



## PM Formalisation of Micro Food Processing Enterprises (PM-FME) Scheme

# MODEL DETAILED PROJECT REPORT PROCESSING OF JAGGERY POWDER



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## CHAPTER 1: PROJECT AT A GLANCE

1. Name of the proposed project	:	Jaggery Powder Processing Unit
2. Name of the entrepreneur/ FPO/ SHG/ Cooperative	:	
3. Nature of proposed project :	:	Proprietorship/Company/Partnership
4. Registered office	:	
5. Project site/location	:	
6. Names of Partners (if partnership)	:	
7. No. of share holders (if company/FPC)	:	
8. Technical advisor	:	
9. Marketing advisor/partners	:	
10. Proposed project capacity	:	120 MT/ annum (70%, 80% & 90% capacity utilization in the 2 <sup>nd</sup> , 3 <sup>rd</sup> & 4 <sup>th</sup> years respectively)
11. Raw materials	:	Sugarcane
12. Major product outputs	:	Jaggery powder
13. Total Project Cost	:	Rs. 32.80 Lakhs
• Land development, building & civil construction(only for expansion of existing built-up area)	:	Rs 2.00 Lakhs
• Machinery and equipments	:	Rs 21.50 Lakhs
• Utilities (Power & water facilities)	:	Rs 2.00 Lakhs
• Miscellaneous fixed assets	:	Rs 2.00 Lakhs
• Pre-operative expenses	:	Rs 0.25 Lakhs
• Contingencies	:	Rs 2.00 Lakhs
• Working capital margin	:	Rs 2.97 Lakhs
14. Working capital requirement	:	
• 2 nd year	:	Rs 11.89 Lakhs
• 3 rd year	:	Rs 14.17 Lakhs
• 4 th year	:	Rs 15.87 Lakhs
15. Means of Finance	:	
• Subsidy grant by MoFPI (max 10 lakhs)	:	Rs 10.00 Lakhs
• Promoter's contribution (min 20%)	:	Rs 8.80 Lakhs
• Term loan (42%)	:	Rs 14.00 Lakhs
16. Debt-equity ratio	:	1.59:1
17. Profit after Depreciation, Interest & Tax	:	
• 2 nd year	:	Rs 7.12 Lakhs
• 3 rd year	:	Rs 15.10 Lakhs
• 4 th year	:	Rs 18.59 Lakhs
18. Average DSCR	:	6.28
19. Benefit-Cost Ratio	:	1.33
20. Term loan repayment	:	7 years with 1year grace period
21. Payback period for investment	:	4 years

## CHAPTER 2

### General Overview of Production, Post Harvest Management and Value Addition of Sugarcane in India

#### 2.1 Introduction

Jaggery is a natural, traditional sweetener made by the concentration of sugarcane juice and is known all over the world in different local names. It is a traditional unrefined non-centrifugal sugar consumed in Asia, Africa, Latin America and the Caribbean. Containing all the minerals and vitamins present in sugarcane juice, it is considered the healthiest sugar in the world. India is world's largest producer of sugarcane. In India, Sugarcane is processed in to sugar, gur (jaggery) and khandsari (cottage sugar). The methods of converting sugarcane and manufacturing sugar, gur and khandsari are different but a great value is added in the manufacturing of these consumable final products. During the last couple of years India has produced more than 300 MMT of sugarcane out of which, about 79.91 % is utilized in producing white sugar, 11.29% in producing jaggery and khandsari, 8.80 % as cane juice, seed cane for the next harvest etc. Sugar recovery for different states in India lies in the range of 8.89 to 11.26% on cane, whereas, recovery of jaggery (gur) ranges from 10-13% depending upon the variety of sugarcane, sugarcane quality, soil texture, irrigation facilities, time of cane crushing etc.

India is the largest producer and consumer of jaggery; out of total world production, more than 70% is produced in India. Jaggery along with khandsari has withstood competition protecting farmers' interests besides meeting ethnic demands. Jaggery prepared in all parts of the country. It is also known as gul, gud, gur, vellum and bella.

Jaggery is among major agro processing industries in India. Nearly 20-30% of total sugarcane produced in the country is used for manufacture of about 7 million tonnes jaggery. This sector provides employment to about 2.5 million people. It is therefore, imperative to expand the sector, as it provides higher food value jaggery at lower cost and boosts-up the rural economic system, involving low transportation cost of raw material, and non requirement of highly technical machinery and labour. Jaggery still dominates in preparation of various traditional products like reori, gazak, chikki, patti and ramdana, etc. Kakavi (liquid jaggery) is part of daily diet in most parts of Maharashtra, and has been gaining commercial importance in India.

Jaggery is rich in important minerals like salts: 2.8 g/100 grams, whereas only 300

mg/kg is obtained in refined sugar. Jaggery is an important sweetening agent added to beverages and foods for increasing palatability. Over the years, food habits of human beings have been greatly influenced by research and developmental activities and also due to their health consciousness.

Despite witnessing pressure of industrialization, the jaggery industry has flourished in different states of the country viz., Uttar Pradesh, Tamilnadu, Karnataka, Maharashtra and Andhra Pradesh. The increasing trend of their production can be attributed to peoples' liking towards jaggery in rural areas mainly due to its nutritional and medicinal values. Further due to these values, jaggery has great export potential. It can further be observed that the lack of infrastructural facilities in production and insufficient price dissemination in marketing were major constraints faced by jaggery manufacturers in India.

Therefore, processing of sugar cane into various value added products such as Jaggery powder can ensure nutritional and food security, improved profitability and also offers huge scope for entrepreneurship development at micro, small or medium scale levels using effective government schemes such as PM-Formalization of Micro Food Processing Enterprises Scheme of MoFPI, Government of India.

## **2.2 Origin and distribution of Sugarcane**

Sugarcane belongs to family Gramineae, class monocotyledons and order Glumaceae sub family Panicoidae, tribe Andriopogoneae and subtribe Saccharininea.

The genus *Saccharum* has five important species viz.,

1. *Saccharum officinarum*,
2. *S. sinense*
3. *S. barberi*
4. *S. robustum*
5. *S. spontaneum*.

The first three are the cultivated species and the last two are wild ones.

The cultivated canes fall into two types:

- (a) thin, hardy types *S. barberi* and the Chinese *S. sinense* and
- (b) thick, juicy noble canes *S. officinarum*.

*S. officinarum* is the highly prized cane. *S. officinarum* originated in the Indo-Myanmar-China border with New Guinea as the main centre of diversity.

The officinarums are called the "noble canes" due to thick, juicy, low-fibred canes of high sucrose content. The process of nobilization in Sugarcane is the modified back crossing of wild cane *S. spontaneum* with *S. officinarum* and a repeated back crossing to the noble parent (*S. officinarum*). It is stated that the cradle of cultivated sugarcane is the region where two wild species i.e., *Saccharum spontaneum* and *S. robustum* are found. *S. robustum* is derived from natural crossing between *S. spontaneum* and *Miscanthus floridulus* and the origin is New Guinea. The origin of *S. spontaneum* is subtropical India.

*Saccharum* is the Latin name proposed by Linne in 1753 as a derivation from Karkara and Sakkara from Sanskrit and Prakrit. It is the opinion of many explorers that sugarcane had its origin in *Saccharum barberi* of North India, and that *Saccharum officinarum* had Polynesian origin. Barber and Jesweit (1930) indicated that *Saccharum officinarum* evolved in Malaysia - Indonesia-Papua-new Guinea region or in the islands of Polynesia or Melanesia groups. Expedition during 1928 that maximum diversity was noted in New Guinea from where *Saccharum officinarum* might have evolved and since *S. robustum* was endemic to this area, the latter may be the ancestor of the former.

Cultivation of sugarcane in India dates back to the Vedic period. The earliest mention of sugarcane cultivation is found in Indian writings of the period 1400 to 1000 B.C. the word 'sugar' is derived from the Sanskrit word 'Sankkara' or 'sarkara'. Barber (1931) was of the opinion that the thin Indian canes probably originated in the moist parts of north eastern Indian, from some plant closely related to *Saccharum spontaneum*. Tropical cane might have originated in some of the larger islands of Oceania, most probably in New Guinea. Brandes (1956) also concluded that it originated in New Guinea, where various forms of thick, tall, tropical cane have been grown from ancient times.

Sugarcane is grown over the land surface of the earth between latitudes 35°N and 35°S. The important sugarcane producing countries in the world are India, Cuba, Brazil, Mexico, Pakistan, China, Philippines and Thailand. It is one of the important crops of the world cultivated over an area of 26 million hectares with a total production of 1832.5 million tonnes of cane. In India area and production of sugarcane has been fluctuating from year to year depending upon pricing policy and climatic conditions. India ranks first among sugarcane-growing countries of the world in both extent of area

and production of cane. It occupies about 5.0 million hectares. The total production of cane is about 340 million tonnes. Uttar Pradesh has the largest acreage under sugarcane, and accounts for about 52 per cent of the area under this crop in whole of India and also accounts for 40 per cent of the total annual production. Productivity is the highest in Tamil Nadu followed by Maharashtra and Karnataka.

### 2.3 Production of Sugar cane in India

The total sugarcane area during 1950 – 51 was 1.7 million hectares which rose to 2.46 million hectares by 1960 – 61 and to 2.62 million hectares by 1970 – 71. Over the last 25 years, the area has expanded by 45.8 percent and the present area is 3.82 million hectares. Sugarcane production also had similar increase.

**Table 1: World Sugarcane area, production and productivity during 2012-13**

Country	Area ('000 ha)	Production ('000 tonnes)	Productivity (tonnes/ha)
Australia	338.63	25957.09	76.65
Brazil	9705.39	721077.29	74.30
China	1802.72	124038.02	68.81
Colombia	350.00	38000.00	108.57
Cuba	361.30	14400.00	39.86
India	5064.00	338963.00	66.94
Indonesia	456.70	26341.60	57.68
Mexico	735.13	50946.48	69.30
Pakistan	1046.00	58397.00	55.83
Philippines	433.30	30000.00	69.24
South Africa	320.00	17278.00	53.99
Thailand	1300.00	96500.00	74.23
United States of America	370.00	27900.00	75.41
Viet Nam	297.50	19040.80	64.00
<b>World</b>	26088.64	1832541.19	70.24

Source: FAOSTAT

Sugarcane is cultivated in the most of the Indian states at present. Uttar Pradesh has the largest area almost 50 per cent of the cane area in the country, followed by Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh (with Telengana), Gujarat, Bihar, Haryana and Punjab. These nine are the most important sugarcane producing States.



The sugar industry supports an estimated 12% of the rural population in the nine states of the country, namely, Punjab, Uttar Pradesh, Maharashtra, Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, and Tamil Nadu, through direct or indirect employment. According to the data compiled by the Indian Sugar Mills Association, the crop production total 25.88 million metric ton in 2018, which was the first such increase in three years and the highest since 2014-2015, when the country produced 28.3 million metric ton.

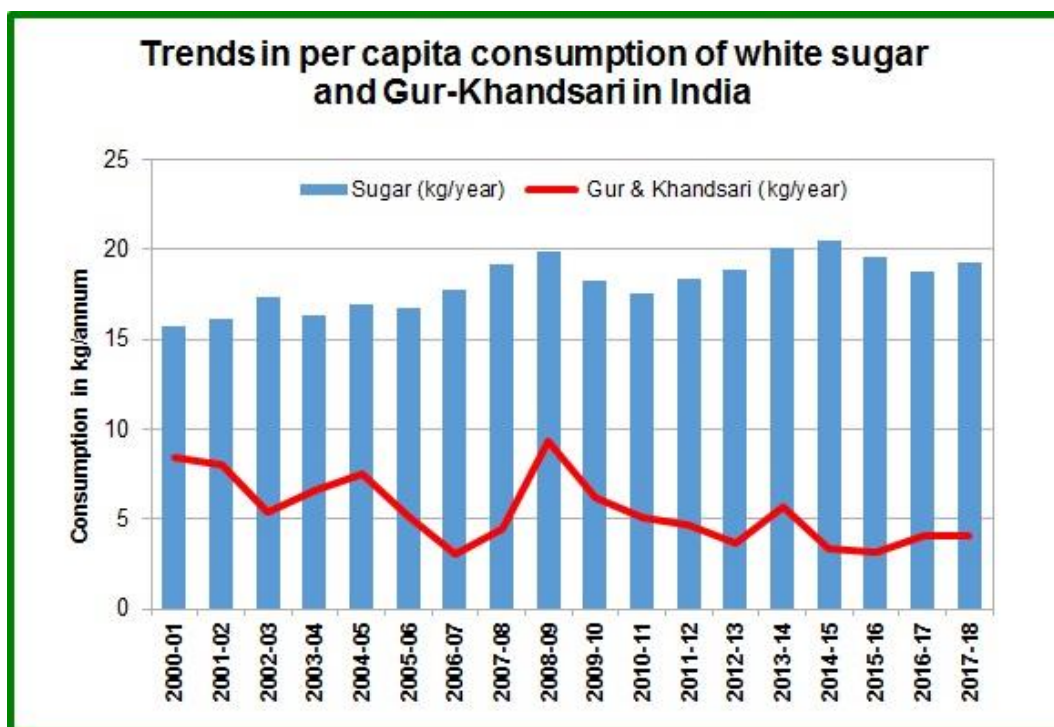
**Table 2: Sugarcane area, production and productivity in India during 2012-13**

State	Area ('000 ha)	Production ('000 tonnes)	Productivity (tonnes/ha)
Andhra Pradesh (Composite)	196	15680	80.0
Bihar	263	14738	56.1
Gujarat	185	13350	72.2
Haryana	101	7437	73.6
Maharashtra	937	62175	66.4
Madhya Pradesh	59	2516	42.3
Karnataka	425	35732	84.1
Orissa	15	952	65.5
Punjab	83	4890	58.9
Tamil Nadu	383	35188	92.0
Uttar Pradesh	2212	134851	61.0
Uttarakhand	110	6718	61.1
<b>INDIA</b>	<b>5064</b>	<b>338963</b>	<b>66.9</b>

*Source: Sugarcane Breeding Institute, Coimbatore*







India is one of the largest agricultural countries, which makes it an ideal market to expand due to the growing consumption of sugar in the country. With new regulatory policies and amendments in the older ones, there is a greater chance for farmers and millers to increase their efforts toward cane sugar production and processing.

#### 2.4 Nutritional value of jaggery

A good quality Jaggery contains more than 70% sucrose, less than 10% of glucose and fructose, less than 5% minerals and less than 3% moisture.

**Table 3: Composition of different forms of jaggery**

Composition per 100g	Types of jaggery		
	Solid (lumped)	Liquid	Granular
Water (g)	3-10	30-35	1-2
Sucrose (g)	65-85	40-60	80-90
Reducing sugars (g)	9-15	15-25	5-9
Protein (g)	0.4	0.5	0.4
Fat (g)	0.1	0.1	0.1
Total minerals	0.6-1.0	0.75	0.6-1.0
Calcium (mg)	8.0	300	9.0
Phosphorous (mg)	4.0	3.0	4.0
Iron (mg)	11.4	8.5-11	12
Energy (Kcal)	383	300	383

It is rich in important minerals (Calcium 40-100 mg, Magnesium 70-90 mg, Potassium 1056 mg, Phosphorus 20-90 mg, Sodium 19-30 mg, Iron 10-13 mg, Manganese 0.2-0.5 mg, Zinc 0.2- 0.4 mg, Copper 0.1-0.9 mg, and Chloride 5.3 mg per 100 g of jaggery), vitamins (viz., Vitamin A-3.8 mg, Vitamin B1-0.01 mg, Vitamin B2- 0.06 mg, Vitamin B5-0.01 mg, Vitamin B6-0.01 mg, Vitamin C-7.00 mg, Vitamin D2-6.50 mg, Vitamin E-111.30 mg) and protein 280 mg per 100 g of jaggery, which can be made available to the masses to mitigate the problems of mal nutrition and under nutrition.

### **2.5 Health benefits of jaggery**

Jaggery is far complex than sugar, as it is made up of longer chains of sucrose. Hence, it is digested slower than sugar and releases energy slowly and not spontaneously. This provides energy for a longer time and is not harmful for the body.

Jaggery is high calorie sweetener and as it contains minerals, protein, glucose and fructose, it is known to be healthier in comparison to white sugar. But this does not certify it fit for consumption by diabetics, because ultimately it is sugar.

Jaggery also gathers a considerable amount of ferrous salts (iron) during its preparation, as it is prepared in iron vessels. This iron is also good for health, particularly for those who are anaemic or lack iron. Jaggery also contains traces of mineral salts which are very beneficial for the body. These salts come from the sugar cane where it is absorbed from the soil.

Furthermore, jaggery is very good as a cleansing agent. It cleans lungs, stomach, intestines, oesophagus and respiratory tracts. Those who face dust in their day to day life are highly recommended to take a daily dose of jaggery. This can keep them safe from asthma, cough & cold, congestion in chest etc.

Jaggery is known to produce heat and give instant energy to a human body. In many parts of India, there is a tradition of serving a glass of water with jaggery to welcome the guests.

Jaggery is also used as a cattle feed, in distillery, medicine manufacturing unit, ayurvedic medicines and health tonics.

Recently jaggery has also found a place in confectionary items. A usage of Jaggery is also seen in leather and tobacco industries. Besides, in cement industries and

coalmines, Jaggery is supplied to the workers for in order to protect them from dust allergies.

The micronutrients present in the jaggery possess antitoxic and anti-carcinogenic properties. It has moderate amount of calcium, phosphorous and zinc, so it helps to optimum health of a person along with all its benefits, purifies the blood and prevents rheumatic afflictions and bile disorders and thus helps to cure jaundice.

Different benefits of jaggery are listed as:

- Rich in mineral salts
- Easy to digest
- Unique taste as sweetener
- Treats throat and lung infections
- Easily dissolved and balances the deficiency of sugar level
- Sulphur less Organic Composition, a best to suite as preferred health alternative.

## 2.6 Sugar cane Varieties in India

The sugarcane crop requires 10-18 months for its maturity in India. Generally 12 month crop duration is most common. Sugarcane varieties are mainly classified into three groups –

1. Early varieties - The varieties attaining 16.5% sucrose, and 85% purity in 10 months
2. Mid-late varieties - The varieties accumulate above 16% sucrose level and 85% purity in 12 months
3. Late varieties - Those varieties, attend the similar 16% sucrose level and 85% purity in more than 12 months and maintain up to 14 months stage

The predominant varieties in each of these categories are as follows.

Early		Mid	Late
CoC 671	CoC 86062	Co 419	Co 62175
CoC 771	CoSi 86071	Co 449	Co 419
CoC 772	CoC 90063	Co 6304	Co 6304
CoC 8001	CoC 91061	CoC 776	CoC 8201
CoC 85061	CoG 94077	CoC 8001	Co 740

The major varieties cultivated in different states are as follows:

Andhra Pradesh	Co 6907, CoT 8201, Co 8013, Co 62175, Co 7219, Co 8014, CoR 8001
Bihar	CoS 767, BO 91, Co 1148
Gujarat	CoC 671, Co 7527, Co 62175, Co 8014, Co 740
Haryana	Co7717, Co 1148, Co 1158, CoS 767
Karnataka	Co 7704, Co 62175, Co 8014, Co 8011, CoC 671, Co 86032
Madhya Pradesh	Co 775, Co 7314, Co 6304, Co 62175
Maharashtra	Co 775, Co 7219, CoC 671, Co 740, Co 7257, Co 86032
Orissa	Co 7704, Co 7219, Co 62175, Co 6304
Punjab	CoJ 64, Co 1148, CoJ 81
Rajasthan	997, Co 419
Tamilnadu	CoC 671, Co 62175, Co 7704, Co 6304, Co 8021, Co 86032, CoC 92061
Uttar Pradesh	CoS 687, CoJ 64, Co1148, CoS 767, CoS 802, CoS 7918, Co 1158, CoS 8408, CoS 8432, BO 91, CoS 8315, CoS 8016, CoS 8118, CoS 8119, BO 19, CoS 837
West Bengal	CoJ 64, Co 1148

Time of planting is governed by the weather conditions. In India, sugarcane planting is done during different months, called planting seasons. In subtropical India, planting seasons are autumn (October), spring (February–March) and summer (April-May). In Peninsular India, planting is done in the months of January-February.

## 2.7 Cultivation and Harvesting of Sugarcane

### 2.7.1 Cultivation

Sugar cane is propagated by planting sections of the stem. The mature stems may have 4 to 12 feet or more height, and 0.75 to 2 inches in diameter. The stem has joints or nodes as in other grasses; these are 4 to 10 inches apart along the above-ground section of the stem. At each node a broad leaf arises which consists of a sheath or base and the leaf blade. The sheath is attached to the stem at the node and at that point entirely surrounds the stem with edges overlapping. The sheath from one node

encircles the stem up to the next node above and may overlap the base of the leaf on the next higher node. The leaf blade is very long and narrow, varying in width from 1 to 3 inches and up to 5 feet or more in length. Also, at each node along the stem is a bud, protected under the leaf sheath. When stem sections are planted by laying them horizontally and covering with soil a new stem grows from the bud, and roots grow from the base of the new stem. The stem branches below ground so several may rise as a clump from the growth of the bud at a node.

In cane fields, mature cane stalks are cut into sections and laid horizontally in furrows. In tropical climates, sections with 2 or 3 nodes are commonly used - since temperatures are more favourable for growth. Usually only one node on a stem piece develops a new plant because of polarity along the stem piece.

Planting is done in rows about 6 feet apart to make cultivation and use of herbicides for early weed control convenient. As plants become tall lower leaves along the stems die and ultimately drop off, so only leaves toward the top remain green and active. Between the nodes the stems have a hard, thin, outer tissue or rind and a softer center. The high-sugar-containing juice is in this center. More than one crop is harvested from a planting. After the first crop is removed two or more so-called stubble crops are obtained. These result from growth of new stalks from the bases of stalks cut near the ground level in harvesting.

## **2.7.2 Harvesting**

### **a. Time of Harvesting**

Proper harvesting of sugarcane is necessary to realize maximum weight of the millable canes (thus sugar) produced with least possible field losses under the given growing environment. Early varieties have to be harvested at 10 to 11 months age and mid-season varieties at 11 to 12 months age.

Proper harvesting should ensure:

- To harvest the cane at peak maturity (i.e., avoiding either over-matured or under-matured cane)
- Cutting cane to ground level so that the bottom sugar rich internodes are harvested which add to yield and sugar
- De-topping at appropriate height so that the top immature internodes are eliminated

- Proper cleaning of the cane i.e., removing the extraneous matter such as leaves, trash, roots etc.
- Quick disposal of the harvested cane to processing centre

Sugarcane matures in 10-12 months in North India and 18-20 months in South India. Brix value is 16-18 in Dec and Jan, at or below 20°C. Different Indicators of harvesting are leaves becoming yellow, plants stop growing and arrows come out, cane produces metallic sounds, buds swell out and eyes start sprouting.

Harvesting of sugarcane at a proper time i.e., peak maturity, by adopting right technique is necessary to realize maximum weight of the mill able canes (thus sugar) produced with least possible field losses under the given growing environment.

On the other hand harvesting either under-aged or over-aged cane with improper methods leads to loss in cane yield, sugar recovery, poor juice quality and problems in milling due to extraneous matter.

## **b. Types of harvesting**

### **Manual Harvesting**

Hand knives, cutting blade or hand axes are used for manual harvesting. It requires skilled labourers as improper harvest of cane leads to loss of cane and sugar yield, poor juice quality and problems in milling due to extraneous matter.

### **Mechanical Harvesting**

Mechanical harvesters are also used which move along rows of cane removing the leafy tops of the cane and cutting the stalk into short pieces or "billets". Billets are loaded into bins which are towed alongside the harvester. When full, the bins are taken by road to processing centres. The field capacity of mechanical cane harvesters varies with the size (2.5 to 4 ha per day of 8 hours).

### **2.7.3 Prevention of Moisture loss in the Harvested cane**

Covering the harvested cane with trash and sprinkling with water both under sun and shade reduces the moisture loss and prevented quality deterioration. Among the varieties studied, maximum loss of moisture (5.9%) was recorded by the variety Co



86249 while the varieties Co 94008 and Co 85019 have registered minimum loss of moisture (4.7%).

## **2.8 Post Harvest Operations, Processing and Storage of jaggery**

### **2.8.1 Post harvest operations for Sugarcane**

#### **a. Collecting the harvested cane**

Canes are harvested by manual or mechanical methods. Canes are cut at ground level, leaves are removed and the top is trimmed off by cutting off the last mature joint. Canes are then placed into large piles, picked up and tied. The sugarcane should be cut and transported to the mill in order to be ground, preferentially at the same day they were cut.

#### **b. Transport**

It may be done in motorized vehicles (trucks and vans) or with animal traction. The vehicles must be clean to avoid impurities such as dirt and stones that contaminate the sugarcane, endanger the quality of the juice and the grinding efficiency.

#### **c. Washing**

This stage is optional. If done, potable water must be used. This stage helps to reduce the contamination of the juice by dirt, straw, and other strange materials.

### **2.8.2 Processing of Jaggery**

#### **a. Extraction of Juice**

Generally three roller mills are used for juice extraction. These are driven by electrical motor or diesel engine. Extraction of juice is in the range of 60 to 70%. After extraction, suspended matters are removed by cotton cloth or fine mesh screen.

#### **b. Clarification of juice**

Sugarcane juice contains colloidal matter, inorganic salts, fiber, various nitrogenous substances, lipids, gums, wax organic acid, inorganic acid, pectin etc. All these impurities removed totally or partially in this clarification process.

In the clarification process generally used two types of clarifying agents are used - organic and inorganic. Organic clarifying agents are from vegetable origin like Bendi,

Sulkali and Doela. Inorganic clarifying agents used are Lime, Hydrose powder and super phosphate.

Filtered juice is taken in open pan and heated slowly so that dissolved air escapes and gummy, colloidal substances get coagulated by the adding of clarifying agents as per requirement. They form a scum at the top surface of the juice which is removed continuously using perforated strainers. In this process temperature requirement is 70- 80°C.

Simultaneously small quantity of lime water is added to reduce the acidity of juice but not to the extent to make juice neutral because taste and colour of Jaggery produced will be inferior. In this lime process pH is maintained at 6.2 to 6.5. In some cases, super phosphate,  $P_2O_5$ , and 0.25% concentrated hydrous power are also added to obtain good colour of Jaggery.

### **c. Concentration of juice**

After clarification, temperature of boiling mass is further increased to around 110 - 115°C. Boiling take place about 2 to 3 hours. After the striking point temperature and brix content are reached, the slurry (semi fluid, pasty concentrate) formed is tipped off and further cooled/ processed to reach the desired end form (moulding/ liquid/ granulation) The striking point/ brix content are different for the different forms of jaggery. Recovery of jaggery is in the range from 8 to 12% that depending upon the total solids in cane.

### **2.8.3 Composition and specification of Jaggery**

Jaggery contains all the nutrients and substances present in cane juice. The nutrient value of jaggery is slightly higher than that of crystalline sugar because it contains all constituents which are normally separated in molasses in manufacturing of sugar.

Jaggery graded in the market according to basis of colour, taste, hardness and crystalinity which is judged by visual appearance. While in practically graded of jaggery should be consider sucrose percentage, reducing sugar, moisture and colour

### **2.8.4 Storage of jaggery**

Jaggery deteriorates faster in monsoon season when relative humidity is more than 70%. During this season Jaggery absorbs moisture from the atmosphere and becomes viscous and dark colour. Hence jaggery blocks packed in gunny bags lined

with water proof sheet.

## CHAPTER 3

### MODEL JAGGERY POWDER PROCESSING UNIT UNDER PM-FME SCHEME

#### 3.1 Introduction

The Central Sector scheme for Formalization of Micro Enterprises in Food Processing sector under Ministry of Food Processing Industries, Government of India is an important scheme that offers for formalization and mainstreaming the unorganized home based or micro food processing units. The scheme is useful for expansion of the existing units in terms of capacity and technology through installation of new machineries and additional civil infrastructures. Further, the scheme promotes establishment of new micro units on the principle of ODOP (One District One Product).

Establishment or expansion of Jaggery Powder Processing Unit is an attractive option in potential sugarcane growing states in India as sugarcane is a major cash crop cultivated across India. A model generalized DPR is therefore, prepared for expansion of existing unformalized Jaggery Powder Processing Unit. A detailed account of the model DPR prepared on the basis of certain generalized assumptions is discussed in the sequent sections. An entrepreneur can use this model DPR template and modify according to his/her need in terms of capacity, location, raw materials availability etc.

#### 3.2 Form of the Business Enterprise

The entrepreneur concerned must specify about the form of his/her business organization i.e. whether Sole Proprietorship, Cooperative, FPO/FPC, SHG Federation, Partnership Firm or Company and accordingly attach all the required documents. The documents may be registration certificate, share holding pattern, loan approval certificate etc as specified in the FME scheme guidelines.

#### 3.3 Background of the Promoters/ Owners and Required Documents

The detailed bio-data of promoter/promoters inter-alia name, fathers name, age, qualification, business experience, training obtained, contact number, email, office address, permanent address, share holding pattern, definite sources of meeting the commitment of promoters contribution, details of others business along with certified balance sheet and profit loss account for the last 3- 4 years, tax registration, PAN Number, income tax return etc for 3-4 years and other requirements as specified in the FME guidelines must be provided with the DPR.

### **3.4 Background of the Proposed Project**

The entrepreneur must specify whether it is a new project or expansion of the existing project. If new project is proposed then the reason to go in to the project and if expansion of the existing project, the must specify what kind of expansion is proposed in terms of capacity, product, machines, civil infrastructure etc.

### **3.5 Location of the Proposed Project and Land**

The entrepreneur must provide description of the proposed location, site of the project, distance from the targeted local and distant markets; and the reasons/advantages thereof i.e. in terms of raw materials availability, market accessibility, logistics support, basic infrastructure availability etc. The entrepreneur must mention whether project is proposed in self owned land or rented/allotted land in any industrial park or private location. Accordingly, he/she must provide ownership document, allotment letter/ lease deed.

Land clearance certificate must be from village authority/ municipality or any other concerned authority. The ideal locations for establishment of exclusive Jaggery Powder Processing Units are in the production clusters of the major Sugarcane growing states such as Andhra Pradesh, Telengana, Karnataka, Tamil Nadu, Punjab, Bihar, Gujarat, Haryana, Maharashtra, Madhya Pradesh, Orissa, Uttar Pradesh and Uttarakhand where adequate quantities of surplus Sugarcane will be available for processing.

### **3.6 Installed Capacity**

The maximum installed capacity of the Jaggery Powder Processing Unit in the present model project is proposed as 120 tonnes/ annum. The unit is assumed to operate 300 days/annum @ 8-10 hrs/day. The 1<sup>st</sup> year is assumed to be construction/expansion period of the project; and in the 2<sup>nd</sup> year 70 percent capacity, 3<sup>rd</sup> year 80 percent capacity and 4<sup>th</sup> year onwards 90 percent capacity utilization is assumed in this model project.

### **3.7 Raw Material Requirements for the Unit**

A sustainable food processing unit must ensure maximum capacity utilization and thus requires an operation of minimum 280-300 days per year to get reasonable profit. Therefore, ensuring uninterrupted raw materials supply requires maintenance of adequate raw material inventory. The processor must have linkage with producer organizations preferably FPCs through legal contract to get adequate quantity and quality of raw materials which otherwise get deteriorated. In the current model Jaggery powder processing project, the unit requires 2.8 Tonnes/ day, 3.2 Tonnes/ day and 3.6 Tonnes/ day of Sugarcane at 70, 80 and 90 percent capacity utilization, respectively.

### **3.8 Product Profile of the Unit**

In the present model Jaggery Powder processing unit, the targeted product output is taken as Jaggery Powder. This product has huge need in view of its nutritional benefits and agricultural significance in India. Further sugarcane is an indispensable and highly valued cash crop in India. India is one of the largest cultivator and producer among sugarcane-growing countries of the world.

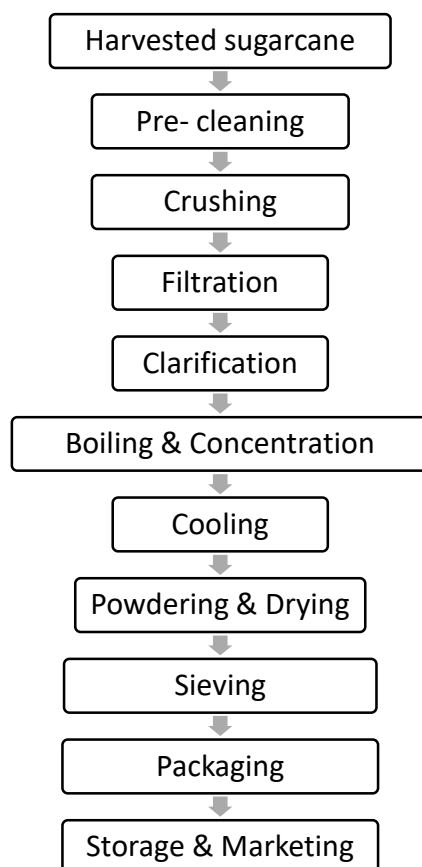
Nearly 70% of the global production of jaggery is done in India and this sector supports huge rural economic system providing employment to millions of people. Jaggery manufacturing is considered as a big cottage industry under unorganised sector; it is produced mostly by small and marginal farmers employing semi-skilled persons. The process involved is a traditionally, labour-intensive and also time consuming. . Being the major agro-processing industry in the rural sector, there is a greater need to uplift the jaggery processing sector which would thus provide higher value jaggery and jaggery based products at reasonable cost and would in turn help the rural economic system to prosper. Hence a mechanized process for jaggery production will reduce the drudgery involved.

In India, about 3 Million Tonnes of jaggery is stored generally, for consumption purposes, throughout the year. According to the estimates, about 10 per cent loss takes place in the quality and quantity of jaggery especially during the monsoon. Therefore, care should be taken to keep it away from moisture and air. Free flowing nature of granular jaggery with low moisture content (up to 1-2 % dry basis), offers advantages in terms of its increased storage life up to two years, compared to the solid moulded jaggery. In India, approximately 80 per cent of jaggery prepared is solid jaggery and remaining 20 per cent includes liquid and granular jaggery. So a good

quality granular jaggery with proper packaging has a long shelf life and by this, storage losses can be eliminated. This reflects the huge scope for the production of jaggery powder.

The never ending demand for high quality, green & clean labelled, organic, nutritious food products like Jaggery, amongst the diet conscious people has inspired innovations in the food processing sector in terms of technology and engineering, design of machinery, etc. Value addition to the existing product line with a view to provide health and wellness to its consumers is now becoming a priority. Objectionable chemicals were used at times to produce better quality jaggery. But now the trend has driven the use of natural clarifying agents of vegetable origin in the process. Looking to its nutritional status and current inclination of people for natural products, jaggery has immense growth potential market both in national & international market.

### 3.9 Manufacturing Process of Jaggery Powder





### **3.10 Technology Accessibility**

IIFPT and its liaison offices at Guwahati and Bhatinda have all the technical knowhow on Jaggery powder processing. These technologies are available through training, incubation and consultancy. The entrepreneur can first avail training or consultancy and then undergo business incubation before venturing into the business. Other than IIFPT, NIFTEM, CFTRI and other institutes also have the technical knowledge and training facilities.

### **3.11 Market Demand and Supply**

On an average 10 to 20 kg of jaggery is consumed per person in a year in developing countries like India; a consumer spends Rs. 500-1000 on jaggery annually which indicates a good market potential. Further the better keeping quality and convenience of usage of properly processed and packaged Jaggery powder can be of more value to a consumer. This advantage also provides ample scope, in terms of conversion from solid jaggery to granular jaggery.

Per capita consumption of sucrose in India is much lower (15 kg) compared to developed countries (50 kg). Major share (above 75%) of sucrose consumption in rich countries has been through manufactured foods. To over-come the problems posed by excess sucrose consumption, many of the countries are serious in looking for alternative sweeteners from sugarcane crop. In India, Jaggery is one such eco friendly sweetener; India contributes more than 70% to the world production. It is exported to many countries like, Bangladesh, Great Britain, Canada, Chili, Egypt, Fiji, Iran, Kuwait, Malaysia, Nepal and USA. With trend towards quality jaggery and its value added products such as jaggery chocolate and confectionaries made of various contributions of cereals, it is possible to significantly increase export of jaggery in powder form.

With increasing awareness about the health drawbacks of refined white sugar consumption and the health benefits of jaggery, jaggery is considered as one of the best alternatives to refined sugar. The annual market demand for jaggery in India is about 5 Lakh Tonnes. The sector is expanding now-a-days with advancement in its processing, storage and packaging techniques. Consumers also like the good taste of chemical free jaggery taste. Though it has a dull golden colour which does not attract the consumers, it still fetches higher price in markets compared to chemically processed jaggery.

### **3.12 Marketing Strategy**

The increasing urbanization offers huge market for readily available jaggery powder packaged attractively and merchandised in organized urban platforms such as departmental stores, malls, super markets. Direct marketing kiosks can also be utilised in urban market areas.

The producer may also enter into agreements for supplying to big players or retailers in their brand name or as private labels.

Jaggery powder can also be sold for businesses involved in producing bakery/ confectionary products using jaggery. Jaggery should be proposed as the healthy alternative to businesses which use refined sugar.

Jaggery powder can also be marketed to restaurants and other food service providers. Single-use sachets can also be marketed to cafe chains, restaurants and hotels to be presented at customer tables.

Ayurvedic medicines and health food industry is another major avenue for marketing jaggery powder. Ayurvedic pharmaceutical companies can be approached for the same.

Export market is a major avenue for jaggery powder, provided good hygienic production and compliant attractive packaging.

Organically produced powder jaggery has another marketing avenue in the form of organic food stores. Further there are several e-commerce companies that sell good quality produce, which can be utilized. Generally organic jaggery is sold at premium prices.

### **3.13 Detailed Project Assumptions**

This model DPR for Jaggery powder Processing Unit is basically prepared as a template based on certain assumptions that may vary with capacity, location, raw materials availability etc. An entrepreneur can use this model DPR format and modify as per requirement and suitability. The assumptions made in preparation of this particular DPR are given in Table 5. This DPR assumes expansion of existing unit by adding new Jaggery powder line. Therefore, land and civil infrastructures are assumed as already available with the entrepreneur.

Parameter	Value	
Assumed Capacity of the Jaggery Powder processing unit :	120 MT/ annum	
Utilization of capacity :	Year 1	Implementation
	Year 2	70%
	Year 3	80%
	Year 4 onwards	90%
Working days per year:	300 days	
Working hours per day:	8-10 hours	
Interest on term loan	12.00%	
Interest on working capital loan	10.00%	
Repayment period	Seven years with one year grace period is considered.	
Average price of raw material:	Rs. 3/ kg	
Average sale price of product	Rs. 80/ kg	

### 3.14 Fixed Capital Investment

#### 3.14. A. Land & Building

This DPR is for FME scheme to upgrade/ formalize existing micro enterprises which already has land & built-up area. However, they can invest to expand the built-up area (Table 5) as required.

i. Land 1000 Sq ft	Assumed land already developed and has 6000 sq ft built in area. So additional 1000 sq ft can be built in @ Rs. 200/sq ft Rs. 2.00 Lakhs
ii. Built-up processing area 6000 sq ft	
iii. Storage area 1000 sq ft	
Total	Rs. 2.00 Lakhs

### 3.14. B. Machinery & Equipment: Rs. 21.50 Lakhs

Table 7: Machineries & Equipments						
S.No	Description	Power required	Area reqd (Sq.ft)	Unit Price, (Rs. in lakhs)	Qty	Amount (Rs. in lakhs)
1.	Crusher Capacity: 1.5T/ h	10 HP	50	1.50	1	1.50
2.	Collecting Tank Capacity: 1000 litres	-	50	0.25	4	1.00
3.	Filtration system with pump capacity: 500 litres/ h	0.75 HP	50	0.50	1	0.50
4.	Steam jacketed Tanks Capacity: 1000 Litres	0.1 HP	200	0.75	2	1.50
5.	Double Effect Evaporator	0.5 HP	300	6.00	1	6.00
6.	Concentrator pan with churner	0.5 HP	100	0.50	2	1.00
7.	Jaggery granulator Capacity:	2 HP	25	3.00	1	3.00
8.	Tray dryer Capacity: 100 kg	8 HP	50	2.00	1	2.00
9.	Form Fill Seal machine Capacity: 100 kg/ hr	1 HP	50	2.00	1	2.00
10.	Boiler Steam output 10 kg Working pressure 10 bar max	3 HP	100	3.00	1	3.00
<b>Total</b>						<b>21.50</b>

### 3.14. C. Utilities and Fittings

Table 8: Utilities and Fittings	
Power	Rs. 1.20 Lakhs
Water	Rs. 0.8 Lakhs
Total	Rs. 2.00 lakhs

### 3.14. D. Other Fixed Assets

Furniture and fixtures	Rs. 2.00 Lakh
Utensils, trays, thermometer, refractometer, etc	
<b>Total</b>	<b>Rs. 2.00 Lakh</b>

### 3.14. E. Pre-operative Expenses

Legal expenses, start-up expenses, establishment cost, consultancy fee, trial runs, & others	Rs. 25,000.00
<b>Total Pre-operative Expenses</b>	<b>Rs. 25,000.00</b>

### 3.14. F. Total Fixed Capital Investment

Total Fixed Capital Investment = (Land & Building + Machinery & Equipment+ Utilities and Fittings + Other Fixed Assets + Pre-operative Expenses)

= Rs. (2+21.50+2+2+0.25) Lakhs = **Rs. 27.75 Lakhs**

### 3.15. Working Capital Requirement

Particulars	Period	year 2	year 3	year 4
		(70% - 70 MT)	(80% - 80 MT)	(90% - 90 MT)
Raw material stock	30 days	2.10	2.40	2.70
Packing material	30 days	0.74	0.84	0.95
Work in progress	15 days	2.00	2.31	2.55
Finished goods' stock	15 days	1.92	2.29	2.54
Receivables	30 days	5.13	6.33	7.13
<b>Total current assets</b>		<b>11.89</b>	<b>14.17</b>	<b>15.87</b>
Trade creditors		0	0	0

Working capital gap		11.89	14.17	15.87
Margin money (25%)		2.97	3.54	3.97
Bank finance		8.92	10.63	11.90

### 3.16. Total Project Cost and Means of Finance

<b>Table 12: Total Project Cost and Means of Finance (Rs. in Lakhs)</b>	
<b>Particulars</b>	<b>Amount</b>
i. Land and building	2.00
ii. Plant and machinery	21.50
iii. Utilities & Fittings	2.00
iv. Other Fixed assets	2.00
v. Pre-operative expenses	0.25
vi. Contingencies	2.00
vii. Working capital margin	2.97
<b>Total project cost (i to vii)</b>	<b>32.80</b>
<b>Means of finance</b>	
i. Subsidy	10.00
ii. Promoter's contribution	8.80
iii. Term loan	14.00

### 3.17. Manpower Requirement

<b>Table 13: Manpower Requirement</b>			
<b>Particulars</b>	<b>No. of persons</b>	<b>Monthly Wage (Rs.)</b>	<b>Total Monthly Salary (Rs.)</b>
i. Manager (can be the owner )	1	20000	20000
ii. Skilled worker	2	10000	20000
iii. Semi skilled	3	7500	22500
iv. Helper	3	5000	15000
v. Salesman	1	7500	7500
<b>Total</b>	<b>10</b>		<b>85000</b>

Note: Only the manager and two skilled workers are permanent staffs (Salary Rs. 40000/ month). Others are causal staffs.

**3.18. Expenditure, Revenue and Profitability Analysis**

<b>Table 14: Expenditure, Revenue and Profitability Analysis</b>									
	<b>Particulars</b>	<b>1<sup>st</sup> year</b>	<b>2<sup>nd</sup> year</b>	<b>3<sup>rd</sup> year</b>	<b>4<sup>th</sup> year</b>	<b>5<sup>th</sup> year</b>	<b>6<sup>th</sup> year</b>	<b>7<sup>th</sup> year</b>	<b>8<sup>th</sup> year</b>
<b>A</b>	<b>Total Installed Capacity</b>	120 MT/Year Jaggery powder							
	Capacity utilization (%)	Under const. (0%)	70 MT (70%)	80 MT (80%)	90 MT (90%)	90 MT (90%)	90 MT (90%)	90 MT (90%)	90 MT (90%)
<b>B</b>	<b>Expenditure (Rs. in Lakh)</b>								
	Sugarcane (Av. Price @ Rs. 3/ Kg )	0.00	25.20	28.80	32.40	32.40	32.40	32.40	32.40
	Packaging materials @ Rs. 10/ Unit	0.00	8.83	10.10	11.36	11.36	11.36	11.36	11.36
	Utilities (Electricity, Fuel)	0.00	4.15	4.55	4.95	4.95	4.95	4.95	4.95
	Salaries (1st yr only manager’s salary)	2.40	7.91	8.67	9.44	9.44	9.44	9.44	9.44
	Repair & maintenance	0	0.63	0.63	0.63	0.63	0.63	0.63	0.63
	Insurance	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Miscellaneous expenses	0.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	<b>Total Expenditure</b>	3.20	47.62	53.65	59.68	59.68	59.68	59.68	59.68
<b>C</b>	<b>Total Sales Revenue (Rs. in Lakh)</b>								
	Sale of Jaggery Powder @ Rs. 80/ kg	0.00	61.60	76.00	85.60	86.40	86.40	86.40	86.40
<b>D</b>	<b>PBDIT (Total Sales Revenue-Total Expenditure) (Rs. in Lakh)</b>	-3.20	13.98	22.35	25.92	26.72	26.72	26.72	26.72
	Depreciation on civil works @ 5% per annum	0.10	0.10	0.09	0.09	0.08	0.08	0.07	0.07



	Depreciation on machinery @ 10% p.a	2.17	1.95	1.76	1.58	1.42	1.28	1.15	1.04
	Depreciation on other fixed assets@ 15% p.a	0.90	0.77	0.65	0.56	0.47	0.40	0.34	0.29
	Interest on term loan @ 12% p.a	1.67	1.67	1.49	1.20	0.92	0.64	0.36	0.09
	Interest on working capital @ 10% p.a	0.00	0.89	1.06	1.19	1.20	1.20	1.19	1.19
E	<b>Profit after Depreciation and Interest</b> (Rs. in Lakh)	-8.04	8.60	17.30	21.30	22.63	23.12	23.61	24.04
F	Tax (assumed 15%) (Rs. in Lakh)	0.00	1.48	2.20	2.71	2.83	2.91	2.98	3.05
G	<b>Profit after depreciation, Interest &amp; Tax</b> (Rs. in Lakh)	-8.04	7.12	15.10	18.59	19.80	20.21	20.63	20.99
H	Surplus available for repayment (PBDIT-Interest on Working Capital -Tax) (Rs. in Lakh)	-3.20	11.61	19.09	22.02	22.69	22.61	22.55	22.48
I	Coverage available (Rs. in Lakh)	-3.20	11.61	19.09	22.02	22.69	22.61	22.55	22.48
J	Total Debt Outgo (Rs. in Lakh)	1.67	3.67	3.49	3.20	2.92	2.64	2.36	2.09
K	<b>Debt Service Coverage Ratio (DSCR)</b>	-1.92	3.16	5.47	6.88	7.77	8.56	9.56	10.76
	<b>Average DSCR</b>	6.28							
L	<b>Cash accruals (PBDIT- Interest-Tax) (Rs. in Lakh)</b>	-4.87	10.83	18.66	22.01	22.97	23.17	23.38	23.58
M	<b>Payback Period</b> (on Rs. 30 Lakhs initial investment)	4 years							

### 3.19. Repayment Schedule

<b>Year</b>	<b>Outstanding loan at start of yr.</b>	<b>Disbursement</b>	<b>Total outstanding Loan</b>	<b>Surplus for repayment</b>	<b>Interest payment</b>	<b>Repayment of principal</b>	<b>Total outgo</b>	<b>o/s Loan at the end of the yr.</b>	<b>Balance left</b>
	0	14	14	-3.20	1.67	0	1.67	14	-4.87
	14		14	11.61	1.67	2	3.67	12	7.94
	12		12	19.09	1.49	2	3.49	10	15.60
	10		10	22.02	1.20	2	3.20	8	18.82
	8		8	22.69	0.92	2	2.92	6	19.77
	6		6	22.61	0.64	2	2.64	4	19.97
	4		4	22.55	0.36	2	2.36	2	20.19
	2		2	22.48	0.09	2	2.09	0	20.39

### 3.20. Assets' Depreciation

<b>Table 16: Assets' Depreciation (Written Down Value Method) (Rs. in Lakh)</b>								
<b>Particulars</b>	<b>1st Year</b>	<b>2nd Year</b>	<b>3rd Year</b>	<b>4th Year</b>	<b>5th Year</b>	<b>6th Year</b>	<b>7th Year</b>	<b>8th Year</b>
Civil works	2.02	1.92	1.82	1.73	1.64	1.56	1.48	1.41
Depreciation	0.10	0.10	0.09	0.09	0.08	0.08	0.07	0.07
Depreciated value	1.92	1.82	1.73	1.64	1.56	1.48	1.41	1.34
Plant & Machinery	21.70	19.53	17.58	15.82	14.24	12.82	11.54	10.39
Depreciation	2.17	1.95	1.76	1.58	1.42	1.28	1.15	1.04
Depreciated value	19.53	17.58	15.82	14.24	12.82	11.54	10.39	9.35
Other Fixed Assets	6.03	5.13	4.36	3.71	3.15	2.68	2.28	1.94
Depreciation	0.90	0.77	0.65	0.56	0.47	0.40	0.34	0.29
Depreciated value	5.13	4.36	3.71	3.15	2.68	2.28	1.94	1.65
All Assets	29.75	26.58	23.76	21.26	19.03	17.06	15.30	13.74
Depreciation	3.17	2.82	2.50	2.23	1.97	1.76	1.56	1.40
Depreciated value	26.58	23.76	21.26	19.03	17.06	15.30	13.74	12.34

### 3.21. Financial Assessment of the Project

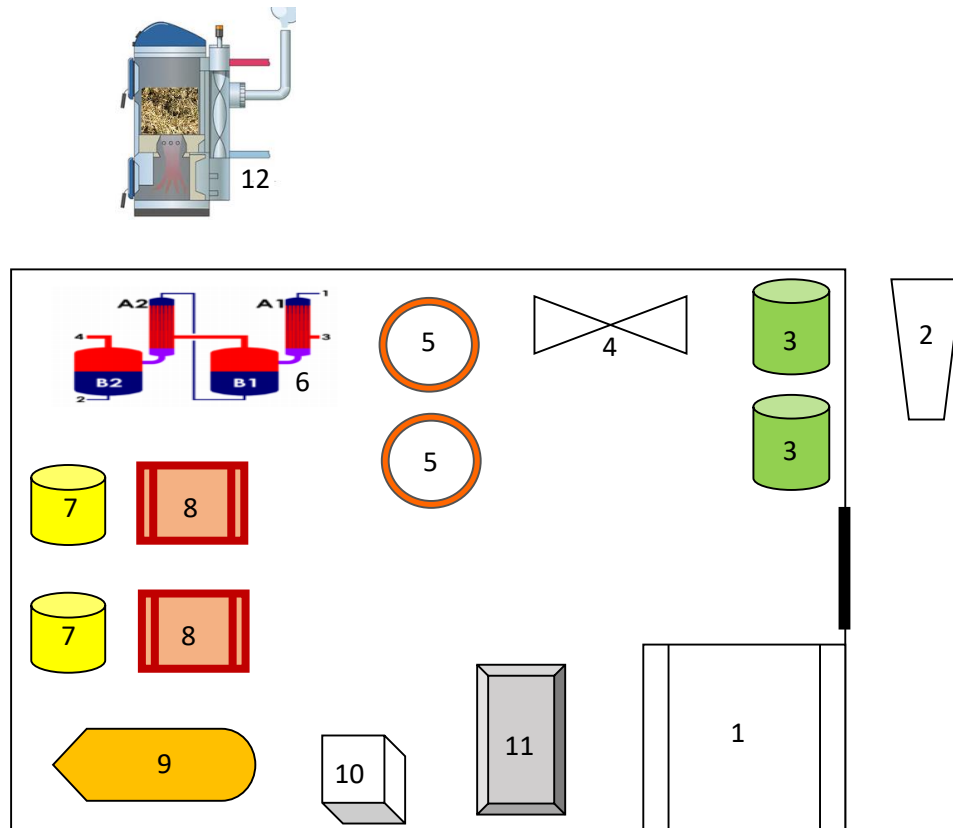
Table 17: Benefit Cost Ratio (BCR) and Net Present Worth (NPW)										
S. No	Particulars	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	
i	Capital cost (Rs. in Lakh)	32.8	0	0	0	0	0	0	0	
ii	Recurring cost (Rs. in Lakh)	3.20	47.62	53.65	59.68	59.68	59.68	59.68	59.68	
iii	Total cost (Rs. in Lakh)	36.00	47.62	53.65	59.68	59.68	59.68	59.68	59.68	435.67
iv	Benefit (Rs. in Lakh)	0.00	61.60	76.00	85.60	86.40	86.40	86.40	86.40	
v	Total Depreciated value of all assets (Rs. in Lakh)								12.34	
vi	Total benefits (Rs. in Lakh)	0.00	61.60	76.00	85.60	86.40	86.40	86.40	98.74	581.14
<b>Benefit-Cost Ratio (BCR): 1.33 (Profitable Project)</b> <b>Net Present Worth (NPW): 145.47</b>										

Break Even analysis indicates costs-volume-profit relations in the short run. This is the level at which the firm is in no loss no profit situation.

<b>Table 18: Break-Even Analysis</b>									
<b>S.No</b>	<b>Particulars</b>	<b>1<sup>st</sup> year</b>	<b>2<sup>nd</sup> year</b>	<b>3<sup>rd</sup> year</b>	<b>4<sup>th</sup> year</b>	<b>5<sup>th</sup> year</b>	<b>6<sup>th</sup> year</b>	<b>7<sup>th</sup> year</b>	<b>8<sup>th</sup> year</b>
	Capacity utilization	Under const. (0%)	70 MT (70 %)	80 MT (80 %)	90 MT (90 %)	90 MT (90 %)	90 MT (90 %)	90 MT (90 %)	90 MT (90 %)
<b>A</b>	<b>Fixed Cost (Rs. in Lakh)</b>								
	Permanent staff salaries	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
	Depreciation on building @ 5% p.a	0.10	0.10	0.09	0.09	0.08	0.08	0.07	0.07
	Depreciation on machinery @ 10% p.a	2.17	1.95	1.76	1.58	1.42	1.28	1.15	1.04
	Depreciation on other fixed assets @ 15% p.a	0.90	0.77	0.65	0.56	0.47	0.40	0.34	0.29
	Interest on term loan	1.67	1.67	1.49	1.20	0.92	0.64	0.36	0.09
	Insurance	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	<b>Total Fixed Cost (Rs. in Lakh)</b>	7.69	7.34	6.84	6.28	5.74	5.25	4.77	4.34
<b>B</b>	<b>Sales Revenue (Rs. in Lakh)</b>	0.00	61.60	76.00	85.60	86.40	86.40	86.40	86.40
<b>C</b>	<b>Variable Cost (Rs. in Lakh)</b>								
	Sugarcane (Average Price @ Rs.3/ kg )	0.00	25.20	28.80	32.40	32.40	32.40	32.40	32.40
	Packaging materials @ Rs.10/ Unit	0.00	8.83	10.10	11.36	11.36	11.36	11.36	11.36

	Casual staff salaries	0.00	5.36	5.36	5.36	5.36	5.36	5.36	5.36
	Utilities (Electricity, Fuel)	0.00	4.15	4.55	4.95	4.95	4.95	4.95	4.95
	Repair & maintenance	0.00	0.73	0.73	0.73	0.73	0.73	0.73	0.73
	Miscellaneous expenses	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Interest on working capital	0.00	0.89	1.06	1.19	1.20	1.20	1.19	1.19
	Total Variable Cost (Rs. in Lakh)	0.50	45.66	51.10	56.49	56.50	56.50	56.49	56.49
D	<b>Break Even Point (BEP) as % of sale</b>	0.00	46.05%	27.47%	21.57%	19.20%	17.56%	15.95%	14.51%
	<b>Break Even Point (BEP) in terms of sales value (Rs. in Lakhs)</b>		28.37	20.88	18.47	16.59	15.17	13.78	12.54

### 3.22 Plant Layout



- |  |                          |
|--|--------------------------|
| 1 Storage area                         | 7 Syrup collecting tanks |
| 2 Crusher                              | 8 Concentrator pans      |
| 3 Juice collecting tanks               | 9 Jaggery granulator     |
| 4 Filtration system                    | 10 Tray dryer            |
| 5 Steam jacketed tanks - clarification | 11 Packing               |
| 6 Double Effect Evaporator             | 12 Boiler                |

### 3.23. Machinery Suppliers

The entrepreneur must provide tentative supplier list and quotations with respect to his project. However, there are many machinery suppliers available within India for Jaggery powder processing machineries and equipments. Some of the suppliers are:

1. M/s. Kesavan Industries, 87, Dharapuram Road, Udumalpet – 642 126, Tamil Nadu.
2. Moon Sun Group of Companies, Vidurkuti Ganj Road, Bijnor - 246701, Uttar Pradesh

3. NSI Equipments Pvt Ltd, 159, Saipuram, Opposite block Development Office, Delhi Road, Meerut – 250001, UP
4. Om Kailash Estate, Yadav Road, Rajkot, Upleta – 360490, Gujarat
5. Annapurna Industries, Gola Road, Lakhimpur Kheri- 262701, UP
6. UP Small Machinery Corporation, Near Kashipur Road, Gandhi Colony, Rudrapur
7. Infinity Engineering, 99, Somalapuram, Ambur, Ambur Taluk, Vellore-635802, Tamil Nadu.
8. Tru Mark Enterprises, Shop no 14, Ground floor, Vighnaharta Coop Housing Society, Mahadev Palav Marg, Currey Road, Mumbai-400012. India
9. IPK Packaging (India) Private Limited, S.F.No. 9, Jagannath Industrial Estate, Chinnavedampatti, Coimbatore - 641049, Tamil Nadu, India
10. Best India, 14, 16/2, Mathura Road, Old Faridabad Sector 20, Faridabad – 121002
11. Excel Plants & Equipment Private Limited, Gate No. 611, Mouje Kuruli, M. I. D. C. Chakan, Pune - 410501, Maharashtra.



## CHAPTER 4

### LIMITATIONS OF THE MODEL DPR AND GUIDELINES FOR ENTREPRENEURS

#### 4.1. Limitations of the Model DPR

i. This model DPR has provided only the basic standard components and methodology to be adopted by an entrepreneur while submitting a proposal under the Formalization of Micro Food Processing Enterprises Scheme of MoFPI.

ii. This is a model DPR made to provide general methodological structure not for specific entrepreneur/crops/location. Therefore, information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of business, background of proposed project, location, raw material base/contract sourcing, entrepreneur's own SWOT analysis, market research, rationale of the project for specific location, community advantage/benefit, employment generation etc are not given in detail.

iii. The present DPR is based on certain assumptions on cost, prices, interest, capacity utilization, output recovery rate and so on. However, these assumptions in reality may vary across places, markets and situations; thus the resultant calculations will also change accordingly.

iv. This particular DPR is made on three components of means of finance i.e. grant, owner's contribution and loan/debt as followed in many central sector schemes.

#### 4.2. Guidelines for the Entrepreneurs

i. The success of any prospective food processing project depends on how closer the assumptions made in the initial stage are with the reality of the targeted market/place/situation. Therefore, the entrepreneurs must do its homework as realistic as possible on the assumed parameters.

ii. This model DPR must be made more comprehensive by the entrepreneur by including information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of entrepreneur's business, project location, raw material base/contract sourcing, entrepreneurs own SWOT analysis, detailed market research, comprehensive product mix based on demand, rationale of the project for specific location, community advantage/benefit

from the project, employment generation, production/availability of the raw materials/crops in the targeted area/clusters and many more relevant aspects for acceptance and approval of the competent authority.

iii. The entrepreneur must be efficient in managing the strategic, financial, operational, material and marketing aspects of a business. In spite of the assumed parameter being closely realistic, a project may become unsustainable if the entrepreneur does not possess the required efficiency in managing different aspects of the business and respond effectively in changing situations.

iv. The machineries should be purchased after thorough market research and satisfactory demonstration.

v. The entrepreneur must ensure uninterrupted quality raw materials' supply and maintain optimum inventory levels for smooth operations management.

vi. The entrepreneur must possess a strategic look to steer the business in upward trajectory.

vii. The entrepreneur must maintain optimum (not more or less) inventory, current assets. Selecting optimum source of finance, not too high debt-equity ratio, proper capital budgeting and judicious utilization of surplus profit for expansion is must.

viii. The entrepreneur must explore prospective markets through extensive research, find innovative marketing strategy, and maintain quality, adjust product mix to demand.

ix. The entrepreneur must provide required documents on land, financial transaction, balance sheet, further project analysis as required by the competent authority for approval.

x. The entrepreneur must be hopeful and remain positive in attitude.



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