

# The Impact of ICT on Paddy Production: Study Focus on Zinardi Union, Palash Thana, Narsingdi District, Dhaka, Bangladesh

Md. Aminul Islam (Corresponding Author)

Senior Lecturer in MIS, Green Business School, Green University of Bangladesh

220/D Begum Rokeya Sarani, Dhaka-1207

E-mail: islam\_khokon@yahoo.com

Md. Fakhruddoza Bari

Lecturer in Economics, Green Business School, Green University of Bangladesh

220/D Begum Rokeya Sarani, Dhaka-1207

E-mail: fbari1987@gmail.com

Md. Asad Noor

Senior Lecturer in Finance, Green Business School, Green University of Bangladesh

220/D Begum Rokeya Sarani, Dhaka-1207

E-mail: asadronnie@gmail.com

Received: May 18, 2017

Accepted: June 21, 2017

Published: June 26, 2017

doi:10.5296/jas.v5i2.11247

URL: <https://doi.org/10.5296/jas.v5i2.11247>

## Abstract

Bangladesh is a riverine country where majority of the people lead their life depending on agriculture. With the advancements of ICT, throughout the world agricultural sector has been updated and developed. Bangladesh has already attempted to adopt ICT in agriculture and started getting benefits for the longer period of time. This paper aims at finding out the effect of Information and Communication Technology (ICT) on paddy production. The study was conducted at Zinardi union, Palash Thana, Narsingdi District, Bangladesh. Exploratory Factor Analysis (EFA) approach has been undertaken to test the data. Findings stated that ICT has significant impact on paddy cultivation in the selected union.

**Keywords:** ICT, Impact, Agriculture, Paddy, Narsingdi, Bangladesh

## 1. Introduction

Bangladesh is an agricultural based South-Asian developing country where majority of the people lives in the rural areas and they are mainly dependent on crop cultivation. There are many other crops cultivated in Bangladesh in different seasons through-out the year. Among the different crops, paddy or rice is known to be staple food for people in Bangladesh. In the past, crop production was not much in quantity but recent statistics shows that the quantity of crop production (Paddy) is higher than those previous years (Tamzid, 2016). One of the major reasons behind this higher production is the advancement and usage of Information and Communication Technology (ICT) in the agricultural sector (Tamzid, 2016). Farmers are now more informative regarding paddy seed information, fertilizer management, land preparation, proper irrigation, disease and paste management, proper herbicide, thrashing and drying of plants, selling and buying price analysis (Survey result, Authors, 2017). Even non-used lands are being used for other crop production because of the available and updated techniques and tools used in the production sector (Survey result, Authors, 2017).

## 2. Literature Review

Without the use of Information and Communication Technology (ICT), agricultural development is not been realized. Recent advancements of ICT offer a great opportunity to introduce the new production tools and technology to the producers efficiently. Throughout the world, several studies were published on the contribution of ICT application in the agricultural production. Nevertheless, few studies have been conducted to find out the effect of ICT based service on rice or paddy production in Bangladesh especially in Zinardi union, Narsingdi District. (Das, S et. al., 2016) said that in recent days, a new paradigm of agricultural development is emerging fast not only in developing country but also in developed countries (McConnell, 2001). In Bangladesh, agriculture is the largest sector of employment. According to the report prepared by the Central Intelligence Agency in 2016, agricultural sectors employs 47% of the total labour force which is accountable for comprising 16% of the GDP of the country. The more the performance, the more opportunity will be created and have an irresistible impact on employment generation and poverty alleviation as well as food security. Due to the fertile soil and ample amount of water supply, rice usually be grown and reaped at least one time in a year in some areas but three times a

year in many areas. Previously, the production of rice was not as much as it is now. Bangladesh's labour-intensive agriculture has reached increases in food grain production in spite of having disapproving weather conditions such as poor flood control, irrigation, and inefficient fertilizers usage, weak distribution of rural credit networks. These are the factors were responsible for unfavourable weather conditions faced more in past years. Information and Communication Technology (ICT) has made a significant impact on recent days regarding the higher level of rice production by eradicating the problems affected rice production negatively on past years (McConnell, 2001). Agricultural growth is a necessity to foster the economic development and to feed growing populations in most of the less developed and developing countries (Datt and Ravallion, 1996). ICT has added a new look to the agri-based production. In addition, for full fledged usage of ICT requires positive attitude from the actors and it was proved by a number of previous studies (Kenneth and Liqat, 2006). Referring to attitude, (Horne, 1985) states that it represents both a mental and neural state of readiness which is organized through experience. For (Breckler et al., 1992), attitude has vast impact positively especially it plays an important role for ICT usage. According to the (Shiro, 2008), the rural communities tend to have positive attitude towards ICT as well as they want any ICT project that has to be developed in their areas. Moreover, lack of their ICT knowledge hinders them using ICT every now and then. (Dixon, 2009) mentioned that frequent usage to ICT needs to be considered if people want to form positive attitude on ICT. (Meyer, 2005) found in his paper that information has consistently been one of the crucial elements in case of the development of human society which has been shaped over the period of time through the way in which people think and act. To increase both agricultural production and improve marketing, distribution strategies information is essential (Oladele, 2006). In fact, Information enables farmers to take informed decisions in the case of production and marketing as well as managing their lives to cope with problems and find out the opportunities (Matovelo, 2008). (Comfort et al., 2005) and (Joseph and Andrew, 2007) found out that rural community use ICT more if it is relevant to their daily tasks and vice versa.

### **3. Research Design**

With consideration of limited previous research on ICT and agriculture, an exploratory research approach has been used (Williams et. al., 2010). The sample framework of this study was 90 participants (farmers) from zinardi union, Narsingdi district, Bangladesh. Convenient sampling method has been used due to its cost effectiveness and wide applicability of ICT on agricultural based research (Azam et. Al., 2013). For data analysis, we have followed Exploratory Factors Analysis tool along with Principal Axis Factoring which is descriptive procedure in nature as well as extraction method where varimax for rotation has been followed because the focus is not to generalize the results beyond the sample. To collect data, a structured questionnaire was developed. The first part of the questionnaire was set to collect the demographic information of the respondents and the second part was used to identify land related information such as how much land actually they use to cultivate and how much land remain unused and the reasons behind not to cultivate the unused land etc. Rest of the part of the questionnaire included different constructs using a 5- point Likert scale ranging from

(1) “Strongly Disagree to (5) “Strongly Agree.” We have distributed 100 surveys questionnaire with 90 returned filled, resulting in 90% response rate.

#### 4. Findings

##### 4.1 Demographic Information

From the demographic analysis (See Table 1), it can be seen that respondents were basically male oriented (100%). 32.2% of the respondents’ age is between 46 to 55 years who are experience in the field of agriculture. In case of income source, 78.8 % respondent said that agriculture is their primary source of income where 12.2% prefer it as a secondary source. Only 2.2 % has master degree but majority (63.3%) has less than SSC (Secondary School Certificate) degree.

Table 1. Demographics of the Respondents

Gender			
Gender	Frequency	Percent	Cumulative Percent
Male	90	100.0	100.0

Age			
Age Range	Frequency	Percent	Cumulative Percent
16-25	3	3.3	3.3
26-35	20	22.2	25.6
36-45	21	23.3	48.9
46-55	29	32.2	81.1
56-65	15	16.7	97.8
>66	2	2.2	100.0
Total	90	100.0	

Education			
Level of Education	Frequency	Percent	Cumulative Percent
SSC<	57	63.3	63.3
SSC	20	22.2	85.6
HSC	10	11.1	96.7
Honors	1	1.1	97.8
Masters	2	2.2	100.0
Total	90	100.0	

Source of Income			
Source of Income	Frequency	Percent	Cumulative Percent
Primary	79	87.8	87.8
Secondary	11	12.2	100.0
Total	90	100.0	

4.2 Land Information

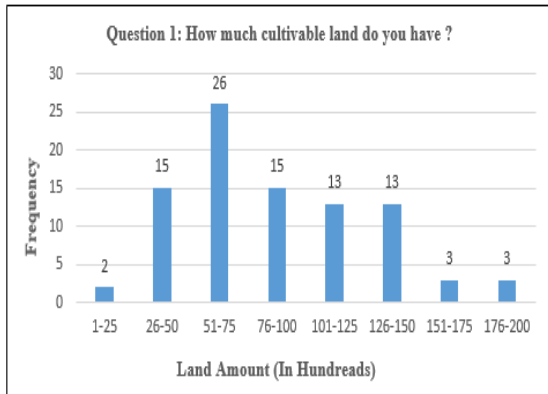


Figure 1

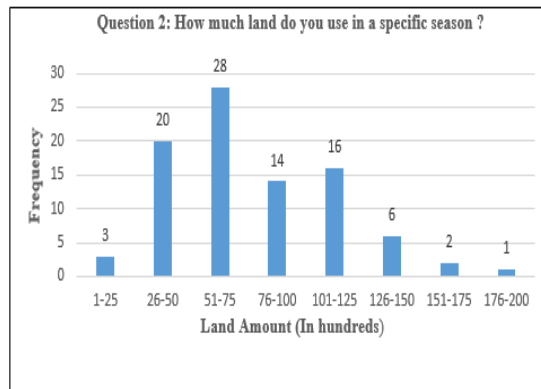


Figure 2

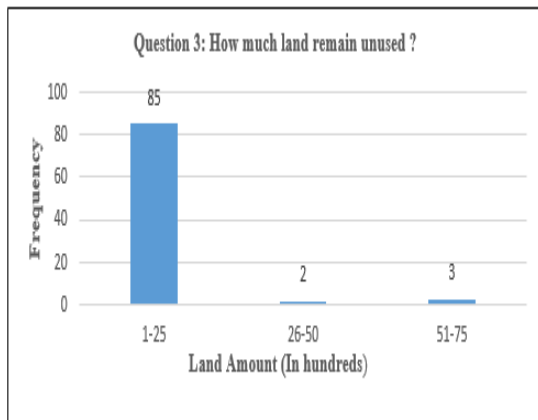


Figure 3

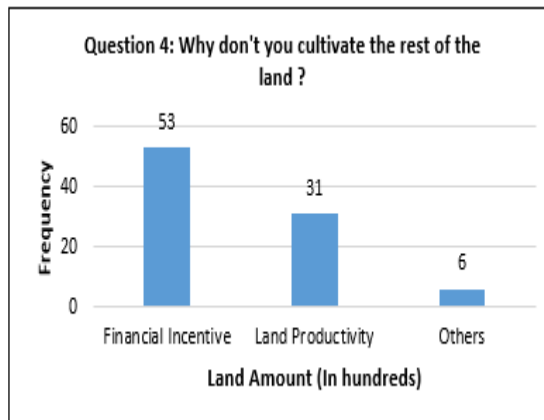


Figure 4

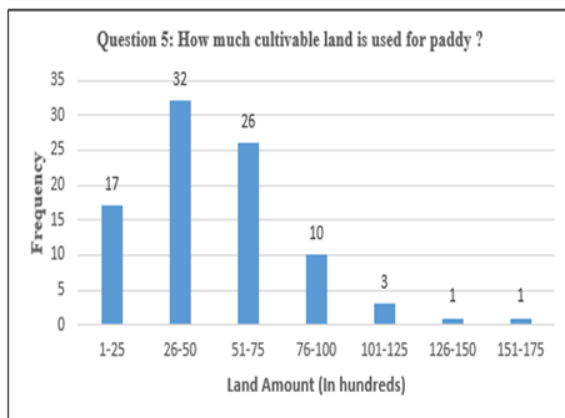


Figure 5

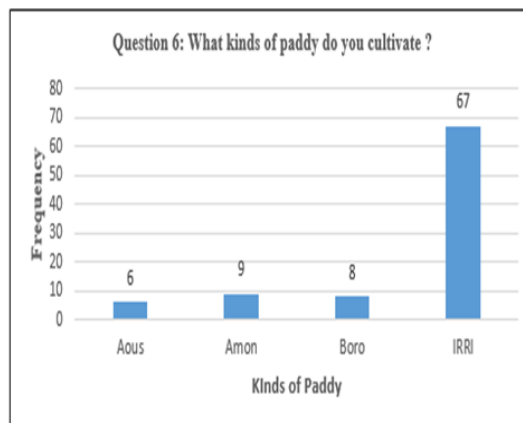


Figure 6

*Figure 1* depicts that most farmers have the cultivable land in the range of 26 to 100 hundredths where *figure 2* resembles quite interesting information that greater part of the farmers is cultivating 26 to 75 hundredths of land in a specific season. According to *figure 3*, 1 to 25 hundredths of land are being unused in different season and reasons behind this scenario found in *figure 4* that lack of financial incentives is primarily responsible in this case. *Figure 5* illustrates that 26 to 75 hundredths of land are using only for paddy cultivation along with a clear picture has been observed from *figure 6* that IRRI (the local name of paddy) is the most cultivable variety of paddy in that region.

#### 4.3 Factor Analysis

The result of the factor analysis shows that Kaiser-Meyer-Olkin measure of sampling adequacy is 0.809 which is well above the recommended value of 0.5 suggested by (Williams et al., 2010) and Bartlett's test of sphericity is significant ( $\chi^2(36) = 917.338, p < 0.5$ ) (See Table 2).

Table 2. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.809
	Approx. Chi-Square	917.338
Bartlett's Test of Sphericity	Df	190
	Sig.	.000

Factor analysis generated five factors with eigenvalue more than one along with item loading more than 0.30 (See Table 3). We considered eighteen items for the study and all of them were loaded. First factor contains six items, second factor contains five items, third factor consists of three items, fourth and fifth factor each of them include two items. All of the factors have more than recommended value by (Williams et al., 2010). We categorized the factor as cost benefit factor, land management factor, thrashing & cutting factor, seed management factor and weather & forecasting factor. According to the analysis, first factor has internal reliability (Cronbach's Alpha > 0.700) and explains 37.64% of the variances, second factor has internal reliability (Cronbach's Alpha > 0.712) and explain 8.16% of the variances, consequently, third and fourth factors are also internally reliable (Cronbach's Alpha > 0.714 & > 0.707 respectively with variance of 7.29%, 5.70% as well. The last factor explains 5.51% of variance with internal reliability of (Cronbach's Alpha > 0.711). Five factors together explain 64.314 of the variances.

Table 3. Factor Analysis Result

<b>Items</b>	<b>Cost Benefit Factor (1)</b>	<b>Land Management and Preparation Factor (2)</b>	<b>Thrashing &amp; Cutting Factor (3)</b>	<b>Seed Management Factor (4)</b>	<b>Weather, Forecasting &amp; Irrigation Factor (5)</b>	<b>Commonalities</b>
<b>Increases Productivity of Land</b>	.822					.703
<b>Reduction of Long Term Cost</b>	.715					.688
<b>Increases the Profit Margin</b>	.696					.546
<b>More Production With less Time</b>	.543					.770
<b>The quality of Paddy</b>	.540					.756
<b>Identifying Maximum Possible Market Price</b>	.529					.876
<b>Suitability of Rice Production</b>		.794				.679
<b>Pest Management</b>		.700				.613
<b>Land Preparation</b>		.604				.487
<b>Effective Weed Plants for Smooth</b>		.591				.790

<b>Application of Herbicide</b>						
<b>Fertilizer Management</b>		.417				.445
<b>Cutting of Paddy</b>			.745			.786
<b>Thrashing Paddy for Better Production With Minimum Cost</b>			.609			.880
<b>Thrashing and Drying of Plants</b>			.594			.611
<b>Seed Bed Preparation</b>				.884		.618
<b>Seed plantation</b>				.605		.888
<b>Weather Forecasting</b>					.646	.561
<b>On Time Irrigation</b>					.525	.423
Eigenvalues (>1)	7.529	1.633	1.458	1.141	1.102	
Percentage of Variance	37.64%	8.16%	7.29%	5.70%	5.51%	
>Cronbach's Alpha	.700	.712	.714	.707	.711	
Extraction Method: Principal Axis Factoring, Rotation Method: Varimax						

Due to the evolution of ICT and its implication to the agricultural segment, there is an overall improvement in the paddy cultivation at Zinardi Union, Narsingdi, Dhaka, Bangladesh. This study reveals that there are five main factors on which farmers are being benefitted in the paddy cultivation. Among these factors, cost benefit related factors have a greater power of explaining the variances followed by rest of the factors. Interview with the farmers revealed that ICT helps to reduce cultivation cost comparing to the traditional systems. It also improves



the land fertility rate thus wastage production is minimized. Every aspect of the communication from the seed selection to the final consumer, ICT contributes to lessen the fluctuation among paddy demand and supply.

## 5. Conclusion and Implication

Long ago, Bangladeshi people weren't so much aware of the natural calamities and agricultural production. Due to the technological advancements and implication of ICT in rural areas have made general people conscious about the environment. The study points out that five factors together explain 64.31% of the variation and there are also other factors which explain rest of the variations. Different other stages of paddy production needs to be concentrated more which should be led by ICT. The last factor (factor 05) has the minimum influence on the paddy production where farmers still have to be more concern in adoption of ICT. More educated farmers (only 2.2% are involved in the paddy production) are still lagging behind in the paddy production where their involvement could have been more significant. So opportunity exists to analyse more to depict the other factors and their variances. Moreover, other unions, districts, divisions in Bangladesh can be under the same research platform so that macroeconomic analysis can be done to view the overall scenario of the country in case of paddy production as well as agricultural production.

## References

- Azam, S. M., Farhatullah, A., Nasim, S., Shah, & Iqbal, S. (2013). Correlation studies for some agronomic and quality traits in Brassica napus L. *Sarhad J. Agric.*, 29(4), 547-550.
- Breckler, S. J., Wiggins, E. C. (1992). On defining attitude and attitude theory: Once more with feeling. In A. R. Pratkanis, S. J. Breckler, A. C. Greenwald (eds.), *Attitude Structure and Function*, 407-427. Hillsdale, NJ: Erlbaum.
- Comfort, K., Goje, L., Funmilola, K. (2005). Relevance and Priorities of ICT for Women in Rural Communities: A Case Study from Nigeria. *Buletin for the American Society for Information Science and Technology*, 29, 24-25
- Das, S., Munshi, N., & Kabir, W. (2016). The Impact Of Icts On Agricultural Production In Bangladesh: A Study With Food Crops. *Saarc Journal of Agriculture*. 14 (2), 79-82.
- Datt, G., Ravallion, M. (1996). *Why have some Indian States Done Better Than Others at Reducing Rural Poverty?* World Bank Policy Research Working paper 1594(April 1996).
- Dixon, K. C. (2009). Attitudes towards ICT Based Interaction: A Bachelor of Education Studies. <http://www.aare.edu.au/09pap/dix091331.pdf>
- Horne, M. D. (1985). Attitudes toward Handicapped Students: Professional, Peer, and Parent Reactions. *United States of America: Lawrence Erlbaum Associates*.
- Joseph, M. K., Andrew, T. N. (2007). Convergence opportunities and factors influencing the use of internet and telephony by the rural women in South Africa and India towards empowerment. *J. Comput. Sci.*, 241, 1-20. [https://doi.org/10.1007/978-0-38773697-6\\_1](https://doi.org/10.1007/978-0-38773697-6_1).

Kenneth, C. K. S., Liaquat, H. (2006). Network structure, ICT Use and Performance Attitudes of Knowledge Workers. <http://is2.lse.ac.uk/asp/aspecis/20080172.pdf>

Matovelo, D. S. (2008). *Enhancing farmer's access to and use of agriculture information for empowerment and improve livelihoods: a case of Morogoro region*. Thesis presented at University of Dares salaam as the requirement of Doctor of Philosophy.

McConnell, S. (2001). Connecting with the unconnected: Proposing an evaluation of the impacts of the Internet on unconnected rural stakeholders.' *Mc Connell International*. <http://mcconnellinternational.com/evaluation.html>.

Meyer, H. W. J. (2005). The nature of information, and effective use of information in rural development, *Journal of information research*, 10 (2). <http://informationr.net/ir/10-2/paper214.html>

Oladele, O. (2006). Multilinguality of farm broadcast and agricultural information access in Nigeria. *Nordic J.Afr.Studies*, 15(2), 199-205. <http://www.njas.helsinki.fi/pdf-files/vol15num2/oladele5.pdf>

Shiro, U. (2008). A Case Study of DIY ICT. *Journal of Information*, 10(4), 46-60.

Tamzid. (2016). The Potential of ICT for Agriculture in Bangladesh. Available: <http://www.ypard.net/2016-may-15/potential-ict-agriculture-bangladesh>. Last accessed 15th May, 2017.

Williams, B., Onsman, A., & Brown, T. (2010). Exploratory factor analysis: A five-step guide for novices. *Australasian Journal of Paramedicine*, 8(3), 1-13.

### **Copyright Disclaimer**

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).