

DETAILED PROJECT REPORT
PAPAYA TUTTI FRUTTI MANUFACTURING UNIT.



INDIAN INSTITUTE OF FOOD PROCESSING TECHNOLOGY

Ministry of Food Processing Industries, Govt. of India

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Project At a Glance

1	Name of the Project	Papaya Tutti Frutti
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 (70, 80 & 90% capacity utilization in the 2nd, 3rd and 4th years' onwards respectively
11	Raw materials	Papaya Fruit
12	Major product outputs	Papaya Tutti Frutti
13	Total project cost (Lakhs)	23.94
	Land development, building & civil construction	5.18
	Machinery and equipments	22.91
	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	10.51
	Third Year	12.01
	Fourth Year	15.44
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	7.9002
	Promoter's contribution (min 20%)	4.788
	Term loan (45%)	11.2518
16	Debt-equity ratio	2.35 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	-5.56
	3rd year	-0.55
	4th year	0.61
18	Average DSCR	2.16
	Benefit Cost Ratio	1.014
	Term Loan Payment	7 Years with 1 year grace period
	Pay Back Period for investment	2 Years

1 GENERAL OVERVIEW OF PAPAYA 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.

Papaya (*Carica papaya*) is a tropical fruit having commercial importance because of its high nutritive and medicinal value. It belongs to Family *Caricaceae*. It is delicious fruit with loaded nutrients. It is most economical fruit of Family *Caricaceae*. Papaya also seems to have antibacterial, antifungal, anti-viral, anti-inflammatory, antioxidant, and immune-stimulating effects. Papaya is considered one of the most important fruits because it is a rich source of antioxidant nutrients (e.g., carotenes, vitamin C, and flavonoids), the B vitamins (e.g., folate and pantothenic acid), minerals (e.g., potassium and magnesium), and fiber. In addition, papaya is a source of the digestive enzyme papain, which is used as an industrial ingredient in brewing, meat tenderizing, pharmaceuticals, beauty products, and cosmetics.

1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF PAPAYA

Papaya is succulent fruit of a large plant of the family Caricaceae. Though its origin is rather obscure, the papaya may represent the fusion of two or more species of *Carica* native to Mexico and Central America. Today, The papaya is believed to be native to southern Mexico and neighboring Central America. It is currently cultivated in Florida, Hawaii, Eastern British Africa, South Africa, Sri-Lanka, India, Canary Islands, Malaysia and Australia. It is now present in every tropical and subtropical country. The history of papaya spread was initiated approximately in 1500, when the Spanish conquerors carried seeds to Panama and Dominican Republic. Papaya was first described in 1526 by the Spanish chronicler Oviedo, who found it first on Panamanian and Colombian coasts. The fruit was rapidly propagated in the tropics, most likely due to the abundant and highly viable seeds. The crop has adapted quite well to tropical areas with fertile soils and abundant rainfall. During the following century Spanish and Portuguese sailors took the seeds to the Phillipines, Malaysia and India. For 1600 the fruit had been produced in warm regions of South and Central America, Southern Mexico, the Antilles, Bahamas, Bermuda y Florida. In the same century pawpaw seeds were taken from India to Naples in Italy. The crop reached Hawaii between 1800 and 1820. Until 1900, papaya seeds were taken to Florida, probably from Bahamas' plantations. The *Solo* variety has been cultivated in Hawaii since 1911, probably brought from Barbados and Jamaica.

Papayas came to India by way of the Caribbean and then Malaysia around 1550. A century later, explorers from Italy and China brought papaya from India's soils back to their respective countries.

Papayas are produced in about 60 countries, with the bulk of production occurring in developing economies. Global papaya production was estimated at 11.22 Mt, growing at an annual rate of 4.35 percent. Asia has been the leading papaya producing region, accounting for 52.55 percent of the global production, followed by South America (23.09%), Africa (13.16%), Central America (9.56%), the Caribbean (1.38%), North America (0.14%), and Oceania (0.13%). There are two main types of papayas produced:

the small-sized Solo-type papayas (aka Hawaiian papayas), and the large-sized papayas (aka Mexican papayas).

India is the largest producer of papaya, contributing 42% of world production from 30% of the global area under papaya cultivation as per an FAO report for 2012. Figures from the UN's Food and Agricultural Organization cites that the country produces a staggering 4.2 million metric tons, accounting for 35 percent of the world's production. In fact, India grows more papayas than the subsequent largest producing countries—Brazil, Indonesia, the Dominican Republic, and Nigeria—combined.

Papaya is a decidedly tropical fruit, thriving in many types of soils where the weather is frost-free. Andhra Pradesh is the largest papaya producer, growing 1.6 million tons. Gujarat is the second, with its production figure of almost 1.2 million tons. Subsequent producers are Karnataka, Maharashtra, West Bengal, Chhattisgarh, Madhya Pradesh, Assam, Tamil Nadu, and Kerala.

The three countries—Mexico, Brazil, and Belize—dominate the papaya export market. Together they accounted for 63.28 percent of the global trade. During that period, Mexico was the leading papaya exporter, representing about 41 percent of the trade, while Brazil and Belize accounted for about 11 percent each of the trade. Other major papaya exporting countries include Malaysia, India, and the United States (mainly via re-exports). In the case of India, despite being the world leading papaya producer, exports of the fruit in 2009 were less than 1 percent of the total production. India domestic demand for papaya has been strong because of a sizable population, a significant rise on per-capita income, and a growing interest for healthier food products. The rise in global papaya exports was particularly strong in recent years, as shipments from Mexico increased markedly from 90,316 t to 134,960 t.

1.3 VARIETIES

There are many distinct, true-breeding varieties of papaya in the world. Many were developed from systematic breeding programmes and while others were from selections made by growers. Recently, transgenic varieties were developed through biotechnology processes. Papaya varieties can be self or cross-pollinated. In general, gynodioecious varieties (having hermaphrodite and female trees) are self or cross-pollinated, while the dioecious varieties (having male and female trees) are enforced cross-pollinators. There are different varieties of papayas growing worldwide. Varieties of papayas growing worldwide are described below.

Sekaki (also known as ‘Hong Kong’ papaya) is the second most popularly cultivated variety in Malaysia. It is a cross-pollinated variety and a prolific bearer (60-70 tonnes/ha/year) with medium sized fruit of 1.5 – 2 kg. The tree is rather dwarfed and bears low to the ground. It is also easy to manage in the field because of its tolerance to malformed top disease. Sekaki⁵ fruit is attractive with smooth, even-coloured and freckle-free skin. The flesh is red, firm but sugar content is not high at 10 °Brix or less.

Philippines Papaya:

Papaya is recently grown for local fresh fruit market, for canning and for papain processing. The most popular strains of Solo papaya commercially propagated here are Kapoho and Sinrise. Many selections from these cultivars are developed and maintained by the more competitive growers like some corporate and multi-national farms. The Solo papaya is basically grown for fresh fruit since local demand is increasing especially in the local supermarkets. On the other hand, there is a favorable demand for Hawaiian Solo from the Middle East, Hong Kong, India and Singapore.

Thailand Papaya:

Papaya is one of the most important and well known economic fruit crops in Thailand which is grown throughout the country. Due to fast growth and good prices for the fruit, it has become one of the most successful crops in producing a quick return for growers. Papaya trees have been successfully planted between rows of newly planted fruit and plantation crops, including the replacements for those destroyed by bad weather.

Mexican red/yellow papaya: This variety is large in size with sweet, rose-colored pulp. The yellow ones are much sweeter and have yellow flesh. They're available throughout the year and reach up to 6-12 inches in size.

Hawaiian Sunrise Papaya: Also known as Strawberry papaya, its red-orange flesh is similar to berries, peaches, and melons. The seeds cavities quite shallow, making seed removing easy. This variety available all year around.

Bettina Papaya: It is mostly grown in Queensland, Australia. This easy to grow papaya has round fruit which weighing arounding 3-5 pounds. It has sweet flesh with few seeds.

Other varieties of papaya growing across world are Kamiya papaya, Hortus gold papaya, Guinea gold papaya, Hawaiian Sunset papaya, Kapoho papaya, Peterson papaya, Waimanalo papaya, Tainug papaya etc.

Varieties of papayas growing in India are 'Honey Dew', 'Coorg Honey Dew', 'Washington', 'Solo', 'Sunrise solo', 'Taiwan', 'Ranchi selection', 'Pusa delicious', 'Coorg green' etc.

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Papayas are delicious juicy fruit with appreciated amount of valuable nutrients, a powerful antioxidant that helps protect cells from damage. Papayas are also a good source of fibre, B vitamins, vitamin A, Vitamin E, Anti-oxidant, calcium and potassium. However,

papayas contain a range of other plant compounds and antioxidants that may reduce inflammation and work against disease. Papaya contains an enzyme called papain, which can break down the tough protein chains found in muscle meat. Because of this, people have used papaya to tenderize meat for thousands of years. Papayas also contain healthy antioxidants known as carotenoids — particularly one type called lycopene.

If the papaya is ripe, it can be eaten raw. However, unripe papaya should always be cooked before eating — especially during pregnancy, as the unripe fruit is high in latex, which can stimulate contractions.

Compounds in papaya support the body and protect us from conditions such as heart disease and cancer – they’re also thought to have some anti-inflammatory, antiviral and antimicrobial benefits.

- **Carbohydrates:** Papaya is a delicious fruit containing just 62 calories per cup. Most of the calories in papaya come from carbohydrates. There are almost 16 grams of carbohydrate in a serving of papaya including fiber (2.5 grams) and naturally-occurring sugars (about 11 grams). The glycemic index of papaya is 60 and the glycemic load is 9.
- **Vitamins and minerals:** Papaya is rich in vitamin C, providing 88.3 milligrams per serving. For most adults, the recommended dietary allowance of vitamin C is between 75–90 milligrams, so 1 cup of papaya just about covers 100% of vitamin C requirements. Papayas are also an excellent source of vitamin A and more specifically, the carotenoid lycopene.
- **Potassium:** Papayas are good source of Potassium. High intake of potassium can lower blood pressure and may reduce risk of heart disease.

Papayas are rich in various bioactive plant compounds and anti-oxidant compounds, which are beneficial to health.

Nutritional value per 100 g

Nutritional composition of one small Papaya (152gms)	
Energy (Kcal)	59
Total carbohydrates (gm)	15
Fiber (gm)	3
Vitamin – C	157 % of RDI
Potassium	11 % of RDI
Folate	14 % of RDI
Vitamin A	33 % of RDI

CONSTITUENTS AND HEALTH BENEFITS OF PAPAYAS

Papayas also have many potential health benefits. Health benefits described below:

Health benefits:

1. Heart health: Papayas contain high levels of antioxidants vitamin A, vitamin C, and vitamin E. Diets high in antioxidants may reduce the risk of heart disease. The antioxidants prevent the oxidation of cholesterol. When cholesterol oxidizes, it's more likely to create blockages that lead to heart disease. Additionally, papaya's high fiber content may reduce the risk of heart disease. High-fiber diets lower cholesterol levels. Papaya has folic acid, which is essential for converting the amino acid homocysteine into less harmful amino acids. High levels of homocysteine, an amino acid primarily found in meat products, are a risk factor for heart disease. So eating papaya in your diet may lower homocysteine levels, reducing this risk factor.

2. Digestion and reduced inflammation: The papaya fruit contains two enzymes, papain and chymopapain. Both enzymes digest proteins, meaning they can help with digestion and reduce inflammation. Papain is an ingredient in some over-the-counter digestive supplements to help with minor upset stomach. Both papain and chymopapain also help to reduce inflammation. They may help acute pain, like those from burns or bruises, and they can help with chronic inflammatory conditions like arthritis and asthma.

3 Immune system: Eating foods high in vitamin C can help to boost the immune system, allowing the body to fight off bacterial and viral illnesses. Papaya has a good amount of this antioxidant, making it part of an immune-healthy diet. Papaya is also a good source of Vitamin A, another important vitamin for a healthy and functional immune system.

4 Potentially protect against Prostate Cancer: Lycopene is a natural pigment found in foods that are red or orange. Tomatoes, watermelon, and papaya are good sources of lycopene. Some experts believe that eating more lycopene reduces the risk of prostate cancer, but some studies have been inconclusive. However, in other studies, eating a diet high in lycopene along with green tea reduced the risk of prostate cancer significantly.

5 Powerful Anti-oxidant Effects: Free radicals are reactive molecules created during your body's metabolism. They can promote oxidative stress, which can lead to disease. Antioxidants, including the carotenoids found in papayas, can neutralize free radicals. Studies note that fermented papaya can reduce oxidative stress in older adults and people with prediabetes, mild hypothyroidism and liver disease.. The reduction in oxidative stress is attributed to papaya's lycopene content and ability to remove excess iron, which is known to produce free radicals

6. Protect against Skin damage: Excessive free radical activity is believed to be responsible for much of the wrinkling, sagging and other skin damage that occurs with age. The vitamin C and lycopene in papaya protect your skin and may help reduce these signs of aging

1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-

The papaya plant is considered a tree, though its palmlike trunk, up to 8 metres (26 feet) tall, is not as woody as the designation generally implies. The plant is crowned by deeply lobed leaves, sometimes 60 cm (2 feet) across, borne on hollow petioles (leaf stalks) 60 cm long. Normally, the species is dioecious, male and female flowers being produced on separate plants, but hermaphroditic forms are known, and numerous irregularities in the distribution of the sexes are common. Male flowers are borne in clusters on stalks 90 cm long; the flowers are funnel-shaped, about 2.5 mm (0.1 inch) long, and whitish, with 10 stamens in the throat. The female flowers are considerably larger, on very short stalks, and often solitary in the leaf axils; they have five fleshy petals that are united toward the base and a large cylindrical or globose superior ovary that is crowned by five fan-shaped sessile stigmas. The fruit is commonly spherical to cylindrical in form, is 75 to 500 mm (3 to 20 inches) or even more in length, and sometimes weighs as much as 9 to 11.5 kg (20 to 25.5 pounds). The very juicy flesh is deep yellow or orange to salmon-coloured. Along the walls of the large central cavity are attached the numerous round, wrinkled black seeds. The unripe fruit contains a milky juice in which is present a protein-digesting enzyme known as papain, which greatly resembles the animal enzyme pepsin in its digestive action. This juice is used in the preparation of various remedies for indigestion and in the manufacture of meat tenderizers.

Cultivation and Bearing:-

Papayas are usually grown from seed. Their development is rapid, with fruit being produced before the end of the first year. Under favourable conditions, a plant may live five years or more. The papaya ringspot virus nearly wiped out papaya crops around the

world, first hitting Hawaiian plantations in the 1940s and soon spreading. A genetically modified (GMO) variety named the Rainbow papaya was developed in the early 2000s with resistance to the virus. It was one of the first GMO fruits in commercial production, and the majority of exported papayas are now GMO crops. Papaya is basically a tropical plant. However, it also grows well in sub-tropical parts. Those foothills which enjoy a mild winter are ideal for papaya cultivation. Low temperature and frost limit its cultivation in higher altitudes. Excessively cold nights cause the fruits to mature slowly and to be of poor quality in the winter season. It can be grown from the sea level to an altitude of 1000 meters, but above an altitude of 600 meters, size and quality of fruits gradually decrease. As it grows in sub-tropical and tropical climates, it can be cultivated in a temperature range of 25-35°C. In this region, it can be grown successfully as a rainfed crop in areas with 1500-2000 mm of evenly distributed annual rainfall, though yield may be poor when compared to an irrigated crop because winter drought restricts the development of the plants and the fruits. High humidity affects the sweetness of the fruits. Fruits tend to lose their sweetness at low temperature also. A warm and dry climate is needed during the ripening season. It can not withstand strong winds being a tender and shallow-rooted plant. Papaya can be farmed in many types of soils, except sandy and sticky or heavy clay soils. Papaya roots are very sensitive to waterlogging or standing water. Even forty eight hour submergence can be fatal for the plant. In heavy soils, water accumulates during high rainfall, and diseases like foot-root and root-rot occur, which may cause the plantation to be wiped out in a short time. Hence a slightly sloppy land is preferred to a perfectly levelled one. Hilly soil of this region is best suited, being well drained in organic matter. While doing best in light, porous soils rich in organic matter, the plant will grow in scarified limestone, marl, or various other soils if it is given adequate care. Optimum pH ranges from 5.5 to 6.7. Overly acid soils are corrected by working in lime at the rate of 1-2 tons/acre (2.4-4.8 tons/ha). On rich organic soils the papaya makes lush growth and bears heavily but the fruits are of low quality. Papaya plants set in the field on 6 ft (1.8 m) centers made stronger, stouter growth and were more fruitful than those at closer spacing. Some growers insist on an 8 x 8 ft (2.4 x 2.4 m) area per plant. Papaya is commercially propagated by seed and tissue culture plants. The seed rate is 250-300 g./ha. The seedlings can be raised in nursery beds 3m. long, 1m. wide and 10

cm. high as well as in pots or polythene bags. The seeds after being treated with 0.1% Monosan (phenyl mercuric acetate), ceresan, etc. are sown 1 cm. deep in rows 10 cm. apart and covered with fine compost or leaf mold. Light irrigation is provided during the morning hours. The nursery beds are covered with polythene sheets or dry paddy straw to protect the seedlings. About 15-20 cm. tall seedlings are chosen for planting in about two months. In India, 'Co. 1' and 'Co. 2' and 'Solo' are set on 6 ft (1.8 m) centers; 'Coorg Honey Dew' and 'Washington' on 8 ft (2.4 m) centers. Papaya is planted during spring (February-March), monsoon (June-July) and autumn (October-November).

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.
- Ethylene gas is used for treating the unripe green papayas such that they develop yellow or orange color.
- Papayas require a temperature of 7 to 8°C and humidity of 85-90% such that they can be stored for 4 – 8 weeks.
- 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 jewelry;
- 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 Papayas. The boxes or baskets have to be ventilated and the fruits should be wrapped in tissue paper or newspaper for protection.

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. Candied fruits notably tutti frutti is quite popular. A number of small scale units manufacture these items and find a ready market at a profitable price. As the consumption of bakery goods is on the increase, the demand for tutti frutti can also be expected to rise at the same pace. Papaya candy and other fruit candies can find a good market outside India also. Just like coconut, papaya tree is considered as "Karpaga Viruksha" because, the various parts of the tree are used either for human consumption or for animals or as raw materials for several of the agro - based industries. Papaya not only helps to improve the farm income but also serves as a cottage industry. Papaya (*Carica papaya*) is a tropical fruit having commercial importance because of its high nutritive and medicinal value. Papaya is a power house of nutrients and is

available throughout the year. It is a rich source of three powerful antioxidant vitamin C, vitamin A and vitamin E; the minerals, magnesium and potassium; the B vitamin pantothenic acid and fiber. Handling papaya fruit post-harvest is to prepare the fruits for market and also to preserve the fruits quality so it can present on market as it demands.

Food preservation has long been an on-going challenge for human with the methods like, drying, salting and fermentation being traditionally done for preservation. The process of impregnation with sugar must not be hurried because otherwise, the fruit would shrivel an unfit for glazing and crystallizing.

Tutti frutti is a colourful confection containing variously chopped and candied fruits, or an artificially created flavouring simulating the combined flavour of different fruits. Papaya is the second most nutritive food for Mango. Tutti frutti is made from unripe papaya fruit and contains a good amount of sugar. The countries with the largest papaya production are India and Brazil followed by Nigeria, Indonesia, and Mexico. Tutti frutti manufacturing project can be initiated on a small scale basis and it is a profitable investment option for startup entrepreneurs.

Tutti frutti is made by impregnating fruits with flavour & taste along with attractive colour. It is useful in the preparation of other food items such as toppings. It provides attractiveness as well as nutritive value to many food items. Mostly used for toppings for bread, ice cream, fruit bar, pulao, cakes, pastries, custard shrikhand and fruit salads, etc. Tutti frutti is a mass consumption added to sweets, paan Masala also.

The FPO specifications for candied fruits having TSS (Total Soluble Solids) value 75%-80% and reducing sugar 25%. Papaya (*Carica papaya*) is a tropical fruit having commercial importance and is famous for its high nutritive and medicinal values. The Candy can be prepared by adjusting the level of different ingredients to obtain the best quality.

2. MODEL PAPAYA TUTTI FRUTTI 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 Papaya Tutti Frutti processing unit are in the production clusters of Papaya growing states/Areas such as Andhra Pradesh, Gujarat, Karnataka, Maharashtra, West Bengal, Chhattisgarh, Madhya Pradesh, Assam, Tamil Nadu, and Kerala, where adequate quantities of surplus raw materials can be available for processing.

2.2 INSTALLED CAPACITY OF THE PAPAYA TUTTI FRUTTI PROCESSING UNIT

The maximum installed capacity of the Papaya Tutti Frutti manufacturing unit in the present model project is proposed as 150 tonns/annum or 500 kg/day Papaya Tutti Frutti. 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 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 Papaya Tutti Frutti manufacturing project, the unit requires 350 kg/day, 400 kg/day and 450 kg/day Papaya fruit at 70, 80 and 90 percent capacity utilization, respectively. The Papaya must be plucked from plant; and then stored below 6°C temperature.

2.4 MANUFACTURING PROCESS OF THE PAPAYA TUTT FRUTTI

The typical Procedure for manufacturing of Papaya Tutti Frutti is as below:

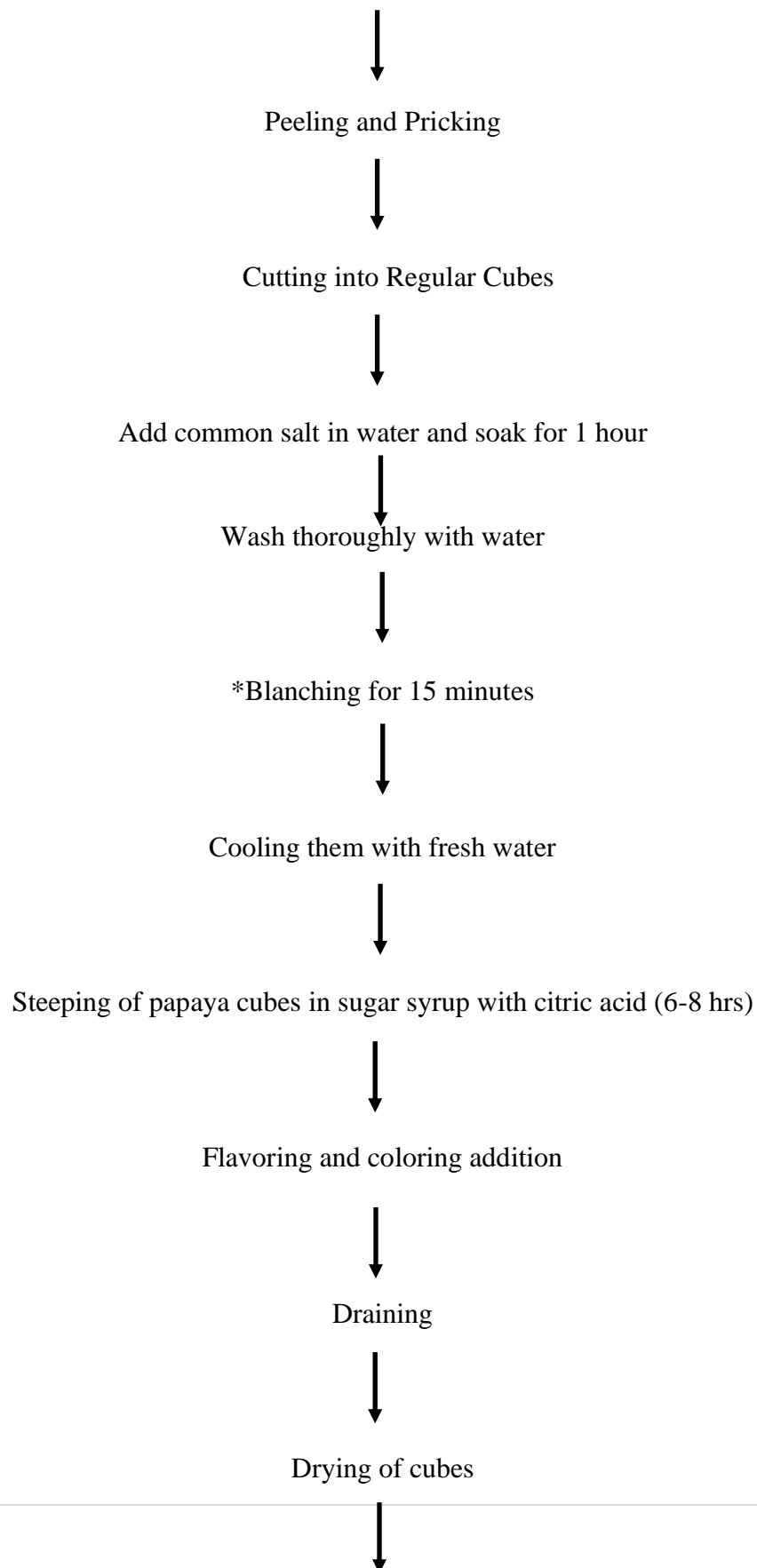
Papaya fruits
(Raw papaya fruits will be used)



Sorting



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



Packaging of papaya candies in polythene products



Storage

*Established Critical Control point

The unripe papaya fruits are peeled and edible portion taken out. These are cured as per requirement of individual commodity. The general process is to slowly impregnate the prepared papaya fruits with sugar by the process of cooking and storage (holding) till the consistency is raised to minimum 68° brix (total soluble solids).

Preserves are packed along with the syrup. Candied fruits are made, after draining the syrup and drying the pieces from the preserves. Candied fruits are further coated with thin transparent layer of sugar to make glazed crystallised fruits. Preserves are packed in glass bottles and plastic jars. Candy fruits are packed in polyethylene pouches or in tins (lined with polyethylene).

All fruit to be processed should be hand picked and not shaken from the tree. To obtain maximum yields of top quality dried product, all fruit should free from bruising. Any rotten or bruised fruit should be thrown away. For maximum profitability, the dryer should be loaded to maximum capacity as often as possible, therefore it is advisable to buy more fruit than is required. Unpeeled fruits should be washed in a mild disinfectant solution made from one part of bleach to 50 parts of water. Care must be taken not to break the skin of the fruits as this will contaminate the flesh. Gloves and aprons must be worn to protect the workers hands and clothes. Ten litres of treated water will be sufficient for about 20kg fruit. The wash water should be changed after this amount has been washed as it becomes contaminated by the fruit. Washed fruits are carefully peeled to remove all the peel and any

damaged parts of the flesh. Fruits are cut into slices of varying thickness depending on the type of fruit.

Blanching: This stage is optional, but some processors choose to soak fruits in a salt water prior to drying. There are several benefits of including this process. Fruit pieces are immersed in concentrated salt water for up to 1 hour. They are rinsed in clean water to remove any excess salt water before processing. Most vegetables and some fruits are blanched before drying to inhibit enzyme activity and to help preserve the colour. The material is cut into appropriate sized pieces and plunged into boiling water for up to 5 minutes. They should be blanched in small batches to ensure that each piece is properly heated through. If too many pieces are put into the water at one time, the water temperature will drop and prolong the blanching time. After blanching for the required time, papaya fruits are rapidly cooled by plunging into cold (or iced) water.

Preparation of Sugar Syrup: A weighed amount of sucrose is dissolved in water to make a solution of a known strength. The water must be heated to dissolve all the sugar. The strength of a sugar solution can be measured using a refractometer, which calculates the total soluble solids as degrees Brix. After the syrup has been used to soak fruit, the strength becomes reduced. It can be made back to the desired concentration by dissolving more sugar. Fruit pieces are soaked for up to 18 hours in a 67% sucrose solution, which will remove about 40% of the water. The fruit is finally added with flavours and colours depends on the requirement and then it is then ready for drying.

Drying: Drying Fruit pieces are arranged on mesh-bottom trays so that they are not touching or overlapping. The fruit should be loaded into the trays as soon as it is cut. This prevents the pieces from sticking together and allows the drying process to start as soon as possible. The trays should be brushed clean to remove any old fruit pieces. The trays should be loaded

into the dryer as soon as they are ready. The dryer doors should be closed after each tray is loaded. Direct sunlight should be avoided as this bleaches the color and reduces the level of vitamins C. The drying temperature should be controlled to avoid over-heating and spoilage of the fruit. Most fruits are dried at about 60-70 deg C. Fruits are dried until they have the desired final moisture content (15% for conventionally dried fruits; 20-25% for osmotically dried (sugar-treated fruits).

2.5 MARKET DEMAND AND SUPPLY FOR PAPAYA TUTTI FRUTTI

Papaya Fruits processed into various value added products like Papaya Paste, Frozen papaya, Papaya chips, Papaya spread, Papaya candied fruit, Papaya jelly, Papaya concentrates, Papaya extracts, Papaya puree, Raw papaya shreds, Papaya juice, Papaya jam, tea powders, Fruit cocktails, Canned papaya products and Ice Papaya gel. Due to sensitivity to chilling injury and limited shelf life of Papaya fruit, it becomes important to process it in the form value added products to reduce the surplus in the market in its peak season of production. Preservation of fruit in the form of value added products 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 for availability in off-season. In recent past the consumption of fruit based products and drinks has increased at a fast rate.

2.6 MARKETING STRATEGY FOR PAPAYA TUTTI FRUTTI

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 Papaya fruit based products.

2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Papaya Tutti Frutti 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 product 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. Papaya cost considered @ Rs.15/-per kg.
 2. 1 kg Papaya will produce 80% 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 Papaya Tutti Frutti 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	15		
Average sale prices per Kg	80	Rs/kg	
Pulp extraction	80		
PAPAYA TUTTI FRUTTI	1 Kg Tuttl Frutti from 0.8 kg Papaya		

2.8 FIXED CAPITAL INVESTMENT

Capital investment of Rs. 5.18 lakh required.

2.8.1 MACHINERY AND EQUIPMENT

Sr No.	Equipment	Capacity	Quantity	Price (Rs. In Lacs)
1	Cold store sq. meter	1	1500 Kg	6
2	Dicing Machine	1	100 kg/hr	0.8
3	Soaking Tank	1	100 liters	0.3
4	Blanching Kettle	1	200 liters	0.6
5	Sugar Syrup Preparation Tank	4	1 KL	2.8
6	Solar Dryer	1	500 Kg	3.5
7	Cotinuuous Sealing Machine	1	60 PPM	0.15
8	Weighing balance	1	Suitable	0.06
9	Accessories	1	Suitable	0.5

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 23.94 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	1.00	1.18	1.61
Work in progress	15 days	2.00	2.36	3.22
Packing material	15 days	0.60	0.71	0.97
Finished goods' stock	15 days	3.18	3.76	5.12
Receivables	30 days	6.36	7.51	10.25
Working expenses	30 days	0.88	1.03	1.41
Total current assets		14.01	16.56	22.58
Trade creditors		0.00	0.00	0.00
Working capital gap		14.01	16.56	22.58
Margin money (25%)		3.50	4.14	5.64
Bank finance		10.51	12.42	16.93

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	14.71
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	3.50
Total project cost (i to vii)	27.19
Means Of finance	
i. Subsidy	8.97
ii. Promoters Contribution	5.44
iii. Term Loan (@10%)	12.78

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	4 th Year	5th year	6th year
A	Total Installed Capacity (MT)	119 MT Papaya/Annum	105	120	135	135	135
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%
B	Expenditure (Rs. in Lakh)	0					
	Raw Papaya (Av. Price 15 rs/Kg)	0.00	12.44	14.22	16.00	16.00	16.00
	Sugar @ Rs. 35/kg	0.00	15.44	17.64	19.85	19.85	19.85
	Other materials (Rs. 80/kg)	0.00	0.17	0.01	0.01	0.01	0.01
	Packaging materials (Rs 8 per Kg)	0.00	8.40	14.40	16.20	16.20	16.20
	Utilities (Electricity, Fuel)	0.00	1.23	1.40	1.58	1.58	1.58
	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	48.26	58.35	64.41	64.41	64.41
C	Total Sales Revenue (Rs. in Lakh)	0.00	66.00	78.00	90.00	108.00	120.00
	Sale of Papaya Tutti Frutti (Av. Sale Price @ Rs.80/kg)	0.00	66.00	78.00	90.00	108.00	120.00
D	PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows	-2.96	17.74	19.65	25.59	43.59	55.59
	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	1.47	1.32	1.19	1.07	0.97	0.87
	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%	1.33	1.28	1.23	1.18	1.11	1.05
	Interest on working capital @ 12%	0.00	1.26	1.26	1.26	1.26	1.26
E	Profit after depreciation and Interest (Rs. in Lakh)	-6.14	14.79	16.90	23.04	41.23	53.42
F	Tax (assumed 30%) (Rs. in Lakh)	0.00	4.44	5.07	6.91	12.37	16.03
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	-6.14	10.35	11.83	16.13	28.86	37.39

H	Surplus available for repayment (PBDIT- Interest on working capital-Tax) (Rs. in Lakh)	1.33	1.28	1.23	1.18	1.11	1.05
I	Coverage available (Rs. in Lakh)	1.33	1.28	1.23	1.18	1.11	1.05
J	Total Debt Outgo (Rs. in Lakh)	0.44	0.49	0.54	0.60	0.66	0.73
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)	-4.29	12.02	13.34	17.50	30.10	38.52
M	Payback Period						
	(on Rs. 27.19 Lakhs initial investment)						

2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	12,78,039.11	1,77,288.54	1,32,916.07	44,372.47	12,33,666.64
2	12,33,666.64	1,77,288.54	1,28,301.33	48,987.21	11,84,679.43
3	11,84,679.43	1,77,288.54	1,23,206.66	54,081.88	11,30,597.55
4	11,30,597.55	1,77,288.54	1,17,582.14	59,706.40	10,70,891.15
5	10,70,891.15	1,77,288.54	1,11,372.68	65,915.86	10,04,975.29
6	10,04,975.29	1,77,288.54	1,04,517.43	72,771.11	9,32,204.18
7	9,32,204.18	1,77,288.54	96,949.23	80,339.31	8,51,864.87
8	8,51,864.87	1,77,288.54	88,593.95	88,694.59	7,63,170.28
9	7,63,170.28	1,77,288.54	79,369.71	97,918.83	6,65,251.44
10	6,65,251.44	1,77,288.54	69,186.15	1,08,102.39	5,57,149.05
11	5,57,149.05	1,77,288.54	57,943.50	1,19,345.04	4,37,804.01
12	4,37,804.01	1,77,288.54	45,531.62	1,31,756.92	3,06,047.09
13	3,06,047.09	1,77,288.54	31,828.90	1,45,459.64	1,60,587.45

14	1,60,587.45	1,77,288.54	16,701.09	1,60,587.45	(0.00)
		24,82,039.57	12,04,000.46	12,78,039.11	(12,78,039.11)

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	14.71	13.24	11.92	10.72	9.65	8.69	7.82	7.04
Depreciation	1.47	1.32	1.19	1.07	0.97	0.87	0.78	0.70
Depreciated value	13.24	11.92	10.72	9.65	8.69	7.82	7.04	6.33
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	20.69	18.84	17.17	15.66	14.29	13.05	11.93	10.91
Depreciation	1.85	1.67	1.51	1.37	1.24	1.12	1.02	0.92
Depreciated value	18.84	17.17	15.66	14.29	13.05	11.93	10.91	9.99

2.15 FINANCIAL ASSESSMENT OF THE PROJECT

Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year	
Capital cost (Rs. in Lakh)	27.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Recurring cost (Rs. in Lakh)	2.96	48.26	58.35	64.41	64.41	64.41	64.41	64.41	
Total cost (Rs. in Lakh)	30.15	48.26	58.35	64.41	64.41	64.41	64.41	64.41	458.83
Benefit (Rs. in Lakh)	0.00	66.00	78.00	90.00	108.00	120.00	120.00	120.00	
Total Depreciated value of all assets (Rs. in Lakh)								9.99	
Total benefits (Rs. in Lakh)	0.00	66.00	78.00	90.00	108.00	120.00	120.00	129.99	711.99
Benefit-Cost Ratio (BCR): (Highly Profitable project)	1.55								
Net Present Worth (NPW):	253.15								

2.16 BREAK EVEN ANALYSIS

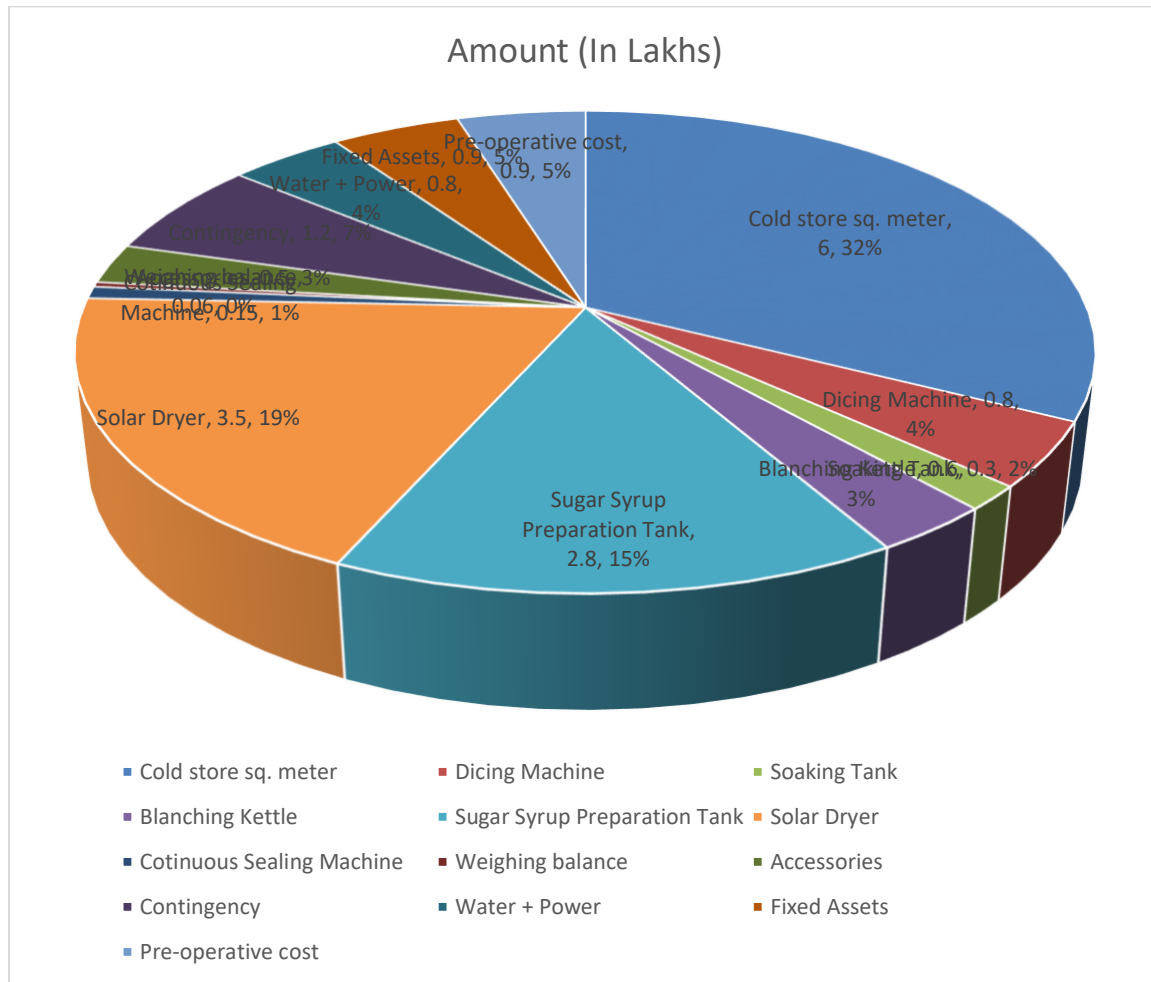
Break even analysis indicates costs-volume profit relations in the short run. This is the level at which, the firm is in no loss no profit situation.

Break-Even Analysis

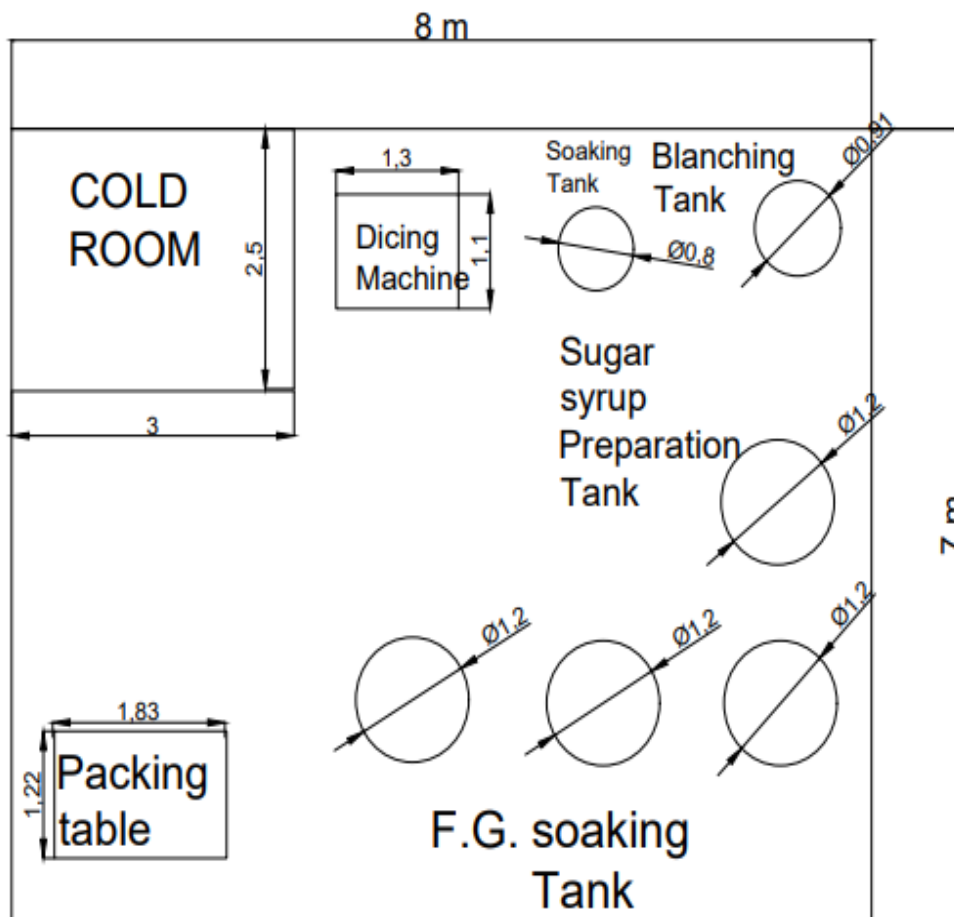
Sr. No.	Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%	100%	100%
	Production MT/Annum		82.50	97.50	112.50	135.00	150.00	150.00	150.00
A	Fixed Cost (Rs. in Lakh)								
	Permanent staff salaries	7.28	7.28	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	1.47	1.32	1.19	1.07	0.97	0.87	0.78	0.70
	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	1.33	1.28	1.23	1.18	1.11	1.05	0.97	0.89
	Insurance	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Total Fixed Cost (Rs. in Lakh)	10.76	10.54	10.33	10.13	9.94	9.75	9.57	9.39
B	Sales Revenue (Rs. in Lakh)	0.00	66.00	78.00	90.00	108.00	120.00	120.00	120.00
C	Variable Cost (Rs. in Lakh)								
	Papaya (Av. Price @ Rs.15/Kg)	0.00	9.78	11.55	13.33	16.00	17.78	17.78	17.78
	Sugar @ 35 per kg	0.00	12.13	14.33	16.54	19.85	22.05	22.05	22.05
	Other ingredients	0.00	0.13	0.16	0.18	0.22	0.24	0.24	0.24
	Packaging materials	0.00	6.60	7.80	9.00	10.80	12.00	12.00	12.00
	Casual staff salaries	0.00	5.78	5.78	5.78	5.78	5.78	5.78	5.78
	Utilities (Electricity, Fuel)	0.00	0.96	1.14	1.31	1.58	1.75	1.75	1.75
	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	1.26	1.26	1.26	1.26	1.26	1.26	1.26
	Total Variable Cost (Rs. in Lakh)	0.50	39.34	44.83	50.31	58.38	63.76	63.76	63.76
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)	-	7.92	7.80	7.20	8.64	8.40	8.40	7.20

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



2.18 TYPICAL PAPAYA TUTTI FRUTTI MANUFACTURING UNIT LAYOUT



Solar Dryer is to be kept at tarrace or in Open ground outside plsnt, hence not shown in 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

Director

Indian Institute of Food Processing Technology

(Ministry of Food Processing Industries, Government of India)

Pudukkottai Road, Thanjavur - 613 005, Tamil Nadu

Phone No.: +91- 4362 - 228155, Fax No.:+91 - 4362 – 227971

Email: director@iifpt.edu.in; Web: www.iifpt.edu.in