

PM Formalization of Micro Food Processing Enterprises Scheme

DETAILED PROJECT REPORT FOR CUSTARD APPLE RTS PROCESSING



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Project At a Glance

1	Name of the Project	Custard Apple 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 shareholders (if company/FPC)	
8	Technical advisor	
9	Marketing advisor/partners	
10	Proposed project capacity	150 MT/annum (55, 65, 75,& 90% capacity utilization in the 2nd, 3rd, 4th year, 5th year onwards respectively)
11	Raw materials	Custard Apple
12	Major product outputs	Custard Apple RTS
13	Total project cost (Lakhs)	27.70
	Land development, building & civil construction	4.5
	Machinery and equipments	15.36
	Utilities (Power & water facilities)	0.9
	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.50
	Contingencies	1.00
	Working capital margin	4.54
14	Working capital Management (In Lakhs)	
	Second Year	13.61
	Third Year	16.08
	Fourth Year	21.93
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	10.01
	Promoter's contribution (min 20%)	6.64
	Term loan (40%)	11.03
16	Debt-equity ratio	1.66: 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	24.72
	3rd year	30.98
	4th year	37.23
18	Average DSCR	2.31
	Benefit Cost Ratio	1.78
	Term Loan Payment	7 Years with 1 year grace period
	Pay Back Period for investment	2 Years

1. GENERAL OVERVIEW AND INTRODUCTION

1.1 ORIGIN AND DISTRIBUTION

- ✓ The custard apple is believed to be a native of the West Indies but it was carried in early times through Central America to southern Mexico. It has long been cultivated and naturalized as far south as Peru and Brazil. It is commonly grown in the Bahamas and occasionally in Bermuda and southern Florida.
- ✓ Apparently it was introduced into tropical Africa early in the 17th century and it is grown in South Africa as a dooryard fruit tree. In India the tree is cultivated, especially around Calcutta, and runs wild in many areas. It has become fairly common on the east coast of Malaya, and more or less throughout Southeast Asia and the Philippines though nowhere particularly esteemed. Eighty years ago it was reported as thoroughly naturalized in Guam. In Hawaii it is not well known.
- ✓ Custard Apples are a sub-tropical deciduous tree belonging to the *Annonaceae* family. This family contains over 2000 members spread throughout the world. Of this family, it is the *atemeoya*, a hybrid of the *Annona* genus that Australia's commercial cultivars derive from.
- ✓ Custard Apple trees are large and spreading, shaded by large, green drooping leaves. The tree sets many light yellow trumpet shaped flowers that emit a pungent, sweet smell especially in the late afternoon when the male pollen sacks burst open. Of these flowers, only a small number will set fruit.
- ✓ The Fruit takes between 20 and 25 weeks to reach maturity in sub-tropical climates where the days are not too warm and the nights not too cool.

1.2 DESCRIPTION

- ✓ Botanically it is a “Multiple-fruit” wherein the fruit is developed from merger of several individual flowers (Ovaries) into a larger fruit mass (infructescences).

- ✓ The custard apple tree is not especially attractive. It is erect, with a rounded or spreading crown and trunk 25-35 cm thick. Height ranges from 4.5-10 m. The ill-smelling leaves are deciduous, alternate, oblong or narrow-lanceolate, 4 to 8 in (10-20 cm) long, 3/4 to 2 in (2 5 cm) wide, with conspicuous veins. Flowers, in drooping clusters, are fragrant, slender, with 3 outer fleshy, narrow petals 3/4 to 1 1/4 in (2 3 cm) long; light-green externally and pale-yellow with a dark-red or purple spot on the inside at the base. The flowers never fully open.
- ✓ The compound fruit, 3 1/4 to 6 1/2 in (8-16 cm) in diameter, may be symmetrically heart-shaped, lopsided, or irregular; or nearly round, or oblate, with a deep or shallow depression at the base. The skin, thin but tough, may be yellow or brownish when ripe, with a pink, reddish or brownish-red blush, and faintly, moderately, or distinctly reticulated. There is a thick, cream-white layer of custard like, somewhat granular, flesh beneath the skin surrounding the concolorous moderately juicy segments, in many of which there is a single, hard, dark-brown or black, glossy seed, oblong, smooth, less than 1/2 in (1.25 cm) long. Actual seed counts have been 55, 60 and 76. A pointed, fibrous, central core, attached to the thick stem, extends more than halfway through the fruit. The flavor is sweet and agreeable though without the distinct character of the cherimoya, sugar apple, or atemoya.

1.3 VARIANTS

- ✓ There are two main varieties of Custard Apples, the Pinks Mammoth (or Hillary White) and the African Pride. Both are sweet, juicy and full of flavor. Pinks Mammoth are large super sweet fruit which some growers hand pollinate at flowering to improve fruit shape. These trees can produce fruit weighing as much as 3 kg. African Prides are a medium sized, well-shaped 500g to 800g fruit that sets well on the tree. Both fruit when mature have a fullness appearance with a smoothing out of the bumps. They also turn from dark green to a light green. Pinks Mammoth can also, when mature, show a yellowing between the fruit carpules.

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Health benefits

- ✓ **Better Cardiovascular Health:** - Custard apple is one of the few fruits that contain a well-balanced ratio of potassium and sodium that helps in regulating and controlling blood pressure fluctuations in the body. The high magnesium content in custard apple relaxes the smooth heart muscles, thus preventing stroke and heart attack. Moreover, fiber and niacin in the fruit help in lowering bad cholesterol while increasing good cholesterol in the body. Most importantly it helps in preventing the absorption of cholesterol in the gut and averts the free radicals from affecting lipid.
- ✓ **Helps fight fatigue:-**Fatigue can result from a number of factors, including daily lifestyle as well as diseases. A 100-gram serving of custard apple contains 101 kilo calories (Kcal), which is roughly around 5% of the recommended dietary allowance. The fruit will keep you going with your day to day activities without any hassle.
- ✓ **Boosts eye sight:-**Custard apple is a rich source of vitamin C and riboflavin, two most essential nutrients that are responsible for keeping the eyes healthy. They also help in fighting free radicals from damaging the cells. As we age, weak eyesight is a common problem. In this day and age where we are glued to the screens of our phone, TV, tablets, and laptops, it is important to take good care of your eyes. The essential nutrients in custard apple prevent your eyes from drying out allowing them to function properly.
- ✓ **Boosts natural anti-cancerous properties:-**Custard apples are rich in flavonoids which are helpful in treating numerous types of tumors and cancers. The fruit also contains elements like alkaloids and acetogenin that are known to reduce the risk of renal failure and cancer. The antioxidant properties of custard apple act against cancer-causing cells, without affecting the healthy cells. Bullatacin and asimicin are two antioxidant compounds that have anti-helminths and anti-cancer properties. They help in counteracting the effects of free radicals, thus avoiding cancer.

- ✓ **Lowers the risk of arthritis:**-Custard apples are a rich source of magnesium. When consumed, magnesium helps in equalizing the water balance in the body, therefore eradicating acids from the joints. This ultimately helps in reducing the symptoms of arthritis and rheumatism. According to experts, regular consumption of the fruit also helps in fighting muscle weakness. Custard apples also contain calcium which is essential for bone health.
- ✓ **For better brain health:**-Custard apples contain B complex vitamins in abundance. B complex vitamins are known for controlling your brain's GABA (gamma-aminobutyric acid) neuron chemical levels. This is what influences different emotions, including depression, irritability, tension, and stress. The B complex vitamins help the brain to calm down, especially when you are stressed about something or are depressed. According to experts, it is a great food to have to protect against Parkinson's disease. 100 gms of custard apple contains 0.6 gms of Vitamin B6 which is 15-20% of the daily recommended value.
- ✓ **Remedy for inflammatory diseases:**-Custard apple is a highly recommended fruit for people suffering from inflammatory diseases like gout and rheumatoid arthritis. The antioxidants present in the fruit can help curb pain related to auto-inflammatory diseases and conditions. Not only the fruit, but the leaves of custard apple have also been known to possess anti-inflammatory properties.
- ✓ **Keeps skin youthful and delays aging:**-Eating custard apple has shown to stimulate and increase collagen production in the body. Collagen is a protein that gives the skin its elasticity, plumpness, and smoothness. As we age, collagen production becomes slow. This results in the formation of crease lines on the skin, sagginess of the skin, and wrinkly skin. Consuming custard apple thickens and stimulates the production of collagen, therefore reducing the fine lines and wrinkles. The compounds present in custard apple slow down the breakdown of collagen, improving the elasticity of the skin and keeping the skin hydrated. The presence of antioxidants in the fruit ensures that signs like blemishes and age spots are delayed. Last but not least, it is essential for the regeneration of the skin cells, which keeps the skin look youthful all the time.

- ✓ **Prevents anemia:-**Anemia occurs due to a disorder within the body. It leads to the body having less than regular amounts of hemoglobin or red blood cells in the body. The red blood cells use hemoglobin for transporting oxygen all around the body, allowing the body to perform numerous functions. Lower amounts of red blood cells or hemoglobin result in the blood lacking an adequate amount of oxygen. This makes the lungs and the heart work harder to produce more oxygen. Custard apple is known as a haematinic as well as an expectorant, which helps in dealing with conditions like anemia.

Nutritional Information Table

Custard Apple Nutrition: - Values per 100 gm. (Source – USDA national Nutrient data base).

Principle	Nutrition Value	% RDA
Energy	101 Kcal	5 %
Carbohydrates	25.20 g	19 %
Protein	1.70 g	3 %
Total Fat	0.60 g	3 %
Cholesterol	0 mg	0 %
Dietary Fibre	2.4 g	6 %
Vitamins		
Niacin	0.500 mg	3.5%
Pantothenic acid	0.135 mg	2.5%
Pyridoxine	0.221 mg	17 %
Riboflavin	0.100 mg	8%
Thiamin	0.80 mg	7 %
Vitamin A	33 IU	1%
Vitamin C	19.2 mg	32%
Electrolytes		
Sodium	3 mg	<1%
Potassium	382 mg	8%
Minerals		
Calcium	30 mg	3%
Iron	0.71 mg	9%
Magnesium	18 mg	4.5%
Manganese	0.093mg	4%
Phosphorous	21 mg	3%

Phytonutrients		
Epicatechin	5.6 mg	--
Proanthocyanidin monomers	6.2 mg	--
Proanthocyanidin dimers	14.2 mg	--

Food Uses

- ✓ In India, the fruit is eaten only by the lower classes, out-of-hand.
- ✓ In Central America, Mexico and the West Indies, the fruit is appreciated by all.
- ✓ When fully ripe it is soft to the touch and the stem and attached core can be easily pulled out. The flesh may be scooped from the skin and eaten as is or served with light cream and a sprinkling of sugar.
- ✓ Often it is pressed through a sieve and added to milk shakes, custards or ice cream.

Toxicity

- ✓ The seeds are so hard that they may be swallowed whole with no ill effects but the kernels are very toxic. The seeds, leaves and young fruits are insecticidal. The leaf RTS kills lice. The bark contains 0.12% anonaine. Injection of an extract from the bark caused paralysis in a rear limb of an experimental toad. Sap from cut branches is acrid and irritant and can severely injure the eyes. The root bark has yielded 3 alkaloids: anonaine, liriodenine and reticuline (muricinine).
- ✓ Safety profile – Custard apple seeds and leaf parts contains toxic alkaloids, and hence should not be consumed. And if whole seed is consumed then it will not pose any threat as it comes out of gastrointestinal track undigested.
- ✓ Accidental consumption can cause abortion as they are mildly poisonous.
- ✓ The insecticides prepared from these seeds should be kept away from eyes as they have the potency of even blinding a person temporarily.

Other Uses

- ✓ The leaves have been employed in tanning and they yield a blue or black dye. A fiber derived from the young twigs is superior to the bark fiber from *Annona squamosa*. Custard apple wood is yellow, rather soft, fibrous but durable, moderately close-grained, with a specific gravity of 0.650. It has been used to make yokes for oxen.

Medicinal Uses

- ✓ The leaf decoction is given as a vermifuge. Crushed leaves or a paste of the flesh may be poultice on boils, abscesses and ulcers.
- ✓ The unripe fruit is rich in tannin; is dried, pulverized and employed against diarrhea and dysentery.
- ✓ The bark is very astringent and the decoction is taken as a tonic and also as a remedy for diarrhea and dysentery.
- ✓ In severe cases, the leaves, bark and green fruits are all boiled together for 5 minutes in a liter of water to make an exceedingly potent decoction. Fragments of the root bark are packed around the gums to relieve toothache. The root decoction is taken as a febrifuge.

1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT

Cultivars

- ✓ No named cultivars are reported but there is considerable variation in the quality of fruit from different trees. The yellow-skinned types seem superior to the brownish, and, when well filled out, have thicker and juicier flesh. Seeds of a purple-skinned, purple-fleshed form, from Mexico, were planted in Florida and the tree has produced fruit of unremarkable quality.

Climate

- ✓ The custard apple tree needs a tropical climate but with cooler winters than those of the west coast of Malaya. It flourishes in the coastal lowlands of Ecuador; is rare above 5,000 ft (1,500 m).
- ✓ In Guatemala, it is nearly always found below 4,000 ft (1,220 m). In India, it does well from the plains up to an elevation of 4,000 ft (1,220 m); in Ceylon, it cannot be grown above 3,000 ft (915 m). Around Luzon in the Philippines, it is common below 2,600 ft (800 m). It is too tender for California and trees introduced into Palestine succumbed to the cold. In southern Florida the leaves are shed at the first onset of cold weather and the tree is dormant all winter.
- ✓ Fully grown, it has survived temperatures of 27° to 28°F (-2.78° to 2.22°C) without serious harm. This species is less drought-tolerant than the sugar apple and prefers a more humid atmosphere.

Soil

- ✓ The custard apple does best in low-lying, deep, rich soil with ample moisture and good drainage. It grows to full size on oolitic limestone in southern Florida and runs wild in light sand and various other types of soil in the New and Old World tropics but is doubtless less productive in the less desirable sites.

Culture

- ✓ The tree is fast-growing and responds well to mulching, organic fertilizers and to frequent irrigation if there is dry weather during the growing period. The form of the tree may be improved by judicious pruning.

Harvesting and Yield

- ✓ The custard apple has the advantage of cropping in late winter and spring when the preferred members of the genus are not in season. It is picked when it has lost all green

color and ripens without splitting so that it is readily sold in local markets. If picked green, it will not color well and will be of inferior quality.

- ✓ The tree is naturally a fairly heavy bearer. With adequate care, a mature tree will produce 75 to 100 lbs (34-45 kg) of fruits per year. The short twigs are shed after they have borne flowers and fruits.

Pests and Diseases

- ✓ The custard apple is heavily attacked by the chalcid fly. Many if not all of the fruits on a tree may be mummified before maturity. In India, the ripening fruits must be covered with bags or nets to avoid damage from fruit bats.
- ✓ A dry charcoal rot was observed on the fruits in Assam in 1947. In 1957 and 1958 it made its appearance at Saharanpur. The causal fungus was identified as *Diplodia annonae*. The infection begins at the stem end of the fruit and gradually spreads until it covers the entire fruit.

General identified diseases are as follows.

- ✓ Anthracnose: - Necrotic spots of 2-10 mm in diameter appear on unripe fruits which turn into dark brown to black spots. These spots coalesce later and cover entire fruit. This has found favorable due to wet and Windy conditions and old fruits left unpicked on the trees provides inoculum for disease spread.
- ✓ Leaf Spot:-The pathogen survives through spores (conidia) or mycelium in diseased plant debris or other hosts. Relative humidity above 70% coupled with warm weather (12-25 °C temp.) and intermittent rains favors disease.
- ✓ Diplodia Rot:-Diseased fruits show symptoms of purplish to black spots or blotches confined to the surface of the fruit and eventually covered with white mycelia and black pycnidia. Diplodia rot is distinguished by its dark internal discoloration and the extensive corky rotting produces. The penetrated flesh eventually softens or hardens and cracks, depending on the presence of secondary microbes.

Bearing:-

- ✓ Pruning and defoliation practices were investigated on juvenile custard apple trees, cv. African Pride, clonally propagated from cuttings.
- ✓ Moderate summer and spring dormant pruning, (the traditional pruning time), resulted in severe yield reduction probably as a result of a reduction in lateral numbers and floral buds initiated. Chemical defoliation of trees using 0.2% V/V Ethrel (R) and 20% W/V urea, during the mid-summer period increased lateral numbers and improved precocity of bearing considerably, 25 t ha⁻¹ in the first year of cropping.
- ✓ The trees receiving no pruning or defoliation treatments (control), although high yielding, were structurally unsound, and exhibited severe limb breakage. In comparison the trees which received the mid-summer defoliation treatment were structurally sound and exhibited the best shape. The experiment also demonstrated the high yield efficiency or fruitfulness of clonally propagated African Pride trees.
- ✓ Yrs 1 to 5 are known to be vegetative stages while 6th onwards are generally flowering & Fruiting. Application of essential nutrients for plants are said to be N,P& K. and their application standards are given below stage wise.

2 nd to 5 th year		6 th year onwards (As per plant)	
FYM	30 kg	FYM	30kg
N	400gm	N	600gm
O	250gm	P	500gm
K	800 gm	K	1200gm

Post-Harvest management.

- ✓ The information about the pre-harvest, post-harvest and processing and value addition practices have not been sufficiently explored. The postharvest system for these fruits is not yet adequately developed and therefore several handling problems are still common.
- ✓ Custard apple (*Annona squamosa*) fruits were harvested at physiological stage of maturity.
- ✓ Fruits were treated with chitosan at 1%, wax coating @ 6%, chitosan-1% and NAA-100 ppm. Treated fruits were subsequently packed in corrugated fiber board boxes and stored at room

temperature. Result indicated that the wax 6% and chitosan 1% combination were effective for extending shelf life of custard apple fruits.as compared to control. Fruits treated with the combination of wax 6% and chitosan 1% coating showed better retention of firmness, TSS, titratable acidity and total sugars and delayed PLW, respiration rate, ethylene evolution rate.

- ✓ The findings showed that the treatment with the combination of wax and chitosan may be utilized commercially to minimize the post-harvest losses of custard apple fruits and fungicidal toxic health hazards.

1.6 PROCESSING & VALUE ADDITION:-

- ✓ The fresh fruits have limited shelf life; therefore, it is necessary to process fresh fruits in to different value added products to increase its availability over an extended period and to stabilize the price during the glut season.
- ✓ The processed products have good potential for internal as well as external trade. Seasonal losses in surplus custard apple fruits can be avoided by processing into different value added products that make them more attractive to the buyer and/or more readily usable to the consumer.
- ✓ Custard apple being rich in taste can be used for preparation of natural jam and jelly. Processed custard apple pulp is an excellent raw material for preparation of RTS, RTS beverages, nectar, powder, candy and preserve. In view of changing consumer attitude, demand and emergence of new market, it has become imperative to develop products that have nutritional as well as health benefits.
- ✓ In this context, custard apple has excellent digestive and nutritive value, pleasant flavor, high palatability and availability in abundance at cheapest rates. Custard apple is a very popular fruit in India and it is available throughout the year except few months. The nutritive value of the fruit is very high and thus it is an ideal crop for processing and value addition.
- ✓ It is consumed in large quantities either fresh or in such prepared foods such as jam, RTSs, ice creams, milk shakes, Pulps, RTS, Nectars, RTS powder, toffee, and chocolates.
- ✓ In current days dried fruits or candied fruits are running fast in the market.

- ✓ More antioxidants present made it more suitable for diabetics also.

Uses of Custard apple Seeds

Along with fruit, Wastage seeds are also having lots of reported uses which makes it more valuable since so long.

1. Eradicates head lice
2. Insect repellent
3. Pesticide, Herbicide & Weedicide
4. Pharmaceutical usage : abortifacient properties
5. Commercial farming pesticides
6. Bio-gas production

Amongst the aforesaid usages custard apple ice creams & RTS are the mostly used product currently.

2. MANUFACTURING PROCESS OF THE CUSTARD APPLE RTS

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 Custard apple RTS manufacturing unit are in the production clusters of Custard apple growing states such as Gujarat , Andhra Pradesh, Punjab, Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar, West Bengal, Assam, Maharashtra, Karnataka, Kerala and Tamil Nadu. Where adequate quantities of surplus raw materials can be available for processing.
- ✓ However, in other states of India multi fruit & other variants based RTS/RTSs unit with Custard apple as one of the raw materials can be established.

2.2 INSTALLED CAPACITY OF THE CUSTARD APPLE RTS MANUFACTURING UNIT

The maximum installed capacity of the Custard Apple RTS manufacturing unit in the present model project is proposed as 150 tons/annum or 500 kg/day Custard Apple RTS manufacturing. The unit is assumed to operate 300 days/annum @ 8-10 hrs/day. The 1st year is assumed to be construction/expansion period of the project; and in the 2nd year 55 percent capacity, 3rd year 65 percent capacity and 4th year onwards 75 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 Custard Apple RTS manufacturing project, the unit requires 80 kg/day, 90 kg/day and 100 kg/day raw ripened fruit at 55, 65 and 75 percent capacity utilization, respectively.
- ✓ If there are shortages in supply, then the entrepreneur can use pulp of other seasonal fruits for same purpose to achieve maximum capacity utilization for higher economic efficiency.
- ✓ The fruit must be plucked from plant at mature stage; and then stored below 6°C temperature.

2.4 MANUFACTURING PROCESS

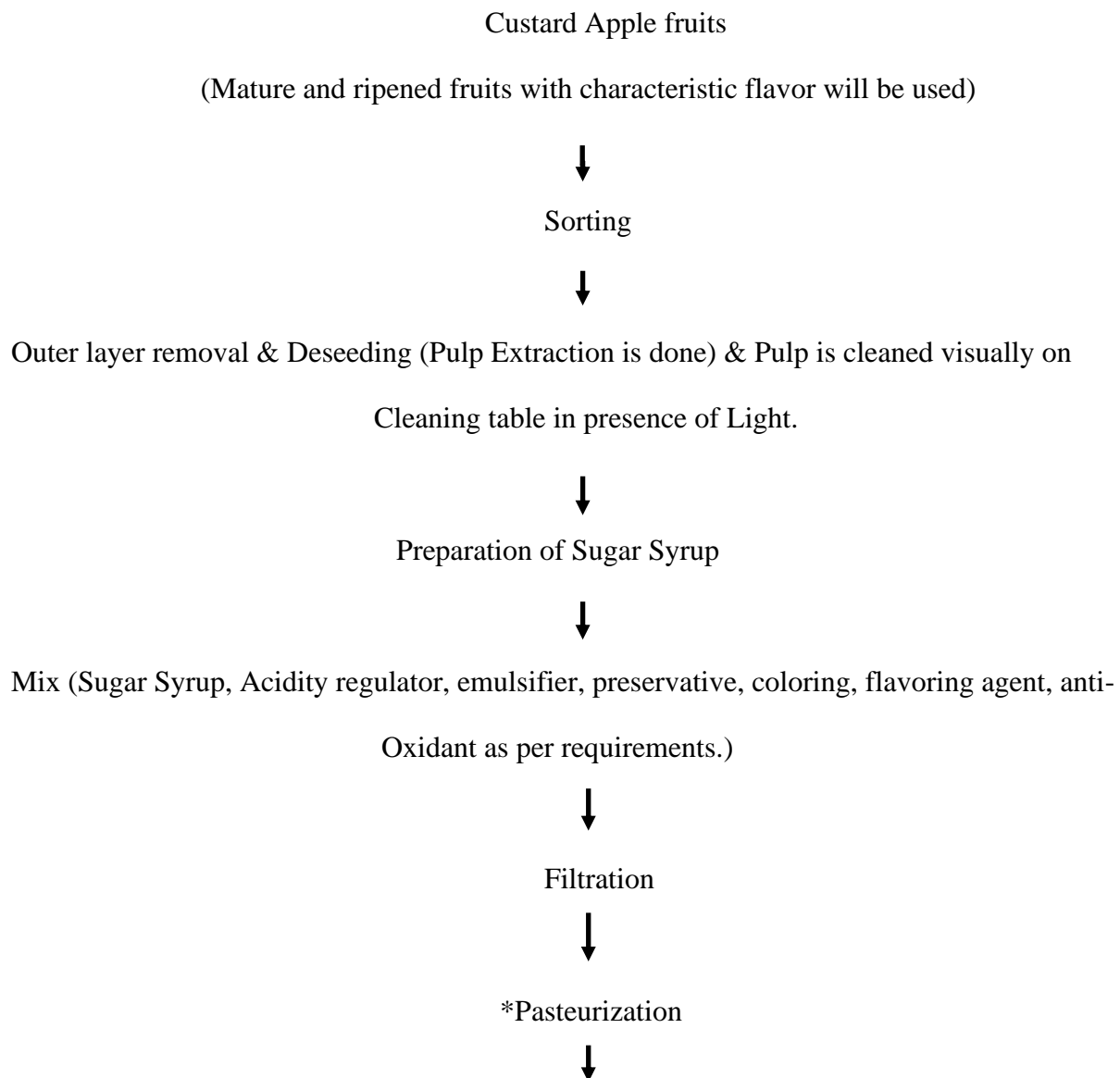
Custard apple fruits are very perishable and have a short post-harvest life therefore they require efficient storage techniques. Ripe fruits can be stored only for 1 -2 days without decay. It is observed that more than 75 per cent of fruits produced go waste after harvesting due to inefficient processing, storage techniques and short shelf life of fruits.

- So in order to overcome this problem, an automatic machine has been designed and developed for separating the pulp, seeds and peels from the custard apple fruits.
- The newly developed machine has been evaluated for its performance. The capacity of the machine is around 120 Kg/hr, and the efficiency of pulp recovery from fruits is around **94-96%** with 6% pulp wastage along with peels. In that pulp recovery coarse / intact Pulp recovery is around **70-72%** and **fine pulp recovery is around 28-30%**, Still work is going on for machine improvements.

- Custard apple Pulp extraction machine works on two basic fundamentals. 1. Centrifugal force and 2. Sieving of pulp for seed removal.

Flow Chart for RTS production.

The typical Procedure for manufacturing of Custard Apple RTS is as below:



Cooling



*Packaging and Storage

2.5 MARKET DEMAND AND SUPPLY FOR CUSTARD APPLE

- ✓ The fruit based products consumption is picking up due to increasing income and changing food habits. Therefore, demand for fruit based beverages are prevalent across length and breadth of the country throughout the year.
- ✓ Custard Apple RTS & Other products if highlighted properly for all these health benefits can occupy significant cold products market.
- ✓ The global **Beverage market** value is expected to reach USD 89.5 billion by 2023, recording an anticipated CAGR of 4.9% during the forecast period (2018-2023). ... Unilever dominates the global **market** occupying eight of the 15 top selling brands and a 22% share in the **market**.
- ✓ Only thing to be done over here is to replace the existing products with custard apple RTS and ice creams with proper demonstration.

2.6 MARKETING STRATEGY FOR CUSTARD APPLE RTS.

- ✓ **Marketing strategy** is a long-term, forward-looking approach and an overall game plan of any organization or any business with the fundamental goal of achieving a sustainable competitive advantage by understanding the needs and wants of customers.

- ✓ 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 Custard apple RTS.

2.7 DETAILED PROJECT ASSUMPTIONS

Detailed Project Assumptions			
Parameter	Assumption		
Capacity of the Custard Apple RTS mfg. Unit	150	MT/ annum	
Utilization of capacity	1st Year Implementation, 55% in second, 65% in third, 75% in fourth, 90% in fifth 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	95	Rs/kg	
Pulp extraction	30		
Custard Apple RTS	1 Kg Custard Apple RTS from 0.660 kg Custard Apple fruit		

- ✓ This model DPR for manufacturing 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 unit by adding new line.

- ✓ 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. Custard Apple cost considered @ Rs. 30/- per kg.
 2. Sugar Cost considered @ Rs. 35/- per kg.
 3. Custard Apple pulp yield from raw fruit to processed pulp is considered as 30 %, which may vary depend on degree of ripening & Size of the fruit., and Fruit purchase is assumed as a bulk & in that 10% approx. will be eliminated as a rejection due to over ripened, decayed, diseased, rotten etc.
 4. Machinery cost may also vary from vendor to vendor.
- ✓ Land and civil infrastructures are assumed as already available with the entrepreneurs.
- ✓ We took less sugar content as fruit is itself sweeter, cost can be reduced by increasing sugar content.

2.8 PROJECT START-UP COSTING SHEETS

2.8.1 Machinery and Equipment: - Rs. 15.36 Lacs

	Equipment	Specification	Quantity	Area Required (sq ft)	Power consumed (KW)	Total Cost in Lakhs (Rs.)
1	Cold store	5000 kg	1	13*13*10	4	6.8
2	Pulper	100 kg/hr	1	3*4	2	1
3	Pulp Sorting Table with Light	Suitable	1	3*4	0.2	0.2
4	Sugar syrup preparation tank	100 liters	1	3 ft dia	1	0.8
5	Mixing/blending tank	100 liters	1	3.5 ft dia	1	0.6
6	Filter press	100 liter	1	3*2	0	0.6
7	Homogenizer	100 liters/hr	1	4*6	1.5	1.8
8	In tank pasteurizer	100 liters/hr	1	7*6	2.5	1.6
9	Filling & Capping	Suitable	1	8*4	1.5	1.4
10	Weighing balance	Suitable	1			0.06
11	Accessories	Suitable	1			0.5

2.8.2 Other costs:-

Land and civil infrastructures are assumed as already available with the entrepreneurs.

Still we have considered approx. 4 Lac Rs. as a construction cost for safer side of the entrepreneur.

Utilities and Fittings:-

Utilities and Fittings	
1. Water	Rs. 0.9 Lacs total
2. Power	

Other Fixed Assets:-

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

Pre-operative expenses

Pre-operative Expenses	
Legal expenses, Start-up expenses, Establishment cost, consultancy fees, trials and others.	0.5 LAC
Total preoperative expenses	0.5 LAC

Contingency cost to be added as approx. 1.00 Lac.

So total startup cost at own land & Premise may be somewhat similar to **27.70 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 REQUIREMENT (IN LACS)

		55%	65%	75%
Particulars	Period	Year 2	Year 3	Year 4
Raw material stock	15 days	1.94	2.29	3.12
Work in progress	15 days	3.87	4.58	6.24
Packing material	15 days	0.90	1.06	1.45
Finished goods' stock	15 days	3.42	4.04	5.51
Receivables	30 days	6.84	8.09	11.03
Working expenses	30 days	1.17	1.38	1.89
Total current assets		18.14	21.44	29.24
Trade creditors		0.00	0.00	0.00
Working capital gap		18.14	21.44	29.24
Margin money (25%)		4.54	5.36	7.31
Bank finance		13.61	16.08	21.93

2.10 TOTAL PROJECT COST AND MEANS OF FINANCE

Particulars	Amount in Lakhs
i. Land and building (20 x 32 x 12 ft. - LxBxH)	4.5
ii. Plant and machinery	15.36
iii. Utilities & Fittings	0.9
iv. Other Fixed assets	0.9
v. Pre-operative expenses	0.50
vi. Contingencies	1.00

vii. Working capital margin	4.54
Total project cost (i to vii)	27.70
Means Of finance	
i. Subsidy	10.01
ii. Promoters Contribution	6.64
iii. Term Loan (@40%)	11.03

2.11 MAN POWER RECRUITMENT

Total Monthly Salary (Rs.)	No	Wages	Total Monthly	Annual Amount
Supervisor (can be the owner)	1	15000	15000	180000
Technician	1	12000	12000	144000
Semi-skilled	2	7600	15200	182400
Helper	1	5500	5500	66000
Sales man	1	8000	8000	96000
Total			55700	668400

2.12 EXPENDITURE, REVENUE & PROFITABILITY ANALYSIS.

Particulars	150 MT				
	1st yr	2nd yr	3rd yr	4 th yr	5th yr
A Total Installed Capacity (MT)	99 MT Custard Apple/Annum	82.5	97.5	112.5	135
Capacity utilization (%)	Under Const.	55%	65%	75%	90%
B Expenditure (Rs. in Lakh)	0				
Custard Apple(Av. Price @ Rs.30/Kg)	0.00	16.34	19.31	22.28	26.73
Sugar @ Rs. 35/kg	0.00	2.02	2.39	2.76	3.31
other material	0.00	0.16	0.19	0.22	0.26

	Packaging materials	0.00	9.90	11.70	13.50	16.20
	Utilities (Electricity, Fuel)	0.00	1.42	1.68	1.94	2.33
	Salaries (1st yr only manager's salary)	1.80	7.09	7.09	7.09	7.09
	Repair & maintenance	0.00	0.70	0.80	0.90	0.90
	Insurance	0.30	0.30	0.30	0.30	0.30
	Miscellaneous expenses	0.50	2.30	2.30	2.30	2.30
	Total Expenditure	2.60	40.23	45.76	51.28	59.42
C	Total Sales Revenue (Rs. in Lakh)	0.00	78.38	92.63	106.88	128.25
	Sale of Custard Apple RTS (Av. Sale Price @ Rs.95/kg)	0.00	78.38	92.63	106.88	128.25
D	PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows	-2.60	38.14	46.87	55.59	68.83
	Depreciation on civil works @ 5% per annum	0.23	0.21	0.20	0.19	0.18
	Depreciation on machinery @ 10% per annum	1.54	1.38	1.24	1.12	1.01
	Depreciation on other fixed assets @ 15% per annum	0.14	0.11	0.10	0.08	0.07
	Interest on term loan @ 12%	1.15	1.11	1.07	1.02	0.97
	Interest on working capital @ 12%	0.00	1.63	1.93	2.63	2.63
E	Profit after depreciation and Interest (Rs. in Lakh)	-5.65	35.32	44.26	53.18	66.60
F	Tax (assumed 30%) (Rs. in Lakh)	0.00	10.60	13.28	15.95	19.98
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	-5.65	24.72	30.98	37.23	46.62
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	1.15	1.11	1.07	1.02	0.97
I	Coverage available (Rs. in Lakh)	1.15	1.11	1.07	1.02	0.97
J	Total Debt Outgo (Rs. in Lakh)	0.38	0.42	0.47	0.52	0.57

K	Debt Service Coverage Ratio (DSCR)	3.00	2.62	2.28	1.97	1.69
	Average DSCR	2.31				
L	Cash accruals (PBDIT- Interest-Tax) (Rs. in Lakh)	-3.75	26.44	32.52	38.62	47.88
M	Payback Period	2.5 yrs				
	(on Rs. 31.97 Lakhs initial investment)					

2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	1,107,839.22	153,678.55	115,215.28	38,463.27	1,069,375.95
2	1,069,375.95	153,678.55	111,215.10	42,463.45	1,026,912.49
3	1,026,912.49	153,678.55	106,798.90	46,879.65	980,032.84
4	980,032.84	153,678.55	101,923.42	51,755.14	928,277.71
5	928,277.71	153,678.55	96,540.88	57,137.67	871,140.04
6	871,140.04	153,678.55	90,598.56	63,079.99	808,060.05
7	808,060.05	153,678.55	84,038.25	69,640.31	738,419.74
8	738,419.74	153,678.55	76,795.65	76,882.90	661,536.85
9	661,536.85	153,678.55	68,799.83	84,878.72	576,658.13
10	576,658.13	153,678.55	59,972.45	93,706.11	482,952.02
11	482,952.02	153,678.55	50,227.01	103,451.54	379,500.48
12	379,500.48	153,678.55	39,468.05	114,210.50	265,289.98
13	265,289.98	153,678.55	27,590.16	126,088.39	139,201.59
14	139,201.59	153,678.55	14,476.96	139,201.59	-
		2,151,500	1,043,660	1,107,839	(1,107,839)

2.14 ASSETS' DEPRECIATION

Assets' Depreciation (Down Value Method)	Amounts in Lakhs							
Particulars	1st yr	2nd yr	3 rd yr	4th yr	5th yr	6th yr	7th yr	8th yr
Civil works	4.50	4.28	4.06	3.86	3.67	3.48	3.31	3.14
Depreciation	0.23	0.21	0.20	0.19	0.18	0.17	0.17	0.16
Depreciated value	4.28	4.06	3.86	3.67	3.48	3.31	3.14	2.99
Plant & Machinery	15.36	13.82	12.44	11.20	10.08	9.07	8.16	7.35
Depreciation	1.54	1.38	1.24	1.12	1.01	0.91	0.82	0.73
Depreciated value	13.82	12.44	11.20	10.08	9.07	8.16	7.35	6.61
Other Fixed Assets	0.90	0.77	0.65	0.55	0.47	0.40	0.34	0.29
Depreciation	0.14	0.11	0.10	0.08	0.07	0.06	0.05	0.04
Depreciated value	0.77	0.65	0.55	0.47	0.40	0.34	0.29	0.25
All Assets	20.76	18.86	17.15	15.61	14.21	12.95	11.81	10.78
Depreciation	1.90	1.71	1.54	1.40	1.26	1.14	1.03	0.94
Depreciated value	18.86	17.15	15.61	14.21	12.95	11.81	10.78	9.84

2.15 FINANCIAL ASSESSMENT OF THE PROJECT

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

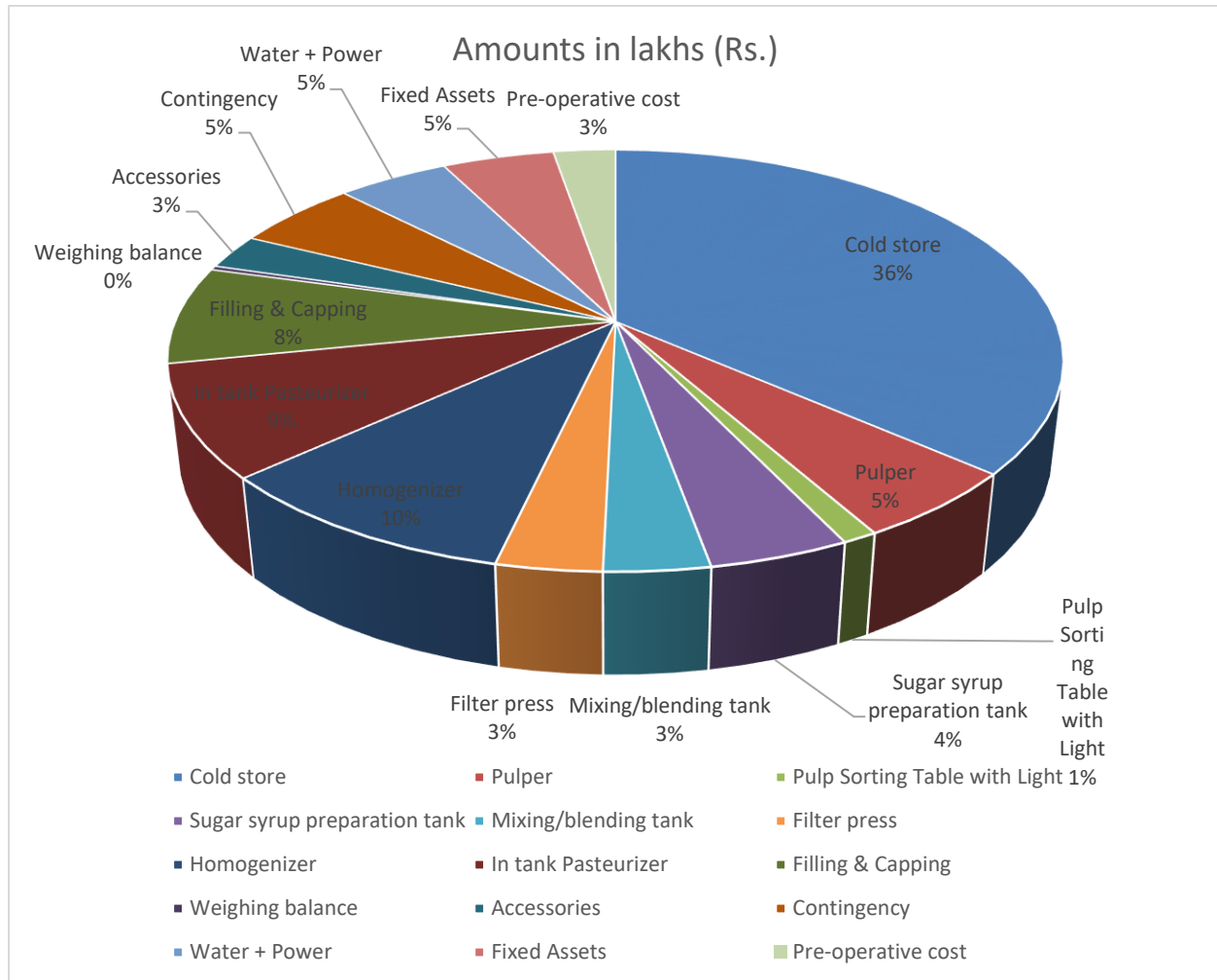
Particulars	1st yr	2nd yr	3 rd yr	4th yr	5th yr	6th yr	
Capital cost (Rs. in Lakh)	27.70	0.00	0.00	0.00	0.00	0.00	0.00
Recurring cost (Rs. in Lakh)	2.60	40.23	45.76	51.28	59.42		
Total cost (Rs. in Lakh)	30.30	40.23	45.76	51.28	59.42		226.98
Benefit (Rs. in Lakh)	0.00	78.38	92.63	106.88	128.25		
Total Depreciated value of all assets (Rs. in Lakh)						9.84	
Total benefits (Rs. in Lakh)	0.00	78.38	92.63	106.88	128.25	9.84	406.13
Benefit-Cost Ratio (BCR): (Highly Profitable project)	1.789						
Net Present Worth (NPW):	179.1						

2.16 BREAK-EVEN ANALYSIS

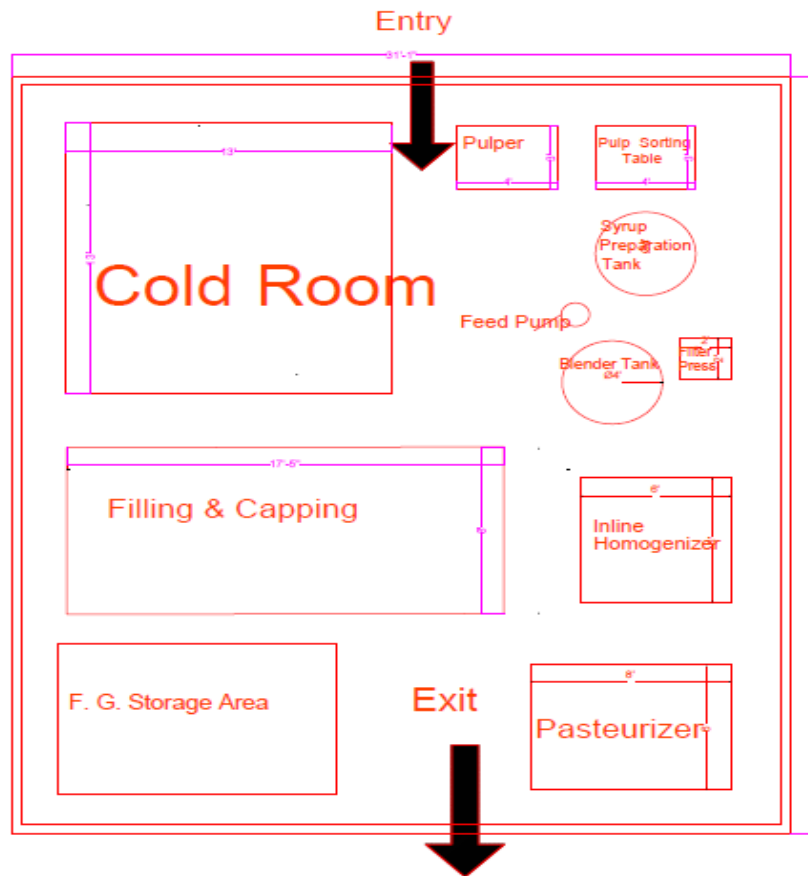
Sr. No.	Particulars	1st yr	2nd yr	3 rd yr	4th yr	5th yr
		Under Const.	55%	65%	75%	90%
	Capacity utilization (%)		82.5	97.5	112.5	135
	Production MT/Annum					
A	Fixed Cost (Rs. in Lakh)					
	Permanent staff salaries	7.092	7.092	7.092	7.092	7.092
	Depreciation on building @ 5% per annum	0.23	0.21	0.20	0.19	0.18
	Depreciation on machinery @ 10% per annum	1.54	1.38	1.24	1.12	1.01
	Depreciation on other fixed assets @ 15% per annum	0.14	0.11	0.10	0.08	0.07

		1.15	1.11	1.07	1.02	0.97
	Interest on term loan					
	Insurance	0.3	0.3	0.3	0.3	0.3
	Total Fixed Cost (Rs. in Lakh)	10.44	10.21	10.00	9.80	9.61
B	Sales Revenue (Rs. in Lakh)	0	78.37	92.62	106.8	128.3
C	Variable Cost (Rs. in Lakh)					
	Custard Apple (Av. Price @ Rs.30/Kg)	0.00	16.34	19.31	22.28	26.73
	Sugar @ 35 per kg	0.00	2.02	2.39	2.76	3.31
	Other material	0.00	0.16	0.19	0.22	0.26
	Packaging materials	0.00	9.90	11.70	13.50	16.20
	Casual staff salaries	0.00	5.59	5.59	5.59	5.59
	Utilities (Electricity, Fuel)	0.00	1.42	1.68	1.94	2.33
	Repair & maintenance	0.00	0.70	0.80	0.90	0.90
	Miscellaneous expenses	0.50	2.00	2.00	2.00	2.00
	Interest on working capital @ 12%	0.00	1.63	1.93	2.63	2.63
	Total Variable Cost (Rs. in Lakh)	0.50	39.76	45.59	51.81	59.95
D	Break Even Point (BEP)					
	as % of sale	-	12.00	10.00	8.00	8.00
	Break Even Point (BEP) in terms of sales value (Rs. in Lakhs)	-	9.41	9.26	8.55	10.26

2.17 PIE CHART



2.18 TYPICAL CUSTARD APPLE RTS MANUFACTURING UNIT LAYOUT



- The figures depicted here are in feet.

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 costingbase/contract sourcing, detailed market research, comprehensive dehydrated product mix based on demand, rationale of the project for specific location, community advantage/benefit from the project, employment generation, production/availability of the raw materials/crops in the targeted area/clusters and many more relevant aspects for acceptance and approval of the competent authority.
 - iii. The entrepreneur must be efficient in managing the strategic, financial, operational, material and marketing aspects of a business. In spite of the assumed parameter being closely realistic, a project may become unsustainable if the entrepreneur does not possess the required efficiency in managing different aspects of the business and respond effectively in changing situations.
 - iv. The machineries should be purchased after thorough market research and satisfactory demonstration.
 - v. The entrepreneur must ensure uninterrupted quality raw materials' supply and maintain optimum inventory levels for smooth operations management.
 - vi. The entrepreneur must possess a strategic look to steer the business in upward trajectory.

- vii. The entrepreneur must maintain optimum (not more or less) inventory, current assets. Selecting optimum source of finance, not too high debt-equity ratio, proper capital budgeting and judicious utilization of surplus profit for expansion is must.
- viii. The entrepreneur must explore prospective markets through extensive research, find innovative marketing strategy, and maintain quality, adjust product mix to demand.
- ix. The entrepreneur must provide required documents on land, financial transaction, balance sheet, further project analysis as required by the competent authority for approval.
- x. The entrepreneur must be hopeful and remain positive in attitude while all situations.



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