



# **PM Formalisation of Micro Food Processing Enterprises Scheme**

## **DETAILED PROJECT REPORT FOR BLACK RICE HALWA**



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## CHAPTER 1: THE PROJECT AT A GLANCE

|     |                                                   |   |                                                                                                                                        |
|-----|---------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | Name of the proposed project                      | : | Black Rice Halwa 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 shareholders (if company/FPC)              | : |                                                                                                                                        |
| 8.  | Technical advisor                                 | : |                                                                                                                                        |
| 9.  | Marketing advisor/partners                        | : |                                                                                                                                        |
| 10. | Proposed project capacity                         | : | 36 MT/ annum (60%, 70%, 80% capacity utilization in the 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> year onwards respectively) |
| 11. | Raw materials                                     | : | Black Rice, Sugar, Ghee                                                                                                                |
| 12. | Major product outputs                             | : | Black Rice halwa                                                                                                                       |
| 13. | Total Project Cost                                | : | Rs. 33.80 Lakhs                                                                                                                        |
|     | • Land development, building & civil construction | : | <i>Rs 5.00 Lakhs</i>                                                                                                                   |
|     | • Machinery and equipment                         | : | <i>Rs 18.00 Lakhs</i>                                                                                                                  |
|     | • Utilities (Power & water facilities)            | : | <i>Rs 2.00 Lakhs</i>                                                                                                                   |
|     | • Miscellaneous fixed assets                      | : | <i>Rs 2.00 Lakhs</i>                                                                                                                   |
|     | • Pre-operative expenses                          | : | <i>Rs 0.50 Lakhs</i>                                                                                                                   |
|     | • Contingencies                                   | : | <i>Rs 2.00 Lakhs</i>                                                                                                                   |
|     | • Working capital margin                          | : | <i>Rs 4.29 Lakhs</i>                                                                                                                   |
| 14. | Working capital requirement                       |   |                                                                                                                                        |
|     | • 1 <sup>st</sup> year                            | : | <i>Rs 17.15 Lakhs</i>                                                                                                                  |
|     | • 2 <sup>nd</sup> year                            | : | <i>Rs 20.80 Lakhs</i>                                                                                                                  |
|     | • 3 <sup>rd</sup> year                            | : | <i>Rs 23.67 Lakhs</i>                                                                                                                  |
| 15. | Means of Finance                                  |   |                                                                                                                                        |
|     | • Subsidy grant by MoFPI (max 10 lakhs)           | : | <i>Rs 10.00 Lakhs</i>                                                                                                                  |
|     | • Promoter's contribution (min 20%)               | : | <i>Rs 3.80 Lakhs</i>                                                                                                                   |
|     | • Term loan (42%)                                 | : | <i>Rs 20.00 Lakhs</i>                                                                                                                  |

|     |                                           |   |                                        |
|-----|-------------------------------------------|---|----------------------------------------|
| 16. | Debt-equity ratio                         | : | 1.45:1 (Considering Subsidy as Equity) |
| 17. | Profit after Depreciation, Interest & Tax |   |                                        |
|     | • 1 <sup>st</sup> year                    | : | <i>Rs 0.61 Lakhs</i>                   |
|     | • 2 <sup>nd</sup> year                    | : | <i>Rs 3.46 Lakhs</i>                   |
|     | • 3 <sup>rd</sup> year                    | : | <i>Rs 5.53 Lakhs</i>                   |
| 18. | Average DSCR                              | : | 2.03                                   |
| 19. | Benefit-Cost Ratio                        | : | 1.14                                   |
| 20. | Term loan repayment                       | : | 5 years with 6 months grace period     |
| 21. | Payback period for investment             | : | 4 years                                |

## **CHAPTER 2**

### **General Overview of Production, Post Harvest Management and Value Addition of Black Rice in India**

#### **2.1 Introduction**

The food processing industry in India has witnessed significant growth due to increasing demand for convenient, nutritious, and traditional ready-to-eat products. Among these, black rice halwa stands out as a premium dessert with immense commercial potential due to its health benefits, unique taste, and growing consumer preference for organic and functional foods. Black rice, often referred to as "forbidden rice" due to its historical exclusivity in ancient China, is a highly nutritious grain that has gained global recognition for its exceptional health benefits. It is rich in antioxidants, fiber, and anthocyanins, making it a superfood with applications in functional desserts. The halwa made from black rice, a traditional South Indian delicacy, is gaining popularity globally due to its diabetic-friendly, gluten-free, and vegan adaptability. Consumers are shifting from traditional sweets (like wheat halwa) to nutrient-dense alternatives, creating a niche for black rice halwa.

The global healthy snacks market is projected to grow at 6.5% CAGR (2024-2030), with functional desserts gaining traction. The black rice market was valued at USD 9.38 billion in 2024 and is projected to reach USD 15.14 billion by 2030, growing at a CAGR of 8.3%. The key drivers for the market are rising health consciousness, demand for plant-based diets, and premiumization of ethnic superfoods. Asia-Pacific dominates (50% market share), but North America and Europe are emerging as high-growth regions due to organic food trends.

This Detailed Project Report (DPR) outlines the establishment of a small-scale production unit for packed black rice halwa, targeting health-conscious consumers, gourmet food markets, and e-commerce platforms. The report covers market potential, production process, financial requirements, machinery, regulatory compliance, and profitability analysis.

Therefore, processing of black rice into value added products such as halwa 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 Black Rice**

Black rice is a type of the rice species *Oryza sativa* L. which is black in colour, glutinous, with high position of nutrients and substantially grown in Asia. The reason they are termed “Black Rice” is the unusual black colour of the grains. The pericarp of kernel of the rice is black due to presence of high amount a pigment known as anthocyanins, a flavonoid that perform as powerful antioxidants in the body. Once cooked, the colour changes into deep purple/violet hence, also called “purple rice”. This rice is supposed to enhance the longevity of life, hence is also known as long life rice. In Homeric China, black rice was called “forbidden rice”, because of its high nutritive value could only be consumed by the emperor. Because of its high nutritive and medicinal values, black rice is now extensively considered as a ‘super food’. It is mostly grown in Southeast Asian countries where China accounts for 62% of global production followed by Sri Lanka, Indonesia, Thailand, India etc. Several kinds of black rice are available in the market today. It is gradationally gaining preference especially among the health-conscious people of the world because of its high nutrition, better antioxidant exertion a

## **2.3 Production of Black rice in India**

Black rice, known for its high anthocyanin content and health benefits, is gaining traction in India as a niche but high-value crop. Black rice is primarily cultivated in niche regions due to its specialized agro-climatic requirements. While official nationwide production data for black rice is limited due to its specialty status, available reports and regional studies provide key insights into its cultivation trends, yield, and market potential.

The total area under cultivation of black rice in India is between 15,000–20,000 hectares in 2024, with Manipur alone accounting for more than 10,000 hectares. The average yield varies between 2.5 and 4 MT/ha compared to 3.8 MT/ha for white rice; the variation caused by farming practices. While traditional methods yield around 2–2.5 MT/ha, SRI & organic farming practices yield up to 5 MT/ha. Assam & Jharkhand are emerging hubs with organic farming initiatives.

The following are the primary black rice growing states in India.

- Manipur leads black rice production with the indigenous "Chak-Hao" variety, contributing to approximately 80% of India's output. Annual production is estimated at 6,000–7,000 metric tons (MT).
- Assam produces about 1,500–2,000 MT of black rice, with the primary varieties being local heirloom strains (e.g., Bora Saul).

- West Bengal produces about 500–1,000 MT with popular variety being "Kalo Nunia" (Burma Black).
- Odisha & Jharkhand - Tribal communities cultivate traditional varieties like Laicha (Odisha) and Dudh Sar (Jharkhand), but production is fragmented (~200–500 MT combined).
- Southern States (Tamil Nadu, Kerala): Minimal production (~100–300 MT) of Kavuni Rice (used in temple offerings)

The high-value varieties include RC Manichakhao-1 (ICAR-NEH, Manipur) with a yield potential of 4.5–5 MT/ha, Kalo Chamal-1 and Kalo Chamal-2 (Nepal-adapted, grown in North-East) with yield of 3.5 MT/ha.

The domestic demand for the black rice is seen rising due to health trends; retail prices range between ₹300–500/kg (in case of organic variants). In case of exports, 6,000 MT was exported in 2024, primarily to EU, U.S., Middle East. Organic black rice fetches 20–30% higher prices globally.

### Challenges

**Low Scalability:** Black rice requires 2–3 times more water than white rice and thrives only in specific soils.

## 2.4 Composition and Nutritional value of Black Rice

Unlike white or brown rice, black rice derives its deep purple-black hue from anthocyanins, the same potent antioxidants found in blueberries and blackberries. This unique pigmentation is just one indicator of its superior nutritional profile, which includes high levels of protein, fiber, vitamins, and minerals.

### Composition & Nutritive Value of Black Rice (per 100 g)

| Nutrient      | Content per 100gm |
|---------------|-------------------|
| Calories      | 335–372 kcal      |
| Carbohydrates | 72–79.1 g         |
| Dietary Fiber | 3.4–5.6 g         |
| Protein       | 7.5–11.6 g        |
| Total Fat     | 2.5–3.49 g        |
| Saturated Fat | 0.5–0.69 g        |

|                     |                         |
|---------------------|-------------------------|
| Iron                | 1.67–1.8 mg             |
| Calcium             | 16–33 mg                |
| Potassium           | 186–285 mg              |
| Magnesium           | 139–143 mg              |
| Phosphorus          | 264–295 mg              |
| Glycemic Index (GI) | 42–50 (low to moderate) |

From a macronutrient perspective, black rice contains approximately 8-10% protein, significantly higher than white rice (6-7%), making it a valuable plant-based protein source. It also provides 3-5% dietary fiber, which aids digestion, promotes gut health, and helps regulate blood sugar levels. The grain is rich in complex carbohydrates, offering sustained energy release without the rapid blood sugar spikes associated with refined grains.

One of the most remarkable aspects of black rice is its anthocyanin content, which gives it antioxidant properties far exceeding those of common rice varieties. Studies indicate that black rice contains 23-30 mg of anthocyanins per 100 grams, comparable to antioxidant-rich fruits like blueberries. These compounds help combat oxidative stress, reduce inflammation, and may lower the risk of chronic diseases such as cancer, diabetes, and cardiovascular disorders. Additionally, black rice is a good source of vitamin E, which supports skin health and immune function, and B vitamins (B1, B2, B6), essential for energy metabolism and neurological health. Mineral-wise, black rice is packed with iron (2-4 mg per 100g), crucial for preventing anemia, and magnesium (150-170 mg per 100g), which supports muscle and nerve function. It also contains zinc, phosphorus, and calcium, contributing to bone health and immune defense. Unlike polished white rice, black rice retains its bran layer, preserving these nutrients and making it a whole grain powerhouse. Another notable component is gamma-oryzanol, a phytochemical with cholesterol-lowering and anti-inflammatory effects.

Black rice is naturally gluten-free, making it an excellent choice for individuals with celiac disease or gluten sensitivity. Its low glycemic index (GI) of around 42-45 (compared to white rice's 70+) makes it suitable for diabetics and those managing weight. Furthermore, the grain contains resistant starch, a type of carbohydrate that acts as a prebiotic, nourishing beneficial gut bacteria and improving digestive health.

In summary, black rice is a nutritionally dense superfood with a balanced composition of macronutrients, antioxidants, vitamins, and minerals. Its health benefits extend beyond basic nutrition, offering protective effects against chronic diseases while supporting metabolic and

digestive health. As demand for functional foods grows, black rice stands out as a versatile, health-promoting alternative to conventional grains.

## **2.5 Health benefits of Black Rice**

### **1. Rich in Antioxidants for Disease Prevention**

Black rice contains 23-30 mg of anthocyanins per 100 grams, surpassing even blueberries in antioxidant capacity. These compounds:

- Neutralize free radicals, reducing oxidative stress linked to aging, cancer, and neurodegenerative diseases.
- Lower inflammation, helping prevent chronic conditions like arthritis and heart disease.
- Protect liver health by reducing fat accumulation and oxidative damage

Additionally, black rice contains vitamin E and phenolic compounds, further enhancing its antioxidant effects.

### **2. Supports Heart Health & Lowers Cholesterol**

Black rice contributes to cardiovascular wellness in multiple ways:

- Reduces LDL ("bad") cholesterol due to its gamma-oryzanol content, a compound that inhibits cholesterol absorption.
- Improves blood vessel function by boosting nitric oxide production, which helps regulate blood pressure.
- Lowers triglycerides, as shown in animal studies where black rice extract reduced fat accumulation in the liver.

A 2019 study in Nutrition Reviews found that consuming whole grains like black rice lowers heart disease risk by 20-30%.

### **3. Aids Blood Sugar Control & Diabetes Management**

With a low glycemic index (GI 42-45), black rice is an excellent choice for diabetics and those managing insulin resistance. High fibre content (3-5 g per 100 g) slows glucose absorption, preventing blood sugar spikes. Anthocyanins improve insulin sensitivity, as demonstrated in a Journal of Nutrition study. Resistant starch acts as a prebiotic, promoting gut bacteria that regulate metabolism. Compared to white rice (GI 70+), black rice is a far healthier alternative for maintaining stable glucose levels.

### **4. Promotes Digestive Health & Weight Management**

Black rice supports a healthy gut and weight loss through:

- Dietary fiber, which prevents constipation and feeds beneficial gut bacteria.

- Resistant starch, a prebiotic that enhances microbiome diversity and reduces bloating.
- High protein (8-11 g per 100 g), increasing satiety and reducing overeating.

Research in Food & Function suggests that black rice consumption may reduce obesity risk by improving lipid metabolism.

## **5. May Help Prevent Cancer**

The anthocyanins and flavonoids in black rice exhibit anti-tumor properties:

- Inhibits cancer cell growth in breast, colon, and liver cancers (studies in Molecular Nutrition & Food Research).
- Protects DNA from damage due to its high antioxidant activity.
- Enhances detoxification by supporting liver function.

While more human trials are needed, epidemiological studies link whole grain consumption to lower cancer rates.

## **6. Boosts Immune Function & Detoxification**

Black rice strengthens immunity through:

- Zinc (2-3 mg per 100 g), crucial for immune cell function.
- Iron (1.8-4 mg per 100 g), preventing anemia and fatigue.
- Antioxidants that reduce inflammation, helping the body fight infections.
- Its lignans and phenolic acids also support liver detoxification, aiding toxin removal.

## **7. Enhances Brain Health & Cognitive Function**

The neuroprotective effects of black rice include:

- Anthocyanins crossing the blood-brain barrier, protecting neurons from oxidative damage.
- Reducing beta-amyloid plaques, linked to Alzheimer's disease.
- Improving memory and focus in animal studies (Journal of Medicinal Food).
- Regular consumption may help delay age-related cognitive decline.

## **8. Supports Healthy Skin & Anti-Aging**

Black rice benefits skin health by:

- Vitamin E and anthocyanins reducing UV damage and wrinkles.
- Zinc and selenium combating acne and inflammation.
- Promoting collagen synthesis, improving skin elasticity.

Traditional Chinese medicine has long used black rice for radiant, youthful skin.

## **9. Gluten-Free & Suitable for Celiac Disease**

Unlike wheat-based grains, black rice is naturally gluten-free, making it safe for those with

Celiac disease, gluten sensitivity and wheat allergies. It's a nutritious alternative to refined gluten-free products.

## 10. Bone Health & Mineral Density

Black rice provides calcium, magnesium, and phosphorus, which:

- Strengthen bones and prevent osteoporosis.
- Support muscle function and nerve transmission.

A 100g serving covers 10-15% of daily magnesium needs, essential for bone metabolism.

## 2.6 Black Rice Varieties in India

| Variety Name                                                        | Key Features                                                                                                                                                                                                    | Uses                                                                                                                                                     |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chak-Hao (Amubi & Poireiton)<br>Cultivated in:<br>Manipur, Nagaland | <ul style="list-style-type: none"> <li>- Aromatic, glutinous, deep purple when cooked</li> <li>- High in anthocyanins (antioxidants) and fiber</li> <li>- Takes 40–45 mins to cook due to bran layer</li> </ul> | <ul style="list-style-type: none"> <li>- Traditional dishes like <i>Chak-Hao kheer</i> (dessert)</li> <li>- Ceremonial feasts, medicinal uses</li> </ul> |
| Kavuni Arisi<br>Cultivated in:<br>Tamil Nadu                        | <ul style="list-style-type: none"> <li>- Non-glutinous, nutty flavor</li> <li>- Used in temple offerings and sweets</li> </ul>                                                                                  | <ul style="list-style-type: none"> <li>- <i>Kavuni rice payasam</i> (pudding)</li> <li>- Fermented foods</li> </ul>                                      |
| Laicha Black Rice<br>Cultivated in:<br>Odisha                       | <ul style="list-style-type: none"> <li>- Heirloom variety, less common</li> <li>- Rich in iron and fiber</li> </ul>                                                                                             | <ul style="list-style-type: none"> <li>- Local tribal cuisine</li> <li>- Health-focused diets</li> </ul>                                                 |
| Dudh Sar<br>Cultivated in:<br>Jharkhand                             | <ul style="list-style-type: none"> <li>- Rare, grown by tribal communities</li> <li>- Mild sweetness</li> </ul>                                                                                                 | <ul style="list-style-type: none"> <li>- Traditional porridges</li> <li>- Festive dishes</li> </ul>                                                      |
| Bora Saul (Black variant)<br>Cultivated in:<br>Assam                | <ul style="list-style-type: none"> <li>- Sticky texture, used in <i>pithas</i> (rice cakes)</li> <li>- High protein content</li> </ul>                                                                          |                                                                                                                                                          |

## 2.7 Black Rice Halwa

Black rice halwa, known regionally as Kavuni Arisi Halwa (Tamil), Karuppu Halwa (Kerala), or Dodol (Anglo-Indian), is a traditional South Indian dessert celebrated for its rich flavor, vibrant purple-black hue, and exceptional nutritional benefits. This indulgent sweet dish, rooted in the culinary heritage of Tamil Nadu, Kerala, and Karnataka, combines glutinous black rice with coconut milk, jaggery, and ghee, resulting in a decadent treat often served during festivals, weddings, and religious ceremonies. The dish's preparation reflects South India's affinity for rice-based desserts, with regional variations:

- ‡ Kerala: Uses dark palm sugar/ jaggery for a deeper color and molasses-like flavor.
- ‡ Tamil Nadu: Emphasizes Kavuni rice, soaked and ground into a paste for a textured halwa.
- ‡ Anglo-Indian communities: Adapted it as Dodol, a Christmas delicacy in Goa

The preparation involves soaking and grinding of black rice to extract its milk and slow-cooking it with coconut milk and jaggery, requiring constant stirring to achieve a gelatinous consistency. Popular variations include:

- ⊗ Kerala Style: Incorporates rice flour for a smoother texture and black jaggery for intensity.
- ⊗ Chettinad Style: Uses whole-grain black rice, cooked with cardamom and cashews.
- ⊗ Thirunelveli Style: Combines black rice flour and wheat flour, omitting spices to highlight the rice's natural flavor

South Indian black rice halwa is more than a dessert—it's a testament to the region's agricultural ingenuity and cultural syncretism. Whether enjoyed as a festive treat or a health-conscious indulgence, its blend of tradition, nutrition, and sensory delight ensures its enduring popularity. For those exploring Indian sweets, this halwa offers a delicious entry into the world of ancient superfoods reimaged.

## 2.8 Cultivation and Harvesting of Black Rice

Black rice, revered for its nutritional richness and striking color, requires specific growing conditions and careful cultivation techniques. While it shares similarities with regular rice farming, its unique characteristics demand special attention. Below is a detailed breakdown of the cultivation and harvesting process for black rice.

### ❖ Climatic and soil requirements

Black rice thrives in tropical and subtropical climates, particularly in regions with:

- Temperature: 20–35°C (optimal for growth).
- Rainfall: 150–300 cm annually (flooded fields are ideal).
- Soil Type: Clay-loam or alluvial soil with good water retention.
- pH Level: Slightly acidic to neutral (5.5–7.0)

#### ❖ **Cultivation Practices:**

##### a. Land Preparation

- Ploughing & Levelling: Fields are ploughed and levelled to ensure uniform water distribution.
- Water Logging: Fields are flooded (5–10 cm deep) before transplanting.

##### b. Seed Selection & Sowing

Varieties: Farmers can choose high-yielding or traditional varieties (e.g., Chak-Hao, Kavuni, RC Manipuri Black).

##### c. Nursery Preparation:

- Seeds are soaked for 24–48 hours to improve germination.
- Pre-germinated seeds are sown in a nursery bed for 25–30 days before transplanting.

##### d. Transplanting

- Seedlings are transplanted into flooded fields at 20–25 cm spacing.
- System of Rice Intensification (SRI): Some farmers use this method, reducing water use while increasing yield.

##### e. Water & Nutrient Management

Irrigation: Fields must remain submerged until grain formation.

Fertilization:

- Organic farming uses compost, cow dung, and neem cake.
- Conventional farming may use NPK fertilizers (Nitrogen, Phosphorus, Potassium).

##### f. Weed & Pest Control

- Manual weeding is preferred to avoid chemical contamination.
- Common pests: Stem borers, leaf folders (controlled with neem oil or biopesticides).

#### ❖ **Harvesting Practices:**

##### a) Timing of Harvest:

Black rice matures in 120–150 days (longer than white rice).

Signs of Maturity:

- Grains turn dark purple-black.

- Stalks start drying (80% of panicles should be ripe).
- b) Harvesting Method:
  - Manual Harvesting: Farmers cut panicles with sickles and the practice is still common in Northeast India.
  - Mechanical Harvesting: Used in large-scale farms (e.g., Tamil Nadu, Kerala).
- c) Threshing & Drying
  - Threshing: Grains are separated from stalks (manually or using machines).
  - Drying: Sun-dried for 3–5 days to reduce moisture (below 14%). Artificial dryers may be used in humid regions.
- d) Milling & Storage
  - Milling: Minimal polishing to retain the nutrient-rich bran layer. Some varieties (like Chak-Hao) are sold as whole grain.
  - Storage: the rice is stored in airtight containers to prevent moisture absorption.
  - Shelf life: 1–2 years if stored properly.

## 2.9. Process Overview of Black Rice Halwa

The following steps indicate the processes involved in the commercial production of Tamilnadu style Black Rice Halwa (Kavuni Rice Halwa).

### a. Soaking & Grinding

- Soak black rice (Kavuni rice) for 6–8 hours. Drain and blend into a coarse paste with water.

### b. Cooking the Base

- In a heavy vessel, the extract is cooked with water on low heat, stirring until it halves and becomes thick.

### c. Adding Sweetener

- Add jaggery or sugar and dissolve completely and cook further.

### d. Tempering

- In ghee, fry cashews, raisins, and ½ tsp cardamom powder. Mix into the halwa.

### e. Final Cooking

- Stir continuously until the halwa thickens, leaves the pan's sides and turns glossy.

### f. Packaging:

The prepared Black Rice halwa is packed in airtight containers or metallised pouches to preserve its flavor and shelf life and prevent moisture absorption. It is then distributed to

markets. The packaging shall be airtight and labelled with product details, including expiry date and batch number.

Packaging Materials: PET containers, aluminum foil pouches, or tin cans shall be used. Printed flexible pouches (pillow type, gusseted type, and stand-up pouches) and lined cartons are the most common forms, with materials such as Polyester/ metalized polyester/ LDPE, BOPP/ LDPE, BOPP/ metalized polyester/ LDPE, Polyester/ Al foil/ LDPE.

**g. Quality Control:**

At every stage from raw material selection to final packaging, quality checks shall be conducted.

**h. Storage and Distribution:**

The packaged Black Rice Halwa shall be stored in a cool, dry place away from direct sunlight in temperature less than 25°C and relative humidity less than 60%. Proper handling during transportation and distribution is essential to prevent damage to packaging.

## **CHAPTER 3**

### **MODEL BLACK RICE HALWA 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 of a Black Rice Halwa Processing Unit is an attractive option as it has high market demand especially in the southern states of India like TamilNadu. A model generalized DPR is therefore, prepared for establishing a Black Rice Halwa 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 Black Rice Halwa Processing Units are in the production clusters of the black rice growing (as well as consuming) states such as Tamil Nadu where adequate quantities of black rice will be available for processing and ample demand is present.

### **3.6 Installed Capacity**

The maximum installed capacity of the Black Rice Halwa Processing Unit in the present model project is proposed as 36 Metric tonnes/ annum. The unit is assumed to operate 300 days/annum @ 8-10 hrs/ day. The 1st year is assumed to be construction/expansion period of the project; and in the 2nd year 60 percent capacity, 3<sup>rd</sup> year 70 percent capacity, 4<sup>th</sup> year onwards 80 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.

### 3.8 Product Profile of the Unit

In the present model Black Rice Halwa processing unit, the targeted product output is taken as Black Rice halwa.

Black rice halwa, a premium dessert rich in antioxidants and nutrients, is gaining popularity in health-conscious and gourmet markets. Black rice halwa is a premium South Indian dessert made from anthocyanin-rich black rice (e.g., Kavuni rice in Tamil Nadu or Chak-Hao in Manipur), cooked with jaggery/sugar, ghee, nuts, and cardamom. Its unique purple-black hue, nutty flavor, and dense nutritional profile (high in fiber, antioxidants, and iron) position it as a functional food appealing to health-conscious consumers.

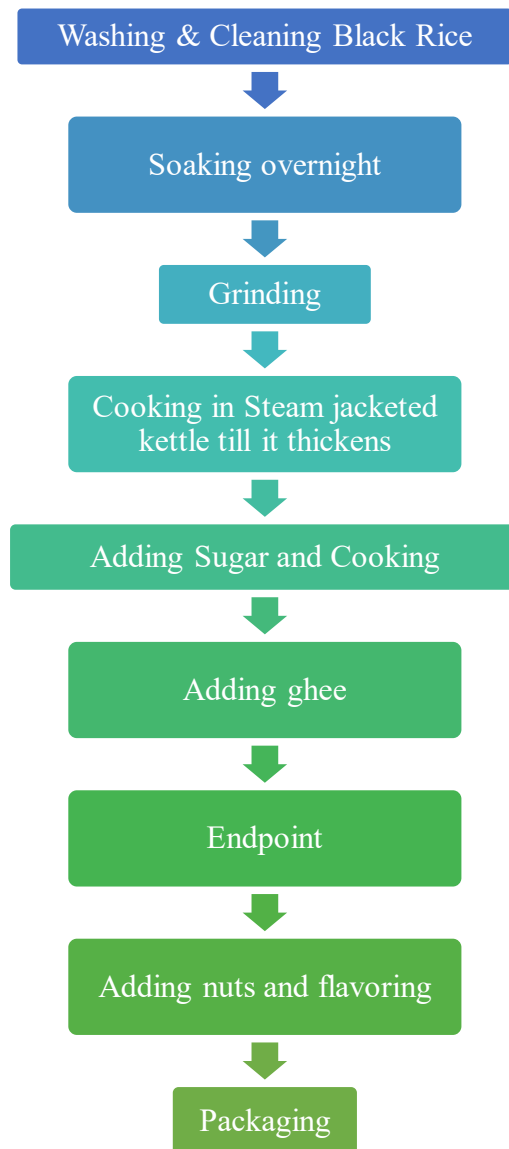
The following are the key variants of the product and their uses:

- Traditional: Served during festivals and religious ceremonies.
- Modern Adaptations: Sugar-free (dates/jaggery), vegan (coconut milk), and gluten-free versions.
- Packaging Formats: Metalized pouches (100g/250g), tin cans (500g), and HDPE bulk containers for gifting/commercial use

South Indian black rice halwa is more than a dessert—it's a testament to the region's agricultural ingenuity and cultural syncretism. Whether enjoyed as a festive treat or a health-conscious indulgence, its blend of tradition, nutrition, and sensory delight ensures its enduring popularity. For those exploring Indian sweets, this halwa offers a delicious entry into the world of ancient superfoods reimaged. The packed black rice halwa unit aligns with global shifts toward functional, traditional, and health-focused foods. With strategic positioning, scalable production, and robust distribution, this venture can capture a lucrative niche in the USD 15+ billion black rice market by 2030.

Therefore, establishing a processing unit for production of packed black rice halwa presents a lucrative opportunity in the health food segment, combining tradition with modern convenience. With proper planning, quality control, and strategic marketing, this venture can achieve steady growth and profitability in the domestic and export markets.

### 3.9 Manufacturing Process of Black Rice Halwa



#### 1. Washing & Cleaning:

The major raw material Black rice is washed and cleaned to remove dust and impurities.

#### 2. Soaking & Grinding

50 kg black rice is soaked for 6–8 hours. The water is then drained and the rice is ground into a coarse paste using 200L wet grinder (add ~25L water for consistency).

#### 3. Cooking the Base

In a 500L steam-jacketed kettle, cook the paste with 150L water (1:3 ratio) at 90°C for 30 mins.

#### 4. Adding Sweetener & Fat

Add 30 kg sugar and 15L ghee. Stir continuously with automatic agitator to prevent burning.

### **5. Flavoring & Tempering**

Mix in 1.5 kg cardamom powder and 5 kg fried nuts (cashews/raisins).

### **6. Final Cooking & Cooling**

Cook until halwa reaches 65°Brix (thick, non-sticky consistency). Transfer to stainless steel cooling trays (~2 hrs).

### **7. Packaging**

The product may then be packed as different SKUs as follows:

- Metalized pouches (100g/250g) using automatic filling & sealing machine.
- Tin cans (500g/1kg): Sealed with induction sealing.
- HDPE containers (5kg): For bulk orders.

## **3.10 Technology Accessibility**

NIFTEM, Thanjavur and its liaison offices at Guwahati and Bhatinda have all the technical knowhow on Black Rice halwa 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 NIFTEM, CFTRI and other institutes also have the technical knowledge and training facilities.

## **3.11 Market Outlook**

The black rice market was valued at USD 9.38 billion in 2024 and is projected to reach USD 15.14 billion by 2030, growing at a CAGR of 8.3%. The key drivers for the trend being rising health consciousness, demand for plant-based diets, and premiumization of ethnic superfoods. Asia-Pacific dominates (50% market share), but North America and Europe are emerging as high-growth regions due to organic food trends.

Packaged traditional desserts are gaining traction in gourmet, gifting, and wellness segments; the segment is niche yet expanding. This is backed by the following factors.

- Health benefits: Low glycemic index, high antioxidants, and natural sweetness (jaggery-based) appeal to diabetics and fitness enthusiasts.
- E-commerce boost: Online platforms like Amazon, BigBasket, and specialty health stores are key distribution channels

Few players specialize in packed black rice halwa, hence creating a first-mover advantage with key differentiators such as the following will greatly benefit the venture.

- Organic sourcing: Partner with farms for premium black rice.
- Innovative packaging: Vacuum-sealed pouches (shelf life: 3 months) and premium glass jars for gifting.
- Health branding: Highlight anthocyanin content, gluten-free, and vegan claims

Packaged traditional desserts are projected to grow at ~6.5% CAGR (2024–2030). The market for Black rice halwa will benefit from:

- ‡ Export demand: Asia-Pacific (India, China, Thailand) dominates production, but North America and Europe show rising demand for organic/vegan variants.
- ‡ Innovative formats: Ready-to-eat halwa, sugar-free (jaggery/dates-based), and vegan (coconut milk) options cater to diverse diets.
- ‡ Gifting segment: Premium packaging (glass jars/vacuum-sealed pouches) taps into festive/corporate gifting, a USD 1.2 billion niche in India alone.

### 3.12 Market Potential

#### A. Domestic Market Potential:

##### ☞ Key Drivers

- Health & Wellness Trend: Increasing demand for antioxidant-rich, low-GI foods among diabetics and fitness enthusiasts.
- Festive & Gourmet Demand: Popular during festivals (Pongal, Diwali) and in premium food segments (e.g., organic stores, luxury gifting).
- E-Commerce Growth: Platforms like BigBasket, Amazon, and Swiggy Instamart are boosting accessibility.

##### ☞ Target Segments

- Urban Health-Consumers: Metro cities (Mumbai, Delhi, Bengaluru) show high demand for organic/sugar-free variants.
- Corporate Gifting: Packaged halwa in tin cans or premium pouches for Diwali/New Year.
- Vegan/Gluten-Free Market: Plant-based (coconut milk) and gluten-free options attract niche buyers.

##### ☞ Challenges

- Price Sensitivity: Black rice costs 2–3× more than white rice, limiting mass adoption.
- Awareness Gaps: Consumers in non-South Indian regions need education on its benefits

#### B. Export Market Potential:

##### ☞ Demand Drivers: Vegan diets, superfood trends, and Asian diaspora markets

##### ☞ High-Growth Regions:

1. North America & Europe

- Key Products: Organic, ready-to-eat halwa cups, and vacuum-sealed pouches 5.
  - Challenges: Tariffs (e.g., U.S. imposed new tariffs in 2025) and competition from quinoa/chia seeds.
2. Middle East & Africa
- Opportunities: Premium hospitality sector (hotels, airlines) and health-conscious expats.
  - Barriers: Low local awareness; reliance on imports from India/Thailand
3. Asia-Pacific
- Traditional Markets: Singapore, Malaysia, and Australia (Indian diaspora demand) 7.
  - Emerging Markets: Japan and South Korea (for anthocyanin-rich skincare/food hybrids
- ☞ Export Strategies
- ‡ Certifications: FSSAI, USDA Organic, and EU compliance for easier market entry 4.
  - ‡ Packaging: Metalized pouches (6-month shelf life) and HDPE bulk packs for foodservice.
  - ‡ Distribution: Partner with ethnic grocery chains and Amazon Global

### 3.13 Detailed Project Assumptions

This model DPR for Black Rice halwa 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 following table.

This DPR assumes creation of a new processing unit with a single Black Rice halwa processing line. Land is assumed as already available with the entrepreneur. Construction of the facility and installation of machinery are assumed to be done in the first 6 months itself.

| Detailed Project Assumptions |       |
|------------------------------|-------|
| Parameter                    | Value |

|                                                            |                                                  |     |
|------------------------------------------------------------|--------------------------------------------------|-----|
| Assumed Capacity of the Black Rice halwa processing unit : | 36 MT/ annum                                     |     |
| Utilization of capacity :                                  | Year 1                                           | 60% |
|                                                            | Year 2                                           | 70% |
|                                                            | Year 3 onwards                                   | 80% |
| Working days per year:                                     | 300 days                                         |     |
| Working hours per day:                                     | 8-10 hours                                       |     |
| Interest on term loan:                                     | 12.00%                                           |     |
| Interest on working capital loan:                          | 12.00%                                           |     |
| Repayment period:                                          | Five years with 1 yr grace period is considered. |     |
| Average price of raw material:                             | Rs. 150/ kg of Black Rice                        |     |
| Average sale price of product:                             | Rs. 400/ kg                                      |     |
| Average Product yield:                                     | 1 kg Black Rice halwa/ 400-gram raw black rice   |     |

### 3.14 Fixed Capital Investment

#### 3.14.1. Land & Building: Rs. 5.00 Lakhs

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 7) as required.

| Table 7: Land and Civil Infrastructures |                                                                                                                                        |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 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. 500/sq ft Rs. 5,00,000 |
| Total                                   | <b>Rs. 5.00 Lakhs</b>                                                                                                                  |

#### 3.14.2. Machinery & Equipment: Rs. 18.00 Lakhs

| Table 8: Machineries & Equipment |
|----------------------------------|
|----------------------------------|

| S.No | Description                 | Area reqd<br>(Sq.ft) | Unit Price,<br>(Rs.) | Qty | Amount<br>(Rs. In<br>Lakhs) |
|------|-----------------------------|----------------------|----------------------|-----|-----------------------------|
| 1.   | Weighing scale              | 50                   | 50000                | 1   | 0.50                        |
| 2.   | Grinder                     | 100                  | 300000               | 1   | 3.00                        |
| 3.   | Steam Jacketed Kettle       | 200                  | 400000               | 1   | 4.00                        |
| 4.   | Agitator                    | 50                   | 200000               | 1   | 2.00                        |
| 5.   | Pouch packing machine       | 100                  | 250000               | 1   | 2.50                        |
| 6.   | Can sealing machine         | 100                  | 200000               | 1   | 2.00                        |
| 7.   | Cooling conveyor            | 200                  | 200000               | 1   | 2.00                        |
| 8.   | Box filling machine         | 100                  | 200000               | 1   | 2.00                        |
|      | <b>Total (Rs. in Lakhs)</b> |                      |                      |     | <b>18.00</b>                |

#### 3.14.3. Utilities and Fittings: Rs. 2.00 Lakhs

| Table 9: Utilities and Fittings |                       |
|---------------------------------|-----------------------|
| Power                           | Rs. 1.20 Lakhs        |
| Water                           | Rs. 0.80 Lakhs        |
| <b>Total</b>                    | <b>Rs. 2.00 Lakhs</b> |

#### 3.14.4. Other Fixed Assets: Rs. 2.00 Lakhs

| Table 10: Other Fixed Assets                     |                       |
|--------------------------------------------------|-----------------------|
| Furniture and fixtures                           | Rs. 2.00 lakhs        |
| Utensils, trays, thermometer, refractometer, etc |                       |
| <b>Total</b>                                     | <b>Rs. 2.00 Lakhs</b> |

#### 3.14.5. Pre-operative Expenses

| Table 11: Pre-operative Expenses |
|----------------------------------|
|----------------------------------|

|                                                                                              |                       |
|----------------------------------------------------------------------------------------------|-----------------------|
| Legal expenses, start-up expenses, establishment cost, consultancy fee, trial runs, & others | Rs. 50,000.00         |
| <b>Total</b>                                                                                 | <b>Rs. 0.50 Lakhs</b> |

### 3.14.6. Total Fixed Capital Investment

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

= Rs. (5.00+18.00+2.00+2.00+0.50) = **Rs. 27.50 Lakhs**

## 3.15 Working Capital Requirement

| Table 12: Working Capital Requirement (Rs. In lakhs) |         |                         |                         |                         |
|------------------------------------------------------|---------|-------------------------|-------------------------|-------------------------|
| Particulars                                          | Period  | Year 1<br>(70% - 70 MT) | Year 2<br>(80% - 80 MT) | Year 3<br>(90% - 90 MT) |
| Raw material stock                                   | 30 days | 3.65                    | 4.26                    | 4.87                    |
| Packing material                                     | 30 days | 0.90                    | 1.05                    | 1.20                    |
| Work in progress                                     | 15 days | 3.06                    | 3.61                    | 4.06                    |
| Finished goods' stock                                | 15 days | 2.94                    | 3.58                    | 4.04                    |
| Receivables                                          | 30 days | 6.60                    | 8.30                    | 9.50                    |
| Total current assets                                 |         | 17.15                   | 20.80                   | 23.67                   |
| Current Liabilities                                  |         | 0.00                    | 0.00                    | 0.00                    |
| Working capital gap                                  |         | 17.15                   | 20.80                   | 23.67                   |
| Margin money (25%)                                   |         | 4.29                    | 5.20                    | 5.92                    |
| Bank finance                                         |         | 12.86                   | 15.60                   | 17.75                   |

## 3.16 Total Project Cost and Means of Finance

**Table 13: Total Project Cost and Means of Finance (Rs. In lakhs)**

| <b>Particulars</b>                                 | <b>Amount</b> |
|----------------------------------------------------|---------------|
| i. Land and building                               | 5.00          |
| ii. Machinery and equipment                        | 18.00         |
| iii. Utilities & Fittings                          | 2.00          |
| iv. Miscellaneous Fixed assets                     | 2.00          |
| v. Pre-operative expenses                          | 0.50          |
| vi. Contingencies                                  | 2.00          |
| vii. Working capital margin                        | 4.29          |
| <b>Total project cost (i to vii) (Rounded-off)</b> | <b>33.80</b>  |
| <b>Means of finance</b>                            |               |
| i. Subsidy                                         | 10.00         |
| ii. Promoter's contribution                        | 3.80          |
| iii. Term loan                                     | 20.00         |

### 3.17 Manpower Requirement

| <b>Table 14: Manpower Requirement</b> |                       |                           |                                        |
|---------------------------------------|-----------------------|---------------------------|----------------------------------------|
| <b>Particulars</b>                    | <b>No. of persons</b> | <b>Monthly Wage (Rs.)</b> | <b>Total Monthly Salary (Rs.)</b>      |
| i. Manager<br>(can be the owner )     | 1                     | 20,000                    | 20,000                                 |
| ii. Salesman                          | 1                     | 15,000                    | 15,000                                 |
| ii. Skilled worker                    | 2                     | 15,000                    | 30,000                                 |
| iii. Semi-skilled                     | 3                     | 10,000                    | 30,000                                 |
| iv. Helper                            | 3                     | 7,500                     | 22,500                                 |
| Total                                 | 10                    |                           | 1,17,500<br>(Rs. 1.18 Lakhs per month) |

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

| Expenditure, Revenue and Profitability Analysis (all values in Rs. in Lakh) |                                                 |                              |                      |                      |                      |                      |                      |                      |                      |
|-----------------------------------------------------------------------------|-------------------------------------------------|------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                                                             | Particulars                                     | 1 <sup>st</sup> year         | 2 <sup>nd</sup> year | 3 <sup>rd</sup> year | 4 <sup>th</sup> year | 5 <sup>th</sup> year | 6 <sup>th</sup> year | 7 <sup>th</sup> year | 8 <sup>th</sup> year |
| A                                                                           | <b>Total Installed Capacity</b>                 | 120 MT/Year Black Rice halwa |                      |                      |                      |                      |                      |                      |                      |
|                                                                             | Capacity utilization (%)                        | 60%                          | 70%                  | 80%                  | 80%                  | 80%                  | 80%                  | 80%                  | 80%                  |
| B                                                                           | <b>Total Sales Revenue (Rs. in Lakh)</b>        |                              |                      |                      |                      |                      |                      |                      |                      |
|                                                                             | Sale of Black Rice Halwa @ Rs. 400/ kg          | 79.20                        | 99.60                | 114.00               | 115.20               | 115.20               | 115.20               | 115.20               | 79.20                |
| C                                                                           | <b>Total Expenditure</b>                        |                              |                      |                      |                      |                      |                      |                      |                      |
|                                                                             | Raw Material Consumed                           | 43.85                        | 51.16                | 58.46                | 58.46                | 58.46                | 58.46                | 58.46                | 58.46                |
|                                                                             | Consumable Stores & Spares                      | 10.80                        | 12.60                | 14.40                | 14.40                | 14.40                | 14.40                | 14.40                | 14.40                |
|                                                                             | Power, fuel & utilities                         | 8.31                         | 9.20                 | 10.09                | 10.09                | 10.09                | 10.09                | 10.09                | 10.09                |
|                                                                             | Salary & wages                                  | 9.88                         | 10.93                | 11.99                | 11.99                | 11.99                | 11.99                | 11.99                | 11.99                |
|                                                                             | Repair & maintenance                            | 0.66                         | 0.66                 | 0.66                 | 0.66                 | 0.66                 | 0.66                 | 0.66                 | 0.66                 |
|                                                                             | Depreciation                                    | 2.99                         | 2.67                 | 2.38                 | 2.12                 | 1.89                 | 1.68                 | 1.50                 | 1.35                 |
|                                                                             | Sub-total                                       | 76.49                        | 87.22                | 97.98                | 97.72                | 97.49                | 97.28                | 97.10                | 96.95                |
|                                                                             | Cost of Production (Adjusting stock in process) | 73.43                        | 86.67                | 97.53                | 97.71                | 97.50                | 97.29                | 97.10                | 96.96                |
|                                                                             | Cost of Sales (CoP adjusted for finished goods) | 70.49                        | 86.03                | 97.07                | 97.68                | 97.51                | 97.30                | 97.10                | 96.97                |
|                                                                             | Selling, packing & distribution expenses        | 1.59                         | 1.99                 | 2.28                 | 2.31                 | 2.31                 | 2.31                 | 2.31                 | 2.31                 |
|                                                                             | Administrative & Misc. Expenses                 | 2.38                         | 2.99                 | 3.42                 | 3.46                 | 3.46                 | 3.46                 | 3.46                 | 3.46                 |
| D                                                                           | Sub-Total                                       | 74.46                        | 91.01                | 102.77               | 103.45               | 103.28               | 103.07               | 102.87               | 102.74               |

|   |                                                                                                                |                                    |                                                                  |              |              |       |       |       |       |
|---|----------------------------------------------------------------------------------------------------------------|------------------------------------|------------------------------------------------------------------|--------------|--------------|-------|-------|-------|-------|
|   | Profit before Interest & Tax (PBIT) A-D                                                                        | 4.74                               | 8.59                                                             | 11.23        | 11.75        | 11.92 | 12.13 | 12.33 | 12.46 |
|   | Interest on Term Loan from Bank                                                                                | 2.39                               | 2.11                                                             | 1.72         | 1.32         | 0.92  | 0.52  | 0.12  | 0.00  |
|   | Interest on Bank Borrowing                                                                                     | 1.54                               | 1.87                                                             | 2.13         | 2.14         | 2.14  | 2.14  | 2.14  | 2.14  |
|   | Operating Profit                                                                                               | 0.81                               | 4.61                                                             | 7.38         | 8.29         | 8.86  | 9.47  | 10.07 | 10.32 |
|   | Profit before Tax (PBT)                                                                                        | 0.81                               | 4.61                                                             | 7.38         | 8.29         | 8.86  | 9.47  | 10.07 | 10.32 |
|   | Provision for Taxation                                                                                         | 0.20                               | 1.15                                                             | 1.85         | 2.07         | 2.22  | 2.37  | 2.52  | 2.58  |
|   | Profit after Tax (PAT)                                                                                         | 0.61                               | 3.46                                                             | 5.53         | 6.22         | 6.64  | 7.10  | 7.55  | 7.74  |
|   | Drawings                                                                                                       | 0.00                               | 0.00                                                             | 0.00         | 0.00         | 0.00  | 0.00  | 0.00  | 0.00  |
|   | Retained Earnings                                                                                              | 0.61                               | 3.46                                                             | 5.53         | 6.22         | 6.64  | 7.10  | 7.55  | 7.74  |
|   | Surplus for Repayment<br>(Net Profit + Non-cash Exp)                                                           | 3.60                               | 6.13                                                             | 7.91         | 8.34         | 8.53  | 8.78  | 9.05  | 9.09  |
| E | Cash Flow available for Debt service<br>(Retained Earnings+ Depreciation+ Term Loan<br>Interest) (Rs. in Lakh) | 5.99                               | 8.24                                                             | 9.63         | 9.66         | 9.45  | 9.30  | 9.17  | 9.09  |
| F | Total Debt                                                                                                     | 3.93                               | 3.98                                                             | 3.85         | 3.46         | 3.06  | 2.66  | 2.26  | 2.14  |
|   | DSCR (E/ F)                                                                                                    | 1.86                               | 1.51                                                             | 1.90         | 2.07         | 2.22  | 2.42  | NA    | NA    |
|   | <b>Average DSCR</b>                                                                                            | 2.03                               | (Sum of Cash Flow available for Debt service/ Sum of Total Debt) |              |              |       |       |       |       |
|   | Total Inflows (PBT+ Interest+ Depreciation)                                                                    | <b>7.73</b>                        | <b>11.26</b>                                                     | <b>13.61</b> | <b>13.87</b> | 13.81 | 13.81 | 13.83 | 13.81 |
|   | <b>Payback Period</b> (on Rs. 33.80 Lakhs initial<br>investment)                                               | 4 years after project commencement |                                                                  |              |              |       |       |       |       |

### 3.19 Repayment Schedule

| Repayment Schedule (Rs. in Lakh) |                                  |              |                        |                       |                  |                        |             |                                |              |
|----------------------------------|----------------------------------|--------------|------------------------|-----------------------|------------------|------------------------|-------------|--------------------------------|--------------|
| Year                             | Outstanding loan at start of yr. | Disbursement | Total outstanding Loan | Surplus for repayment | Interest payment | Repayment of principal | Total outgo | o/s Loan at the end of the yr. | Balance left |
| 1                                | 0                                | 20.00        | 20.00                  | 3.60                  | 2.39             | 0                      | 2.39        | 20.00                          | 1.21         |
| 2                                | 20.00                            |              | 20.00                  | 6.13                  | 2.11             | 4.00                   | 6.11        | 16.00                          | 0.02         |
| 3                                | 16.00                            |              | 16.00                  | 11.23                 | 1.72             | 4.00                   | 5.72        | 12.00                          | 5.51         |
| 4                                | 12.00                            |              | 12.00                  | 13.62                 | 1.32             | 4.00                   | 5.32        | 8.00                           | 8.30         |
| 5                                | 8.00                             |              | 8.00                   | 14.59                 | 0.92             | 4.00                   | 4.92        | 4.00                           | 9.67         |
| 6                                | 4.00                             |              | 4.00                   | 14.44                 | 0.52             | 4.00                   | 4.52        | 0.00                           | 9.92         |

### 3.20 Assets' Depreciation

| Assets' Depreciation (Written Down Value Method) (Rs. in Lakh) |          |          |          |          |          |          |          |          |
|----------------------------------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Particulars                                                    | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th Year | 6th Year | 7th Year | 8th Year |
| Civil works (5%)                                               | 5.09     | 4.84     | 4.60     | 4.37     | 4.15     | 3.94     | 3.74     | 3.55     |
| Depreciation                                                   | 0.25     | 0.24     | 0.23     | 0.22     | 0.21     | 0.20     | 0.19     | 0.18     |
| Depreciated value                                              | 4.84     | 4.60     | 4.37     | 4.15     | 3.94     | 3.74     | 3.55     | 3.37     |
|                                                                |          |          |          |          |          |          |          |          |
| Plant & Machinery (10%)                                        | 18.33    | 16.50    | 14.85    | 13.36    | 12.02    | 10.82    | 9.74     | 8.77     |
| Depreciation                                                   | 1.83     | 1.65     | 1.49     | 1.34     | 1.20     | 1.08     | 0.97     | 0.88     |
| Depreciated value                                              | 16.50    | 14.85    | 13.36    | 12.02    | 10.82    | 9.74     | 8.77     | 7.89     |
|                                                                |          |          |          |          |          |          |          |          |
| Other Fixed Assets (15%)                                       | 6.08     | 5.17     | 4.39     | 3.73     | 3.17     | 2.69     | 2.29     | 1.95     |
| Depreciation                                                   | 0.91     | 0.78     | 0.66     | 0.56     | 0.48     | 0.40     | 0.34     | 0.29     |
| Depreciated value                                              | 5.17     | 4.39     | 3.73     | 3.17     | 2.69     | 2.29     | 1.95     | 1.66     |
|                                                                |          |          |          |          |          |          |          |          |
| All Assets                                                     | 29.50    | 26.51    | 23.84    | 21.46    | 19.34    | 17.45    | 15.77    | 14.27    |
| Depreciation                                                   | 2.99     | 2.67     | 2.38     | 2.12     | 1.89     | 1.68     | 1.50     | 1.35     |
| Depreciated value                                              | 26.51    | 23.84    | 21.46    | 19.34    | 17.45    | 15.77    | 14.27    | 12.92    |

### 3.21 Financial Assessment of the Project

| 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)                                 | 29.50    | 0        | 0        | 0        | 0        | 0        | 0        | 0        |        |
| ii                                                   | Recurring cost (Rs. in Lakh)                               | 3.20     | 74.30    | 85.35    | 96.40    | 96.40    | 96.40    | 96.40    | 96.40    |        |
| iii                                                  | Total cost (Rs. in Lakh)                                   | 32.70    | 74.30    | 85.35    | 96.40    | 96.40    | 96.40    | 96.40    | 96.40    | 674.35 |
| iv                                                   | Benefit (Rs. in Lakh)                                      | 0.00     | 79.20    | 99.60    | 114.00   | 115.20   | 115.20   | 115.20   | 115.20   |        |
| v                                                    | Total Depreciated value of all assets (Rs. in Lakh)        |          |          |          |          |          |          |          | 12.92    |        |
| vi                                                   | Total benefits (Rs. in Lakh)                               | 0.00     | 79.20    | 99.60    | 114.00   | 115.20   | 115.20   | 115.20   | 128.12   | 766.52 |
|                                                      | Benefit-Cost Ratio (BCR): <b>1.14</b> (Profitable Project) |          |          |          |          |          |          |          |          |        |
|                                                      | Net Present Worth (NPW): <b>Rs. 92.17 Lakhs</b>            |          |          |          |          |          |          |          |          |        |

### 3.22 Break Even Analysis of the Project

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 19: 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                                | 60%                        | 70%                        | 80%                        | 80%                        | 80%                        | 80%                        | 80%                        | 80%                        |
|                                      |                                                     |                            |                            |                            |                            |                            |                            |                            |                            |
| <b>A</b>                             | <b>Variable Cost (Rs. in Lakh)</b>                  |                            |                            |                            |                            |                            |                            |                            |                            |
|                                      | Raw Material Consumed                               | 43.85                      | 51.16                      | 58.46                      | 58.46                      | 58.46                      | 58.46                      | 58.46                      | 58.46                      |
|                                      | Consumable Spares                                   | 10.80                      | 12.60                      | 14.40                      | 14.40                      | 14.40                      | 14.40                      | 14.40                      | 14.40                      |
|                                      | Power, Fuel & Other Utilities (Variable)            | 5.34                       | 6.23                       | 7.12                       | 7.12                       | 7.12                       | 7.12                       | 7.12                       | 7.12                       |
|                                      | Factory Salaries & Wages (Variable)                 | 6.35                       | 7.40                       | 8.46                       | 8.46                       | 8.46                       | 8.46                       | 8.46                       | 8.46                       |
|                                      | Selling, Packing & Distribution Expenses (Variable) | 1.19                       | 1.49                       | 1.71                       | 1.73                       | 1.73                       | 1.73                       | 1.73                       | 1.73                       |
|                                      | Interest on Bank Borrowing                          | 1.54                       | 1.87                       | 2.13                       | 2.14                       | 2.14                       | 2.14                       | 2.14                       | 2.14                       |
|                                      | Total Variable Cost (Rs. in Lakh)                   | 69.07                      | 80.75                      | 92.28                      | 92.31                      | 92.31                      | 92.31                      | 92.31                      | 92.31                      |
| <b>B</b>                             | <b>Total Income (Rs. in Lakh)</b>                   | 85.20                      | 100.79                     | 114.91                     | 115.24                     | 115.18                     | 115.18                     | 115.20                     | 115.18                     |
| <b>C</b>                             | <b>Contribution (B-A)</b>                           | 16.13                      | 20.04                      | 22.63                      | 22.93                      | 22.87                      | 22.87                      | 22.89                      | 22.87                      |
| <b>D</b>                             | <b>Fixed Cost (Rs. in Lakh)</b>                     |                            |                            |                            |                            |                            |                            |                            |                            |
|                                      | Power, Fuel & Other Utilities (Fixed)               | 2.97                       | 2.97                       | 2.97                       | 2.97                       | 2.97                       | 2.97                       | 2.97                       | 2.97                       |

|   |                                                          |        |        |        |        |        |        |        |        |
|---|----------------------------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
|   | Factory Salaries & Wages (Fixed)                         | 3.53   | 3.53   | 3.53   | 3.53   | 3.53   | 3.53   | 3.53   | 3.53   |
|   | Repairs & Maintenance                                    | 0.66   | 0.66   | 0.66   | 0.66   | 0.66   | 0.66   | 0.66   | 0.66   |
|   | Selling, Packing & Distribution Expenses (Fixed)         | 0.40   | 0.50   | 0.57   | 0.58   | 0.58   | 0.58   | 0.58   | 0.58   |
|   | Depreciation                                             | 2.99   | 2.67   | 2.38   | 2.12   | 1.89   | 1.68   | 1.50   | 1.35   |
|   | Administrative & Misc. Expenses                          | 2.38   | 2.99   | 3.42   | 3.46   | 3.46   | 3.46   | 3.46   | 3.46   |
|   | Interest on Term Loan from Bank                          | 2.39   | 2.11   | 1.72   | 1.32   | 0.92   | 0.52   | 0.12   | 0.00   |
|   | Total Fixed Cost (Rs. in Lakh)                           | 15.32  | 15.43  | 15.25  | 14.64  | 14.01  | 13.40  | 12.82  | 12.55  |
| D | <b>Break Even Point (BEP) as % of installed capacity</b> | 56.99% | 53.90% | 53.91% | 51.08% | 49.01% | 46.87% | 44.81% | 43.90% |

### 3.23 Projected Cash Flow Statement

| Table 3.16: Projected Cash flow statement |                     |              |              |              |              |              |              |              |              |
|-------------------------------------------|---------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Particulars                               | Construction period | Year 1       | Year 2       | Year 3       | Year 4       | Year 5       | Year 6       | Year 7       | Year 8       |
| <b>Sources of funds</b>                   |                     |              |              |              |              |              |              |              |              |
| PBT with interest added back              | 0.00                | 4.74         | 8.59         | 11.23        | 11.75        | 11.92        | 12.13        | 12.33        | 4.74         |
| Depreciation                              | 0.00                | 2.99         | 2.67         | 2.38         | 2.12         | 1.89         | 1.68         | 1.50         | 2.99         |
| Increase in Proprietor's Capital          | 3.80                | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         |
| Increase in Subsidy                       | 10.00               | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         |
| Increase in Term Loan from Bank           | 20.00               | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         |
| Increase in Bank Borrowings for WC        | 0.00                | 12.86        | 2.74         | 2.15         | 0.11         | 0.02         | 0.01         | 0.00         | 0.00         |
| Increase in Current Liabilities           | 0.00                | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         |
| Preliminary Expenses written off          | 0.00                | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         |
| <b>Total</b>                              | <b>33.80</b>        | <b>20.59</b> | <b>14.00</b> | <b>15.76</b> | <b>13.98</b> | <b>13.79</b> | <b>13.80</b> | <b>13.83</b> | <b>33.80</b> |
| <b>Disposition of funds</b>               |                     |              |              |              |              |              |              |              |              |
| Increase in Capital expenditure           | 29.50               | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         |

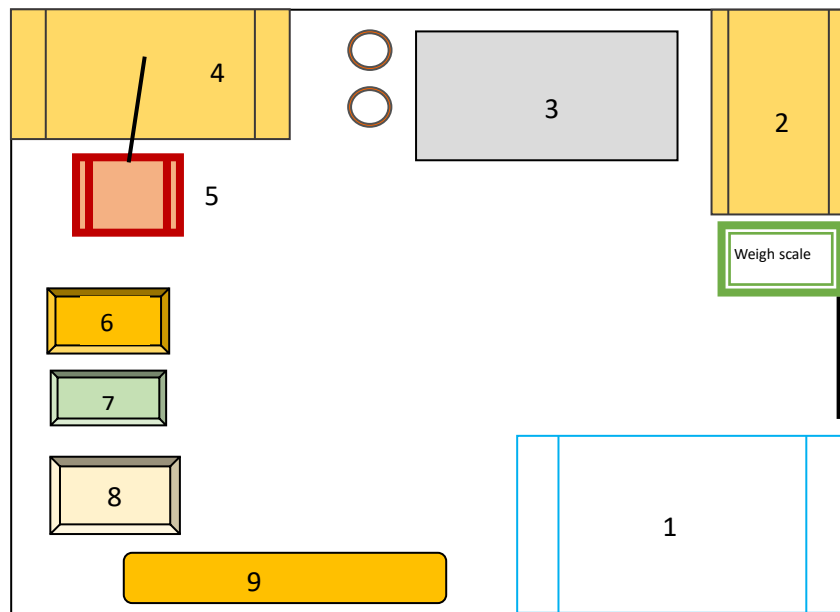
|                                   |              |              |              |              |             |             |             |             |              |
|-----------------------------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|--------------|
| Preliminary Expenses              | 0.00         | 0.00         | 0.00         | 0.00         | 0.00        | 0.00        | 0.00        | 0.00        | 0.00         |
| Increase in Current Assets        | 0.00         | 0.00         | 17.15        | 3.65         | 2.87        | 0.14        | -0.02       | -0.02       | 0.00         |
| Decrease in Term Loan from Bank   | 0.00         | 0.00         | 0.83         | 3.33         | 3.34        | 3.34        | 3.33        | 3.33        | 2.50         |
| Interest on Term Loan from Bank   | 0.00         | 2.39         | 2.11         | 1.72         | 1.32        | 0.92        | 0.52        | 0.12        | 0.00         |
| Interest on Working Capital Limit | 0.00         | 1.54         | 1.87         | 2.13         | 2.14        | 2.14        | 2.14        | 2.14        | 0.00         |
| Taxation                          | 0.00         | 0.20         | 1.15         | 1.85         | 2.07        | 2.22        | 2.37        | 2.52        | 0.00         |
| <b>Total</b>                      | <b>29.50</b> | <b>22.11</b> | <b>12.11</b> | <b>11.91</b> | <b>9.01</b> | <b>8.59</b> | <b>8.34</b> | <b>7.28</b> | <b>29.50</b> |
| Opening Cash & Bank Balance       | 0.00         | 4.30         | 2.78         | 4.67         | 8.52        | 13.49       | 18.69       | 24.15       | 0.00         |
| Net Surplus/ Deficit              | 4.30         | -1.52        | 1.89         | 3.85         | 4.97        | 5.20        | 5.46        | 6.55        | 4.30         |
| Closing Cash & Bank Balance       | 4.30         | 2.78         | 4.67         | 8.52         | 13.49       | 18.69       | 24.15       | 30.70       | 4.30         |

### 3.24 Projected Balance Sheet

| Table 3.17: Projected Balance sheet |                     |              |              |              |              |              |              |              |              |
|-------------------------------------|---------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Particulars                         | Construction period | Year 1       | Year 2       | Year 3       | Year 4       | Year 5       | Year 6       | Year 7       | Year 8       |
| <b>A. Liabilities</b>               |                     |              |              |              |              |              |              |              |              |
| Proprietor's Capital                | 3.80                | 3.80         | 3.80         | 3.80         | 3.80         | 3.80         | 3.80         | 3.80         | 3.80         |
| Reserves & Surplus                  | 0.00                | 0.61         | 4.07         | 9.60         | 15.82        | 22.46        | 29.56        | 37.11        | 0.61         |
| Subsidy                             | 10.00               | 10.00        | 10.00        | 10.00        | 10.00        | 10.00        | 10.00        | 10.00        | 10.00        |
| Term Loan from Bank                 | 20.00               | 19.17        | 15.84        | 12.50        | 9.16         | 5.83         | 2.50         | 0.00         | 19.17        |
| Bank Borrowings for WC              | 0.00                | 12.86        | 15.60        | 17.75        | 17.86        | 17.84        | 17.83        | 17.83        | 12.86        |
| Current Liabilities                 | 0.00                | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         |
| <b>Total Liabilities</b>            | <b>33.80</b>        | <b>46.44</b> | <b>49.31</b> | <b>53.65</b> | <b>56.64</b> | <b>59.93</b> | <b>63.69</b> | <b>68.74</b> | <b>33.80</b> |
| <b>B. Assets</b>                    |                     |              |              |              |              |              |              |              |              |
| WDV of Fixed assets                 | 29.50               | 29.50        | 26.51        | 23.84        | 21.46        | 19.34        | 17.45        | 15.77        | 29.50        |
| Less : Depreciation                 | 0.00                | 2.99         | 2.67         | 2.38         | 2.12         | 1.89         | 1.68         | 1.50         | 0.00         |
| Net Fixed Assets                    | 29.50               | 26.51        | 23.84        | 21.46        | 19.34        | 17.45        | 15.77        | 14.27        | 29.50        |

|                                      |              |              |              |              |              |              |              |              |              |
|--------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Current Assets                       | 0.00         | 17.15        | 20.80        | 23.67        | 23.81        | 23.79        | 23.77        | 23.77        | 0.00         |
| Cash & Bank Balance                  | 4.30         | 2.78         | 4.67         | 8.52         | 13.49        | 18.69        | 24.15        | 30.70        | 4.30         |
| Preliminary Expenses not written off | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         | 0.00         |
| <b>Total Assets</b>                  | <b>33.80</b> | <b>46.44</b> | <b>49.31</b> | <b>53.65</b> | <b>56.64</b> | <b>59.93</b> | <b>63.69</b> | <b>68.74</b> | <b>33.80</b> |
| Current Ratio                        |              | 1.55         | 1.63         | 1.81         | 2.09         | 2.38         | 2.69         | 3.05         | 3.57         |
| Debt Equity Ratio                    | 1.45         | 1.33         | 0.89         | 0.53         | 0.31         | 0.16         | 0.06         | 0.00         | 0.00         |

### 3.25 Plant Layout



- |                         |                         |
|-------------------------|-------------------------|
| 1 Storage               | 6 Pouch packing machine |
| 2 Soaking tank          | 7 Can sealing machine   |
| 3 Grinder               | 8 Box filling machine   |
| 4 Steam Jacketed Kettle | 9 Cooling conveyor      |
| 5 Agitator              |                         |

## **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.

## ANNEXURE

### List of Suppliers of Machinery and Equipment

| S.No | Supplier details                                                                                                                                                | Machinery/ Equipment                       |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| 1.   | The General Engineering Corporation<br>202, Nehru street, Ramnagar,<br>Coimbatore- 641 009.                                                                     | Grinder                                    |
| 2.   | Global Kitchen Equipments Company<br>No. 252, Sivasakthi Colony, 1st Street, Ganapathy<br>Coimbatore - 641006, Tamil Nadu, India                                | Steam kettle, sweets making machine        |
| 3.   | Kookmate Equipment Manufacturers,<br>No:285, Srinivasa Nagar, Industrial Estate,<br>Alapakkam Main Road, Near Meenakshi College,<br>Maduravoyal, Chennai-600095 | Steam kettle, sweets making machine        |
| 4.   | SP Automation and Packaging Machines,<br>64, Athipalayam Rd, Ramakrishnapuram,<br>Chinnavedampatti, Coimbatore - 641006,<br>Tamil Nadu<br>+91 80489 79085       | FFS machine; different packaging machinery |
| 5.   | Ace Pack Machines<br>23, V. N. Industrial Estate, Bharathi Colony Rd,<br>Sri Kamadhenu Nagar, Coimbatore - 641004<br>Tamil Nadu<br>+91 80489 85386              | FFS machine, Packing machinery             |
| 6.   | Sri Karpagam Engineering<br>39A, Lakshman Gounder Street, 2nd Cross<br>Sanganoor, Coimbatore - 641027, Tamil Nadu<br>+91 80460 56077                            | SS work tables, trolleys, bins, trays      |
| 7.   | Terra Tech packs,<br>125, Kumaran Garden,<br>Edayarpalayam Pirivu,<br>Kuniamuthur, Coimbatore - 641008                                                          | Packing Containers                         |





## Contact Us

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