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Financial and Economic Profitability of Jute in Bangladesh: A Comparative Assessment

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ABSTRACT

The study was aimed to analyze the financial and economic profitability of jute and its main alternative crop Aus including an assessment of comparative advantage using Policy Analysis Matrix. Both primary and secondary data were used considering the period from July 2010 through June 2011**.** It is found that jute production was more profitable financially in the study period than Aus in the selected areas of Bangladesh. Economic profitability showed that the government protective policies affect positively and negatively to the producer incentives in case of jute and Aus crops, respectively. Relative divergences reflect that the jute producer obtained higher price than the world prices and the Aus producer obtained lower price than the world prices. Relative divergences between private and social prices of tradable inputs illustrated that domestic producer bought the imported inputs at less prices than the world price for producing jute and Aus crops. Net policy divergences or net transfer of these crops showed that the productions were more profitable socially than privately. The study revealed that Bangladesh had a comparative advantage for import substitutions for these crops. Hence, government should continue the existing policy support for these crops in a market economy condition.

Keywords: Comparative advantage, economic profitability, financial profitability, parity prices, jute, policy analysis matrix.

INTRODUCTION

Jute is not only the important cash cum industrial crop but also the main raw materials for jute based handicrafts of Bangladesh. In recent years, area and production of jute increased significantly due to increase internal demand. But the producers take decisions based on expected profitability. Generally, while taking production decisions, the farmers consider returns against expected cost. Sometimes it is mentioned that the yield they receive does not cover the cost of production. Owing to environmental degradation, scarcity of arable land, high input cost, high profitability of modern varieties of food crops and unstable jute price, jute at present tends to be cultivated in less productive land (Rahman and Khaled, 2011). So,

comprehensive plan is needed to make the crop popular and sustainable. But, the rate of adoption and sustainability of jute depends largely on its profitability against alternative crops. The production of jute has to be increased and farmers have to be motivated to grow more jute, if the return on investment is higher than other alternatives. Only assured return can motivate a farmer to grow more jute. This study is expected to quantify the profitability of jute against its alternative crop (Aus) in present situation. As jute is an important internationally traded agricultural commodity of Bangladesh, it is imperative to investigate its comparative advantages. Because, the optimum pattern of production and trade for a country is determined from a comparison of the relative opportunity cost of producing a given commodity with the relative price at which the commodity can be traded. A country will reduce production of those goods which can be imported at lower relative prices and will lead to specialize in the production of goods which can produce at lower relative cost.

Profitability is one of the major criteria for determination of farmers' acceptance of any crop production. In other words, financial profitability of a crop is the basis of farmers' decision making. Such profitability is based on calculation of market prices of inputs and outputs that farmers actually pay or receive for producing crop, along with the quantities used of each. Farmers allocate land and other resources in the production of different crops on the basis of relative financial profitability. Financial profitability of jute has been measured in terms of gross margin, net return and benefit cost ratio. Enterprise budgets were used to estimate financial profitability such as costs, returns and profit per unit area of jute cultivation from primary sources. Financial profitability differs from economic (social) profitability because of distortions in the factor and product markets such as government taxes and subsidies, trade restrictions, monopoly elements in marketing and segmentations in the capital market. It is therefore, necessary to determine economic profitability which involves deriving border prices of all inputs and outputs and adjusting those prices by the economic costs of transportation and marketing. The economic analysis was carried out by using appropriate shadow prices for the used inputs. The study attempts to analyze the financial and economic profitability of jute and its competing crop, Aus paddy, including an assessment of comparative advantage using policy analysis matrix (PAM). In Bangladesh, considerable numbers of research studies under different levels were done on jute, which mainly centered on estimation of production cost, gross return, gross margin and resource use efficiency. A few studies were conducted on economic profitability of jute in Bangladesh. Rashid 2009 estimated economic profitability depending on the secondary sources of information only. But this study used latest primary survey data along with secondary sources of information up to the year 2010-11. So, the study is, therefore, an attempt to examine both the financial and economic profitability of jute at the present economic condition.

MATERIALS AND METHODS

Financial Profitability Assessment

Study Area and sample selection

The study areas were selected purposively where jute and jute goods produce intensively. Depending on the percentage of the total production and availability of data, five major jute producing districts namely, Faridpur, Kurigram, Kushtia, Jessore and Jamalpur were selected. Talma, Kanaipur and Khalilpur under Faridpur, Ulipur and Durgapur under Kurigram, Katuadah and Baragangdia under Kushtia, Monirampur under Jessore, Raniganj and Nandina under Jamalpur districts were selected for collection of production related data from different categories (small, medium and large) of jute growers. A total of 150 jute growers (30 from each location) were selected randomly according to the objectives of the study. Data were collected from the selected respondents through face to face interview method using a structured questionnaire during the period from July 2010 through June 2011**.** On the other

hand, financial profitability of Aus, which is an alternative crop of jute, was obtained from the secondary sources of Bangladesh Rice Research Institute.

Economic Profitability Assessment

Economic profitability of jute and its competing crop Aus was measured including an assessment of comparative advantage using policy analysis matrix (PAM). The basic information needed for constructing a PAM are yield, inputs and the market and social prices of inputs and outputs. Inputs are divided into two categories: i) Traded intermediate inputs and ii) Non-traded intermediate inputs. In this study, land, labour, animal power, seed, pesticides, manure, irrigation and land preparation charge, interest on operating capital are considered as non-traded intermediate inputs and domestic resources. The costs of these inputs were collected from field survey. Though irrigation equipment is traded intermediate inputs, but detailed cost of production figure for irrigation equipment was not available. Since this item was not taken into account in the estimation of cost of traded intermediate input costs, only chemical fertilizer viz., Urea, TSP and MOP were considered as traded intermediate inputs for estimating costs.

After the tradable and non-tradable inputs are classified, market prices of inputs are converted into social prices. Market prices were used to calculate the financial analysis for the private profit. Social prices of tradable and non-tradable inputs were determined to conduct the economic analysis of alternative crop production for the whole economy. In this case social prices are equal to their opportunity cost for non-tradable inputs. An average official exchange rate of 2010-11 was used in this study, which is taken from Bangladesh Bank (2012) and the corresponding exchange rate is Tk. 71.17 per US dollar. The study used FOB price for urea (Ukraine), TSP (US Gulf ports) and MP (Morocco) from the same source. Freight and domestic handling cost were collected from Rashid (2009) and extended to 2010-11 using the non-agricultural wholesale price indices.

For constructing social budget, the study used specific conversion factors 0.75 and 0.86 for labour and irrigation charge respectively and full social costs of seed/seedlings, insecticide and manure from secondary sources (Shahabuddin and Dorosh, 2002). Social prices of traded goods were calculated through border prices. For imported items, border price was computed through import parity price, which is the world market price in domestic currency obtained after adjusting the transport cost and other market distortions to the domestic markets. For export items, export parity price was computed by deducting the transport and other marketing cost from the farm gate to the point of international export market. Opportunity cost of operating capital was calculated at a 10 percent rate of interest for the production period of the respective crops. The payments for non-traded intermediate inputs and resources were also converted into per unit of output by adjusting yields.

Procedure for Calculating Border Parity Prices

The import and export parity prices at farm gate level computed from the border parity prices by adjusting the social cost associated with moving the imported commodity from border to farm gate or moving the export commodity from farm gate to border. For determining the parity price at farm gate level, the border price adjusted with the marketing, transportation and processing cost computed using secondary sources.

Export Parity Price of Jute

The world price of jute represented the f.o.b. price Chittagong. Border price measured at farm gate equal to world price time's official exchange rate less export handling, transportation cost, trading cost and interest on the operating capital for four months. World price (f.o.b. Chittagong) of jute was obtained from secondary source. Interest on operating capital for jute was collected from field survey. Export handling cost was the main cost of exporter excluding transportation cost which consisted of loading and unloading, rope

making, hessian ticket, pressing charge, stacking, export brokerage, commission to C&F agents, bank interest and insurance charge, which were obtained from field survey. Trading cost was the cost of all marketing intermediaries from farmers to exporters and these were obtained from field survey also.

Import Parity Prices of Fertilizers

Import parity prices of three chemical fertilizers viz., Urea, TST and MP were computed from their international prices during 2010-11. The world price of Urea was c.i.f. price Chittagong, which was equal to F.O.B. Ukraine plus ocean freight from Middle East to Chittagong. The boarder price measured at farm gate represented the c.i.f. price Chittagong time's official exchange rate plus domestic handling cost from port to wholesale market to farm gate. The world prices of TSP (US Gulf ports) and MOP (Morocco) were computed following the similar procedure

Import Parity Price of Rice

The F.O.B price of rice (Thailand) was collected from Food Outlook of GIEWS. In this study, Dhaka is taken as a wholesale market for rice because marketing, import and export routed and centered through Dhaka (other studies for example Mahmud et al. 1994; Huda 2001; Rashid 2009 also used in the similar way). Then the c.i.f. price of rice at Chittagong plus transport cost from Chittagong to Dhaka, import handling cost and domestic trading cost less cost from mill gate to wholesale represented the border price at mill gate. From this, milling cost of rice was subtracted by adjusting milling rate. Cost from mill gate to wholesale, milling cost and cost from farm gate to mill gate were collected from Dewan (2011). Since the import handling cost was not found, this cost was considered as 3% of c.i.f. prices of rice (Huda, 2001).

Policy Analysis Matrix (PAM) Framework

The Policy Analysis Matrix (PAM) is a computational frame-work for measuring input use efficiency in production, comparative advantage and the degree of government interventions (Mohanty and Chaudhury, 2002). An application of PAM approach was used to assess the efficiency and competitiveness of jute production in Bangladesh. The assessment of competitiveness and economic efficiency of jute and its competing crop Aus at the farm gate level in Bangladesh are undertaken and the necessary indicators are derived to explain in the private profitability, social profitability and divergence, which are presented in Appendix Table 1.

Table 1: The structure of the policy analysis matrix (PAM)

Items	Revenue	Costs		Profit
		Tradable inputs	Domestic factors	
Private prices	A	B	C	D
Social prices	E	F	G	H
Divergence	I	J	K	L

Source: Based on Monke and Pearson (1989)

Where, Private profits (D) = A – (B + C), Social profits (H) = E– (F + G), Output transfers (I) = A–E, Input transfers (J) = B – F, Factor transfers (K) = C – G, Net transfer (L) = D – H = I – J – K

Valued at Private prices A = *Pid * Qi*, *B = Pjd * Qj*, *C =Pnd * Qn*

Valued at Social prices E = *Pib * Qi*, *F = Pjb * Qj*, *G = Pns * Qn*

Where, *Pid* = domestic price of output i*; Pjd* = domestic price of tradable input *j*

Pib = international price of output i*; Pjb* = international price of tradable input *j*

Pnd = market price of non-tradable input *n; Pns* = shadow price of non-tradable input *n*

Qi = quantity of output; *Qj* = quantity of tradable input; *Qn* = quantity of non-tradable input

Domestic Resource Cost (DRC) Calculation

In this study, DRC will be used to examine the efficiency of using resources to produce jute and Aus crop at home instead of importing the same from abroad. DRC was used for

determining economic profitability of jute and its competing crop (Aus), which was calculated by using the following equation (Bruno, 1972):

$$DRC = \frac{\text{Cost of domestic resource and non - traded inputs for producing per unit of output}}{\text{Value of tradable output - Value of tradable inputs}}$$

$$DRC = \frac{\sum f_{ij} P_j^d}{U_i - \sum a_{ik} P_k^b} \qquad (j = 1\ldots\ldots\ldots\ldots m,\ k = 1\ldots\ldots\ldots\ldots n)$$

Where,

f_{ij} = Domestic resource and non-traded inputs j used for producing per unit commodity i
P^d_j = Price of non-traded intermediate inputs and domestic resource
U_i = Border price of output i
a_{ik} = Amount of traded intermediate inputs for unit production of i
P^b_k = Border price of traded intermediate input

If the DRC ratio is less than one, the system uses domestic resources efficiently, thus has comparative advantage. If the DRC ratio is greater than one, then the system shows inefficiency in domestic resource use and possesses a comparative disadvantage.

RESULTS AND DISCUSSION

Financial Profitability of Jute and Alternative Crop (Aus) Production

Cost and return is one of the important factors to select the suitable crop for farmers. Farmers should be able to know whether jute can compete with the other crops that they are currently growing or not and how much net profit they can get from jute. Aus are an main alternative crop that can be grown on land used for jute cultivation. Efficiency in production of jute and Aus paddy has been measured in terms of gross return, net returns, benefit cost ratio, etc. Cultural system and management practices of jute and Aus farming varied according to their costs and returns.

Table 2: Enterprise budget for producing Jute and Aus

Items	Jute (Taka/ha)	Aus (Taka/ha)
Average yield (Kg/ha)	2313	4089
Average producer prices (Taka/kg)	37.75	12.50
Gross Return	114664	54440
Total Variable Cost (TVC)	60851	37917
Total Cash Cost (TCC) :	54085	20386
- Hired labour	41764	3953
- Land preparation	3598	3920
- Pesticides/herbicides	427	1370
- Irrigation charge	2644	2500
- Fertilizer	3378	7238
- Seed	1178	1405
- Others (bamboo, polithene, etc)	1096	-
Tatal Non-cash Cost :	6766	17531
- Family labour	5088	14013
- Manure	1678	3518
Interest on operating capital (@ 6.0% for 4 months)	1803	680
Rental value of land	12135	12664
Total Cost (Full cost)	74789	51261
Return above Variable Cost	53813	16523
Return above Cash Cost	60579	34054
Return above Full Cost	39875	3179
Benefit Cost Ratio (BCR):		
- On TVC basis	1.88	1.44
- On TCC basis	2.12	2.67
- On Full Cost basis	1.53	1.06

Source: Field Survey and BRRI, 2010-11

Appendix Table 2 shows that the costs of production were higher for jute than for Aus[1]. The reason behind the higher cost of production for jute was intensive use of human labour, which was 63% of the total cost. Gross return of jute was also higher than that of Aus[2]. The higher gross return for jute was mainly due to the higher prices of the fibre in the market during the study period compared to Aus. It is evident from the table that net returns of jute production were significantly higher than for Aus production. Undiscounted benefit cost ratio on full cost basis was higher for jute (1.53) compared to Aus production (1.06). Therefore, overall findings revealed that jute was more profitable compared with its competing crop Aus in the selected areas during the study period. Though, Aus found less profitable than jute at farm level, farmers are still producing it as a staple food item mainly for their own family consumption. Moreover, less capital is needed for Aus cultivation compared to jute, which is another reason for producing it by the farmers in every year. However, ensuring reasonable market price during harvest time is the prerequisite of jute production.

Economic Profitability of Jute and Alternative Crop (Aus) Production

For measuring economic profitability of jute and its competing crop Aus, border parity prices such as export parity price of jute, import parity prices of fertilizer as well as rice were calculated, which are presented in Appendix Table 3, 4 and 5.

Table 3: Import parity border prices of fertilizer for 2010-11

Items	Urea	TSP	MOP
F.o.b. US$/MT	354.78	460.08	324.90
F.o.b. Tk/MT	25249.69	32743.89	23123.13
Freight US$/MT	56.00	56.00	56.00
Freight Tk/MT	3985.52	3985.52	3985.52
A. CIF price at Chittagong(US$/MT)	410.78	516.08	380.90
B. CIF price at Chittagong(Tk/MT)	29235.21	36729.41	27108.65
C. Domestic handling cost (from port to wholesale)Tk/MT	2441.06	2441.06	2441.06
D. Border price at wholesale level (B+C)	31676.27	39170.47	29549.71
E. Domestic handling cost (from wholesale to farmer)Tk/MT	485.68	564.10	564.10
F. Border price of farm produce at farm gate (D+E)	32161.95	39734.57	30113.81
Market price at firm level (Tk/MT)	12000.00	28000.00	24920.00

Source: Own calculation by using different data sets from various publications

Table 4: Calculation of import parity border prices of Rice for 2010-11

Items	Rice
F.o.b price at the port of origin (Thailand) (US$/MT)	464.00
Freight (US$/MT)	56.00
A. C.i.f. price at Chittagong (US$/MT)	520.00
B. C.i.f. price at Chittagong (Tk/MT)	37008.40
C. Marketing margin from the port of entry to the wholesale market:	2278.36
Import handling cost	1110.25
Transportation cost	1016.00
Domestic trading cost	152.11
D. Border price at wholesale level (B+C)	39286.76
E. Components of the marketing spread between the wholesale market to the produce level:	
Cost from mill gate to wholesale	19440.54
Milling cost	994.25
Adjustment at 67% milling rate	4242.50
Interest cost	12964.63
Cost from farmer to mill gate	474.16
	765.00
F. Border price of farm produce at farm gate (D-E)	19846.22

Source: Own calculation by using different data sets from various publications

[1] This result supports the conclusions derived earlier by Sikder (1981), Mannan (1987) and more recently by Afroze (2011) and Forman (2011).
[2] This is also supported by Talukder *et al.*, (1993), Afroze (2011) and Forman (2011).

Table 5: Calculation of export parity prices of Jute for 2010-11

Items	Jute
A.F.O.B price at the port of origin (US$/MT)	658.00
B. Freight (US$/MT)	56.00
C. F.o.b price at Chittagong(US$/MT) (A-B)	602.00
D. F.o.b price at Chittagong(Tk/MT)	42844.34
E. Components of the marketing margin from border to producers level:	7387.03
Export handling cost	1285.33
Transportation cost	1074.20
Trading cost	5027.50
F. Border price at producer level (D-E)	35457.31

Source: Own calculation by using different data sets from various publications

Results of Policy Analysis Matrix (PAM)

Appendix Table 6 and 7 showed the divergences between private and social values for jute and its competing crop Aus rice. A divergence causes an actual market price to differ from a counterpart efficiency price. Generally divergences arise from either of two sources- market failures or distorting policies. A market failure occurs if a market fails to provide a competitive outcome and an efficient price. A distorting policy is a government intervention that forces a market price to diverge from its efficient valuation. Taxes/subsidies, trade restrictions or price regulation could lead to this result (Aung, 2006).

Table 6: Policy analysis matrix (PAM) for jute (Taka/MT)

Items	Revenue	Costs		Profit
		Tradable inputs	Domestic factors	
Private prices	37750.00	1460.60	29620.00	6669.40
Social prices	35457.31	2811.82	25368.37	7277.13
Divergences	2292.69	-1351.22	4251.63	-607.73
Relative Divergences (%)	6.47	-48.05	16.80	- 8.35

Table 7: Policy analysis matrix (PAM) for Aus (Taka/MT)

Items	Revenue	Costs		Profit
		Tradable inputs	Domestic factors	
Private prices	12500.00	1770.11	9983.50	746.38
Social prices	19846.22	3162.01	8857.54	7826.67
Divergence	-7346.22	-1391.90	1125.96	-7080.29
Relative Divergences (%)	-37.02	-44.02	12.71	-90.46

PAM Tables showed different policy divergences such as revenue from output, tradable input, domestic factor and net profit. It is evident that revenue transfer (difference between private revenue and social revenue) was positive for jute (2292.69) and negative for Aus rice (-7346.22). The positive value indicates that the government protective policies affect positively to the producer incentives. Relative divergence between private and social revenue for jute was 6.47%, which reflects that the price obtained by the producer was higher than the world prices. On the other hand, negative value for Aus rice indicates that the government protective policies affect negatively to the producer incentives. Relative divergence between private and social revenue for Aus rice was -37.02%, which reflects that the price obtained by the producer was lower than the world prices.

The interpretation of tradable input transfer (difference between private and social price of tradable inputs) is similar to that for tradable output transfer because both are based on comparisons of actual market (private) prices with world (social) prices. There were negative divergences of tradable inputs for both jute (-1351.22) and Aus (-1391.90) crops. Relative divergences between private and social prices of tradable inputs for jute and Aus crops were -48.05% and -44.02%, respectively. The negative values illustrate that the domestic producer buy the imported inputs less than the world price for producing jute and Aus crops. Thus, the

government has implemented input subsidy policy to the crop sector to decrease cost of production.

The domestic factor transfer (difference between private and social prices of non-tradable inputs) was positive both for jute (4251.63) and Aus (1125.96) crops. The positive values showed that the opportunity costs of non-tradable inputs were lower than their market prices. Relative divergence between private and social prices of non-traded inputs for jute production was higher (16.80%) compared to Aus rice (12.71%) production. On the other hand, net policy divergences or net transfer of jute (-607.73) and Aus (-7080.29) crops showed the negative value. The negative values mean the domestic prices were lower than import parity prices and the production was more profitable socially than privately. These negative values illustrate that the producers could earn higher profit or less loss without government intervention.

Comparative Advantage Analysis

The Domestic Resource Cost (DRC) was used for determining economic profitability of jute and its main alternative crop (Aus). In considering the comparative advantage in the international market, DRC for jute and rice was calculated and the results are presented in Appendix Table 8.

Table 8: Calculation of DRC for Jute and Rice in Bangladesh during 2010-11

Items	Jute	Rice
A. Traded inputs (Tk/MT):	2811.82	3162.00
Urea	1703.21	1149.49
TSP	751.23	1499.88
MoP	357.38	512.63
B. Non-traded inputs and domestic resources (Tk/MT):	25368.37	8857.53
Human labour	15192.00	3295.50
Machinery inputs	2699.00	1570.00
Seed	509.00	344.00
Manure	725.00	-
Rental value of land	5246.00	3097.00
Pesticides	185.00	335.00
Interest on operating capital	812.37	216.03
C. Output price (Tk/MT)	35457.31	19846.22
D. Value added (Tradable) (Tk/MT) [C – A]	32645.49	16684.22
E. DRC [B ÷ D]	0.78	0.53

Source: Own estimation by using different data sets

DRC indicates whether the usage of domestic factor is socially profitable (DRC< 1) or not (DRC> 1). If DRC< 1, the economy saves foreign exchange by producing the selected crops domestically either for export or import substitution. This is because the opportunity cost of domestic resources and non-traded inputs used in producing the selected crops is less than the foreign exchange earned or saved. In contrast, if DRC> 1, domestic costs are in excess of foreign costs or savings indicating that the selected crops should not be produced domestically and should be imported instead. In this study, DRC of jute (0.78) and Aus (0.53) crop was less than one. It can be interpreted that jute and Aus had comparative advantages in Bangladesh. Table also showed that Aus crop had higher comparative advantage than jute production. This result is supported by a study conducted by Bari (1986). It implies that jute production is more profitable at private prices compared to social prices.

CONCLUSION

Financial analysis showed that jute production was more profitable than Aus in the study areas. It is evident that revenue transfer was positive for jute and negative for Aus. It indicates that the government protective policies affect positively and negatively to the producer incentives in case of jute and Aus crops, respectively. Relative divergences reflect that the jute producer obtained higher price than the world prices and the Aus producer

obtained lower price than the world prices. On the other hand, relative divergences between private and social prices of tradable inputs illustrated that the domestic producer bought the imported inputs at less prices than the world price for producing jute and Aus crops. The domestic factor transfer for jute and Aus crops showed that the opportunity costs of non-tradable inputs were lower than their market prices. Net policy divergences or net transfer of jute and Aus crops showed that the domestic prices were lower than import parity prices and the productions were more profitable socially than privately. The producers could earn higher profit or less loss without government intervention. The value of DRC for jute and Aus crop was less than one, which indicated that Bangladesh had a comparative advantage for import substitutions for these crops. It means the value of domestic resources used in producing per ton of these crops was less than the cost of these imports. Therefore, government should continue the existing policy support for these crops in a market economy condition.

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