Aqua. Stud., 3: 212-217.

Vaumik S, SK Sarker, MS Uddin, MT Alam, A Satter and AA Asif, 2017. Constraints and prospects of fish farming in Lalmonirhat district. Int. J. Bus. Soc. Sci. Res., 5: 201-210.

Zaman MFU, MA Samad, MA Islam, MHU Jaman, S Khondoker and AA Asif, 2017. Assessment of sustainability of Pangasius (Pangasius hypophthalmus) farming at Jhikargachha upazila in Jessore district, Bangladesh. Int. J. Fau. Biol. Stud., 4: 109-119.

Islam MA, AA Asif, MA Samad, BMS Rahman, MH Rahman, A Nima and SM Yeasmin, 2014. Socio-economic conditions of the fish farmers in Jessore, Bangladesh. Int. J. Bus. Soc. Sci. Res., 2: 153-160.

Islam MM, AA Asif, S Vaumik, MA Zafar, BMN Sharif, MH Rahman and S Shahriyar, 2015b. Socio economic status of fry collectors at Sundarban region. Int. J. Fish. Aqua. Stud., 3: 89-94.

Hossain A, MAR Hossain, AA Asif, S Ahmed and A Satter, 2017. Fish fermentation in Lalpur, Brahmanbaria district: ecological implication and value chain analysis. Asian Australas. J. Biosci. Biotechnol., 2: 159-172.

Hossain MA, AA Asif, MA Zafar, MT Hossain, MS Alam and MA Islam, 2015. Marketing of fish and fishery products in Dinajpur and livelihoods of the fish retailers. Int. J. Fish. Aqua. Stud., 3: 86-92.

Hossain MZ, A Pal, MA Hasan, MS Parvej, N Nahar and AA Asif, 2016. Nutritional status and socio-demographic characteristics of the people of south-west coastal region in Bangladesh. Asian Australas. J. Biosci. Biotechnol., 1: 323-332.

Islam FMK, AA Asif, M Ahmed, MS Islam, B Sarker, MA Zafar and M Rahman, 2017. Performances of resource poor households in aquaculture practices in sadar upazila, Meherpur, Bangladesh. Int. J. Fish. Aqua. Stud., 5: 281-288.

Sharif BMN and AA Asif, 2015. Present status of fish hatchlings and fry production management in greater Jessore, Bangladesh. Int. J. Fish. Aqua. Stud., 2: 123-127.

Ali MM, AA Asif, MAI Shabuj, S Vaumik, MA Zafar and BMN Sharif, 2016. Status of polyculture *Pangasius hypophthalmus* with carps in Jhikargacha Upazila of Jessore District, Bangladesh. Int. J. Fish. Aqua. Stud., 4: 423-430.

Asif AA and MAB Habib, 2017. Socio-economic condition of fish farmers of Jhikargachha upazila in Jessore district, Bangladesh. Asian J. Med. Biol. Res., 3: 462-475.

Asif AA, MA Samad, MH Rahman, MA Farid, SM Yeasmin and BMS Rahman, 2015. Socio-economic condition of fish fry and fingerling traders in greater Jessore region, Bangladesh. Int. J. Fish. Aqua. Stud., 2: 290-293.

Asif AA, MA Samad, BMS Rahman, MA Rahman, MH Rahman, SM Yeasmin, and A Nima, 2014. Study on Management of Fish Fry and Fingerling Marketing of Jessore in Bangladesh. Int. J. Bus. Soc. Sci. Res., 2: 127-135.