Costs of Milling Paddy in Bangladesh

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Introduction

Bangladesh produces about 40 million MT of paddy (un-husked rice) annually (MOA 2010). Almost this entire quantity is processed in over 100,000 rice mills in the country to produce clean rice for human consumption. About 10% of the paddy is dry processed and 90% is processed after parboiling (Baqui, MA 1994). There are broadly three types of rice mills in the country: fully automatic mill, semiautomatic mill and hauler mill. In the case of the fully automatic mill, parboiled paddy is cooled down manually by spreading on the floor and the cooled paddy is fed into the mill. The mill dries and husks the paddy and delivers clean rice, husk, bran and broken rice separately. In the case of the semiautomatic mill, parboiled paddy is dried manually by spreading and stirring on the floor under the sun and the dried paddy is fed into the mill. The mill husks the paddy and delivers clean rice, husk, bran and broken rice separately. In the case of the hauler mill, likewise the case of the semiautomatic mill, dried paddy is fed in to the mill but semi finished products out of the mill need to be fed into the mill three times manually before the mill can fully husk the paddy. The hauler mill delivers clean rice, straw, and bran mixed with broken rice separately, and the mixture of bran and broken rice has to be winnowed manually to separate bran and broken rice. The cost structures, extraction rates and milling capacities of the mills are different and, as a result, the unit cost of processing paddy is different in different mills.

Although Bangladesh has rich data on many aspects of its agriculture, reliable data on the processing cost of paddy and its byproducts is hard to find. Besides, Bangladesh government maintains a policy of procurement and distribution of food grains as a means to support producers and consumers at times of uneven food prices. For example, in the boro season of 2009-2010 the government set the procurement target of 1200,000 MT of rice and 150,000 MT of paddy. Initially rice price was set at Tk 25 per kg and paddy price was set at Tk 17 per kg, but from July 1, 2010 a higher price of Tk 3 per kg of rice was declared as incentive bonus (FPMU 2010). The paddy procured by the government is made to rice before distribution to the consumers by processing in the government enlisted rice mills on payment of processing cost which, in the absence of reliable data, is fixed arbitrarily.

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Objectives

The major objective of the study is to find out the average milling cost of paddy by types of mill. It is expected that the findings will meet the existing data gap in the area, and support the government to take more informed decisions on the processing cost of paddy, and buying and selling prices of rice and paddy for better management of the public food grain procurement and distribution system.

Methodology

Rice mills are found in all major markets of the over 65,000 markets in the country (Baqui, MA 1994). However, the mills are more concentrated in few locations, such as, Kushtia, Naogaon, Dubchachia, Dinajpur, Bhairab, Mymensingh, Ishwardi, Dhamrai, Bera, Kalihati and Sherpur. The study decided to observe 10 automatic mills, 10 semiautomatic mills and 10 hauler mills randomly in three locations, namely, Dhamrai, Bhairab and Kushtia. However, after observing 2-3 mills of each type in the locations, variations within mill types were found minimal. The study finally observed 5 automatic mills, 5 semiautomatic mills and 5 hauler mills.

The data were collected using a checklist by the researchers themselves in November-December 2010 and analyzed using Excel.

Description of Milling Activities

Every mill has some contract buyers (Aratdars) who buy paddy from the market and bring these to the mill gate. Once the paddy arrives, a group of contract laborers, usually males, unload the paddy and store these in the warehouse. Later on, they soak the paddy in the water tank and stir the paddy a few times to remove the floating unfilled grains. When the paddy is fully soaked in 8-10 hours, the laborers drain out the water and transfer the soaked paddy from the water tanks to the parboiling pans. Water vapor from the boiler, which is fueled by rice husks, parboils the paddy in the pans. Few pans are set at a time and it takes about 5-10 minutes to parboil a set of pan load of soaked paddy.

Rice Milling Activities

- Paddy arrives at mill gate, unloaded and stored
- Paddy soaked in water tank, stirred, and unfilled grains removed
- Soaked paddy transferred to parboiling pan
- Water vapor from boiler parboil the paddy
- Parboiled paddy dried (or cooled down) in the sun
- Dried paddy (cooled paddy in the case of the automatic mills) loaded in the mill
- Clean rice, husk, bran and broken rice produced or separated
- Products weighed, bagged and uploaded on delivery vans

After the parboiling is complete, another group of contract laborers, usually females, spread the parboiled paddy under the sun on the drying floor and repeatedly stir the paddy to either cool down or sundry. It takes about 4-5 days to completely sundry the paddy.

The cooled down paddy is loaded in the automatic mills while the sun dried paddy is loaded in the semiautomatic and hauler mills for husking. The mills are run by electricity. It takes three rounds of milling to completely husk the paddy. In the case of the automatic and semiautomatic mills the rounds are automatic, but in the case of the hauler mills the semi finished outputs from the mills need to be reloaded in the mills manually three times after every round of milling. The automatic and semiautomatic mills can separate the cleaned rice, husk, bran and broken rice automatically, and no product needs further processing. But the hauler mills can separate cleaned rice, husk, and bran mixed with broken rice; and the mixture of bran and broken rice needs manual winnowing for separation.

An average semiautomatic mill has the capacity to husk 400 maunds (16,000 kg) and an average hauler mill has the capacity to husk 300 maunds (12,000 kg) of dried paddy in 7 hours. After the products are separated, cleaned rice, bran and broken rice are weighed manually, sacked and delivered in the market for sale. The husks are retained back for fueling the boiler. The automatic mills are able to get some surplus husks after fueling the boiler but the hauler mills need the entire husks from 100 sacks of paddy to parboil 100 sacks of paddy and get no surplus. The bran from the automatic mills is sold to manufacture poultry feed but the bran from the hauler mills are sold to manufacture cattle and fish feed as these contain higher proportions of husks which poultry does not like it to eat.

Explanation of Costs

The mills incur costs for a number of purposes which may be grouped into few broad categories. The assumptions behind the estimated costs in each category are:

Unloading, soaking, boiling, separating unfilled grains and reloading

These activities are performed by manual labor only. As paddy arrives at the mill gate these need to be unloaded, stored, soaked, unfilled grains removed and boiled; and as the finished products goes out of the mills these need to be weighed, sacked and loaded on delivery vans. In every mill these activities are performed by contract laborers on the work basis. The standard rate of payment is Tk 14 per sack of paddy of 80 kg per sack. This rate is used in our cost calculations. The instruments and facilities used to perform these tasks are supplied by the mills, costs of which are included in the overhead costs of the mill. Mostly male laborers perform these tasks.

Cooling Down and Drying

These activities are performed by manual labor only. As paddy is boiled, this need to be cooled down or dried before loading in the mills for husking. In every mill this activity is performed by contract laborers on the work basis. The mills observed that one laborer can dry 10 sacks of paddy (80 kg per sack) in 5 days. The standard rate of payment to these laborers is Tk 70 per labor day. This rate is used in our cost calculations. The instruments and facilities used to perform these tasks are supplied by the mills costs of which are included in the overhead costs of the mill. Mostly female laborers perform this task.

Manager

Every mill hires a manager to oversee the mill activities and to keep records. The manager is also a contract laborer and paid on work basis. The rate of payment differs among mills. Typically the semiautomatic mills pay Tk 10 per sack of paddy (80 kg per sack) and the hauler mills pay Tk 11 per sack of clean rice (75 kg per sack) produced. These rates have been used in our cost calculations. The instruments and facilities used to perform the tasks are supplied by the mills costs of which are included in the overhead costs of the mill.

Winnowing bran

The automatic mills produce bran and broken rice separately which does not require winnowing. But the hauler mills produce bran and broken rice together which need winnowing for separation. This activity is performed by contract laborers only on work basis. The standard rate of payment is Tk 10 per sack of bran (55 kg per sack) and this rate is used in our cost calculations. The instruments and facilities used to perform this task are supplied by the mills, costs of which are included in the overhead costs of the mill. Mostly female laborers perform this task.

Gunny bags

This material cost needed for bagging paddy and rice. One gunny bag costs Tk 45 in the local markets and this rate is used in our cost calculations.

Milling

This cost covers the rent for the mill and includes all operating, maintenance and overhead costs of milling and profit to the mill owner (e.g., salary of technician and costs of electricity, communication, mill upkeep, depreciation, interest, other overheads and markup). The rate is fixed and received by the mill owner. It varies by mills. Typically for the semiautomatic mills it is Tk 90 per sack (75 kg per sack) clean rice, and for the hauler mills Tk 54 per sack (75 kg per sack) of clean rice. These rates are used for our cost calculations. The lower rate for the hauler mills is due to the lower electricity, upkeep and overhead costs.

Explanation of Outputs

The outputs of the mills include clean rice as the main product, and husk, bran, broken rice and unfilled grains as byproducts. The assumptions behind the calculated values of the outputs are:

Clean rice

On the average, 70 sacks of clean rice (75 kg per sack) are produced in the semiautomatic mills and 72 sacks (75 kg per sack) are produced in the hauler mills from 100 sacks of paddy (80 kg per sack). As the purpose of the study is to estimate the processing cost of paddy to produce clean rice the values of paddy and rice are not included in the cost estimates.

Bran

On the average, 9 sacks of bran (50 kg per sack) are produced in the semiautomatic mills and 16 sacks (55 kg per sack) are produced in the hauler mills from 100 sacks of paddy (80 kg per sack). The price of bran in the local markets is Tk 600 per sack of bran produced from the semiautomatic mills, and Tk 400 per sack of bran produced from the hauler mills. These rates are used to estimate the value of bran in the study. The lower price of bran from the hauler mills is due the lower quality as it contains higher proportions of husk in it.

Broken rice

On the average, 20 kg of broken rice are produced in the semiautomatic mills and 40 kg are produced in the hauler mills from 100 sacks of paddy (80 kg per sack). The price of broken rice in the local markets is Tk 1500 per sack of broken rice (75 kg per sack). This rate is used to estimate the value of broken rice in the study.

Unfilled grains

On the average, 8 sacks of unfilled grains are produced from 100 sacks of paddy (80 kg per sack) in both the semiautomatic and hauler mills. The price of the whole lot unfilled grains in the local markets is Tk 2000. This rate is used to estimate the value of unfilled grains in the study.

Husks

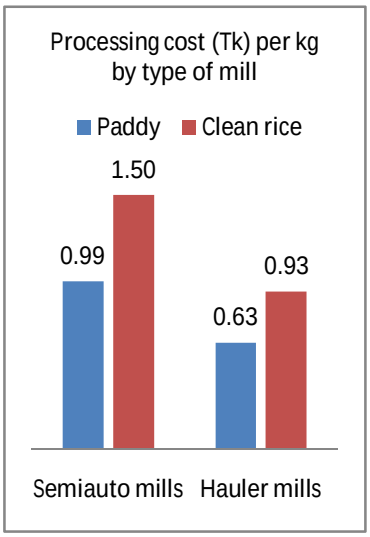
The mills use husks to fuel the boiler to parboil the paddy. The husks produced from 100 sacks of paddy are all used up to parboil 100 sacks of paddy in the hauler mills, but 10 sacks (15 kg per sack) remain as surplus in the semiautomatic mills. The price of husk in the local markets is Tk 100 per sack. This rate is used to estimate the value of the surplus husk in the case of the semiautomatic mills. The fuel cost for the boiler and the value of the husk that is used to fuel the boiler are not counted in the cost calculations to avoid double counting.

Explanation of Net Cost and Unit Costs

Since the purpose of the study is to assess the processing cost of paddy to produce clean rice, the net cost of processing is calculated adding all the input costs of processing and deducting from it the values of the byproducts for a given quantity of paddy. The cost of processing per kilogram of paddy is calculated dividing the net cost by the kilograms of paddy processed; and the cost of processing per kilogram of clean rice is calculated dividing the net cost by the kilograms of clean rice produced.

Analysis of Results

The results of the study are summarized in Table 1. Overall, the net cost of processing 100 sacks of paddy is Tk 7900 in the semiautomatic mills and Tk 5040 in the hauler mills. The net cost of processing per kg of paddy is Tk 0.9875 in the semiautomatic mills and Tk 0.63 in the hauler mills. From 100 sacks of paddy, 5250 kg of clean rice is produced in the semiautomatic mills and 5400 kg are produced in the hauler mills. Thus, the net cost of processing per kg of clean rice is Tk 1.50 in the semiautomatic mills and Tk 0.93 in the hauler mills. The hauler mills can produce twice the amount of broken rice than the semiautomatic mills from the same quantity of paddy, and broken rice is also edible by humans. The higher production of clean rice and broken rice in the hauler mills is mainly due to the lower degree of milling in the mills. It was observed that the degree of milling in the hauler mills is 7-8% whereas it is 8-12% in the semiautomatic and automatic mills (Baqui, MA 1994).



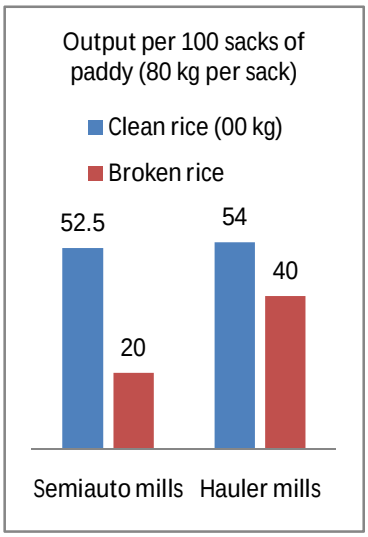


Table 1: Costs of Milling Paddy

Items	Automatic mills		Semiautomatic mills N=2; Nayarhat and Dhamrai; 6 Nov 2010		Hauler mills N=2; Nayarhat and Dhamrai; 6 Nov 2010	
	Mill measures (for 100 sacks of paddy, 80 kg per sack; description of costs and outputs)	Costs per 100 sacks of paddy (Tk)	Mill measures (for 100 sacks of paddy, 80 kg per sack; description of costs and outputs)	Costs per 100 sacks of paddy (Tk)	Mill measures (for 100 sacks of paddy, 80 kg per sack; description of costs and outputs)	Costs per 100 sacks of paddy (Tk)
Unloading; Soaking; Boiling; Reloading (Labor costs)			100 sacks @ Tk 14 per sack	1400	100 sacks @ Tk 14 per sack	1400
Drying (Labor cost; mostly female)			One labor can dry 10 sacks in 5 days @ Tk 70 per labor day	3500	One labor can dry 10 sacks in 5 days @ Tk 70 per labor day	3500
Manager (Labor cost)			100 sacks @ Tk 10 per sack	1000	72 sacks of clean rice @ Tk 11 per sack	792
Milling (Machine rental)			70 sacks of clean rice @Tk 90 per sack	6300	72 sacks of clean rice @Tk 54 per sack	388
Output rates (from 100 sacks of paddy; 80 kg per sack)			70 sacks of clean rice (75 kg per sack = 5250 kg) 10 sacks of surplus husk (15 kg per sack) after using for boiler fuel @ Tk 100 per sack 9 sacks of bran (50 kg per sack) @ Tk 600 per sack 20 kg of broken rice @ Tk 1500 per sack (75 kg) 8 sacks of unfilled grains (separated during soaking) worth Tk 2000 lump	 -1000 -5400 -400 -2000	72 sacks of clean rice (75 kg per sack = 5400 kg) Husks of 100 sacks of paddy are all used up for boiling 100 sacks of paddy, no surplus husk 16 sacks of bran (55 kg per sack) @ Tk 400 per sack 40 kg of broken rice @ Tk 1500 per sack (75 kg) 8 sacks of unfilled grains (separated during soaking) worth Tk 2000 lump	 -6400 -800 -2000
Winnowing bran (Labor cost; all female)			Not needed in semiautomatic mills		16 sacks of bran @ Tk 10 per sack	160
Gunny bag (material cost)			100 bags @Tk 45 per bag	4500	100 bags @Tk 45 per bag	4500
Milling capacity			250 sacks per 7 hours		150 sacks per 7 hours	
Net cost (less byproducts) Cost per kg of paddy Cost per kg of rice				7900 0.9875 1.504762		5040 0.63 0.933333
Comparative advantage					3% more edible output at 1/3 less cost	

Conclusion

Combining the information on the production of clean rice and broken rice and the cost of processing, hauler mill has a clear advantage over the semiautomatic mills. This is, hauler mills can produce 3% more edible output at one-third less cost compared to the semiautomatic mills. This, however, does not mean the superiority of the hauler mills over the semiautomatic mills as the semiautomatic mill has the capacity to process over two-thirds more paddy than the hauler mills in the same amount of time.

References

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