Model Project on Rice Milling

Govt. of West Bengal

Prepared By

NABARD Consultancy Services Private Limited

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PROJECT PROFILE OF RICE MILL

I. INTRODUCTION

Agriculture is the main occupation of the rural population in West Bengal. Among various crops, rice is the principal food crop of the State. West Bengal is the largest producer of rice in the country with an annual output of around 150 Lakh Tonnes. The rice is obtained after hulling/ dehusking of paddy in a rice mill. The paddy comprises of 20% rice hull or husk, 11% bran layers, and 69% starchy endosperm. Paddy in its raw form cannot be consumed by human beings. It needs to be suitably processed for obtaining rice. Rice milling is the process which helps in removal of hulls and bran from paddy grains to produce polished rice. Rice milling is the process of removal of husk and bran layer from the paddy to produce whole white rice kernel. The rice should be free from impurities and should contain minimum number of broken grains. Food Corporation of India (FCI) is the main purchaser of rice. About 20 to 25% of total production of rice is procured by FCI for at Minimum Support Price for Public Distribution System.

India has about 82000 registered single huller units, 2600 double hulling unit, 5000 units of disc sheller cum polisher and 10000 units of rubber roll sheller. The average capacity of these units ranges between 2 tonnes per hour to 10 tonnes per hour. In India, rice milling business has a turnover of more than Rs.25,500 crore per annum. Among other states, Punjab, Haryana, Andhra Pradesh etc. also produce large quantities of rice.

II. OBJECTIVES

The commercial rice milling will have a following objective

- Production of edible rice free of husks, stones and other foreign material
- Minimization of grain breakage and maximization of whole rice recovery

III. RAW MATERIAL AVAILABILITY

The rice production in the State has shown remarkable growth in production. It has been grown over an area of 5 million Ha with 15 Million tons of production during the year. As a result of new agriculture strategy, like 'High Yield Varieties Programme' the production of paddy has seen appreciable growth in production over the years. Most of the rice mills operate at 3 shifts per day during harvesting and procurement season.

IV. MARKET OPPORTUNITIES

Setting up rice mill will allow farmers to engage in value addition & more profits. Rice bran is a byproduct obtained during rice milling process, which is a very good source of edible oil. Rice is in great demand both in house hold consumption and also in Hotels, restaurant, canteens, etc. A major share of crop production can easily be sold to FCI or other procurement agency at MSP. Both rice and fish are in great demand in the State and it is used as a staple food. In the state consumption of cooked rice is 164 kg per person per year. Therefore, existing infrastructure for processing paddy to rice is not enough to meet current and future demand. The new entrants have good scope to start this business.

V. PROJECT DESCRIPTION

- **PRODUCT AND ITS USES**

Rice is a staple food for the majority of population in India. Rice bran is a byproduct of the rice milling process and it contains various antioxidants that impart beneficial effects on human health. This can be utilized for the production of oil and as animal feed. The rice bran oil is a niche product and is being promoted as healthy oil. The husk is having high calorific value and used as a source of energy. The husk is a delicacy for horses and is in good demand for animal feed.

- **CAPACITY**

The rice mill works on economies of scale model. The decision about the capacity of rice milling plant depends upon number of factors like market demand, availability of manpower etc. The capacity of this model is considered as 50 Qtl. (0.5 MT) per hour. The plant will operate for 16 h per day in two shifts.

- **MANUFACTURING PROCESS WITH FLOW CHART**

Generally three types of methods are used for milling of paddy rice viz. one step, two step and multi stage process. Efficiency of milling depends on the variety of paddy, quality of equipment, operator skill etc.

In one pass milling the husk and bran are separated in one pass and the white rice is produced directly from the paddy. In two pass technology husk and bran are removed separately and brown rice is produced from paddy. Multi pass or multi stage process is a commercially used for the rice milling. It combines number of operations that produces higher quality and higher yield of white rice

from paddy. In modern commercial mill, the multi stage process is adopted. Multi stage process of rice milling involves following steps:

Pre cleaning: It is the process of removal of foreign materials like straw, weed, seeds, soil, etc. from paddy prior to milling.

De-stoning: It is a process of removing small stones from the paddy prior to milling process. It is done by using the destoner.

Dehusking/Dehulling: It is a process of removing the husk or outer layer of paddy to produce brown rice.

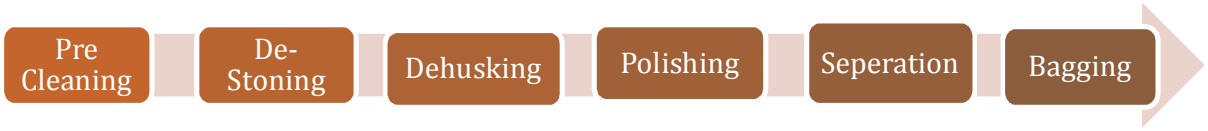
Separation of Paddy: It involves the separation of hulled paddy rice from brown rice. After dehusking the husk, bran and broken rice are separated. The separation is done on the basis of difference in size, gravity, buoyancy etc by automatic machines.

Whitening or Polishing: The white rice is obtained from brown rice using the process of abrasion or friction between two surfaces.

Separation: Separation of rice from broken rice is carried out using different types of graders and separator. There are different indent sizes being used for separation depending on the size of grain.

Bagging: The milled rice is packed in different quantity according to the requirement.

Process flow chart for commercial rice milling is as under:



VI. PROJECT COMPONENTS

- **Land and Land Development**

  It will be ideal to acquire a land of about 0.5 acre of land keeping in mind future expansion of the project. Accordingly, a land cost of Rs.2.50 lakh (Rs.5 lakh/acre) has been considered in this model. In addition, cost of Rs.5.0 lakh has been considered as land development cost. The cost of land if purchased for the project can form part of margin of the promoters subject to a ceiling of 10% project cost.

- **Buildings and Civil Works**

  The following buildings and civil works have been considered for this model.

Milling and storage Area	500 sq. m
Office, Lab& other	500 sq.m

  The construction cost is considered as Rs. 6000 per sq. meter. Hence, the total construction cost for built up area is Rs. 30.00 Lakhs. Another 500 sq. meter area is required for office, lab boundary wall, parking area etc. An amount of Rs. 5 Lakh is necessary to take care of miscellaneous civil wok.

- **Plant and Machineries**

  A list of plant and machinery required for a rice mill are as under:

S.N.	Name of Machinery	Qty. in Nos	Price in Rs.
1	Grain Cleaning & Sorting Sieves of Capacity 2 Ton Per Hour, complete with Electric Motor & Blower.	2	380000
2	Gravity De-Stoner Machine of capacity 2 Ton per hour, with Motor & Blower, including all Std. accessories.	2	330000
3	Rubber Sheller, Husker with Gearbox & Motor	1	187000
4	Gravity Paddy Separator with Motor	1	155000
5	Rotary Glaze Machine with blower & water pump	1	170000
6	All Elevator with Accessories	1	120000
7	Rice polisher with Blower without Motor	1	135000
8	All structural equipments, Main Line & Pipe line etc.	1	100000
9	Hot Air Blowing Dryer Machine	1	15000
10	30 H.P Electric Motor, of "Crompton" make, TEFC Model, complete Set, with Starters & Main Switch.	1	65500
Total Machineries (Rs. In Lakhs)		16.58	
Transportation, Erection, VAT, Excise duty etc.		5.78	
Total Cost of Plant and Machineries (Rs. In Lakhs)		**22.36**	

- **Miscellaneous Fixed Assets**

  Cost of office furniture and other infrastructure, telephone installation, electrical infrastructure is considered under miscellaneous fixed assets. A provision of Rs. 3.78 Lakh is needed to take care of this expenditure.

- **Preliminary Preoperative Expenses**

  There will be different preoperative expenses like registration, establishment, travelling, market survey, administrative, trial run expenses etc. An amount of Rs. 2.00 Lakh is required to pay these expenses.

- **Contingency**
  Contingency charges are considered as a 2 % of the cost of project excluding the pre-operative expenses and land cost.

- **Margin Money for Working Capital**
  Margin money for working capital is considered for one cycle in project cost while calculating project components

VII. PROJECT COST

S. No.	Particulars	Amount (Rs. In Lakhs)
1	Land & Land Development	07.50
2	Civil Works	35.00
3	Plant & Machineries	22.36
4	Miscellaneous Fixed Assets	3.78
5	Working Capital Margin Money	22.23
6	Preliminary & Preoperative Expenses	02.00
7	Contingency @2%	01.27
Total Project Cost		**94.19**

VIII. MEAN OF FINANACE

S. No.	Source of Finance	Amount (Rs. In Lakhs)
1	Equity (25%)	23.55
2	Term Loan from Bank (75%)	70.64

IX. WORKING CAPITAL ASSESMENT

The working capital required to run the plant is worked out as under

Rupees in Lakh

Working Capital Assessment				
Particulars	Days	Year 1	Year 2	Year 3
Raw material	25	5.17	8.27	9.30
WIP	5	1.24	1.99	2.23
Finished Goods	30	7.45	11.92	13.41
Debtors	30	8.38	12.84	14.33
Total		22.23	35.01	39.27
Creditors		0	0	0
Total		0	0	0
WCG		22.23	35.01	39.27
Margin	25%	5.56	8.75	9.82
MPBF		16.67	26.26	29.45
Interest	14%	2.33	3.68	4.12

X. MANPOWER REQUIREMENT

Particulars	Nos.	Monthly Salary (Rs.)
Factory Manager	1	25000
Accountant -cum -Cashier	1	12000
Mechanic	2	7500
Watchman	1	6000
Total salary	5	58000
Total salary (Rs. In Lakh Per year)		**6.96**

Four labours are required for unskilled work like handling, packing etc. Wages per person per day is Rs. 200/-. This would be cost for Rs. 2.4 Lakhs per annum.

XI. PROJECT PROFITABILITY

- **Installed Capacity and Capacity Utilization**

The installed capacity of the plant is 0.5 MT per hour. The plant will be operated in two shifts of 16 hour each for 225 days per annum. Hence the target of the production per year is to process 1800 MT paddy. One third of the installed

capacity is used for custom milling i.e. around 600 MT and remaining is for trading in rice (1200MT). The capacity utilisation considered during first, second and third year onwards is 50%, 80% and 90%, respectively.

- **Yield and Production**

Product	Yield in %	Total Production in MT
Milled Rice	62.00%	744
Milling Charges for Milled Rice On custom Basis	62.00%	372
Bran	5.00%	60
Husk	18.00%	216

- **Sales Revenue**

The sale revenue from the business at 100% capacity utilization is as under:

S. N.	Products	Price/MT (Rs)	Income (Rs in Lakh)
1	Milled Rice	20500	152.52
2	Milling Charges for Milled Rice On custom Basis	1200	4.46
3	Bran	3000	1.80
4	Husk	1000	2.16
Total Sale			**160.94**

For milling on custom basis by products like bran and husk produced during milling will be taken away by the customer himself.

- **Profitability Calculations**

Particulars		Amount (Rs. In lakh)				
Installed Capacity (MT of Paddy/ Year)		1800				
Years		1	2	3	4	5
Capacity utilization (%)		50	80	90	90	90
Income						
1	Milled Rice	76.26	122.016	137.268	137.268	137.268
2	Charges for Milled Rice On custom Basis	2.232	3.5712	4.0176	4.0176	4.0176
3	Bran	0.9	1.44	1.62	1.62	1.62
4	Husk	1.08	1.728	1.94	1.94	1.94
Total income		**74.89**	**80.47**	**128.76**	**144.85**	**144.85**
Total expenditure		**63.74**	**97.53**	**108.85**	**108.99**	**109.13**
PBDIT		16.73	31.23	36.00	35.86	35.71
Depreciation		7.18	6.31	5.55	4.88	4.30

Interest on term loan	8.48	8.48	7.27	6.06	4.84
Interest on working capital	2.33	3.68	4.12	4.12	4.12
Intangible assets written off	0.00	0.40	0.40	0.40	0.40
Profit after depreciation and interest	-1.25	12.37	18.66	20.40	22.05
Tax @ 36%	0.00	4.45	6.72	7.34	7.94
PADIT	-1.25	7.91	11.94	13.05	14.11
Surplus available for repayment	14.40	22.70	24.76	23.99	23.25
Cash Accruals	5.92	14.22	17.49	17.94	18.41

XII. FINANCIAL PARAMETERS

- **Cash Flow Statement**

  It is useful in determining the short-term viability of a company, particularly its ability to pay bills. Cash inflow means the source of cash i.e equity, Loan from bank and the cash accruals from the business. Cash outflow is a sum of cash required for the applications like increase in fixed assets, for repayment of term loan, preoperative expenses and cash required for the payment of dividend.

Particulars	1st Year	2nd Year	3rd Year	4th Year	5th Year
Cash Inflow	100.11	14.22	17.49	17.94	18.41
Cash outflow	94.19	10.09	10.09	10.56	10.56
Opening Balance	0.00	5.92	10.05	17.45	24.83
Surplus	5.92	4.13	7.40	7.37	7.85
Closing Balance	5.92	10.05	17.45	24.83	32.68

- **Break Even Analysis**

Particulars (Rs. In Lakh)	Year 1	Year 2	Year 3	Year 4	Year 5
Sales Revenue	80.47	128.76	144.85	144.85	144.85
Total Variable Cost	55.86	89.37	100.54	100.54	100.54
Contribution	24.62	39.39	44.31	44.31	44.31
Total Fixed Cost	16.36	16.57	15.41	14.18	12.94
Break Even Point (%)	66.46%	42.07%	34.78%	31.99%	29.21%

The unit is expected to break even at approximately 66% capacity utilisation during first year and in third year breakeven will be 34%.

- **Debt Service Coverage Ratio (DSCR)**

DSCR	Year 1	Year 2	Year 3	Year 4	Year 5
Coverage Available	14.40	22.70	24.76	23.99	23.25
Debt	8.48	18.57	17.36	16.15	14.94
DSCR Ratio	1.70	1.22	1.43	1.49	1.56
Average DSCR Ratio	**1.52**				

The debt service coverage ratio based on the assumed techno economic parameters is found satisfactory. The average DSCR is 1.52.

- **Internal Rate of Return (IRR)**

The financial indicators like Net Present Worth (NPW), Benefit Cost Ratio (BCR), Internal Rate of Return (IRR) etc. were analysed by discounting cash flow @15% discounting rate. The internal rate of return is found to be 38.24% and BCR is about 1.10.

- **Projected Balance Sheet**

Liabilities	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
Equity	23.55	23.55	23.55	23.55	23.55	23.55	23.55
Term Loan	70.64	60.55	50.46	40.37	30.28	20.18	10.09
Reserve & Surpluses	-1.25	6.66	18.20	30.39	43.62	57.52	72.37
Total	**92.94**	**90.76**	**92.21**	**94.30**	**97.45**	**101.25**	**106.01**
Assets							
Gross Fixed Assets	92.19	92.19	92.19	92.19	92.19	92.19	92.19
Less Depreciation	7.18	13.49	19.04	23.92	28.22	32.01	35.35
Net Fixed Assets	85.01	78.70	73.15	68.27	63.97	60.18	56.84
Intangible Assets	2.00	2.00	1.60	1.20	0.80	0.40	0.40
Cash & Bank Balance	5.92	10.05	17.45	24.83	32.68	40.67	48.77
Total	**92.94**	**90.76**	**92.21**	**94.30**	**97.45**	**101.25**	**106.01**
TNW	116.48	114.31	115.76	117.85	120.99	124.80	129.56
TOL	70.64	60.55	50.46	40.37	30.28	20.18	10.09
TOL/TNW	0.61	0.53	0.44	0.34	0.25	0.16	0.08

XIII. ASSUMPTIONS

a. The plant will be operated in two shifts of 16 hour each for 225 days per annum.
b. Capacity utilization: First year –50%, Second year - 80%, Third year onwards - 90%.
c. The wages for unskilled workers are taken as per prevailing rates in this type of industry.
d. Interest rate for term loan is 12% per annum and that is for working capital is 14% per annum.
e. Margin money considered at 25% of the financial outlay.
f. Insurance charges for the fixed assets considered as 0.5% of the depreciated cost of the assets.
g. Repayment period of eight years with one year grace period for repayment of principal.
h. Costs of machinery and equipment are based on average prices of machinery manufacturers.
i. Power cost is considered as Rs. 6.00 per unit and that for the fuel is Rs. 55 per litre.
j. The cost of water is considered as 30 paisa per L.
k. Repair and maintenance is considered as a percentage of total project cost excluding preliminary preoperative expenses, land and land development cost. The percentages are 0.10, 0.25 and 0.5 for first three years respectively and 0.75 for fourth year onwards.
l. The administrative expenses will be considered as Lump sum Rs. 25 thousand per annum.
m. The 0.5% of total income would be considered to take care of promotion and marketing expenses.
n. Insurance of the fixed assets is a function of their depreciated cost. It is considered as a 0.5% of depreciated cost (WDV method) of assets.
o. Land cost is considered as Rs.5 Lakh per acre.

XIV. ADDRESS OF PLANT AND MACHINERIES SUPPLIER

Shankar Engg. Corp. Burdwan, (W.B), India
Branch Office: CA-230,Sector-1,
Salt Lake Kolkata-700064, (W.B)
+91-8001771047, 8334809237

Agro Power Gasification Plant Pvt. Ltd.
B- 37/181, B- 1, Birdopur , Varanasi - 221010,
Uttar Pradesh, India
Phone: +(91)-542-2364285

Four Brothers Ex- Imp Pvt Ltd
Old No. 123 New No. 255 LinghiChetty Street,
Chennai - 600001, Tamil Nadu, India
Phone: +(91)-44-42163224

Bansal Ltd.
A - 8, Rajasthan Udyog Nagar, G. T. Karnal Road,
Near Jahangirpuri Metro Station,
Delhi - 110033, Delhi, India

Jet Flash Economics Groups
No. 9, Kazi Nazrul, Islam Avenue, Express I. T. Building,
2nd Floor, Kaikhali, Kolkata - 700 052,
West Bengal, India

RRK Engineering Pvt. Ltd
Village - Gohalbaria, Post-bantul ,
Howrah - 711 312,
West Bengal, India

Maulana Engineering Private Limited
Sulempur, Sakrawal, Tanda, Ambedkarnagar ,
Tanda - 224 190, Uttar Pradesh, India