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Role of ICTs in Increasing Agricultural Production as Perceived by the Coastal Farmers

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ABSTRACT

The study was conducted to know the role of ICTs in increasing agricultural production perceived by the coastal farmers of southern Bangladesh. Data were collected from 120 randomly selected farmers during August 2017 with the objectives to determine the extent of the role of ICTs in increasing agricultural production. The role of ICTs was measured by Likert type rating scale with assigned score and Farmers Perception Index was used to explain the relative proportion of the statements related to perception regarding the role of ICTs. Majority of the respondents (62.50%) observed medium role of ICTs in increasing agricultural production followed by 21.67% and 15.83% observed high and low role of ICTs respectively. Correlation analysis indicated that among the selected seven socio-economic characteristics; respondent's level of education, annual family income, communication exposure, and participation in agricultural training showed positive and significant relationship with the role of ICTs. On the other hand, age, credit received and household assets showed no significant relationship with the role of ICTs in increasing agricultural production. It was found that the large portion (88.8%) of the farmers faced medium to high constraints and only 11.2% faced low constraints in using the ICTs for increasing agricultural production.

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INTRODUCTION

Information and Communication Technologies (ICTs) in agriculture is an emerging field focusing the enhancement of agriculture and rural development. The advancement in ICTs can be utilized for providing accurate, timely, relevant information and services to the farmers, thereby facilitating an environment for more remunerative agriculture. However, all the ICT initiatives are not uniform with disparities between regions in the level and quality of telecommunications, information and the effort of individuals, public and private organizations, and differentiated nature of demand of the farmers in different areas. As a result, there have been many successes, failures, lessons learned and experiences gained, so far. While these initiatives are intended to address the needs of the farmers through ICTs, their actual usage and ability to bring significant impact on the farm productivity and socio-economic development depends on the use of the facilities provided to meet their needs (Mondal, 2005).

The common problems in use of ICTs in rural segments are ICT illiteracy, unavailability of relevant and localized contents in their own languages, unaffordable accessibility and other issues as lack of awareness and willingness for adoption of new technologies among the rural peoples etc. Most of the farmers of Bangladesh are still in lack of information about modern agricultural knowledge. Moreover, conventional production system is becoming the greatest threat in the history of humanity.

Bangladesh is one of those countries that have been fighting against food security threat for the last few decades. Every year it is losing a valuable amount of GDP due to severe natural disasters, like flood, cyclone, river bank erosion, salinity etc. increase the loss by inadequate supply of information (World Bank, 2006). ICTs create opportunities for rural farmers to obtain information and knowledge about market, agricultural issues and suggest how to develop the agricultural market. Mobile services in agricultural sector provide more information on market, weather, transport services and agricultural techniques, help easy contact with the agencies and departments (Aker, 2011). Considering the present scenario, the study was conducted to know the role of ICTs in increasing agricultural production perceived by coastal farmers of Bangladesh.

Specific objectives:

The specific objectives include-

i. to analyze the selected socio-economic characteristics of the coastal farmers
ii. to identify the existing ICTs being used by the farmers in the study area
iii. to explore the relationships between the selected characteristics of the respondents and their perception regarding the role of ICTs
iv. to find out the constraints faced by coastal farmers during use of ICTs in agricultural activities.

METHODOLOGY

Locale of the study

The study was conducted in four villages namely Kadir Hanif and Noannai of Sadar upazila and Sharifpur and Kadirpur of Begumgonj upazila under Noakhali district of Bangladesh. These villages are situated in coastal areas and the farmers living there use comparatively contemporary methods of agriculture. Prior to the selection of these villages, a thorough discussion with the concerned GOs and NGOs personnel and local elites were conducted by the researcher in order to contact with targeted farmers. Most of the farmers in this area are smallholders whose livelihood depends on various farming activities. Their farming activities are being changed and affected due to shortage of information and communication systems. The coastal farmers are trying their level best in conducting various farm practices through using various technologies although modern technologies are insufficient there.

Population and sampling

Nearly 150 coastal farmers live in each village. The population size was 600, out of which 20% were selected from four villages as sample. Thus the sample size was 120.

Data collection

Prior to data collection with interview method, four Focus Group Discussions (FGDs) were conducted, each group consisted of 12 participants having farmers, local leaders and Sub Assistant Agriculture Officers (SAAOs). With a view to get in-depth information four Key Informant Interviews (KIIs) with UP (Union Parishad) members, school head masters, SAAOs and local leaders were also conducted in the study area. The qualitative data helped the researcher to design interview schedule for the study. A personal interview was conducted with the 120 respondents through the interview schedule during August 2017.

Selection and measurement of variables of the study

Role of ICTs in increasing agricultural production perceived by the farmers was treated as dependent variable while selected characteristics of the respondents were considered as independent variable. With a view to measuring dependent variables a number of 12 statements like, save time, access to information, increase production, increase income, better management practices, access to market etc. were included. A 4- point Likert type scale such as strongly agree, moderately agree, somewhat agree, not at all agree was employed against the rating scale respectively. The score assigned the rating scale were 3,2,1 and 0 respectively. The perception score of the respondents ranged from 0-36. Based on perception score, the respondents were classified on the following categories.

Categories	Score
Low role perceived	0-12
Medium role perceived	13-24
High role perceived	>24

Besides, A Farmers Perception Index (FPI) was calculated using the following formula to have an understanding of the relative proportion of the statements related to perception regarding the role of ICTs in increasing agricultural production of Bangladesh.

$$FPI = N_1 \times 3 + N_2 \times 2 + N_3 \times 1 + N_4 \times 0$$

Where,

FPI= Farmers Perception Index
N_1= No. of respondents rated the role of ICTs as strongly agree,
N_2= No. of respondents rated the role of ICTs as moderately agree,
N_3= No. of respondents rated the role of ICTs as somewhat agree,
N_4= No. of respondents rated the role of ICTs as not at all agree,

The FPI score ranged from 0-360, where 0 indicate low role while 360 indicate high role of ICTs as perceived by the coastal farmers in increasing agricultural production.

Data analysis

The collected data were coded, categorized, tabulated and analyzed as per requirement. The local units were converted into standard units. The qualitative data were transferred into quantitative data by appropriate scoring techniques. The SPSS computer program was used for analyzing the data. Various descriptive statistical measures such as range, frequency, number, percentage, mean, standard deviation (SD) and coefficient of variation (CV) were used for categorization and describing the variables. Pearson's product moment correlation coefficient (r) was utilized to identify the relationship between the selected characteristics of the respondents and their perception regarding the role of ICTs in increasing agricultural production.

RESULTS AND DISCUSSION

Socio-demographic characteristics of the coastal farmers

The findings of the study indicate that the majority of the respondents (62.9%) are middle aged while two-third (40.3%) of them have primary education. The majority of the farmers (60.7%) have low household assets and two-third (40.3%) of them have low annual income while 43.9% of them did not receive any credit. The study also reveals that about half (49.2 %) of the farmers' have medium communication exposure. The majority (51.5%) of the respondents receive no agricultural training (Table 1). World Bank (2011) observed similar types of socio-demographic features in a research work entitled "World Bank's e-sourcebook ICT in agriculture - connecting smallholder farmers to knowledge, networks and institutions".

Existing ICTs used by the coastal farmers in agricultural activities

The respondents in the study area were exposed to various ICTs to increase agricultural production. The findings of the study reveal that among the selected ICTs, most of the respondents (94%) were exposed to television as ICTs to get up-to-date farming information followed by daily newspaper (76%), cell phone (72%), smart phone (40%), social media (22%), poster (17%), leaflet (14%), computer (12%), radio (8%) and so on, but none of the respondents exposed to satellite, video conferences, solar panel, Geo-graphical Information System (GIS), and sensor network for farming purposes (Figure 1).

Table 1. Salient features of the selected characteristics of the respondents

Socio-economic variables	(%)	Respondents (N=120)			
		Min.	Max.	Mean	Standard deviation
Age (years)					
Young (18-35)	19.6				
Middle (36-55)	62.9	21	67	44.87	11.32
Old (above 55)	17.5				
Level of education (years of schooling)					
Illiterate (0)	29.2				
Primary (l-5)	40.3	0	16	5.9	3.75
Secondary (6-10)	21.9				
Above secondary (Above 10)	8.6				
Household assets (thousand BDT)					
Low (up to 200)	60.7				
Medium (201-500)	31.7	75	640	97.23	55.21
High (above 500)	7.6				
Annual family income (thousand BDT)					
Low (up to 60)	40.3				
Medium (61-100)	38.2	50	230	85.54	41.82
High (above 100)	21.5				
Credit received (thousand BDT)					
No credit (0)	43.9				
Low credit (up to 35)	34.6	0	150	29.72	27.18
Medium credit (36-70)	15.7				
High credit (above 70)	5.8				
Communication exposure (scale score)					
Poor exposure (upto14)	34.5				
Medium exposure (l 5-28)	49.2	5	37	19.26	7.35
High exposure (29 and above)	16.3				
Agricultural training received (scale score)					
No training (0 days)	51.5				
Short training (1 -7 days)	31.8	0	23	3.7	4.18
Medium training (8-14 days)	13.0				
Long training (above 14 days)	3.7				

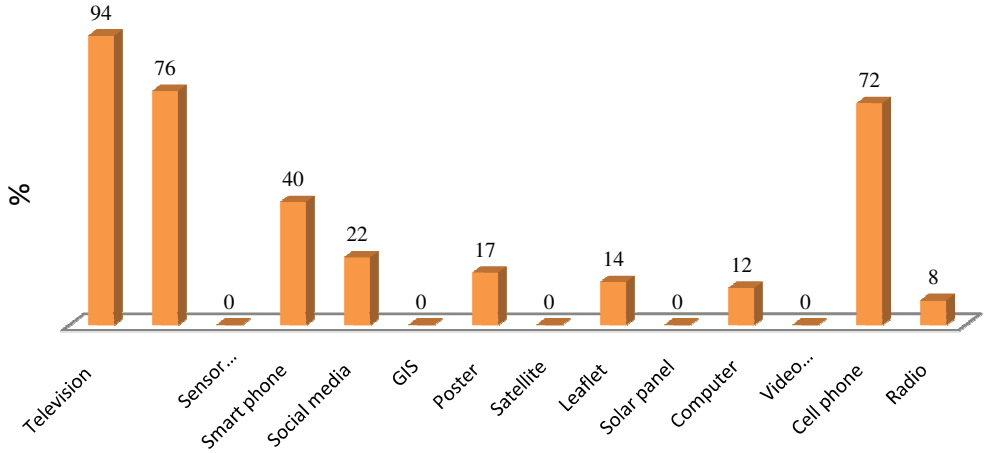

Figure 1. Use of ICTs by the respondents in agricultural activities

Aker (2011) reported that similar types of ICTs are being used by the farmers resulted from findings of his research work entitled "Dial "A" for agriculture: a review of information and communication technologies for agricultural extension in developing countries".

Extent of perceived role of ICTs in increasing agricultural production

The farmer's perception related to the role of ICTs score ranged from 0 to 36 with a mean of 25.16 and standard deviation of 5.35. The distribution of respondent's access to their perception related to the role of ICTs is presented in Figure 2.

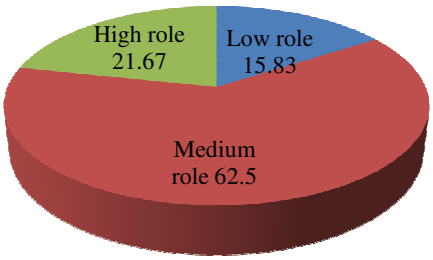

Figure 2. Perceived role of ICTs in increasing agricultural production

The data presented in Figure 2 indicate that majority of the respondents (62.5%) opined that ICTs plays medium level of role in increasing agricultural production followed by high role (21.67%) and low role (15.83%). For clear understanding of the extent of perceived role of ICTs in increasing agricultural production a Farmers Perception Index (FPI) is presented in Table 2.

Table 2. Farmers Perception Index on role of ICTs in increasing agricultural production

Statements	Farmers Perception Index (FPI)		
	Score	%	Rank Order
Save time	175	48.61	9th
Access to information	245	68.06	3rd
Increase production	257	71.39	1st
Increase income	249	69.17	2nd
Better management practices	197	54.72	7th
Access to market	230	63.89	4th
Reduces production cost	170	47.22	10th
Supply up to date knowledge	210	58.33	6th
Balanced ecology	150	41.67	12th
Modern technology	190	52.77	8th
Reduce labor requirements	213	59.17	5th
Increase soil fertility	165	45.83	11th

Data presented in Table 2 indicate that among the 12 statements perceived as the role of ICTs by the coastal farmers in increasing agricultural production; majority of the respondents (71.39%) opined that ICTs play high role in increasing agricultural production while only 41.67 percent respondents observed that ICTs play low role in maintaining balanced ecology.

Relationship between the role of ICTs and selected characteristics of coastal farmers

Karl Pearson's product moment correlation coefficient was estimated for finding out the relationship between perceived role of ICTs and selected characteristics of the coastal farmers. The analysis indicate that among the seven selected characteristics of the farmers; level of education, annual family income, agricultural training received and communication exposure were positively correlated with the perceived role of ICTs while there is no relationship of age, household assets and credit received with the perceived role of ICTs in increasing agricultural production (Table 3).

Table 3. Correlation coefficients between the role of ICTs and selected characteristics of the farmers

Independent Variables	Dependent Variables	Correlation efficient (r)
Age		-0.207
Level of education		0.694**
Household assets	**Role of ICTS**	0.243
Annual family income		0.804**
Credit received		-0.276
Agricultural training received		0.575**
Communication exposure		0.869**

**= Significant at 1% level of significance

Constraints faced by the coastal farmers in using ICTs

The respondents in the study area are suffering from numerous constraints in using ICTs for increasing agricultural production properly. The findings expose that the majority (69.5%) of the respondents face medium constraints while 19.3% and 11.2% face high and low constraints respectively. For clear understanding of the severity of constraints faced by the coastal farmers in using ICTs a Constraints Index (CI) is presented in Table 4.

Table 4. Severity of constraints in using ICTs for agricultural activities

Constraints faced by farmers	Constraints Index (CI)	
	%	Rank Order
Difficult to handle	49.17	4th
Lack of subsidy or loan	43.89	8th
Lack of information	55.56	1st
Illiteracy	46.67	5th
Absence of electricity	43.61	7th
Costly to adopt	51.39	3rd
Lack of repair sources	37.52	9th
Lack of trainings	53.61	2nd
Social barrier	32.28	10th
Unwillingness to investment	44.43	6th

Sofia et al. (2011) observed similar type of barriers in adopting ICT technologies for agricultural production in their research work entitled "ICT adoption and development: issues in rural accommodation".

CONCLUSIONS

Average perceived role of ICTs was not so satisfactory, because all aspects of role of ICTs were not properly fulfilled by the coastal farmers in larger extents. Thus, it can be concluded that such low to medium perceived role may not improve the agricultural profile of the farmers effectively and efficiently.

The study explored that the coastal farmers are mainly using particular ICTs in agricultural activities but time has changed, so the concern authority should be aware of exploring modern ICTs to all farming community for maintaining sustainability in agricultural production. Majority of the farmers faced medium to high constraints in using ICTs for agricultural activities. Thus, it may be concluded that initiatives like education, training, income generating activities, communication exposure should be ensured to the farming communities for increasing agricultural production.

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