

## Paddy Processing System for Food Security and Poverty Alleviation in Bangladesh

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**Abstract** The study was based on the observation of paddy processing systems used by *bari* (home) based firms and rural parboiling firm cum rice mills in the study area named Khawaza Nagar which belonged to the union of Gagati under the district of Kushtia. The objectives of this study were: (i) to pin-point the salient features of *bari* based paddy processing system; (ii) to comprehend the managerial systems of parboiling firm cum rice mill. The findings revealed that: (i) Small scale and labor-intensive paddy processing firms dominate the private rice markets in Bangladesh. (ii) In *bari* based paddy processing system, the entire works from paddy soaking to products separation are managed by women and it is the main source of local employment in the study area. (iii) Every parboiling firm has two distinct parts: paddy parboiling firm supervised by three *beparis* (marketing functionaries) and rice mill administrated by miller himself though the proprietorship of total parboiling firm cum rice mill belongs to the rice miller. Activities of parboiling firm are contingent on the availability of paddy and rainfall distribution pattern of the study area as the technology and equipments used in the parboiling firm are very traditional in nature. The formation of *bepari* group depends on mutual trust and belief, honesty, dignity, hardwork and working capital. Each parboiling firm is highly generative of female employments. Some rice millers have access institutional credit from local commercial banks but *beparis, farias, kutials* and retailers faced the rigid institutional difficulties in gaining access to benefits being distributed by the commercial banks. On the basis of the findings the following recommendations are put forward for policy implications: (i) Institutional credit support should be given to a small group of like minded *beparis, farias, kutials* and retailers for the expansion of their business activities as well as for the improvement of technology and equipments used in the paddy processing system. It may reduce poverty ensuring household food security for the poorest of poor of the local area through the expansion of labor market. (ii) For the quality and ensured supply of paddy, contract marketing arrangement between paddy growers and parboiling firm or rice mill can be considered. In this regard, experience of the existing four major contract marketing arrangements in Bangladesh can be taken as guidelines for formulating an effective strategy to implement the contract marketing arrangement.

**Key words:** Paddy Processing System , Food Security and Poverty Alleviation

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### I. Introduction

In the economy of Bangladesh, paddy is by far the most important food crop that covers 74.36%

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of the total cropped area supplying 93.84% of the total caloric intake and about 90% of the protein from all cereals (Chowdhury, 1992). Paddy cultivation in Bangladesh has been revolutionized after the diffusion of high yielding varieties in the past two decades that has significantly alleviated the scanty supply of rice through the expeditious increase of marketed surplus from 10.4 to 50% (Chowdhury, 1992) whose ultimate manifesto has addressed the unemployment and underemployment by magnifying the rural labor market and trading and processing activities of paddy and rice in the country.

The rice consumption in Bangladesh is over-whelmingly rural as only 9.5 % of the population being classed as urban (BBS, 1991). Accordingly, about 6 percent of the total paddy produced in the country is processed by the major rice mills, usually located in or very close to the urban areas and the rest is by *bari* (home) based rice processing firms and small parboiling firm cum rice mills sited in the rural areas (Barbara Harriss, 1979).

Despite its considerable significance in the economy, these rural paddy processing systems have far been neglected by both economist and engineers as a consequence a very few and sporadic studies have conducted in this areas of paddy processing. Thus, present study addresses these key issues to pick up the salient features of prevailing paddy processing systems in a rural area of Bangladesh. However, the specific objectives of this study were:

- (i) To ascertain the salient features of *bari* (home) based paddy processing system
- (ii) To comprehend the managerial systems of paddy parboiling firm cum rice mill.

For this intention, the configuration of this paper has comprised with the subsequent sections. Latter the introduction (Section I), section II overviews the existing paddy processing systems in Bangladesh in a concise form. Section III describes the source of data. Section IV highlights the *bari* based paddy processing system. Section V evaluates the paddy processing system followed by parboiling firm cum rice. The main findings are summarized and some concluding remarks are drawn in section VI.

## II. A Brief Overview of Paddy Processing Systems in Bangladesh

The purpose of paddy milling is to remove the hulls and bran from harvested, dried rough paddy and to produce a milled, polished, or white rice (Luh, 1980). In Bangladesh context, milling is dehulling the paddy. Dehulling is a kind of peeling action. Techniques range from those that separate the husk by impact (e.g., in a pestle - and - mortar) or by scraping action of hullers or metallic stones as they are passed, at high speed, through paddy. About 98% of Bangladesh's paddy is husked by mills using the scraping devices, powered by either diesel engines or electric motors (Chowdhury, 1992).

In Bangladesh, rice mills can be categorized into four types, namely:

- (i) Traditional rice mill (*Dheki*): This is a foot operated hammer mill manufactured by wood and iron used for removing the husk and bran by the sharing action of paddy against the side of hole on which the hammer plunges. The capacity of *Dheki* mill is about 0.005 metric ton of brown rice per labor hour.
- (ii) Small parboiling firm cum rice mill: It incorporates the following operations: soaking the paddy in tanks, parboiling, drying the parboiled paddy on the concrete floor by sunlight and husking to the rice mills.
- (iii) Major rice mill: It embodies with an improved paddy processing system though it has no contemporary facilities of drying and cleaning.
- (iv) Automatic rice mill: It employs the sophisticated techniques for paddy processing. It represents a paddy processing complex with (a) a parboiling unit, (b) a modified Louisiana

State University type of drier, and a multistage milling unit of either Satake (Japan) model or Shule (German) model (Chowdhury, 1992).

A large number of paddy processors with a variety of capacities, and scales of operation, have come into being in Bangladesh. In 1989/90, there were 88 automatic rice mills with capacities ranging between 2 and 4 tones per hour, about 486 major rice mills with capacity of 1 ton per hour, and 19700 smaller parboiling cum rice mills with capacities ranging 15 maunds to 27 maunds per hour (Chowdhury, 1992). Accordingly, 8.7 million metric tones of rice were marketed in the year 1989/90. Of that quantity, the Directorate of Food procured 0.92 million metric tones supplied by automatic and major rice mills and the residual of 7.8 million metric tones were privately marketed supplied by the small parboiling firm cum rice mills and traditional rice mills. However, automatic and major rice mills can at best handle about 15% of the marketed surplus of paddy. Thus, small scale and labor-intensive paddy processing firms dominate the private markets of rice in Bangladesh.

For rice marketing, most millers use the normal commercial channels. Sometimes, millers come into a contract to mill paddy for the Ministry of Food. When millers sell through commercial channels, they either consign rice direct to wholesalers-cum-*araddars* in terminal markets, or sell to visiting traders from outside the local market area. A small portions of the produce also market through *araddars* in the local area. Occasionally, terminal-market wholesalers order indents by phone or telegraph, and back them up by bank transfers of the payment, in advance. This is common for relatively large and well-known mills, which produce rice of a consistent grade or quality. When the itinerant merchant purchases rice from the miller, he transports the rice, by truck or rail, to the terminal market. Once the rice reaches terminal wholesale market, like Dhaka (Babubazar), Chittagong (Pahartali), Khulna (Khalishpur), the terminal- market *araddars* start matching arrivals with indents received from retailers or *araddars* from other consumption areas.

### III. Survey Site, Methodological Framework and Respondents Profile

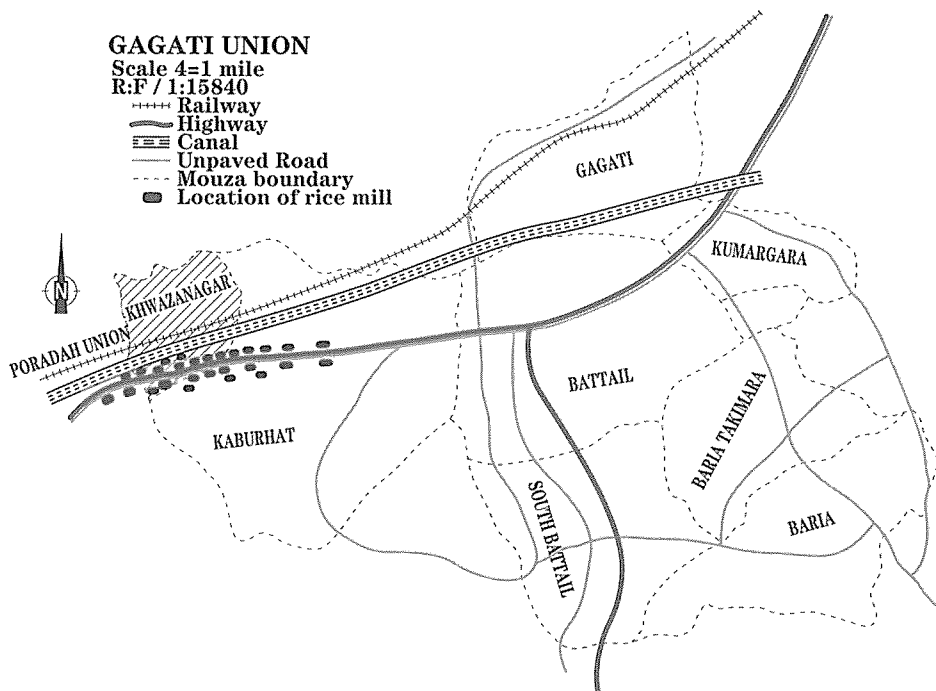


Fig. 1. Map of Gagati Union Showing the Study Area

### (1) Survey Site

The study area was a village named Khwaza Nagar in the union of Gagati under the Kushtia district. A map of Gagati Union showing the location of study area is depicted in Figure 1. The study village is within the radius of Ganges-Kabadak Irrigation Project area. Due to the irrigation facilities by this project, high yielding varieties of paddy became very popular and spread about 85% of the project area. According to the Bangladesh Bureau of Statistics, the area of HYVs boro paddy expanded from 910 acres to 63,690 acres from the year 1968 to 1992 in Kushtia district.

The increment of paddy production expanded the activities of paddy and rice trading and processing in the study area. The striking feature of the study area was that rice miller, *bepari*, *faria*, and day labor (man and woman) were mostly intra-migrants emanated from different villages like Chilhari Char, Bazumara Char, Vabonadia Char, and Chak Rajapur located in Dolowatpur thana, Kushtia district whose predecessors originated from Dhaka, Manikgang, Comilla, Noakhali and Faridpur districts under the free rehabilitation program of then government of East Pakistan. In the study area, they are called *Bangal*. It is due to their colloquial language which is little different from kushtia dialect. River erosion and job scarcity were the main reasons for their intra-migration.

The communication facilities of the study area is good due to the highway leading from Kushtia to Khulna, the entire portion of which is metalled. Another metalled road is passed through the study area and connected with Puradahow. Puradahow is important for its railway communication network with northern districts. The study area is made accessible via many inter district bus routes. Auto-rickshaws and pedal rickshaws are available in the study area. Puradahow, Vadali and Alchara *hats* are the major local supply sources of paddy for the parboiling firms.

### (2) Methodological Framework

The study was based on the observation of paddy processing systems used by *bari* (home) based firms and rural parboiling firm cum rice mills. For collecting the relevant information of this research, 5 *bari* based rice processing firms and 10 paddy parboiling firm cum rice mills were taken as sample. Marketing functionaries like *faria* and retailer, 10 of each group were considered as sample. Labor organization (*sarder gar*), *bepari* association, rice miller association and husk and bran selling firms were considered for supplementary information. All discussions with sample respondents were recorded and the relevant information were edited, summarized and analyzed by using the simple descriptive statistical method.

### (3) Respondents Profile

According to the Table 1, retailer, *faria* and *bepari* were comparatively more young than rice miller and *kutial*. In case of education, rice miller and *bepari* had more school education than *faria*, retailer and *kutial*. Family size of the rice miller was comparatively bigger than other respondents. Average land possessed by rice miller, *bepari*, *kutial*, *faria* and retailer was 5 acres, 1 acre, 0.5 acre, 0.3 acre and 0.2 acre respectively. About business experience, rice miller, *kutial* and *bepari* had more than 10 years experience, on the other hand, *faria* and retailer had less than 10 years experience.

Table 1 Respondents Profile of the Study Area

Variables	<i>Kutial</i>	Rice miller	<i>Bepari</i>	<i>Faria</i>	Retailer
Average age (yr)	42	45	37	32	30
Average schooling	5	10	7	4	4
Family size (Nos)	7	9	6	6	7
Land ownership (acres)	0.5	5	1	0.3	0.2
Experience in this business (yrs)	15	17	13	9	7

Source: Field Survey, 1997

#### (4) A Typical Scenario of Respondents

- (i) **Rice Miller:** Rafiq Ali Mondol, had one wife, two daughters and three sons. His parent migrated from Vabonadia Char and started trading of paddy as *faria* at Khwaza Nagar. Rafiq had cooperated his father since then and had learnt the business by heart. By hard work, his father was able to establish a small paddy parboiling firm cum rice mill in three years before. Last year, he took the managerial charge of that rice mill after departed his father. He reported that his father sold one acre of farming land for the installation of rice mill.
- (ii) **Kutial:** Zonaieb Shek, a landless farmer, had one wife, three sons and three daughters. He lived in Dosth Para village, Gagati Union. Locally he was called *kutial*. In the study area, those involved in the *bari* based rice processing activities are named *kutial*. He had three years schooling. His main occupation is an agricultural day labor but in addition, he usually purchases some quantity of paddy from village or *hat* and his wife and daughters parboil and convert it into rice by *dheki*. Usually, he sells rice to the different *hats*.
- (iii) **Bepari:** Mondol Ali, had one wife, three sons and four daughters, migrated from Chilmari Char in the year 1974 due to the job scarcity. Worthy to be mentioned that a devastating famine grasped Bangladesh in the year 1974. While he was asked for the reasons for his migration at Khwaza Nagar, he reported that he came to know from his friend that there was a job opportunity in Ganges- Kabadak Irrigation Project Area. He came to Vadalua village with his friend in Gagati Union and worked as an agricultural labor. In the year 1989, he started rice processing business with his friends. For working capital, he sold 0.5 acre of agricultural land and borrowed 5000 *taka* from local money lender at 25% interest rate. When asked about his future plan, he indicated to be a rice miller.
- (iv) **Faria:** Pukare, had one wife, two sons and four daughters, lived in Satian village. His parent came from Vabonadia Char in the year 1976. He had three years primary education from Satian free primary school. At the age of nine, he took a job in a local rich farmer's house, named Hajji Suwad Ali Biswas where he looked after the cattle. Due to his simplicity and honesty, Hajji gave him the responsibility of selling paddy at different *hats* and marketing the daily commodities for his family. From this, he got touch many *farias*, *beparis* and *aratdars* at different *hats*. Still he is working in hajji's family and in addition, purchases paddy from different villages (Satian, Varol, Atigram, Dokkin Para) and sells it to the local *hats*, *arats* or different parboiling firms at Khwaza Nagar. Usually, he buys the paddy from farmers in credit.
- (v) **Retailer:** Ohab Ali Shek, lived in Goush Para with his two wives, five daughters and one son. His dissident was a local inhabitant. He had 0.6 acre of agricultural land but three years before he had to sell it out for his daughter's marriage. He works as an agricultural labor and when has no job, he borrows some money from friends or rich farmers to purchases rice from parboiling firms and sells the purchased rice on the premises of different local *hats* mainly to the landless farmers, rickshaw and van pullers, day laborers etc.
- (vi) **Labor Sarder (leader):** Gulbahar, had one wife, three sons and one daughter. He established the first labor organization in Khwaza Nagar. He was very popular among laborers. Besides labor *sarder* Gulbahar, there were four other labor organizations headed by Rashid Sarder at Dost Para and Rob *Sarder*, Siraj *Sarder* and Ismail *Sarder* at Khwaza Nagar. Every labor *Sarder* ensures the job security of laborers and provides free boarding facilities for the rice *bepari* from different wholesale markets. He also ensures the supply of laborers for making all arrangement for dispatch after purchasing the rice by *bepari*. For these services, every *sarder* takes a commission from both sides at fixed rate.

According to the statements of different respondents, various types of business risks encountered

by them can be ranked as follows: (i) unstable of market price of paddy and rice; (ii) risky movement with cash; (iii) risks such as theft and robbery; (iv) not payment the consignment. Due to these risks, ups and down was a salient feature of different functionaries and entrepreneurs in the study area. Figure 2 shows the schematic model of transforming process of different functionaries in the study area.

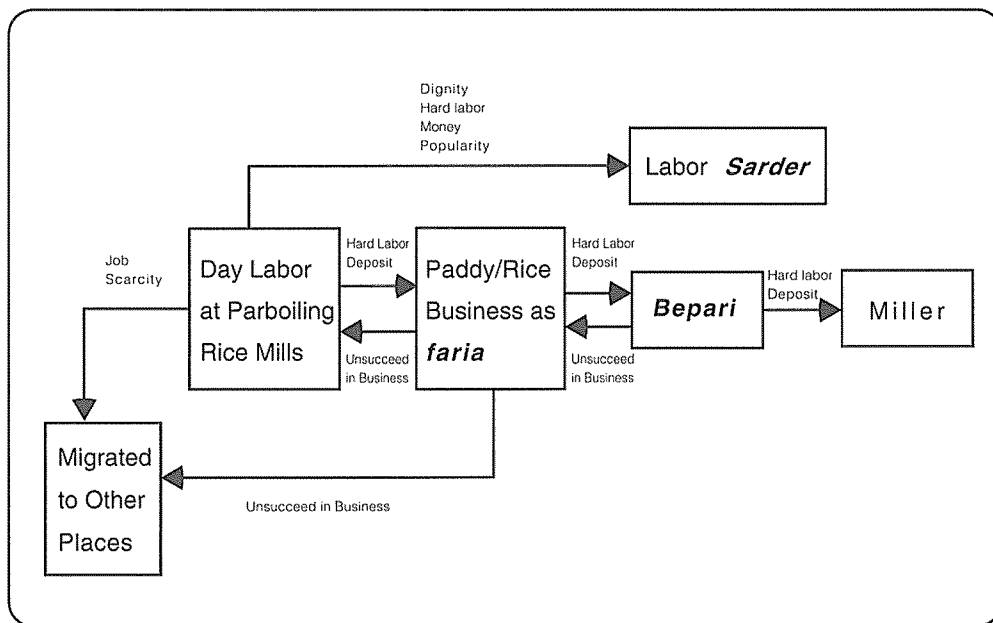


Fig. 2. Schematic Model Showing the Process of Transformation of Different Functionaries

#### IV. Bari (home) Based Paddy Processing System

Though the imperative of *pardah* dictates the exclusion of women from harvesting in the field, but in fact, women in Bangladesh perform a crucial role in rice production, especially in post harvest processing. Ahmed (1981) showed that about 85% of the paddy post harvest activities in the rural area executed by women. In the processing of paddy, soaking, parboiling, drying, husking and winnowing activities are totally conducted by them. Thus, this section, highlighted the *bari* based paddy processing system in the study area with the emphasis of women participation.

A chronological steps of *bari* based paddy processing system is depicted in Figure 3.

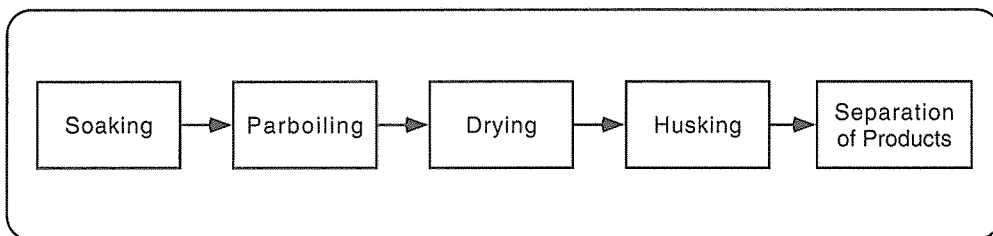


Fig. 3. Schematic Model Showing Home Based Paddy Processing System

**(1) Soaking:** Paddy is usually soaked by women in earthenware pots or metal vessel '*korai*' with variable capacities for 24-48 hours. During soaking, water penetrates the endosperm of paddy, forms hydrates by hydrogen bonding and results in limited swelling (Harriss, 1979). Ahmed (1981), points out that in the soaking process, the voids in the hull and rice kernel are filled with water (30% moisture content) and the grain swell, which causes an increase in the volume of paddy.

**(2) Parboiling:** Soaked paddy is placed in pot in such a way that 20-30% of paddy remains under water. The pot is then heated in mud oven '*chula*', fired by wood, husk and straw. Usually 30 minutes is required to complete the steaming process when paddy has been soaked for 24 hours, and for up to 2 hours where it has been soaked for a shorter period. Parboiling is complete when a majority of paddy husks are split. High yielding varieties of paddy are often double parboiled apparently because of the thicker husks, though lack of fuel may constrain this practice. Total work is conducted by rural women. Mannan and Mahmood (1978) states that during parboiling heat weakens the starch granule by disrupting the hydrogen. The surface area exposed to hydration is increased and the granules swell in an irreversible manner, a phenomenon known as gelatinization. According to Harriss (1979), parboiled paddy has the following characteristics:

- (i) The split husk facilitates milling;
- (ii) Gelatinization binds fractures in the endosperm and greatly reduces the number of broken;
- (iii) Proteins, vitamins and minerals are absorbed;
- (iv) Being harder, it is more resistant to insect infestation during storage than raw paddy;
- (v) Bran from parboiled rice contains approximately 15-30 percent of oil. The oil is of superior quality because it has a lower concentration of free fatty acid.

**(3) Drying:** Parboiled paddy is dried in the sunlight. Sun drying of paddy is the most common practice in the study area and about 90% of work is done by women. Parboiled paddy dried on the country yard is prepared by cleaning, prior to binding the dust with cow-dung-water. The paddy is usually stirred by foot dragging. Drying takes from 1 to 3 days depending on temperature, day length and surface of the yard. Harriss (1979) mentions that Aman season is coolest thus two days drying is usual. In Aus season, drying is usually completed in one day. Boro season is hot and wet, requires special techniques such as spreading of husk on the country yard for no blot up standing water, the laying out of paddy on mats to facilitate quick removal. HYV paddy require longer drying than does local variety of paddy. All drying processes take place under close supervision but there is some physical loss by poultry and bird scaring.

**(4) Husking:** *Dheki*, a foot operated 'hammer' mill, usually located in a special shelter or hut in the *bari*, used for removing the husk and bran by the shearing action of the paddy against the side of the hole on which the hammer plunges. Paddy is circulated manually under the hammer. In the study area, *dheki* was 5 feet long and operated by two women, one standing in relief and one at the hammer and stirring or clearing the grain. In the study area, *Dheki* was the popular milling device before the introduction of huller mill. Recently, high capacity and low cost of milling compared to *Dheki* make the huller more popular to the farmers.

**(5) Separation of Products:** The separation of products (husk, bran and rice) is totally done by women in traditional method using '*kula*' with the wind, takes 45 minutes per *maund*. Husk is used for fuel and bran is fed to chicks, poultry, cattle and fish.

Worthy to be mentioned that entrepreneur of *bari* based paddy processing firm is locally called

*kutial*. The equipments used in the *bari* based paddy processing system are presented in the Table 2.

Table 2 Equipment for *Bari* (Home) Based Paddy Processing System in Study Area

Item	Purpose	Capacity	Price
Eartenware pots	Soaking	0.5 - 1 <i>maunds</i>	T.K. 25 - 30
<i>Korai</i> ( Metal vessel )	Soaking/Parboiling	1 - 1.5 <i>maunds</i>	T.K. 125 - 130
Kerosene tins	Parboiling	0.5 - 0.7 <i>maunds</i>	T.K. 30
Oil drum	Parboiling	Various	T.K. 100
Mud oven <i>chula</i>	Parboiling	-----	-----
Dheki	Husking	1.5 <i>maund</i> / day	T.K. 250 - 300
<i>Kula</i> (Winnowing basket )	Winnowing	1 - 1.5 kg	T.K. 7
Earthenware pots	Storage	1 - 3 <i>maunds</i>	T.K. 25 - 30
Bamboo+ mud stores	Storage	10 - 12 <i>maunds</i>	T.K. 15 - 20

Source: Field Survey, 1997

1 *maund* = 37.3241 kg

1 *taka* = 3 yen

## V. Parboiling Firm -Cum- Rice Mill Based Paddy Processing System

This section focused the system and equipments used in the parboiling firm cum rice mill in brief. It also highlighted the seasonal impact of processing activities, managerial structure, labor employment, marketing pattern of paddy and rice and returns of parboiling firm and rice mill in the study area. Finally, it discussed the problems which were confronted by entrepreneurs and marketing functionaries.

### (1) The System and Equipment Used

In parboiling firm, paddy is first steamed in cylindrical bins for 7 minutes; it is then thrown into the soaking tanks and is left there for about 24 hours. The saturated paddy is again steamed for about 10 minutes. After parboiling, paddy is then allowed to dry on cement covered drying yards by the sun light. After drying, paddy is husked and polished by using the Engleberg- type of rice mills. Parboiling is done in split 45 gallon oil drums containing 2 metric tons of paddy each, over a larger version of the domestic mud stove, or it is done by using steam generated from a simple boiler made of 3 welded oil drums set in a brick furnace. Figure 4 shows the different steps of rice processing system in parboiling firm cum rice mill.

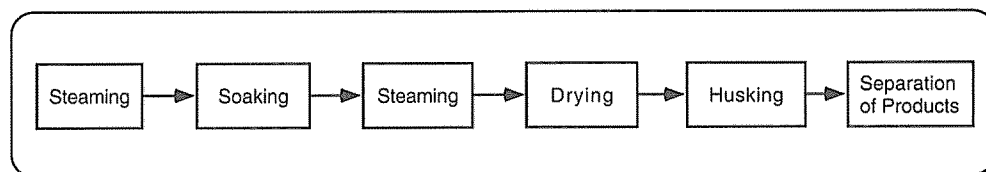


Fig. 4. Schematic Model Showing the Steps of Paddy Processing System in Parboiling Firm -Cum-Rice Mill



The area of parboiling firm-cum-rice mill premises ranged from 0.1-0.5 hectare. It is provided with parboiling plant, rice mill, store house, soaking tanks and large concrete drying yard.

The diameter of the soaking tank was 120 and 150 cubic feet on an average. The capacity of soaking tank varied from 1 to 10 metric tons per day. The capacity of concrete drying yard varied from 50 to 100 *maunds* of paddy. The rice mill was powered from 15-25 h.p. electric engine. The capacity of rice mill varied from 10-15 *maund* per hour to over 35 *maunds*. The equipments used in the parboiling firms are shown in Table-3.

Table 3 Equipment for Parboiling Firm Based Paddy Processing System in the Study Area

Item	Purpose	Capacity	Cost
Mud pots	Soaking	1.5 - 2 <i>maunds</i>	T.K. 50 - 60
1/2 Oil drums	Boiling	1 <i>maunds</i>	T.K. 120 - 135
Rake	Drying	1 <i>maunds</i>	T.K. 25 - 30
Brush	Drying	1.5 <i>maunds</i>	T.K. 8
<i>Kuta</i> (winnowing)	Winnowing	-----	T.K. 10
Soaking tank	Soaking	20 - 25 <i>maunds</i>	T.K. 4000
Simple boiler	Parboiling	20 - 25 <i>maunds</i>	T.K. 5000 - 6000
Basket ( <i>Dhama</i> )	Drying	1 - 2 <i>maunds</i>	T.K. 8
Drying Yard	Sun Drying	100 <i>maunds</i>	T.K. 75,000

Source: Field Survey, 1997

1 *maund* = 37.3241 kg

1 *taka* = 3 yen

## (2) Seasonal Effect on the Activity of Parboiling Firm Cum Rice Mill

The study area is characterized by a tropical monsoon climate having two general agricultural seasons: (i) *kharif* (wet), and ii) *rabi* (dry). May to October is regarded as the *kharif* season, while November to April is the *rabi* season. Within these broad division, three distinct paddy crops are grown: i) *boro* (Dec-April), (ii) *aus* (mid March to Aug.), and (iii) *aman* (July to Dec.) The climate is humid and warm during *kharif* and relatively dry during the *rabi*.

As in agriculture, parboiling firm cum rice mill has three seasons. They are as follows:

- (i) Peak Season: From late November to February, the prevailing good weather and availability of newly harvested *aman* paddy helps in parboiling and drying activities. As a result, the firm activity goes up.
- (ii) Normal Season: It comprises the months of May to September when paddy supply falls below that of the peak season. The excessive rainfall severely affects the parboiling and drying activities. Consequently, firms activities are lowered.
- (iii) Slack Season: It comprises the months from October to April when paddy is not at all available to the firm. Due to this reason, firm activities are at their lowest level for the year.

## (3) Managemental Structure of Parboiling Firm Cum Rice Mill

Every parboiling firm cum rice mill has two distinct parts: parboiling firm and rice mill. Each parboiling firm consists of 3 *beparis* (entrepreneur) and 5 laborers. Each of three *beparis* has to

invest 50,000 to 1,00,000 *takas* as working capital for starting this business. Friendship, honesty, dignity, hard work and working capital are the basic criteria for forming a *bepari* group.

Each parboiling firm has three sections: Labor management section, marketing section and accounting section. Each section works under the close supervision of a concerned *bepari*.

The *bepari* who is in charge of labor management section, he looks after the following activities:

- (i) To guide the laborers in parboiling activities of paddy processing;
- (ii) To decide the volume of paddy to be parboiled in each day with considering weather forecasting;
- (iii) To enhance or decrease the parboiling activities after considering the marketing situation.

The *bepari* who supervises marketing section, he cares for the following works:

- (i) To develop the human relationship with *faria* for ensuring paddy supply to the parboiling firm;
- (ii) To buy paddy from local and distant *hats*;
- (iii) To develop human relationship with *aratdars* (urban wholesale market), rice purchasing *beparis*, and retailers for selling rice.
- (iv) To decide the advance payment of *farias* for buying paddy from farmers.
- (v) To decide the sale of rice in credit to *aratdars* and retailers.

The *bepari* who keeps finance and accounting section, he keeps an eye on the following deeds:

- (i) To pay the labor wage;
- (ii) To pay the husking and floor charge to the miller;
- (iii) To give the monthly *chada* (toll) to *bepari* organization;
- (iv) To maintain all the records of transactions of paddy and rice.

On the other hand, each rice mill has two employees for operating the huller. One is driver who operates the huller and the other helps the driver's work. It should be noted that rice miller is the owner of the total parboiling firm cum rice mill. He rents the concrete floor to *beparis* at fixed remuneration and takes fixed charge for husking the paddy by huller.

Again, the other three important organizations play a vital role for running the firms activities smoothly. These are as follows;

#### **(i) Labor Organization**

It ensures the supply of male laborers to parboiling firms for carrying, loading and unloading activities of paddy and rice at fixed remuneration. Another important feature of this organization is to help the rice *beparis* from spatially down stream markets for purchasing the rice from different parboiling firms. It provides the free boarding facilities to the rice *bepari*. If, as is usual, the rice *bepari* is carrying cash for the purchase, it will be put in safe custody at the *Sarder* (labor leader) vault. Once purchase is made, this organization ensures the supply of laborers for making all arrangement for dispatch.

#### **(ii) Bepari Association**

It is an association of *beparis* of different parboiling firms. The main purpose of this organization is to help each other. It also helps those *beparis* who make loss in business.

#### **(iii) Rice Miller Association**

It is an association of rice millers. It's main role is to fix the husking charge of parboiled paddy and concrete floor charge for sun drying of parboiled paddy.

#### **(iv) Husk and Bran Sale Arat (Firm)**

*Aratdar* purchases husk and bran from different parboiling firms and sells it to other urban

wholesale markets, local retailers and consumers.

#### (4) Labor Employment of Parboiling Firm

Every parboiling firm is highly generative of female employments. Women laborers supervise soaking, parboiling, drying and post milling winnowing. They carry 2 *maunds* of gunny bags of paddy and pile up the dried paddy. Harriss (1979) states that traditionally, women do not work as wage labor for religious reasons and this deeply bedded social practice remains as a major determinant of participation rates. Repression of female mobility and participation is only relaxed when poverty requires it. In the study parboiling firms, this is very true, only those households without an able-bodied male earner (mainly households headed by widowed or divorced women) are forced to work in parboiling firms as wage laborers.

Out of 5 laborers required for each parboiling plant, 3-4 laborers are women. Labor compensation is given in cash and rice and some cases providing housing facilities in mill area. Labor wage rate is almost the same in different firms which was 3 *taka* plus 0.2 kg of rice for 5 laborers for each *maund* of paddy processing activities (paddy soaking to post milling winnowing).

#### (5) Marketing Pattern of Paddy and Rice of Parboiling Firm

The analysis of marketing channel is intended to provide a systematic knowledge of the flow of paddy and rice from their origin (producer) to their final destination (consumer). A schematic model depicted the place and mode of transportation of paddy and rice is shown in Figure 5.

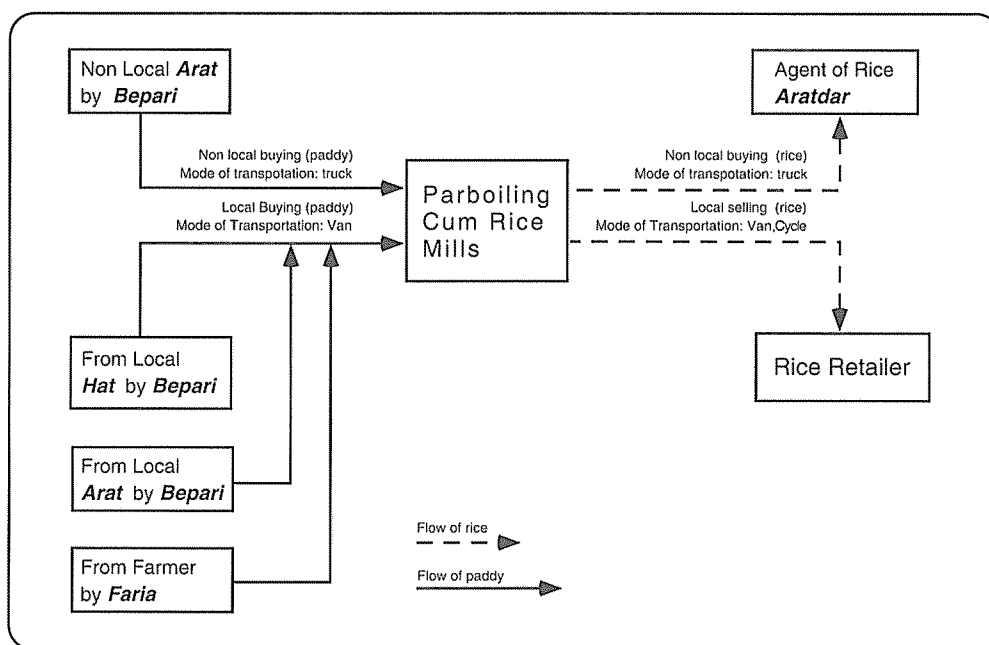


Fig. 5. Schematic Model Showing the Place and Mode of Transportation of Paddy & Rice

For paddy marketing, parboiling firms in the study area follow the three patterns:

- (i) From local village to parboiling firm by *faria*.
- (ii) From local *hat* to parboiling firm by *faria* and marketing *bepari*.
- (iii) From local and non-local *arat* (wholesale market) to parboiling firm by marketing *bepari*.

The mode of transportation for local purchased paddy is almost traditional method like van and

for non-local paddy, it is almost truck.

For rice marketing, the following two patterns are followed by the parboiling firms:

- (i) From parboiling firm to local retailer shops by retailer himself.
- (ii) From parboiling firm to non-local *arat* (wholesale market) by rice *bepari*. (agent of rice wholesaler).

The mode of transportation of purchased rice for non-local *arat* (wholesale market) is almost truck and van and cycles are used for local transportation.

## **(6) Return of Parboiling Firm and Rice Mill**

### **(i) Parboiling Firm**

The elements of processing cost of parboiling firm are labor wages, concrete yard and husking charge, transportation and fuel cost. As estimated in the table 4, the first most important cost was husking charge to the miller (8.5 *taka / maund*). The second most important cost was labor wage (6.62 *taka / maund*) and the third most important cost was transportation cost when paddy was locally purchased (3 *taka / maund*). But in case of non- local buying it turned to the second position (7 *taka / maund*).

On the other hand, the sources of return of parboiling firm are the head rice, broken rice, husk and bran. The out put of head and broken rice depends on boiling times of paddy. According to the respondents' statements, if paddy is boiled only one time then output of head rice from each *maund* paddy will be 2 kg lesser then two times boiling. Besides, Percentage of broken rice will be 5-10% higher in one time boiled paddy than two times.

Return of parboiling firm for each *maund* paddy processing as estimated in Table 4 was 20.12 *taka* when paddy purchased from local sources or 16.12 *taka* when paddy purchased from non local sources.

Table 4 Return of Parboiling Firm in the Case of BR-11 Aman Paddy Processing

**1. Cost of paddy per *maund* :** 225 T.K.

#### **2. Elements of processing cost of paddy to rice (*permaund*)**

- i) Labour wage for unloading the paddy : 0.50 T.K
- ii) Labour wage for parboiling, drying : 3.00 T.K. plus 1.62 T.K.( Rice value)
- iii) Floor charge for drying to miller : 1.00 T.K.
- iv) Labour wage for milling operation : 1.50 T.K.
- v) Husking charge for miller : 8.50 T.K.
- vi) Transportation cost in local buying : 3.00 T.K , for non local buying 7.00 T.K.
- vii) Fuel cost : 0.50 T.K

**Total processing cost in local buying of paddy :** 19.62 T.K. / *maund*

**Total processing cost in non local buying of paddy:** 23.62 T.K. / *maund*

#### **3. Contents of *permaund* paddy after converted into rice and respective values**

- i) 28 kg head rice = 240.74 T.K. at the rate of selling price 325 T.K. / *maund*
- ii) 2 kg broken rice = 12.00 T.K. at the rate selling price 6.00 T.K. / kg
- iii) 6 kg husk = 9.00 T.K. at the rate of selling price 1.50 T.K. / kg
- iv) 4 kg bran = 3.00 T.K. at the rate of selling price 0.75 T.K. / kg

**Total income from per *maund* processing of paddy:** 264.74 T.K. / *maund*

**4. Firm's Return in local buying of paddy:** 20.12 T.K. / *maund*

**Firm's Return in non local buying of paddy:** 16.12 T.K. / *maund*

Source: Field Survey, 1997

1 *maund* = 37.3241 kg

1 *taka* = 3 yen

**(ii) Rice Mill**

The major costs of rice miller are electric charge, salary of two employees (driver and helper) for huller operation and some maintenance cost. Monthly salary of driver and helper is 2000 *taka* and 1200 *taka* respectively. Electricity charge for each *maund* paddy husking takes 3 *taka*. As estimated in Table 5, the income sources of miller were paddy husking (8.5 *taka/maund*) and drying yard charge (1 *taka/maund*).

**(7) Problems Faced by Entrepreneurs and Marketing Functionaries****(i) Lack of Capital**

Capital constraints potentially affect the rice millers, *beparis* and marketing functionaries *farias* and retailers differently: the former can face up to both fixed assets constraints and working capital constraints. For the latter, the binding constraint is most often about operating or working capital. Though the some large scale rice millers have an access of formal credit facilities but *beparis*, *farias*, and retailers, almost have no access of formal credit. Usually, *beparis* of parboiling firms, use their personal savings or to sell or mortgage their own cultivated land for accumulation of working capital to start the business. In most cases, *farias* buy paddy from producer in credit or taking advance payment facilities from parboiling firms. Due to lack of working capital, *beparis*, *farias* and retailers are mostly depending on informal credit market with high interest rate for running their business activities smoothly. The diversities of informal credit market in the study area are as follows:

*Land mortgage:* This is widely practiced, particularly when credit requirement is large or when alternative sources have been exhausted. Transfer of user rights in land in exchange for cash, with the stipulation that such rights will revert to the owner once repayment is completed, is the most popular form of land mortgage in the study area. *Beparis* in the parboiling firms often come to this contract with moneylender or rich farmer for accumulation of working capital for starting paddy processing business. In some cases, rice millers also come to this credit contract for emergency need of money.

*Cash credit with positive interest:* This is widely found in the study area, particularly *farias* and retailers. Interest rates can be as high as 25 percent per month. Collateral requirements and repayment period are sometimes stipulated, but this is not common. When collateral is taken, interest rates are usually lower.

*Interest free credit:* Amounts involved in this case is very small. The transacting parties are usually from the same class (for example between *farias* or retailers), often involved in a web of mutual obligations. Such transactions are called in the study area is *karja* or *hawlat*.

**(ii) Rainy Season**

In Bangladesh, about 70-85% of annual rainfall is concentrated in 5 months (May-September). The weather of study area is similar to the average weather of Bangladesh. As parboiled paddy is dried by sunlight, excessive rainfall affects the drying operation severely.

**(iii) Electricity Disturbance and Its High Cost**

Due to the frequent load shading (lack of power supply) of electricity, the normal milling operation hinders frequently. Recently, increased prize of per unit electricity supply also increases the husking cost of paddy.

**VI. Summary and Conclusion**

The study delineates the paddy processing systems of the study area in general so as to be better understood and its limits. The study was conducted in the month of January to March in the year 1997. The leading objectives of the study were:

- (i) To pin-point the salient features of *bari* based paddy processing system;

(ii) To comprehend the managerial systems of parboiling firm cum rice mill

The crucial findings of the study are as follows:

- (1) Small scale and labor -intensive rice processing firms dominate the private rice markets in Bangladesh.
- (2) In *bari* based paddy processing system, the entire works (paddy soaking to product separation) are executed by women. It is the premier source of employment for women in the study area. Again, in contrast with *Dheki* mill, high capacity and low cost of husking make the huller mill more popular to the farmers in the study area.
- (3) Rice millers, *beparis*, *farias* and laborers of parboiling firm cum rice mills are mostly intra-migrant from *char* area (Dolowatpur thana, Kushtia district). Major reasons behind the migration are the river erosion and scarcity of works.
- (4) Activities of parboiling firm cum rice mill are contingent on the availability of paddy and rainfall distribution pattern of the study area which can be categorized under three broad seasons.
  - (i) Peak season: from late November to February.
  - (ii) Normal season: from May to September.
  - (iii) Slack season: from October to April.
- (5) Though the proprietorship of the total parboiling firm cum rice mill belongs to the rice miller but each firm has two distinct parts: paddy parboiling firm supervised by the three *beparis* and rice mill supervised by the rice miller himself. Friendship, honesty, dignity, hard labor and working capital are the foremost hallmarks requisite for forming a *bepari* group.
- (6) Each parboiling firm is immensely generative of female employments. Out of 5 laborers required for each parboiling plant, 3-4 laborers are women. Paddy soaking to post milling winnowing are totally conducted by women laborers. Labor wage paid by different parboiling firms is almost at fixed rate.
- (7) The movement of paddy from farmer to parboiling firm follows the subsequent patterns:
  - (i) from local village by *faria*.
  - (ii) from local *hat* by *faria* or marketing *bepari*.
  - (iii) from local and non-local *arat* ( wholesale market ) by marketing *bepari*.
 The movement of rice from parboiling firm to different markets follows the following patterns:
  - (i) to non- local *arat* ( urban rice wholesale market ) by rice *bepari*.
  - (ii) to retailer shop by retailer himself.
- (8) Return of parboiling firm for each *maund* paddy processing was 20.12 *taka* when paddy purchased from local sources or 16.12 *taka* when paddy purchased from non local sources. It highly depends on the output of head and broken rice which is extremely related with parboiling activities.
- (9) Though the some rice millers has access of institutional credit from local commercial banks but *beparis*, *farias* and retailers faced the rigid institutional difficulties in gaining access to the benefits being distributed by the commercial banks. The banks followed rigid lending practices and particularly their insistence on security made it almost impossible for the *beparis*, *farias* and retailers to obtain financial support for operating their business smoothly. Again, excessive rainfall hampers the drying operation immensely specially in 5 months (May to September). High cost of electricity and electric disturbance whose ultimate manifesto is increasing the husking charges by the rice miller.

Based on the findings, the following suggestion can be drawn:

- (1) The total recovery of head and broken rice depend on the technology and equipments used in the

parboiling firm. So more attention should be directed to the improvement of parboiling firm in terms of milling recovery.

- (2) Most of the *beparis, farias, kutials* and retailers are started their business either by selling or mortgaging their farming lands or from own savings. In most cases, they have to depend on the informal credit market with high interest rate. Under this circumstances, Rural Financial Institutions (RFIs) of government can be played a crucial role by providing the credit supports to the *beparis, farias, kutials* and retailers in such a technique for disbursing the loans to the recipients which ensures the repayments of scheduled loan to the institutes with out any collateral. Considering the experience of Grameen Bank that has succeeded in providing credit without collateral to over two million poor people in Bangladesh with very low default rates. It is, therefore, recommended that institutional support can be given by a small group of like minded *beparis, farias, kutials* and retailers for the expansion of their business activities. This of course, will provide more employment opportunity in the rural areas specially for female women in the local area. It's ultimate manifesto will break the poverty cycle by insuring household food security for the hard-core poor.
- (3) During the slack season, there is a shortage of paddy causing parboiling firms to stop operating. Under this circumstances, contract marketing of paddy can be beneficial both for the growers and the buyers (entrepreneur and marketing functionaries) in the sense that growers input/credit facilities, will help maximizing yield; ensured price and buying back guarantee will help continuing commitment for further production increase. Again, it will be beneficial to buyer in the sense that it will assure quality supplies at fixed price to sustain his long term processing and business interest. Experience of four majors contract marketing arrangement in Bangladesh e.g., sugar cane and producers with the sugar mill, cotton and producers with the Cotton Development Board, BADC Seed and producers with the BADC( Bangladesh Agricultural Development Corporation) and Tobacco and producers with the Bangladesh Tobacco Company can be taken into consideration for implementing the contract marketing arrangement between paddy growers and parboiling firm or rice mills.

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## 食糧安全と貧困軽減のための粃処理システム

— バングラデシュを事例として —

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この論文ではバングラデシュのクシチア地方カザナガル村の粃処理システムの事例調査をもとに食糧安全と貧困軽減との関連で把握して経営課題を整理・検討することを目的とする。分析の具体的手順として2つの点を検討した。(1)農村家庭による粃処理システムを解明する。(2)伝統的企業による粃処理システムを解明する。分析結果は(1)バングラデシュにおける粃処理過程の変化では、農村家庭による粃のパーボイル（精米の前の煮沸）は現在も行われているがデキ（足踏み精米機）による精米は急速に減少している。かわって小規模ライスミラーのハラ（精米機）による精米が普及している。(2)商品化される粃は、フェア（産地商人）を経て、ベバリ（粃処理業者）に買い取られる。ベバリはパーボイルした粃をライスミラーで委託加工し、その精米を小売商や都市の卸業者に販売する。(3)粃処理作業はほとんど農村婦人労働者によって行われ、日雇い労働者の主な職業先となっている。(4)フェアやベバリはインフォーマルな金融に依存している。そのためベバリは乾燥など施設の近代化が困難である。これらの結果から次の2点を結論づけることができる。(1)小規模なメンバー、例えばベバリ、フェア、クティアル、小売業者の事業拡大及び施設の近代化のために制度的サポートが与えるべきである。このことは農村地域での雇用機会の拡大によって食糧安全及び貧困軽減に影響与える。(2)米の質及び粃の安全供給のために生産者と購買者（産地商人又は粃処理業者）の間で契約販売システムの導入することが必要である。