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Analyzing Factors on Productivity and Marketing Linkage of Maize Value Chain

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Abstract
A study was conducted at Sadar Upazilla in Sherpur district, Bangladesh during July 2017 to June 2018 to find out the factors affecting production costs, returns and marketing of maize production. Out of the sample size 55, two separate questionnaires were used for collecting data from producer (30) and market actors (25). Three types of data analysis, namely descriptive statistics (means, percentages and standard deviations), value chain analysis and economic analysis were used for analyzing the collected primary data. From the reviewed theories and empirical works, some factors were identified as influencing maize production; age of the farmer, farmer experience in farming, household income, household education level, cost of labor and number of extension visits. The value chain analysis confirmed that the main actors involved in maize value chain include faria/bepari/assemblers/collectors, wholesalers, retailers. Study revealed that in maize production, the returns of scale of the selected areas were high. So, in the recent time most of the farmers divers from rice to maize production. It was also found that, the opportunity of maize production on an average was high in Sherpur district and farmers had a large scope to increase maize productivity by attaining full efficiency through reallocating the resources. Economic analysis of maize and maize-based cropping pattern in comparison to *boro* and *boro*-based cropping pattern indicates the high productivity of maize production system than that of *boro* rice.

Keywords: Maize production, Marketing linkage, Value chain, Value chain actor

Introduction

Lack of crop diversity results in shortage of some specific food crops which the country needs to import from abroad (Chowdhury *et al.*, 2013). In this circumstance, it has been increasingly realized that for the betterment of Bangladesh economy a real breakthrough in crop diversity is necessary (Baksh, 2003). Maize may be helpful to improve this situation although it is relatively a new crop in Bangladesh (Rahman *et al.*, 2013). After the establishment of Bangladesh Agricultural Research Institute (BARI) in 1976, researchers and government felt the potentiality of maize production in Bangladesh (Ali *et al*., 2008). According to International Maize and Wheat Improvement Center (CIMMYT, 2009) maize is very well suited to the country's fertile alluvial soil and can be grown almost any time, except the rainy season. From 2000, maize become a lucrative cash crop particularly to the farmers of central, northern and western parts of Bangladesh boosted by huge and expanding market demand for it. Thus, the area under maize cultivation has quickly increased to 804 thousand acres of land in 2014-15 fiscal year from 72 thousand acres of land in 2003-04 fiscal year (BBS, 2012 & 2015). It has been increasing day to day according to its characteristics of mainly fish feed while its consistent production is being deteriorating due to some challenges.

These include insufficient physical infrastructure in terms of roads which increase the cost of transportation, works as an informal market barrier and forms a wedge between the supplier price and consumer price, due to lack of fair pricing system. Lack of know- how shows in poor market orientation and business skills and leads to difficulties in managing and obtaining loans. Furthermore, the current institutional framework is unable to support the formation of strong traders and producer's associations and other representative bodies to enhance capacity building and to bargain for fairer terms of trade. In addition, the lack of market information and the weak legal framework led to difficulties in negotiating trade agreements and enforcing the existing contracts. The maize value chain in the rural central areas of Bangladesh is largely self-contained with the spheres of input production and supply, processing and feed and flour consumption. That is why, the present studies were undertaken to analyze maize value chain starting from the input supply up to the end user, determinants of maize market participation decision and level of participation, marketing margin and benefit share of actors of maize value chain in the study area.

Materials and Methods

The study was conducted at Sadar Upazilla in Sherpur district, Bangladesh during July 2017 to June 2018 to find out the factors affecting production costs, returns and marketing of maize production. Out of the sample size 55, two separate pre-tested semi-structured questionnaires were used for collecting data from producer (30) and market actors (25) comprising faria/assemblers/collectors 11, wholesalers 5, processors 5 and retailers 4, through face-to-face interview. In addition to primary data, secondary data were also collected from various

publications like journals, different organizations like BBS, Department of Agricultural Marketing, Department of Agricultural Extension, FAO and website searching. Three types of data analysis, namely descriptive statistics (means, percentages and standard deviations), value chain analysis (Staritz, 2012) and economic analysis (Omburi, 2005) were used for analyzing the collected primary data. Marketing margin analysis also deals to comparison of prices at different levels of marketing chain over the same period of time (Smith, 1981).

Results and Discussion

Socio-economic characteristics of sampled households

Almost 40.88% farmers have 2 to 4 family members, 50.60% have 5 to 6 family members and 8.52% have above 6 family members. Joint family system was found to be prominent amongst the rural households. Though household size of farmers is large but they have low amount of land. About 5.7% farmers have no amount of land, 10.50% have 0 to 0.25 acres, 60.50% farmers have 0.26 t0 0.50 acres and 23.35% farmers have over 0.50 acres of land. Majority of the head of the family amongst the rural households was more than 35 years of age which constitute 50.68% of the total sample. Most of the maize farmers just finished primary education (55.65%), Secondary, higher secondary school completed and graduate and/or above are 22.50%, 21.85% and 0% respectively. The fact that literate is advantageous to the adoption of any innovation meant to improve maize farming in the study area. It has been reported that increased farmer education positively influenced adoption of improved practices. About 85.50% of respondent dominates in maize production by men than women (15.5%). In case of current occupation, the highest number of farmers who are directly engaged to agriculture 65.58%, 30.33% have business and none of them has government job and rest 4.09% in other activities.

Almost 45.7% used their own capital in production of rice and wheat, around 25.98% of them are interested in producing maize depending on lending institution for their capital. About 95.8% of the farmers collected seeds from the markets. About 2.6% seeds are provided by government subsidies. Majority (64.2%) of the farmers who are involved in maize production are unskilled and only 35.8% farmers are skilled. About 87.45% of the farmers are untrained and only 12.55% of the farmers are trained. Ninety percent of the traders used their mode of payment system to the farmers is pay in cash. Only 6.45% is used are advanced credit and 8.26% are in trustful person and most of the actors always used pay in cash about 85.29%. The marketing systems that farmers sold their maize are mainly bepari (52.56%) and 25.55% wholesaler, 14.65% are collector and 7.24% are retailer.

The total cost on per acre basis was found to be Tk. 25908. It showed that the maize cultivation was highly labour intensive. Expenses on the seeds, fertilizers and land preparation were most important components of the variable cost which varied among different categories of farmers. On average farmers harvested 80 mounds per acre of maize. The gross margin during the period of February-March 2018, was estimated to be Tk. 41616.66/acre and net return is 33291.66 Tk/acre.

Factors affecting in production and availability of maize

The coefficient of determination (R^2) was 0.67 meaning that the factors captured the model explained 67% of the fluctuations in maize production in the study area and only 33% of the fluctuations was unexplained (**Table 1**). Variables that are plays significant role in maize production are household income, household education level, extension contracts and access to credit. All the four variables had coefficients with the expected signs. This means that these variables have positively influence on maize production in the study area. Such as if household income increase maize production is expected to increase significantly. Those farmers have extension contract, they are in better position in maize production. Education level also response positively with maize production.

Table 1. The factors affecting maize productivity in the study area

Variables	Coefficient	Standard error	T- values
Constant	1.256	0.090	13.96
Age	-0.101	0.150	-0.67
Farmer's experience	0.081	0.253	0.32
Household income***	0.051	0.001	12.33
Household education level*	0.042	0.511	2.51
Cost of labour	0.070	0.113	0.62
Extension contract**	0.124	0.040	3.10
Access to credit**	0.113	0.102	3.11
R^2			0.67

***, ** and * indicates 1%, 5% and 10% level of significance respectively

Assessing and mapping of maize value chain

The value chain prompts existence of two major products prepared out of maize in study area namely-

A. Poultry feed manufacturing - Channel 1 has two sub channels-

i. Farmers - Faria/Assembler/Collector - poultry feed Manufacturers - (Poultry feed) - Poultry farmers
ii. Farmers - Faria/Assembler/Collector - poultry feed Manufacturers - (Pellets) - Poultry farmers

B. Snack manufacturing - Channel 2 has three sub channels-

i. Farmers - Faria/Assembler/Collector - Snack Manufacturers - (Corn Sev) – Wholesalers/ Retailers - Consumers
ii. Farmers - Faria/Assembler/Collector - Snack Manufacturers - (Corn Balls) – Wholesalers/ Retailers - Consumers
iii. Farmers - Faria/Assembler/Collector - Snack Manufacturers - (Corn Sticks) – Wholesalers/ Retailers – Consumers

The study revealed that 60% of the assemblers purchased maize direct from farmers at farm gate while the remaining maize from farmers at village markets. The

study further revealed that 72.5% of the assemblers sold their produce to wholesalers, 12.5% to retailers and 14.93% to processing factories.

Marketing cost and margins in two value chain activities

In the major poultry feed channel of maize, the producer's share in the consumer's taka is 36 per powdered/granular poultry feed and 39 taka for pellet feed in major channel 1 where as in major

Table 2. Marketing cost and margins in two different value chain activities

Sl. No.	Particulars	Channel - 1 (TK./Qty.)		Channel - 2 (TK./Qty.)		
		Poultry feed	Pellet feed	Corn sev	Corn bolls	Co stic
1.	Net price received by producer/Farmer	1180.96	1180.96	1306.8	1306.8	130
2.	Expenses incurred the producer					
	Loading and unloading charges	6.05	6.05	3.63	3.63	3.(
	Transport cost	18.15	18.15	14.52	14.52	14.
	Bagging cost	4.84	4.84	6.05	6.05	6.(
	Sub -total	29.04	29.04	24.2	24.2	24
3.	Producers' sale price/ Traders' purchase price	1210	1210	1331	1331	13
4.	Marketing costs incurred by traders					
	Fixed costs	7.26	7.26	4.84	4.84	4.8
	Variable costs	64.13	64.13	36.3	36.3	36
	Cost of holding produce	81.07	81.07	15.73	15.73	15.
	Sub-total	152.46	152.46	56.87	56.87	56.
5.	Trader's margin	29.04	29.04	64.13	64.13	64.
6.	Traders' sale price/ processors' purchasing price	1391.5	1391.5	1452	1452	14
7.	Marketing costs incurred by processors					
	Fixed costs	60.5	145.2	30.25	30.25	42.
	Variable costs including raw materials costs	2188.285	2188.285	1391.5	1391.5	139
	Labour costs and miscellaneous	399.3	459.8	139.15	139.15	14!
	Sub-total excluding the cost of maize	1655.885	1401.785	211.75	193.6	235
	Sub-total including the cost of maize	1655.885	2793.285	1663.75	1645.6	168
8.	Total marketing margin	195.415	231.715	1585.1	1948.1	217
9.	Processors' margin	224.455	260.755	1649.23	1649.23	112(
10.	Consumer purchase price	3242.8	3025	3248.85	3593.7	385
11.	Producers' share in consumer	36.41	39.04	40.22	36.36	33.

channel 2 i.e., snack manufacturing channel it is 40 taka for corn sev, 36 taka for corn bolls and 33 taka for corn sticks. The margins received by the commission agents and traders are found to be about Tk. 29 to 64 per quintal while the margins received by the processors are Tk. 195 and Tk. 231.7 for powered feed and pelleted feed respectively. The margin for snack processors is Tk. 1585 for corn sev, Tk. 1948 for corn boll and Tk. 2171.9 for corn sticks per quintal across the various products. This area of using the maize into making of sev, bolls and sticks is not receiving ample attention but if proper marketing arrangements are done to facilitate the contracts with farmers, the share of farmer in the value addition would go up. The sale price of one quintal of poultry feed is Tk. 3025 -3243 and snack foods is Tk.3249-3860 showing the potential of diversity of uses and the amount of value addition done to maize (**Table 2**).

Marketing efficiency

The marketing efficiency for the two main channels found to be 2.66 and 2.77 which is high compared to other cereal crops. The maximum value addition is occurred in channel 2 of corn boll which is around Tk. 2286/quintal (**Table 3**).

Table 3. Indices of marketing efficiency in the selected maize channels

Sl. No.	Particulars	Poultry feed manufacturing channel	Snack food Channel
1.	Price received by farmers	1185.8	1185.8
2.	Marketing costs and margin	3162.94	3631.609
3.	Index of Marketing Efficiency	2.67	2.77

Recommendations

Based on the findings of the study it can be recommended that if the related concern organization must ensure the supply of quality hybrid maize seeds in time, increase linkage and coordination among value chain actors, concern bodies give attention to pay more benefit to farmers through providing training on how the farmers supply quality product, obtain perfect information and bargaining power, updating farmers knowledge through training in all aspects of agricultural activities will improve and develop sustainable maize value chain that are adaptable locally and expected to increases competitiveness.

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