MINISTRY OF FOOD PROCESSING INDUSTRIES
GOVERNMENT OF INDIA

PMFME
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NIFTEM
THANJAVUR

PM Formalisation of
Micro Food Processing Enterprises Scheme

DETAILED PROJECT REPORT
FOR
MANGO RTS

AATMANIRBHAR BHARAT

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The Project at a Glance		
1	Name of the Project	Mango RTS
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 share holders (if company/FPC)	
8	Technical advisor	
9	Marketing advisor/partners	
10	Proposed project capacity	150 MT/annum (55, 65, 75, 90 & 100% capacity utilization in the 2nd, 3rd, 4th, 5th and 6th years' onwards respectively
11	Raw materials	Mango Fruit
12	Major product outputs	Mango RTS
13	Total project cost (Lakhs)	30.60
	Land development, building & civil construction	5.18
	Machinery and equipments	18.61
	Utilities (Power & water facilities)	0.8
	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.90
	Contingencies	1.20
	Working capital margin	0.25
14	Working capital Management (In Lakhs)	
	Second Year	9.04
	Third Year	10.68
	Fourth Year	14.57
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	10.09885967
	Promoter's contribution (min 20%)	6.120521009

	Term loan (45%)	**14.38322437**
16	**Debt-equity ratio**	**2.34 : 1**
17	**Profit after Depreciation, Interest & Tax**	
	2nd year	**11.44**
	3rd year	**16.34**
	4th year	**21.17**
18	**Average DSCR**	**2.16**
	Benefit Cost Ratio	**1.771195656**
	Term Loan Payment	**7 Years with 1 year grace period**
	Pay Back Period for investment	**2 Years**

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

1.1 INTRODUCTION

India ranks second for 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 respectively (Horticulture statistics At a glance, 2018, MoA& FW Gol). 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 to 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 % in the supply chain due to improper handling, transportation and poor post-harvest management; and only 2 % of them are processed in to value added products and the rest is consumed fresh.

Mango (*Mangifera indica L.*) is one of the favored fruits in the tropical and sub-tropical regions. It has an excellent flavor, attractive fragrance, delicious taste and high nutritional value that have made it one of the best fruits.

Originating from India and Malaysia, mango is a common tropical fruit. It looks oval and light yellow. Mango is rich in protein, vitamin, minerals and other nutrients. It has efficacy of anti-oxidation, which can lower the risk of cancer, prevent cardiovascular disease, resolve phlegm, delay senescence, and strengthen stomach and anti-depression. Mango pulps taste sweet, which can be eaten directly or made into dried fruits. Usually, mangos are processed into mango juice, brewed wine, mango vinegar, dried mango, and canned mango.

1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF MANGO

Mango (*Mangifera indica*), member of the cashew family (Anacardiaceae) and one of the most important and widely cultivated fruits of the tropical world. The mango tree is considered indigenous to southern Asia, especially Myanmar and Assam state of India, and numerous cultivars have been developed. Mangoes are a rich source of vitamins A, C, and D.

The mango is inextricably connected with the folklore and religious ceremonies of India. Buddha himself was presented with a mango grove that he might find repose in its grateful shade. The name *mango*, by which the fruit is known in English- and Spanish-speaking countries, is most likely derived from the Malayam *manna*, which the Portuguese adopted as *manga* when they came to Kerala in 1498 for the spice trade. Probably because of the difficulty in transporting seeds (they retain their viability a short time only), the tree was not introduced into the Western Hemisphere until about 1700, when it was planted in Brazil; it reached the West Indies about 1740.

In 2018, global production of mangoes (report includes mangosteens and guavas) was 55.4 million tonnes, led by India with 39% (22 million tonnes) of the world total. China and Thailand were the next largest producers.

India ranks first among world's mango producing countries accounting for about 50% of the world's mango production. Other major mango producing countries include China, Thailand, Mexico, Pakistan, Philippines, Indonesia, Brazil, Nigeria and Egypt. India's share is around 52% of world production i.e. 12 million tonnes as against world's production of 23 million tonnes.

An increasing trend has been observed in world mango production averaging 22 million metric tonnes per year. Worldwide production is mostly concentrated in Asia, accounting for 75% followed by South and Northern America with about 10% share.

.

The main mango producing states in India are Uttar Pradesh (23.86%), Andhra Pradesh (22.14%), Karnataka (11.71%), Bihar (8.79%), Gujarat (6.00%) and Tamil Nadu (5.09%). Total export of mangoes from India is 59.22 thousand tons, valuing Rs. 162.92 crores during 2010-11. India exports mango to over 40 countries worldwide. The major importing countries of India's Mangoes were UAE (61.79%), Bangladesh (11.41%), UK (8.92%), Saudi Arabia(3.79%), Kuwait (2.32%), and Bahrain (2.19%) respectively.

1.3 VARIETIES

Over **500 varieties** of mangoes are known, many of which ripen in summer, while some give a double crop. The fruit takes four to five months from flowering to ripen. The ripe fruit varies according to cultivar in size, shape, color, sweetness, and eating quality.

Some of the varieties of mangoes growing worldwide are described below.

Alphonso: Named after the Portuguese general Afonso de Albuquerque, Alphonso mango is known as the King of mangoes. Unparalleled taste and texture make Alphonso the most sought after variety of mango in the world. Grown in the Konkan region of Maharashtra,

Alphonso is believed to be the driving force behind Mango being the national fruit of India. Alphonso mango from Konkan region has been awarded the Geographical Indication.

Sein Ta Lone: 'Sein Ta Lone' translates into Diamond mango. These valuable mangoes from Myanmar are most cherished for their non-fibrous and juicy flesh. 15 cm in length and over 3 pounds in weight, the diamond mango looks big and imposing. Diamond mangoes have made its own mark among the best varieties of mangoes in the world.

Ataulfo: Named after the grower Ataulfo Morales Gordillo, this variety of mango can be identified from its golden yellow skin. Ataulfo mangoes are mainly produced in and largely exported from Mexico**.** It is best known for its buttery, elegant texture at the peak of its ripeness. Rather than sharing an Indian heritage, Ataulfo is a descendant of Philipino mangoes. Its seedling arrived in Mexico during the 18th-century Manila-Acapulco galleon trade.

Ivory mango: Ivory mangoes rule the Thai and Chinese mainlands. The thin, elongated shape and lustrous smooth skin are the distinct characteristics of Ivory mangoes. Ivory mangoes have bright yellowish flesh and are not too fibrous. These unique features make Ivory rank among the best varieties of mangoes in the world.

Kensington Pride: The Kensington Pride mango is the largest cultivated commercial crop in Australia. The round-shaped mango has a sweet and spicy taste which reportedly accounts for 80 percent of the mango market. The ripening season for Bowens begins in September and lasts till March. Clearly, Kensington pride makes a place for itself among the best varieties of mangoes in the world.

Kesar: Kesar mangoes owe their name to their saffron appearance and heavenly taste. This variety, highly renowned for their distinct sweet flavour, is considered to be the 'Queen of Mangoes'. Girnar Hills of Junagadh, Gujarat are famous for their Kesar mangoes. Situated at 320 km from Ahmedabad, these hills are accessible by road and rail network. Available from May to July, Kesar mangoes are sought after as an ingredient for exotic dishes.

Badami mangoes: The northern part of Karnataka is famous for its Badami variety of mangoes. Their delicious taste can be stated from the fact that Badami is also called the Karnataka-Alphonso in the neighbouring areas. They are usually available from May to July.

Amrapali Mangoes: Amrapali Mangoes are a hybrid variety created in 1971. A cross breed between Dasheri and Neelam Mangoes, Amrapali is grown in farms and orchards across India and is known for its deep red flesh once fully ripe but has a relatively short shelf life compared to other commercial variety of mangoes.

Totapuri mangoes: The electronic city of India, Bangalore, is famous for its Totapuri mangoes, also known as Bangalora or Sandersha mangoes. The city's medium-sized greenish yellow mangoes are a mango-lovers delight! Available from May to July, Totapuri is also one of the significant varieties of mangoes in our country with a distinct taste and aroma.

Safeda: Safeda or Banganpali or Benishan Mango is a popular fruit in several regions in Andhra Pradesh; especially in Banganpalle town, which is evident from its name. Often called as 'The King of Mangoes in South India', this fruit is significantly larger than other varieties of mangoes commonly sold mid-season in the market and on average weighs about 350 - 400 grams. Exhibiting meaty texture, the thin and firm skin of this mango is sweet in taste and lacks fibre. Moreover, Safeda Mango is known to be rich in Vitamin A and C so it is good for health.

Langra: Famous for its Langra variety of mangoes, Varanasi is a renowned hotspot for mango-lovers in India. Natives narrate the tale of a farmer who cultivated this variety of mangoes. Banarasi Langra mangoes, available in June-July are known for their lemon-yellow skin tone and equally delicious taste.

Other varieties of mangoes growing in India are Dasheri, Himsagar, Kishan Bhog, Chausa etc.

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Mango is a low-calorie fruit that is high in fibre, and is a great source of vitamins A and C. It also contains folate, B6, iron and a little calcium, zinc and vitamin E. Mangoes are a good source of antioxidants, containing certain phytochemicals such as gallotannins and mangiferin which have been studied for their health benefits.

Just 80g of mango (2 x 2 inch slices) counts as one of your five-a-day. This one portion will provide 53 calories, 11g of naturally-occurring sugar and just over 2g of fibre.

Nutritional value of mango:

Mango is low in calories but full of nutrients. One cup (165 grams) of sliced mango provides:

- **Calories:** 99
- **Protein:** 1.4 grams
- **Carbs:** 24.7 grams
- **Fat:** 0.6 grams
- **Dietary fiber:** 2.6 grams
- **Vitamin C:** 67% of the Reference Daily Intake (RDI)
- **Copper:** 20% of the RDI
- **Folate:** 18% of the RDI
- **Vitamin B6:** 11.6% of the RDI
- **Vitamin A:** 10% of the RDI
- **Vitamin E:** 9.7% of the RDI
- **Vitamin B5:** 6.5% of the RDI
- **Vitamin K:** 6% of the RDI
- **Niacin:** 7% of the RDI

- **Potassium:** 6% of the RDI
- **Riboflavin:** 5% of the RDI
- **Manganese:** 4.5% of the RDI
- **Thiamine:** 4% of the RDI
- **Magnesium:** 4% of the RDI

It also contains small amounts of phosphorus, pantothenic acid, calcium, selenium and iron

Health benefits:

Consuming mangoes can help strengthen and protect the body in numerous ways. Here's an overview of mango and the health benefits it offers:

1. Promotes Eye health - Rich in beta-carotene that helps in the production of Vitamin A
2. Prevent Cancer - antioxidants -quercetin, isoquercitrin Protects against Carcinogens
3. Cholesterol level - high vitamin C, fiber and pectin Helps Maintain the Fat level
4. Cleansing Skin - It cleanses your skin from deep inside your body.
5. Immune System - vitamin C, carotenoids Responsible for Boosting immune
6. Prevents Anemia- iron content in mango is a natural remedy for anemic people.

1.4 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-

Mango *(Mangifira indica)*, seedling trees are big in size and can grow over 20 metre high with a same spread. Grafted trees can attain a height of 8-10 metres with a dome shaped

top. Mango is evergreen with spreading branches. On road sides seedling trees have erect branches.

The leaves are alternate, leathery and lanceolate in shape, with short petiole. Inflorescences in mango appear mostly terminally and rarely axillary. Flowers are small both male and hermaphrodite flowers are borne on the same inflorescence, which may be of 10-40 cm long. The stamens (4-5) of different lengths are present in a flower only one or two are fertile and rest are reduced to staminodes. Ovary is one celled, oblique and compressed. The fruit is a drupe with leathery epicarp, fleshy mesocarp (edible) and a seed with hard covering (stone) endocarp.

A particle may have few to more than 1000 flowers. The ratio of male to hermaphrodite flowers varies from 4:1 to 1:1. The ratio can vary with season, from area to area and within cultivars. In northern India Dusehari, Amrapali and Langra cultivars may have 80, 85 and 65 percent perfect flowers, respectively. Some of the sucking mango selections have only 25 to 30 percent perfect flowers.

Cultivation and Bearing:-

Mangoes have been cultivated in South Asia for thousands of years and reached Southeast Asia between the fifth and fourth centuries BCE. By the 10th century CE, cultivation had begun in East Africa. The 14th-century Moroccan traveler Ibn Battuta reported it at Mogadishu. Cultivation came later to Brazil, Bermuda, the West Indies, and Mexico, where an appropriate climate allows its growth. The mango is now cultivated in most frost-free tropical and warmer subtropical climates; almost half of the world's mangoes are cultivated in India alone, with the second-largest source being China. Mangoes are also grown in Andalusia, Spain (mainly in Málaga province), as its coastal subtropical climate is one of the few places in mainland Europe that permits the growth of tropical plants and fruit trees. The Canary Islands are another notable Spanish producer of the fruit. Other cultivators include North America (in South Florida and the California Coachella Valley), South

and Central America, the Caribbean, Hawai'i, south, west, and central Africa, Australia, China, South Korea, Pakistan, Bangladesh, and Southeast Asia. Though India is the largest producer of mangoes, it accounts for less than 1% of the international mango trade; India consumes most of its own production.

Mango *(Mangiferaindica L.)* Family *Anacardiaceae* is the most popular fruit and is considered to be the "King of Fruits". The mango growing states in India are Andhra Pradesh, Assam, Bihar, Dadara Nagar & Haveli, Gujarat, Goa, Haryana, Kerala, Karnataka, Madhya Pradesh, Maharastra, Manipur, Orrisa, Punjab, Tamil nadu, Tripura, Uttar pradesh, West Bengal. Mango occupies over 50% of the total area under fruits in India.It has both Medicinal and Industrial importance and almost all parts of the tree are used for various uses Ripe mango fruits are rich in vitamin A and Vitamin C. In Goa, the area under mango is 4414 with annual production estimated at about 19280 tonnes.

Mango thrives well up to 600 m above mean sea level provided locality is frost free and there is no high humidity or rains during flowering. The favourable temperature is 240 C to 270 C, however, it can tolerate temperature as high as 480 C provided that trees are getting regular irrigation.

Mango has been found to grow on a wide range of soils. However, deep and well-drained loam to sandy loam soils are most suitable for cultivation.Heavy black cotton, saline and alkaline soils should be avoided. The deal range of soil pH for mango cultivation is 5.5 to 7.5.

Mango fruits mature in 3-4 months from flowering, Fruit colour changes from dark green to light green on maturity. Harvesting should be started after few fruits drop, during morning hours. Individual fruits are clipped with 1.5 cm stalk using mango harvester. Harvested fruits are kept on gunny bags under shade. Under sized, bruized and infested fruits are sorted out and healthy fruits are graded into 2 – 3 grades depending upon colour, shape and size and packed in wooden or corrugated boxes.

Post-harvest management:-

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

- Fruits are graded according to their size and color. All the diseased, deformed, bruised and unripe fruits are sorted out.
- Do not leave harvested fruit out in the hot sun;
- Do not pick cold, wet fruit. When wet turgid fruit is handled the oil
- Glands can be ruptured. The released oil burns the fruit surface (oleocellosis) and also stimulates fungal spores to germinate. The burn Marks can take 2-3 days to develop;
- Wear cotton gloves when harvesting. This reduces puncture marks from Fingernails and jewellery;
- Use picking bags. This reduces damage as a result of abrasion on
- Wooden or metal picking bins and allows fruit to be gently lowered into
- Bulk harvesting bins;
- Do not leave stems on fruit or damage buttons by “plugging”;
- Use clean, smooth harvesting bins;
- Make sure packing line equipment is cleaned regularly. This reduces dirt and wax buildup which can cause fruit abrasion;
- Reduce packing line abrasion by using foam, rubber and smooth belts to Cushion fruit;
- Remove old and rotten fruit regularly from the packing shed and surrounds;
- Treat harvested fruit with a registered fungicide within 24hrs of harvest;

The general practice is to wash the harvested fruits with chlorine and coat them with a shine wax so that the fruits look fresh. They are dried at a temperature of 50-55˚C after coating. If the fruits have to be transported over longer distances, then they are packed in wooden boxes else baskets made of bamboo and mulberry are used for packing Mangos. The boxes or baskets have to be ventilated and the fruits should be wrapped in tissue paper or newspaper for protection.

1.5 PROCESSING & VALUE ADDITION:-

Fruit beverages and drinks are one of the popular categories of beverages that are consumed across the globe. The fruit beverages and drinks are easily digestible, highly refreshing, thirst quenching, appetizing and nutritionally far superior to most of the synthetic and aerated drinks. In recent past the consumption of fruit based beverages and drinks has increased at a fast rate. Fruit RTSs or pulp used for the preparation of these products are subjected to minimal processing operations like filtration, clarification and pasteurization. The fruit RTS or pulp, are mixed with ingredients like sugar, acid, stabilizers, micronutrients and preservative to develop beverages and drinks. The principle groups of fruit beverages are as follows:

- Ready-to-Serve (RTS) pre-packaged Beverages
- Fruit RTS and Nectars
- Dilutable beverages

Beverages are essential for growth, development as well for carrying out various physiological processes that are critical for living a healthy life. In adult individuals 70 percent of body weight, 73 percent of lean muscle, 25 percent of adipose tissues, 22 percent of bone and 80 percent of blood consists of water. Consumption of beverages help in maintaining the water content in body and prevent dehydration.

The water assists in digestion, assimilation and excretion of foods. It also helps in removing the toxic substances produced in body as a result of metabolisms such as urea, uric acid, ammonia etc. through kidney. Water in beverages help in regulating the temperature of body through the process of sweating. Beverages specially the fruit and vegetable based ones are source of micronutrients (vitamins and minerals) and antioxidants (carotenoids, flavonoids).

The ready-to-serve beverages as per FSSAI specifications should contain at least 10% fruit content and not less than 10 % TSS besides 0.3% acid maximum as citric acid. The levels of permitted preservatives include 70 ppm (maximum) for sulphur dioxide and 120 ppm (maximum) for benzoic acid. The total plate count and yeast and mold counts should not

exceed, to 50.0 cfu/ml and 2.0 cfu/ml, respectively. The Coliform counts should be nil in 100 ml beverage samples. Since these beverages are consumed as such without dilution, hence are termed as Ready-to-serve beverage. The majority of packaged fruit beverages belong to this category.

Wide range of fruits including mango, citrus fruits, berries, litchi, guava, pineapple, grapes etc. are preferred for RTS beverages. Required amount of sugar, acid, stabilizer, colouring and flavouring ingredients are added in RTS or pulp along with water and the mixture is blending properly, filtered if desired. The RTS mix is pasteurized (80-90°C) in bottle (20-30 min), continuous RTS pasteurizer (few seconds to one minute) and cooled immediately. Nowadays, UHT processing of RTS beverages is quite popular because of longer shelf-life and less loss of nutrients during processing.

The amount of fruit RTS or pulp may vary according to fruit and cost effectiveness. The presence of oxygen in headspace often leads to oxidation resulting in off-flavour and loss of nutritive value, hence anti-oxidants such as ascorbic acid is often added in RTS beverages. Besides it, colour and flavour ingredients which are stable to heat and oxygen are preferred.

RTS and RTS products represent a very important segment of the total processed fruit industry. RTS products are being marketed as refrigerated, shelf-stable, and frozen, in a variety of packages with increased emphasis on functionality, health attributes, new flavours or blends, and in some cases fortified with vitamins and minerals. High-quality RTS operations are dependent upon a source of high-quality raw material. Most fruit RTSs are excellent sources of vitamin C, several are good sources of carotene and many contain moderate amounts of pyridoxine, inositol, folic acid and biotin. Fruit RTS is regarded as source of energy due to their rich carbohydrate content. The organic acids present in the fruit RTS plays a significant role in the maintenance of the acid-base balance in the body.

The process starts with sound fruit, freshly harvested from the field or taken from refrigerated or frozen storage. Thorough washing is usually necessary to remove dirt and foreign objects and may be followed by a sanitation step to decrease the load of contaminants.

Sorting to remove decayed and mold contaminated fruit is necessary to make sure that the final RTS will not have a high microbial load, undesirable flavours, or mycotoxin contamination. For most fruits, preparation steps such as pitting and grinding is required prior to RTS extraction. Heating and addition of enzymes might also be included before the mash is transferred to the extraction stage. RTS extraction can be performed by pressing or by enzymatic treatment followed by decanting. The extracted RTS will then be treated according to the characteristics of the final product.

For cloudy RTSs, further clarification might not be necessary or may involve a coarse filtration or a controlled centrifugation to remove large insoluble particles. For clear RTSs, complete de-pectinization by addition of enzymes, fine filtration, or high speed centrifugation is required to achieve visual clarity. The next step is usually a heat treatment or equivalent non-thermal process to achieve a safe and stable RTS and final packaging if single-strength RTS is being produced.

For a concentrate, the RTS is fed to an evaporator to remove water until the desired concentration level is obtained. Other processes used for water removal include reverse osmosis and freeze concentration, which are best suited for heat-sensitive RTSs. The concentrate is then ready for final processing, packaging, and storage.

2. MODEL MANGO READY TO SERVE 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 Mango Ready to Serve processing unit are in the production clusters of Mango growing states/areas such as Andhra Pradesh, Assam, Bihar, Dadara Nagar & Haveli, Gujarat, Goa, Haryana, Kerala, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Odisha, Punjab, Tamil Nadu, Tripura, Uttar pradesh, West Bengal where adequate quantities of surplus raw materials can be available for processing.

2.2 INSTALLED CAPACITY OF THE MANGO READY TO SERVE PROCESSING UNIT

The maximum installed capacity of the Mango Ready to Serve manufacturing unit in the present model project is proposed as150 tonns/annum or 500 kg/day Mango Ready to Serve. 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 70 percent capacity, 3rd

year 80 percent capacity and 4th year onwards 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 Mango Ready to Serve manufacturing project, the unit requires 350 kg/day, 400 kg/day and 450 kg/day Mango fruit at 70, 80 and 90 percent capacity utilization, respectively. The Mature Mango must be plucked from plant; and then stored below 6°C temperature.

2.4 MANUFACTURING PROCESS OF THE MANGO READY TO SERVE

The typical Procedure for manufacturing of Mango Ready to Serve is as below:

Mango fruits

(Mature and ripened fruits with characteristic flavor will be used)

Sorting

↓

*Washing and cleaning (Soaked in water containing chlorine solution (10-20ppm) for 2-5 minutes)

↓

RTS extraction/ Pulp extraction or Concentrate

↓

Preparation of Sugar Syrup

↓

Mix (Sugar Syrup, Acidity regulator, emulsifier, preservative, coloring, flavoring agent, anti-oxidant)

↓

Filtration

↓

*Pasteurization

↓

Cooling

↓

*Packaging and Storage

*Established Critical Control point

Mango RTS is a complex product. A good understanding of the basic nature and properties of Mango RTS is therefore needed for processing and packaging Mango RTS. In fact, such knowledge is indispensable for ensuring that high product quality is maintained during RTS processing. The quality of Mango fruit is important for the characteristics of the final Mango RTS product.

Receiving of Mango fruits: Fruit goes through inspection lines for removal of bruised or damages fruits.

Washing and cleaning: The fruits are graded and soaked in water containing chlorine solution (10-20ppm) for 2-5 minutes, scrubbed by revolving brushes, rinsed with clean water, and inspected again to remove the damaged ones.

RTS extractor/Juice or Pulp Extractor: RTS is extracted by pressing of Peeled Mangos to get juice/pulp in machine. These extractors produces RTS free of peel extractives.

Filtration: Clarification is done to separate RTS by removing extractives. After Juice extraction, the juice is clarified. The mechanical separation of sieving is used as the final process.

Pasteurization: Pasteurization deactivates the enzymes present in the RTS and makes the RTS microbiologically stable. It is carried out using tubular or plate heat exchangers. RTS beverages is more sensitive to microbial contamination and also dissolved oxygen causes vitamin-c deterioration during storage. Hence pasteurization is major concern in RTS processing to enhance the shelf life of RTS beverage. In pasteurization tank Mango RTS is preheated at 74°C and then pasteurized to kill bacteria. Two main aim of pasteurization of RTS beverages are

1) To deactivate enzymes
2) To make the RTS microbiologically safe.

Packaging: Different types of packaging including cans, bottles, cartons, drums and barrels made up of glass, metals, plastic, or laminates are used for the packaging of Mango juice.

2.5 MARKET DEMAND AND SUPPLY FOR MANGO READY TO SERVE

Raw mangoes and mango fruits were processed into various value added products like pickles, aam panna, dry mango powder, chutneys, mango juice, mango concentrate, mango squash, mango marmalade, mango jam, mango jellies, mango syrup/canned mango etc. Due to sensitivity to chilling injury and limited shelf life of Mango fruit, it becomes important to process it in the form of RTS to reduce the surplus in the market in its peak season of production. Preservation of fruit in the form of RTS has turn out to be the business activity of great significance and countries with rich fruit resources with short harvesting season are emphasizing more for establishes storage to keep up quality of fruits, enhance shelf life and preserve fruit RTS for availability in off-season. Fruit beverages and drinks are one of the popular categories of beverages that are consumed across the globe. The fruit beverages and drinks are easily digestible, highly refreshing, thirst quenching, appetizing and nutritionally far superior to most of the synthetic and aerated drinks. In recent past the consumption of fruit based beverages and drinks has increased at a fast rate.

2.6 MARKETING STRATEGY FOR MANGO READY TO SERVE

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 Mango fruit based products.

2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Mango Ready to Serve 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 juice 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. Mango cost considered @ Rs.30/-per kg.
    2. 1 kg Mango will produce 50% 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 Straw berry crush Unit	150	MT/annum	
Utilization of capacity	1st Year Implemetation, 70% in second, 80% in third and 90% in fourth year 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	30		
Average sale prices per Kg	75	Rs/kg	
Pulp extraction	50		
MANGO RTS	1 Kg RTS from 0.4 kg raw mango		

2.8 FIXED CAPITAL INVESTMENT

Rs. 5.18 Lakhs required

2.8.1 MACHINERY AND EQUIPMENT

Sr No.	Equipment	Capacity	Quantity	Price (Rs. In Lacs)
1	Cold store sq. meter	1500 Kg	1	6
2	Mango washer	100 kg/hr	1	1.5
3	Mango Pulper	100 kg/hr	1	1.2
4	Feed Pump	Suitable	1	0.25
5	Sugar Syrup Prearation tank	100 Liters	1	1
6	Mixing/Blending tank	100 Liters	1	0.8
7	Filter press	100 Liters	1	0.7
8	Homogenizer	100 Liters/hr	1	2.3
9	Pasteurizer (PHE)	100 Liters/hr	1	1.6
10	Filling & Capping	500 BPM	1	2.7
11	Weighing balance	Suitable	1	0.06
12	Accessories	Lot		0.5
	Total			18.61

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 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 27.84 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

Working Capital Requirement (Rs. in Lakh)				
		55%	65%	75%
Particulars	Period	Year 2	Year 3	Year 4
Raw material stock	7 days	0.63	0.74	1.01
Work in progress	15 days	1.26	1.49	2.03
Packing material	15 days	0.90	1.06	1.45
Finished goods' stock	15 days	2.75	3.25	4.43
Receivables	30 days	5.50	6.50	8.87
Working expenses	30 days	1.01	1.19	1.63
Total current assets		12.05	14.24	19.42
Trade creditors		0.00	0.00	0.00
Working capital gap		12.05	14.24	19.42
Margin money (25%)		3.01	3.56	4.86
Bank finance		9.04	10.68	14.57

2.10 TOTAL PROJECT COST AND MEANS OF FINANCES

Project Cost and Means of Finance	
Particulars	
Particulars	**Amount in Lakhs**

i. Land and building (20 x 32 x 12 ft -LxBxH)	**5.18**
ii. Plant and machinery	**18.61**
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	**3.01**
Total project cost (i to vii)	**30.60**
Means Of finance	
i. Subsidy	**10.10**
ii. Promoters Contribution	**6.12**
iii. Term Loan (@10%)	**14.38**

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

	Expenditure, Revenue and Profitability Analysis						
		150	MT				
	Particulars	1st Year	2nd Year	3rd Year	4th Year	5th year	6th year
A	Total Installed Capacity (MT)	135 MT Mangoes/Ann num	105	120	135	135	135
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%
B	Expenditure (Rs. in Lakh)	0					
	Raw mango(Av. Price @ Rs. 30/Kg)	0.00	11.34	12.96	14.58	14.58	14.58
	Sugar @ Rs. 35/kg	0.00	5.15	5.88	6.62	6.62	6.62
	Other materials (Rs. 100/kg)	0.00	0.22	0.16	0.18	0.22	0.24
	Packaging materials (Rs 12 per Kg)	0.00	12.60	14.40	16.20	16.20	16.20
	Utilities (Electricity, Fuel)	0.00	2.17	2.48	2.79	2.79	2.79
	Salaries (1st yr only manager's salary)	2.16	7.28	7.28	7.28	7.28	7.28
	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	**2.96**	**42.06**	**46.56**	**51.15**	**51.19**	**51.21**
C	**Total Sales Revenue (Rs. in Lakh)**	**0.00**	**61.88**	**73.13**	**84.38**	**101.25**	**112.50**
	Sale of Mango RTS (Av. Sale Price @ Rs.75/kg)	**0.00**	**61.88**	**73.13**	**84.38**	**101.25**	**112.50**
D	**PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows**	**-2.96**	**19.81**	**26.56**	**33.22**	**50.06**	**61.29**
	Depreciation on civil works @ 5% per annum	**0.26**	**0.25**	**0.23**	**0.22**	**0.21**	**0.20**
	Depreciation on machinery @ 10% per annum	**1.86**	**1.67**	**1.51**	**1.36**	**1.22**	**1.10**
	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%	**1.50**	**1.44**	**1.39**	**1.32**	**1.25**	**1.18**
	Interest on working capital @ 12%	**0.00**	**1.08**	**1.08**	**1.08**	**1.08**	**1.08**
E	**Profit after depreciation and Interest (Rs. in Lakh)**	**-6.70**	**16.35**	**23.35**	**30.25**	**47.31**	**58.76**
F	**Tax (assumed 30%) (Rs. in Lakh)**	**0.00**	**4.90**	**7.00**	**9.07**	**14.19**	**17.63**
G	**Profit after depreciation, Interest & Tax (Rs. in Lakh)**	**-6.70**	**11.44**	**16.34**	**21.17**	**33.12**	**41.13**

H	**Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)**	**1.50**	**1.44**	**1.39**	**1.32**	**1.25**	**1.18**
I	**Coverage available (Rs. in Lakh)**	**1.50**	**1.44**	**1.39**	**1.32**	**1.25**	**1.18**
J	**Total Debt Outgo (Rs. in Lakh)**	**0.50**	**0.55**	**0.61**	**0.67**	**0.74**	**0.82**
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)**	**-4.46**	**13.47**	**18.17**	**22.83**	**34.62**	**42.48**
M	**Payback Period**						
	(on Rs. 30.60 Lakhs initial investment)						

2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	14,38,322.44	1,99,522.91	1,49,585.53	49,937.38	13,88,385.06
2	13,88,385.06	1,99,522.91	1,44,392.05	55,130.87	13,33,254.19
3	13,33,254.19	1,99,522.91	1,38,658.44	60,864.48	12,72,389.71
4	12,72,389.71	1,99,522.91	1,32,328.53	67,194.38	12,05,195.33
5	12,05,195.33	1,99,522.91	1,25,340.31	74,182.60	11,31,012.73

6	**11,31,012.73**	**1,99,522.91**	**1,17,625.32**	**81,897.59**	**10,49,115.14**
7	**10,49,115.14**	**1,99,522.91**	**1,09,107.97**	**90,414.94**	**9,58,700.20**
8	**9,58,700.20**	**1,99,522.91**	**99,704.82**	**99,818.09**	**8,58,882.11**
9	**8,58,882.11**	**1,99,522.91**	**89,323.74**	**1,10,199.17**	**7,48,682.94**
10	**7,48,682.94**	**1,99,522.91**	**77,863.03**	**1,21,659.89**	**6,27,023.05**
11	**6,27,023.05**	**1,99,522.91**	**65,210.40**	**1,34,312.52**	**4,92,710.54**
12	**4,92,710.54**	**1,99,522.91**	**51,241.90**	**1,48,281.02**	**3,44,429.52**
13	**3,44,429.52**	**1,99,522.91**	**35,820.67**	**1,63,702.24**	**1,80,727.28**
14	**1,80,727.28**	**1,99,522.91**	**18,795.64**	**1,80,727.28**	**(0.00)**
		27,93,320.78	**13,54,998.35**	**14,38,322.44**	**(14,38,322.44)**

2.14 ASSET'S DEPRECIATION

Assets' 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	18.61	16.75	15.07	13.57	12.21	10.99	9.89	8.90
Depreciation	1.86	1.67	1.51	1.36	1.22	1.10	0.99	0.89
Depreciated value	16.75	15.07	13.57	12.21	10.99	9.89	8.90	8.01
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	24.59	22.35	20.33	18.50	16.85	15.35	14.00	12.77
Depreciation	2.24	2.02	1.83	1.65	1.49	1.35	1.22	1.11
Depreciated value	22.35	20.33	18.50	16.85	15.35	14.00	12.77	11.67

2.15 FINANCIAL ASSESSMENT OF THE PROJECT

Financial Assessment of the Project									

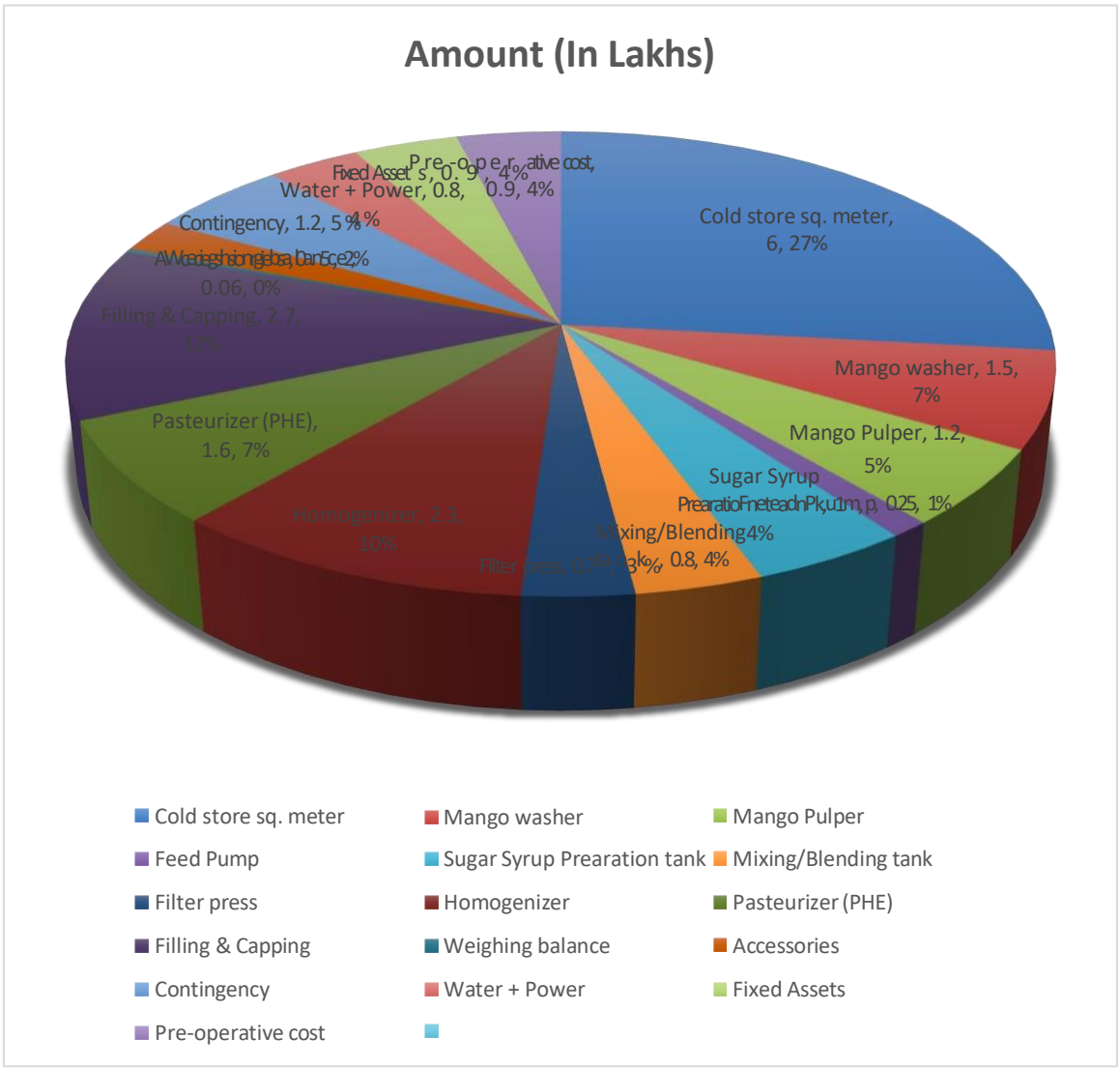
Benefit Cost Ratio (BCR) and Net Present Worth (NPW)									
Particulars	**1st Year**	**2nd year**	**3 rd year**	**4th year**	**5th year**	**6th year**	**7th year**	**8th year**	
Capital cost (Rs. in Lakh)	**30.60**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	
Recurring cost (Rs. in Lakh)	**2.96**	**42.06**	**46.56**	**51.15**	**51.19**	**51.21**	**51.21**	**51.21**	
Total cost (Rs. in Lakh)	**33.56**	**42.06**	**46.56**	**51.15**	**51.19**	**51.21**	**51.21**	**51.21**	**378.16**
Benefit (Rs. in Lakh)	**0.00**	**61.88**	**73.13**	**84.38**	**101.25**	**112.50**	**112.50**	**112.50**	
Total Depreciated value of all assets (Rs. in Lakh)								**11.67**	
Total benefits (Rs. in Lakh)	**0.00**	**61.88**	**73.13**	**84.38**	**101.25**	**112.50**	**112.50**	**124.17**	**669.79**
Benefit-Cost Ratio (BCR): (Highly Profitable project)	**1.77**								
Net Present Worth (NPW):	**291.63**								

2.16 BREAK EVEN ANALYSIS

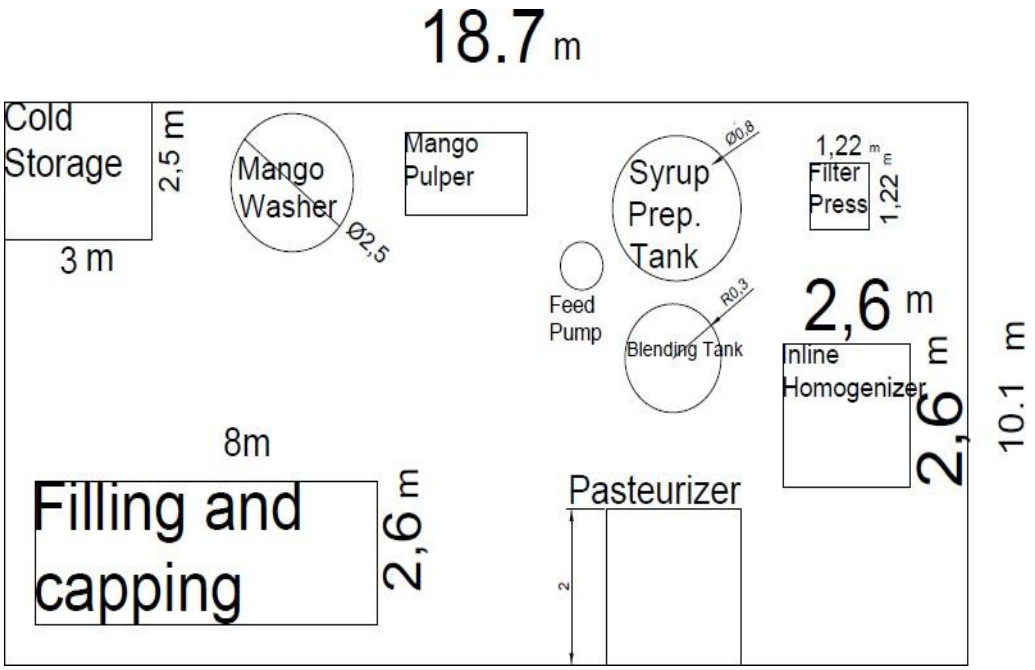
Break-Even Analysis

Sr. No.	Particulars	1st Year	2nd year	3 rd 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		82.50	97.50	112.50	135.00	150.00	150.00	150.00
A	Fixed Cost (Rs. in Lakh)								
	Permanent staff salaries	7.28	7.28	7.28	7.28	7.28	7.28	7.28	7.28
	Depreciation on building @ 5% per annum	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18
	Depreciation on machinery @ 10% per annum	1.86	1.67	1.51	1.36	1.22	1.10	0.99	0.89
	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	1.50	1.44	1.39	1.32	1.25	1.18	1.09	1.00
	Insurance	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Total Fixed Cost (Rs. in Lakh)	**11.32**	**11.05**	**10.80**	**10.56**	**10.33**	**10.11**	**9.90**	**9.69**
B	**Sales Revenue (Rs. in Lakh)**	**0.00**	**61.88**	**73.13**	**84.38**	**101.25**	**112.50**	**112.50**	**112.50**
C	Variable Cost (Rs. in Lakh)								
	Mango (Av. Price @ Rs.30/Kg)	0.00	22.28	26.33	30.38	36.45	40.50	40.50	40.50
	Sugar @ 35 per kg	0.00	2.89	3.41	3.94	4.73	5.25	5.25	5.25
	Other ingredients	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Packaging materials	0.00	9.90	11.70	13.50	16.20	18.00	18.00	18.00
	Casual staff salaries	0.00	5.78	5.78	5.78	5.78	5.78	5.78	5.78
	Utilities (Electricity, Fuel)	0.00	1.71	2.02	2.33	2.79	3.10	3.10	3.10
	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	1.08	1.08	1.08	1.08	1.08	1.08	1.08
	Total Variable Cost (Rs. in Lakh)	**0.50**	**46.34**	**53.12**	**59.91**	**69.94**	**76.62**	**76.62**	**76.62**
D	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)	-	7.43	7.31	6.75	8.10	7.88	7.88	6.75

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



2.18 TYPICAL MANGO READY TO SERVE MANUFACTURING UNIT LAYOUT



2.19 MACHINERY SUPPLIERS

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

1. Bajaj Process pack Limited, Noida, India 0
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.

Contact Us

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