Effects of Marketing Practices on Farmers Profit in Northern Bangladesh

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ABSTRACT

Agriculture is the main foundation of the economy of Bangladesh. This sector contributes about 17.22% to the country's GDP and accommodates around 45.6% of the labor force. New technologies have increased over the past few decades in Bangladesh's agriculture. As a result, agricultural production in the country has grown tremendously, but due to an inefficient marketing system, farmers do not receive the advantage of the enormous output. Because of some inefficiency in the agricultural marketing system, farmers are deprived of the fair price of their produce. Several factors influence the price received by the farmers for their agricultural commodities. This study thus aims to examine marketing practice and the degree of influence of these practices on farmers' profit in Northern Bangladesh. Two districts, namely Naogaon and Dinajpur, were selected purposively from two divisions in Northern Bangladesh. Two upazillas and two villages were chosen following a simple random sampling (SRS) method for collecting data. The study used a set of questionnaires with five sections to collect data. To serve research objectives, 216 farmers were interviewed using a structured questionnaire with a face-to-face interview, and 32 key informant respondents were interviewed using a checklist. To achieve the goal, a multiple linear regression model was used, considering the farmer's profit as a dependent variable, marketing practices as an independent variable, and financial factors as an independent variable. The multiple linear regression model was estimated. The study found that almost cent percent of farmers sell their produce from farmhouses or to the rural Hat at Bepari. It was found that different types of intermediaries were functioning in agricultural marketing: farmers, Farias, Beparies, Aratders, wholesalers, Millers, cold storage owners, and retailers. Using a multiple linear regression model, it was found that three explanatory variables, i.e., the Sale of an agricultural commodity at a town market, Crop storage status, sell produce to public procurement, positively affects the farmer's profit. The remaining two explanatory variables, i.e., the Sale of agricultural commodities during the harvesting period and receiving a loan from informal sources, negatively affect the farmer's profit. Only one independent variable, i.e., Crop storing status, is a statistically insignificant factor. The rest of the four independent variables are statistically significant factors affecting farmers' profit in Northern Bangladesh.

Key words: Farmers Profit, GDP, Agricultural Production, Agricultural Marketing Systems, Farmhouse

INTRODUCTION

Agriculture in Bangladesh has directly or indirectly continued to be the most important source of livelihood for the majority of the population. Agriculture is the largest production sector of the economy and contributes about 17.22% to the country's total Gross Domestic Product (GDP). This sector also accommodates around 45.6% of the labor force (Statistical Year Book Bangladesh, 2015). The GDP growth rate of Bangladesh mainly depends on the performance of the agriculture sector.

The economy of Bangladesh is heavily dependent on agriculture. About 75 percent of the country's total cropland is used for paddy cultivation, and 35 percent of the entire household expenditure is spent on rice (Goodland, 2001). Rice is the staple food in our country. It provides 68 percent of the calorie and 45 percent of an individual's protein intake on average (Karim et al., 1997). The paddy-rice sector is a significant source of income for many Bangladeshis, with the total combined revenue from the production and marketing of rice amounting to about 27 percent of the total Gross Domestic Product (Shahabuddin & Rahman, 1998). Paddy and rice are

important for resource-poor households as cultivated crops and as significant components of foods in rural and urban areas. For these households, paddy cultivation provides an essential source of food for the family and is often a vital source of income. Markets of agricultural commodities play a critical role in the livelihoods of many of the poor in Bangladesh, providing both an outlet for selling agro products and a source of food for consumption.

Agricultural marketing can be defined as the commercial functions involved in transferring agricultural products consisting of a farm, horticultural, and other allied products from producer to consumer (Miller et al., 2000). Agricultural marketing also reflects another dimension from the supply of produce from rural to rural, rural to urban, and rural to industrial consumers (Rahman et al., 2006). In the olden days, selling agricultural produce was easy as it was directly between the producer and the consumer, either for money or barter. In brief, it was selling, not marketing. In the modern world, it has become challenging with the latest technologies and the involvement of intermediaries and commission agents who keep their margins and move the product further. It is well known that the more the number of mediatory, the more will be the costs as each transaction incurs expenses and invites profits. Ultimately, the cost of the produce goes up steep when it comes to the consumer. In the entire marketing process, the producer gets the lowest price, and the ultimate consumer pays the highest through the involvement of more intermediaries in the distribution process as a whole.

Marketing plays a significant role in value addition and generating economic employment. However, the quantity of Crops grown by the farmers depends to a large extent on the marketing facilities available in the country (Tasnoova & Iwamoto, 2006). A substantial proportion of the farming households sell a balance of the produced agro products for income, including those households classified as a deficit. The cash earned from agro-products sold on the market is frequently one of the most important sources of income for rural homes, and the level of this income is dependent upon the price received.

The amount of profit derived from farming may be somewhat dependent on the marketing practice of agricultural commodities. The main objective of this study is to estimate the effects of marketing practices on farmers' profit. For example, rural Bangladesh farmers follow conventional marketing methods for selling their agro products. In this study, we have analyzed whether the traditional practice of agro products marketing influences the farmers' profits.

THE DATA

Agriculture is the principal economic activity in most of the Northern districts of Bangladesh. This region is a surplus area and one of the significant contributors to the nation's grain supply. The marketing of agricultural commodities is a vital issue for this region. Northern Bangladesh is the northwestern part of the country. It consists of 16 districts of the Rajshahi and Rangpur divisions. Two communities, Naogaon and Dinajpur, have been selected purposively from two divisions as they possess the same sub-tropical climate and agricultural activities. After that, one Upazila from each district was established, i.e., Mohadevpur from Naogaon, out of 11 upazillas and Hakimpur from Dinajpur, out of 13 upazillas following the Simple Random Sampling (SRS) lottery method. Again as each upazilla has some unions; therefore, one union from each upazilla has been selected in the same manner. Finally, two villages were established in the same technique, i.e., one town from each union. The process of the chosen study area is shown in the following table:

Table1: Sampling procedure

Northern Bangladesh	**Purposive**	**SRS**	**SRS**	**SRS**
	Naogaon District	Mohadevpur Upazilla	Chandas Union	Baghdob Village
	Dinajpur District	Hakimpur Upazilla	Khatta Madhab Para Union	Ghonashampur Village

Determination of Sample Size and Distribution

For selecting a representative sample size, the first task of a researcher is to identify the population of the study area. The total number of households in the selected two upazillas is 98984 (Community Report, 2011). The total number of households engaged in agricultural commodities production and marketing in the selected two upazillas is 80177 (Document review, Upazila Agriculture Office, Mohadevpur, and Hakimpur). Therefore, 81% of households are engaged in agricultural commodities production and marketing in the study area. Total number of household in selected two villages is (575 + 204) = 779 and (466 + 165) = 631 households are engaged in agricultural commodities production and marketing (Community Report, 2011). Therefore, the size of the study population (N) is 631. By using the following formula, we can determine the sample size (Kotheri, 2014).

$$n = \frac{z^2.N.p.q}{e^2(N-1)+z^2.p.q} = \frac{(1.96)^2\times631\times0.81\times0.19}{(0.05)^2(631-1)+(1.96)^2\times0.81\times0.19} = \frac{373.06}{2.166}$$

$$= 172.23 = 173$$

Here,

n = Sample size

N = Total number of households (engage in agricultural commodities production and marketing)

z = Confidence level (at 95% probability = 1.96)

e = Acceptable error (error limit 5%, i.e., 0.05)

p = Estimated population proportion = 0.81 (Kotheri, 2014, p 179)

q = (1-p) = (1-0.81) = 0.19

Table 2: Sampling Distribution for Farmers

Types of Respondents	Data Collection Methods	Sample Villages	Total Households	Households Engage in Agricultural Commodity Production and Marketing (N)	Sample Households (n)
Farmer	Questionnaire Survey	Baghdob	575	N_1=466	n_1=127
		Ghonashapur	204	N_2=165	n_2= 45
Total			779	N= 631	n=172

Sample households for each village (n_i) have been calculated by using the following formula:

$$n_i = \frac{N_i}{N} \times n$$

Here,

$n_i = Size\ of\ sample\ village\ i$

$N_i = Study\ population\ of\ the\ village\ i$

$N = Total\ number\ of\ the\ study\ population$

$n = Sample\ size$

But researchers collect data from 216 farmers.

THE ANALYTICAL FRAMEWORK

The factors influencing farmers' profits are estimated using the Multiple Linear Regression (MLR) models. Multiple linear regression analysis is a technique for modeling the linear relationship between a dependent and one or more independent variables. It is one of the most widely used of all statistical methods. In the economics literature, regression analysis is a prevalent method used to find the determinants of profit (Elsiddig, 2015; Shyti et al., 2016; Baba et al., 2015; Ge et al., 2019; Stankov et al., 2015; Corraya et al., 2016) the present study involves fitting a model based on the five independent variables. MLR is a statistical technique that uses several explanatory variables to predict the outcome of a response variable. MLR aims to model the linear relationship between the explanatory (independent) variables and the response (dependent) variable. Every value of the independent variable x is associated with a value of the dependent variable y. The population regression line for p explanatory variables x_1, x_2, ..., x_n is defined to be $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots\cdots + \beta_n X_n$. This line describes how the mean response (μ_y) changes with the explanatory variables. The observed values for Y vary in their means (μ_y) and are assumed to have the same standard deviation (σ). The fitted values b_0, b_1, ..., b_n estimate the parameters 0, $\beta_1, \beta_2 \cdots \cdots \beta_n$ of the population regression line. Since the observed values for y vary about their means (μ_y) the multiple regression model includes a term for this variation. The model is expressed as DATA = FIT + RESIDUAL, where the "FIT" term represents the expression. $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots\cdots + \beta_n X_n$. The "RESIDUAL" time represents the deviations of the observed values y from their mean μ_y, normally distributed with mean 0 and variance σ^2. The notation for the model deviations is ϵ.

Formally, the model for multiple linear regression, given n observations, is

$$Y = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \cdots\cdots + \beta_n X_{in} + \epsilon \quad (1)$$

for i = 1, 2, ... n.

The present study simplifies MLR model as follows,

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon \quad (2)$$

Here,

Y = Farmers' profit

X_1 = Sell of the agricultural commodity at the town market

X_2 = Sell of the agricultural commodity during the harvesting period

X_3 = Crop storing status

X_4 = Sell produce to public procurement

X_5 = Received loan from informal sources

β_0 = Intercept of Y (Constant term)

β_1, ..., β_5 = Slope coefficients for each explanatory variable

ϵ = The models' error term (also known as the residuals)

In the least-squares model, the best-fitting line for the observed data is calculated by minimizing the sum of the squares of the vertical deviations from each data point to the bar (if a point lies on the fitted line exactly, then its vertical deviation is 0). Because the variations are first squared, then summed, there are no cancellations between positive and negative values. The least-squares estimates β_0, β_1, ..., β_5 are computed by statistical software SPSS statistics version 22.

Results and Discussion

Demographic characteristics of statistical population

Our survey result revealed that most of the farmers are young and energetic. For example, 48.6 percent of farmers are within the age limit between 25 and 45 years, and 82.87 percent of farmers lie between 30 years to 60 years, which indicate that most of the farmer are experienced in the production and marketing of agricultural commodities. The highest number of farmers lies between the ages of 45 and 50. There are three types of farm ownership visible in the study area. These are Self-ownership, Lease, and Crop Sharing (*Barga*). The result shows that 52.3 percent of the surveyed farmers have their land to cultivate. Who does not grow in the lease or crop sharing system? For example, 15.3 percent of farmers have no self-land to cultivate. Instead, they produce another farmer's land by lease or crop sharing system/method. For example, 32.4 percent of farmers have a small amount of self-land and acquire another farmer's land by lease and crop sharing.

A significant portion (37 percent) of farmers have prior education experience over five years of schooling. Twenty-five percent of them have never attended school. In addition, 22.2 percent continue their education at the SSC level. On the other hand, 15.7 percent have HSC to graduation level of formal education. Only eleven farmers out of two hundred and sixteen farmers have a higher degree.

We found the average household size of the surveyed farmers we found 4.92, and for several dependent people in farmers' families, we found 3.68 on average. We found that agriculture is the main occupation of most (94.4 percent) survey households. Only eight and four household heads are engaged in business and service accordingly, but they also cultivate the land, producing agricultural commodities. The result shows that agriculture is the rural people's primary source of income and livelihood. So, profit from farming is essential for each farmer to continue their livelihood safely.

Factors (Marketing Practices) Affecting Farmers' Profit

Table 3 present the model summary. This table provides the R, R^2, and the standard error of the estimate, which can be used to determine how well the regression model fits the data.

Table 3: Model Summary of MLR model

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.818	.669	.661	191.87

Source: Own estimation, 2019.

a. **Predictors**: (Constant), Received loan from informal sources, sell produce to public procurement, Sale of the agricultural commodity at Town Market, Crop storing status, Sale of the farming commodity at Harvesting Period

b. **Dependent Variable**: Farmers profit from paddy cultivation

The results of multiple linear regression analysis of the data showed that the regression model containing all the predictors was statistically significant. Here, we focus on the adjusted R square, which reflects the so-called R^2. The value here reflects how much of the variation in the dependent variable (farmer's profit from paddy cultivation) the independent variables explain. Finally, it was found that the independent variables explain 66.1 percent of the variation in profit earned from paddy cultivation (Table 4).

Table 4: Results of MLR model

Coefficients							
	Unstandardized Coefficients		Standardized Coefficients			95.0 percent confidence interval for B	
Variables	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
(Constant)	2688.971	40.068		6.711	.000	1899.086	3478.855
Sale of an agricultural commodity at town market (X_1)	1114.221	34.282	.169	3.250	.001	438.399	1790.042
Sale of an agricultural commodity during harvesting period (X_2)	-2256.939	39.523	-.337	-5.71	.000	-3036.078	-1477.800
Crop storing Status (X_3)	598.669	36.485	.090	1.641	.102	-120.576	1317.915
Sell produce to public procurement (X_4)	912.912	46.087	.082	1.981	.049	4.384	1821.440
Received loan from informal sources(X_5)	-2199.281	41.509	-.326	-5.29	.000	-3017.563	-1380.999

Source: Own estimation, 2019.

a. Dependent Variable: Farmers profit from paddy cultivation

In multiple regression, an equation containing a coefficient (β) for each explanatory variable was taken. The first part of Table 4 gives us estimates of these β values, and these values (*B* in Table 4) indicate the individual contribution of each explanatory variable to the model.

The *B* values in Table 4 are the coefficient of each explanatory variable, which indicates the relationship between farmers' profit from paddy cultivation and each (predictor) explanatory variable. If the value is positive, we can say there is a positive relationship between the explanatory variable and dependent variable, whereas a negative coefficient illustrates a negative relationship.

Each of these *B* values has a related standard error representing to what extent these values would vary across different samples. These common errors are used to determine whether or not *B* values differ significantly from zero using the t-statistic. So, if the t-test related to a *B* value is significant, i.e., if the value in the column called Sig. is less than 0.05. The explanatory variable makes a substantial contribution to the model. On the other hand, the standardized beta values indicate the number of standard deviations the outcome will change due to one specific deviation change in the explanatory variable. All beta values are measured in standard deviation units and are directly comparable. Therefore, beta values provide a better insight into the importance of an explanatory variable in the model.

In Table 4, column *B* shows the regression analysis's coefficient values associated with explanatory variables (independent variables). Concerning sell of agricultural commodities at the town market, we can see that the *B* coefficient is 1114.22. This means that increase every farmers' Sale at the town market, the amount of farmers' profit increased by Tk. 1114.22 per *Bigha*. The column called Sig. shows the *p*-value for Sales at the town market; it is 0.001, which indicates that the association between Sales at the town market and farmers' profit is statistically significant at the 0.1% level (Table 4). Then we look at the part of the table called 95% Confidence Interval for *B*. This gives us lower confidence limits and upper confidence limits. For Sale at the town market, the interval does not include the null value (always X = 0 in linear regression); thus, the results are statistically significant at the 5% level (Table 4). The conclusion here is that there is a statistically significant positive association between sell of agricultural commodities at the town market and farmers' profit- where higher entities selling at the town market is related to more profit for farmers- also when other explanatory variables are adjusted for.

The *B* coefficient for the Sale of agricultural commodities during the harvesting period is --2256.93, suggesting that increase in every one of farmers' Sales during the harvesting period, the amount of farmers' profit decreased by Tk. 2256.93 per *Bigha*. The column called Sig. shows the *p*-value for Sales during the harvesting period; it is 0.000, which means that the association between Sales during the harvesting period and farmers' profit is statistically significant at the 1% level (Table 4). Then we look at the part of the table called 95% Confidence Interval for *B*. This gives us lower and upper confidence limits. For Sale during the harvesting period, the interval does not include the null value (always X = 0 in linear regression); thus, the results are statistically significant at the 5% level (Table 4). The conclusion is that there is a statistically significant negative association between sell of agricultural commodities during the harvesting period and farmers' profit- where items sold during the harvesting period are related to fewer farmers' profit- also when other explanatory variables are adjusted for.

The *B* coefficient for Crop storing status is 598.66, which means that increase in one farmer's Crop holding position, the amount of farmers' profit increased by Tk. 598.66 per *Bigha*. But the *p*-value is 0.102, which indicates that the association between Crop storing status and farmers' gain is statistically insignificant. For Crop storing status, the Confidence Interval for *B* includes the null value (always X = 0 in linear regression); thus, the results are statistically insignificant at the 5% level (Table 4). So, there is a statistically negligible positive association between Crop storing status and farmers' profit- where more Crop holding is not related to more farmers' profit- also when other explanatory variables are adjusted.

The *B* coefficient for selling produce to public procurement is 912.91; this suggests that for every farmer's sold produce to public procurement, the farmers' profit increased by Tk. 912.91 per *Bigha*. Here *p*-value is 0.049, which indicates that the association between selling produce to public procurement and farmers' profit is statistically significant at the 0.5% level (Table 4). For selling produce to public procurement, the Confidence Interval for *B* does not include the null value (always X = 0 in linear regression); thus, the results are statistically significant at the 5% level (Table 4). The conclusion is that there is a statistically significant positive association between selling produce to public procurement and farmers' profit- where higher produce sold to public procurement is related to more profit for the farmer- also when other explanatory variables are adjusted for.

The *B* coefficient for a received loan from informal sources is -2199.28, which means that increase in farmers' loans from informal sources, the amount of farmers' profit decreased by Tk. 2199.28 per *Bigha*. For this variable, *the p*-value is 0.000, which means that the association between a received loan from informal sources and farmers' profit is statistically significant at the 0.1% level (Table 4). For accepted loans from informal sources, the Confidence Interval for *B* does not include the null value (always X = 0 in linear regression); thus, the results are statistically

significant at the 5% level (Table 4). The conclusion here is that there is a statistically significant negative association between a received loan from informal sources and farmers' profit- where a higher loan obtained from informal sources is related to less profit for the farmer- also when other explanatory variables are adjusted for.

The standardized beta values for explanatory variables- Sale of agricultural commodities at the town market, Sale of farming things during harvesting period, Crop storing status, selling produce to public procurement, and receiving a loan from informal sources are 0.169, -0.337, 0.090, 0.082, and -0.326 respectively. These results indicate that the Sale of an agricultural commodity during the harvesting period (X_2) has the highest negative impact in the model. Received loan from informal sources (X_5) has a slightly less harmful effect than the Sale of an agricultural commodity during the harvesting period in the model but has more impact than other explanatory variables included in the model. For example, the Sale of a farming commodity at the town market (X_1) has a comparatively less positive effect than the two explanatory variables X_2 and X_5 but a comparatively high impact than the variables X_3 and X_4. Crop storing status (X_3) has less positive impact than variables X_1, X_2, and X_5 but a higher impact than variable X_4, whereas a statistically insignificant association is found between Crop storing status and farmer's profit. Sell produce to public procurement (X_4) has the lowest impact in the model.

CONCLUSION

We have taken five explanatory variables in our model which affect farmers' profit earned from paddy cultivation. First, we have found three explanatory variables, i.e., Sale of the agricultural commodity at the town market, Crop storage Status, Sell produce to public procurement, which positively affects the farmers' profit in Northern Bangladesh. The remaining two explanatory variables, i.e., the Sale of agricultural commodities during the harvesting period and receiving a loan from informal sources, negatively affect the farmers' profit in Northern Bangladesh. Four independent variables, i.e., the Sale of an agricultural commodity at the town market, the Sale of farming things during the harvesting period, Selling produce to public procurement, and receiving a loan from informal sources, are statistically significant factors that affect the farmers' profit in Northern Bangladesh. Only one independent variable, i.e., Crop storing status, is a statistically insignificant factor affecting the farmers' yield in Northern Bangladesh. So it is concluded that farmers' profit from farming depends on their marketing practices, financial solvency, and institutional credit.

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