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The Role of Rice Processing Industries in Bangladesh : A Case Study of the Sherpur District

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Summary

A case study was conducted to investigate the processing technique and marketing of rice in Bangladesh. Rice-processing industries (millers) are one of the most dominant rice-trading agencies in the study area. Our results indicate that this processing sector provides a significant number of jobs to the rural people. Seasonal employment patterns showed that employment opportunities are high during the crop seasons, especially in the boro (spring paddy) harvesting season. Women had higher employment opportunities than men in the researched area. The breakeven price per kilogram (kg) of rice was analyzed in order to identify the margin for the mill owner. It was found that the millers selling price was higher than that of the breakeven price, indicating that rice trading is a profitable business in Bangladesh.

1. Introduction :

Rice is the most important cereal and staple food in Bangladesh. More than 70 per cent of the total calorie intake comes from this food item. The per capita consumption (about 400 gm/day) of rice in Bangladesh is one of the highest in the world. Rice cultivation covers more than 70 per cent of the total cropped area. Three types of rice, namely aus (summer), aman (winter) and boro (spring) are grown in Bangladesh. The aggregated production of aus, aman and boro paddies were more than 21 million ton during the 1999-2000 fiscal year that contributed 8.0, 45.0 and 47.0 per cent of the total production, respectively.

When the paddy is harvested from fields, it needs to be processed for consumption. Parboiling, drying and milling are the different stages of rice processing. These are done both at home (small scale) and at the rice mills (large scale). Processing at home, the non-commercial sector of milling is perhaps the oldest and almost obsolete form of rice processing method

in Bangladesh. In this method, paddy is processed in *dheki*¹ after it is parboiled and dried.

Paddy processing and milling in Bangladesh is mostly performed at the rice mills. These mills are called commercial milling center. There are two kinds of commercial mills available in Bangladesh: one type is the rice miller those purchase paddy directly or through their agents from the local bazaar or hat². In these facilities, after parboiling, drying and milling the paddy, they usually supply the milled rice (finished products) to the wholesalers and assemblers of the big cities.

On the other side, after parboiling and drying the paddy at home facility, the processed paddy is milled for finished rice in a small husking machine³ that situated in the nearby village bazaar. These huskers also husk paddy for the small itinerant traders of the village. Recently, vendor huskers⁴ are also available in the villages. These huskers visit from door to door of the villagers and husk paddy for them at a fixed price in the farmyards of the customers.

Number of commercial rice millers is in-

creasing over the years. Increasing trend in mechanical process unit in the market has gradually replaced the traditional method of rice processing. These commercial—processing units have been playing a significant role in the rice marketing system. We will discuss here the role of the rice mills in the marketing and processing system. Their role needs to be interpreted as a part of the entire marketing process. Therefore, we have decided to carry out a research on the rice millers in Bangladesh. The role of the rice millers from rice purchase to distribution as well as the nature of margin of the mill owners will be discussed in this paper. Because of inadequate data and information of the non—commercial processing unit (*dheki*) and small commercial husking unit like vendor huskers and other small huskers, we shall discuss here only about those commercial millers, who purchase paddy through different agents, parboil, dry, process in own mill, and sell bulk volume of paddy to the long distance traders.

2. Methodology :

Three types of rice mills are available in Bangladesh. According to the Ministry of Food [6], these are husky, major and automatic rice mills. We did not find the major type rice mills in our study area (Sherpur district). Therefore, our analysis will be confined to husky and automatic rice mills only. There are 305 husky and 2 automatic rice mills are in operation [6] in the Sherpur district⁵. Of the total mills, 27 (25 husky and 2 automatic) rice millers from 2 thanas (viz., from Nakla and Sherpur Sadar thana) were interviewed from the 2nd week of February 2000 to 2nd week of March 2000 for this research. Because of the same nature of functions and capacity of the husky mills, we did not categorize among these mills so, 25 husky mills were randomly chosen for this research, and for automatic mills we selected both.

Data were collected on different aspects. It was difficult to receive data from the rice millers. Initially, they were suspicious about our purpose, after repeated request and explaining our purpose clearly to them they agreed to talk to us. Yet, we are convinced that in some occasions millers did not respond sufficiently according to our need. To overcome some of these problems, we also accumulated some detailed information from a single husky miller (automatic millers did not cooperate for detailed information) when it seemed necessary. Though there might be some limitations in our analysis, and the sample numbers might not symbolize the whole Bangladesh, this paper will provide a good overview on the functions and characteristics of the commercial rice mills of the study area yet.

3. Role of the Rice Mills

3. 1. Rice Millers as Paddy Purchaser :

Rice millers in the research area are the most significant members of the marketing system. In fact, they play a vital role in paddy purchasing and selling operations. They buy paddy either directly or through their agents from the markets. In our case, we found that all the millers bought paddy through the *aratsdar*⁶, a commission agent, who has permanent business shop in the thana market. These commission agents get capital (money) in advance from the millers for supplying paddy to the mills. The amount of money varies from mill to mill. *Aratsdars* supply paddy to the mill within 7—15 days of receiving money from mills. How much paddy would be purchased and at what price level is the decision of the millers and controlled by them, *aratsdars* have little freedom in such matter.

After receiving money, *aratsdars* are ordered to maintain liaison with the millers for necessary direction on paddy purchase process. Millers follow closely the information of nearby

markets about the price and volume of paddy transacted at each market in a hat day. This information helps the millers to order their suppliers on further line of action.

Based on the direction, *aratdars* supplied the desired quantity of paddy to the millers.

For providing this service, suppliers received a fixed commission from the millers. Generally, millers bear all the purchasing cost. No risk is involved for *aratdar* for purchasing and delivering the paddy at the mill gate. The only risk they have is to deliver 81-kg of paddy in a bag.

If they fail to deliver this quantity, millers might regret the transaction. The standard measurement of one bag is 80-kg. It is to be mentioned here that the *aratdars* will not be awarded with extra money for supplying extra one-kg of paddy, he will receive the price that equivalent to 80-kg. This is a well-established practice in the interviewed area.

To maintain the standard of 81-kg per bag, *aratdar* follow unfair weighing method when they buy paddy from other itinerant traders or farmers. On the other hand, the itinerant traders who purchase paddy from the farmers might ensue the same weighing method that *aratdar* usually practiced and deceived the farmer in order to maintain their margin. We received this complain from the farmers during the interview. However, this complain was not crosschecked with other parties. From the above discussion it can be said safely that the rigidity of supplying 81-kg of paddy in a bag to the millers should certainly force the traders to adapt discriminatory weighing systems while they procure paddy from the primary suppliers. This indicates that the farmers incurred loss as primary suppliers of paddy for the discriminatory weighing method.

3.2 Paddy Processing, Milling, By-product

3.2.1 Paddy Processing :

Various steps are followed in this stage to fit the

rough paddy for human consumption. These are soaking and parboiling, and drying.

Paddy soaking and parboiling process is different for two and one boiled rice type. For two-boiled rice type, the paddy is steamed first in a cylindrical bin, and then it soaked for 24 hours in a cemented tank. The paddy is then steamed again. The whole steaming process takes about one hour or less depending on the volume of paddy. On the other hand for the one-boiled rice type, the paddy is first soaked in the cemented tank for about 12 hours then steamed. The whole steaming process takes about 30 minutes or less.

In the automatic mill, the machine takes care the entire process. Method of parboiling and soaking is more uniform and superior to the small-scale machine. Parboiling and soaking are performed in controlled temperature hence the chances of over and under steaming is less.

Sun-drying is the main method of reducing moisture to the level required for proper milling quality. In the rice mills, paddy is dried on the large cemented yards commonly known as *chatahs*. According to a miller, a 60 decimal *chatal* of the rice mill is capable of drying nearly 10,000-kg of wet paddy. At least eight-hours per day for three days drying is necessary during the months of November to January. Eight-hours per day for two days in February and March and six-hours per day for two days drying is needed in the summer months [8,10]. At the end of the day, dried paddy is assembled in small heaps and covered with tin or wicker to avoid wetting [11].

3.2.2 Milling :

Milling procedure of husky and automatic mills differs. These are explicated below.

Husky rice mills do some polishing in addition to husking mostly by using two or more passes through hullers to grind off some of the bran after husking. These mills usually pro-

Table 1 : Major Differences of Husky and Automatic Rice Mills

Types	Major Components	Capacity	Power Requirement	Hulling/ Polishing	Bran Separation and Grading
Husky	Soaking Tank Steam Parboiled Drying Floor Engleberg Huller	0.6 to 1 ton/hour	30-40HP	2 to 3 Operations	Manually
Automatic	Pre-cleaner Soaking Tank Boiler, Steam Pressure Parboiled Dryer, Rubber Roll Sheller Paddy Separator Polisher, Bran Separator etc.	2 ton/hour	65-100HP	Separately by different devices	All Activities Mechanically

Source : Rahman (1998), Baqui, Miah and Ahmed (1994)

Table 2 : Milling Outturn and Production of By-products by Mill Types for 40-kilogram Paddy

Mill Type	Milling Outturn (Kg)	Husk (Kg)	Rice Bran (Kg)	Broken Rice (Kg)
Husky	25.2 (63.0)	7 (17.5)	6 (15.0)	1.8 (4.5)
Automatic	26.4 (66.0)	6.2 (15.5)	5.7 (14.3)	1.7 (4.2)

Note : Data were taken from one rice mill from each group. Figures within parentheses indicate percentages.

Source : Field Survey (February-March, 2000)

duce four types of products : milled rice, some broken rice, rice bran and husks.

Automatic rice mills use modern techniques for paddy processing. The paddy is pre-cleaned before soaking in water at high temperature and parboiled under pressure by steaming. Then the steamed paddy is dried in dryer and husked in a rubber roll huller or disc huller. The unhusked paddy is separated from the brown rice by a paddy separator and is recycled back to the huller. Brown rice polished by a cone type polisher, engleberg operated roller polisher. Milled rice is graded according to head rice, large broken, small broken rice and processed at least 2 tons per hour. Major differences among these mills are presented in Table 1.

3.2.3 By-product Generation :

Rice mills can produce three kinds of by-products ; these are rice husk, rice bran and broken rice. Ratio of these by-products is also

different. The ratio of head rice, rice husk, rice bran and broken rice varies by mill types. On average, the surveyed husky mills could generate 63.0, 17.5, 15.0 and 4.5 per cent of head rice, rice husk, rice bran and broken rice, respectively while the automatic mill could produce different proportion of head rice, husks, bran and broken rice (Table 2). The price of these by-products is not the same and could be different by mill type. It was reported that the by-product of automatic mill has higher market value because of quality products produced by these mills. Quantity of by-products produced by a mill and their market value could influence the margin of the millers.

All the by-products that a mill produce have alternative applications such as, bran and broken rice are useful feed for poultry, livestock and fish, while rice husks has been utilized as fuel for millers and rural community. Millers

are generally use husks as fuel for steaming. A miller needs roughly 7,200–kg husks to steam 40,000–kg of paddy. The rests of the husks they sell out either to villagers or to other millers. Villagers utilize the husks for cooking. On the other hand, millers who purchase husks from other millers or from the market make charcoal sticks (those used as fuel) by heat pressure in a different machine. Villagers and small city dwellers purchase these sticks for fuel.

3.2.4 Distribution of Milled Rice :

About 200 automatic rice mills with capacities of 2 tons per hour, over 200 major rice mills with capacity of 1 ton per hour, and more than 11 thousand husking mills with capacity of about 0.6 to 1 ton per hour are in operation in Bangladesh. These mills are distributed all over the country (Table 3).

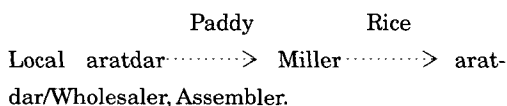
The millers generally market the milled rice through private commercial channels. One rice miller was found who has contract with the Ministry of Food to supply mill rice for them.

When a miller enters into the market, he sells the product directly to the assembler or *aratdar* cum wholesaler of the terminal market, or sells to the visiting traders from outside the local market [11]. In our case, all millers were found to sell rice to the *aratdar* cum wholesaler or to the assembler of Dhaka, Chittagong and Choumuhani. The average distance of these areas is about 200, 400 and 600 kilometer (km), respectively. Rice is transported by truck in those ar-

reas because of good road conditions.

There are several reasons for selling rice in these areas, such as excellent transaction, opportunity to sell large volume at a time. Moreover, traders usually come to the mill site; consequently, the millers are safe from bearing transport cost, risk of hijack at the road and other hazards. The millers association of the study area plays strong role on the behalf of its members. According to a miller, few years ago, due to the problem of price negotiation with the traders of the distant areas, millers stopped supplying rice to that area resulted in shortage of some varieties of rice in the terminal markets.

However, this problem was negotiated latter. On the basis of the above discussion the following marketing channel was identified for the rice millers :



3.3 Employment Generation :

The level of employment provided by this industry is an important indicator of its performance. According to the report of BBS 1989 obtained both directly and indirectly, 16,448,000 workers were employed in the rice industry. It should be mentioned here that the concerned ministry has had no recent study on this issue [11].

We tried to identify the level of employment generated by the sample millers those are shown from Table 4 to 6. Twenty–seven mills have provided employment for 454 daily wage-workers in a day of which 62 per cent are female. The daily wage rate however, varies by sex. Female laborers could get 69 per cent wages of the male laborers (Table 4).

Table 5 shows that these mills have provided jobs for 118 permanent staffs, of which 80.5 per cent work for husky mills and the rest

Table 3 : Number of Rice Mills by Type and by Divisions*

Divisions	Automatic	Major	Husky
Dhaka	12	91	2,309
Chittagong	105	18	1,456
Rajshahi	26	67	5,661
Khulna	7	15	1,695
Barisal	—	7	230
Sylhet	48	22	782
Total	198	220	11,533

Note : * Highest level of local administrative unit.

Source : Database on Food Situation Bangladesh June, 1999, Food Planning and Monitoring Unit (FPMU), Ministry of Food

Table 4 : Number of Labors Working in the Rice Mills in a Day and their Average Wage Rate (Taka/day)

Mill Type	Male	Female	Total	Per Mill	Male (Wage)	Female (Wage)
Husky (25)	161 [38.0]	268 [62.0]	429 [100.0]	17.2	48.2	31.5
Auto (2)	11 [44.0]	14 [56.0]	25 [100.0]	12.5	55.0	40.0
All	172 [38.0]	282 [62.0]	454 [100.0]	16.8	51.6	35.8

Note : Figure within () indicate sample no & figure within [] indicate percentages.

Labor numbers are shown in aggregate and wage in average

Source : Field Survey (February – March, 2000)

Table 5 : Number of Permanent Staffs Work in the Mill and their Average Salary (Taka/month)

Mill Type	Manager	Machine Man	Field Supervisor	Night Guard	Cook	Purchaser	Total
Husky (25)	24 (2269.5)	25 (2250.5)	19 (1691.0)	25 (1384.0)	2 (900.0)	—	95 [3.8]
Auto (2)	3 (3333.0)	14 (3029.0)	1 (4000.0)	4 (1800.0)	—	1 (3000.0)	23 [11.5]
All	27	39	20	29	2	1	118 [4.4]

Note : Figure in () indicate sample no. and average salary of the corresponding staff & figure within [] indicate average number of employees. No. of staffs are shown in aggregate.

Source : Field Survey (February – March, 2000)

Table 6 : Annually Employed daily Labor (no.) in the Rice Mills by Sex and their Average Income (Taka)

Mill Type	No. of Male Employed	No. of Female Employed	Total	Income* (Male)	Income* (Female)
Husky (25)	43,470 (38.0)	72,360 (62.0)	115,830 (100.0)	13,000 [241.7]	8,505 [157.5]
Auto (2)	2,970 (44.0)	3,780 (56.0)	6,750 (100.0)	14,850 [275.0]	10,800 [200.0]
All	46,440 (37.9)	76,140 (62.1)	122,580 (100.0)	13,925 [257.9]	9,653 [178.8]

Note : No. of employed labor & annual income are calculated by assuming that a mill is operated 270 days a year. *income of a labor for 270 days.

Figures within () indicate sample no. & percentages, & figures within [] indicate income in US \$. 1 US\$=Taka 54.0

Source : Field Survey (February – March, 2000)

jobs are for the automatic mills. The average employment rate is higher for automatic mills.

Table 6 represents the picture of annual employment of daily waged workers and their annual income by sex. In all, 27 mills could provide 122,580 daily workers in a year, of which 46,440 are male and 76,140 are female (see the note of the table for estimating the number of annual worker). The average income of male laborers was Taka (Tk) 13,925 (258 US dollar) while the income for the female laborers was Tk9,653 (about 179 US dollar).

We did not have related study in our hand to compare the employment situation of rice mills with other industries. So, to depict the importance of rice mills in employment scope, we have compared our result with the published data of the Ministry of Planning [1]. We understand that this comparison will reflect the place of rice mills in employment opening. Referring our analysis in Figure 1 we retrieved that except the apparel sector, none of the other industries could provide higher employment scope as high as rice mills. Employment posi-

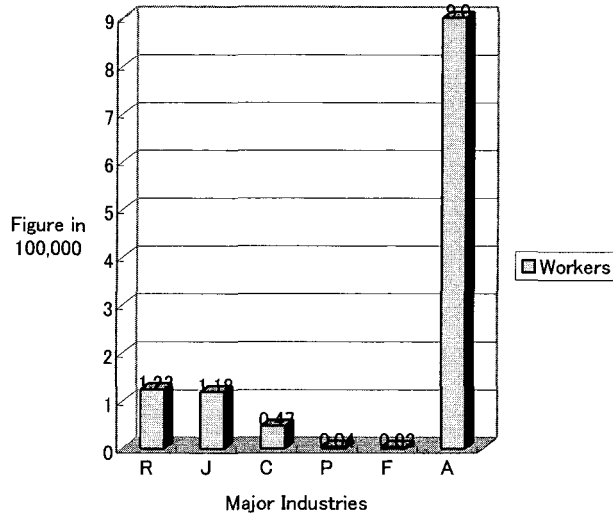


Figure 1 : Numbers of Workers by Major Industries in Bangladesh

Note : R=Rice, J=Jute, C=Cotton, P=Paper, F=Fertilizer, A=Apparels

Source : Rice industries data were taken from Table 6 and data of other industries were obtained from Ministry of Planning 1996

tion of rice mills could have been more if all the rice mills were included in this analysis.

To know the employment figure by crop (seasonally and non – seasonally) in a mill seasonal pattern of employment of daily waged workers and their annual income based on sex obtained from a miller is shown in Table 7. This analysis would render some insights on how employment changes between the crops, and seasonally and non – seasonally within a crop. In addition, though it would not be highlighted in the present study, this analysis would provide important guideline to compute the seasonal and non – seasonal margin of millers in future.

Data for this table was collected from a single rice miller. Some interesting results were observed in this parameter ; number of workers varied by the seasons. The number of workers declined during the non – seasons for all crops. However, employment opportunity increases in the boro seasons and the percent of female workers remains higher for both crops. Although it was not shown in the table, wages of

the workers varies by sex. Per day average wages was Tk 60 (\$ 1.11) for male and Tk 30 (\$ 0.56) for female workers.

Column 4 to column 6 shows (Table 7) the annual employment pattern by season and by sex for both crops. Some assumptions were made to estimate this annual employment pattern. Assumptions were made based on the information obtained from the miller. According to the miller, a mill could be operated for 30 days in a month in the peak season and 12 to 16 days in non – seasons in a month, which also depend on the volume of paddy. We assumed here 12 days mill operation period for non – season. Aman season is defined here from November – December to January – February i.e., the mill was opened for 90 days in the aman season. In the non – season of aman, the mill was opened for 24 days (February – March to March – April is assumed as non – season for aman).

On the contrary, the mill had operated 120 days in the boro season and 36 days in the non – season of boro (the boro season is from April – May to July – August, while August – Sep-

Table 7 : Data Obtained from a Rice Miller on the Seasonal Pattern of Employment of Daily Labor and Aggregate Annual Wages (Taka) of a Labor by Sex

	Daily			Yearly			Annual Wage	
	Male (no.) 1	Female (no.) 2	Total (no.) 3	Male (no.) 4	Female (no.) 5	Total (no.) 6	Male 7	Female 8
Aman :								
Seasonal	14 (24.6) 35.9	25 (25.0) 64.1	39 (24.8) 100.0	1260 (30.0) 35.9	2250 (31.2) 64.1	3510 (30.7) 100.0	5400 [100.0]	2700 [50.0]
Non-seasonal	10 (17.5) 33.3	20 (20.0) 66.7	30 (19.1) 100.0	240 (5.7) 33.3	480 (6.6) 66.7	720 (6.3) 100.0	1440 [26.7]	720 [13.3]
All	24 (42.1) 34.8	45 (45.0) 65.2	69 (43.9) 100.0	1500 (35.7) 35.5	2730 (37.7) 64.5	4230 (37.0) 100.0	6840 [126.7]	3420 [63.3]
Boro :								
Seasonal	18 (31.6) 37.5	30 (30.0) 62.5	48 (30.6) 100.0	2160 (51.4) 37.5	3600 (49.7) 62.5	5760 (50.4) 100.0	7200 [133.3]	3600 [66.7]
Non-seasonal	15 (26.3) 37.5	25 (25.0) 62.5	40 (25.5) 100.0	540 (12.9) 37.5	900 (12.4) 62.5	1440 (12.6) 100.0	2160 [40.0]	1080 [20.0]
All	33 (57.9) 37.5	55 (55.0) 62.5	88 (56.1) 100.0	2700 (64.3) 37.5	4500 (62.2) 62.5	7200 (63.0) 100.0	9360 [173.3]	4680 [86.7]
Grand Total	57 (100.) 36.3	100 (100.) 63.7	157 (100.) 100.0	4200 (100.) 36.7	7230 (100.) 63.3	11430 (100.) 100.0	16200 [300.0]	8100 [150.0]

Note : Figure within () indicate vertical percentages, figures within | | indicate horizontal percentages and figure within [] indicate income in US \$.
1 US \$ = Taka 54.0

Source : Field Survey (February – March, 2000)

tember to October – November⁷ is defined as the non – season for boro). The reason for longer operating days in the boro season is it includes the aus paddy as well. Aus paddies are harvested from July to September.

Based on the assumption, our estimated total employment in the aman season was 4,230 while for the boro season it was 7,200. Of course, the employment rate was highest in the seasons. For aman, employment rate was 83 per cent and for boro, it was 80 per cent. The boro season generated highest employment (63 per cent) and income opportunity for the study area. A male laborer could earn Tk 16,200 (300 US dollar) while a female laborer could obtain half of the male laborers. Keeping in mind the total number of mill scattered all over the country, we can suggest that rice – milling industry can be a vital sector of employment if proper attention is

given [11].

4. Costs of Processing, Selling and Margin of the Rice Millers

4.1 Cost of Processing and Selling :

It was difficult to obtain data on the costs and margin from the rice millers. They were always suspicious whenever they were asked to provide information on the cost of paddy processing and distribution. Initially, we tried to get information on the various aspects of costs and margin from the millers on monthly basis. But, they were reluctant to respond mainly for two reasons. First, they did not want to disclose their business secret to a stranger ; second, it was very tiring to provide data for 12 months, so we obtained averages of all cost items and profit margin.

Though the averages of costs and margin

data do provide some insights into the nature of the costs and margins of the millers, we however, approached one husky miller about our purpose and convinced him to cooperate with our study. Consequently, we obtained some details on the costs of operation, selling and margin of BR-26 (aus), BR-11 (aman), and BR-3, BR-14, and BR-28^s variety of boro from the miller that he purchases and sells in a season. These are the common varieties grown in the surveyed area. By and large, all the millers of the district purchase and sell these varieties.

Although we have obtained data of cost of processing and selling from a single miller, our collected data do not vary significantly from the result of Begum (Department of Agricultural Marketing) and Rahman. Begum found that the processing cost of 40-kg paddy (coarse variety) was Tk 18.0 in Dinajpur district. She did not estimate the selling cost [4]. Rahman estimated the same for Naogaon district was Tk 13.3 for 40-kg paddy [11]. Comprising the selling costs, total cost was computed as Tk 21.6 in Rahman's study.

In contrast, the processing costs were estimated in our case study as Tk 16.8 and 19.7 for aman and boro, respectively. Together with the selling cost, our estimated total costs were Tk 36.8 and 43.4 for aman and boro. Apparently, the difference was due to that the studies were conducted in two different places and two different seasons. In addition, the difference in selling costs observed with Rahman was due to local transportation cost and commission of local *aratdar's* considered in his study. While on the contrary, we discussed the long distance transportation cost and long distance *aratdar's* commission. Although our figures varied from the result of Begum and Rahman to some extent, we are able to provide some insight on the nature of costs of processing and selling of rice miller at the micro level.

Cost of processing was classified as fixed

and variable cost. First category includes salaries of permanent staff, depreciation and maintenance cost, rent etc. Variable costs include labor required for soaking, parboiling, drying, and packing etc. Electric bill, cost of bags for packing and storage were also included in the category of variable costs. Other costs include entertainment costs, bribe to traffic police, local mastans⁹, etc. Details of the cost of processing and selling are provided in Table 8.

As shown in the table, the transportation cost of selling rice is the major cost for all the varieties, followed by labor cost. The cost of processing and selling were the same for all the boro and the aus varieties. Among the crops, the cost of processing and selling was higher for boro and aus.

4.2 Margin of the Millers :

Obtaining a reasonable margin from the business is the ultimate goal of an entrepreneur. However it was difficult to collect such data, especially from those who tried to conceal information. During the interview, the miller was providing information in a way that led us to assume that rice milling is not a profitable business. In such case, to identify the margin of the millers, we decided to identify the breakeven price (BP) of the miller with a formula that developed by FAO [12]. We believe that the breakeven price would provide a parameter to understand how much a miller could profit from rice trading. To assess the margin of the miller, it is important to know the sell price (SP) of rice that we collected from the miller by variety. Finally the margin was calculated by deducting the breakeven price from the sell price.

FAO subtracted the value of by-products from the summation of purchase price and processing cost to estimate the breakeven price. But in our case, we modified the formula by adding the transportation cost and commission. Because, in Bangladesh, millers do not only process paddy, they also sell the processed rice to

Table 8 : Data Obtained from One Miller on the Processing and Selling Cost (Taka) of 40 Kg Paddy by Variety

Variety	Processing Costs				Selling Costs				Total Costs				
	Fixed		Variable		Selling Costs								
	Staffs Salary	Maintainence & Depreciation Cost	Rent	Taxes	Labour Cost	Storage	Electric Cost	Bag Cost	Other Costs	Total Processing Cost	Transport Cost (sell)	Com-mision	
BR-11	1.2 (3.3)	0.64 (1.7)	1.45 (3.9)	0.02 (0.0)	6 (16.3)	2 (5.4)	1.6 (4.3)	1.9 (5.2)	2 (5.4)	16.8 (45.6)	15 (40.8)	5 (13.6)	36.8 (100.0)
BR-14, BR-3, BR-28, BR-26	1.4 (3.2)	0.68 (1.7)	1.45 (3.3)	0.02 (0.0)	7.2 (16.6)	2.6 (6.0)	2 (4.6)	1.9 (4.5)	2.4 (5.5)	19.7 (45.4)	18.7 (43.1)	5 (11.5)	43.4 (100.0)
Average	2.3 (5.6)	0.66 (1.6)	1.45 (3.5)	0.02 (0.0)	6.6 (16.1)	2.3 (5.6)	1.8 (4.4)	1.9 (4.6)	2.2 (5.4)	19.2 (46.7)	16.9 (41.1)	5 (12.2)	41.1 (100.0)

Note : BR-11 is a aman variety, BR-3, BR-14, BR-28 are boro variety and BR-26 is an aus variety. According to the miller, the cost of processing and selling of boro and aus variety were same so, they are shown in the same column. Figures within parentheses indicate percentages.

Source : Field Survey (February--March, 2000)

the distant wholesaler or assemblers, too. For selling rice, they have to bear the transportation costs as well as the commission of the aratdars, when they sell rice through them. So, we felt that, to estimate the breakeven price of rice in Bangladesh, consideration of transportation costs and commission of the intermediaries would be meaningful in this analysis.

If $BP > SP$, this indicate that the miller is not making profit from the business. If $BP = SP$ which mean that there is no margin point. And if $BP < SP$ will indicate that the rice milling is a profitable business. We followed the following formula to estimate the breakeven price and margin of the miller for 1 kg of rice by variety.

Formula of Breakeven Price :

$$BP = [(PP+PC) \cdot VBP \cdot 1.58] + TC + C$$

Where, BP = Breakeven price ;

PP = Paddy purchase price ;

PC = Processing costs ;

TC = Transport cost of selling ;

C = Commission of aratdars ;

VBP = Value of by-products (value of rice bran + value of broken rice) ;

1.58 = Conversion ratio (1.58 kg paddy is required to produce 1 kg of rice). FAO

assumed 66 per cent milling outturn, but in our case we found that the milling outturn of husky millers was 63 per cent, i.e., the miller had to mill 63.5 kg of paddy to get 40 kg of rice, thus our conversion ratio stands as 1.58.

Formula of Margin :

$$M = SP - BP$$

Where, M = Profit Margin of the miller

SP = Sell price of rice

BP = Breakeven price

All the by-products have market value and their value changes seasonally, depending on the demand.

As mentioned in section 3.2.3, rice bran and broken rice are used for feeding fishes, poultry and livestock, and the rice husk is used as alternative sources of fuel in the rural areas.

Millers generally sell out all the bran and broken rice that produced in their mill, while some bulk of the husks are used as fuel for steaming paddy and the rest they sell out at the market. The volume of husk that the millers sell was difficult to quantify, so we excluded its value from the computation of total value of by-products. To estimate the breakeven price, we collected necessary information from a husky miller.

According to the miller's estimation, a 52-kg bag of bran could be sold at Tk 40 (0.77 Tk/kg), while an 80-kg bag of broken rice had the market value of Tk 210 (2.63 Tk/kg) as for the time of interview. Thus per kg aggregated value of the by-products after multiplying with their recovery ratios (ratio of husky millers was used as shown in Table 2) was estimated as Tk 0.23. Some methodological expression used in the table is important to note here.

The millers stated that they purchase an 80-kg bag of paddy from the suppliers. However, according to some suppliers, it is customary in the area that a supplier must have to supply 81-kg of paddy in a bag instead of normal weight of 80-kg to the millers. Suppliers would not be paid for an extra kg. This was crosschecked with other millers and they acknowledged the fact. Hence, the purchase price of paddy was divided by 81-kg to estimate 1-kg price of paddy. For other variables, we followed the standard measurement of 80-kg to estimate the costs and margin for 1-kg of rice. Thus, the costs and margin estimated are shown in Table 9. Purchase price of paddy includes transportation cost, commission of the supplier and loading charge.

The analysis showed that the millers had sold all the varieties higher values than the breakeven price. The average margin of the millers was Tk 0.16/kg. This however, varied from Tk 0.11 to 0.16 among the varieties. Per

kg margin was highest for BR-11 and lowest for BR-26. The reason of higher margin of BR-11 can be explained by the fact that it was sold during the non-seasonal period. Miller's margin varied marginally during the boro season.

These margins are, however, higher compared to the findings of Baulch et al. [3] and Rahman [11]. The higher margin we obtained might have been caused by the included value of by-products that the other studies failed to identify. Longer period of storage might be the other reason for higher margin in this case. According to the latest notification (October 4, 1987) of foodstuffs price control and anti-hoarding order, no trader of foodstuffs shall keep in his or her control any foodstuff for longer than 20 days from the date of purchase and shall not keep it in one place for more than 7 days.

However, it is revealed from the miller we interviewed that he stored paddy in his mill about 40-50 days. The miller stated that although there are some risks to store paddy such as, down fall of price (for longer period), he often purchases paddy at the lowest price after the harvest and stores major portions of paddy for future sell. Though we have not computed the interest for storage, we found that the miller stored paddy beyond the stipulated time for which we might have observed higher margin here. Further study is needed in this area.

Table 9 : Costs and Breakeven Price, and Margin Obtained by a Miller from 1 -kg. of Rice by Variety

	BR-3 (Coarse)	BR-14 (Coarse)	BR-28 (Coarse)	BR-26 (Coarse)	BR-11 (Coarse)	All
1. Total Purchase Price (Tk)	6.42	6.67	6.41	6.17	7.46	6.64
2. Processing Cost (Tk)	0.49	0.49	0.49	0.49	0.42	0.48
3. By-product Value (Tk)	0.23	0.23	0.23	0.23	0.23	0.23
4. Real Purchase Price [(1 + 2) - 3] Tk	6.68	6.93	6.67	6.43	7.65	6.89
5. Real Price of Rice (4 * 1.58) Tk	10.55	10.95	10.54	10.16	12.09	10.89
6. Transportation Cost (selling) Tk	0.46	0.46	0.46	0.46	0.37	0.42
7. Commission (selling) Tk	0.13	0.13	0.13	0.13	0.13	0.13
8. Breakeven Price (5 + 6 + 7) Tk	11.14	11.54	11.13	10.75	12.59	11.44
9. Sell Price (Tk)	11.25	11.7	11.25	10.85	12.75	11.6
10. Margin (9 - 8) Tk	0.11	0.16	0.12	0.10	0.16	0.16

Source : Field Survey (February-March, 2000)

5. Conclusions :

Rice millers were observed as the most dominant traders in the paddy/rice – marketing channel in the study area. They have strong authority on the paddy purchase from the local areas and selling rice at the distant market. Local traders (*aratdars*/commission agents) received capital in advance from the millers for delivering paddy to them at a price that specified by the millers. Millers are also fixed the limits of the volume of paddy that they desire to procure from an *aratdar* in a hat day and the amount packed in a gunny bag as well.

Millers did not follow the standard weighing method of the local area. Rather they asked the commission agents to supply an extra kilogram of paddy in a gunny bag for which the *aratdars* would not be awarded with extra price. Certainly, this kind of discrimination might compel the local traders to fraud the primary suppliers viz., farmers from whom they procure paddy. Consequently, farmers might incur loss for the discriminatory weighing method. For supplying paddy, *aratdars* receive certain percentage of commission from the millers.

Millers could provide employment opportunity for both men and women of the rural areas.

Female workers certainly dominate in the employment pattern and their wages was less than that of the male worker. Compared to other major industries, employment scope in the rice mills was observed high at the national level.

The breakeven price and margin analyses indicate that the margin of the miller varies among the varieties. We also found that the millers stored food beyond the stipulated time for which they could increase profit margin. Because of the lack of data for other parameters such as efficiency of the rice mill, problems of the rice miller, margin of other intermediaries, we could not explain if the margin they obtained was higher or lower. But we explained

that a miller could be benefited from the paddy/rice trading, and this might motivate other entrepreneurs in milling business.

At the end, we conclude that the profit margin that a rice miller earns might not be very high if their role as employment generation is considered. Furthermore, we did not cover the efficiency measurement of a rice mill in this paper ; therefore, any conclusion on the millers' margin would be premature at this stage. We therefore, suggest a detailed study on the various aspects of the rice mill that include the efficiency measurement of the mill, storage patterns, the problems they face during trading, and the margin of other intermediaries are further required to comprehend the role of the milling industries in Bangladesh's economy.

Notes :

1. A wooden made instrument, 2.5 – meter long and 20 – cm square, balanced like a seesaw on a bamboo fulcrum. This is the *Dheki*, the tool the village women use to husk rice. During the husking, women push one end with her foot, so that the other end, fitted with a wooden peg, rises and falls on the rice grains in a hole scooped in the kitchen's earthen floor. The pounding breaks the outer husks, leaving the inner kernels intact (Hartmann and Boyce 1990).
2. Hat is a village bazaar that takes place once or twice in a week. Almost all kinds of necessary goods are available in this bazaar. Villagers sell paddy, jute, vegetables, bamboo and many others things for which they buy daily necessary goods. The size of buyers and sellers is higher in a hat than the normal bazaar. This is also a common meeting place of the villagers.
3. These are the one or two pass – husking mills operated with diesel or Electric and producing a maximum of three products – rice, bran and husks.
4. Generally, the vendors for husking operation use the engine of shallow tube – well (STW). These vendor huskers are the owners of STWs. Applying their intelligence and using tube – well engines, these STW owners have adapted a new method of husk-

ing in the villages. This concept of husking has captivated the villagers especially, those who hold paddy for consumption. Small pushing cart is used to carry the engine of a STW and necessary equipment for the husking machine. All the huskers in these categories charge a fixed price for husking 40 – kg of paddy from the customers.

5. Local administrative unit in Bangladesh. Division is the highest level of local administrative unit that followed by the district, thana, union council and village.
6. A commission agent, who has permanent business premise in the local area. Buy paddy from the village markets and sell to the rice millers for a fixed commission. *aratdars* of the village areas buy paddy only. *aratdars*, who buy rice from the millers, are operating largely in the larger assembly and metropolitan markets. Sometimes wholesalers of the big city also act as *aratdar*.
7. Farmers generally follow the Bengali calendar month for crop season. A Bengali month begins in the middle of an English calendar month. This method was followed here to estimate the number of days for season and non – season period.
8. High yielding variety developed by Bangladesh Rice Research Institute.
9. Local touts. Basically, they do not have job. They grab money and ornaments from the common people and from the business premises of others thus they maintain their life style.

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