PM Formalization of

Micro Food Processing Enterprises Scheme

DETAILED PROJECT REPORT

FOR

GUAVA PULP PROCESSING

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10	Proposed project capacity	150 MT/annum (55, 65, 75 & 90 % capacity utilization in the 2nd, 3rd, 4th & 5th years' onwards respectively
11	Raw materials	Guava
12	Major product outputs	Guava pulp
13	Total project cost (Lakhs)	32.83
	Land development, building & civil construction	5.18
	Machinery and equipments	17.86
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	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.90
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	Second Year	17.98
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	Fourth Year	28.97
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	9.99
	Promoter's contribution (min 20%)	8.20
	Term loan	14.62
16	Debt-equity ratio	1.78 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	55.95
	3rd year	68.00
	4th year	80.05
18	Average DSCR	2.31
	Benefit Cost Ratio	2.01
	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 GUAVA PRODUCTION, CLUSTERS, POST-HARVEST MANAGEMENT AND VALUE ADDITION IN INDIA

1.1 INTRODUCTION

Guava is a common tropical fruit cultivated in many tropical and subtropical regions. Psidium guajava (common guava, lemon guava) is a small tree in the myrtle family (Myrtaceae), native to Mexico, Central America, the Caribbean and northern South America. Although related species may also be called guavas, they belong to other species or genera, such as the pineapple guava, Feijoa sellowiana. In 2019, 55 million tonnes of guavas were produced worldwide, led by India with 45% of the total.

The most frequently eaten species, and the one often simply referred to as "the guava", is the apple guava (Psidium guajava). Guavas are typical Myrtoideae, with tough dark leaves that are opposite, simple, elliptic to ovate, and 5–15 centimetres (2.0–5.9 in) long. The flowers are white, with five petals and numerous stamens. The fruits are many-seeded berries.

Guava (Psidium guajava) family Myrtaceae is widely grown all over the tropics and sub-tropics though Origin of guava is the tropical America but in this sub-continent, guava has been in cultivation since early 17th century. It has become one of the most common and important fruits in Bangladesh for its nutritive value and pleasing test. It claims to be the most important fruit in area and production after mango, jackfruit, guava and lemon. It is grown in the homestead gardens throughout the country even without or with little care.

India is known as the second largest fruits and vegetables producer in the world followed by China. India, during 2017-18 has produced about 97358 Thousand MT fruits and 184394 Thousand MT vegetables in about 6506 Thousand Ha and 10259 Thousand Ha areas, respectively (Horticultural Statistics At a Glance, 2018,

MoA&FW, GoI). In spite of this, the per capita availability of fruit in India is 107 gm/day which is below the recommended 120 gm/day. India's share of global exports of fresh fruits and processed fruit products is also quite meager compared with other major fruit producers of the world (Bung, 2012). Unfortunately, fruits and vegetables being perishable in nature get wasted to the tune of 20-30 per cent in the supply chain due to improper handling, transportation and poor post-harvest management; and only 2 per cent are processed in to value added products and the rest is consumed as fresh. Therefore, processing of fruits and vegetables offers immense scope for wastage minimization and value addition; thus can generate significant income and employment in Indian agrarian economy. In India, guava is one of the important fruit crops cultivated in tropical and sub-tropical areas and has huge potential for value addition and entrepreneurship development. Guava is the fourth important crop after mango, banana and citrus. In India, 20-25% of guava fruits are spoiled due to improper handling, transportation and processing (Nida et al., 2016) and therefore, processing and value addition is extremely needed.

1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF GUAVA

Guava (*Psidium guajava)* is originated from an extended area of Mexico, Central America or North-South America throughout the Caribbean region. Guava is cultivated in many tropical and subtropical countries across Asia, the southern United States, tropical Africa, South Asia, Southeast Asia, and Oceania. India with the production 4054 Thousand MT Guava in about 265 Thousand Ha areas during 2017-18 (Horticultural Statistics At a Glance, 2018, MoA&FW, GoI) had occupied the first position in the world (41% of the World's production). Its adaptability to varied environments makes it one of the favorite commercial crops.

In India (Table 1), the ten major Guava producing states during 2017-18 (Horticultural Statistics At a Glance, 2018, MoA&FW, GoI) were Uttar Pradesh (928.44 Thousand MT), Madhya Pradesh (686.70 Thousand MT), Bihar (427.61 Thousand MT), Andhra Pradesh (229.78 Thousand MT), West Bengal (215.20 Thousand MT), Chhatisgarh

(197.18 Thousand MT), Punjab (195.60 Thousand MT), Gujarat (169.57 Thousand MT), Tamil Nadu (155.06 Thousand MT) and Karnataka (140.23 Thousand MT). The major growing clusters in these states are given:

Table 1: State-wise Area and Production of Guava in India (Area in '000 Ha, Production in '000 MT)

Sl.	States/UTs	2015-16		2016-17		2017-18	
		Area	Prod.	Area	Prod.	Area	Prod.
1	Andhra Pradesh	6.04	109.03	7.43	288.02	9.53	229.78
2	Arunachal Pradesh	0.46	0.65	0.13	0.27	0.12	0.22
3	Assam	4.36	95.62	4.38	96.14	4.43	96.69
4	Bihar	29.34	370.00	29.38	370.37	27.61	427.61
5	Chhatisgarh	20.63	179.59	20.30	180.21	21.89	197.18
6	Gujarat	11.64	153.0	12.09	160.81	12.67	169.57
7	Haryana	11.21	152.18	11.73	163.22	12.09	137.02
8	Himachal Pradesh	2.27	2.61	2.29	2.66	2.32	2.61
9	Jammu & Kashmir	2.46	8.65	2.48	9.15	2.34	7.77
10	Jharkhan	8.10	80.05	8.17	88.84	8.32	89.31
11	Karnataka	6.61	128.11	6.87	134.31	7.18	140.23
12	Kerala	0.22	1.37	0.43	0.62	0.16	1.42
13	Madhya Pradesh	28.44	990.00	32.07	613.05	35.08	686.70
14	Maharashtra	11.74	130.71	11.12	124.31	9.07	122.83
15	Mizoram	0.43	2.47	0.42	2.55	0.42	2.55
16	Nagaland	0.53	4.29	0.58	4.74	0.58	4.75
17	Odisha	14.21	103.79	14.22	104.00	14.27	105.04
18	Punjab	8.12	182.27	8.10	182.09	8.69	195.60
19	Rajasthan	3.85	41.35	4.17	27.18	4.33	55.13
20	Sikkim	1.22	0.12	1.29	0.13	1.21	17.60

21	Tamil Nadu	9.00	71.97	10.79	105.43	9.69	155.06
22	Telengana	5.38	101.11	2.23	13.86	2.56	38.74
23	Tripura	1.01	5.08	0.88	4.56	0.70	3.40
24	Uttar Pradesh	48.70	914.36	49.28	926.25	49.53	928.44
25	Uttarakhand	3.37	19.09	3.43	19.34	3.62	20.37
26	West Bengal	15.37	198.79	15.67	202.95	16.25	215.20
	Others States	0.17	1.50	0.14	1.35	0.20	2.73
	Total	**254.87**	**4047.79**	**260.07**	**3826.40**	**264.85**	**4053.51**
Source: Horticultural Statistics At a Glance, 2018, MoA&FW, GoI							

Table 2: Major Guava Clusters in Important Guava Growing States in India

State	**Guava Production Clusters**
Uttar Pradesh	Allahabad, Farukhabad, Aligarh, Badaun
Madhya Pradesh	Jabalpur, Ujjain, Hoshangabad, Khargone, Badwani, Indore, Shivpuri
Bihar	Mujaffarpur, Begusarai, Katihar, Siwan, Madhubani, Kishanganj, Purnia
Andhra Pradesh	East Godavari, West Godavari, Guntur, Krishna, Ananthapur, Medak, Ranga Reddy, Mahaboob nagar, Prakasham, Khammam
West Bengal	South 24 Parganas, North 24 Parganas, Hooghly
Chhatisgarh	Raipur, Durg
Punjab	Ludhiana, Gurudaspur, Amritsar, Taran Taran, Jalandhar
Gujarat	Bhavnagar, Ahmedabad
Tamil Nadu	Madurai, Dindigul, Salem
Karnataka	Kolar, Shimoga, Dharwar, Raichur, Bangalore (R & U), Belgaum
Source: http://nhb.gov.in	

1.3 VARIETIES

Some common varieties of guava found in worldwide are mentioned below:

Supreme: Of faint odor, thick, white flesh, relatively few, small seeds, high ascorbic acid content and ability to produce heavy crops over a period of 8 months from late fall to early spring.

Red Indian: Of strong odor, medium to large size, round but slightly flattened at the base and apex, yellow skin often with pink blush; with medium thick, red flesh of sweet flavor; numerous but small seeds; agreeable for eating fresh; fairly productive in fall and early winter.

Ruby: With pungent odor, medium to large size; ovate; with thick, red flesh, sweet flavor, relatively few seeds. An excellent guava for eating fresh and for canning; fairly productive, mainly in fall and early winter.

Blitch|: Of strong odor, medium size, oval, with light-pink flesh, numerous, small seeds; tart, pleasant flavor; good for jelly.

Patillo: Of very mild odor, medium size, ovate to obovate, with pink flesh, moderate number of small seeds; subacid, agreeable flavor; good for general cooking.

Rolfs: Of medium size with pink flesh; of good quality and containing 9% sugar.

Hart: fairly large, with pale-yellow flesh, and 8% sugar content.

Apple Colour:–of medium size, slightly oblate; deep-pink skin, creamy-white flesh, moderate amount of seeds, very sweet flavor (0.34-2.12% acid, 9 to 11.36% sugar); heavy bearer; good keeping quality; good for canning.

Behat Coconut:–Large, with thick white flesh, few seeds; poor for canning.

Chittidar:–medium to large, round-ovate, white-fleshed, mild acid-sweet flavor; bears moderately well; keeps well; well for canning.

Habshi:–Of medium size with thick, white flesh, few seeds; halves good for canning.

Lucknow 42:–of medium size, roundish, with creamy-white, soft flesh; sweet, pleasant flavor; very few seeds; good quality; bears heavily; keeps fairly well; not suitable for canning.

Lucknow 49: medium-large with cream-white, thick flesh, few seeds; acid-sweet; good quality; heavy bearer; high in pectin and good for jelly; halves good for canning.

Safeda: Of medium size, with very thin skin, thick, white flesh, few seeds. Outstanding quality for canning. A famous guava, widely planted, but susceptible to wilt and branches are brittle and break readily.

Smooth Green: Of medium size, with thick white flesh, few, small, hard seeds. Halves are firm, good for canning.

Allahabad:–large, white-fleshed, with few, medium-sized, fairly hard seeds.

Karela:–Medium-large, pear-shaped, furrowed, rough-skinned, with soft, granular, white flesh; sweet, rich, pleasant flavor. Poor bearer. Not popular.

Nagpur Seedless: Small to medium, often irregular in shape; white-fleshed.

Seedless: (from Allahabad)–medium to large, pear-shaped to ovoid; with thick white flesh, firm to soft, sweet. Light bearer; poor keeper. A seedless type at Poona, India, was found to be a triploid with 33 chromosomes in place of the usual 22.

Other white-fleshed guavas with poor canning qualities are: **'Dharwar', 'Mirzapuri', 'Nasik', 'Sindh',** and **'White Supreme X Ruby'.**

Among red-fleshed cultivars in India there are:

Anakapalle: –small, with thin, red flesh, many seeds; not suitable for canning.

Florida Seedling:–Small, with thin, red, acid flesh; many seeds; not suitable for canning.

Hapi:–medium to large, with red flesh.

Hybrid Red Supreme: –Large, with thin, red, acid flesh; moderate amount of seeds; not suitable for canning.

Kothrud:–Of medium size with medium thick, red flesh; moderate amount of seeds; not suitable for canning.

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Guava is low in calories and fats but has several vital vitamins, minerals, and antioxidant polyphenolic and flavonoid compounds (Table 3) that play a pivotal role to prevent cancers, aging, infections etc. It is very rich source of soluble dietary fiber and antioxidant Vitamin-C. The fruit is a very good source of Vitamin-A, and flavonoids like beta-carotene, lycopene, lutein and cryptoxanthin that are known to have antioxidant properties. Higher potassium in guava is important component of cell and body fluids that helps controlling heart rate and blood pressure.

Nutritional value:

Table 3: Nutritive Value of Guava (*Psidium guajava)* per 100 gm

Principle	**Nutrient Value**	**Percentage to RDA**
Energy	68 Kcal	3.50%
Carbohydrates	14.3 g	11.50%
Protein	2.55 g	5%

Total Fat	0.95 g	3%
Cholesterol	0 mg	0%
Dietary fiber	5.4 g	14%
Vitamins & Minerals		
Folates	49µg	12.50%
Niacin	1.084 mg	7%
Pantothenic Acid	0.451 mg	9%
Pyridoxine	0.110 mg	8.50%
Riboflavin	0.040 mg	3%
Thiamin	0.067 mg	5.50%
Vitamin A	624 IU	21%
Vitamin C	228 mg	3.96%
Vitamin E	0.73 mg	5%
Vitamin K	2.6 µg	2%
Sodium	2 mg	0%
Potassium	417 mg	9%
Calcium	18 mg	2%
Copper	0.230 mg	2.50%
Iron	0.26 mg	3%
Magnesium	22 mg	5.50%
Manganese	0.150 mg	6.50%
Phosphorus	11 mg	2%
Selenium	0.6 mcg	1%
Zinc	0.23 mg	2%
Phyto-Nutrients		
Carotene β	374 µg	-
Crypto-xanthin β	0 µg	-
Lycopene	5204 µg	-
Source: USDA National Nutrient data base		

CONSTITUENTS AND HEALTH BENEFITS OF GUAVA

Health benefits:

- Lower blood sugar level
- Boost heart health
- Improve gut health
- Aid weigh loss
- Improve eye sight
- Stress buster
- Anti ageing effect
- Anticancer effect
- Boost immunity
- Good for skin

1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-

Guava can grow from the sea level to an altitude of about 1500 meter with annual rainfall of below 1000 mm. June and September is the best time for the growth of guava plants. Young plants are susceptible to drought and cold conditions. Guava being perennial fruit plant can live up to 40 years without being replanted and the fruits are readily available year around in tropical region. Guava plants are vegetatively propagated by budding, inarching or air layering. Planting is done during the rainy season i.e. June-July through layers and seedling. Plants start bearing fruits at 2 years and become heavy bearers by 8 years. A Guava plant can be ready for harvesting twice in a year under proper agronomic practices. The fruits are usually let ripened on the tree to experience their intense, natural flavor. However for longer storage, these must be picked while green and mature; and later allowed for ripening. The ripe guava fruit is soft

with sweet musky aroma, varied colours and creamy texture. The fresh ripe fruit has a short shelf life; however, mature and green fruits can be stored up to five weeks between 46°F and 55°F temperature and 85- 95% relative humidity and then value addition can be done at later stage.

Guava is grown in both tropical and sub-tropical regions upto 1,500 m. above m.s.l. It tolerates high temperatures and drought conditions prevalent in north India in summers. However, it is susceptible to severe frost as it can kill the young plants. An annual rainfall of about 100 cm. is sufficient during the rainy season (July-September). Rainfall during the harvesting period deteriorates the quality of fruits.

Heavy clay to very light sandy soils having pH between 4.5-8.2 are suitable for cultivation of guava. Good quality guavas are produced in river basins. The crop is sensitive to water-logging.

Land Preparation:

Land is prepared during the summer season by ploughing, harrowing, levelling and removing weeds.

Planting:

Plants are vegetative propagated by budding, inarching or air layering. Planting is done during the rainy season. June-July is the ideal time for planting the layers and seedling. The plants are usually planted at a distance of 5-8 m. The exact planting distance is decided according to variety, soil fertility and availability of irrigation facilities. Standard spacing is 6 m. x 6 m. accommodating 112 plants/acre. By increasing the plant density, productivity can be increased. In the model scheme, a spacing of 6 m. x 6 m. with a population of 110 plants per acre has been considered which was commonly observed in areas covered during a field study. High density planting causes erect growth of branches making the plant tall, compact and also gives higher yield/unit area in early

years of fruiting. Square system of planting is generally adopted. Pits of 1x1x1m. Size are dug before the monsoon and filled with a mixture of farmyard manure and soil. Guava is mostly grown under rain fed condition. During winter season, irrigation is provided at an interval of 20-25 days and in the summer months it is provided at an interval of 10-15 days by the ring method. The plants start bearing at an early age of 2-3 years but they attain full bearing capacity at the age of 8-10 years. The yield of a plant depends on its age, cropping pattern and the cultural practices. A 10 year old plant yields about 100 to 150 kg. of fruits every year. If both rainy and winter season crops are taken, more yields may be obtained in the rainy season.

Guavas are harvested throughout the year (except during May and June) in one or the other region of the country. However, peak harvesting periods in north India are August for rainy season crop, November- December for winter season crop and March-April for spring season crop. In the mild climatic conditions of the other parts of the country, the peak harvesting periods are not so distinct.

Guava fruits develop best flavour and aroma only when they ripen on tree. In most of the commercial varieties, the stage of fruit ripeness is indicated by the colour development which is usually yellow. For local markets, fully yellow but firm fruits are harvested, whereas half yellow fruits are picked for distant markets. Fruits are harvested selectively by hand along with the stalk and leaves.

POST-HARVEST MANAGEMENT

- Fruits are graded on the basis of their weight, size and colour. The fresh fruit has a short shelf life and distant marketing can be done only if it is properly stored.

- The shelf life can be extended up to 20 days by keeping them at low temperature of 5^0 C and 75-85% relative humidity. It can be stored for about 10 days at room temperature (18^0-23^0 C) in polybags providing a ventilation of 0.25%.

- The fruits are packed in baskets made from locally available plant material. For distant markets, wooden or corrugated fibre board boxes are used along with cushioning materials viz. paddy straw, dry grass, guava leaves or rough paper. Good ventilation is necessary to check build-up of heat. Guava is a delicate fruit requiring careful handling during harvesting and transportation.

- Guavas being perishable in nature are immediately sent after harvesting in the local market and only a small quantity is being sent to the distant markets.

- Majority of the cultivation sell their produce either through trade agents at village level or commission agents at the market.

- Road transport by trucks / Lorries is the most convenient mode of transport due to easy approach from orchards to the market.

1.6 PROCESSING & VALUE ADDITION:-

The fresh fruits have limited shelf life; therefore, it is necessary to process fresh fruits in to different value added products to increase its availability over an extended period and to stabilize the price during the glut season. The processed products have good potential for internal as well as external trade. Seasonal losses in surplus guava fruits can be avoided by processing into different value added products that make them more attractive to the buyer and/or more readily usable to the consumer. Guava being rich in pectin can be used for preparation of natural jam and jelly. Processed guava pulp is an excellent raw material for preparation of juice, RTS beverages, wine, nectar, powder, candy and preserve.

Guava pulp or juice can also be used as additive in other fruit juice or pulp. In view of changing consumer attitude, demand and emergence of new market, it has become imperative to develop products that have nutritional as well as health benefits. In this context, guava has excellent digestive and nutritive value, pleasant flavour, high palatability and availability in abundance at moderate price. Guava is a very popular fruit in India and it is available throughout the year except summer season. The nutritive value of the fruit is very high and thus it is an ideal crop for processing and value addition.

2. MODEL GUAVA PULP 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 ideal locations for establishment of exclusive guava pulp processing unit are in the production clusters of guava growing states/Areas such as The ideal locations for establishment of exclusive guava pulp processing unit are in the production clusters of the ten major guava growing states such as Uttar Pradesh, Madhya Pradesh, Bihar, Andhra Pradesh, West Bengal, Chhattisgarh, Punjab, Gujarat, Tamil Nadu and Karnataka where adequate quantities of surplus raw materials can be available for processing. However, in other states of India multi fruit based processed pulp unit with guava as one of the raw materials can be established.

2.2 INSTALLED CAPACITY OF THE GUAVA PULP PROCESSING UNIT

The maximum installed capacity of the Guava pulp manufacturing unit in the present model project is proposed as 150 tonns/annum or 500 kg/day Guava pulp. The unit is assumed to operate 300 days/annum @ 8-10 hrs/day. The 1styear 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 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 Guava pulp manufacturing project, the unit requires 336.11 kg/day, 397.22 kg/day, 458.33 kg/day, 550 kg/day Guava fruit at 55, 65, 75, 90 percent capacity utilization, respectively. The Guava must be harvested from plant; and then stored below 6°C temperature.

2.4 MANUFACTURING PROCESS OF THE GUAVA PULP

The typical Procedure for manufacturing of Guava pulp is as below:

Flow chart for Guava pulp:

Blanching

Crushing/milling

Grinding

Heating (80-90°C for 5 min)

Colloid milling

Canning & Hot Filling

2.5 MARKET DEMAND AND SUPPLY FOR GUAVA PULP

Production of guava is majorly concentrated in India, Pakistan, Brazil, and Mexico. Other producing nations include China, Bangladesh, Thailand, Vietnam, Malaysia, Philippines, Cuba, Israel, Sri Lanka, Sudan, South Africa, the Dominican Republic, El Salvador, Guatemala, Colombia, Peru, Suriname, and Venezuela. Most of the fruit that is produced is being consumed in the country of origin as fresh fruit. The majority of trade that occurs is in the form of pulp and concentrate form. The processed form of guava is mainly traded from countries such as Mexico and Brazil, where most of the processing is destined for juice production. US Imports of guava paste/pulp have been relatively stable in the last five years the flow of trade is mostly from Brazil and Dominican Republic. Mexico the main supplier of fresh guavas has recorded growth in demand in the processed guava pulp segment, this significant growth is mainly fuelled by European demand for paste/pulp.

Guava pulp is segmented on the basis of source and end use. Based on the source guava pulp is segmented as organic guava pulp and conventional guava pulp.

On the basis of end use, guava pulp is segmented as; infant food, beverages, bakery & snacks, ice-cream & yogurt, dressings and sauces and others.

The global guava pulp market is expected to rise at a CAGR of 5.6% by the end of forecast period. The market generated revenue of US$ 313.8 mn during 2017 and is expected to rise significantly in the coming years. According to variety, the leading segment is tropical pink with 55.2% share in 2017. Tropical pink segment is expected to continue leading the market during the forecast period. Geographically, Asia Pacific is expected to gain a significant amount of share by the end of forecast period.

Global guava pulp market is expected to grow majorly due to its various health benefits. According to a report by Transparency Market Research, the global guava pulp market is estimated to rise during the forecast period of 2017 to 2027 due to increased

consumption of guava pulp by various consumers due to its health benefit. The major companies in this market are involved in growing guava cultivation and supplying guava pulp to food and beverage industry. Manufacturers are supplying guava pulp to different regions depending on the penetration of demand in each region. Manufacturers are also involving in improving the taste and texture of the pulp to attract more customers.

Guava pulps are generally thick and smooth products which is obtained from processing of guavas including removal of the insoluble fibrous part and can pass through a fine sieve. Fruit pulps are commonly used for the preparation of beverages, syrups, ice cream topping, jams and jellies, dressing and fruit sauces. Most common form of guava pulps are frozen, canned, and aseptic packed. Few companies even dry guava pulp powder for enhanced shelf life of the product and easy exports.

Guava pulp market is driven by demand from the food and beverages industry. Advancements in guava cultivation and processing has augmented guava pulp supply globally over the years. Demand is concentrated in the western part of the world while supply of guava is concentrated in the eastern part of the world. However, demand in North America and European region is met by South American and African countries. On the other hand, guava pulp demand is locally consumed in India and rest is exported to Middle-Eastern countries mainly.

The major demand for guava pulp market is derived from food and beverages industry. The advancement in processing and cultivation of guava pulp has increased its demand in the market.

Demand in the western part of the world is provided by eastern part of the world due to increased consumption of the same. Eastern part of the world therefore consumes and also exports guava to western part of the world. Guava has various health benefits which increases its demand among consumers. It is helpful in maintaining bowel system and cleansing digestive system. Due to rise in diabetes, guava pulp consumption has increased majorly in many regions of the world. It also help in boosting the

blood sugar level. The adequate supply of guava is also leading to the increased consumption of guava pulp globally. The taste, flavor, texture, and color of guava attracts and encourages customers to consume it. The increased consumption of guava pulp due to its health benefits are likely to boost the market. These factors will show a significant rise in the growth and supply of guava pulp during the forecast period.

2.6 MARKETING STRATEGY FOR GUAVA PULP

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

2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Guava pulp 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 fruit processing unit by adding new pulp manufacturing 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. Guava cost considered @ Rs.20/-per kg.
    2. 1 kg Guava will produce 90% 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 Guava Pulp Unit	150	MT/annum
Utilization of capacity	1st Year Implementation, 55% in second, 65% in third, 75% in fourth year, 90% in fifth years onwards respectively.	
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	20	
Average sale prices per Kg	180	Rs/kg
Pulp extraction	90	
GUAVA PULP	1.22 Kg Guava for 1 kg Guava Pulp	

2.8 FIXED CAPITAL INVESTMENT

2.8.1 MACHINERY AND EQUIPMENT

Sr No.	Equipment	Quantity	Capacity	Area (in feet)	Price (Rs. In Lacs)
1	Cold store	1	9000 kg	10*12*12	8
2	Washing tank	1	200 liter	3 ft dia	0.6
3	Peeling machine	1	200 kg/hr	3*5	1.2

4	Blanching kettle Gas operated	1	300 Liter	4*3	0.8
5	Crusher/miller	1	100 kg/hr	3*3	0.4
6	Pulping machine with deseeder	1	100 kg/hr	4*3	0.6
7	Thermic fluid kettle with scraper	1	150 liter	3 .5 ft dia	1.6
8	Seamer	1	Suitable	4*3	3
9	Hot filling machine	1	Suitable	6*4	1.1
10	Weighing balance	1	Suitable		0.06
11	Accessories	1	Suitable		0.5
					17.86

2.8.2 OTHER COSTS:-

Utilities and Fittings:-

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

Other Fixed Assests:

Other Fixed Assets	
1. Furniture & Fixtures	Rs. 0.9 LacS 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 32.83 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	Year 2 (55%)	Year 3 (65%)	Year 4 (75%)
Raw material stock	7 days	0.96	1.13	1.54
Work in progress	15 days	1.91	2.26	3.08
Packing material	15 days	3.00	3.55	4.83
Finished goods' stock	15 days	5.64	6.67	9.09
Receivables	30 days	11.28	13.33	18.18
Working expenses	30 days	1.18	1.40	1.91
Total current assets		23.97	28.33	38.63
Trade creditors		0.00	0.00	0.00
Working capital gap		23.97	28.33	38.63
Margin money (25%)		5.99	7.08	9.66
Bank finance		17.98	21.25	28.97

2.10 TOTAL PROJECT COST AND MEANS OF FINANCES

Particulars	Amount in Lakhs
i. Land and building (20 x 32 x 12 ft - LxBxH)	5.18
ii. Plant and machinery	17.86
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	5.99
Total project cost (i to vii)	32.83
Means Of finance	
i. Subsidy	9.99
ii. Promoters Contribution	8.20
iii. Term Loan (@45%)	14.62

2.11 MANPOWER REQUIREMENTS

Total Monthly Salary (Rs.)	No	Wages	Total Monthly	Total Annualy
Supervisor (can be the owner)	1	18000	18000	216000
Technician	1	14000	14000	168000
Semi skilled	2	7600	15200	182400
Helper	1	5500	5500	66000
Sales man	1	8000	8000	96000
			60700	728400

2.12 EXPENDITURE, REVENUE AND PROFITABILITY ANALYSIS

	Particulars	**1st Year**	**2nd Year**	**3rd Year**	**4th Year**	**5th year**
A	Total Installed Capacity (MT)	184 MT Guava/Annum	82.5	97.5	112.5	135
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%
B	**Expenditure (Rs. in Lakh)**	0				
	Guava (Av. Price @ Rs.20/Kg)	0.00	20.17	23.83	27.50	33.00
	Preservative @ Rs. 150/kg	0.00	0.12	0.15	0.17	0.20
	Other materials	0.00	0.10	0.12	0.14	0.16
	Packaging materials (Rs 12 per Kg)	0.00	33.00	39.00	45.00	54.00
	Utilities (Electricity, Fuel)	0.00	1.18	1.40	1.61	1.93
	Salaries (1st yr only manager's salary)	2.16	7.28	7.28	7.28	7.28
	Repair & maintenance	0.00	0.70	0.80	0.90	0.90
	Insurance	0.30	0.30	0.30	0.30	0.30
	Miscellaneous expenses	0.50	2.30	2.30	2.30	2.30
	Total Expenditure	**2.96**	**65.15**	**75.18**	**85.20**	**100.08**
C	**Total Sales Revenue (Rs. in Lakh)**	**0.00**	**148.50**	**175.50**	**202.50**	**202.50**
	Sale of Guava pulp (Av. Sale Price @ Rs.180/kg)	0.00	148.50	175.50	202.50	202.50
D	**PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows**	**-2.96**	**83.35**	**100.32**	**117.30**	**102.42**
	Depreciation on civil works @ 5% per annum	0.26	0.25	0.23	0.22	0.21
	Depreciation on machinery @ 10% per annum	1.79	1.61	1.45	1.30	1.17
	Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06
	Interest on term loan @ 12%	1.52	1.47	1.41	1.35	1.27

	Interest on working capital @ 12%	0.00	2.16	2.55	3.48	3.48
E	Profit after depreciation and Interest (Rs. in Lakh)	**-6.65**	**79.92**	**97.15**	**114.36**	**99.70**
F	Tax (assumed 30%) (Rs. in Lakh)	**0.00**	**23.98**	**29.14**	**34.31**	**29.91**
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	**-6.65**	**55.95**	**68.00**	**80.05**	**69.79**
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	1.52	1.47	1.41	1.35	1.27
I	Coverage available (Rs. in Lakh)	1.52	1.47	1.41	1.35	1.27
J	Total Debt Outgo (Rs. in Lakh)	0.51	0.56	0.62	0.68	0.75
K	Debt Service Coverage Ratio (DSCR)	3.00	2.62	2.28	1.97	1.69
	Average DSCR	2.31				
L	Cash accruals (PBDIT- Interest-Tax) (Rs. in Lakh)	-4.48	57.90	69.77	81.65	71.24
M	Payback Period	2.5 Years				
	(on Rs. 32.83 Lakhs initial investment)					

2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	1,462,704.91	202,905.23	152,121.31	50,783.92	1,411,921.00
2	1,411,921.00	202,905.23	146,839.78	56,065.45	1,355,855.55
3	1,355,855.55	202,905.23	141,008.98	61,896.25	1,293,959.30
4	1,293,959.30	202,905.23	134,571.77	68,333.46	1,225,625.83
5	1,225,625.83	202,905.23	127,465.09	75,440.14	1,150,185.69
6	1,150,185.69	202,905.23	119,619.31	83,285.92	1,066,899.77
7	1,066,899.77	202,905.23	110,957.58	91,947.65	974,952.11

8	974,952.11	202,905.23	101,395.02	101,510.21	873,441.90
9	873,441.90	202,905.23	90,837.96	112,067.27	761,374.63
10	761,374.63	202,905.23	79,182.96	123,722.27	637,652.36
11	637,652.36	202,905.23	66,315.85	136,589.38	501,062.98
12	501,062.98	202,905.23	52,110.55	150,794.68	350,268.30
13	350,268.30	202,905.23	36,427.90	166,477.33	183,790.97
14	183,790.97	202,905.23	19,114.26	183,790.97	-
		2,840,673.23	1,377,968.31	1,462,704.91	(1,462,704.91)

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	5.18	4.92	4.67	4.44	4.22	4.01	3.81	3.62
Depreciation	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18
Depreciated value	4.92	4.67	4.44	4.22	4.01	3.81	3.62	3.44
Plant & Machinery	17.86	16.07	14.47	13.02	11.72	10.55	9.49	8.54
Depreciation	1.79	1.61	1.45	1.30	1.17	1.05	0.95	0.85
Depreciated value	16.07	14.47	13.02	11.72	10.55	9.49	8.54	7.69
Other Fixed	0.80	0.68	0.58	0.49	0.42	0.35	0.30	0.26

Assets								
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	23.84	21.68	19.72	17.95	16.35	14.91	13.60	12.42
Depreciation	2.17	1.96	1.77	1.60	1.45	1.31	1.18	1.07
Depreciated value	21.68	19.72	17.95	16.35	14.91	13.60	12.42	11.34

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	
Capital cost (Rs. in Lakh)	32.83	0.00	0.00	0.00	0.00		
Recurring cost (Rs. in Lakh)	2.96	65.15	75.18	85.20	100.08		
Total cost (Rs. in Lakh)	35.79	65.15	75.18	85.20	100.08		361.40
Benefit (Rs. in Lakh)	0.00	148.50	175.50	202.50	202.50		
Total Depreciated value of all assets (Rs. in Lakh)						11.34	
Total benefits (Rs. in Lakh)	0.00	148.50	175.50	202.50	202.50	11.34	729.00
Benefit-Cost Ratio (BCR): (Highly Profitable project)	**2.017**						
Net Present Worth (NPW):	367.60						

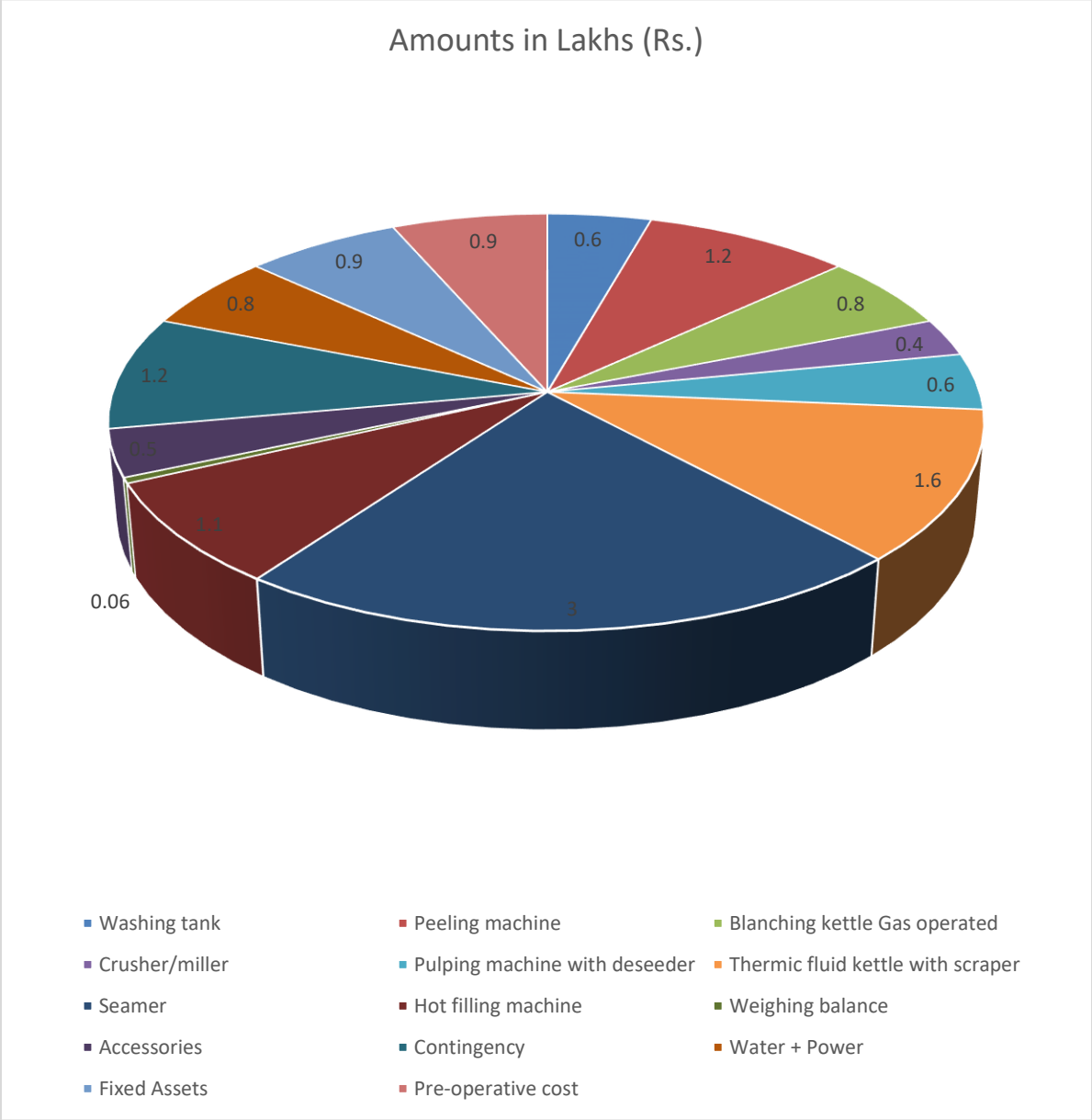
2.16 BREAK EVEN ANALYSIS

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.

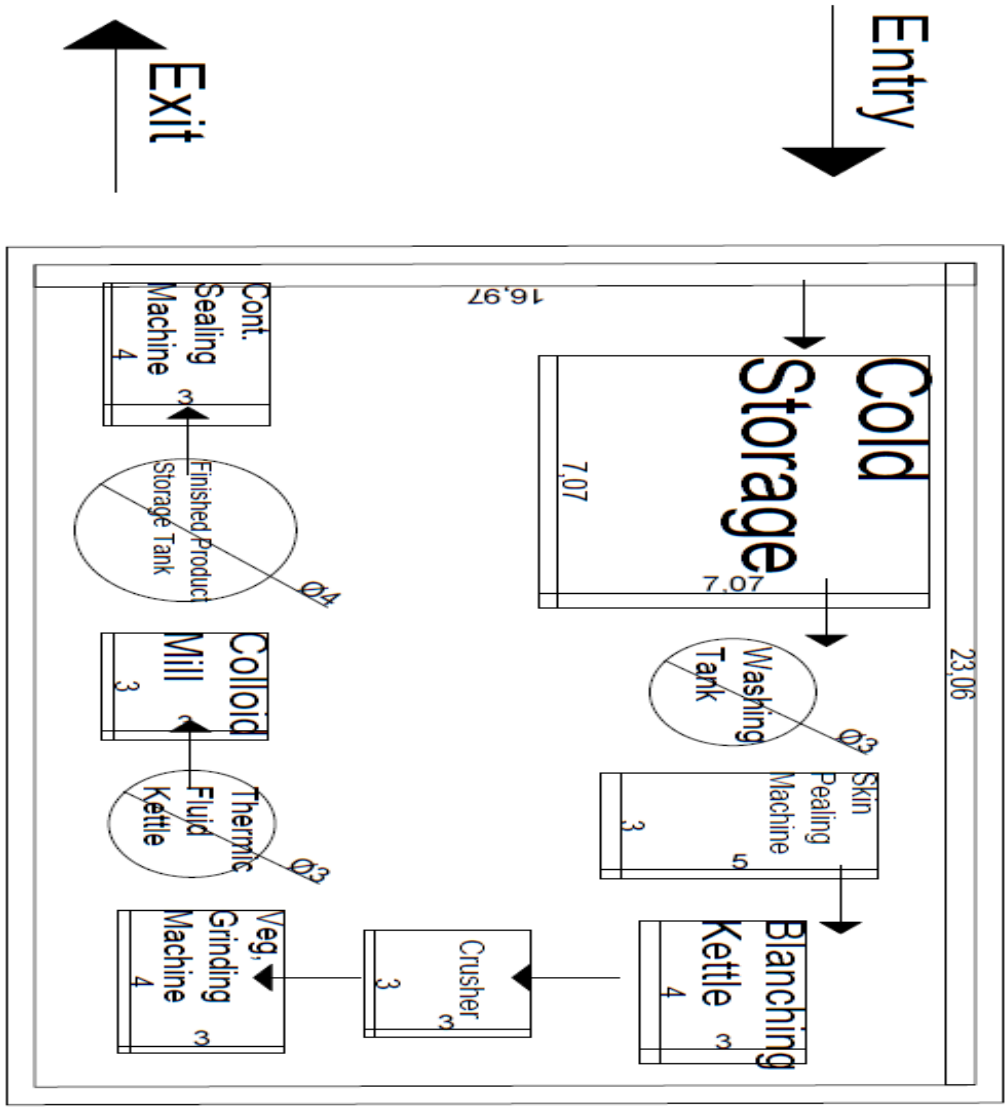
Particulars	**1st Year**	**2nd year**	**3 rd year**	**4th year**	**5th year**
Capacity utilization (%)	Under Const.	55%	65%	75%	90%
Production MT/Annum		82.5	97.5	112.5	135
Fixed Cost (Rs. in Lakh)					
Permanent staff salaries	7.284	7.284	7.284	7.284	7.284
Depreciation on building @ 5% per annum	0.26	0.25	0.23	0.22	0.21
Depreciation on machinery @ 10% per annum	1.79	1.61	1.45	1.30	1.17
Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06
Interest on term loan	1.52	1.47	1.41	1.35	1.27
Insurance	0.3	0.3	0.3	0.3	0.3
Total Fixed Cost (Rs. in Lakh)	**11.27**	**11.00**	**10.76**	**10.52**	**10.30**
Sales Revenue (Rs. in Lakh)	**0**	**148.5**	**175.5**	**202.5**	**202.5**
Variable Cost (Rs. in Lakh)					
Guava (Av. Price @ Rs. 20/Kg)	0.00	20.17	23.83	27.50	33.00
Preservative @ 150 per kg	0.00	0.12	0.15	0.17	0.20
Other ingredients	0.00	0.10	0.12	0.14	0.16
Packaging materials	0.00	33.00	39.00	45.00	54.00
Casual staff salaries	0.00	5.78	5.78	5.78	5.78
Utilities (Electricity, Fuel)	0.00	1.18	1.40	1.61	1.93

Repair & maintenance	0.00	0.70	0.80	0.90	0.90
Miscellaneous expenses	0.50	2.00	2.00	2.00	2.00
Interest on working capital @ 12%	0.00	2.16	2.55	3.48	3.48
Total Variable Cost (Rs. in Lakh)	**0.50**	**65.21**	**75.63**	**86.57**	**101.46**
Break Even Point (BEP)					
as % of sale	-	12.00	10.00	8.00	8.00
Break Even Point (BEP) in terms of sales value (Rs. in Lakhs)	-	17.82	17.55	16.20	16.20

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



2.18 TYPICAL GUAVA PULP MANUFACTURING UNIT LAYOUT



2.19 MACHINERY SUPPLIERS

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

1. Bajaj Process pack Limited, Noida, India
2. Shriyan Enterprises. Mumbai, India
3. Jwala Technocrats, Boiser, Maharashtra, 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.

Contact Us

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