

Utilization and Effectiveness of ICT as Agricultural Information Delivery System in Thakurgao, Bangladesh

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Authors' contributions

This work was carried out in collaboration between both authors. Author MEH designed the study, managed the literature searches, wrote the protocol and first draft of the manuscript. Author MZH performed the statistical analysis and editing of the manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

The study was conducted in Thakurgaon sadar Upazila to determine farmers' perception of the extent and factors of ICTs effectiveness in transferring farming information. A total of 250 people who were already been taken services from different ICT center was selected as sample respondents following a random sampling technique. Primary data were collected using a predesigned interview schedule. Findings revealed that 57.2% of the respondents contacted with Union Digital Center while 38.8% contacted with government own ICT center AICC (Agricultural Information and Communication Center) for their farming-related information. Majority (79.2%) of the respondents opined that they have utilized ICTs moderately to highly whereas three-fourth of the respondents found ICTs moderately to extremely effective in transferring farming technology. Uninterrupted electricity supply, high speed of internet, providing regular training on ICTs, skilled staff and technicians for ICTs and provision for repairing ICT tools are being perceived as significant factors of ICTs effectiveness. Near future, ICT may offer a great opportunity to facilitate the flow of information and technology service delivery to the rural people of Bangladesh.

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1. INTRODUCTION

Information and Communication Technology (ICT) at the beginning of 21st century proved its vibrant role in alleviating poverty and facilitating development corridors [1]. However, it can't meet the 21st century development goals unless being adopted and utilized effectively by different groups including rural mass. Research endeavors focusing on ICTs may contribute to minimize the current digital gap among the potential users.

Bangladesh is considering now as one of the first growing economies in South Asia and received the status of middle-income category very recently. Moreover, the country achieved food sufficiency despite its huge population, limited land area, and adverse climatic condition through higher agricultural production with the help of market-oriented agricultural policy and technological innovation [2,3,4,5–12]. A larger portion of the people are still living in the rural areas whose livelihoods are primarily dependent on agricultural activities [13] that implies greater attention to farming for sustainable rural development [7,9,14]. However, grass-root farming communities are far away from their basic information needs [15]. Evidence from previous studies has proven that ICT has improved the livelihoods of marginalized poor people through the direct or indirect impact on increased agricultural production, better market facilities and cost-effective post-harvest management [16–20]. Also, ICT can open up so many areas to facilitate flow of information and technology service delivery systems to develop the capacity of rural farmers [21,22]. In the last decade, the Government of Bangladesh under the Ministry of ICT and many other departments launched a wide range of ICT projects to achieve the status of 'Digital Bangladesh'. Realizing the importance of agriculture in sustaining the economic progress of the country, the government has also taken initiatives to take the farming information and technologies to the doorstep of the farmers through e-agricultural services. Union Digital Centre (UDC) is one of those 'e-Service delivery outlets' which have the potentiality of bringing the benefits to rural people who do not otherwise have access to information and technology [23]. It improves the efficiency of government information, reduces cost, increases transparency, and ensures quality of

service [24]. A total of 4,501 UDCs have been established and inaugurated on 11th November, 2010, in order to translate the dream of 'Digital Bangladesh' into reality [25,26].

Despite having many impressive achievements, the country is yet to take full advantage of the agricultural sector through the potentialities of ICT utilization. Bangladesh's ranking of the ICT Development Index (IDI) in 2017 was 147 out of 176 countries whereas other Asian countries like Korea, Japan, China, and India remain in higher rank i.e., 2, 10, 80, and 134 respectively [27]. Literature shows that Australia, Malaysia, and India integrated ICT as a tool for rural development very effectively [1]. Hence, this study was attempted to provide the policymaker with a handful of information on the access, utilization, and effectiveness of ICTs for the agricultural development of Bangladesh. The specific objectives of the study were to (i) assess the farmers' participation (access, utilization, and effectiveness) in ICT for practicing different farming technology; and (ii) identify the factors contributing effectiveness of ICT services.

2. METHODOLOGY

2.1 Study Area and Sampling Technique

The study was an ex-post facto survey research. It was conducted through household survey in five union of Thakurgaon Sadar upazila under Thakurgaon District. Data were collected from 250 sampled respondents. The respondents were selected using a proportionate random sampling technique. Primary data were collected through the application of different Rapid Rural Appraisal (RRA) tools such as focus group discussion, and direct field observation. Focus group discussions were conducted to crosscheck and generate information on farmers' experiences of ICT use. Household survey was administered with a structured interview schedule to gather the required information. Both open and close-ended questions were included in the schedule.

2.2 Measurement of Utilization and Effectiveness of ICTs

Farmers were asked to provide their opinion on the level of utilization and effectiveness of ICTs in transferring some selected farming

information. In order to specify the farming information, focus group discussion (FGD) with the farmers, and opinion of extension and ICT service providers were considered. The selected information were 'improved crop varieties and their production technology', 'fruit garden management', 'plant nutrient and water usage', 'pest & disease infestation and their control methods', 'input sources i.e. fertilizer, diesel and seeds', 'post-harvest management and processing', 'demands and current stock of agricultural produces', 'weather forecasting', 'marketing and price', and 'farm credit and subsidy'. A five-point Likert type scale was used to take the agreements of the farmers on each of the selected 10 farming information. The weights assigned to the scale were 0 for 'very low', 1 for 'low', 2 for 'moderate', 3 for 'high', and 4 for 'very highly utilized/effective'.

2.3 Determination of Factors of ICTs Effectiveness

Factors of ICT effectiveness was determined by taking the perception of the respondents against related statements. Based on the available literature, the experience of the researcher in Focus Group Discussion (FGD), and suggestions of the experts, 10 factors were selected. Respondents were asked to furnish their opinions against each statement on 5 point scale (strongly agree, moderately agree, slightly agree,

slightly disagree, strongly disagree following a score of 5, 4, 3, 2, and 1, respectively). Their responses were compiled in frequencies and percentages against individual statements.

2.4 Data Analysis

Collected data were analyzed by using the Statistical Package for Social Science (SPSS) and Microsoft excel. Chi-square test was employed to assess the level of association among the respondents regarding their perception of the factors of ICTS effectiveness. Qualitative information were analyzed manually, both by the researcher and in conjunction with the villagers, and interpreted in relevant chapters to complement and supplement the quantitative information collected from household interviews.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Respondents

As shown in Table 1, age of the respondent ranged from 25 to 67 years with an average of 39.19 years. The cumulative percentage of young and middle-aged category was 75.6 percent that constituted the huge majority of the respondents.

Table 1. Distribution of the respondents according to their socio-economic characteristics

Character	Unit	Categories	% Respondents
Age of the respondent	Actual year	Young aged (24 to 35)	45.60
		Middle aged (36-50)	30.00
		Old (>50)	24.40
Years of Schooling of the respondent	Year of schooling	Illiterate	10.00
		Primary (1-5)	27.20
		Secondary (6-10)	42.80
		Higher secondary (above 10)	20.00
Family size	Number	Small (up to 4)	16.40
		Medium (5 to 6)	55.20
		Large (7 and above)	28.40
Participation in training programme	Score	No training (0)	28.40
		Short training (1-3)	66.40
		Medium training (4-6)	5.20
Innovativeness	No. of year used	Low innovativeness (1-16)	29.20
		Medium innovativeness (17-32)	48.40
		High innovativeness (Above 32)	22.40
Knowledge on ICTs	Score	Low (Up to 8)	24.40
		Medium (9-14)	54.80
		High (15 and above)	20.80

Most of the respondents (42.8%) got secondary level of education which was the highest followed by primary level of education (27.2%), higher secondary level of education (20.0%), and illiterate (10.0%) respectively. The number of family members of the respondents ranged from 2 to 10, the mean being 4.85, the highest proportion (55.2 %) of the respondents had medium family size. Majority of the respondents (66.4%) had low training whereas a big portion of them (28.4%) did not receive any training at all. The highest proportion (77.6%) of the respondents in this study had low to medium innovativeness. However, it is observed that an overwhelming majority (79.2%) of the respondents had low to medium knowledge of modern ICT technology.

3.2 Participation of Farmers in ICTs

3.2.1 Access to ICTs

In the study area, four ICT based information service providers are providing agriculture information and news on new technology to the farmers. These four ICT service providers are Union Digital Centre (UDC), Agricultural Information and Communication Center (AICC), *Jiggasha 7676 – Banglalink*, and *Grameen Phone Center*.

Table 2 shows that 57.20 percent of the respondents contacted UDC the former Union Information Service Center (UISC) whereas 38.80 percent contacted with the government's own ICT center AICC. These two are the successful ICT based information dissemination initiative of governments. Besides these, it is also evident that only 2.4 % of the respondent farmers used to communicate with *Jiggasha 7676* an e-agriculture initiative from *Katalyst*. The reason might be that this is a new ICT initiative in comparison to a government one. However, in the NGO sector, this is an active and award-winning ICT support initiative in association with a private telecommunication company

'Banglalink' for farmers to access the agricultural information world to solve their problems related to agricultural production. Similarly, *Grameen Phone* itself operating an agriculture information dissemination service with the ICT center which reveals only 1.6% direct contact by the farmers. The reason behind the less usage of this agriculture information support service may be less user-friendliness in terms of other centers.

3.2.2 Utilization of ICT in getting farming information

Utilization of ICT by farmers in getting farming information against 10 selected farm technologies are varying in different degrees. Majority of the respondents (35.28%) utilized moderately, however, overall 79.24 percent of them opined that they have utilized ICTs moderately to highly (Fig. 1).

3.3 Effectiveness of ICT in Transferring Farming Information

Effectiveness of ICTs in transferring selected farming technology used by the farmers varied in different degrees ('no effective', 'slightly effective', 'moderately effective', 'highly effective' and 'very highly effective'). Fig. 2 shows that 60.96 percent of the respondents found ICTs moderately to very highly effective in transferring farming technology whereas 26.36 percent and 12.68 percent found it slightly and not effective at all.

3.4 Factors Influencing Effectiveness of ICTs Use

In order to identify the key factors of effective ICT services to the farmers, 10 most vital factors were selected by applying FGD technique with the beneficiary farmers. After that, opinion of the individual respondents were collected on three levels of agreement (strongly agree, moderately agree, slightly agree, and disagree).

Table 2. Respondents' access to different ICT service providers as a prime source of information

ICT Service Providers	No. of respondent (n = 250)	Percent (%)
Union Digital Centre (UDC)	143	57.20
Agricultural Information and Communication Center (AICC)	97	38.80
<i>Jiggasha 7676 – Banglalink</i>	6	2.40
<i>Grameen Phone Center</i>	4	1.60

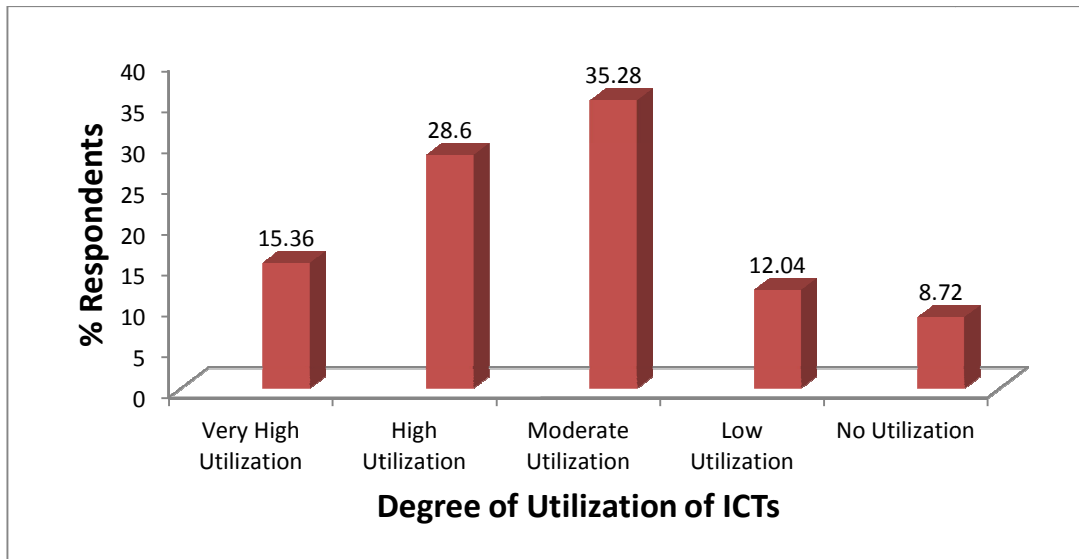


Fig. 1. Distribution of respondents according to overall utilization of ICTs

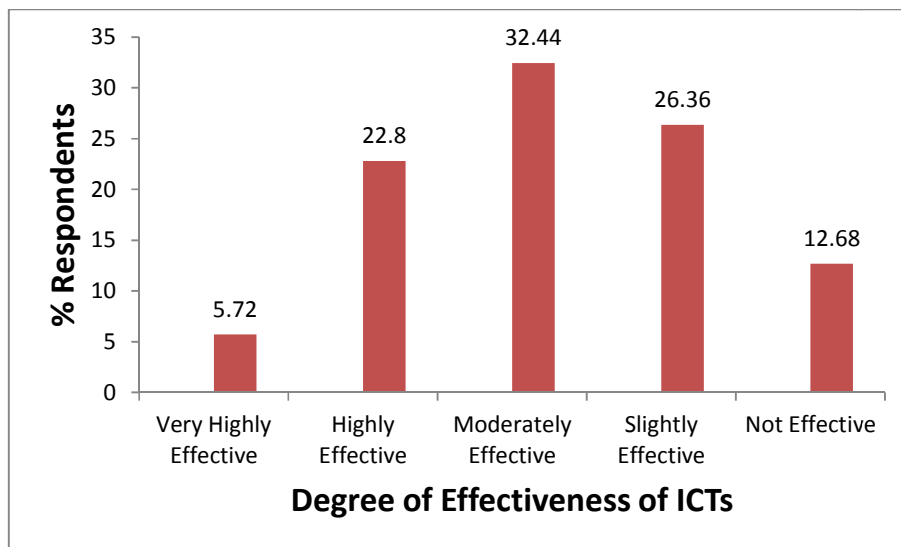


Fig. 2. Distribution of respondent according to effectiveness of ICTs

Findings revealed that majority (84.8%) of the respondents were strongly agreed with that 'uninterrupted electricity supply' is needed for ensuring effective ICTs services whereas 15.2% of respondents moderately agreed with this statement. Chi-square value (121.11**) indicates a very high significant difference among the opinions of the respondents (Table 3). As majorities (84.8%) of the respondents were found strongly agreed, hence it can be said that 'uninterrupted electricity supply' is identified as a vital factor for ensuring effective ICT services.

Again internet speed is another catastrophic factor for ICT services. Majority (58%) of the respondents strongly agreed with the statement 'high speed of internet' is needed for effective ICT services followed by 14.4 percent moderately agreed and 27.6 percent were slightly agreed. Chi-square value (74.98**) indicates a very high significant difference among the opinions of the respondents (Table 3). Hence it can be concluded that 'high speed of internet' is identified as a strong factor for ensuring effective ICT services.

Table 3. Distribution of the respondents according to their agreement on factors of ICT effectiveness

Factors	Extent of Response						Chi-square Value
	Strongly Agree		Moderately Agree		Slightly Agree		
	F	%	F	%	F	%	
Uninterrupted electricity supply	212	84.8	38	15.2	0	0	121.11**
High speed of internet	145	58.0	36	14.4	69	27.6	74.98**
Supply of accurate information	97	38.8	81	32.4	72	28.8	3.85 ^{NS}
Availability of necessary ICT tools	91	36.4	73	29.2	86	34.4	2.07 ^{NS}
Providing regular training on ICTs	176	70.4	47	18.8	27	10.8	156.97**
Skilled staff and technicians for ICTs	187	74.8	51	20.4	12	4.8	202.57**
Ensuring low cost services	77	30.8	81	32.4	92	36.8	1.49 ^{NS}
Suitable location of ICT centers	89	35.6	76	30.4	85	34	1.06 ^{NS}
Ensuring proper security for ICT tools	93	37.2	84	33.6	73	29.2	2.41 ^{NS}
Facilities for repairing ICT tools	177	70.8	47	18.8	26	10.4	160.57**

F= Frequency, **= Significant at 1% level, ^{NS}= Insignificant

Training to the ICT practitioners is another vital factor for the effectiveness of ICTs. Majority (70.4%) of the respondents strongly agreed with the statement 'providing regular training on ICTs' as a factor of ICT s effectiveness followed by 18.8 percent moderately agreed and only 10.8 percent were slightly agreed with the statements. Chi-square value (156.97**) indicates a very high significant difference among the opinions of the respondents (Table 3). So, it may be assumed that 'providing regular training on ICTs' would be a vibrant factor for ensuring effective ICT services.

Skilled service providers are also a very important factor of ICTs effectiveness. Majority (74.8%) of the respondents strongly agreed with the statements 'skilled staff and technicians for ICTs' is needed for effective ICT services' followed by 20.4 percent moderately and only 4.8 percent were slightly agreed with the statement. Chi-square value (202.57**) indicates a very high significant difference among the opinions of the respondents (Table 3). So, it can be implicit that 'skilled staff and technicians for ICTs' is may be a strong factor for ensuring effective ICT services.

Provision of repairing the ICT tools is considered as an essential factor for ensuring better ICT services. Majority (70.8%) of the respondents was strongly agreed with the statement 'facilities for repairing ICT tools' is required for effective

ICT services followed by 18.8 percent moderately and 10.4 percent were slightly agreed with the statement. Chi-square value (160.57**) indicates a very high significant difference among the opinions of the respondents (Table 3). So, it can also be implicit that 'facilities for repairing ICT tools' is may be a strong factor for ensuring effective ICT services.

In case of other six selected factors Chi-square values are insignificant (Table 3) which implies that the extent of responses are more or less equally distributed in the scale (strongly agree, moderately agree, and slightly agree).

4. CONCLUSION

The UDC (former UISC) and AIC are two successful ICT based government information service providers. Majority of the respondents utilized ICTs moderately in using farming technology with moderate effectiveness. Uninterrupted electricity supply, high speed of internet, providing regular training on ICTs, skilled staff and technicians for ICTs as well as facilities for repairing ICT are being perceived as the major leading factors of ICTs effectiveness. It may be therefore concluded that the above mentioned factors significantly contribute to the effectiveness of ICT in utilization of farm technology. Government would have to be taken particular care to ensure the stable supply of power to the ICT centre and take responsibilities

to monitor, give logistic support and formulate policy in coordination with concerned departments.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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