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*Full Length Research Paper*

# Product commercialization and income generation at different agricultural farms in Bogra District of Bangladesh

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**Bangladesh is a land of agriculture, forestry and fishery due to the fact that she abounds with many arable lands, rivers in her esteem deltaic plain. This is because the total economy more or less relies on the agriculture. The main objective of this study was to bring out the scenario of income and commercialization of agricultural products in the study area. By considering this, an interview schedule was made to collect data from the study area through random sampling. Kahaloo and Sherpur upazilas of Bogra were the study area. The collected data were analyzed by Statistical Packages for the Social Sciences (SPSS). Statistical tools, Gini coefficient and regression were employed for transforming data into summarized information. Through the entire investigation, it became clear that aquaculture dominates other income sources in the study area, besides the commercialization of the fishery product found greater than others. Not only was income inequality found at the lowest extent in the aquaculture sector, it was also found at the highest extent in the crops sector. Moreover, socio-demographic characters namely "farm size", "knowledge" and "commercialization" have significant relationship with income of respondents, in which "farm size" has enormous contribution to the explained total variation of income generation of respondents. Furthermore, in the case of commercialization, "income", "knowledge" and "education" have significant relationship. Among these factors, income of respondents played a vital role in contributing to the explained total variation in commercialization as a major factor. It is visualized that commercialization was provoked by income, besides, income provoked by farm size, but there is a scanty provision to get greater size farm for per person in this country because of land utilization for different purposes. In this regard, technological improvement as well as innovations might be one of the solutions.**

**Key words:** Commercialization, income, agriculture, farm size.

## INTRODUCTION

Bangladesh, a symbol of an agrarian economic country comprises 18.70% GDP share in Agriculture, Forestry and Fisheries among all other sectors of her total economy (BBS, 2013). In the fiscal year of 1993-1994, 33315 thousand acres of land was used for agricultural production; this utilization was triggered gradually to 37261 thousand acres in 2011-2012 (BBS, 2014). This scenario beckons that the arable land area has not been noticeably increasing since 1993. Moreover in this beautiful country, having all facilities regarding agricultural production facilitates around 21.34% of people to get employed with a view to curbing the unemployment situation (BBS, 2014). That is why it is a good source of income, not only that but also can be a significant export earning sector. For sustainable income from this sector, this is necessary to determine the overall commercialization status of agricultural product and income inequality in intra sector incomes. This condition

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motivated researchers to: 1) know about the present income share, commercialization of agricultural subsectors and income inequality; and 2) ascertain the affiliation among different socio-demographic factors to both income and commercialization of farmers.

## MATERIALS AND METHODS

Kahaloo and Sherpur, two esteem upazilas of Bogra district were considered as the locale of the present study. Kahaloo is located at the western part of Bogra, whereas Sherpur is located at the southern part of it. For this survey study, the researcher planned to prepare a list of farmers with the help of government officials affiliated with the agricultural sectors. Total number of farmers of these areas was 366. Only 366 fish farmers, having other agricultural activities of this area constituted the population. By using simple random technique, 110 fish farmers were taken as sample of this study. In order to collect valid and reliable information from the farmers, an interview schedule was developed in which both open and closed form questions were taken into account with a view to considering the objectives of the study. To ascertain the inequality of income from various agricultural sources such as fisheries, crops and other income sources, Gini coefficient was computed as discussed by Anonymous (2005). The Gini coefficient is a measure of inequality developed by the Italian statistician Corrado Gini and published in 1912. The Gini coefficient is calculated as a ratio of the areas on the Lorenz curve diagram. If the area between the line of perfect equality and Lorenz curve is A, and the area underneath the Lorenz curve is B, then the Gini coefficient is A/(A+B). This ratio is expressed as a percentage or as the numerical equivalent of that percentage, which is always a number between 0 and 1 (Anonymous, 2005).

On the other hand, regression was employed to bring out the information about the contribution of socio-economical factors towards income and commercialization of farmers. In this study, firstly age, education, family size, farm size, use of information sources, annual family income, social participation, innovativeness and knowledge on farming were the independent variables, whereas commercialization of agricultural products was the dependent variable. Secondly age, education, family size, farm size, use of information sources, commercialization of agricultural products, social participation, innovativeness and knowledge on farming were the independent variables, whereas annual family income was the dependent variable. To carry out this study, commercialization index is needed for calculation. That is why commercialization was calculated (Agwu et. al., 2013) by using the following formula for both the fisheries and crops sectors:

$$\mathrm{HCL}i = \frac{\text{Gross value of crop sales hh}i\ \text{year}j}{\text{Gross value of crop product hh}i\ \text{year}j} \times 100$$

The household commercialization index (HCI) was used to determine household specific level of commercialization (Govereh et al., 1999; Strasberg et al., 1999). The index measures the ratio of the gross value of crop sales by household *i* in year *j* to the gross value of all crops produced by the same household *i* in the same year *j* expressed as a percentage. The value of commercialization lies between 0 and 100. Zero indicates the lower extent of commercialization, while hundred indicates higher extent. Collected data were analyzed by both Microsoft XL and SPSS version 20 software.

## RESULTS AND DISCUSSION

### Income generation from different sources

Figure 2 depicts that ten percent income is made from crop production in the arable lands. Besides, 83% earning comes from fish farming in the natural resources such as ponds, floodplains and wetlands. On the other hand, surprisingly only 7% of the income comes from different non agricultural sources.

This scenario indicates that majority of the respondents were dependent on agricultural products and services for their livelihood. Moreover it can be stated that fish production is playing the vital role to improve the livelihood of the community at the study area due to large amount of earning from these sources than crops and other sectors as evinced in Figure 2.

### Comparison of commercialization between crop and fish products

Commercialization of the crops and fishes are noticeably high in the study area, in which fish product commercialization is more than that of the crop product. Figure 3 reveals that around 62% commercialization was made in the crops sector while 78% was made in the fish sector.

From the previous statement, it can be assumed that most of the respondents are commercial farmers in both sectors. Besides that, aquaculture is an important sector that leads those farmers to do farming commercially in the investigated area.

### Inequality of income

Figure 3 reveals that the Gini Index of fish, crop and other sources are 0.358, 0.464, and 0.406, accordingly. That estimated Gini coefficient shows the income inequality among the respondents of the society in the study area from different sources. As would be expected, the lowest inequality was observed in the fish sector than that of the crop sector and others. This situation beckons on the fact that the income variation among the respondents can be considered at small extent. This status is very influential for the fish production in the study area but not for the crop sector. There is need for subsidy in the crop sector

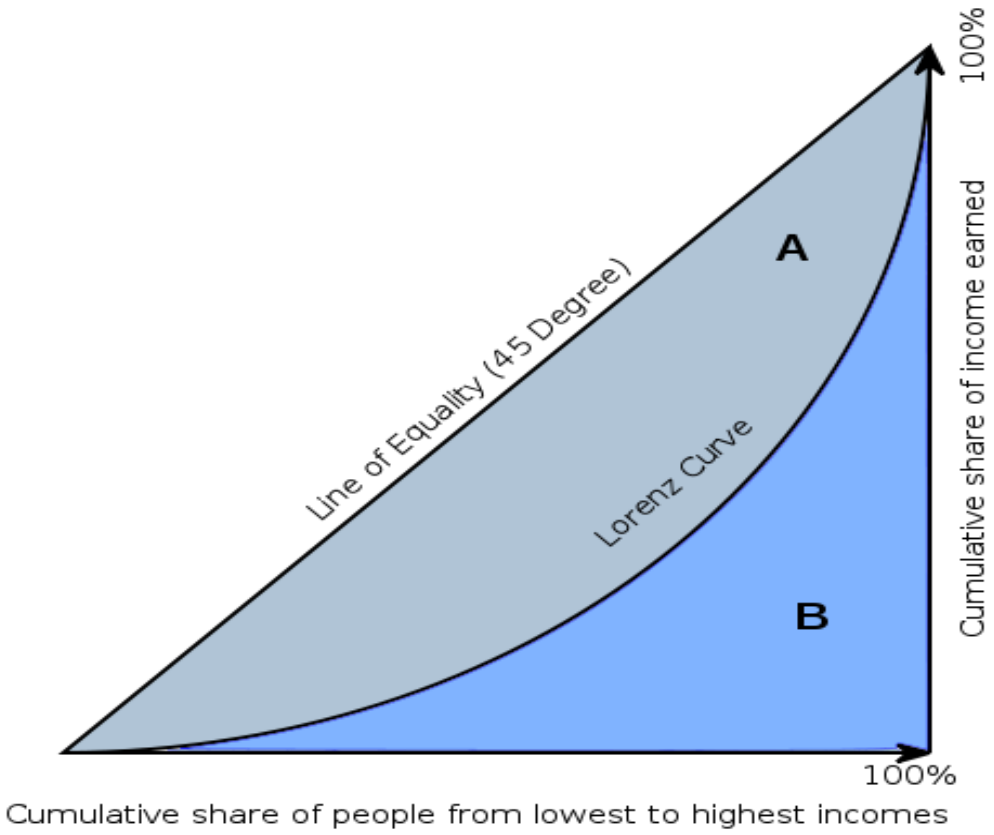


**Figure 1.** Income inequality presentation with Lorenz curve.

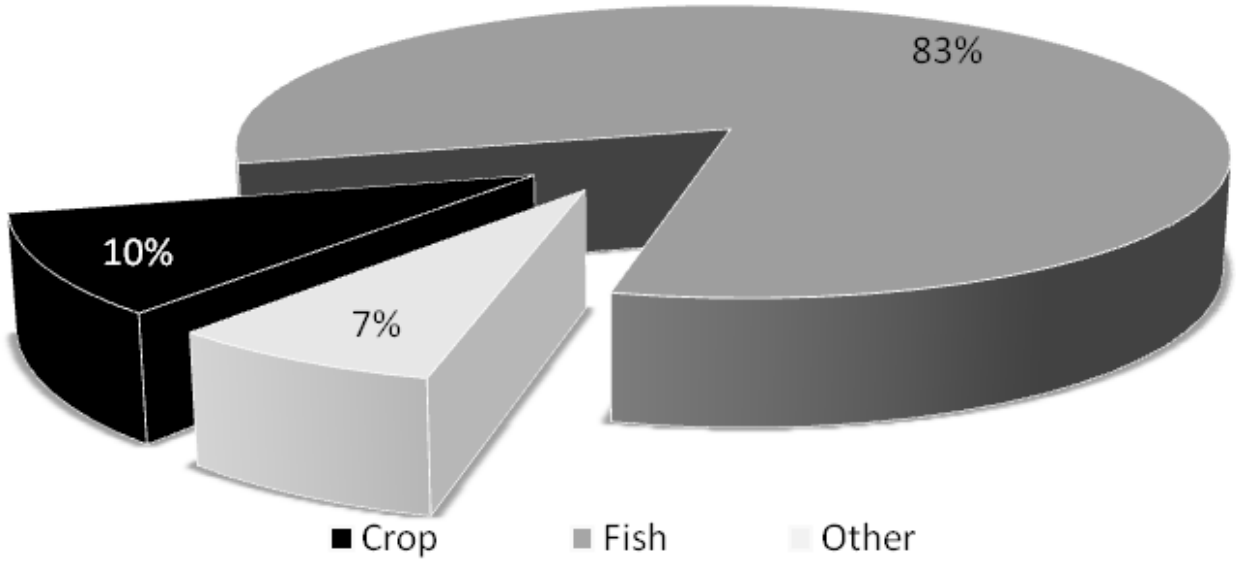


**Figure 2.** Share of income from different sources.

in different dimensions namely: inputs (seed, fertilizers, irrigation) for marginal and small farmers.

Ayinde et al. (2012) reported that Gini coefficient in rural areas regarding agriculture was 0.41 in Nigeria

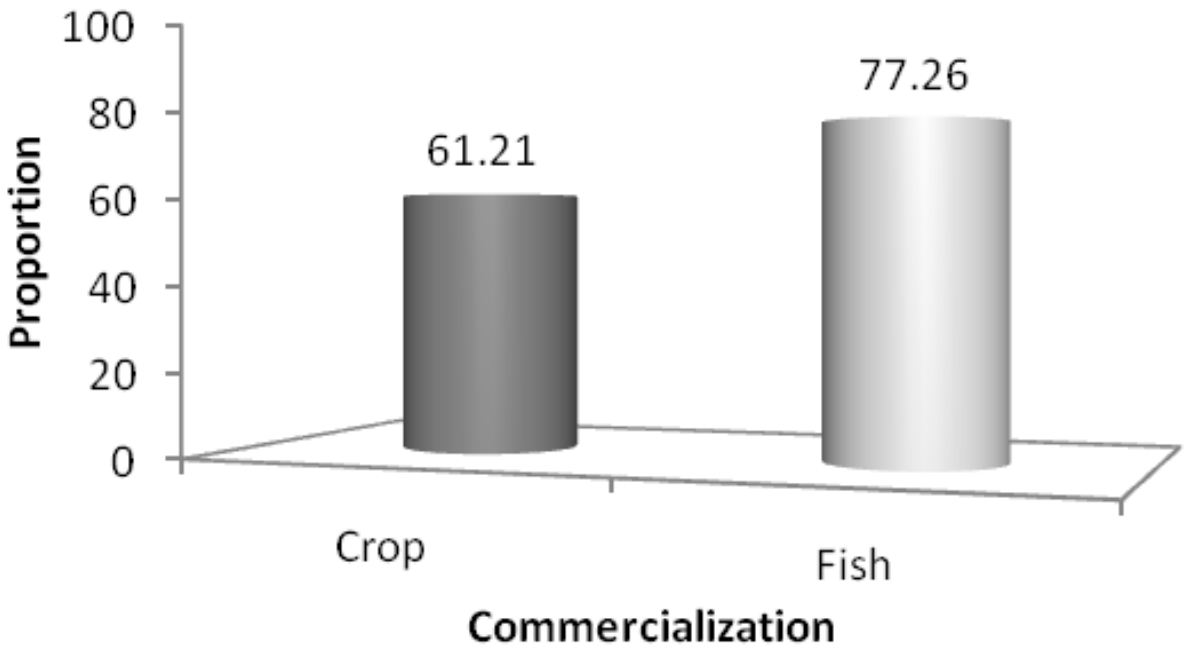


**Figure 3.** Commercialization of agricultural product.

**Table 1.** Regression coefficients of farmers' product commercialization with their characteristics entered in regression model.

| Respondents' characteristics | Coefficients | | t-value | Level of significance |
|---|---|---|---|---|
| | Unstandardized | Standardized | | |
| Constant | 78.401 | | 35.064 | 0.000 |
| 1. Income | 2.174E-005 | 0.684 | 5.940 | 0.000 |
| 2. Knowledge | -0.714 | -0.499 | -3.919 | 0.000 |
| 3. Education | 0.516 | 0.304 | 2.479 | 0.015 |
| $R^2$ = 0.380 | Adjusted $R^2$ = 0.362 | F-value= 21.623 | | P = 0.000 |

which is more or less similar to that of the present study, since the locale of this study is conducted in rural areas of Bangladesh. Besides Gini coefficient was used by Samman (2005) to allocate the income differences between different countries' economies relying on agriculture with a view to subsidize them. In this connection, subsidy is needed in the crop sector as per findings of this investigation in the study area.

**Stepwise regression analysis between product commercialization and respondents' socio-demographic characters**

Table 1 conveys the information on relationship between characteristics of respondents and their product commercialization. Socio-demographic characters of the respondents "income", "knowledge" and "education" have significant relationship with product commercialization of respondents. Stepwise regression estimated that $R^2$=0.362 thus indicates that the above three socio-demographic characters can explain 36.20% of the total variation in product commercialization of the respondents. As shown in Table 1, it is depicted that the F-value is 21.623 at 0.00 level of significance. It might explain that 0.68 unit increase of income will lead to 1.00 unit increase of product commercialization. Moreover, product commercialization will increase one unit with the 0.304 unit increase of education level of the respondents. In the case of knowledge, it shows negative relationship, thus evinces that 0.499 unit curtail will incite product commercialization to increase by one unit. Perhaps that occurred due to involvement of respondents in different social work and agricultural input businesses; this is because they could not manage enough time for their own farm to make it more efficient in production as well as commercialization.

**Table 2.** Regression coefficients of farmers' income with their characteristics entered in regression model.

| Respondents' characteristics | Coefficients | | t-value | Level of significance |
|---|---|---|---|---|
| | Unstandardized | Standardized | | |
| Constant | -634098.571 | | -6.064 | 0.000 |
| 1. Farm size | 152160.537 | 0.531 | 10.824 | 0.000 |
| 2. Knowledge | 20335.497 | 0.452 | 10.496 | 0.000 |
| 3. Commercialization | 5170.983 | 0.164 | 3.609 | 0.000 |
| $R^2$ = 0.839 | Adjusted $R^2$ = 0.835 | F-value = 184.253 | | P = 0.000 |

**Table 3.** Changes in the multiple $R^2$ for entering of a variable into the stepwise regression analysis model for agricultural product commercialization by the respondents.

| Variable entered | Multiple R | Multiple $R^2$ | Change in $R^2$ | Variation explained percent | Level of significance of F-change |
|---|---|---|---|---|---|
| 1. Income | 0.537 | 0.288 | 0.288 | 28.8 | 0.000 |
| 2. Knowledge | 0.586 | 0.344 | 0.056 | 5.6 | 0.003 |
| 3. Education | 0.616 | 0.380 | 0.036 | 3.6 | 0.015 |

**Table 4.** Changes in the multiple $R^2$ for entering of a variable into the stepwise regression analysis model for income generation by the respondents.

| Variable entered | Multiple R | Multiple $R^2$ | Change in $R^2$ | Variation explained percent | Level of significance of F-change |
|---|---|---|---|---|---|
| 1. Farm size | 0.808 | 0.652 | 0.652 | 65.2 | 0.000 |
| 2. Knowledge | 0.905 | 0.819 | 0.167 | 16.7 | 0.000 |
| 3. Commercialization | 0.916 | 0.839 | 0.020 | 2.0 | 0.000 |

**Stepwise regression analysis between income and respondents' socio-demographic characters**

Among the considered socio-demographic characters of the respondents, "farm size", "knowledge" and "commercialization" have significant relationship with income of respondents. Stepwise regression estimated that $R^2$=0.835 thus, indicates that the above three socio demographic characters can explain 83.5% of the total variation in income of the respondents. As shown in Table 2, it is visualized that the F-value is 184.253 at 0.00 level of significance. From Table 2, it can be easily illustrated that farm size, knowledge and commercialization have positive and significant relationship with the income generation of the respondents. Besides it is estimated that 0.531, 0.452 and 0.164 unit change in farm size, knowledge and commercialization accordingly will make a one unit change in income generation.

**Contribution of influential socio-economic factors**

To ascertain about the unique contribution of each explored character, it was determined by taking the changes in $R^2$ value with the help of stepwise regression model. Contributions of variables are drawn in Tables 3 and 4.

The depicted highest contribution of income is 28.8% to the total explained variance of 38.0% in commercialization of agricultural product in Table 3. The remaining two variables (knowledge and education) contributed 3.60 and 2.80% respectively. On the other hand, in Table 4, it evinces that 65.2% contribution has been made by the farm size, which was responsible for the total explained variation of 83.9% in income generation from different sources. Not only farm size, but also knowledge (16.7%) and commercialization (2.0%) contributed to the variation of income generation.

'Education' and 'farm size' have a positive role to play in enhancing commercialization of agricultural crop in Ghana, which was brought out by Edward (2012), whereas in this study it was found that income, knowledge and education have positive effect on improving the status of commercialization of agricultural product. On the other hand, Aman (2014) reported that the level of horticultural crop commercialization was

influenced by household education, household family size, irrigation, farm size, livestock, and distance to the nearest market all with expected signs which is in line with the present investigation on commercialization of agricultural products.

## Conclusion

Aquaculture dominates on other income sources in the study area, moreover commercialization of the fisheries product is found to be greater than that of any other products. Not only income inequality was found at the lowest extent in aquaculture sector, it was also found at the highest extent in the crops sector. On the other hand, socio-demographic characters namely “farm size”, “knowledge” and “commercialization” have significant relationship with income of respondents, in which “farm size” has enormous contribution to the explained total variation of income generation of respondents. Besides, in the case of commercialization, “income”, “knowledge” and “education” have significant relationship. Among these factors, income played a vital role in contribution as a major factor to the explained total variation in commercialization. It is visualized that commercialization was provoked by income and income was provoked by farm size, but there is a scanty provision to get a greater size of farm for each person in this country because of land utilization for different purposes. In this connection, technological improvement as well as innovations might be one of the solutions.

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