

MODEL DETAILED PROJECT REPORT

ORANGE READY TO SERVE MANUFACTURING UNIT.



Project At a Glance		
1	Name of the Project	Orange RTS
2	Name of the entrepreneur/FPO/SHG/Cooperative	
3	Nature of proposed project	Proprietorship/Company/ Partnership
4	Registered office	
5	Project site/location	
6	Names of Partner (if partnership)	
7	No of share holders (if company/FPC)	
8	Technical advisor	
9	Marketing advisor/partners	
10	Proposed project capacity	150 MT/annum (70, 80 & 90% capacity utilization in the 2nd, 3rd and 4th years' onwards respectively
11	Raw materials	Orange Fruit
12	Major product outputs	Orange RTS
13	Total project cost (Lakhs)	32.14
	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	9.06
	Third Year	10.36
	Fourth Year	13.31
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	10.6062
	Promoter's contribution (min 20%)	6.428
	Term loan (45%)	15.1058
16	Debt-equity ratio	2.35 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	6.82
	3rd year	9.39
	4th year	11.94
18	Average DSCR	2.16
	Benefit Cost Ratio	1.29
	Term Loan Payment	7 Years with 1 year grace period
	Pay Back Period for investment	2 Years

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

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. Orange is the third most important largest producer fruit following bananas and mangoes. Fruits of Orange are appreciated for their high content of flavonoids, vitamin C, citric acid and minerals.

Sweet orange (*Citrus sinensis* L.) is one of the most important subtropical fruits of India and belongs to the family Rutaceae. It is widely consumed fruit RTS by normal as well as sick people and is well known for its instant energy, pectins, vitamin C and potassium content. Sweet orange RTS is refreshing after any hectic activity or on a dry, hot day to quench thirst.

HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Oranges are known for their vitamin C content, a powerful antioxidant that helps protect cells from damage. Oranges are also a good source of fibre, B vitamins, vitamin A, calcium and potassium. This popular citrus fruit is particularly known for its vitamin C content. However, oranges contain a range of other plant compounds and antioxidants that may reduce inflammation and work against disease. They also contain health-promoting compounds known as flavanones. Research suggests that these citrus phytochemicals help 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.

One medium orange will provide the NRV (nutrient reference value) of vitamin C for adults. Orange peel actually contains higher amounts of certain nutrients than the flesh, so using recipes that incorporate the zest of an orange will give your diet an extra boost.

- **Carbohydrates:** Oranges are mainly composed of Carbohydrates and water, with very little protein and fat and few calories. Oranges have a low glycemic index (GI) of 31-51.
- **Fiber:** Oranges are a good source of fiber. The main fibers found in oranges are pectin, cellulose, hemicellulose, and lignin. One large orange packs around 18% of the Reference Daily intake (RDI).
- **Vitamin C:** Oranges are an excellent source of Vitamin C. One orange provide 100% of RDI.
- **Folate:** Folate has many essential functions and is found in many plant foods.
- **Potassium:** Oranges are good source of Potassium. High intake of potassium can lower blood pressure and may reduce risk of heart disease.

Oranges are rich in various bioactive plant compounds, which are beneficial to health.

These are the main plant compounds in Oranges:

Citric acid: The most abundant organic acid in oranges, citric acid may help prevent the formation of kidney stones.

Hesperidin: This antioxidant may strengthen your blood vessels and prevent atherosclerosis — the buildup of fatty deposits (plaque) inside your arteries.

Anthocyanin: A class of antioxidant flavonoids, anthocyanin are responsible for the red flesh of blood oranges.

Beta-cryptoxanthin. This is one of the most abundant carotenoid antioxidants in oranges. Your body converts it into vitamin A.

Lycopene. An antioxidant found in high amounts in red-fleshed navel oranges, lycopene is also found in tomatoes and grapefruit. It has various health benefits.

Nutritional value per 100 g

Nutritional composition of orange fruit per 100ml	
Energy (Kcal)	42
Total sugars (g)	9
Vitamin – C (mg)	45
Potassium (mg)	176
Folate (mcg)	215
Total carbohydrates (mg)	0.7
Hesperidin (mg)	52
Pectins (mg)	33.4

CONSTITUENTS AND HEALTH BENEFITS OF ORANGES

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

Health benefits:

1. Heart health: Intake of fruits high in vitamin C is linked to reduced heart disease risk; Intake of isolated fibers from citrus fruits has been shown to decrease blood cholesterol levels, and the essential oils in oranges can protect LDL (bad) cholesterol particles from becoming oxidized. Flavonoids in citrus fruits (especially hesperidin) may help lower the risk of ischemic stroke in women and have protective effect against heart disease. Long term, regular consumption of foods that contain flavonoids might help protect against cancer and cardiovascular disease. Potassium may help lower the risk of stroke. Regular consumption of orange juice has a blood-thinning effect and lower risk of CVD.
2. Blood pressure: Consuming Orange can help reduce blood pressure.

3 Cancer prevention: Orange and orange juice are an excellent source of the antioxidant vitamin C. Antioxidants may help prevent free radicals from causing cell damage that can lead to cancer.

4 Prevent asthma: vitamin C also benefitted people with bronchial hypersensitivity when they also had a common cold and people with asthma.

5 Anemia prevention: Anemia is often caused by iron deficiency and most common in pre-menopausal women. Although Oranges are not good source of iron, but they are a great source of vitamin C and citric acid, which can increase the absorption of iron from other foods. It may help prevent anemia.

6. Prevention of kidney stones: The citric acid in Oranges may reduce your risk of kidney stones by diluting urine and increasing its citrate content. Potassium citrate is often prescribed to patients with the kidney stones. Citrates in oranges seem to have similar effects.

7. Boosting the immune system: Foods that are high in vitamin C and other antioxidants may help strengthen the immune system against the germs that cause the common cold and the flu.

8. Maintaining healthy complexion: Vitamin C plays a vital role in the formation of collagen, the support system of the skin. Sun exposure, pollution, age, and other factors can result in skin damage. By eating vitamin C in its natural form or applying it topically can help prevent this type of damage.

9. Scurvy: Scurvy is caused by deficiency of Vitamin C, connective tissues weaken due to the lack of vitamin C. Consumption of Orange prevent scurvy.

1.1 PROCESSING & VALUE ADDITION:-

Fruit beverages and drinks are one of the popular categories of beverages that are consumed across the globe. The fruit beverages and drinks are easily digestible, highly refreshing, thirst quenching, appetizing and nutritionally far superior to most of the synthetic and aerated drinks. In recent past the consumption of fruit based beverages and

drinks has increased at a fast rate. Fruit RTSs or pulp used for the preparation of these products are subjected to minimal processing operations like filtration, clarification and pasteurization. The fruit RTS or pulp, are mixed with ingredients like sugar, acid, stabilizers, micronutrients and preservative to develop beverages and drinks. The principle groups of fruit beverages are as follows:

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

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

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

The ready-to-serve beverages as per FSSAI specifications should contain at least 10% fruit content and not less than 10 % TSS besides 0.3% acid maximum as citric acid. The levels of permitted preservatives include 70 ppm (maximum) for sulphur dioxide and 120 ppm (maximum) for benzoic acid. The total plate count and yeast and mold counts should not exceed, to 50.0 cfu/ml and 2.0 cfu/ml, respectively. The Coliform counts should be nil in 100 ml beverage samples. Since these beverages are consumed as such without dilution, hence are termed as Ready-to-serve beverage. The majority of packaged fruit beverages belong to this category.

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

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

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

The process starts with sound fruit, freshly harvested from the field or taken from refrigerated or frozen storage. Thorough washing is usually necessary to remove dirt and foreign objects and may be followed by a sanitation step to decrease the load of contaminants. Sorting to remove decayed and mold contaminated fruit is necessary to make sure that the final RTS will not have a high microbial load, undesirable flavours, or mycotoxin contamination. For most fruits, preparation steps such as pitting and grinding is required prior to RTS extraction. Heating and addition of enzymes might also be included before the mash is transferred to the extraction stage. RTS extraction can be performed by pressing or by

enzymatic treatment followed by decanting. The extracted RTS will then be treated according to the characteristics of the final product.

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

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

2. MODEL ORANGE READY TO SERVE PROCESSING UNDER FME SCHEME

2.1 LOCATION OF THE PROPOSED PROJECT AND LAND

The entrepreneur must provide description of the proposed location, site of the project, distance from the targeted local and distant markets; and the reasons/advantages thereof i.e. in terms of raw materials availability, market accessibility, logistics support, basic infrastructure availability etc.

The ideal locations for establishment of exclusive Orange Ready to Serve processing unit are in the production clusters of Orange growing states/Areas such as Andhra Pradesh, Maharashtra, Karnataka, Punjab, Haryana, Rajasthan, Meghalaya, Assam and Darjeeling where adequate quantities of surplus raw materials can be available for processing.

2.2 INSTALLED CAPACITY OF THE ORANGE READY TO SERVE PROCESSING UNIT

The maximum installed capacity of the Orange Ready to Serve manufacturing unit in the present model project is proposed as 150 tonns/annum or 500 kg/day Orange Ready to Serve. 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

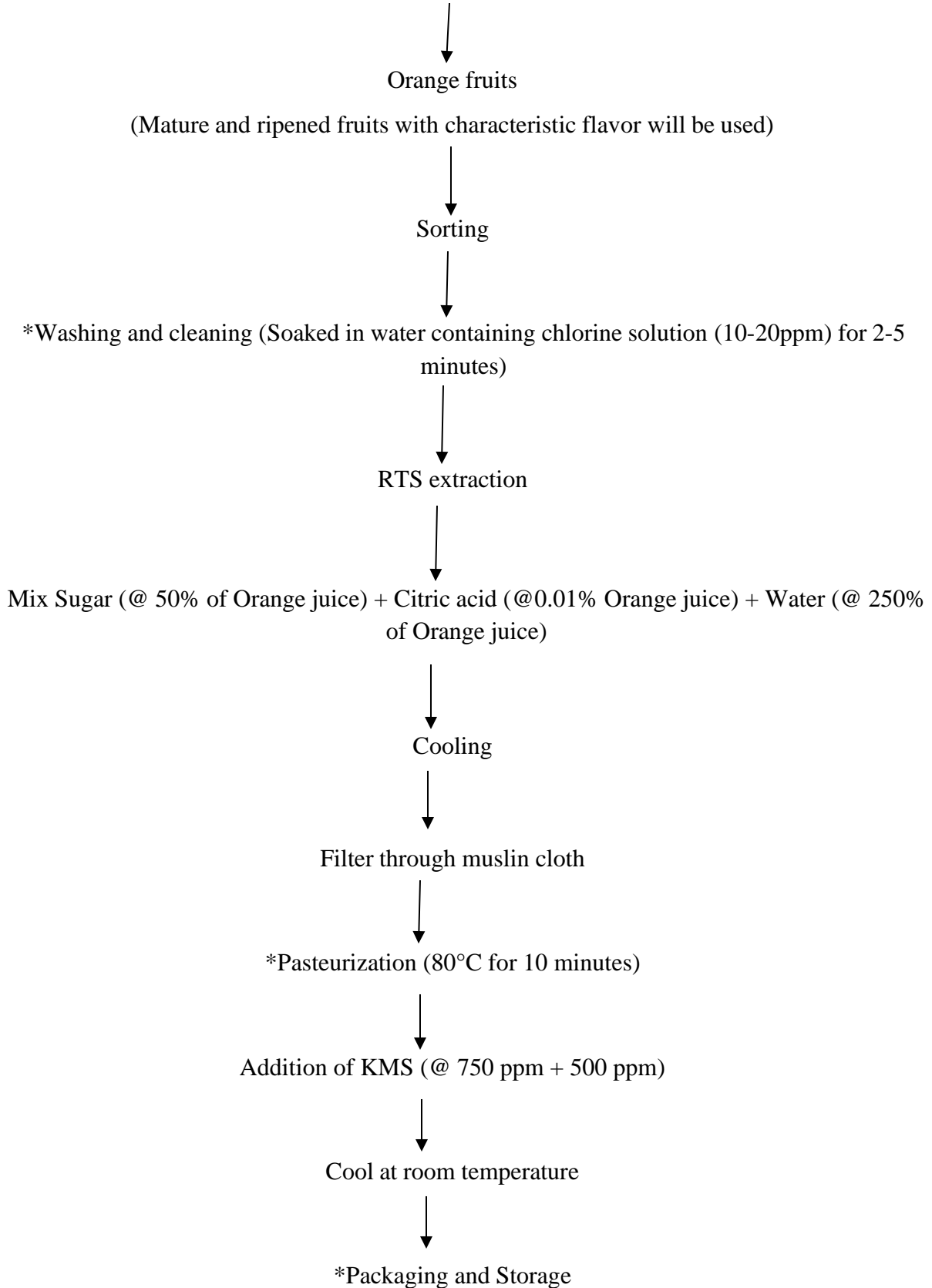
year 80 percent capacity and 4th year onwards 90 percent capacity utilization is assumed in this model project.

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

MANUFACTURING PROCESS OF THE ORANGE READY TO SERVE

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



*Established Critical Control point

Orange RTS is a complex product. A good understanding of the basic nature and properties of orange RTS is therefore needed for processing and packaging orange RTS. In fact, such knowledge is indispensable for ensuring that high product quality is maintained during RTS processing. The quality of orange fruit is important for the characteristics of the final orange RTS product. Oranges are natural products and therefore vary significantly in flavour, vitamin C content and colour according to the variety of orange, the time of season when harvested and the region of the world where they are grown.

Receiving of Orange fruits: Fruit goes through inspection lines for removal of bruised or damaged fruits.

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

RTS extractor: RTS is extracted by pressing of whole oranges to get juice in machine. These extractors produce RTS free of peel extractives.

Filtration: Clarification is done to separate RTS by removing pulp. Extracted fruit RTS contains varying amount of suspended solids – broken fruit tissue, seed, skin & various gums, pectic substances and proteins in colloidal suspension. After Juice extraction, the juice is clarified and separated from the pulp. The mechanical separation of sieving is used as the final process. The pulp strain containing seeds, sacs further subjected to pulp washing and recovery.

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

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

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

2.4 MARKET DEMAND AND SUPPLY FOR ORANGE READY TO SERVE

Orange Fruits and peel were processed into various value added products like Orange Squash, Orange Crush, Orange marmalade, Orange sherbets, Orange candied peel, Orange candied peel with chocolate, Orange candied fruit slices, Orange candied fruit slices with chocolate, Orange jelly, Orange jam, and Orange ice lollies. Orange peel also processes into essential oil products. Due to sensitivity to chilling injury and limited shelf life of Orange fruit, it becomes important to process it in the form of RTS to reduce the surplus in the market in its peak season of production. Preservation of fruit in the form of RTS has turn out to be the business activity of great significance and countries with rich fruit resources with short harvesting season are emphasizing more for establishes storage to keep up quality of fruits, enhance shelf life and preserve fruit RTS for availability in off-season. Fruit beverages and drinks are one of the popular categories of beverages that are consumed across the globe. The fruit beverages and drinks are easily digestible, highly refreshing, thirst quenching, appetizing and nutritionally far superior to most of the synthetic and aerated drinks. In recent past the consumption of fruit based beverages and drinks has increased at a fast rate.

2.5 MARKETING STRATEGY FOR ORANGE READY TO SERVE

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

2.6 DETAILED PROJECT ASSUMPTIONS

This model DPR for Orange Ready to Serve unit is basically prepared as a template based on certain assumptions that may vary with capacity, location, raw materials availability etc. An entrepreneur can use this model DPR format and modify as per requirement and suitability. The assumptions made in preparation of this particular DPR are given in This DPR assumes expansion of existing fruit processing unit by adding new juice manufacturing line. Therefore, land and civil infrastructures are assumed as already available with the entrepreneurs.

- Herewith in this DPR, we have considered the assumptions as listed below in the tables of different costs, which may vary as per region, seasons and machinery designs and supplier.

1. Orange cost considered @ Rs.13/-per kg.
2. 1 kg Orange will produce 30% 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

Detailed Project Assumptions			
Parameter	Assumption		
Capacity of the Orange RTS 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	13		
Average sale prices per Kg	75	Rs/kg	
Pulp extraction	30		
ORANGE RTS	1 Kg RTS from 0.9 kg Orange		

2.7 FIXED CAPITAL INVESTMENT

Rs. 5.18 lakhs required as Fixed Capital investment.

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	Fruit Washer	1	100 kg/hr	1.5
3	Citrus juice Extractor	1	100 kg/hr	0.8
4	Pulper	1	100 kg/hr	1.2
5	Storage Tank	1	100 liters	0.8
6	Feed Pump	1	Suitable	0.25
7	Filter press	1	100 liters	0.7
8	Homogenizer	1	100 liters/hr	2.3
9	Steam kettle	1	100 liters/hr	1.7
10	Boiler	1	50 kg/hr	1.5

11	Pasteurizer	1	100 liters/hr	1.6
12	Carbonation Unit	1	Suitable	0.7
13	Filling & Capping	1	500 BPH	2.7
14	Compressor	1	Suitable	0.6
15	Weighing balance	1	Suitable	0.06
16	Accessories	1	Suitable	0.5
			Total	22.91

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 32.14 lacs. This is according to survey done at X location india. This may vary on location, situation and design change over.

2.8 WORKING CAPITAL REQUIREMENTS

Working Capital Requirement (Rs. in Lakh)

		55%	65%	75%
Particulars	Period	Year 2	Year 3	Year 4
Raw material stock	7 days	0.61	0.72	0.98
Work in progress	15 days	1.21	1.44	1.96
Packing material	15 days	0.90	1.06	1.45
Finished goods' stock	15 days	2.75	3.25	4.44
Receivables	30 days	5.51	6.51	8.87
Working expenses	30 days	1.10	1.30	1.78
Total current assets		12.08	14.28	19.47
Trade creditors		0.00	0.00	0.00
Working capital gap		12.08	14.28	19.47
Margin money (25%)		3.02	3.57	4.87
Bank finance		9.06	10.71	14.60

2.9 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	22.91
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	3.02
Total project cost (i to vii)	34.91

Means Of finance

i. Subsidy	11.52
ii. Promoters Contribution	6.98
iii. Term Loan (@10%)	16.41

MANPOWER REQUIREMENTS

Total Monthly Salary (Rs.)	No	Wages	Total Monthly	Total Annually
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

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
 2. Shriyan Enterprises. Mumbai, India
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PLANT LAYOUT

19,7 m

