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Small-scale Commercial Vegetables Farming and its Implications for Improving Livelihoods of C*har* People

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Abstract *The study was designed to evaluate the profitability of small-scale commercial okra and snake gourd farming in two adjacent Char villages under Sadar Upazila of Mymensingh district. In total 60 farmers, 30 for okra and 30 for snake gourd growers, were randomly selected for the study. Activity budgets, descriptive statistics and Cobb-Douglas production function model were applied for analyzing the primary data. The findings of the study revealed that small-scale farming of both okra and snake gourd was highly profitable from the viewpoint of individual farmers. However, okra cultivation was more profitable than the cultivation of snake gourd. The study clearly indicated that per hectare gross returns were significantly influenced by the use of human labour, tillage, seeds, fertilizers and irrigation. These factors were directly or jointly responsible for influencing per hectare gross returns of both okra and snake gourd. Nevertheless, farmers growing both these vegetables were facing some problems and constraints in conducting small-scale commercial vegetables farming in the Char area of Mymensingh district. These problems included shortage of financial capital, high prices of inputs, low prices of output, lack of quality seeds, inadequate extension services, etc. Finally, some recommendations were made for improving cultural and management practices for the selected commercial vegetables farming. Thus, Char people can earn more household income for improving living standard by applying improved practices in okra and snake gourd cultivation.*

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1. Introduction

The agro-climatic conditions of Bangladesh are suitable for the cultivation of a large variety of crops but 80.0 percent of the gross cropped areas are at present confined to the production of rice and wheat. The increase in the production of rice and wheat, however, will not be sufficient to meet the food requirements of the fast growing population of Bangladesh. Food grain production led to an adverse effect on the acreage and production of vegetables. As a consequence, Bangladesh is not self-sufficient in vegetables production; and most people have been suffering from severe malnutrition for a quite long time. It is often argued that an addition of vegetables to the dietary menu is a must to maintain sound health of its people.

In Bangladesh, around 70.0 percent of total vegetables production take place in winter season. As a result, the consumption of vegetables is relatively lower in the summer season than in the winter. Under the circumstances, production of summer vegetables needs to be increased. The Government of Bangladesh has given more emphasis on year round vegetable production in order to meet the nutritional and caloric need of the growing population and for increasing employment opportunities and income of farmers. Okra and snake gourd that are grown in the summer season may provide such opportunities. It may be noted here that these vegetables were usually grown in the homestead area under traditional technology, but small-scale commercial okra and snake gourd farming has of late been started in the *Char* area following improved technology during the summer season. Unfortunately, no economic studies on profitability of commercial vegetables farming have yet been conducted in this area.

Prior to giving emphasis on the production of summer vegetables, it requires relevant and adequate information on different aspects of production at farm level. Such knowledge of production is also necessary to make appropriate decision by the growers especially when several alternatives are available to them. No systematic economic investigations on these vegetables have been undertaken either by the government or private organizations in order to satisfy the demand of extension workers, policy makers, research personnel, Non-Government Organization (NGO) officials and the farmer.

For this reason, the present study makes an attempt to analyze and compare the relative profitability of okra and snake gourd production. The study would identify the major factors that affect the yield of these vegetables. Farmers would be benefited from this study for effective operation and management of their farms. This study will be helpful to the researchers for further studies of similar

nature and to the extension personnel, who are directly involved in agricultural development, and to the planners for making effective and judicious plan for the country. This study also may help extension workers to learn the various problems of the selected vegetables growers so that they will be equipped with adequate knowledge for giving suggestions to the farmers.

2. Research Methods

Study Area and Sample Size

Since small-scale commercial vegetables farming has recently been started in the *Char* area, two adjacent villages namely *Char* Shirta and *Char* Kharicha of Shirta union under Sadar Upazila of Mymensingh District were purposively selected for the study. In total 60 farmers, 30 for okra and 30 for snake gourd, were randomly selected for collecting primary data. A draft survey schedule was prepared and pretested by interviewing a few vegetables growing farmers of the study area. Thus, the draft schedule was improved, rearranged and modified in light of the actual and practical experience gathered from the study villages. After making necessary adjustments, a final survey schedule was developed and primary data were collected. Data entry was made in computer and analyses were done using the concerned software Microsoft Excel and Statistical Package for Social Science (SPSS). The study covered the whole summer vegetable season (April to August) of 2012. However, formal data were collected during the period from February to March 2013.

Analytical techniques

Activity Budget

Activity budget (see Dillon and Hardaker, 1993) was prepared and this technique was applied with the help of some descriptive statistical measures like the sum, average, percentages, etc. To assess per hectare profitability of the selected small-scale okra and snake gourd farming, the following algebraic equation was followed:

$$\eta = TR - TC$$

$$\eta = \sum Q_y.P_y + \sum Q_b.P_b - \sum_{i=1}^{n}(Xi.Pxi) - TFC$$

Where,

η = Net returns from okra/snake gourd (Tk/ha);
Q_y = Total quantity of (okra/snake gourd) outputs (kg/ha);
P_y = Per unit prices of the okra/snake gourd (Tk/kg);
Q_b = Total quantity of the concerned byproducts (kg/ha);
P_b = Per unit prices of the relevant byproduct (Tk/kg);
X_i = Quantity of the concerned i^{th} inputs;
P_{xi} = Per unit price of the relevant i^{th} inputs;
TFC = Total fixed cost involved in production of okra/snake gourd;
i = 1,2,3, ... η (number of inputs).

Cobb-Douglas production function model

Cobb-Douglas production function model was chosen to estimate the effects of key variables in the production process of okra and snake gourd. The double log form of the Cobb-Douglas production function model proved to be a superior alternative on theoretical and econometric grounds.

The Cobb-Douglas production function model has the following characteristics:

1. The function is linear in logs;
2. The exponents are the elasticity of production and can be estimated directly;
3. Total variations in the output explained by the selected inputs are measured by co-efficient of multiple determination;
4. The individual co-efficient represents relative factors share if there is constant returns to scale; and
5. For testing the significance level of individual co-efficient having sufficient degrees of freedom, 1 percent, 5 percent and 10 percent probabilities are used.

The specification of the Cobb-Douglas production function model was as follows:

$$Y = a\, X_1^{\,b_1}\, X_2^{\,b_2}\, X_3^{\,b_3}\, X_4^{\,b_4}\, X_5^{\,b_5}\, X_6^{\,b_6}\, X_7^{\,b_7}\, X_8^{\,b_8}\, u_i$$

By taking log in both sides the Cobb-Douglas production function was transformed into the following logarithmic form, because it could be solved by the ordinary least squares (OLS) method.

$$\text{Ln } Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + \ldots + b_8 \ln X_8 + Ui.$$

Where,

Y = Return per hectare (Tk/ha);

ln a = Intercept of the function;

X_1 = Human labour cost (Tk/ha);

X_2 = Tillage cost (Tk/ha);

X_3 = Seed/Seedling cost (Tk/ha);

X_4 = Urea cost (Tk/ha);

X_5 = MOP cost (Tk/ha);

X_6 = TSP cost (Tk/ha);

X_7 = Irrigation cost (Tk/ha);

X_8 = Insecticide cost (Tk/ha);

$b_1, b_2, \ldots, b_8$ = Coefficients of the respective input to be estimated; and Ui = Error term.

Detailed information on the selected model and its interpretations are given in Section IV.

Major Cost Items

Estimation of cost was exclusively necessary for enterprise costing and subsequently determining the profitability of the enterprise from the viewpoint of individual farmers. Farmer's decision about production is mainly influenced by the cost of inputs. Both purchased and family supplied inputs were used by the farmers of the study area. Thus the total production costs consisted of cash and non-cash expenses. Farmers had to pay cash for the purchased inputs like hired labour, seeds, fertilizers, insecticides, irrigation water charge, etc. It was very easy to calculate the costs of these items. On the other hand, for the home supplied inputs (for example, family labour) costs were estimated by applying the opportunity cost principle. A list of cost items that have been used in the selected vegetable growing farms are: (i) Human labour cost; (ii) Power tiller cost; (iii) Seed cost; (iv) Fertilizers; (v) Manure and oilcake; (vi) Insecticides; (vii) Irrigation water; (viii) Fencing cost; and (ix) Interest on operating capital.

3. Results and Discussion

The costs, returns and profitability of small-scale commercial okra and snake gourd per hectare farming are presented in this section.

Profitability of Commercial Okra Farming

Activity budgets, as stated before, have been prepared to assess the profitability of the concerned vegetables of the selected farmers. To obtain the net return, at first the cost of production and then the value of output (gross return) have been calculated. The net return can be obtained by deducting the gross costs from its gross returns. Costs are the expenses incurred in organizing the production process (Doll and Orazem 1984). The results of the estimation of the costs and returns of commercial okra farming are presented in Table 1.

Table 1 shows that the small-scale commercial okra farming is highly profitable from the viewpoint of individual farmers. In fact, farmers were earning Tk 86645.00 per hectare from commercial okra farming. Farmers had to spend Tk 138355.0/ha for conducting the small-scale commercial okra farming; but the highest cost (Tk 105,000.00/ha) was incurred for human labour (family plus hired) cost, which represented 75.88 percent of total gross costs of production of per hectare okra (Figure 1). In other words, commercial okra farming has created employment opportunity for a lot of resource-poor *Char* people, including farm family members. Since the *Char* people were working in commercial vegetable farming, they were earning an attractive amount of extra money during the summer season. Thus, both producers and resource-poor people as day lobourers were making extra income due to adoption of commercial vegetable farming in *Char* area during the summer season.

The undiscounted Benefit-Cost Ratio (BCR) is a relative measure which is used to compare benefits per unit of cost. It helps to analyze the financial efficiency of the farmers. This undiscounted BCR was calculated as a ratio of per hectare gross returns and gross costs. Table 1 reveals that BCR (undiscounted) of okra is 1.63 indicating that production of okra is highly profitable from the viewpoint of individual farmers in the *Char* area of Mymensingh district.

Profitability of Commercial Snake Gourd Farming

Table 2 shows that small-scale commercial snake gourd farming is also profitable from the viewpoint of individual farmers of *Char* area. For producing snake gourd farmers had to spend altogether Tk 169058.0 per hectare, while its gross return was

Table 1 : Activity Budgets: Per Hectare Okra Production in Summer Season

Items of returns/costs	Total quantity/ha	Per unit price (Tk)	Returns/costs (Tk/ha)	% of total
A. Gross Returns				
Main product	22000 kg	10.00	220000.00	97.78
By-product	n.a	-	5000.00	2.22
Total returns	-	-	225000.00	100.00
B. Variable Costs				
Human (hired) labour	250 Man-day	300/Man-day	75000.00	54.20
Human (family) labour	100 Man-day	300/Man-day	30000.00	21.68
Power tiller	3 times	7.0/decimal	5187.00	3.75
Seeds	3 kg	400/kg	1200.00	0.87
Urea	200 kg	22/kg	4400.00	3.19
TSP	70 kg	25/kg	1750.00	1.27
MOP	70 kg	15	1050.00	0.76
Cow dung	9000 kg	1/kg	9000.00	6.50
Insecticides	n.a	-	4500.00	3.25
Irrigation charge	n.a	-	4000.00	2.90
Total			136087.00	98.36
C. Fixed Costs				
Interest on OC	-	@10%	2268.00	1.64
Total			2268.00	1.64
D. Gross costs (B+C)			138355.00	100.00
F. Net Return (A-D)			86645.00	
G. Undiscounted BCR			1.63	

Source: *Adapted from Hassan (2013, p. 53)*

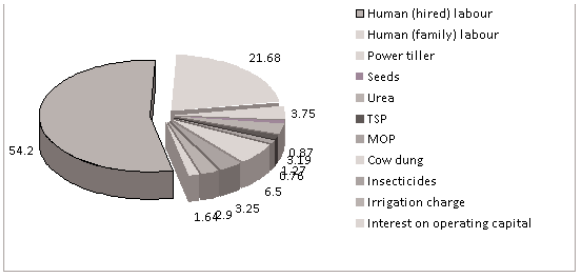

Figure 1 : Pie Chart Showing Percentage Share of Cost Item for Okra

Tk 240000.0 per hectare. Thus, its net return or profit was Tk 70942.0 per hectare during the summer season. Table 2 reveals that BCR (undiscounted) of small-scale commercial snake gourd farming was 1.42. This implies production of small-scale commercial snake gourd was highly profitable from the viewpoint of individual investors in *Char* area. It may be noted here that 420 man days (both family and hired labour) per hectare were required for conducting small-scale commercial snake gourd farming in *Char* area. In other words, a greater proportion of money had to be spent for human labour costs, which represents 74.52 percent of total gross costs of per hectare snake gourd production (Figure 2).

Table 2 : Activity Budgets: Per Hectare Snake Gourd Production in Summer Season

Items of returns/costs	Total quantity/ha	Per unit price (Tk)	Returns/costs (Tk/ha)	% of total
A. Gross Returns				
Main product	20000.00 kg	12.00	240000.00	100.00
Total returns	-	-	240000.00	100.00
B. Variable Costs				
Human (hired) labour	300 Man-day	300/Man-day	90000.00	53.23
Family labour	120 Man-day	300/Man-day	36000.00	21.29
Power tiller	3 times	7.00/decimal	5187.00	3.08
Seeds	3 kg	600/kg	1800.00	1.06
Urea	250 kg	22/kg	5500.00	3.25
TSP	120 kg	25/kg	3000.00	1.78
MOP	120 kg	15/kg	1800.00	1.06
Cow dung	9000 kg	1/kg	9000.00	5.32
Insecticides	n.a	-	4500.00	2.67
Irrigation charge	n.a	-	4500.00	2.67
Fence and *Mancha*	n.a	-	5000.00	2.96
Total			166287.00	98.36
C. Fixed Costs				
Interest on OC	-	@10%	2771.00	1.64
Total	-	-	2771.00	1.64
D. Gross costs (B+C)			169058.00	100.00
F.Net Return (A-D)			70942.00	
G. Undiscounted BCR			1.42	

Source: *Adapted from Hassan (2013, p. 58).*

The undiscounted BCR of snake gourd production, as shown in Table 2, was 1.42. This result also indicates that investment in commercial snake gourd farming in *Char* area is highly remunerative to the individual investors. Once again, resource-poor people as day labourers, were earning income by engaging themselves in commercial vegetables farms in *Char* area. In a word, both vegetables farmers and day labourers were benefiting from the adoption of commercial vegetables farming in *Char* area; and their livelihoods status has improved much better than ever before.

Comparison of Commercial Okra and Snake Gourd Farming

The summary results of yield, gross return, gross cost and net return per hectare and BCR (undiscounted) of okra and snake gourd are presented in Table 3. It shows that per hectare yield and net returns of okra (Figure 3) were much higher

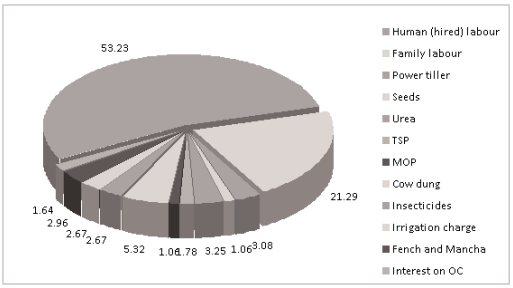

Figure 2 : Pie Chart Showing Percentage Share of Cost Item for Snake Gourd

than those of the snake gourd farming. The cost of production per hectare snake gourd farming was higher than that in okra (Table 3 and Figure 3). Similarly, BCR of okra was much higher than that of the snake gourd farming. From these discussions it is clear that both okra and snake gourd farming were profitable, but okra was more profitable than the snake gourd production in the *Char* area. Thus, the standard of living of farmers as well as resource-poor people would be increased substantially since commercial vegetables farming are highly remunerative to the *Char* people.

4. Factors Affecting the Vegetables Production

Production function is a relation (or mathematical relationship) specifying the maximum output that can be produced with given inputs for a given level of

Table 3 : Relative Profitability of Growing Okra and Snake Gourd per Hectare

Particulars	Okra	Snake gourd
Yield (kg/ha)	22000.00	20000.00
Gross return (Tk/ha)	225000.00	240000.00
Gross costs (Tk/ha)	138355.00	169058.00
Net returns (Tk/ha)	86645.00	70942.00
BCR (Undiscounted)	1.63	1.42

Sources: *Adapted from Tables 1 and 2.*

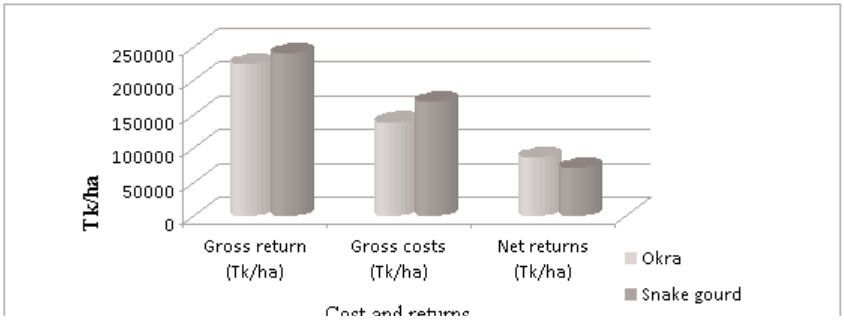

Figure 3 : Relative Profitability of Growing per Hectare Okra and Snake Gourd

technology. It applies to a firm or as an aggregate production function to the economy as a whole (Samuelson and Nordhaus 1995). Considering the effects of explanatory variables on yield of okra and snake gourd, eight explanatory variables, namely human labour cost (X_1), tillage cost (X_2), seeds cost (X_3), Urea cost (X_4), MOP cost (X_5), TSP cost (X_6), irrigation cost (X_7) and insecticides cost (X_8) were chosen as key independent factors to estimate the quantitative effect of inputs on yield of okra and snake gourd, respectively. All these variables have been estimated as per hectare monetary values. However, other important variables such as management, land quality, soil type, sowing time and weather etc., were excluded in the analysis due to paucity of reliable data. To explore the input output relationships production function was fitted. Of possible statistical forms, Cobb-Douglas production function, most popular in farm-firm analysis, was used as this algebraic model provides a compromise (a) adequate fit of the data, (b) computation feasibility, and (c) sufficient degrees of freedom unused to allow for statistical testing. In other words, the Cobb-Douglas is a relatively "efficient user" of degrees of freedom (Heady and Dillon 1961).

Another special advantage of using Cobb-Douglas production function model was that the regression under OLS in logarithm yields coefficients, which represents partial elasticities of production and if all the inputs related to the production are taken into account, the sum of the elasticities indicates whether the production process as a whole yields increasing, constant or decreasing returns to scale. It is therefore widely used by many researchers in their economic studies. The advantages of the model are that it is simple to calculate and the elasticity of production can directly be obtained from the coefficient.

Interpretations of the Results of Okra Farming

Human labour cost (X_1). The magnitude of the regression coefficient of human labour cost was 0.142 with a positive sign. It was significant at one percent probability level. It implies that a one percent increase in human labour cost, keeping other factors constant, would lead to an increase in the gross return by 0.142 percent for okra (Table 4).

Tillage cost (X_2). Table 4 shows that regression coefficient of tillage cost was 0.153 for okra. It was positive and significant at five percent probability level. This indicates that an increase by one percent in tillage cost, other factors remaining constant, would result in an increase in the gross return by 0.153 percent.

Seed cost (X_3). Table 4 indicates that the regression coefficient of seed cost was 0.166 for okra. It was positive and significant at ten percent probability level. This indicates that an increase by one percent in seed cost, other factors remaining constant, would result in an increase in the gross return by 0.166 percent.

Urea cost (X_4). The regression coefficient of Urea cost was 0.175 for okra. It was positive and was significant at five percent probability level. This indicates that an increase in one percent of Urea cost, other factors remaining constant, would result in an increase in the gross return of okra by 0.175 percent (Table 4).

MOP cost (X_5). The regression co-efficient of MOP cost was 0.291, which was significant at five percent probability level. It indicates that a one percent increase of MOP cost, on an average, significantly increased gross return by 0.291 percent for okra keeping all other factors remaining constant (Table 4).

TSP cost (X_6). The regression co-efficient of TSP cost was -0.05 which was statistically not significant. Moreover, its negative sign indicated an inverse relationship between gross return and TSP cost. That means, in response to a one percent increase in TSP cost, on an average, gross return for okra would be decreased by 0.05 percent (Table 4).

Irrigation water cost (X_7). The magnitude of the regression coefficient of irrigation water cost was 0.014 for okra. This indicates that a one percent increase in irrigation water cost, other factors remaining constant, would result in an increase in the gross return by 0.014 percent (Table 4).

Insecticides Cost (X_8). Table 4 indicates that regression coefficient of insecticides cost was 0.036. This indicates that an increase by one percent of insecticides cost, other factors remaining constant, would result in an increase in the gross return by 0.036 percent.

Coefficient of multiple determination (R^2). It is evident from Table 4 that the value of the coefficient of multiple determination (R^2) was 0.826 for okra. It indicates that about 82 percent of the variations of the gross returns are explained by the explanatory variables included in the model.

Goodness of fit (F - value). The F-value was 58.968 for okra, and the estimated production was significant at one percent probability level (Table 4), which implies good fit of the model. That is, all the explanatory variables included in the model were important for explaining variation of okra production.

Returns to scale (bi). The summation of all the regression coefficients or production elasticities of the estimated model gives information about the returns to scale, that is, in the response of output to a proportionate change in all inputs. The sum of all the production coefficients of the equations for okra production was 0.927 (Table 4). This indicates that the production function exhibited decreasing returns to scale for the okra production.

Interpretations of the Results of Snake Gourd Farming

Human labour cost (X_1). The magnitude of the regression coefficient of human labour cost was 0.266. It was significant at one percent probability level. It implies that a one percent increase of human labour cost, keeping other factors constant, would lead to an increase in the gross return by 0.266 percent for snake gourd (Table 4).

Tillage cost (X_2). The vale of coefficient of tillage cost was 0.010 with a negative sign. It implies that one percent increase of tillage cost, keeping other factors constant, would lead to a decrease in the gross return by 0.010 percent for snake gourd (Table 4). This coefficient was not however statistically significant.

Seed cost (X_3). Table 4 indicates that the regression coefficient of seed cost was 0.030 for snake gourd. This indicates that an increase by one percent of seed cost, other factors remaining constant, would result in an increase in the gross return by 0.030 percent.

Urea cost (X_4). Table 4 shows that the regression coefficient of fertilizer cost was 0.360 for snake gourd. It was positive and was significant at one percent probability level. This indicates that an increase by one percent in fertilizer cost, other factors remaining constant, would result in an increase in the gross return by 0.360 percent.

MOP cost (X_5). The value of the coefficient of MOP cost was 0.180 with a positive sign (Table 4). It implies that one percent increase of MOP cost, keeping other factors constant, would lead to an increase in the gross return by 0.180 percent for snake gourd. This coefficient was, however, not statistically significant.

TSP cost (X_6). The regression co-efficient of TSP cost was 0.038 for snake gourd, which was positive but not statistically significant. The coefficient, however, indicates that in response to one percent increase of TSP cost, on an average, gross return would increase by 0.038 percent (Table 4).

Irrigation water cost cost (X_7). Table 4 indicates that the regression coefficient of irrigation water cost was 0.095 with a positive sign. This indicates that an increase by one percent of irrigation water cost, other factors remaining constant, would result in an increase in the gross return by 0.095 percent for snake gourd.

Insecticides cost (X_8). The value of the regression coefficient of insecticides cost, other factors remaining constant, would result in a decrease in the gross return by 0.024 percent for snake gourd. The coefficient has a negative sign, a possible cause of this negative sign might be the mismanagement and over-use of this input. Farmers can have better return per hectare by making efficient use of this input.

Coefficient of multiple determination (R^2). It is evident from Table 4 that the value of the coefficient of multiple determinations (R^2) was 0.768 for snake gourd. It indicates that about 76.0 percent of the variations of the gross return are explained by the explanatory variables included in the model.

Goodness of fit (F-value). The F-value was 15.426 for snake gourd. The estimated production function was significant at one percent probability level (Table 4), which implies good fit of the model. That is, all the explanatory variables included in the model were important for explaining the variation of snake gourd production.

Returns to scale (bi). The sum of all the production coefficients of the equations for snake gourd production was 0.935 (Table 4). It indicates that the production function exhibited decreasing returns to scale for snake gourd farming.

Table 4 : Estimated Values of Coefficients and Related Statistics of Cobb-Douglas Production Function Model for Okra and Snake Gourd Production

Explanatory variables	Commercial okra farming		Commercial snake gourd farming	
	Coefficients	t-value	Coefficients	t-value
Intercept/Constant	5.923	6.647	9.044	7.668
	(0.891)		(1.179)	
Human labour cost (X_1)	0.142***	3.181	0.266***	3.420
	(0.045)		(0.078)	
Tillage cost (X_2)	0.153**	2.780	-0.010	-0.226
	(0.055)		(0.044)	
Seed cost (X_3)	0.166*	1.932	0.030	0.061
	(0.086)		(0.046)	
Urea cost (X_4)	0.175**	2.778	0.360 ***	3.539
	(0.063)		(0.102)	
MOP cost (X_5)	0.291**	2.273	0.180	4.186
	(0.128)		(0.043)	
TSP cost (X_6)	-0.05	-0.871	0.038	0.410
	(0.057)		(0.094)	
Irrigation cost (X_7)	0.014	0.557	0.095**	2.211
	(0.025)		(0.043)	
Insecticide cost (X_8)	0.036	0.231	-0.024	-0.630
	(0.158)		(0.038)	
F-value	58.968		15.426	
R^2	0.826		0.768	
Returns to scale ($\sum$ bi)	0.927		0.935	

Note: *** = Significant at 1% level
** = Significant at 5% level
* = Significant at 10% level
Figures within parentheses indicate standard deviation.
Source: *Adapted from Hassan (2013, p. 65 and 68).*

Cobb-Douglas production function model revealed that the key variables included in the model were individually or jointly responsible for variation in the gross return or output of okra and snake gourd. It also revealed that okra and snake gourd growers allocated their resources in the zone of decreasing returns (i.e., in Stage II), which indicates that they were operating okra and snake gourd farming in the rational zone of production.

5. Problems of Commercial Vegetable Farming

An attempt is made in this section to identify major problems and constraints faced by farmers in conducting small-scale okra and snake gourd commercial farming. The problems and constraints are broadly classified into three categories:

(i) economic and technical problems; (ii) marketing problems; and (iii) social problems.

Economic and Technical Problems

Lack of financial capital

Since improved farming technique was followed in commercial vegetables farming, both okra and snake gourd farmers were facing a severe shortage of financial capital during the cultivation of okra and snake gourd. In the *Char* area financial condition of both okra and snake gourd growers were not so good. They did not have enough financial capital to conduct the selected vegetables farming since the production cost was much higher than the traditional homestead vegetables gardening. About 58.34 percent of total selected vegetables growers reported this problem (Table 5).

Lack of scientific knowledge

Many farmers did not have any scientific knowledge of commercial okra and snake gourd cultivation. Most farmers were illiterate. About 70.0 percent of the selected vegetables growers reported that the productivity of these vegetables was low due to lack of scientific knowledge about modern cultural practices.

Insufficient irrigation

Irrigation water was an important input for producing the selected vegetables. Because okra and snake gourd were produced in the summer season and, rain fall was very low in summer, farmers irrigated their vegetables by shallow tubewells (STWs). But in the study areas there were not enough STWs. About 30.0 percent vegetable growers had to face this problem (Table 5).

High prices of fertilizers and insecticides

Fertilizers and insecticides are vital inputs in the production of the selected vegetables. It was reported that the selected vegetables were often attacked by pests and diseases. About 63.0 percent of the selected vegetable growers reported that the availability of fertilizers and insecticides was scarce in local markets. For this reason price was a bit higher in *Char* area. Normally the prices situation of the material inputs was not too bad, but the situation aggravated in the peak cultivation period when the price of fertilizers, insecticides and pesticides went up overnight due to unfair profit making motive of retailers and wholesale dealers, who usually created an artificial crisis to create panic among the *Char* farmers.

Scarcity of good quality seeds

Availability of modem variety as well as quality seeds was another limiting factor in producing okra and snake gourd. On an average 51.67 percent vegetable farmers reported this problem. They said that in local market MV (modern variety) seeds were not available. Most growers purchased seeds but they opined that in many cases the seeds were not of good quality and the price of seeds was also too high during the sowing/planting period of vegetables.

Attack by pest and disease

It was reported that a considerable amount of yield of vegetables were lost by the attack of pests and diseases. In the study area, about 50.0 percent vegetable growers faced this problem.

Marketing Problems

Marketing was one of the serious problems of the commercial vegetables farmers. Most commercial farmers used to sell their products to the local *Paikars* at their farm-gates. As a consequence, they received much lower price for their products. A few farmers, of course, sold their products at the village market as well as town market. The commercial vegetables were fetching some marketing problems, which are highlighted below:

Low price of the products

The prices of selected vegetables in the peak harvesting period were very low. About 85.0 percent of the selected vegetables growers reported this problem. Many farmers were compelled to make distress sale in order to meet the urgent needs of cash for their day-to-day household expenditures that led to increase the supply of their products in the village market at harvesting period and thereby lowering the selling price per unit. Thus the production of the selected vegetables became less profitable to them (Table 5).

Carrying and handling problems

Due to carrying and handling problem the vegetables growers used to sell their product to local *Paikars* at the village markets and a few growers sold their products at farm-gate. Table 5 shows that about 37 percent of the selected vegetable growers treated carrying and handling as a serious problem. Farmers also reported that they could not take advantage of the higher price prevailing at distant markets due to lack of carrying and handling facilities. Adequate carrying and handling facilities at reasonable cost would improve the efficiency of vegetable marketing.

Table 5 : Problems and Constraints of Small-scale Commercial Okra and Snake Gourd Farming

Nature of problems	Okra		Snake gourd		Average of all farmers (%)
	No.	Percentage	No.	Percentage	
A. Economic and Technical Problems					
Lack of financial capital	17	56.67	18	60.00	58.34
Lack of scientific knowledge	20	66.67	22	73.33	70.00
Insufficient irrigation	10	33.33	08	26.70	30.01
High prices fertilizer and insecticides	18	60.00	20	66.67	63.34
Scarcity of good quality seeds	16	53.33	15	50.00	51.67
Attacked by pest and diseases	15	50.00	15	50.00	50.00
B. Marketing Problems					
Low price of products	25	83.33	26	86.67	85
Carrying and handling problem	10	33.33	12	40.00	36.67
C. Social Problems					
Damaged by domestic animals	10	33.33	06	20.00	26.67
Loss of product due to theft	12	40.00	16	53.33	46.67

Source: *Adapted from Hssan (2013, p. 78).*

Social Problems

It was found that farmers were facing some social problems in producing okra and snake gourd commercially. These are discussed below.

Vegetables damaged by stray animals

Farmers gathered an experience that in the early stage the plants were affected by stray cattle and goats. About 27.0 percent growers reported that their plots were affected by stray animals of influential people in the *Char* area.

Loss of production due to theft

In this *Char* area, theft of okra and snake gourd was a common phenomenon which discouraged the growers to grow these vegetables commercially. About 46.0 percent of the selected vegetable growers reported that their products were often stolen by unknown notorious people.

The discussions made above as well as the results presented in Table 5 indicate that commercial okra and snake gourd growers in the study area currently face some major problems in conducting commercial vegetables farming. The concerned authority must pay an immediate attention to solve these problems of commercial vegetables growers, which will increase the per unit yield of vegetables and enable farmers to have better income from commercial vegetables farming.

6. Conclusion and Recommendations

It can cautiously be concluded that a considerable scope apparently exists in the *Char* area to increase the productivity of okra and snake gourd and to increase income, employment and nutritional status of the farmers. The study reveals that small-scale commercial okra and snake gourd farming is highly profitable from the viewpoint of individual farmers in *Char* area of Mymensingh district. Thus, the small-scale commercial vegetable farming has had bright prospects and *Char* people can improve their standard of living by adopting improved vegetable farming instead of the so called traditional homestead vegetables gardening.

The management practices of selected vegetables production in the *Char* area were not found efficient enough due to some marketing problems. Farmers have had very little knowledge about the application of inputs in right time with right doses. Consequently, they made over or under use of some inputs. Thus, well planned management training in accordance with their problems, needs, goals and resource use can lead to viable production practices and sustainable income from commercial okra and snake gourd cultivation.

Policy Recommendations

It was evident that commercial okra and snake gourd production were highly profitable and they can generate income earning and employment opportunity to the most neglected resource-poor *Char* people of Mymensingh district. But some problems and constraints were barriers to attain the ultimate goals of the commercial vegetables growers. The following policy recommendations are likely to be useful for policy formulation:

(a) From actual field experience gained so far, it is gathered that there is an imbalance in the use of fertilizers in the study area. So public and private interventions might be required for (i) ensuring balanced use of fertilizers; (ii) encourage increasing use of organic and bio-fertilizers; and (iii) training the farmers by extension service people in using appropriate doses and combinations of fertilizers. Farmers often reported that they had to purchase adulterated fertilizers. Public initiative should be taken to maintain fertilizer quality.

(b) The commercial vegetables farmers can form producers cooperative and this cooperative society can purchase STWs to ensure irrigation facilities for commercial vegetables growers in the *Cha*r area.

(c) Operating capital is a serious problem for the commercial farmers of the study area. Institutional credit programme should be launched aiming particularly the commercial vegetables growers. The commercial banks should be encouraged to provide loans at a reasonable rate of interest to enable farmers to operate their farming on commercial basis.

(d) Farmers could not get reasonable prices for their vegetables. Marketing costs are high because of inadequate information, infrastructure, high price risks, etc. So steps should be taken to ensure: (i) fair price; (ii) quality of agricultural products; and (iii) floor price scheme for vegetables producers.

(e) Good quality of MV seeds in right quantity is recognized to be one of the key elements for enhancing vegetables production. Emphasis should be given on creating facilities and infrastructure support for hybrid seed production, marketing and development.

(f) Actual plant protection activities involve pest surveillance, monitoring and early warning against pest attacks, and rendering advisory service to farmers, traders and others dealing with pesticides and quality control of pesticides marketed by private sector. Agricultural extension workers are responsible for providing advice to the farmers about appropriate plant protection measures. The integrated pest management (IPM) programme should be expanded to keep okra and snake gourd free from pests and combat environmental degradation due to the use of pesticides. Training should be given to the farmers in the use of different plant protection measure by demonstration.

(g) Transfer of technologies and diversification and intensification of crop production programme through appropriate extension service are of crucial importance to Bangladesh agriculture. The extension service must be able to render the needed advice, management and technical support to the okra, and snake gourd growers at the appropriate time.

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