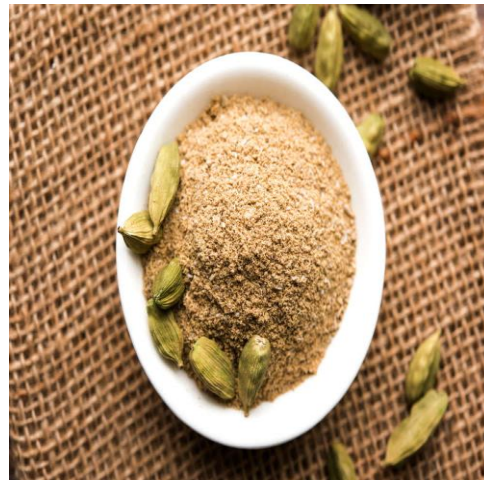


PM Formalization of Micro Food Processing Enterprises Scheme

DETAILED PROJECT REPORT FOR LARGE CARDAMOM POWDER PROCESSING



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Project At a Glance

| | | |
|----|---|--|
| 1 | Name of the Project | Large cardamom powder |
| 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 Partner (if partnership) | |
| 7 | No of shareholders (if company/FPC) | |
| 8 | Technical advisor | |
| 9 | Marketing advisor/partners | |
| 10 | Proposed project capacity | 30 MT/annum (55, 65, 75,90 & 100% capacity utilization in the 2nd, 3 rd , 4 th , 5 th & 6 th years' onwards respectively |
| 11 | Raw materials | Cardamom Fruit |
| 12 | Major product outputs | Large cardamom powder |
| 13 | Total project cost (Lakhs) | 29.80 |
| | Land development, building & civil construction | 4.5 |
| | Machinery and equipment | 12.33 |
| | Utilities (Power & water facilities) | 0.8 |
| | Miscellaneous fixed assets | 0.9 |
| | Pre-operative expenses | 0.90 |
| | Contingencies | 1.20 |
| | Working capital margin | 9.17 |
| 14 | Working capital Management (In Lakhs) | |
| | Second Year | 27.52 |
| | Third Year | 32.53 |
| | Fourth Year | 44.36 |
| 15 | Means of Finance | |
| | Subsidy grant by MOFPI (max 10 lakhs) | 9.98 |
| | Promoter's contribution (min 20%) | 7.75 |
| | Term loan (45%) | 12.07 |
| 16 | Debt-equity ratio | 1.55: 1 |
| 17 | Profit after Depreciation, Interest & Tax | |
| | 2nd year | 88.98 |
| | 3rd year | 106.70 |
| | 4th year | 124.40 |
| 18 | Average DSCR | 2.16 |
| | Benefit Cost Ratio | 1.97 |
| | Term Loan Payment | 7 Years with 1 year grace period |
| | Pay Back Period for investment | 2 Years |

Note: All the data/contents of this DPR are taken from the available information on IIFPT site.

1 GENERAL OVERVIEW OF CARDAMOM PRODUCTION, CLUSTERS, POST-HARVEST MANAGEMENT AND VALUE ADDITION IN INDIA

1.1 INTRODUCTION

Large cardamom (*Amomum subulatum Roxb.*), a member of the family, *Zingiberaceae* is the main cash crop cultivated in the sub-Himalayan state of Sikkim and Darjeeling district of West Bengal. Large cardamom is known to be amongst the oldest spice used by the mankind. Sikkim is the largest producer of large cardamom and contributes lion's share to the Indian and world market. Recently large cardamom cultivation has also started in Nagaland, Meghalaya and Arunachal Pradesh.

Large cardamom commonly known as 'badi elachi' in Hindi is indigenous. Grows in evergreen forests of sub Himalayan tracts. Large cardamom, a shade loving plant, grows well in the altitudes of 600-2000m receiving annual rainfall of 2000-3500 mm apportioned over 200 days. Cloudy conditions prevail for most of the monsoon period. The flowering season begins early in the lower altitudes with peak flowering during March-April, while it is late in the higher altitudes with a peak period during June-July. The fruit is a trilocular, many seeded capsule. The capsule wall is echinate having reddish-brown to dark-pinkish to maroon colour. The seeds are di-angular, whitish when immature and become dark greyish towards maturity. Usually the capsules which are formed at the basal portion of the spike are bigger and bolder than others. The seeds contain about 2-3 per cent essential oil, a powerful flavouring agent and are used mainly as spice and for food flavourings.

Large cardamom dried fruit is a high-value, low-volume spice crop grown only in the three eastern Himalayan countries. It is widely used in

foods, beverages, perfumes, and medicines. Production is currently declining, and improved post-harvest management would be one way to help ensure the sustainability of this niche crop. The value chain for large cardamom consists largely of traditional practices which should be scientifically refined during a number of post-harvest steps including marketing. The primary processing steps required by the present market are curing, tail cutting, and grading

1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF CARDAMOM

Large Cardamom is cultivated in the Sub-Himalayan region of North Eastern India, Nepal and Bhutan. It is grown in cold humid conditions under shade of trees at an altitude between 800-2000 meters above MSL. With an average precipitation of 3000-3500 mm spread over about 200 days and with temperature ranging from 6-30 degree C.

The origin of cardamom can be traced back to as early as 4th century BC in the monsoon forests of the Western Ghats in southern India. Today, this area is known as the Cardamom Hills, and until 200 years back, this area produced most of the world's cardamom. The cardamom fruits have been in trade in India for more than 1000 years. They had been in print in the medical compendium Charaka Samhita between 2nd century BC and 2nd century AD. What's more, it is also mentioned in the Sanskrit texts, Taitirriya Samhita of the 4th century BC. During the same time, the Greeks began importing cardamom from the East. While the inferior grades were called amomon, the superior grades were named kardamomon. Eventually, the Romans started importing substantial quantities of cardamom from India and regarded them as one of the most popular oriental spices in the Roman cuisine. Most of the cardamom was supplied from the evergreen monsoon forests of southern India and Sri Lanka. In 1903, cardamom plantation was abolished due to excessive production in Ceylon, now Sri Lanka, which led to low prices. The British colonies spread the

plantation of cardamom in other parts of India as a secondary crop. Today, cardamom is largely used as an aromatic spice in Eastern, Arab and some Scandinavian cuisines.

1.3 VARIETIES

There are mainly six popular cultivars of large cardamom viz., Ramsey, Ramla, Sawney, Varlangey, Seremna and Dzongu Golsey. Several others include Chivey, Ramsey, Gardo Seto Ramnag, Madhusey, Seto Golsey, Slant Golsey, Red Sawney, Green Sawney and Mingney.

1. Ramsey: It is well-suited to high altitude (1515 m amsl) and can be cultivated even on steep slopes. The cultivar is identified by maroonish colour of the tiller and narrow leaves. Plants are 1.5 to 2.0 m tall, robust with large number of tillers. Flowering starts in May and crop is ready for harvest by October-November. Capsules are smaller in size with 25-40 seeds.

2. Ramla: Plants are 1.5 to 2 m tall and vigorous like Ramsey. Colour of tillers resembles that of Ramsey and the leaves are broad and long, capsules are dark pinkish in colour with 30-40 seeds. Cultivation is restricted to few high altitude areas in North Sikkim. Flowering commences in May and the crop is generally ready for harvest in October.

3. Sawney: It is a widely adapted cultivar, which is most suited to medium (975-1515 m amsl) and high (> 1515 m amsl) altitude areas. Plants are 1.5 to 2.0 m tall, robust in nature, leaves are ovate and broad and the colour of tiller is similar to Ramsey. Capsules are bigger and bold with 35-50 seeds. Flowering starts from March to May and harvest begins in September-October, sometimes extends up to November in high altitude areas

4. Varlangey: It is found to grow in mid and high altitude (> 1515 m amsl) areas. Its yield performance is exceptionally high at high altitudes. Plant height is 1.5 - 2.5 m, robust type and resembles Ramsey with narrow leaves having wavy margins. The productive tiller and spike ratio is relatively high in this cultivar. Capsules are bold with 50-70 seeds. Flowering starts in May at medium altitudes and during June-July at high altitudes. Consequently, harvesting is delayed up to the end of November in high altitudes.

5. Seremna: The cultivar is grown in a small pocket of the Hee-Gaon, West Sikkim at low altitude and is known for its high yield potential. Plants are 1.5 to 2.0 m tall, tillers are green and leaves are mostly drooping type, hence named as 'Seremna'. On an average 2-3 spikes in each productive tiller with average 10 capsules in each spike and 65-70 seeds per capsules are recorded.

6. Dzongu Golsey: It is suitable to areas below 975 m amsl and is very specific in Dzongu area of North Sikkim. The plant height is 1.0 to 1.5 m and not as robust like other cultivars. Unlike Ramsey and Sawney, the tillers are green in colour and the leaves are narrow and erect. Capsules are big and bold and contain 50-70 seeds. Flowering starts in March and harvesting is done in September-October

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Nutritional value:

One tablespoon of ground cardamom contains the following nutrients:

- calories: 18
- total fat: 0.4 grams (g)
- carbohydrates: 4.0 g
- fiber: 1.6 g

- protein: 0.6 g

It also contains the following quantities of vitamins and minerals:

- potassium: 64.9 milligrams (mg)
- calcium: 22.2 mg
- iron: 0.81 mg
- magnesium: 13.3 mg
- phosphorus: 10.3 mg

CONSTITUENTS AND HEALTH BENEFITS OF LARGE CARDAMOM

Large cardamom also have many potential health benefits. Eating large cardamom may lower your risk of heart disease, cancer, and kidney stones.

Health benefits:

- **For Gastrointestinal Health:**

Consuming black cardamom helps in various digestive disorders and also helps in fighting stomach ulcers. It also keeps the acids in the stomach under proper control. It also improves your appetite and helps in maintaining good heart health as well. It also keeps issues of gas and bloating at bay.

- **Oral care**

The strong aroma can help in curing bad breath problems. It can also help in curing both teeth and gum infection.

- **Respiratory relief**

Consuming black cardamom can be of great help to people suffering from asthma, congestion or other respiratory problems. It can relieve the symptoms and it can also keep you away from cough, cold and sore throat as it normalizes the flow of mucous through the respiratory tract.

- **Cardiovascular health**

Regular intake of black cardamom helps in maintaining a healthy heart. It also reduces the probability of blood clot and also helps to keep a check on our blood pressure. The spice also acts as a shield by protecting us from heatstroke in summers.

- **Good for your skin**

Black cardamom is rich in anti-bacterial properties and is a good antioxidant. Apart from that, it is also rich in Vitamin C and thus it keeps our system free from toxic materials and improves blood circulation.

- **Healthy hair**

Being rich in antiseptic and antibacterial properties, it helps in preventing scalp infection and provides proper nourishment to the hair due to its anti-oxidative properties.

1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-

Large Cardamom is a perennial herb with subterranean rhizomes and 50-140 aerial leafy shoots. Each shoot has height of 1.7 to 2.6 mtr and possess 9 to 13 leaves in each tiller. Leaves are glabrous on both sides with a prominent mid-rib. Inflorescence is a condensed spike with yellowish perianth. Each spike has 10-

15 fruits. Fruit is round or oval shape, capsule with reddish brown colour. Each capsule is trilobular with many seeds.

Cultivation and Bearing:-

Large cardamom, a shade loving plant (sciophyte), has its natural habitat in the humid subtropical semi-evergreen forests of mountainous sub-Himalayan region. The areas under large cardamom cultivation receive annual rainfall of 2000-3500 mm apportioned over 200 days. The lower altitudes of cooler zones (proximal to the snow-line) and higher reaches of the warmer zones are best suited for its growth. Large cardamom belts experience mean annual ambient temperature range of 6oC (December-January) and 30oC (June-July) accompanied by constant high relative humidity. Continuous rain during flowering is detrimental, as it hampers the foraging activity of pollinating bees, thus affecting the flowers and resulting in poor capsule setting and barren spikes. Plants remain dormant during severe winter and can withstand up to 2oC but frost and hailstorms are injurious to large cardamom.

Large cardamom is generally grown in forest loamy soils having soil depth of few centimetres to several inches. Colour of large cardamom soil ranges from brownish yellow to very dark greyish brown. Texture varies from sandy, sandy loam, silty loam to clay. In general, large cardamom soils are acidic in nature and majority of soils have pH ranges from 5.0 to 5.5 and more than one per cent organic carbon content. On an average, these soils have high available nitrogen and medium phosphorus and potassium. Steepness of the terrain reduces chances of water logging and water-logged conditions are not suitable for the plants hence, adequate drainage is quite essential for the better stand of the crop.

Large cardamom grows well in forest loamy soils with gentle to medium slopes. Luxuriant growth is observed close to perennial water sources. However, water-logged condition is detrimental to the plants. It performs well under partial shade (50 %). *Alnus nepalensis* (utis) is the most common shade tree and *Alnus*-large cardamom is the most appropriate agro-forestry system for sustainable production in the region. The other species of shade trees are *Terminalia myriocarpa* (panisaj), *Bucklandia* spp. (pipli), *Macaranga denticulata* (malato), *Edgeworthia gardneri* (argeli), *Viburnum erubescens* (asare), *Maesa chisia* (bilaune), *Symplocos theifolia* (kharane), *Albizzia lebbeck* (siris), *Erythrina indica* (phaledo), *Schima wallichii* (chilaune) etc. The land selected for planting is cleared of all the under growth, weeds etc. Old large cardamom plants, if any may also be removed. Pits of size 30 cm x 30 cm x 30 cm are prepared on contours at a spacing of 1.5 m x 1.5 m from the centre of the pits. Wider spacing of 1.8 m x 1.8 m is recommended for robust cultivars like Ramla, Ramsey, Sawney, Varlangey etc. While closer spacing 1.45 m x 1.45 m is advised for non-robust cultivators like Dzongu Golsey, Seremna etc. Pits are left open for weathering for a fortnight and then filled with topsoil mixed with cow dung compost/FYM @ 1-2 kg per pit. Pit making and filling operation should be completed in the third week of May before the onset of pre-monsoon showers. Planting is done in June-July when there is enough moisture in the soil. A mature tiller with 2-3 immature tillers/vegetative buds is used as planting unit. Quality planting materials are to be raised in the nurseries or to be collected from certified nurseries for better production. Suckers/seedlings are planted by scooping a little soil from the centre of the pits and planted up to collar zone. Deep planting should be avoided. Staking is needed to avoid lodging under heavy rain and wind and mulching is done at the plant base.

The indication of time of harvest is when the seeds of top most capsules turn brown. As soon as the said colour appears and to enhance maturity bearing tillers are cut at a height of 30-40 cm from ground and left for another 10-15 days for full maturity. The spikes are harvested by using special knives known as “Cardamom-knife” (*Elaichi chhuri*).

POST-HARVEST MANAGEMENT

There are some spices handling management after harvesting to avoid post-harvest losses. Following are Post-harvesting handling practices:

- Remove extraneous matter and wash thoroughly the harvested produce before drying.
- Adopt flue pipe system for curing to retain the original color, aroma and flavor.
- Dry the capsules immediately after harvest.
- Dried cardamom should not contain more than 10% moisture for better shelf life.
- Remove tails after drying.
- Grade according to size and color and store in moist proof containers.
- Use clean, polythene lined gunny bags for storing.
- Store in dry places and in wooden boxes.

The properly dried capsules should be allowed to cool and then packed in polythene lined jute bags. The bags may be stored on wooden platform away from the sidewall to avoid absorption of moisture and thereby, avoid fungal growth on the stored produce

1.5 PROCESSING & VALUE ADDITION:-

Large cardamom (*Amomum subulatum* Roxb.) is one of the popular spices that comes under the family Zingiberaceae. Eastern Himalayas region as its origin where wild species are still located. Cardamom is the world's third-most expensive spice, exceeded in price per weight only by vanilla and saffron. It is an ancient spice cum medicinal herb. India is the largest producer and exporter of large-cardamom (*Amomum subulatum* Roxb). The other major producers of largecardamom are Nepal and Bhutan. Its cultivation is confined in Eastern Himalaya covering Sikkim, West Bengal (Darjeeling

hills) and Arunachal Pradesh. Large cardamom seeds are considered as an antidote to either snake venom or scorpion venom. It is also reported that large cardamom seeds are used as preventive as well as a medicinal measure for throat. The seeds of large cardamom have been used to flavor food, confections, beverages and liquids. Furthermore, it has been used as an insecticide as well. Its usage in Ayurvedic is well known from prehistoric time. It is used as flavoring and preservative to different types of coffee, liquors, confections, beverages and tobacco. Volatile oil (2-4%) is the principal aroma-giving compound in large cardamom and 1,8- cineole is the major active compound after compound, in an extent 60 to 80% of the total volatile oil. Large Cardamom powder is produced by grinding of dried seeds with moisture content 10% to fine powder followed by sieving

Value added products of large cardamom, such as essential oil and oleoresin, have high market values and export potentials. However, no equipment for extracting such products is available in India. The major markets for oleoresin are the USA, the UK, Germany, France, Canada, Japan and South Korea. After removing the oleoresin from the dry cardamom spices, the residues also has good marketing scope as ingredient of animalfeed. The capsule on an average comprises 70% seeds and 30% skin. Moisture- 8.49%, volatile oil- 2.8% v/w, protein- 6.0%, total ether extract- 5.31%, non-volatile ether extract- 2.31%, volatile ether extract- 3.0%, crude fibre- 22.0%, starch- 43.21%; alcohol extract- 7.02%. Total ash in large cardamom and seeds varied from 5.49 to 6.56% and 3.45 to 4.57 and volatile oil 0.5 to 1.5% and 0.9 to 2.0%.

2. MODEL LARGE CARDAMOM POWDER PROCESSING UNDER FME SCHEME

2.1 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 major cardamom growing regions are districts of Sikkim and the districts of Kalimpong and Darjeeling in West Bengal are among the leading producers of large cardamom in India. Furthermore, Uttarakhand, the North Eastern Hill states- Arunachal Pradesh, Nagaland, Mizoram, Manipur, Meghalaya and Assam too produce large cardamom

2.2 INSTALLED CAPACITY OF THE LARGE CARDAMOM POWDER PROCESSING UNIT

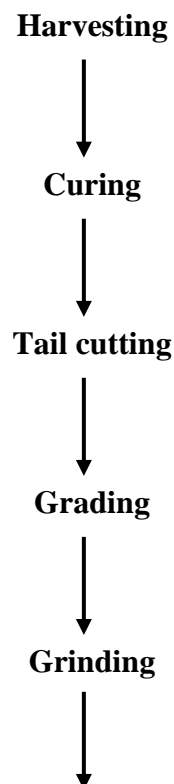
The maximum installed capacity of the large cardamom powder manufacturing unit in the present model project is proposed as **30** tonns/annum or **100 kg/day** large cardamom powder. The unit is assumed to operate 300 days/annum @ 8-10 hrs/day the 1st year is assumed to be construction/expansion period of the project; and in the 2nd year 55 percent capacity, 3rd year 65 percent capacity, 4th year 75 percent capacity, 5th year 90 percent capacity & 6th year onwards 100 percent capacity utilization is assumed in this model project.

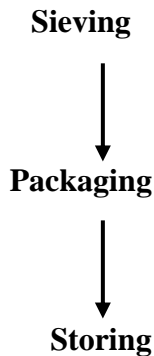
2.3 RAW MATERIAL REQUIREMENTS FOR THE UNIT

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 spoiled. In the Large cardamom powder manufacturing project, the unit requires **270.09 kg/day, 319.2 kg/day, 368.3 kg/day, 442 Kg/day & 492 kg/day** Cardamom at 55, 65, 75, 90 & 100 percent capacity utilization, respectively.

2.4 MANUFACTURING PROCESS OF THE LARGE CARDAMOM POWDER

Flow chart for large cardamom powder:





Traditional curing (Bhatti)

- This curing system is constructed using mud and bricks.
- Raw cardamom capsules are spread over the drying platforms.
- Hot smokes from firewood are passed through the capsules.
- The process takes 35-40 hrs for complete drying.
- The bhatti operates with very poor operating thermal efficiency of the order of 5-15 per cent resulting in wastage of huge quantities of fuel wood.

Modified bhatti (Flue pipe curing house)

- This is an indirect system of drying and smoke does not come in contact with the produce at any stage.
- Flue pipe is connected to a fire place with an exit provided outside the building.
- The capsules are spread over the floor/shelves as 17-24 hours, volatile oil content of 2-2.4 per cent.
- When the firewood is burnt, hot air passes through flue pipes and capsules gets dried by the heat generated.
- Proper ventilation is provided to control temperature inside the room. Since smoke does not come in contact with capsules, its original maroon colour is retained fetching better price in the market.
- The capacity of this system varies from 200 to 400 kg of fresh capsules.

Solar drier

- On an average 55.7 per cent of higher temperature was obtained in the solar dryer over the ambient temperature.
- It takes 24 hours (3 sunny days) for curing of capsules than open sun drying which takes 48 hours to obtain the same level of moisture contents resulting in a net saving of about 50 per cent of drying time for the solar dryer in comparison to the open sun drying.

Grading

There are four commercial grades of dried capsules

- badadana (big capsule),
- chotadana (small capsule),
- kainchi-cut (capsule tail removed) and
- non-kainchi-cut (capsule tail intact).

Manually operated sieves for grading are reported, but so far no mechanical grading machines have been developed.

Grinding

Large cardamom capsules are usually sold whole.

- Grinding can be a method of adding value to a product. However, it is not advisable to grind spices.
- After grinding, spices are more vulnerable to spoilage.
- The flavour and aroma compounds are not stable and will quickly disappear from ground products.
- The storage life of ground spices is much less than for the whole spices.

- Pulverizer is used to grind cardamom into powder followed by sieving to give uniformity to the product

Packaging and Storage

- Cardamom powder is packed in inert and rigid containers.
- Stored at dry and warm places to prevent reabsorption of moisture from the atmosphere

2.5 MARKET DEMAND AND SUPPLY FOR LARGE CARDAMOM POWDER

The global cardamom market is projected to register a CAGR of 5.7% during the forecast period (2020-2025). The price of cardamom is unstable due to the irregular demand from the major importers such as Saudi Arabia and UAE amid COVID-19 pandemic and the decrease in the global supply of cardamom due to poor weather conditions.

India is the largest producer of large cardamom with 54% share in world production. The districts of Sikkim and the districts of Kalimpong and Darjeeling in West Bengal are among the leading producers of large cardamom in India. Furthermore, Uttarakhand, the North Eastern Hill states- Arunachal Pradesh, Nagaland, Mizoram, Manipur, Meghalaya and Assam too produce large cardamom. Other Himalayan countries in the sub-continent such as Bhutan and Nepal are also major cultivators of this spice and have recently witnessed a spike in the production and export of large cardamom.

Powdered spice is air tight packaging material is of enormous demand. Increasing urbanization paired with a rise in number of working women has reduced the time of cooking. Consequently, homemakers have started demanding

readymade spice powder that includes chilli powder, cumin powder, fennel powder, black pepper powder, turmeric powder. Also popular are ready made paste of onion, garlic, ginger in packet form. An official report from Everest Spices Ltd. Reveals their exports about 10 per cent of its products to the US, West Asia, Singapore, Australia, New Zealand and East Africa, said: “The total market size of branded spices is estimated at 6,600 crores, and is growing at 14 per cent annually.

2.6 MARKETING STRATEGY FOR LARGE CARDAMOM POWDER

The increasing urbanization and income offers huge scope for marketing of spice based products. Urban organized platforms such as departmental stores, malls, super markets can be attractive platforms to sell well packaged and branded cardamom products.

2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Large cardamom powder 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 This DPR assumes expansion of existing spice processing unit by adding new dehydration processing line. Therefore, land and civil infrastructures are assumed as already available with the entrepreneurs.

- Herewith in this DPR, we have considered the assumptions as listed below in the tables of different costs, which may vary as per region, seasons and machinery designs and supplier.
 1. Cardamom cost considered @ Rs.150/-per kg.
 2. 1 kg Cardamom will produce 22.4% recovery.

3. 1 Batch size is approximately 100 kg.
4. No. of hours per day are approximately 8-10 hours.
5. Batch yield is 95%.

| Detailed Project Assumptions | | |
|---|--|----------|
| Parameter | Assumption | |
| Capacity of the Cardamom powder Unit | 30 | MT/annum |
| Utilization of capacity | 1st Year Implementation, 55% in second, 65% in third, 75% in fourth year, 90% in fifth & onwards | |
| Working days per year | 300 | days |
| Working hours per day | 10 | hours |
| Interest on term and working capital loan | 12% | |
| Repayment period | Seven year with one year grace period is considered. | |
| Average prices of raw material | 150 | |
| Average sale prices per Kg | 1600 | Rs/kg |
| seed extraction | 22.4 | |
| LARGE CARDAMOM POWDER | 1 kg Cardamom powder from 4.91 kg Cardamom | |

2.8 FIXED CAPITAL INVESTMENT

2.8.1 MACHINERY AND EQUIPMENT

| Sr No. | Equipment | Capacity | Quantity | Price (Rs. In Lacs) |
|--------|------------------------|----------|------------------|---------------------|
| 1 | Cold Room | 1 | 5000 kg | 6 |
| 2 | Tray Heater | 1 | 200 kg per batch | 2.9 |
| 3 | pod breaker cum peeler | 1 | 50 kg per hour | 1.1 |
| 4 | Pulverizer | 1 | Suitable | 1.4 |
| 5 | Cont. sealing machine | 1 | Suitable | 0.25 |
| 6 | Batch coding machine | 1 | Suitable | 0.12 |
| 7 | Weighing balance | 1 | Suitable | 0.06 |
| 8 | Accessories | 1 | Suitable | 0.5 |
| | | | Total | 12.33 |

2.8.2 OTHER COSTS:-

Utilities and Fittings:-

| Utilities and Fittings | |
|------------------------|-------------------|
| 1. Water | Rs. 0.8Lacs total |
| 2. Power | |

Other Fixed Assets:

| Other Fixed Assets | |
|--------------------------|-------------------|
| 1. Furniture & Fixtures | Rs. 0.9 lac total |
| 2. Plastic tray capacity | |
| 3. Electrical fittings | |

Pre-operative expenses

| | |
|---|---------|
| Pre-operative Expenses | |
| Legal expenses, Start-up expenses, Establishment cost, consultancy fees, trials and others. | 0.9 LAC |
| Total preoperative expenses | 0.9 LAC |

Contingency cost to be added as approx.1.2 Lac.

So total startup cost at own land & Premise may be somewhat similar to 29.80 lacs. This is according to survey done at X location India. This may vary on location, situation and design change over.

2.9 WORKING CAPITAL REQUIREMENTS

| Particulars | Period (Days) | Year 2 (55%) | Year 3 (65%) | Year 4 (75%) |
|-----------------------|---------------|--------------|--------------|--------------|
| Raw material stock | 5 | 3.88 | 4.58 | 6.25 |
| Work in progress | 10 | 7.75 | 9.16 | 12.50 |
| Packing material | 10 | 0.12 | 0.14 | 0.19 |
| Finished goods' stock | 10 | 8.17 | 9.66 | 13.17 |
| Receivables | 20 | 16.35 | 19.32 | 26.35 |
| Working expenses | 14 | 0.42 | 0.50 | 0.68 |
| Total current assets | | 36.70 | 43.37 | 59.14 |
| Trade creditors | | 0.00 | 0.00 | 0.00 |
| Working capital gap | | 36.70 | 43.37 | 59.14 |
| Margin money (25%) | | 9.17 | 10.84 | 14.79 |
| Bank finance | | 27.52 | 32.53 | 44.36 |

2.10 TOTAL PROJECT COST AND MEANS OF FINANCES

| Particulars | Amount in Lakhs |
|--|-----------------|
| i. Land and building (20 x 32 x 12 ft - LxBxH) | 4.5 |
| ii. Plant and machinery | 12.33 |
| iii. Utilities & Fittings | 0.8 |
| iv. Other Fixed assets | 0.9 |
| v. Pre-operative expenses | 0.90 |
| vi. Contingencies | 1.20 |
| vii. Working capital margin | 9.17 |
| Total project cost (i to vii) | 29.80 |
| Means Of finance | |
| i. Subsidy | 9.98 |
| ii. Promoters Contribution | 7.75 |
| iii. Term Loan (@10%) | 12.07 |

2.11 MANPOWER REQUIREMENTS

| Total Monthly Salary (Rs.) | No | Wages | Total Monthly | Total Annualy |
|-------------------------------|----|--------------|---------------|---------------|
| Supervisor (can be the owner) | 1 | 15000 | 15000 | 180000 |
| Technician | 1 | 12000 | 12000 | 144000 |
| Helper | 2 | 6000 | 12000 | 144000 |
| Sales man | 1 | 8000 | 8000 | 96000 |
| | | Total | 47000 | 564000 |

2.12 EXPENDITURE, REVENUE AND PROFITABILITY ANALYSIS

| | Particulars | 1st Year | 2nd Year | 3rd Year | 4th Year | 5th year | 6th year |
|---|---|------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| A | Total Installed Capacity (MT) | 150 MT Cardamom /Annum | 16.5 | 19.5 | 22.5 | 27 | 30 |
| | Capacity utilization (%) | Under Const. | 55% | 65% | 75% | 90% | 100% |
| B | Expenditure (Rs. in Lakh) | 0 | | | | | |
| | Cardamom (Av. Price @ Rs. 150/Kg) | 0.00 | 121.54 | 143.64 | 165.74 | 198.88 | 220.98 |
| | Packaging materials | 0.00 | 1.98 | 2.34 | 2.70 | 3.24 | 3.60 |
| | Utilities (Electricity, Fuel) | 0.00 | 1.78 | 2.11 | 2.43 | 2.92 | 3.24 |
| | Salaries (1st yr only manager's salary) | 1.80 | 5.64 | 5.64 | 5.64 | 5.64 | 5.64 |
| | Repair & maintenance | 0.00 | 0.70 | 0.80 | 0.90 | 0.90 | 0.90 |
| | Insurance | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| | Miscellaneous expenses | 0.50 | 2.30 | 2.30 | 2.30 | 2.30 | 2.30 |
| | Total Expenditure | 2.60 | 134.24 | 157.13 | 180.01 | 214.18 | 236.97 |
| C | Total Sales Revenue (Rs. in Lakh) | 0.00 | 264.00 | 312.00 | 360.00 | 432.00 | 480.00 |
| | Sale of cardamom powder (Av. Sale Price @ Rs. 1600/kg) | 0.00 | 264.00 | 312.00 | 360.00 | 432.00 | 480.00 |
| D | PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows | -2.60 | 129.76 | 154.87 | 179.99 | 217.82 | 243.03 |
| | Depreciation on civil works @ 5% per annum | 0.23 | 0.21 | 0.20 | 0.19 | 0.18 | 0.17 |
| | Depreciation on machinery @ 10% per annum | 1.23 | 1.11 | 1.00 | 0.90 | 0.81 | 0.73 |
| | Depreciation on other fixed assets @ 15% per annum | 0.12 | 0.10 | 0.09 | 0.07 | 0.06 | 0.05 |
| | Interest on term loan @ 12% | 1.26 | 1.21 | 1.16 | 1.11 | 1.05 | 0.99 |
| | Interest on working capital @ 12% | 0.00 | 3.30 | 3.90 | 5.32 | 5.32 | 5.32 |

| | | | | | | | |
|---|---|--------------|---------------|---------------|---------------|---------------|---------------|
| E | Profit after depreciation and Interest (Rs. in Lakh) | -5.43 | 127.12 | 152.42 | 177.72 | 215.71 | 241.09 |
| F | Tax (assumed 30%) (Rs. in Lakh) | 0.00 | 38.14 | 45.73 | 53.31 | 64.71 | 72.33 |
| G | Profit after depreciation, Interest & Tax (Rs. in Lakh) | -5.43 | 88.98 | 106.70 | 124.40 | 151.00 | 168.76 |
| H | Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh) | 1.26 | 1.21 | 1.16 | 1.11 | 1.05 | 0.99 |
| I | Coverage available (Rs. in Lakh) | 1.26 | 1.21 | 1.16 | 1.11 | 1.05 | 0.99 |
| J | Total Debt Outgo (Rs. in Lakh) | 0.42 | 0.46 | 0.51 | 0.56 | 0.62 | 0.69 |
| K | Debt Service Coverage Ratio (DSCR) | 3.00 | 2.62 | 2.28 | 1.97 | 1.69 | 1.44 |
| | Average DSCR | 2.16 | | | | | |
| L | Cash accruals (PBDIT- Interest-Tax) (Rs. in Lakh) | -3.86 | 90.41 | 107.98 | 125.57 | 152.05 | 169.72 |
| M | Payback Period | 2.0 Years | | | | | |
| | (on Rs. 29.80 Lakhs initial investment) | | | | | | |

2.13 REPAYMENT SCHEDULE

| Year | Beginning | PMT | Interest | Principal | Ending Balance |
|------|--------------|------------|------------|-----------|----------------|
| 1 | 1,207,074.09 | 167,444.33 | 125,535.71 | 41,908.63 | 1,165,165.46 |
| 2 | 1,165,165.46 | 167,444.33 | 121,177.21 | 46,267.12 | 1,118,898.34 |
| 3 | 1,118,898.34 | 167,444.33 | 116,365.43 | 51,078.90 | 1,067,819.44 |
| 4 | 1,067,819.44 | 167,444.33 | 111,053.22 | 56,391.11 | 1,011,428.33 |
| 5 | 1,011,428.33 | 167,444.33 | 105,188.55 | 62,255.79 | 949,172.54 |
| 6 | 949,172.54 | 167,444.33 | 98,713.94 | 68,730.39 | 880,442.15 |
| 7 | 880,442.15 | 167,444.33 | 91,565.98 | 75,878.35 | 804,563.81 |
| 8 | 804,563.81 | 167,444.33 | 83,674.64 | 83,769.70 | 720,794.11 |

| | | | | | |
|----|------------|--------------|--------------|--------------|----------------|
| 9 | 720,794.11 | 167,444.33 | 74,962.59 | 92,481.74 | 628,312.37 |
| 10 | 628,312.37 | 167,444.33 | 65,344.49 | 102,099.84 | 526,212.52 |
| 11 | 526,212.52 | 167,444.33 | 54,726.10 | 112,718.23 | 413,494.29 |
| 12 | 413,494.29 | 167,444.33 | 43,003.41 | 124,440.92 | 289,053.37 |
| 13 | 289,053.37 | 167,444.33 | 30,061.55 | 137,382.78 | 151,670.59 |
| 14 | 151,670.59 | 167,444.33 | 15,773.74 | 151,670.59 | (0.00) |
| | | 2,344,220.64 | 1,137,146.55 | 1,207,074.09 | (1,207,074.09) |

2.14 ASSET'S DEPRECIATION

| Assets' Depreciation (Down Value Method) | Amounts in Lakhs | | | | | | | |
|--|------------------|----------|-----------|----------|----------|----------|----------|----------|
| Particulars | 1st Year | 2nd year | 3 rd year | 4th year | 5th year | 6th year | 7th year | 8th year |
| Civil works | 4.50 | 4.28 | 4.06 | 3.86 | 3.67 | 3.48 | 3.31 | 3.14 |
| Depreciation | 0.23 | 0.21 | 0.20 | 0.19 | 0.18 | 0.17 | 0.17 | 0.16 |
| Depreciated value | 4.28 | 4.06 | 3.86 | 3.67 | 3.48 | 3.31 | 3.14 | 2.99 |
| | | | | | | | | |
| Plant & Machinery | 12.33 | 11.10 | 9.99 | 8.99 | 8.09 | 7.28 | 6.55 | 5.90 |
| Depreciation | 1.23 | 1.11 | 1.00 | 0.90 | 0.81 | 0.73 | 0.66 | 0.59 |
| Depreciated value | 11.10 | 9.99 | 8.99 | 8.09 | 7.28 | 6.55 | 5.90 | 5.31 |
| | | | | | | | | |
| Other Fixed Assets | 0.80 | 0.68 | 0.58 | 0.49 | 0.42 | 0.35 | 0.30 | 0.26 |

| | | | | | | | | |
|-------------------|-------|-------|-------|-------|-------|-------|-------|------|
| Depreciation | 0.12 | 0.10 | 0.09 | 0.07 | 0.06 | 0.05 | 0.05 | 0.04 |
| Depreciated value | 0.68 | 0.58 | 0.49 | 0.42 | 0.35 | 0.30 | 0.26 | 0.22 |
| | | | | | | | | |
| All Assets | 17.63 | 16.05 | 14.63 | 13.34 | 12.17 | 11.12 | 10.16 | 9.30 |
| Depreciation | 1.58 | 1.43 | 1.29 | 1.17 | 1.05 | 0.96 | 0.87 | 0.79 |
| Depreciated value | 16.05 | 14.63 | 13.34 | 12.17 | 11.12 | 10.16 | 9.30 | 8.51 |

2.15 FINANCIAL ASSESSMENT OF THE PROJECT

Benefit Cost Ratio (BCR) and Net Present Worth (NPW)

| Particulars | 1st Year | 2nd year | 3 rd year | 4th year | 5th year | 6th year | 7th year | 8th year | |
|---|--------------|----------|-----------|----------|----------|----------|----------|----------|---------|
| Capital cost (Rs. in Lakh) | 29.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Recurring cost (Rs. in Lakh) | 2.60 | 134.24 | 157.13 | 180.01 | 214.18 | 236.97 | 236.97 | 236.97 | |
| Total cost (Rs. in Lakh) | 32.40 | 134.24 | 157.13 | 180.01 | 214.18 | 236.97 | 236.97 | 236.97 | 1428.86 |
| Benefit (Rs. in Lakh) | 0.00 | 264.00 | 312.00 | 360.00 | 432.00 | 480.00 | 480.00 | 480.00 | |
| Total Depreciated value of all assets (Rs. in Lakh) | | | | | | | | 8.51 | |
| Total benefits (Rs. in Lakh) | 0.00 | 264.00 | 312.00 | 360.00 | 432.00 | 480.00 | 480.00 | 488.51 | 2816.51 |
| Benefit-Cost Ratio (BCR): (Highly Profitable project) | 1.971 | | | | | | | | |
| Net Present Worth (NPW): | 1387.65 | | | | | | | | |

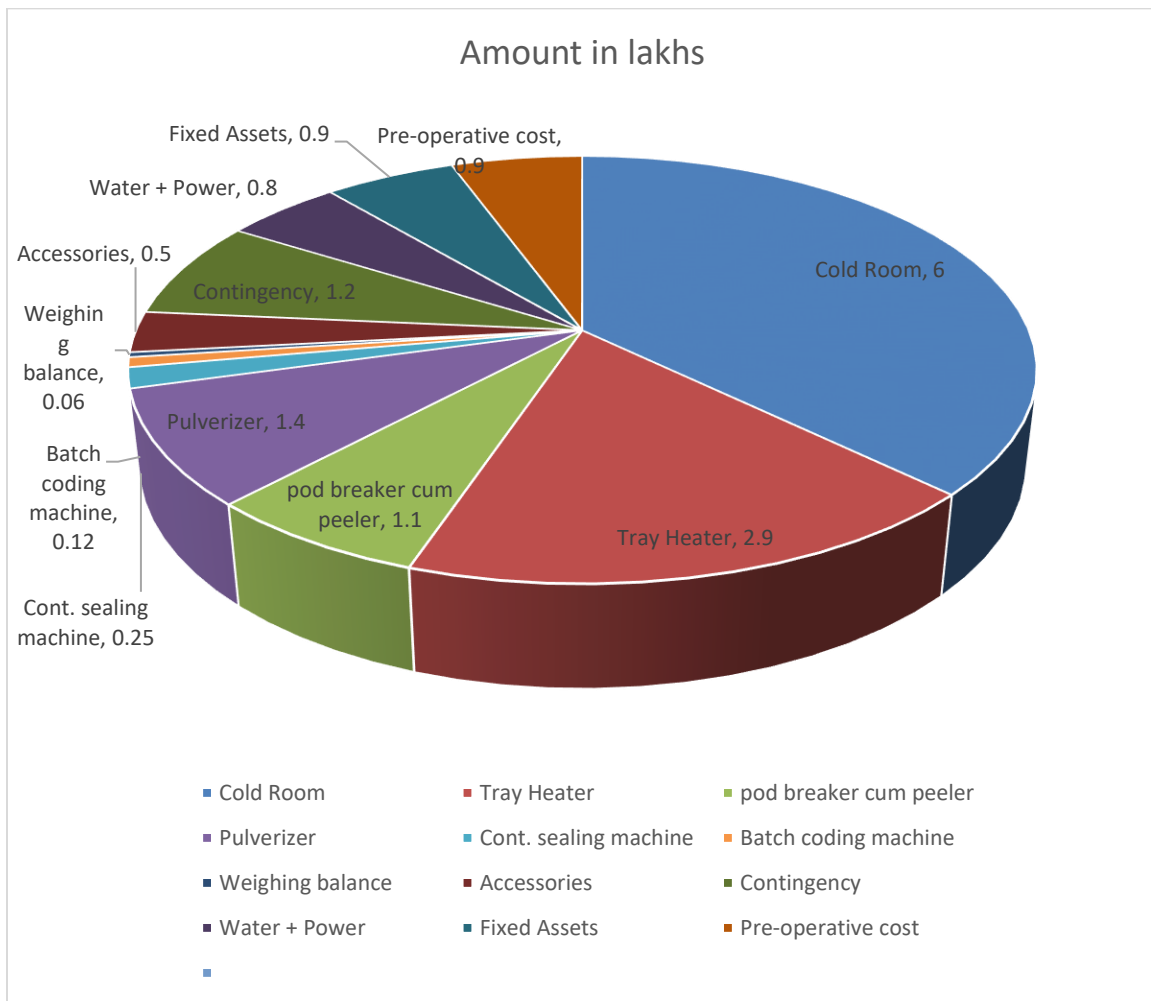
2.16 BREAK EVEN ANALYSIS

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.

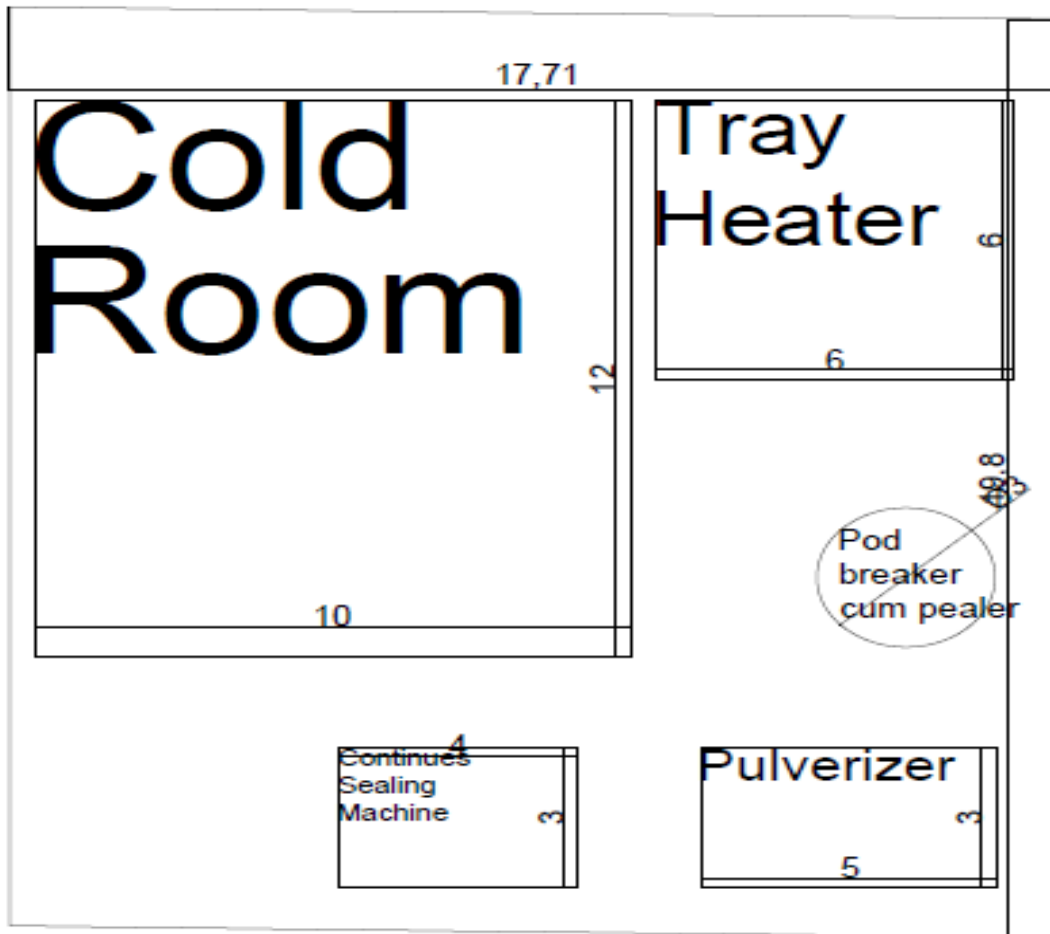
| Particulars | 1st Year | 2nd year | 3rd year | 4th year | 5th year | 6th year | 7th year | 8th year |
|--|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Capacity utilization (%) | Under Const. | 55% | 65% | 75% | 90% | 100% | 100% | 100% |
| Production MT/Annum | | 16.5 | 19.5 | 22.5 | 27 | 30 | 30 | 30 |
| Fixed Cost (Rs. in Lakh) | | | | | | | | |
| Permanent staff salaries | 5.64 | 5.64 | 5.64 | 5.64 | 5.64 | 5.64 | 5.64 | 5.64 |
| Depreciation on building @ 5% per annum | 0.23 | 0.21 | 0.20 | 0.19 | 0.18 | 0.17 | 0.17 | 0.16 |
| Depreciation on machinery @ 10% per annum | 1.23 | 1.11 | 1.00 | 0.90 | 0.81 | 0.73 | 0.66 | 0.59 |
| Depreciation on other fixed assets @ 15% per annum | 0.12 | 0.10 | 0.09 | 0.07 | 0.06 | 0.05 | 0.05 | 0.04 |
| Interest on term loan | 1.26 | 1.21 | 1.16 | 1.11 | 1.05 | 0.99 | 0.92 | 0.84 |
| Insurance | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| Total Fixed Cost (Rs. in Lakh) | 8.77 | 8.57 | 8.39 | 8.21 | 8.04 | 7.88 | 7.72 | 7.56 |
| Sales Revenue (Rs. in Lakh) | 0 | 264 | 312 | 360 | 432 | 480 | 480 | 480 |
| Variable Cost (Rs. in Lakh) | | | | | | | | |
| Cardamom (Av. Price @ Rs. 150/Kg) | 0.00 | 121.54 | 143.64 | 165.74 | 198.88 | 220.98 | 220.98 | 220.98 |
| Packaging materials | 0.00 | 1.98 | 2.34 | 2.70 | 3.24 | 3.60 | 3.60 | 3.60 |
| Casual staff salaries | 0.00 | 4.14 | 4.14 | 4.14 | 4.14 | 4.14 | 4.14 | 4.14 |
| Utilities (Electricity, Fuel) | 0.00 | 1.78 | 2.11 | 2.43 | 2.92 | 3.24 | 3.24 | 3.24 |
| Repair & maintenance | 0.00 | 0.70 | 0.80 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Miscellaneous expenses | 0.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| Interest on working capital @ 12% | 0.00 | 3.30 | 3.90 | 5.32 | 5.32 | 5.32 | 5.32 | 5.32 |

| | | | | | | | | |
|---|-------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Total Variable Cost (Rs. in Lakh) | 0.50 | 135.45 | 158.93 | 183.23 | 217.41 | 240.19 | 240.19 | 240.19 |
| Break Even Point (BEP) | | | | | | | | |
| as % of sale | - | 12.00 | 10.00 | 8.00 | 8.00 | 7.00 | 7.00 | 6.00 |
| Break Even Point (BEP) in terms of sales value (Rs. in Lakhs) | - | 31.68 | 31.20 | 28.80 | 34.56 | 33.60 | 33.60 | 28.80 |

2.17 PIE CHART FOR BETTER UNDERSTANDING OF EXPENSES OF EACH HEAD:



2.18 TYPICAL LARGE CARDAMOM POWDER MANUFACTURING UNIT LAYOUT



2.19 MACHINERY SUPPLIERS

There are many machinery suppliers available within India for spices based beverage processing machineries and equipment. Some of the suppliers are:

1. Bajaj Process pack Limited, Noida, India
2. Shriyan Enterprises. Mumbai, India

3. LIMITATIONS OF MODEL DPR & GUIDELINES FOR ENTREPRENEURS

3.1 LIMITATIONS OF THE DPR

- i. This 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 DPR is 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.

3.2 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 costing base/contract

sourcing, detailed market research, comprehensive dehydrated 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 while all situations.



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