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PROFITABILITY OF CROP CULTIVATION UNDER DIFFERENT LAND TENURIAL ARRANGEMENTS IN SOME SELECTED SITES OF BANGLADESH

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Abstract

Proper land tenurial arrangements perceived as an important strategy for input use and agricultural production in utilization of land resource. Government of Bangladesh initiated due measures in this respect by formulating and declaring the land reform ordinance 1984.The main quest of this study is to identify the profitability of crop cultivation and factors influencing gross revenues in the variousl and tenurial arrangements under this land reform ordinance 1984. In search of this research question, a case study was conducted in two Upazilas (sub districts) of Bangladesh based on cross section data. This data were collected by purposive stratified sampling technique in the year 2013. Benefit cost ratio (BCR) was used to identify the profitability of crop cultivation under different land tenurial arrangements. Ordinary least square (OLS) regression method was used to identify the factors influencing gross revenues of the share cropped land of owner cum tenant farmers. This study reveals that the aspects of land reform ordinance have been implemented in output sharing aspect but not in input cost sharing aspect. Again BCR in leased land was higher than share cropped land. Moreover, regression analysis indicates that farm size had significant positive impact on gross revenues. The study holistically reveals that lease arrangements could be judged as a vital player to increase gross revenue as well as profit inshare cropped lands.

Keywords: Benefit cost ratio, ordinary least square regression method, land tenure, agricultural production, Bangladesh.

I. Introduction

The word tenancy is part and parcel related with various sorts of tenure arrangements. Land tenure refers to the arrangements (i.e., rules, institution, and process) through which people gain legitimate access to land. The policies those are related to the land tenure for the improvement of agricultural production as well as proper use of agricultural lands in the country are termed as land tenure policies and land tenure arrangements are administered by these land tenure policies. Bangladesh is an agricultural developing country. The total area of

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Bangladesh is 144,000 sq. km and population is 150 million having cultivable area of 8.44 million hectare (ha). The contribution of agriculture sector in the share of Gross Domestic Product (GDP) is 23.50%, and this sector ensures the 52% of the total employment of the country, again the contribution of crop subsector to GDP is 13.44% (BBS, 2011). The following three farming categories are prevailing in the country:

(I) Owner farming
(II) Owner cum tenant farming
(III) Tenant farming.

Among these farming categories the following tenancy arrangements are observed:

(a) Share cropping
(b) Leasing
(c) Mortgaging

There are seven patterns of land those are cultivated among these farming categories. Owner farmers cultivate owned land and mortgaged land in owner farming. In cultivating this owned land, owner farmers get the whole amount of produced crop as net revenue after subtracting the production cost. In the case of mortgaged land, cultivators need not to pay any share of the produced output to the land owner and duration of this mortgaged land persist until the mortgaged money can be repaid by the mortgagor *(who mortgaged out the land)*. Owner cum tenant farmers generally cultivate owned land, mortgaged land, leased land, and share cropped land. In cultivation of the leased land, a certain amount of money is needed to pay annually to the land owner by the lessee (who leased in the land in lease system).The terms and conditions of mortgaged land in owner cum tenant farming is as same as mortgaged land in owner farming.

Again tenant farmers cultivate share cropped land only in their renting in system in tenant farming by providing half of the produced crop to the land owner according to the legal provision of land reform ordinance 1984.The focal issue of this ordinance is tenant will provide labor. Land will be provided by the land owner and the rest other input costs will be shared between land owner and tenant farmers in 50:50ratio and the produced output will be shared based on the same ratio between the land owner and tenant farmers to attain proper incentive in agricultural production. The contract shall be valid for a period of five years commencing from such date as may be specified in the contract(LRB, 1982).This crop sharing arrangement is applied in case of the share cropped land of owner cum tenant farmers also. Major cultivated crops in the study areas are rice, jute, wheat, mustard and pulses. These terms and conditions are applicable in cultivation of all of these crops. Moreover, cultivators get rationality in cultivation of their land having proper incentive in cultivating all of these afore

mentioned types of land except this share cropped land. Because, only in share cropped land cultivators need to provide half of the produced crop to the land owner. That leads them lack of proper incentive. Profitability and factors influencing gross revenues are two important aspects to achieve this proper incentive; those are needed to be assessed. Presently in Bangladesh, the percentages of owner, owner cum tenant, and tenant farmers are 65, 22, and 13%, respectively (BBS, 2011).These percentages of owner, owner cum tenant, and tenant farmers in the study areas are 44.5, 33.5, and 22%, respectively. Farming is practiced as primary and secondary occupation among farmers 42% and 58% in owner farming, 76% and 24% in owner cum tenant farming, and 72% and 28% in tenant farming in the study areas (DAE, 2013).

Table 1. Number of households under different farming categories in the study areas.

Household category	Basail Upazila	Titas Upazila	Overall
Owner	13,063(48)	13,731(41)	26,794(44.5)
Owner cum tenant	7,488(28)	12,950(39)	20,438(33.5)
Tenant	6,612(24)	6,450(20)	13,062 (22)
Total	27,163(100)	33,131(100)	60,294(100)

Source: DAE, 2013Note: Figures in the parentheses indicate percentage of total.

Land ownership pattern affects per hectare gross revenues by using the efficient use of inputs under different land tenure systems. In Bangladesh, about one-fifth of the total operated area is under some kind of tenancy arrangements with share cropping covering about one-half of the lands (Tenaw *et al.,* 2009).

There are studies (Asadullah, 2005) about land tenure and tenancy system in Bangladesh refuting the claim about the significance of land leasing in and consequence enhancements in the viability of small farms, it is cited evidence that the terms of tenancy in Bangladesh were very oppressive. In large portion of the cases, the share of land owner was 50 percent of the produced crops as rent without sharing any parts of the cost and at least 5 per cent of the cases, the share of rent was more than 50 percent. Thus, when full cost accounting is applied the share croppers incurred a negative return. It is also argued that share croppers were more dependent on family labour than owner farmers and they survived through self-exploitation and tremendous deprivation in the form of under consumption (Ullah, 1996).

The dimension of agricultural production in Bangladesh has been changed in recent time within this last decade. Farmers are adopting modern technology like high yielding variety of seed, chemical fertilizer, irrigation even mechanized agricultural equipment like power tiller, weeder, paddle thresher, etc. and even input cost sharing arrangement has been changing day by day. But in cultivation of this high yielding varieties, if input cost is shared by the land owner then the

adaptation rate becomes higher, but if this input cost is not shared by the land owner then this adaptation rate becomes lower in case of share cropping arrangement, but this adaptation rate becomes highest in case of cash rental (leasing) arrangement. There is a potentiality of technological transformation in Bangladesh agriculture, but in share cropping rental arrangement, if this input cost is not shared properly by the land owner, then that share cropping arrangement works as a drawback of this potential technological transformation (Hossain, 1991).

The specific objectives of the study are as follows:

- To measure the profitability of different patterns of cultivated land by the tenure categories to depict the impact of land ownership under different land tenurial arrangements;
- To assess the impact of socio-economic variables on the gross revenues of the share cropped land of owner cum tenant farmers.

II. Materials and Method

Study area selection: This study was carried out at Basail Upazila of Tangail district and Titas Upazila of Comilla district in Bangladesh. The area of Basail Upazila was 158 sq.km and population was 76,002, and the area of Titas Upazila was 107.19 sq.km and population was 183,425 (DAE, 2013). Lease form was practiced in Titas Upazila only (Source: Field Survey, 2013).

Sampling technique and method of data collection: 300 respondents were taken 100 from each category and 50 respondents from each Upazila. Data were collected from January to March 2013 by purposive stratified sampling technique to trace out the proper impact of profitability of crop cultivation and factors influencing gross revenues under various land tenurial arrangements on agricultural production based on the cultivated crops in a cropping year. The major cultivated crops in the study areas were rice, wheat, mustard, jute, and pulses, normally three crops were cultivated in each plot of land among these crops in a year. The cultivated crops produced by the respondent farmers are shown in Table 2.

Table 2. Number of farmers and cultivated crops in the study areas.

Farmers' categories	Basail Upazila	Titas Upazila	Total	Cultivated crops
Owner	50	50	100	Rice, mustard, rice
Owner cum tenant	50	50	100	Rice, wheat/pulses, jute
Tenant	50	50	100	Rice, pulses, jute
Total	150	150	300	

Source: Field Survey, 2013

The purposive stratified sampling technique was needed as the percentages of owner, owner cum tenant, and tenant farmers were very disproportionate in the study areas (Table 1).

Analytical technique: The collected data were analyzed by using STATA9. BCR was used to identify the profitability of crop cultivation in the different categories of lands under different land tenurial arrangements in the study areas. This BCR is the ratio of gross revenue and total cost. BCR= $\frac{Gross\ revenue}{Total\ cost}$

Regression analysis was done to get the impact of socio-economic variables on gross revenues of the share cropped land of owner cum tenant farmers. For this, regression analysis OLS method was used. Because OLS is easier to analyze mathematically than many other regression techniques, it produces solution that are easily interpretable, OLS is the best unbiased linear estimator of the model coefficient. Moreover, robust regression technique of OLS model mitigates the problem of data variation. Before running this OLS model, data were validated using Variance Inflation Factor (VIF) and robust regression method for multicollinearity and heteroskedasticity, respectively. This OLS method was used in many other similar studies including in the study conducted by Ahmed (2012) on Agricultural Land Tenancy.

Operational model: $Y_i=a+b_1X_1+ b_2X_2 +b_3X_3 +b_4X_4 +b_5X_5+b_6X_6+b_7X_7 +b_8X_8+b_9X_9+b_{10}X_{10}+b_{11}X_{11}+b_{12}X_{12}+b_{13}X_{13}+b_{14}X_{14}+b_{15}X_{15}+U_i$

Where,

Y_i=Gross revenue (Tk./ha) of the share cropped land of owner cum tenant farmers

$a, b_1, b_2, b_3, b_4, b_5, b_6, b_7, b_8, b_9, b_{10}, b_{11}, b_{12}, b_{13}, b_{14}, b_{15}$= Parameters to be estimated

X_1= Cost of labour (Tk./ha)

X_2=Cost of mechanized power (Tk./ha)

X_3=Cost of seed (Tk./ha)

X_4= Cost of chemical fertilizer (Tk./ha)

X_5=Cost of irrigation (Tk./ha)

X_6=Cost of weedicide (Tk./ha)

X_7= Age of the HHH[1]

X_8= Education of the HHH[1]

X_9= Occupation

X_{10}= LFU[3]

X_{11}= Farm size

X_{12}= Off-farm income

X_{13}= Extension service

X_{14}= Disease management

X_{15}= LSU[4]

U_i= Error term

It was found in the study areas that if half of the seed cost was provided to the tenant by the land owner then land owner claimed half of the produced by-product. But sometimes without sharing this seed cost, the half of the produced by- product was claimed also based on customary rule. To avoid this complexity the price of the by product was not taken into consideration to estimate the gross revenue. In estimating total cost of the farmers, the interest on operating capital was calculated as follows:

$$\text{Interest on operating capital} = \frac{\text{operating capital x Time considered}}{2}$$

Where, operating capital= Total cost- irrigation cost (IC^2), and interest rate was charged at the rate of 12 percent per annum, as this 12 percent interest rate was charged in the commercial bank for short term loan.

Moreover, farm size was classified to five categories in Bangladesh. These categories were (a) marginal farm: farm size up to 0.19ha, (b) marginally small farm: 0.20- 0.60ha, (c) small farm: 0.61 -1.008 ha, (d) medium farm: 1.009-3.03 ha, and (e) large farm: 3.03 ha and above(BBS, 2011).

III. Results and Discussion

3.1 Socio-economic characteristics of the respondent households

Table 3 presents the farm size and other socio-economic characteristics of the sample households. In this study, farm size was considered based on operated farm size to get the actual impact of profitability from crop cultivation.

Considering this existing classification of farm size, the farmers in the study areas was dominated by marginally small and small size of farms, but it was found based on study that farm size of 1.01 to 2.02 ha group was most efficient in agricultural production in Bangladesh (Bilkis, 2012). But this farm size in overall study areas among owners, owner cum tenants, and tenant farmers were 0.90 ha, 0.80 ha, and 0.705 ha, respectively. From Table 3, it is also found that there was a difference of age of the HHH[1], off-farm income, and other socio-economic characteristics among owners, owner cum tenants, and tenant farmers. Moreover, tenant farmers were in less advantageous position than owner farmers, and even owner cum tenant farmers in consideration of all the socio-economic perspectives.

Table 3. Socio-economic characteristics of the sample households.

Variables	Basail Upazila (n= 150)	Titas Upazila (n= 150)	Both areas (n= 300)
Age of the HHH(year)			
Owner	50.22(10.43)	52.64(9.54)	51.43(9.98)
Owner cum tenant	50.32(9.39)	50.70(8.59)	50.51(8.99)
Tenant	43.62(9.79)	43.92(9.59)	43.77(9.69)
Overall	48.05(9.87)	49.08(9.24)	48.57(9.56)
Education(year)			
Owner	4.34(3.55)	4.96(3.45)	4.65(3.5)
Owner cum tenant	3.76(2.53)	4.12(3.06)	3.94(2.79)
Tenant	2.16(1.88)	2.28(2.06)	2.22(1.97)
Overall	3.42(0.65)	3.79(2.85)	3.61(1.75)
Farm size:(ha)			
Owner	0.88(0.68)	0.92(0.66)	0.90(0.67)
Owner cum tenant	0.75(0.34)	0.85(0.32)	0.80(0.33)
Tenant	0.71(0.52)	0.70(0.51)	0.705(0.52)
Overall	0.78(0.51)	0.82(0.49)	0.80(0.50)
Home stead(ha)			
Owner	0.03(0.02)	0.02(0.01)	0.025(0.015)
Owner cum tenant	0.03(0.01)	0.03(0.018)	0.03(0.014)
Tenant	0.020(0.013)	0.02(0.011)	0.020 (0.012)
Overall	0.026(0.01)	0.023(0.013)	0.025 (0.012)
Family labor	（No./ household）		
Owner	3.54 (0.86)	3.76 (0.79)	3.65 (0.83)
Owner cum tenant	3.56 (0.81)	3.52 (0.73)	3.54 (0.77)
Tenant	3.14 (0.90)	3.12 (0.87)	3.13 (0.885)
Overall	3.41(0.85)	3.46(0.79)	3.44 (0.82)
Livestock		No./ household	
Owner	3.06 (1.21)	3.06(1.21)	3.06 (1.21)
Owner cum tenant	2.92(0.68)	3.08(0.77)	3.00 (0.73)
Tenant	2.32(0.91)	2.32(0.91)	2.32 (0.91)
Overall	2.76(0.93)	2.82(0.96)	2.79 (0.95)
Off farm income (Tk./ year)			
Owner	74,200(79,609)	65,080(74,280)	69,640 (76,944)
Owner cum tenant	32,560(49,426)	24,940(38,607)	28,750 (44,016)
Tenant	27,020(19,329)	25,020(18,588)	26,020 (18,958)
Overall	44,593(49,454)	38,346(43,825)	41,469 (46,639)

Source: Field survey, 2013 Note: 1 US Dollar=77.98BDT(BDT= Bangladesh Taka) Figures in the parentheses indicate Std. Deviation.

3.2 Gross revenue of the farmers

Table 4 presents the gross revenue of the farmers in the study areas. This gross revenue was estimated based on cultivated crops in one cropping year. Generally rice, wheat, mustard, jute, and pulses were produced crops, and three crops were cultivated among these crops including dominant crop rice in each plot of land in a year. This gross revenue (GR) was calculated by multiplying the output with the per unit market price (GR = *Qi. Pi*). Where, Qi= quantity of produced output and Pi= per unit market price of concerned crop.

The highest gross revenue obtained by owner cum tenant farmers from owned land. These highest gross revenues were Tk.111,530, Tk.116,167, and Tk.113,848 in Basail Upazila, Titas Upazila, and study areas, respectively. Again the lowest gross revenue obtained by owner cum tenant farmers from mortgaged land and these lowest gross revenues were Tk. 55,409,Tk.50,012, and Tk. 52,710 in Basail Upazila, Titas Upazila, and study areas, respectively. This trend was found similar in the Basail Upazila, Titas Upazila, and even study areas.

3.3 Total cost of the farmers

Table 4 depicts the total production cost of the farmers. Labour, mechanized power (i.e., power tiller), seed, chemical fertilizer, irrigation, weedicide, and pesticides costs were taken into account. The opportunity cost of home supplied inputs was taken into account including home supplied labour. The highest incurred total cost in Basail upazila as well as study areas in the share cropped land of tenant farmers, but in Titas upazila, this highest total cost incurred in the share cropped land of owner cum tenant farmers and the lowest in the mortgaged land of owner cum tenant farmers in BasailUpazila, Titas Upazila, and study areas.

Rental cost of share cropped land was taken based on the value of the half of the produced crop. Leased and mortgaged costs of land were taken equally based on the paid amount for the leased land in the study areas. This cost of production varies in cultivation of land by different tenure categories as well as in Basail Upazila and Titas Upazila due to:

(a) Without tillage cultivation;

(b) Government supplied subsidized seed;

(c) Compost fertilizer used in cheaper price;

(d) Other concerned issues.

3.4 Net revenue of the farmers

Table 4 presents the net revenue of the farmers in the study areas. This net revenue (NR) was estimated gross revenue subtracting the total cost of

production (NR = GR – TC). Where, GR=gross revenue and TC= total cost of production

Table 4. Cost and revenue of the respondent farmers under different categories of farming(Taka/ha).

Different categories of land in farming	Basail Upazila	Titas Upazila	Overall
A. Gross revenue			
Owner (owned land)	110,026(38,852)	114,951(37,921)	112,488(38,213)
Owner (mortgaged land)	77,995(72,215)	75,261(73,562)	76,628(72,567)
Owner cum tenant (owned land)	111,530(35,667)	116,167(33,508)	113,848(34,489)
Owner cum tenant (mortgaged land)	55,409(48,486)	50,012(50,808)	52,710(49,449)
Owner cum tenant (leased land)	-	112,120(224,783)	112,120(224,783)
Owner cum tenant (share cropped land)	95,173(130,567)	99,007(178,811)	97,089(156,200)
Tenant (share cropped land)	102,741(34,028)	105,092(33,306)	103,916(33,501)
B. Total cost			
Owner (owned land)	63,253(11,170)	60,981(10,583)	62,116(10,878)
Owner (mortgaged land)	33,340(52,281)	29,620(55,096)	31,480(53,464)
Owner cum tenant (owned land)	70,863(76,441)	71,906(75,726)	71,384(75,701)
Owner cum tenant (mortgaged land)	19,454(62,287)	14,277(37,415)	16,865(51,178)
Owner cum tenant (leased land)	-	72,114(18,205)	72,114(18,205)
Owner cum tenant (share cropped land)	74,147(23,640)	76,070(16,318)	75,108(20,230)
Tenant (share cropped land)	76,706(20,156)	75,779(22,872)	76,242(21,452)
C.Net revenue(A-B)			
Owner (owned land)	46,773(29,438)	53,970(44,450)	50,372(37,605)
Owner (mortgaged land)	44,655(22,104)	45,641(22,659)	45,148(22,273)
Owner cum tenant (owned land)	40,667(23,659)	44,261(21,299)	42,464(22,401)
Owner cum tenant (mortgagedland)	35,955(14,017)	35,735(15,027)	35,845(14,474)
Owner cum tenant (leased land)	-	40,006(22,017)	40,006(22,017)
Owner cum tenant (share cropped land)	21,026(14,781)	22,937(18,276)	21,981(16,706)
Tenant (share cropped land)	26,035(16,205)	29,313(22,203)	27,674(19,407)

Source: Field survey, 2013 Note: Figures in the parentheses indicate Std. Deviation.

From the net revenue analysis of different farming categories, it is concluded that there is a similar trend of net revenue obtained in Basail Upazila, Titas Upazila, and even study areas in different patterns of cultivated land by the tenure categories. In the owner category, the net revenue of owned land was higher than owner operated mortgaged land. Owner cum tenant operators obtained higher net revenue in owned land than that of share cropped, leased, and mortgaged land. Again, owner operators obtained the highest net revenue per hectare from owned land. These highest net revenues were Tk. 46,773, Tk. 53,970, and Tk.50,372 in Basail Upazila, Titas Upazila, and study areas, respectively. The lowest net revenue was obtained by the owner cum tenant operators from share cropped land. These lowest net revenues were Tk. 21,026, Tk. 22,937, and Tk. 21,981 in Basail Upazila, Titas Upazila, and study areas, respectively. Again, net revenue per hectare from the share cropped land of tenant farmers was higher than share cropped land of owner cum tenant farmers.

3.5 Benefit cost ratio (BCR) of the farmers

Table 5 presents BCR of the different categories of land among farmers under different tenurial arrangements in the study areas.

It was found that the highest BCR (3.13) was obtained by owner cum tenant farmers from mortgaged land and the lowest BCR(1.29) was obtained by owner cum tenant farmers from share cropped land in overall. Again, the BCR in leased land (1.55) of owner cum tenant farmers was higher than this share cropped land (Table 5).The results are in conformity with the findings of Majumder and Roy (2009).

Table 5. Benefit cost ratio (BCR) of crop cultivation under different land tenure arrangements.

Different categories of land in farming	Basail Upazila	Titas Upazila	Over all
Owner (owned land)	1.74	1.89	1.81
Owner (mortgaged land)	2.34	2.54	2.43
Owner cum tenant (owned land)	1.57	1.62	1.59
Owner cum tenant (mortgaged land)	2.85	3.50	3.13
Owner cum tenant (leased land)	-	1.55	1.55
Owner cum tenant (share cropped land)	1.28	1.30	1.29
Tenant (share cropped land)	1.34	1.39	1.36

Note**:** Though there is a legal provision of 50:50 input cost and output sharing in share cropping arrangements according to the land reform ordinance 1984, but in reality this is not practiced in input cost sharing rather it is practiced only in case of output sharing based on customary rule (Source: Field survey,2013).

3.6 Impact of socio-economic variables on gross revenues of the share cropped land of owner cum tenant farmers

Table 6 presents the summary result of the impact of socio-economic variables on gross revenues. Six production cost related and nine other socio-economic explanatory variables were regressed against gross revenues. From the analysis, it was found that the direction of the response of weedicide (X_6) was as per the hypothesis and this weedicide (X_6) had significant positive impact on gross revenues, indicates that 1 Taka increase in weedicide cost (X_6) leads to an increase the gross revenues by 311 Taka. This might be for better utility of weedicide (X_6) in agricultural production. Other production cost related variables did not show significant impact on gross revenues.

The direction of the response of non-production cost related variables, namely age (X_7), education (X8), occupation(X9), farm size (X11), and off-farm income (X12) were as per hypothesis and significant. It indicates that 1 year increment of age (X_7) leads to increase the gross revenues by 6,416 Taka. This might be for better utility of experience in farming due to age (X_7).1 year increase of education (X_8) leads to increase gross revenues by 32,842 Taka. This might be better utility of education (X_8) in farming. This result is in conformity with the finding of Asadullah (2005). If farming is treated as primary occupation (X_9), that leads to increase the gross revenues by Tk. 96,071 compared to those who are adopting farming as secondary occupation (X_9). This might be due to better incentive from farming.1 hectare increment of farm size (X_{11}) leads to increase gross revenues by Tk. 54,460.This might be for the better utilization of the farming resources. 1 Taka increase in the investment of off-farm activities (X_{12}) leads to increase gross revenues by Tk. 0.81.

This might be due to non-profitability of off- farm income (X_{12}) sources when exact cost accounting is applied. Still then owner cum tenant farmers engaged themselves in these off-farm income activities to employ their disguise unemployed labour and other farming resources. The coefficients of family labour (X_{10}) and livestock (X_{15}) were significant, but did not show expected sign. For the case of family labour (X_{10}), this might be for the disguise unemployment of labor (X_{10}). In case of livestock (X_{15}), this might be the livestock reared in owner cum tenant farming in rented in system of livestock is not economically viable when exact cost accounting is considered, but still then owner cum tenant farmers were rearing these rented in livestock (X_{15}) to utilize their farming resources. Other non-production cost related socio-economic variables did not show significant impact on gross revenues.

Table 6. Parameter estimates of OLS regression model.

Variables	Measurement unit	Expected sign	Owner cum tenant farmers (share cropped land)	
Production cost related variables:			Co efficient	P- value
Labor(X_1)	Cost in BDT	+	3.29(9.99)	0.742
Mechanized power(X_2)	Cost in BDT	+	-5.72(14.67)	0.698
Seed(X_3)	Cost in BDT	+	-15.74(10.76)	0.147
Chemical fertilizer(X_4)	Cost in BDT	+	-2.99(3.65)	0.414
Irrigation(X_5)	Cost in BDT	+	3.97(3.41)	0.247
Weedicide(X_6)	Cost in BDT	+	311（104.95)	0.004***
Non- production cost related variables:				
Age (X_7)	Year	+	6,416 (2,065.87)	0.003***
Education (X_8)	Year of formal education	+	32,842 (10,965.37)	0.004***
Occupation (X_9)	Dummy, 1=Primary0= Secondary		96,071 (51,634.92)	0.066*
Family Labor (X_{10})	LFU[3]	+	-3,658 (13,695.79)	0.028**
Farm size(X_{11})	Hectare	+	54,460 (26,440.14)	0.043**
Off farm income(X_{12})	BDT	+	.81 (.44)	0.070*
Extension services(X_{13})	Yes/No	+	39,515 (38,444.83)	0.307
Disease management(X_{14})	Yes/ No	+	-14,620 (39,244.75)	0.710
Livestock (X_{15})	LSU[4]	+	-36,505 (11,419.54)	0.002***
Constant	BDT	+	-308,002 (145,244.9)	0.037**

Note: Number of observation: 100, R-squared=65,Root MSE =99,280, BDT= Bangladesh Taka,

Figures in the parentheses indicate Std. Err., ***= Significant at1 percent level, **=Significant at 5 percent level, and *= Significant at 10 percent level

Conclusions and Recommendations

We analyzed BCR analysis, it is found that the highest BCR was obtained by owner cum tenant farmers from mortgaged land and the lowest by owner cum tenant farmers from share cropped land. Again, this BCR in leased land was higher than this share cropped land. Moreover, regression analysis reveals that the impact of socio-economic variables on gross revenues of the share cropped land for owner cum tenant farmers; weedicide, age, education, occupation, off-farm income including farm size had significant positive impact on gross revenues.

From the foregoing discussion, it can be discerned that there is a potentiality of agricultural improvement by encouraging lease system in providing microcredit support for the farmers. Implementation of this lease system might be helpful to lead to attain higher gross revenue attaining higher profit as well as higher gross production and technological transformation for the betterment of agricultural production in Bangladesh.

Notes

(1) HHH stands for house hold head

(2) IC stands for irrigation cost. This irrigation cost is paid in kind as one fourth of the total produced crop;

(3) Labour force unit (LFU) is the measurement of family labour, where people from 15-59 years regardless of sex were categorised 1 person=1 LFU, but in case of children 10-14 and elderly people more than 59 years old 1 person= 0.5 LFU;

(4) Livestock unit (LSU) is the aggregate of different types of livestock kept at household standard unit calculated using following equivalents;

1 adult buffalo = 1 LSU,1 immature buffalo= 0.5 LSU 1 cow= 0.8 LSU, 1sheep or goat= 0.2 LSU and 1 poultry or pigeon=0.1 LSU (Khanal and Maharjan,2013)

References

Asadullah, N. M. 2005. Farm Productivity and Efficiency in Rural Bangladesh: The Role of Education Revisited SKOPE, Department of Economics university of Oxford, UK.

Bangladeshbureau of Statistics (BBS). 2011. Year Book of Agricultural Statistics of Bangladesh Bureau of Statistics Ministry of Planning, Government of the People`s Republic of Bangladesh, Dhaka.

Bamatraf, A. R. 2000. Impact of Land Tenure and other Socioeconomic Factors on Mountain Terrace Maintenance in Yemen, International Food Policy Research Institute, Washington D.C, USA.

Bilkis, R. 2012. Trend in productivity research in Bangladesh Agriculture: A Review of Selected Articles, Asian Business Review, Vol. 1.

Department of Agricultural Extension (DAE).2013. Department of Agriculture Extension, Tangail and Comilla districts, Bangladesh.

Fujita, K. 2010. Re-thinking Economic Development: The Green revolution Agrarian Structure and Transformation in Bangladesh, Centre for South East Asian Studies, Kyoto University, Japan.

Hossain, M. 1991.Agriculture in Bangladesh: Performance, Problems, and Prospects. The University Press limited, Bangladesh. Pp.399.

Khanal, N. P. and K. L. Maharjan. 2013. Technical efficiency of rice seed growers in the Tarai region of Nepal. *Journal of Rural Problems* **49**(1): 27-31.

Land Reform Board (LRB).1982. Land reform report of land reform committee, Land Reform Board, Ministry of Land, Government of the People`s Republic of Bangladesh, Dhaka.

Majumder, L. Mozumdar and P.C. Roy. 2009.Productivity and resource use ffficiency of Boro Rice Production. Journal of *Bangladesh Agricultural University* **7**(2): 247-252

Maharjan, K. L. 1997. Impacts of Irrigation and Drainage Schemes in Bangladesh, Center for Regional Geography, Hiroshima University, Japan.

Tenaw S., K. M. Z. Islam and T. Parviainen. 2009. Effects of Land Tenure and Property Rights on Agricultural Productivity in Ethiopia, Namibia and Bangladesh University of Helsinki, Department of Economics and Management, Helsinki, Finland.

Ullah, M. 1996. Land Livelihood and Change in Rural Bangladesh, University Press Limited, Bangladesh, Pp.74.