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# AN ECONOMIC STUDY ON TRANSPLANTED AMAN RICE PRODUCTION UNDER ALTERNATIVE CROP SHARING ARRANGEMENT IN SELECTED AREAS OF MYMENSINGH DISTRICT

**Hossain MR, Mollah AR, Ahmed JU[1], Alamgir MS [2] and Rahman MM[3]**

*Former MS Student, Prof, Dept. Agril. Econ, BAU, Mymensingh, [1]Assoc. Prof, Dept. Agril. Econ & Policy, SAU, Sylhet; [2]Asst. Prof,. Dept. Agril. Finance & Banking, SAU, Sylhet; [3]Lecturer, Dept. Agril. Marketing & Business Management, SAU, Sylhet*

## ABSTRACT

The study was designed to conduct an economic study of transplanted *Aman* rice production under alternative crop sharing arrangement in some selected areas of Sadar Upazila in Mymensingh district. A stratified random sampling technique was followed for conducting field survey. A total of 64 farmers were selected, of which 32 sample farmers were under fifty-fifty sharing arrangement and 32 sample farmers under the crop sharing arrangement. The findings came up from this study that fifty-fifty sharing arrangement is not profitable for tenant farmer and higher production inputs were used in this arrangement. On the other hand, crop sharing arrangement is profitable for tenant farmer. In this arrangement BCR is 2.33, which is 30.17 percent higher than fifty-fifty sharing arrangement. A Cobb-Douglas production function model was applied to determine the effect of key variables on transplanted *Aman* rice production. Most of the variable has significant impact on *Aman* rice production. Income distribution calculation through Gini-coefficient showed that, in crop sharing arrangement income of owner and tenant is more equitably distributed than fifty-fifty sharing arrangement. Labor availability is the main problems in both sharing arrangements were identified through problem ranking table.

***Key Words:*** *Aman rice production, Crop sharing, Profitability, Economic efficiency*

## INTRODUCTION

In Bangladesh per capita cultivated land is only 12.5 decimals. It is claimed that the agricultural land is converting by 1.00 percent per year. The annual conversion of farm land in six divisions of Bangladesh is estimated 0.56 percent and the country losses rice reduction between 0.86 to 1.16 percent. Converted land is used to construction of houses, followed by construction of roads and business enterprises. The poor records higher rates of land conversation .Two determinants factor of conversion are ownership size of household and non-agricultural occupations of the households (Quasem, 2011) and the land quality is deteriorating owing to degradation of soil fertility (e.g. nutrient imbalance), soil erosion and soil salinity. In addition, water resources are also shrinking. In order to produce more food for an increasing population, and raw materials for agro-industries, there is a need for increasing agricultural growth through higher productivity, including increased yield, agricultural intensification and diversification, and value addition.

Leasing arrangements are confined to the cultivation of various cash crops; this process is accelerating the landlessness in rural Bangladesh. The small and marginal farmers comprise the poorest segment of the rural population. With the rise in input costs, most of the holdings are becoming unfeasible for cultivation and they are opt to lease out their small farms to the larger commercial ones that employ more capital intensive technique in order to ensure economies of scale. In this way, they are loosing their lands on hand and are becoming poorer than earlier. The specific objectives of the study are as follows: i) to address the different sharing arrangements in *Aman* rice production; ii) to determine the costs, returns and profitability in the *Aman* rice production; iii) to identify factors affecting gross returns in *Aman* rice production; and iv) to identify the problems in sharing arrangements and suggest some policy recommendation.

The Aman rice is a major crop in Bangladesh. In Bangladesh 13993 thousands acre of land is cultivated and 12207 MT produced 2009-10 year (BBS, 2010). It is widely cultivated over the Bangladesh due to excellent taste and aromatic property of its commonly produced varieties.

The sharecropper and the landowner each receive one-third of the crop; the remaining one third is allocated based on each party's share of the costs. The sharecropper has a right of first refusal to purchase the land at market price (Shafi and Payne, 2007). The extent of share tenancy in rural Bangladesh has been declining giving way to fixed rent tenancy or cash tenancy and medium term leasing arrangements. These institutional changes are assumed to enable tenants to derive some of the benefits of additional investment in agriculture inputs. Cash tenancy has been crop and season specific and has been confined to the cultivation of HYV rice in the *Boro* and *Aman* season. Thus, households associated with fixed rent contracts have the lowest crop diversity. Productivity is also higher on fixed-rented land than on sharecropped land (Uddin and Haque, 2009). Sharing arrangement on agricultural farm is common in Bangladesh. This helps the small farmers to increase their cropping areas. Also it allows the big land owners to lease out their fallow lands which remains uncultivated and which they fail to operate efficiently. Sharing arrangement affects productivity of workers and hence the potential market for non-agricultural products and services, capital and labor to be realized for other sectors. Different types of sharing affect the production and use of resources by different degree of incentives and disincentives. Small farmers do not have enough capital, modern input and improved technology. Therefore, agricultural production remains low. Since most small farmers do need incentives to raise the output. Above mentioned aspects reveals necessity of study and evaluate the sharing arrangements from economic point of view. The present study proposes to indicate how far the prevailing sharing arrangement provides incentive to the farmers and landlords in efficiently using resources. It also conducted with the view: to identify socio-economic

characteristics of the Aman rice producers; to address the different sharing arrangements in Aman rice production; and to identify the problems in sharing arrangements and suggest some policy recommendation.

## MATERIALS AND METHODS

Primary data collection conducted at four selected villages namely Kismot, Maijbari, Mirjapur and Rahmatput under khagdahar union located in the West of Mymensingh Sadar Upazila from January to March 2012. Stratified random sampling technique was used to select sample farmers under these two sharing arrangements. a) Fifty-fifty sharing arrangement, where owner carry fifty percent cost of percent of seed, fertilizer, irrigation, pesticide and take fifty percent of the produces (Locally called "*Borga Chas*"). b) The owner takes one mound paddy or equivalent cash but does not carry any cost, tenant bear all costs produces (Locally called "*Chuktibagi*"). A list of farmers following various sharing practices in the research area was made with the help of key informant and Members of the Union Parishad and 64 farmers (16 from each village) were selected for discussion and necessary data. The simple calculations (sum, average, percentage, gross return etc.) arithmetic techniques were used, Cobb-Douglas type production function was used to identify the contribution of the most important variables in the production process and Gini-coefficient was calculated to see income distribution of sample farmers.

Cobb-Douglas production function is

$$Q = \alpha \, L^{\beta 1} \, K^{\beta 2} e^{ui}$$

The liberalized by converting the variables into logarithmic form, thus the empirical specification of the function as follows:

$\ln Yi = \ln a + b_1 \ln X_i + b_2 \ln X_i + b_3 \ln X_i + b_4 \ln X_i + b_5 \ln X_i + b_6 \ln X_i + b_7 \ln X_i + U_i$

Where, Y = Gross return (Kg);
ln = Natural logarithm;
ln a = Intercept or constant term;
$X_1$ = Human labor (Man days);
$X_2$ = Seed (Kg);
$X_3$ = Power tiller cost (Tk.);
$X_4$ = Inorganic fertilizer (Kg);
$X_5$ = Organic fertilizer (Kg);
$X_6$ = Irrigation cost (Tk.);
$X_7$ = Insecticide (Kg);
$X_8$ = Sharing arrangement (Dummy);
b1, b2, b3 ...b = Coefficient of the respective variables;
Ui = Disturbance term; and
i = 1, 2, 3,.,, 32.

Also, Gini ratio was used to show the income distribution, both owner farmers and tenant farmers.

$$G = \left| \sum P_1 I_{i+1} - \sum P_{i+1} I_i \right|$$

Where, G = Gini co-efficient;
$P_1$ = Cumulative percentage of farmers; and
$I_i$ = Cumulative percentage of income.

## RESULTS AND DISCUSSION

Total *Aman* production of 2011-2012 has been estimated at 12.79 million metric tons as compared to 12.79 million metric tons which is 0.05 percent higher than that of last year (BBS, 2010). Per hectare gross return from *Aman* rice production includes the monetary value of physical produces obtained from the production process. Here, the output includes the physical quantities of main product (paddy) and by-product (paddy straw). Total return was estimated by multiplying, the total physical quantities of both main product and by-product by their respective market prices.

Most of human labor used in *Aman* rice production is unpaid. In both sharing arrangements owner does not provide any labor or cost for human labor. In both arrangement tenant has to bear this cost and give own, family labor. In crop sharing arrangement, total human labor cost is Tk. 20705.38 (Table 2) and Tk. 28643.2 for fifty- fifty sharing arrangement (Table 1).

In the study area, farmers used both home supplied and purchased seedlings. The costs of home supplied seedlings were determined at the ongoing market rate in the study area and costs of purchased seedlings were calculated on the basis of actual prices paid by the farmers. Per hectare costs of seedlings of *Aman* paddy was total Tk.1073.75 which share by owner and tenant farmers under fifty- fifty sharing arrangement (Table 1). Per hectare seedling costs for producing *Aman* paddy were Tk.892.08 for tenant farmers, under crop sharing arrangement (Table 2).

Optimum dose of fertilizer is a major requirement for *Aman* paddy production. The sample farmers used three kinds of chemical fertilizer namely Urea, Triple Super Phosphate (TSP), Muriate of Potash (MP) and Gypsum. The costs of fertilizers were calculated by the prevailing market rate, the farmers for the concerned. Per hectare total costs of fertilizers were Tk. 3953.11, Tk. 3310.13 and respectively, for fifty- fifty sharing arrangement and crop sharing arrangement, respectively (Table 1 & 2).

Table 2 shows that per hectare Urea, TSP, MP, Gypsum cost was TK. 1294.96, TK. 1081.18, TK. 508.85, and TK. 91.41 respectively. All of these costs were shared by owner and tenant fifty-fifty basis. Table 3 shows that in crop sharing arrangement where owner bear no cost, per hectare costs of fertilizers as Gypsum was Tk.82.86, MP cost was Tk. 348.71, TSP cost was 1038.0 and Urea cost was Tk.1028.7.

Irrigation is not so important input for the production of *Aman* paddy production. In the study area, most of the sample farmers used on shallow tube-wells (STWs) and deep tube-wells (DTWs) for irrigation because it was required. These tube-wells were diesel operated and/or electricity operated. Some of the irrigation water user had their own tube-wells while others purchased water. The cost of water was charged at fixed rate for per unit area of irrigated land.

**Table 1. Per hectare cost and return of *Aman* rice production under "Fifty-Fifty sharing arrangement"**

| Items | Fifty-Fifty sharing arrangement | | | | |
|---|---|---|---|---|---|
| | Owner | Tenant | Total quantity (kg ha$^{-1}$) | Price (Tk. Unit$^{-1}$) | Total value (Tk. ha$^{-1}$) |
| **A. Total return** | | | | | |
| Paddy (kg) | 2327.16 | 2327.16 | 4654.32 | 15 | 69814.8 |
| Straw (kg) | 902.57 | 902.57 | 1841.1 | 3.50 | 6443.9 |
| Total (Tk.) | 38066.4 | 38066.4 | | | 76258.7 |
| **B. Total cost** | | | | | |
| **Human labor(man-days)** | | | | | |
| Unpaid Male | - | 55 | 55 | 250 | 13750 |
| Female | - | 18.66 | 18.66 | 250 | 4665 |
| Hired | - | 40.91 | 40.91 | 250 | 10228.2 |
| Seedlings | 18.40 | 18.40 | 36.81 | 42 | 1043.7 |
| **Inorganic fertilizer (kg)** | | | | | |
| Urea | 30.83 | 30.83 | 61.66 | 21 | 1294.9 |
| TSP | 18.01 | 18.01 | 36.03 | 30 | 1081.1 |
| MP | 15.9 | 15.90 | 31.80 | 16 | 508.8 |
| Gypsum | 4.57 | 4.57 | 9.14 | 10 | 91.41 |
| Organic fertilizer | 162. 8 | 162.8 | 325.57 | 03 | 976.7 |
| Insecticide (Kg.) | 2.31 | 2.31 | 4.62 | 140 | 647.6 |
| Irrigation (Tk.) | 525.6 | 525.6 | - | - | 1051.2 |
| Power tiller(Tk) | - | 4726.4 | - | - | 4726.4 |
| Interest on operating cost | 1231.4 | 1231.4 | - | - | 2463.9 |
| Total (Tk.) | 4579.8 | 37949.5 | | | 42529.3 |
| Net return(Tk.) | 33486.5 | 116.8 | | | 33729.3 |
| BCR | 8.31 | 1.00 | | | 1.79 |

*Source: Field survey, 2012.*

**Table 2. Per hectare cost and return of *Aman* rice production under "Crop sharing arrangement"**

| Items | Crop sharing arrangement | | | | |
|---|---|---|---|---|---|
| | Owner | Tenant | Total quantity (Kg ha$^{-1}$) | Price (Tk. Unit$^{-1}$) | Total value (Tk. ha$^{-1}$) |
| **A. Total Return** | | | | | |
| Paddy (kg) | 1347 | 3013.6 | 4360.6 | 15 | 65409.6 |
| Straw (kg) | - | 1465.4 | 1465.4 | 3.50 | 5129.1 |
| Total (Tk) | 20205 | 50333.8 | | | 70538.8 |
| **B. Total Cost** | | | | | |
| **Human Labor (man-days)** | | | | | |
| Unpaid Male | - | 44.63 | 44.63 | 250 | 11158.1 |
| Female | - | 08 | 08 | 250 | 2000 |
| Hired | - | 30.18 | 30.18 | 250 | 7547.2 |
| Seedlings | - | 41.96 | 41.96 | 42 | 892.0 |
| **Inorganic fertilizer (kg)** | | | | | |
| Urea | - | 48.98 | 48.98 | 21 | 1028.7 |
| TSP | - | 34.60 | 34.60 | 30 | 1038.0 |
| MP | - | 21.79 | 21.79 | 16 | 348.7 |
| Gypsum | - | 8.26 | 8.26 | 10 | 82.68 |
| Organic fertilizer | - | 270.6 | 270.6 | 03 | 811.9 |
| Insecticide | | 3.09 | 3.09 | 140 | 433.9 |
| Irrigation (Tk) | - | 488.8 | - | - | 488.8 |
| Power tiller | - | 2643.6 | - | - | 2643.6 |
| Interest on operating cost | - | 1708.5 | | - | 1708.5 |
| Total cost | - | 30182.5 | | | 30182.5 |
| Net return | 20205 | 40356.2 | | | 40356.2 |
| BCR | | 1.67 | | | 2.33 |

*Source: Field survey, 2012.*

**Table 3. Income distributions of sampled farmers**

| Sharing Arrangements | Entity | Gini-coefficients |
|---|---|---|
| Arrangement 1 | Owner | 0.10 |
| | Tenant | 0.42 |
| Arrangement 2 | Owner | 0.27 |
| | Tenant | 0.38 |

*Source: Field survey and author's estimation, 2012*

All irrigation water charges were paid in cash. It does cost Tk. 50.00 per 6.50 decimals (*Katha*). Per hectare costs of irrigation were Tk.525.63, and Tk.525.63 for owner and tenant farmers under fifty-fifty sharing arrangement, respectively (Table-2) and per hectare costs of irrigation was Tk. 488, for tenant farmers under crop sharing arrangement (Table 2).

In the study area, *Aman* paddy growers used different kinds of insecticides such as Basudin, Dimecron and others. Farmers often use liquid insecticide; also they use solid insecticide which used fertilizer to use in *Aman* production field. Per Kg solid insecticide does cost Tk. 140.00. The cost of insecticides was computed on the basis of the actual price paid by the farmer. Per hectare costs of Urea were Tk. 323.83 and Tk.323.83 for owner and tenant farmers under fifty-fifty sharing arrangement, respectively (Table-2) and per hectare costs of insecticide was Tk. 433.97, tenant farmers under crop sharing arrangement (Table 2).

For quick land preparation particularly for *Aman* paddy, the use of power tiller is very important. In the study area, farmers were used power tiller for land preparation. The payment involved rental charge of the power tiller and the driver's cost. It was used on hired basis. Power tiller was purchased on co-operative basis; shareholders get special benefit from it. Per hectare power tiller costs for producing *Aman* paddy was Tk. 4726.48and tenant farmers, under fifty-fifty sharing arrangement tenant has to bear this cost alone (Table 2). Per hectare power tiller costs for producing *Aman* paddy was Tk. 2643 for tenant farmers, under crop sharing arrangement (Table 2).

Interest on operating cost (OC) was determined on the basis of opportunity cost principle. The operating capital actually represented the average operating costs over the period because all costs were not incurred at the beginning or at any fixed time. The costs were incurred throughout the whole period. Interest on operating capital charged on cash cost only, such as human labor, animal labor, power tiller, seedlings, fertilizers, insecticides, irrigation, etc. Interest on operating capital was charged for the crop season at the rate of 12 percent per annum. Interest on operating capital for fifty-fifty sharing arrangement, was Tk. 1231.4 for owner, same for tenant and for crop sharing arrangement, it was Tk. 1708.5 (Table 1 & 2).

Per hectare total costs is Tk. 4579.85 and Tk. 37949.53 for owner and tenant farmers under fifty-fifty sharing arrangement, respectively (Table 1) and total cost is Tk. 42529.39. Per hectare total costs is Tk. 30182.54, which is beard by the tenant farmer alone under crop sharing arrangement (Table 2).

Per hectare yield of product was 4654.32 Kg. and byproduct 1841.13 Kg. under fifty-fifty sharing arrangement where owner and tenant farmer sharer total output fifty-fifty basis. Per hectare total return is worth Tk. 76258.76.Net return is Tk. 33486.55 and Tk. 116.87 for owner, tenant, respectively. It is very clear that tenant can't make profit in fifty-fifty sharing arrangement because tenant has to bear major cost solely as labor cost, power tiller cost, which comprises most of the operating cost (Table 1).

Per hectare yield of product was 4360.64 Kg. and byproduct 1465.48 Kg. under crop sharing arrangement where owner takes product 1347 Kg in per hectare and tenant farmer 3013.64 Kg per hectare. Total byproduct is taken by tenant who is worth enough Tk. 5129.18. Net return is Tk. 20205 and Tk. 40356.24 for owner; tenant respectively under crop sharing arrangement. It looks like huge difference in net return, tenant farmer gets almost twice than owner farmer (Table 2).

***Income distribution of sample farmers***

The value of Gini-coefficient for owner and tenant are 0.10, 0.42 respectively. The values represent equitable distribution of income both for owner and tenant in sharing arrangement 1. Also in sharing arrangement 2 incomes of both owner and farmer are equitably distributed, but income distribution in sharing arrangement 2, is much better than sharing arrangement 1 (Table 3).

**Table 4. Estimated values of regression coefficients and related statistics of Cobb-Douglas type production function**

| Variables | Estimated coefficients | Standard error | t- value | Significant |
|---|---|---|---|---|
| Constant | 05.76 | 0.625 | 9.261 | |
| Labor use ($X_1$) | 0.462 | 0.184 | 2.510 | ** |
| Seed use ($X_2$) | 0.652 | 0.113 | 5.769 | *** |
| Power tiller cost ($X_3$) | 0.312 | 0.152 | 2.052 | ** |
| Inorganic fertilizer use ($X_4$) | 0.261 | 0.115 | 2.269 | ** |
| Organic fertilizer use ($X_5$) | 0.082 | 0.033 | 2.484 | ** |
| Irrigation cost ($X_6$) | 0.222 | 0.060 | 3.666 | *** |
| Insecticide use ($X_7$) | -0.179 | 0.116 | -1.543 | |
| Sharing arrangement($X_8$) | 0.027 | 0.084 | 0.325 | |
| $R^2$ | | 0.837 | | |
| Adjusted $R^2$ | | 0.804 | | |
| F-value | | 24.97 | | *** |
| Returns to scale | | 1.837 | | |

*Source: Author's estimation based on field survey, 2012.*

*Note: *** = Significant at 1 percent level; **= Significant at 5 percent level; and *=Significant at 10 percent level;*

***Interpretation of the Estimated Model***

Constant represents the composite impact of all other influencing variables that are excluded from the model. In the estimated model constant value is 5.76 (Table 4).

**Human labor use ($X_1$):** The estimated value of the coefficient of human labor use is 0.462, which was significant at 5 percent probability level. Thus, there was a positive relationship between human labor unit use and gross return. That is, 1 percent increase in human labor unit use will increase 0.46 percent gross return holding other variables constant (Table 4).

**Seed unit use ($X_2$):** The coefficient of seed use is 0.652. This indicates, holding other variables constant, 1 percent increase in the seed unit use will cause, increase in the gross return 0.652 percent (Table 4).

**Power tiller cost ($X_3$):** The estimated coefficient of power tiller cost was 0.31. That means, 1 percent increase in the power tiller cost will raise the gross return 0.31 percent, keeping other variables constant (Table 4).

**Inorganic fertilizer use ($X_4$):** The estimated value coefficient of inorganic fertilizer use is 0.261. This value is significant at 5 percent probability level. It can be said that 1 percent increase in inorganic fertilizer unit use will result to an increase of gross return by 0.26 percent keeping other factors constant (Table 4).

**Organic fertilizer unit use ($X_5$):** The estimated value coefficient of organic fertilizer (cow dung) use is 0.082. This value is significant at 5 percent probability level. It can be said that 1 percent increase in inorganic fertilizer unit will result to an increase of gross return by 0.08 percent keeping other factors constant (Table 4).

**Irrigation cost ($X_6$):** The estimated regression coefficient of irrigation cost was 0.222 and was significant at 10 percent probability level. It can be said that considering all other variables unchanged, l percent increase in irrigation cost will bring us 0.22 percent increase in gross return (Table 4).

**Insecticide unit use ($X_7$):** From the table, estimated co-efficient of insecticide use is negative -0.117 and which indicated an inverse relationship between gross return and insecticide use. That means, in response to l percent increase in insecticide use, the gross return, on an average, decreased by 0.117 percent, while other variables were remain unchanged (Table 4).

**Sharing arrangement (Dummy) ($X_8$):** Sharing arrangements has positive relationship with gross return. Change in sharing arranges causes in gross return change. But the impact of sharing arrangement on gross return is in significant. Estimated coefficient is 0.027 means that production in Chuktibagi sharing arrangement is 0.027 percent higher compared to Borga Chas sharing arrangement (Table 4).

**Value of $R^2$:** The estimated value of the goodness of fit, $R^2$ of the model is 0.837, which indicated that about 83 percent of the total variation in gross return under sharing arrangement has been explained by the variables included in the model. In other words, 30 percent of the total variation in the gross return is unexplained due to the variables which were not included in the model (Table 4).

**Value of adjusted $R^2$:** The estimated value of the adjusted $R^2$ of the model is 0.804 .These values indicated that about 84.00 percent of the total variation in gross return under both sharing arrangement has been explained by the variables included in the model (Table 4).

**F-value:** The F-statistic was estimated for overall significance′ of `the estimated model. The F-values of the model derived 8.97, that all the explanatory variables included in the model were important for explaining the variation in gross return under both sharing arrangements (Table 4).

**Returns to scale:** The summation of all the regression coefficients of the estimated model gives information about the returns to scale, that is, the response of output to a proportionate change in all inputs. In the present research, the value of returns to scale is estimated as 1.84. It indicates that if all the inputs specified in the model were increased by 1 percent, the gross return of share tenants would increase by 1.83 percent (Table 4).

**Major Problems Faced by the Farmers in *Aman* rice production**

In Bangladesh farmers are facing different problems as, rapid shrinkage of agricultural land, climate change and variations, technology generation (needs expertise, time and money, technology dissemination (needs expertise, time, logistics support), alternate livelihoods/rehabilitation program, developing stress tolerant varieties, attaining irrigation efficiency, research-extension-farmer-market linkage, regaining soil fertility and natural ingredients, shortage of argil labor at peak seasons. Study areas farmers are suffering from these problems (Table 4).

Table 5 shows that sample farmers suffering from labor availability problem. It has ranked as number I problem. Labor is scarce resource in the study area. Though the farmers hardly gets labor but most of then remain unskilled. Low product price is second problem in ranking number II. Since last two years' price of paddy is very low, young farmers losing interest. Though study area (all four villages) linked with hi-way road but internal communication is really bad. Delimitative and narrow roads area not suitable for carry yields to the market. This problem ranked in number IX, by the sample farmers. And sample farmers are efficient in processing of yield; therefore it is least ranked problem.

**Table 5. Major Problems Faced by the Farmers in *Aman* rice production**

| Priority | LF | QS | CL | AIF | ATS | PRO | LA | LPP | PF | TC |
|---|---|---|---|---|---|---|---|---|---|---|
| 01 | - | - | - | - | - | - | 34 | 04 | 10 | - |
| 02 | - | - | - | - | - | - | 11 | 29 | 08 | - |
| 03 | - | 02 | 13 | - | - | - | 05 | 08 | 20 | - |
| 04 | 12 | 21 | 01 | 03 | - | - | - | 03 | 03 | - |
| 05 | 17 | 13 | 16 | 23 | 40 | 04 | - | - | 04 | 01 |
| 0 | 02 | 01 | - | - | 04 | 40 | - | 01 | - | 41 |
| Index | 0.26 | 0.32 | 0.38 | 0.22 | 0.20 | 0.02 | 0.95 | 0.75 | 0.68 | 0.05 |
| Priority Ranking | VI | V | IV | VII | VIII | X | I | II | III | IX |

*Source: Field survey, 2012.*

*Where, LF= Lack of fertilizer; QS= Quality seed; CL= Cost of labor; AIF= Availability of irrigation facility; ATS= Availability of technical support; PRO= Processing; LA= Labor availability; LLP= Low product price; PF= Price fluctuation; TC= Transportation cost.*

**Solution to the Problems as Suggested by the *Aman* rice farmers**

1. Introducing labor cooperative association, volunteer program could meet labor demand, from where enlisted farmers will be available to make provision of and young people will occasionally work in agricultural sector.
2. For better service beneficiaries association could introduce besides cooperative basis irrigation facility to ensure better service.
3. Formers can take training, hire consultant to get technical support and time to time assistance for better Production.
4. Though it is difficult and almost nothing to do for farmers to control price fluctuation and low product price. Producers and consumers association formation could abate agricultural product prices. The Government can take efficient policy and best implication of polices could save the sector.

## CONCLUSION

The present study represented that the *Aman* rice production is profitable. But profitability varies in sharing arrangements. In fifty-fifty sharing arrangement (*Borga Chas*), relatively higher amount of input use take place but it is not profitable for the tenant farmers. Crop sharing arrangement (*Chuktibagi*)**,** is efficient and better sharing practice for tenant farmer. In both sharing arrangement owner gets benefit and economically in safer position. Nasrin (2011) also found *Boro* rice production is profitable but profitability varies with sharing arrangements and fifty-fifty sharing arrangement is less efficient than crop sharing arrangement. Therefore to enhance better economic return and efficient resource use improved crop sharing system could take place as where in both crops sharing arrangement owners will bear a certain extent of risk and uncertainty.

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