Original Research Article

Adoption of BARI dhan49 by the Farmers of Bogra Sadar Upazila in Bangladesh

ABSTRACT

The research examined the status of adoption of BRRI dhan49 and to explore the contribution of the selected characteristics of the cultivators with their adoption of BRRI dhan49. The methodology of this study is an integration of quantitative and qualitative methods based on data collection in Ashokola, Polikukrul, Teldhap, Shashibadoni, Darial and Ontahar villages under Noongola union of Bogra Sadar Upazila. Data were collected from 116 BRRI dhan49 cultivators from January 21 to February 20, 2017. Descriptive statistics, multiple regressions were used for analysis. Most of the farmers (78.4 percent) belong to medium adoption followed by high adoption (11.2 percent) by the rice cultivators in the adoption of BRRI dhan49 production technologies. Among the influential variables- the level of education, annual family income, extension media contact, rice cultivation knowledge and attitude towards BRRI dhan49 were a significant contributor and provided 53.8 percent contribution on adoption of BRRI dhan49. It was also found that 3.4%, 16.3%, 38.8%, 33.7% and 7.8% farmers were innovators, early adopters, early majority, late majority and laggards respectively regarding BRRI dhan49 adoption. It is concluded that the composite adoption of BRRI dhan49 production technologies is moderate and needs further advancement. Based on the findings, it is recommended that respective authorities should implement and popularize farmers based projects on a massive scale for the adoption of BRRI dhan49.

Keywords: Technologies, rice cultivation, adopters, adoption;

INTRODUCTION

Bangladesh is a farming depended nation. About 76% of the people live in rural areas, and 47.5% of the total manpower is involved in agriculture. In Bangladesh, agriculture contributes 18.82% of the gross domestic product (GDP) of the country in the year of 2014-2015 (BEC, 2016). Bangladesh has a long history of rice cultivation. Rice is grown throughout the country except in the southeastern hilly territories. The agroclimatic states of the country are suitable for growing rice year-round. However, the national average rice yield is much lower (2.94 t/ha) than that of other rice-growing countries (BBS, 2012). Rice is the staple food for about 156 million people of the country. Rice (*Oryza sativa* L.) is the most important food for over two billion people in Asia and To feed the ever-increasing population of these regions the world"s annual rice production must be increased from the present 560 to 750 million tons by 2020 (Saranraj*et al.*, 2013). During the year 2015-2016, Rice ranked first position by production among all the cereals in Bangladesh (BBS, 2016). At present, the total area and production of rice in Bangladesh are about 11.65 million hectares and 34.00 million metric tons, respectively (BBS, 2013). The population growth rate is 2 million years, and if the population increases along this same line, the total population will be 238 million by 2050. An expansion in total rice production is required to feed this ever-expanding population. In the meantime, the total cultivable land is diminishing more than 1% per year attributable to the construction of industries, factories, houses, and highways. On the other hand, due to urbanization, food habits tend to change, demanding the cultivation of new crops that must share land used for rice cultivation. Therefore, the modern varieties of rice have given its contribution to increasing the yield per unit area of rice. Among the modern varieties, BRRI dhan49, benefit to expand rice production in a sustainable manner for the food and nutritional security of this exceptionally populated country. The rice cropping pattern of Bangladesh has changed-areas once occupied by the rainfed Aus gradually shifted to Boro cultivation. As a result, the contribution from each season also changed-Aman rice previously contributed a major portion of total rice, but Boro is now the major contributor to total rice production in the country, despite Aman coverage area is greater. Aus, Aman, and Boro rice were recently reported to account for 7%, 38%, and 55%, respectively, of the total rice production in Bangladesh (Risingbd, 2014). Bangladesh has made notable progress in sustaining respectable growth in rice production, and this growth in production has originated mostly from the shift from low-yielding traditional to high-yielding modern varieties when irrigation facilities were developed (Hossain *et al.*, 2006). Another factor contributing to the increase in total rice production by modern rice varieties such as BRRI dhan49 is the key to change in the rural economy. Although Bangladesh has an agrarian economy, about 89% of total farm-holdings are below 2.49 acres in size (Kashem, 2013). However, socioeconomic factors, such as the predominance of small and marginal farmers and tenancy cultivation in agrarian structure, did not impede the adoption of modern rice varieties in Bangladesh (Asaduzzaman, 1979; Mandal, 1980; Alauddin and Tisdell, 1996). Major constraints to the adoption of

modern rice varieties were, in fact, logistic factors (Hossain *et al.*, 2006). Bogra locale is considered as surplus rice generation zone of the nation, where BRRI Dhan49 was a noteworthy endeavour. Bogra sadar upazila range, in this manner, considered a most reasonable area to concentrate the marvels of selection of BRRI Dhan49 innovations by the rice cultivators. Contemplates on individual, gathering and society uncovered that acknowledgement of modem innovations is restrictive upon many variables. Some of these are social, individual, practical and situational components. While directing any review on the reception of modem advancements, these elements should be considered. An extremely couple of past research work attempted to discover the above certainties. Subsequently, the present examines felt need to lead an exploration entitled "Adoption of BRRI dhan49 by the farmers of Bogra sadar upazila."

The focal point of the research work was to explore the trends of adoption of BRRI dhan49 by the farmers. This is why the following objectives were structured out in order to provide an appropriate track to the research work: To assess the extent of adoption of BRRI dhan49 by the farmers; to describe the selected socio-economic characteristics of farmers, to estimate the level of contribution of the selected characteristics of farmers in adoption of BRRI dhan49 and categorize the adopters of BRRI dhan49;

MATERIALS AND METHODS

The methodology assumes an essential part in logical research. To fulfil the objectives of the study, a researcher should be very careful while formulating methods and procedures in conducting the research. This chapter of the thesis illustrates the research methodology and procedures used to collect and analyze the data for answering the research questions and attaining the purposes. The methods and operational procedures followed in conducting the study e.g. selection of study area, sampling procedures, instrumentation, categorization of variables, a collection of data, measurement of the variables and statistical measurements. A chronological description of the methodology followed in conducting this research work has been presented in this chapter.

Measurement of the dependent variable

Adoption of BRRI dhan49 was measured by computing Adoption Quotient (AQ). It was calculated by asking the farmers i) cultivated area of BRRI dhan49 ii) potential area for cultivation of BRRI dhan49 iii) years of BRRI dhan49 cultivation. Adoption of BRRI dhan49 was measured by Adoption Quotient as the following formula suggested by Bhuiyan (2005):

$$\text{Adoption Quotient (}\mathbf{AQ}\text{)} = \frac{\sum c/p}{Y} \times 100$$

Where, c = cultivated area

P = Potential area

y = Years of BRRI dhan49 cultivation

Using the above formula, adoption of BRRI dhan49 production technologies score of a respondent could range from 0-100, while 0 indicating no adoption and 100 indicating highest adoption. This variable appears in item number 10.1 in the interview schedule as presented in Appendix-I. Based on the information cited by the farmers, they were classified into three categories (Mean ± Standard Deviation) namely „low", „medium" and „high" adoption of BRRI dhan49.

Measurement of adopter categories

Before measuring the adopter categories, the researcher calculated the Adoption Period Score (APS) of BRRI dhan49 by asking the question to the farmers “How many times did you take after hearing about the BRRI dhan49 qualities to cultivate in your land?". The adopter categorization on the basis of APS diving the bell-shaped curve into five areas by using its two parameters (mean and standard deviation). After assigning APS for all farmers according to the adoption Period of all farmers were calculated as follows (Roger, 1995):

Innovator = ($\bar{x}$ - 2σ)

Early adopter = ($\bar{x}$ -2σ) to ($\bar{x}$ -σ)

Early majority = $(x - \sigma)$ to $(\bar{x})$

Late majority = $(\bar{x})$ to $(\bar{x} + \sigma)$

Laggards & non-adopters = $(\bar{x} + \sigma)$ to $(\bar{x} + 2\sigma)$

The measure of adoption used and the procedure followed to classify adopters where 1st group were an innovator and then early adopter, early majority, late majority & last group considered as laggards. The majority of Indian researchers used this type of category

Statistical analysis

Regression analysis was used to identify the linear combination between independent variables used collectively to predict the dependent variables (Miles and Shevlin, 2001). Regression analysis helps us understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed. Ordinary Least Squares (OLS) is used most extensively for estimation of regression functions. In short, the method chooses a regression where the sum of residuals, ΣUi is as small as possible (Gujarati, 1995). The factors that contribute to the adoption of BRRI dhan49 are analyzed using a regression model. The overall quality of fit of the model has been tested by ANOVA specifically F and R^2 test.

The data were analyzed in accordance with the objectives of the proposed research work. The factors that contribute to the constraints faced by the farmers in vegetable production are analyzed using a regression model, multiple regression analysis (B) was used. Throughout the study, five (0.05) percent and one (0.01) percent level of significance was used as the basis for rejecting any null hypothesis. If the computed value of (B) was equal to or greater than the designated level of significance (*p*), the null hypothesis was rejected and it was concluded that there was a significant contribution between the concerned variable. Whenever the computed value of (B) was found to be smaller at the designated level of significance (*p*), the null hypothesis could not be rejected. Hence, it was concluded that there was no contribution to the concerned variables.

The model used for this analysis can be explained as follows:

$$Y = a + b1x1 + b2x2 + b3x3 + b4x4 + b5x5 + b6x6 + b7x7 + b8x8 + b9x9 + e;$$

Where Y= is the adoption of BRRI dhan49;
Of the independent variables, x1 is the rice cultivators age, x2 is level education, x3 is effective farm size, x 4 is annual family income, x5 is organizational participation, x6 is cosmopoliteness, x7 is extension media contact, x8 is rice cultivation knowledge and x9 is attitude towards BRRI dhan49. On the other hand, b1, b2, b3, b4, b5, b6, b7, b8and b9 are regression coefficients of the corresponding independent variables, and e is random error, which is normally and independently distributed with zero mean and constant variance.

RESULTS AND DISCUSSION

The recorded observations in accordance with the objective of the study were presented and probable discussion was made of the findings with probable justifiable and relevant interpretation under this chapter. The findings of the study and their interpretation have been presented in this section. The first section deals with the selected characteristics of the farmers, while the second section deals with the adoption of BRRI dhan49. The third section deals with the contribution of farmers" selected characteristics to their adoption of BRRI dhan49, while the fourth section deals with the categorization of BRRI dhan49 adopter.

Characteristics of the farmers

The behavior of an individual is determined to a large extent by one"s personal characteristics. There were various characteristics of the farmers that might have a consequence of the adoption of BRRI dhan49. But in this study, nine characteristics of them were selected as independent variables, which included their age, level of education, effective farm size, annual family income, organizational participation, cosmopoliteness, extension media contact, rice cultivation knowledge and attitude towards BRRI dhan49 that might be greatly influenced the adoption of BRRI dhan49 of farmers are presented below-

Age

The age of the farmers has been varied from 28 to 74 years with a mean and standard deviation of 47.31 and 10.17, respectively. Considering the recorded age farmers were classified into three categories namely „young", „middle" and „old" aged following Rashid (2014). The distribution of the farmers in accordance of their age is presented in Table 1. Table 1 reveals that the middle-aged farmers comprised the highest proportion (53.4percent) followed by old aged category (34.5percent) and the lowest proportion was made by the young aged category (12.1percent). Data also indicates that the middle and old aged category constitute 87.9 percent of total farmers. The middle and young aged farmers were generally more involved in farm activities than the young.

Level of education

The level of educational scores of the farmers ranged from 0 to 17 with a mean and standard deviation of 7.62 and 4.05, respectively. Based on the educational scores, the farmers were classified into five categories. The distributions of farmers according to their level of education are presented in Table 1. Table 1 shows that farmers under secondary education category constitute the highest proportion (47.4 percent) followed by primary education (22.4percent). On the other hand, the lowest 5.2 percent in can"t read and sign category followed by can sign only category (6.9 percent) and 18.1 percent respondents were above secondary category. Education broadens the horizon of outlook of farmers and expands their capability to analyze any situation related to adopt the BRRI dhan49. An educated farmer is likely to be more responsive to the modern facts, ideas, and information of BRRI dhan49. To adjust with the same, they would be progressive-minded to adopt cultivation technologies of BRRI dhan49 as well as involve with modern cultural farm activities.

Effective farm size

The effective farm size of the farmers ranged from 0.08 ha to 2.62 ha with a mean and standard deviation of 0.96 and 0.54, respectively. Based on their farm size, the farmers were classified into five categories following the categorization according to DAE. The distribution of the farmers according to their farm size is presented in Table 1. Table 1 indicates that the small farm holder constitutes the highest proportion (63.8percent) followed by medium farm holder (33.6 percent). The findings of the study reveal that majority of the farmers were small to medium sized farm holder. The average farm size of the farmers of the study area (0.96ha) was higher than that of national average (0.60 ha) of Bangladesh (BBS, 2014). This might be due to the enhancing the economic status of the farmers; the farmers are likely to motivate to buy the land.

Annual family income

The score of annual income of the rice cultivators ranged from 100 to 525 thousand (BDT) with a mean and standard deviation of 223.58 and 81.08, respectively. On the basis of annual income, the rice cultivators were classified into three categories (Mean ± Standard Deviation) namely „low", „medium" and „high" annual family income. The distribution of the rice cultivators according to their annual family income is presented in Table 1. DataTotal revealed that the rice cultivators having medium annual income constitute the highest proportion (69.0 percent), while the lowest proportion in low income (12.9 percent) followed by high income (18.1 percent). Majority (87.1 percent) rice cultivators have medium to high annual family income.

Organizational participation

Organizational participation score of the rice cultivators ranged from 4 to 16 with a mean and standard deviation of 10.12 and 2.22, respectively. Based on organizational participation score, the rice cultivators were classified into three categories (Mean ± Standard Deviation) namely less, medium and high participation. The distribution of the rice cultivators as per their organizational participation is presented in Table 1. Data reveals that the highest proportion (78.4 percent) of the rice cultivators had medium organizational participation, while 7.8 percent and 13.8 percent had less and high organizational participation respectively.

Cosmopoliteness

Cosmopolites score of the rice cultivators ranged from 8 to 22 with a mean and standard deviation of 17.12 and 2.22, respectively. Based on the cosmopoliteness score, the rice cultivators were classified into three categories (Mean ± Standard Deviation) namely low, medium and high cosmopoliteness. The distribution of the rice cultivators as per their cosmopoliteness is presented in Table 1. Data

revealed that the highest proportion (87.9 percent) of the rice cultivators had medium cosmopoliteness, while 7.8 percent had low cosmopoliteness and the lowest 7.8 percent high low cosmopoliteness. It might be logical because the respondents of the study area were sincere in their income generating activities. Hence, the cosmopoliteness of the rice growers in the study area was medium to high (87.9 percent).

Extension media contact

The observed score of agricultural extension contact of the farmers ranged from 10 to 30against a possible range of 0 to 40. The average score of the farmers was 22.89 with a standard deviation of 3.17 (Table 1). The farmers were classified into three categories on the basis of their exposure to farming information through communication exposure scores and distribution of the three categories (Mean ± Standard Deviation) namely „low", „medium" and „high" agricultural extension media contact of the farmers. Data showed that the highest proportion (79.3percent) of the farmers had medium extension contact as compared to 11.2 percent of them having low extension contact and 9.5 percent fell in high extension media contact (Table 4.7). From this table, it might be concluded that majority of the farmers had medium extension contact. It could be concluded that an extension agent or media of the study area were available to the farmers. The finding was interesting but logical because in general the farmers in the rural areas of Bangladesh are low cosmopolite in nature and less exposed to different information sources. Finding revealed that 11.2 percent of the farmers had low extension contact which demands to strengthen and to improve the communication strategy. Low extension contact might be the reason that some respondent may think that they have enough knowledge about farming activities. Extension contact pertains to ones contact with multifarious sources of farming knowledge and information. This results in cognitive change of the users with an eventual change in behavior and also in skill. They receive information from their neighbors, relatives etc.

Rice cultivation knowledge

Rice cultivation knowledge scores of the farmers ranged from 10 to 28 against a possible score of 0 to 30. The average score and standard deviation were 22.84 and 3.49, respectively. Based on the rice cultivation knowledge scores, the farmers were classified into three categories (Mean ± Standard Deviation) namely low knowledge, medium knowledge and high knowledge (Table 1). Total Data presented in table 1 reveals that 79.3 percent of the farmers had medium rice cultivation knowledge, 19.7percent had low knowledge and 22.2 percent had high rice cultivation knowledge. Thus, an overwhelming majority (58.1%) of the farmers had medium knowledge. This lead to the understanding that rice cultivation knowledge would reflect more by the medium knowledge on agriculture group in the present study. Rice cultivation knowledge of the farmers is definitely affected by the education of the farmers because education helps to enhance the eagerness to be acquainted with new variety or technology. In addition, rice cultivation knowledge of the respondent is definitely affected by the extension contact because with the increase of the communication exposure new thing can be taught. Farmers lives on farming. Hence, they must require skill and modern knowledge to bring more yield and profit to ensure adoption of BRRI dhan49 cultivation.

Attitude towards BRRI dhan49

Attitude towards BRRI dhan49 of the farmers ranged from 1 to 3. The average and standard deviation were 2.46 and 0.65 respectively shown in the following Table 1. On the basis of attitude towards BRRI dhan49, the respondents were categorized into three classes" (Mean ± Standard Deviation) namely poorly favorable attitude, moderately favorable attitude and highly favorable attitude.

The observed data showed that most of the farmers (91.4 percent) had a moderately favorable attitude towards rice cultivation while 8.6 percent of them had a poorly favorable attitude. No respondent was found in highly favorable attitude category. The attitude of the respondents expressed their perception of rice cultivation. It helped the researcher to judge or measure the acceptance/rejection of rice cultivation in the rural area.

Adoption of BRRI dhan49

Adoption of BRRI dhan49 by the rice cultivators is the dependent variable of this study and it was measured by computing scores according to the extent of adoption. Adoption of rice cultivation by the rice cultivators scored varied from 34.58 to 68.04 with the mean and standard deviation of 44.48and 5.32 respectively. On the basis of adoption scores, the rice cultivators were classified into three categories (Mean ± Standard Deviation) namely low, medium and high adoption of BRRI dhan49. The

distribution of the cultivators according to their adoption of BRRI dhan49 score under the study is given in

Table 1 indicates that among the respondents, the highest 78.4 percent rice cultivators belongs to the group of medium adoption and the lowest percentage 10.3 percent in low adoption followed by high adoption (11.2 percent) by the rice cultivators in adoption of BRRI dhan49. Among the cultivators, most of the rice cultivators (89.7 percent) have medium to high adoption in BRRI dhan49.

Table 1. List of characteristics and its component for farmers

Characteristics	Categories	Range	Number	Percent	Mean	STD
Age	Young aged	28-74	14	12.1	47.31	10.17
	Middle aged		62	53.4		
	Old aged		40	34.5		
Level of education	Can‟t read and sign	0-17	6	5.2	7.62	4.05
	Can sign only		8	6.9		
	Primary education		26	22.4		
	Secondary education		55	47.4		
	Above secondary		21	18.1		
Effective farm size	Landless	0.08-2.62	-	-		
	Marginal		3	2.6		
	Small		74	63.8		
	Medium		39	33.6		
	Large		-	-		
Annual family income	Low income	62-230	15	12.9	223.58	81.08
	Medium income		80	69.0		
	High income		21	18.1		
Organizational participation	Less participation	4-16	9	7.8	10.12	2.22
	Medium participation		91	78.4		
	High participation		16	13.4		
Cosmopoliteness	Low cosmopoliteness	8-22	9	7.8	17.12	2.22
	Medium cosmopoliteness		102	87.9		
	High cosmopoliteness		5	4.3		
Extension media contact	Low contact	10-30	13	11.2	22.89	3.17
	Medium contact		92	79.3		
	High contact		11	9.5		
Rice cultivation knowledge	Low knowledge	10-28	17	14.7	22.84	3.49
	Medium knowledge		92	79.3		
	High knowledge		7	6.0		
Attitude towards BRRI dhan49	Poorly favorable attitude	1-3	12	10.3	2.46	0.65
	Moderately favorable attitude		91	78.4		

	Highly favorable attitude		13	11.2		
Adoption of BRRI dhan49	Low adoption	34.58-68.04	12	10.3	44.48	5.32
	Medium adoption		91	78.4		
	High adoption		13	11.2		

Factors related to the adoption of BRRI dhan49

In order to estimate the adoption of BRRI dhan49 by the rice cultivators from the independent variables, multiple regression analysis was used which is shown in the Table 2.

Table 2 Multiple regression coefficients of contributing factors related to the farmers‟ adoption of BRRI dhan49

Dependent variable	**Independent variables**	**B**	***p***	**R 2**	**Adj. R**	**F**	***p***
Farmers‟ adoption of BRRI dhan49	Age	0.059	0.203	0.538	0.507	20.75	0.000**
	Level of education	0.296	0.037*				
	Effective farm size	0.584	0.702				
	Annual family income	2.041	0.034*				
	Organizational participation	0.151	0.573				
	Cosmopoliteness	-.138	0.507				
	Extension media contact	0.447	0.020*				
	Rice cultivation knowledge	0.398	0.003**				
	Attitude towards BRRI dhan49	3.383	0.000**				

Significant at $p < 0.01$;

Significant at $p < 0.05$;

Table 2 shows that there is a significant contribution of respondents‟ level of education, annual family income, extension media contact, rice cultivation knowledge and attitude towards BRRI dhan49. Of

these, rice cultivation knowledge and attitude towards BRRI dhan49 were the most important contributing factors (significant at the 1% level of significance).Level of education, annual family income and extension media contact (significant at the 5% level of significance while coefficients of other selected variables don"t have any contribution on adoption of BRRI dhan49.

The value of R^2 is a measure of how of the variability in the dependent variable is accounted for by the independent variables. So, the value R^2 0.538 means that independent variables account for 53% of the variation in adoption of BRRI dhan49. The adjusted R^2 indicates the loss of predictive power or shrinkage. Therefore, the adjusted value (0.507) tells us how much variance in Y (adoption of BRRI dhan49) would be accounted if the model has been derived of the populations from which the sample was taken. The F ratio is 20.75 which is highly significance ($p<.001$). This ratio indicates that the regression model significantly improved the ability to predict the outcome variable.

The b-values indicate the individual contribution of each predictor to the model. Almost all predictors have positive b-values indicates if scores/ values of predictors (e.g. level of education) increases so do the extent of adoption of BRRI dhan49 production technologies. However, each predictor may explain some of the variances in respondents" adoption of BRRI dhan49 conditions simply by chance. In summary, the models suggest that the respective authority should consider farmers" level of education, annual family income, extension media contact, rice cultivation knowledge and attitude towards BRRI dhan49.

A significant contribution of rice cultivation knowledge on adoption of BRRI dhan49

The contribution of the rice cultivation knowledge on adoption of BRRI dhan49 was at 1% significance level.

The b-value of rice cultivation knowledge is 0.398. So, it can be stated that as rice cultivation knowledge increase by one unit, the adoption of BRRI dhan49 increase by 0.398 units. This interpretation is true only if the effects of all other predictors are held constant.

Based on the above finding, it can be said that clear understanding of the different aspects of innovation increases cultivators" knowledge about a new technology which helps him/her to adopt it for own benefit. So, rice cultivation knowledge influenced significantly on the adoption of BRRI dhan49.

A significant contribution of attitude towards BRRI dhan49 on adoption of BRRI dhan49

The contribution of the attitude towards BRRI dhan49 on adoption of BRRI dhan49 was at 1% significance level.

The b-value of attitude towards BRRI dhan49 is 3.383. So, it can be stated that as attitude towards BRRI dhan49 increase by one unit, adoption of BRRI dhan49 increase by 3.383 units. This interpretation is true only if the effects of all other predictors are held constant.

Based on the above finding, it can be said that attitude towards BRRI dhan49 increases cultivators" willingness which helps him/her to adopt it for own benefit. So, attitude towards BRRI dhan49 influenced significantly on the adoption of BRRI dhan49.

A significant contribution of the level of education on adoption of BRRI dhan49

The contribution of the level of education on adoption of BRRI dhan49 was at 5% significance level.

The b-value of the level of education is 0.296. So, it can be stated that as the level of education increase by one unit, the adoption of BRRI dhan49 increased by 0.296 units. This interpretation is true only if the effects of all other predictors are held constant.

Based on the above finding, it can be said that level of education increases cultivators" willingness which helps him/her to adopt it for own benefit. So, level of education influenced significantly on the adoption of BRRI dhan49.

A significant contribution of annual family income on adoption of BRRI dhan49

The contribution of the annual family income on adoption of BRRI dhan49 was at 5% significance level.

The b-value of annual family income is 2.041. So, it can be stated that an annual family income increase by one unit, the adoption of BRRI dhan49 increased by 2.041 units. This interpretation is true only if the effects of all other predictors are held constant.
Based on the above finding, it can be said that annual family income increases cultivators‟ willingness which helps him/her to adopt it for own benefit. So, annual family income influenced significantly on adoption of BRRI dhan49.

A significant contribution of extension media contact on adoption of BRRI dhan49

The contribution of the extension media contact on adoption of BRRI dhan49 was at 5% significance level.

So, the null hypothesis could be rejected.

The b-value of extension media contact is 0.447. So, it can be stated that an extension media contact increase by one unit, the adoption of BRRI dhan49 increased by 0.447 units. This interpretation is true only if the effects of all other predictors are held constant.

Based on the above finding, it can be said that extension media contact increases cultivators‟ willingness which helps him/her to adopt it for own benefit. So, extension media contact influenced on adoption of BRRI dhan49.

Conclusions

The present study concluded that the composite adoption of BRRI dhan49 is adequate and needs further advancement for maintaining. Level of education of the farmers showed the most important contributing factor in the adoption of BRRI dhan49. This means that high literacy and educational level among the farmers might have influenced high BRRI dhan49. Annual family income of the farmers had a significant contribution in adoption of BRRI dhan49. The above facts lead to conclude that necessary arrangements should be made to increase the annual family income of farmers which would ultimately increase the adoption of selected rice cultivation. Extension media contact of the farmers had a significant contribution in adoption of BRRI dhan49. The above facts lead to conclude that necessary arrangements should be made to increase the extension media contact of farmers which would ultimately increase the adoption of selected rice cultivation. Rice cultivation knowledge of the farmer had a significant contribution in adoption of BRRI dhan49. The above facts lead to the conclusion that necessary arrangements should be made to increase the knowledge of farmers which would ultimately increase the adoption of selected rice cultivation. Farmer‟s attitude towards BRRI dhan49 had a significant contribution in adoption of BRRI dhan49. It is, therefore, concluded that extension workers should vocation adequately with the farm people through various teaching methods and correctly envisaging those characteristics of the farmers which have some bearing on these activities.

REFERENCES

1. Akpabio, I. A., and Inyang, E. B. (2007). Major constraints affecting aquaculture development in Akwa Ibom State, Nigeria. *African Journal of Aquatic Science*, **32**(1), 45-50.

2. Amin, M. R. (2015). Adoption of Modern Technologies by the Rice Cultivators in the Selected Areas of Jhalokathi District. M.S. Thesis, Department of Agricultural Extension and Information System, Sher-e-Bangla Agricultural University, Dhaka, Bangladesh.

3. Anderson, J. R. and Feder, G. (2007). Agricultural extension. Handbook of agricultural economics, **3**: 2343-2378.

4. Azilah, M. E. (2007). Adoption of Cassava Technology for Sustainable Livelihoods: A Thesis Presented in Partial Fulfillment of the Requirements for the Degree of Master of Applied Science in Rural Development at Massey University, New Zealand. Massey University, Palmerstone North.

5. Baloch, A. W., Soomro A. M., Javed, M. A., Ahmed, M., Bughio, H. R., Bughio, M. S and Mastoi, N. N. (2002). Optimum Plant Density for High Yield in Rice (Oryza sativa L.). *Asian Journal of Plant Sciences,* **1**: 25-27.

6. Bannan-Rittand, B. (2003). The Role of Design in Research: The Integrative Learning Design Framework. *Educational Res.***32**(1): 21-24.

7. Chau, P. Y. K. and Tam, K. Y. (1997). Factors affecting the adoption of open systems: an exploratory study. *Mis Quarterly*, 1-24.

8. Curtis, A., Byron, I. and MacKay, J. (2005). Integrating socioeconomic and biophysical data to underpin collaborative watershed management 1. *JAWRA Journal of the American Water Resources Association*, **41**(3), 549-563.

9. Daberkow, S. G. and McBride, W. D. (2003). Farm and operator characteristicsaffecting the awareness and adoption of precision agriculture technologies in the US. *Precision Agriculture*, **4**(2), 163-177.

10. Damanpour, F. and Schneider, M. (2009). Characteristics of innovation and innovation adoption in public organizations: Assessing the role of managers. *J. of Public Administration Res. and Theory*, **19**(3), 495.

11. Deressa, T. T., Hassan, R. M., Ringler, C., Alemu, T. and Yesuf, M. (2009). Determinants of farmers' choice of adaptation methods to climate change in the Nile Basin of Ethiopia. *Global Env. Change*, **19**(2), 248-255.

12. Doss, C. R. and Morris, M. L. (2000). How does gender affect the adoption of agricultural innovations? *Agric. Economics*, **25**(1), 27-39.

13. D"Emden, F. H., Llewellyn, R. S. And Burton, M.P. (2008). Factors Influencing Adoption of Conservation Tillage in Australian Cropping Regions. The Australian Journal of Agricultural and Resource Economics. DOI: 10.1111/J.1467-8489.2008.00409.

14. Erenstein, O. and Farooq, U. (2009). Factors affecting the adoption of zero tillage wheat in the rice wheat systems of India and Pakistan. *Outlook on Agric.*, **38**(4), 367-373.

15. Floyd, C., Harding, A.H., Paudel, K.C., Rasali, D.P., Subedi, K. and Subedi, (2003). Household adoption and the associated impact of multiple agric. technologies in the western hills of Nepal. *Agric. Sys.***76** (2), 715-738.

16. Hassan, R. and Nhemachena, C. (2008). Determinants of African farmers" strategies for adapting to climate change: Multinomial choice analysis. *African J. of Agric. and Resource Economics*, **2**(1), 83-104.

17. Hossain, M., Bose, M. L. and Mustafi, B. A. A. (2006). Adoption and productivity impact of modern rice varieties in Bangladesh. *The Developing Economies*, **44**(2), 149-166.

18. Kathuria, H., Giri, J., Tyagi, H. and Tyagi, A.K. (2007). Advances in transgenic rice biotechnology. *Critical Reviews in Plant Sciences***, 26**, 65–103.

19. Knowler, D. and Bradshaw, B. (2007). Farmers' adoption of conservation agriculture: A review and synthesis of recent research. *Food Policy*, **32**(1), 25-48.

20. Kurkalova, L., Kling, C. and Zhao, J. (2006). Green subsidies in agriculture: Estimating the adoption costs of conservation tillage from observed behavior. *Canadian J. of Agric. Eco.,* **54**(2), 247-267.

21. Lawrence, G., Richards, C. A. and Cheshire, L. (2004). The environmental enigma: Why do producers professing stewardship continue to practice poor natural resource management? *J. of Env. Policy and Planning*, **6**(3), 251-270.

22. Ogunlana, E. A. (2004). The technology adoption behavior of women farmers: The case of alley farming in Nigeria. *Renewable Agric. and Food Sys.*, **19**(01), 57-65.

23. Pannell, D. J., Marshall, G. R., Barr, N., Curtis, A., Vanclay, F. and Wilkinson, R. (2006). Understanding and promoting adoption of conservation practices by rural landholders. *Australian J. of Exp. Agric.*, **46**(11), 1407-1424.

24. Rodriguez, J. M., Molnar, J. J., Fazio, R. A., Sydnor, E., & Lowe, M. J. (2009). Barriers to adoption of sustainable agriculture practices: Change agent perspectives. *Renewable Agric. and Food Sys.*, **24**(01), 60-71.

25. Ssewanyana, J. and MakerereBusler, M. (2007). Adoption and usage of ICT in developing countries: Case of Ugandan firms. *Int. J. of Edu. and Dev. using Info. and Communication Technol*., **3**(3): 49-59.

26. Tiamiyu, S., Akintola, J. and Rahji, M. (2009). Technology Adoption and Productivity Difference among Growers of New Rice for Africa in Savanna Zone of Nigeria. *Tropicultura*, **27**(4), 193-197.

27. Twati, J. M. and Tripoli, L. (2008). The influence of societal culture on the adoption of information systems: The case of Libya. *Communications of the IIMA*, **8**(1), 1-12.