

PM Formalization of Micro Food Processing Enterprises Scheme

DETAILED PROJECT REPORT FOR DEHYDRATED CARROT PROCESSING



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Project At a Glance

1	Name of the Project	Dehydrated carrot pieces
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	75 MT/annum (55, 65, 75 & 90 % capacity utilization in the 2nd, 3 rd , 4 th & 5 th years' onwards respectively
11	Raw materials	Carrot
12	Major product outputs	Dehydrated carrot pieces
13	Total project cost (Lakhs)	38.66
	Land development, building & civil construction	5.3
	Machinery and equipments	24.73
	Utilities (Power & water facilities)	0.8
	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.90
	Contingencies	1.20
	Working capital margin	4.83
14	Working capital Management (In Lakhs)	
	Second Year	14.49
	Third Year	17.13
	Fourth Year	23.36
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	10.00
	Promoter's contribution (min 20%)	9.66
	Term loan (49%)	18.99
16	Debt-equity ratio	1.96 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	46.61
	3rd year	57.00
	4th year	67.38
18	Average DSCR	2.31
	Benefit Cost Ratio	1.82
	Term Loan Payment	7 Years with 1 year grace period
	Pay Back Period for investment	2 Years

Note: All the data/contents of this DPR are taken from the available information on IIFPT site.

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

1.1 INTRODUCTION

The carrot (*Daucus carota* subsp. *sativus*) is a root vegetable, usually orange in color, though purple, black, red, white, and yellow cultivars exist. They are a domesticated form of the wild carrot, *Daucus carota*, native to Europe and Southwestern Asia. The plant probably originated in Persia and was originally cultivated for its leaves and seeds. The most commonly eaten part of the plant is the taproot, although the stems and leaves are also eaten. The domestic carrot has been selectively bred for its greatly enlarged, more palatable, less woody-textured taproot.

The carrot is a biennial plant in the umbellifer family, *Apiaceae*. At first, it grows a rosette of leaves while building up the enlarged taproot. Fast-growing cultivars mature within three months (90 days) of sowing the seed, while slower-maturing cultivars need a month longer (120 days). The roots contain high quantities of alpha- and beta-carotene, and are a good source of vitamin K and vitamin B6.

The United Nations Food and Agriculture Organization (FAO) reports that world production of carrots and turnips (these plants are combined by the FAO) for 2018 was 40 million tonnes, with 45% of the world total grown in China. Carrots are widely used in many cuisines, especially in the preparation of salads, and carrot salads are a tradition in many regional cuisines.

1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF CARROT

Both written history and molecular genetic studies indicate that the domestic carrot has a single origin in Central Asia. Its wild ancestors probably originated in Persia (regions of which are now Iran and Afghanistan), which remains the centre of diversity for the wild

carrot *Daucus carota*. A naturally occurring subspecies of the wild carrot was presumably bred selectively over the centuries to reduce bitterness, increase sweetness and minimise the woody core; this process produced the familiar garden vegetable.

When they were first cultivated, carrots were grown for their aromatic leaves and seeds rather than their roots. Carrot seeds have been found in Switzerland and Southern Germany dating back to 2000–3000 BC. Some close relatives of the carrot are still grown for their leaves and seeds, such as parsley, cilantro, coriander, fennel, anise, dill and cumin. The first mention of the root in classical sources is from the 1st century AD; the Romans ate a root vegetable called *pastinaca*, which may have been either the carrot or the closely related parsnip.

The plant is depicted and described in the Eastern Roman Juliana Anicia Codex, a 6th-century AD Constantinopolitan copy of the Greek physician Dioscorides 1st-century pharmacopoeia of herbs and medicines, *De Materia Medica*. Three different types of carrots are depicted, and the text states that "the root can be cooked and eaten".

1.3 VARIETIES

Varieties of carrots are divided into categories based on their shape. There are four different carrot types which are described they include Danvers, Nantes Imperator, Chantenay and Ball (or Mini):

- **Danvers** – When most people think of a carrot this is the type that they visual. They are long, skinny, taper to a point and typically are orange in color, although they are available in more shades. The foliage and taproot are longer than Chantenay. They are more tolerant to poor soil. The name comes from where they were developed in Danvers, Massachusetts. Preferred varieties include ‘Yellowstone.’
- **Nantes** – They were first described as almost perfectly cylindrical being both round at the tip and top, having sparse foliage and with near red flesh that was sweet flavor and nice

crunch. Their name is taken from the Atlantic coast of France where the area is ideal for growing this type of carrot. This category can also be referred to as Scarlet Nantes, Early Coreless or Nante Superior. There is estimated to be over 40 different varieties of carrots that fall into this category. A very quick growing carrot and matures faster. Preferred varieties include: ‘Napoli’, ‘Touchon’, ‘Napa’ or ‘White Satin.’

- **Imperator** – This category is what most commercial growers produce and commonly found in grocery stores throughout the country. They are very similar looking to Danvers, but thicker in width and often a higher sugar content than the other categories. The foliage is very fast growing compared. The roots of this grouping is longer than all others listed above. Preferred varieties include: ‘Japanese Imperial Long’, ‘Cosmic Red’ or ‘Sugarsnax 54.’

- **Chantenay** – Before Nantes were developed this category was the best to plant in heavy or rocky soil due to its size. Chantenay typically only reach 6 to 7 inches long making them very short and broad. These are a great choice for those gardening in containers or soil described above. However, it is important to harvest at the length mentioned because they do become woody and not tasty if harvested too late in the season. Very vigorous top growth and store extremely well. Preferred varieties include: ‘Red-Cored Chantenay’, ‘Hercules’ or ‘Carson Hybrid.’

- **Ball or Mini** – This grouping includes carrot varieties that are shaped like radishes or miniature compared to Chantenay. Again they work extremely well for those gardening in containers due to their short taproot and required growing area. The miniature forms that only reach about 3 to 4 inches long are typically served whole with the tops attached. Radish-shaped varieties are typically cross-sectioned to see the beautiful circular pattern inside. Preferred varieties include: ‘Babette’, ‘Romeo’ or ‘Paris Market.’

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Nutritional value:

The nutrition facts for two small-to-medium raw carrots (100 grams) are:

- Calories: 41
- Water: 88%
- Protein: 0.9 grams
- Carbs: 9.6 grams
- Sugar: 4.7 grams
- Fiber: 2.8 grams
- Fat: 0.2 grams

Carrots are a good source of several vitamins and minerals, especially biotin, potassium, and vitamins A (from beta carotene), K1 (phylloquinone), and B6.

- **Vitamin A:** Carrots are rich in beta carotene, which your body converts into vitamin A. This nutrient promotes good vision and is important for growth, development, and immune function.
- **Biotin:** A B vitamin formerly known as vitamin H, biotin plays an important role in fat and protein metabolism.
- **Vitamin K1:** Also known as phylloquinone, vitamin K1 is important for blood coagulation and can promote bone health.
- **Potassium:** An essential mineral, potassium is important for blood pressure control.
- **Vitamin B6:** A group of related vitamins, B6 is involved in the conversion of food into energy.

Other plant compounds:

The main plant compounds in carrots are:

- **Beta carotene:** Orange carrots are very high in beta carotene. The absorption is better (up to 6.5-fold) if the carrots are cooked.
- **Alpha-carotene:** An antioxidant that, like beta carotene, is partly converted into vitamin A in your body.
- **Lutein:** One of the most common antioxidants in carrots, lutein is predominantly found in yellow and orange carrots and is important for eye health.
- **Lycopene:** A bright red antioxidant found in many red fruits and vegetables, including red and purple carrots, lycopene may decrease your risk of cancer and heart disease.
- **Polyacetylenes:** Recent research has identified bioactive compounds in carrots that may help protect against leukemia and other cancers.
- **Anthocyanins:** These are powerful antioxidants found in dark-colored carrots.

CONSTITUENTS AND HEALTH BENEFITS OF CARROTS

Health benefits:

1. Reduces Risks of Cancer:

Consuming carrots can reduce your risks of having colon, stomach and prostate cancer. Well, this is because carrots have carotenoid which is an antioxidant that strengthens your immune system and reduces your risks of developing cancer. According to a study by the Centers for Disease Control and Prevention, carrots need to be added to your everyday diet as this will help your immune system to fight various deadly diseases. Moreover, the study concluded

that both orange and carrots can reduce your risks of cardiovascular diseases as well as cancer.

2. Reduces Cholesterol in Blood:

Traditionally speaking, the primary cause of any heart disease is cholesterol in your blood and consuming carrots will keep you safe from getting hitched with cholesterol. The rich source of fibre that is found in carrots is usually soluble fibre which is the primary reason for lowering down cholesterol in your blood. All you need to do is to add carrots to your everyday diet and prevent yourself from the risks of developing cholesterol related problems.

3. Aids in Weight loss:

If you are a diet enthusiast and prefer losing out weight most often, you need to add carrots on your regular diet. This is because carrots are rich in fibre that takes longer to digest and as a result this makes you feel full most often. This will also prevent you from snacking on fatty foods.

4. Helps in Good Vision:

If you are suffering from bad eyesight, then carrots can help improve your state of vision. It has been considered as a full-proof remedy that can save you from bad eyesight. This can also help you see better in the dark. Moreover, the substance that makes carrots aid good eyesight is that it is rich in lycopene and lutein including vitamin A.

5. Ensures Normal Bowel Movements And Digestion:

The high amounts of dietary fibre in carrots aids in good digestion and ensure that you have normal stools. Fibre makes your stool bulky and as a result, this will help you pass healthy and normal stools. Say goodbye to constipation and yes to carrots.

6. Carrots are good for Your Skin:

Just as the skin of the carrot is red and shiny, consuming carrots will give your skin a radiant glowing texture. Not just that your skin will benefit from eating a carrot, but your nails too. This because carrots have high amounts of silicon content in their root that helps maintain healthy nails and skin. In order to get the best nutrients out of carrots, you need to consume them raw.

7. A Good Boost for Your Immunity:

Carrots are a good boost for your immunity as they are rich in antioxidants, vitamin K and B6. All of these factors contribute to a stronger nervous system, better bone health and higher brain power. The antioxidants in the vegetable protect the body from harmful bacteria, inflammation and viruses that can be deadly. Thus, all of these put together constitute a better and stronger immune system that can prevent you from a bastion of diseases.

1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-

Carrot (*Daucus carota*) is a biennial plant. In the first year, its rosette of leaves produces large amounts of sugars, which are stored in the taproot to provide energy for the plant to flower in the second year.

Soon after germination, carrot seedlings show a distinct demarcation between taproot and stem: the stem is thicker and lacks lateral roots. At the upper end of the stem is the seed leaf. The first true leaf appears about 10–15 days after germination. Subsequent leaves are alternate (with a single leaf attached to a node), spirally arranged, and pinnately compound, with leaf bases sheathing the stem. As the plant grows, the bases of the seed leaves, near the taproot, are pushed apart. The stem, located just above the ground, is compressed and the internodes are not distinct. When the seed stalk elongates for flowering, the tip of the stem narrows and becomes pointed, and the stem

extends upward to become a highly branched inflorescence up to 60–200 cm (20–80 in) tall.

Most of the taproot consists of a pulpy outer cortex (phloem) and an inner core (xylem). High-quality carrots have a large proportion of cortex compared to core. Although a completely xylem-free carrot is not possible, some cultivars have small and deeply pigmented cores; the taproot can appear to lack a core when the color of the cortex and core are similar in intensity. Taproots are typically long and conical, although cylindrical and nearly-spherical cultivars are available. The root diameter can range from 1 cm ($\frac{3}{8}$ in) to as much as 10 cm (4 in) at the widest part. The root length ranges from 5 to 50 cm (2 to 20 in), although most are between 10 and 25 cm (4 and 10 in).

Carrots are grown from seed and can take up to four months (120 days) to mature, but most cultivars mature within 70 to 80 days under the right conditions. They grow best in full sun but tolerate some shade.¹ The optimum temperature is 16 to 21 °C (61 to 70 °F). The ideal soil is deep, loose and well-drained, sandy or loamy, with a pH of 6.3 to 6.8.

Fertilizer should be applied according to soil type because the crop requires low levels of nitrogen, moderate phosphate and high potash. Rich or rocky soils should be avoided, as these will cause the roots to become hairy and/or misshapen. Irrigation is applied when needed to keep the soil moist. After sprouting, the crop is eventually thinned to a spacing of 8 to 10 cm (3 to 4 in) and weeded to prevent competition beneath the soil.

Cultivation and Bearing:-

Carrot is an important root crop cultivated throughout the world for its fleshy edible roots. Carrot farming is done in the spring, summer, and autumn in temperate climate countries and during winter in tropical and subtropical regions.

Roots of carrot are used as a vegetable for soups & curries; graded roots are used as a salad, tender roots as pickles also Carrot halwa and jam are famous.

Carrot juice is a rich source of carotene and is sometimes used for colouring buffer and other food particles. Carrot tops are used for extraction of leaf protein, as fodder, and also for poultry feed.

Carrots possess many medicinal properties and are used in Ayurvedic medicine. Carrots are a rich source of b-carotene and contain appreciable amounts of thiamine and riboflavin

The Carrot crop is the second most popular vegetable in the world after potato. China ranks first in production, followed by Russia.

The major carrot growing states in India are Karnataka, Punjab, Uttar Pradesh, Tamil Nadu, and Andhra Pradesh.

Carrots can be grown well in a wide variety of soils. However, commercial carrot farming's ideal soil should be deep, loose, well-drained, and rich in humus. Loamy or sandy loam soils with sufficient quantities of humus are well suited to the cultivation of carrots.

The ideal pH range for obtaining a good yield is 5.5-6.5. Soils with pH up to 7.0 can also be used, but too alkaline or acidic soils are unsuitable for this crop.

Carrot is a cold-weather crop, and it also does well in warm climates. The optimum temperatures for getting excellent growth is between 16 to 20 °C, while temperatures above 28°C drastically reduce top growth. Temperatures lower than 16°C affect the development of color and result in long slender roots, while higher temperatures produce shorter and thicker roots. The temperatures between 15 and 20°C result in attractive roots with excellent red color and quality.

Early carrots are harvested when they are partially developed. For distinct markets, otherwise, they are retained in the soil till they reach the full maturity stage they should not be retained full maturity stage because they become hard and is unfit for consumption.

Carrots are harvested when the roots are about 1.8 cm or larger in diameter at the upper end. The soil may be loosened with a special plow (carrot lifter) or an ordinary plow.

The field is irrigated once a day before harvesting to facilitate harvest.

After harvesting, the carrots are placed in a packing house in crates before washing. After that, carefully wash Carrots and sort them by size before packaging.

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 carrots such that they develop yellow or carrot color.
- 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 chances of getting injured.
- 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 24 hrs of harvest;

The general practice is to wash the harvested fruits with chlorine. 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 carrot. 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:-

Carrots (*Daucus carota L.*) are rather inexpensive and it is highly nutritious as it contains appreciable amount carotene. Total vitamins B1, B2, B6 and B12 besides being rich in carotene. Vitamin – A in carrot ranges between 2055 to 9100 IU/100g. High carotenoid intake is associated with lowering risk of many cancers, especially the prostate cancer. Further, vitamin A is an antioxidant which is key to the growth and repair of tissues and helps the body to fight with infections, keep eyes healthy, nourish epithelial tissues in the lungs, as well as of the skin. Apart from being high in carotenoids, carrots are also high in dietary fiber. Carrots also contain a significant supply of calcium, potassium and phosphorus.

Dehydrated carrot pieces are a dehydrated version of carrot which can be preserved by drying. It can easily be added into the diet or can be consumed as a low-calorie snack, anywhere, anytime. Many commercial brands today add ingredients such as salt, spices and vegetable oils not only to boost its flavour but also to lengthen its shelf life. Carrot's suitability for drying is fair to good. Modern research shows that its nutritional content may benefit the health. Since drying process reduces the effects of some nutrients, like vitamin C, most other nutrients are retained and are concentrated.

Drying or dehydration is one of the most effective means to extend the shelf life of perishable fruits and vegetables. The main purpose of dehydration in preserving fruits and vegetables is to remove moisture so that water activity of the dehydrated products is low enough of a_w less than 0.6 for preventing the spoilage and the growth of pathogenic microorganisms and subsequently to reduce the spoilage reactions. Dehydration is also used in combination with other preservative factors such as initial heating of vegetable in boiling water and salt solution to extend the shelf life of vegetables. Dehydration significantly reduces the cost of transportation and storage due reduced weight and volume of dehydrated vegetables. Unlike fresh vegetables, dehydrated vegetables do not require refrigeration during storage.

Value addition of carrot increases the nutritional profile and helps in proper utilization of crop by reducing wastage. It helps farmers to produce higher shelf-life product with reasonable higher income.

2. MODEL DEHYDRATED CARROT PIECES 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 major carrot growing states in India are Karnataka, Punjab, Uttar Pradesh, Tamil Nadu, and Andhra Pradesh.

2.2 INSTALLED CAPACITY OF THE DEHYDRATED CARROT PIECES PROCESSING UNIT

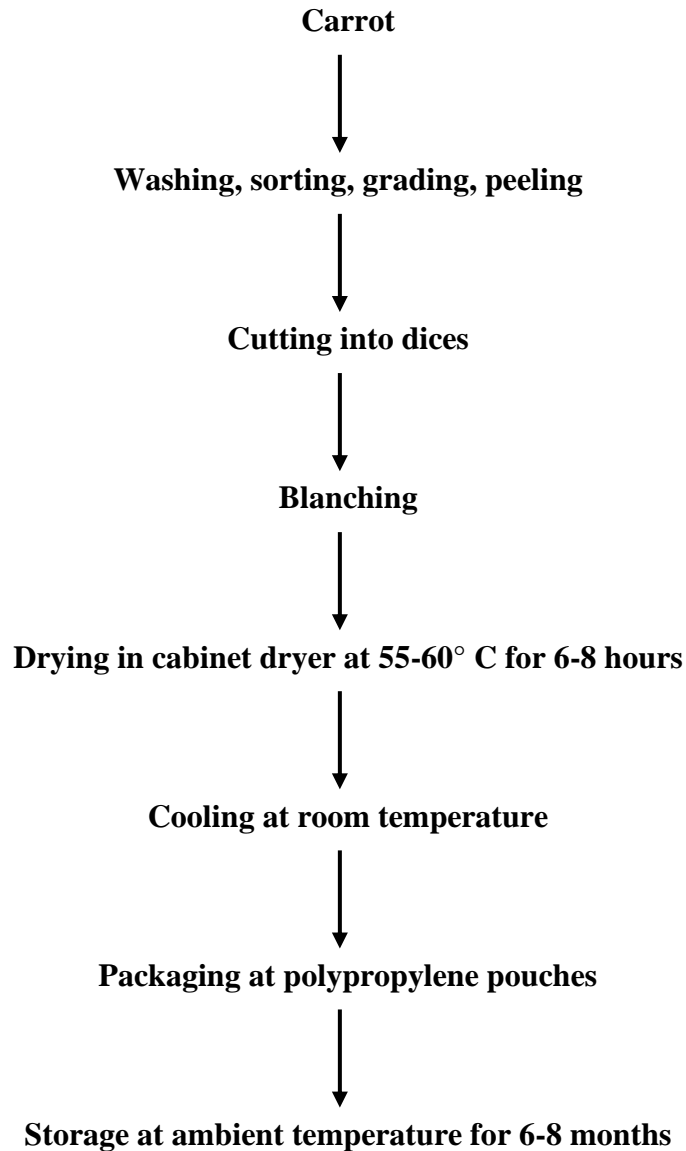
The maximum installed capacity of the Dehydrated carrot pieces manufacturing unit in the present model project is proposed as 75 tonns/annum or 500 kg/day Dehydrated carrot pieces. The unit is assumed to operate 300 days/annum @ 8-10 hrs/day. The 1st year is assumed to be construction/expansion period of the project; and in the 2nd year 55 percent capacity, 3rd year 65 percent capacity, 4th year 75 percent capacity and 5th 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 Dehydrated carrot pieces manufacturing project, the unit requires 1312.5 kg/day, 1551.13 kg/day, 1789.77 kg/day & 2147.72 kg/day Carrot vegetable at 55, 65, 75, and 90 percent capacity utilization, respectively. The Mature Carrot must be plucked from plant; and then stored below 6°C temperature.

2.4 MANUFACTURING PROCESS OF THE DEHYDRATED CARROT PIECES

FLOW CHART OF DEHYDRATED CARROT PIECES



Pre-processing of Carrot:

Pre-drying processing means to prepare the raw product for drying or dehydration and include raw product preparation and colour preservation. Carrot preparation includes selection and sorting, washing, peeling and cutting into the appropriate form, and blanching. Carrot is selected; sorted according to size, maturity, and soundness; and then washed to remove dust, dirt, insect matter, mold spores, plant parts, and other material that might contaminate or affect the colour, aroma, or flavour. Next, the product is cut into the appropriate shape or form (i.e., halves, slices, cubes, etc.). Carrot is blanched by immersion in hot water (95 to 100 °C) or exposure to steam. Then they are treated with sulphite solutions to retard enzymatic browning. Sulphites and Sulphur dioxide. Sulphur dioxide gas and sodium or potassium sulphite, bisulphite or metabisulphite are the most common forms used. Commonly used levels: 0.005-0.2% In addition to colour preservation, the presence of a small amount of sulphite in blanched, cut carrot improves storage stability and makes it possible to increase the drying temperature during dehydration, thus decreasing drying time and increasing the drier capacity without exceeding the tolerance for heat damage.

Post-dehydration treatments:

These treatments may include sweating, screening, inspection, instantiation treatments, and packaging. Sweating involves holding the dehydrated product in bins or boxes to equalize the moisture content. Screening removes dehydrated pieces of unwanted size, usually called "fines". The dried product is inspected to remove foreign materials, discoloured pieces, or other imperfections such as skin, carpel, or stem particles. Instantiation treatments are used to improve the rehydration rate of the low-moisture product. Packaging is common to all most all dehydrated products and has a great deal of influence on the shelf life of the dried product. Packaging of dehydrated vegetables must protect the product against moisture, light, air, dust, micro flora, foreign odour, insects, and rodents; provide strength and stability to maintain original product

size, shape, and appearance throughout storage, handling, and marketing; and consist of materials that are approved for contact with food. Cost is also an important factor in packaging. Package types include cans, plastic bags, drums, bins, and cartons, and depend on the end-use of the product.

2.5 MARKET DEMAND AND SUPPLY FOR DEHYDRATED CARROT PIECES

Carrots are a member of the *Apiaceae* (formerly called *Unbelliferae*) family, which also includes celery, anise, dill, and cilantro. They are a biennial crop, producing their taproot the first year, and, if left to grow, would flower, set seed and die the second year. Although most all the carrots marketed in the United States today are orange, other colors such as red, yellow, or purple can occasionally be found in various fresh, frozen, and juice products. All carrots can be eaten root to tip, with the leaves often added to salads.

Carrots are primarily consumed fresh and are the 6th most consumed fresh vegetable in the U.S. Consumption of fresh carrots peaked in 1997 at 6.3 kgs per person and since then has dropped off and settled into a stable amount of approximately 3.7 kgs per person in 2015 (Vegetable and Melon Outlook, 2016). In contrast, consumption of frozen carrots averaged 0.6 kg per person.

Carrots are very high in beta carotene, and also contain Vitamin C, Vitamin K, potassium, other vitamins and minerals, and dietary fiber. In this century, carrots have become a popular cooking vegetable, salad item, snack food, and raw vegetable.

The upsurge in carrot popularity came after 1986 with the introduction of "baby-cut" carrots, which are packaged petite carrots made by chopping down and polishing much larger versions of the vegetable. "Baby carrots" are actually very young carrots that are harvested while the vegetables are still quite tiny. Baby-cut carrot products have been

the fastest growing segment of the carrot industry since the early 1990s and are among the most popular produce items in the supermarket aisle.

Approximately 6.3 percent of the fresh carrots supply in 2015 was exported. Imports totaled more than 19 thousand crores kgs. Major carrot imports come from Canada and Mexico.

2.6 MARKETING STRATEGY FOR DEHYDRATED CARROT PIECES

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 Carrot products.

2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Dehydrated carrot pieces 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 dehydration processing 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. Carrot cost considered @ Rs.15/-per kg.
 2. 1 kg Carrot will produce 12 % 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 Dehydrated carrot pieces Unit	75	MT/annum
Utilization of capacity	1st Year Implementation, 55% in second, 65% in third, 75% in fourth year, 90% in fifth & 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	350	Rs/kg
Powder extraction	12%	
Dehydrated carrot pieces	1 kg Dehydrated carrot pieces from 10 kg Carrot	

2.8 FIXED CAPITAL INVESTMENT

2.8.1 MACHINERY AND EQUIPMENT

Sr No.	Equipment	Quantity	Area (in feet)	Capacity	Price (Rs. In Lacs)
1	Cold Room	1	12*14*10	10000 kg	11.4

2	Bubble washer	1	6*4	200 kg/ batch	2.9
3	Carrot peeler	1	4*5	500 kg/hr	1.5
4	Vegetable dicing machines	1	4*3	Suitable	1.2
5	Blanching kettle	1	3.5 ft dia.	200 liter	0.8
6	Tray drier with trolley	1	8*10	500 kg/hr	6
7	Cont. sealing machine	1	4*3	Suitable	0.25
8	Batch coding machine	1		Suitable	0.12
9	Weighing balance	1		Suitable	0.06
10	Accessories	1		Suitable	0.5
				Total	24.73

2.8.2 OTHER COSTS:-

Utilities and Fittings:-

Utilities and Fittings	
1.Water	Rs. 0.8Lacs 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,	0.9 LAC

trials and others.	
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 38.66 lacs. This is according to survey done at X location India. This may vary on location, situation and design change over.

2.9 WORKING CAPITAL REQUIREMENTS

Particulars	Period (days)	Year 2 (55%)	Year 3 (65%)	Year 4 (75%)
Raw material stock	5	1.88	2.23	3.04
Work in progress	10	3.77	4.45	6.07
Packing material	10	0.15	0.18	0.24
Finished goods' stock	10	4.32	5.11	6.96
Receivables	20	8.64	10.21	13.92
Working expenses	14	0.56	0.67	0.91
Total current assets		19.33	22.84	31.14
Trade creditors		0.00	0.00	0.00
Working capital gap		19.33	22.84	31.14
Margin money (25%)		4.83	5.71	7.79
Bank finance		14.49	17.13	23.36

2.10 TOTAL PROJECT COST AND MEANS OF FINANCES

Particulars	Amount in Lakhs
i. Land and building (20 x 32 x 12 ft - LxBxH)	53
ii. Plant and machinery	24.73
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	4.83
Total project cost (i to vii)	8.66
Means Of finance	
i. Subsidy	10.00
ii. Promoters Contribution	9.66
iii. Term Loan (@49%)	18.99

2.11 MANPOWER REQUIREMENTS

Total Monthly Salary (Rs.)	No	Wages	Total Monthly	Total Annually
Supervisor (can be the owner)	1	15000	15000	180000
Technician	1	12000	12000	144000
Helper	3	5500	16500	198000
Sales man	1	7000	7000	84000
			50500	606000

2.12 EXPENDITURE, REVENUE AND PROFITABILITY ANALYSIS

	Particulars	1st Year	2nd Year	3rd Year	4th Year	5th year
A	Total Installed Capacity (MT)	715 MT Carrot /Annum	41.25	48.75	56.25	67.5
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%
B	Expenditure (Rs. in Lakh)	0				
	Carrot (Av. Price @ Rs. 15/Kg)	0.00	59.06	69.80	80.54	96.65
	Packaging materials	0.00	2.48	2.93	3.38	4.05
	Utilities (Electricity, Fuel)	0.00	2.41	2.85	3.29	3.95
	Salaries (1st yr only manager's salary)	1.80	6.06	6.06	6.06	6.06
	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	73.31	85.04	96.76	114.20
C	Total Sales Revenue (Rs. in Lakh)	0.00	144.38	170.63	196.88	236.25
	Sale of Deydrated carrot pieces (Av. Sale Price @ Rs. 350/kg)	0.00	144.38	170.63	196.88	236.25
D	PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows	-2.60	71.07	85.59	100.11	122.05
	Depreciation on civil works @ 5% per annum	0.27	0.25	0.24	0.23	0.22
	Depreciation on machinery @ 10% per annum	2.47	2.23	2.00	1.80	1.62
	Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06
	Interest on term loan @ 12%	1.98	1.91	1.83	1.75	1.65
	Interest on working capital @ 12%	0.00	1.74	2.06	2.80	2.80

E	Profit after depreciation and Interest (Rs. in Lakh)	-7.43	66.58	81.43	96.26	118.49
F	Tax (assumed 30%) (Rs. in Lakh)	0.00	19.97	24.43	28.88	35.55
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	-7.43	46.61	57.00	67.38	82.94
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	1.98	1.91	1.83	1.75	1.65
I	Coverage available (Rs. in Lakh)	1.98	1.91	1.83	1.75	1.65
J	Total Debt Outgo (Rs. in Lakh)	0.66	0.73	0.80	0.89	0.98
K	Debt Service Coverage Ratio (DSCR)	3.00	2.62	2.28	1.97	1.69
	Average DSCR	2.31				
L	Cash accruals (PBDIT- Interest-Tax) (Rs. in Lakh)	-4.58	49.19	59.33	69.49	84.84
M	Payback Period	2.0 Years				
	(on Rs. 38.66 Lakhs initial investment)					

2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	1,899,047.17	263,434.27	197,500.91	65,933.37	1,833,113.80
2	1,833,113.80	263,434.27	190,643.84	72,790.44	1,760,323.37
3	1,760,323.37	263,434.27	183,073.63	80,360.64	1,679,962.73
4	1,679,962.73	263,434.27	174,716.12	88,718.15	1,591,244.58
5	1,591,244.58	263,434.27	165,489.44	97,944.84	1,493,299.74
6	1,493,299.74	263,434.27	155,303.17	108,131.10	1,385,168.65
7	1,385,168.65	263,434.27	144,057.54	119,376.73	1,265,791.91
8	1,265,791.91	263,434.27	131,642.36	131,791.91	1,134,000.00

9	1,134,000.00	263,434.27	117,936.00	145,498.27	988,501.73
10	988,501.73	263,434.27	102,804.18	160,630.09	827,871.64
11	827,871.64	263,434.27	86,098.65	177,335.62	650,536.02
12	650,536.02	263,434.27	67,655.75	195,778.53	454,757.49
13	454,757.49	263,434.27	47,294.78	216,139.49	238,618.00
14	238,618.00	263,434.27	24,816.27	238,618.00	(0.00)
		3,688,079.80	1,789,032.63	1,899,047.17	(1,899,047.17)

2.14 ASSET'S DEPRECIATION

Assets' Depreciation (Down Value Method)	Amounts in Lakhs							
Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
Civil works	5.30	5.04	4.78	4.54	4.32	4.10	3.90	3.70
Depreciation	0.27	0.25	0.24	0.23	0.22	0.21	0.19	0.19
Depreciated value	5.04	4.78	4.54	4.32	4.10	3.90	3.70	3.52
Plant & Machinery	24.73	22.26	20.03	18.03	16.23	14.60	13.14	11.83
Depreciation	2.47	2.23	2.00	1.80	1.62	1.46	1.31	1.18
Depreciated value	22.26	20.03	18.03	16.23	14.60	13.14	11.83	10.65
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	30.83	27.97	25.39	23.06	20.96	19.06	17.34	15.79
Depreciation	2.86	2.58	2.33	2.10	1.90	1.72	1.55	1.41
Depreciated value	27.97	25.39	23.06	20.96	19.06	17.34	15.79	14.38

2.15 FINANCIAL ASSESSMENT OF THE PROJECT

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

Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year
Capital cost (Rs. in Lakh)	38.66	0.00	0.00	0.00	0.00		
Recurring cost (Rs. in Lakh)	2.60	73.31	85.04	96.76	114.20		
Total cost (Rs. in Lakh)	41.26	73.31	85.04	96.76	114.20		410.58
Benefit (Rs. in Lakh)	0.00	144.38	170.63	196.88	236.25		
Total Depreciated value of all assets (Rs. in Lakh)						14.38	
Total benefits (Rs. in Lakh)	0.00	144.38	170.63	196.88	236.25	14.38	748.13
Benefit-Cost Ratio (BCR): (Highly Profitable project)	1.822						
Net Present Worth (NPW):	337.55						

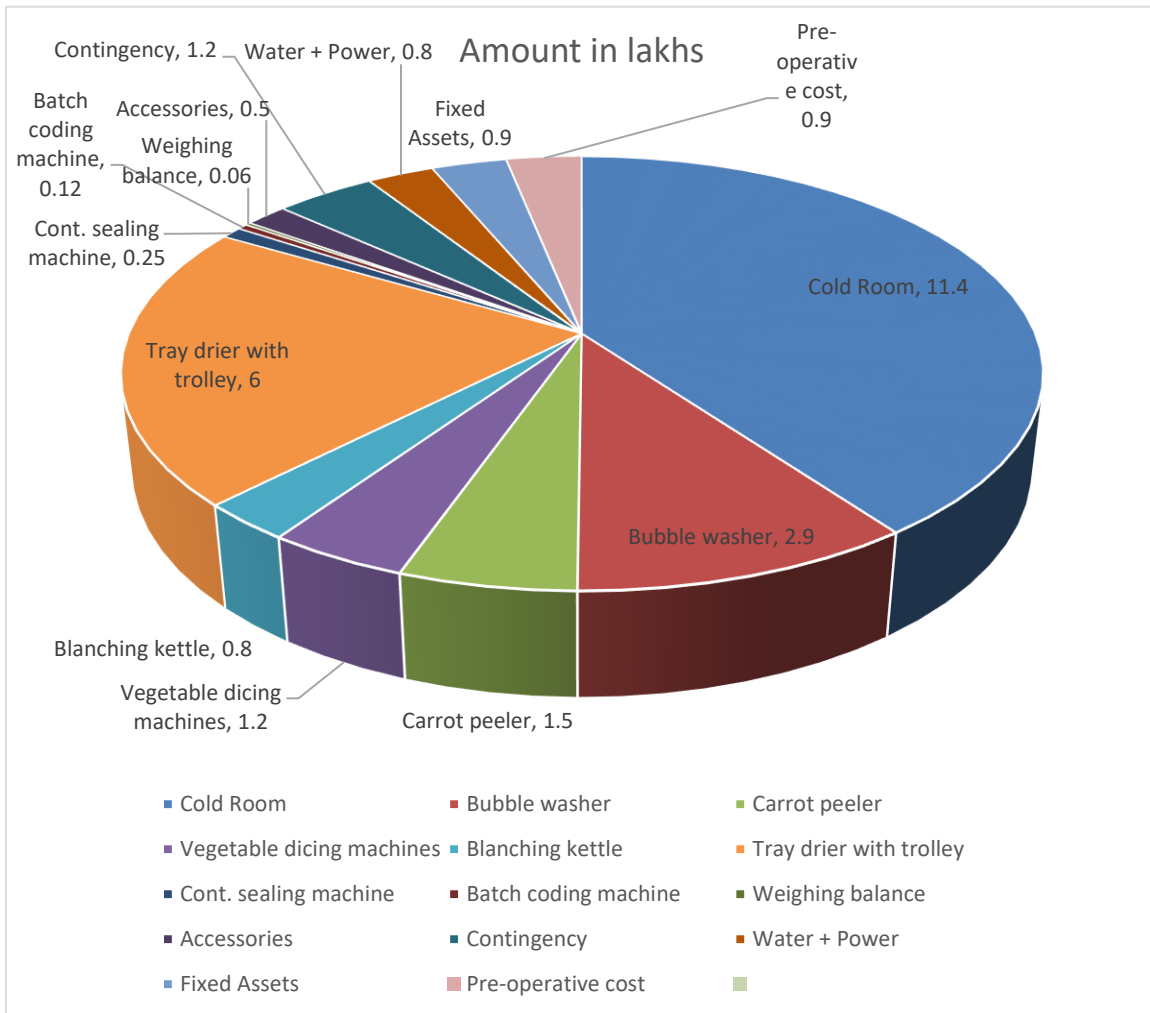
2.16 BREAK EVEN ANALYSIS

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

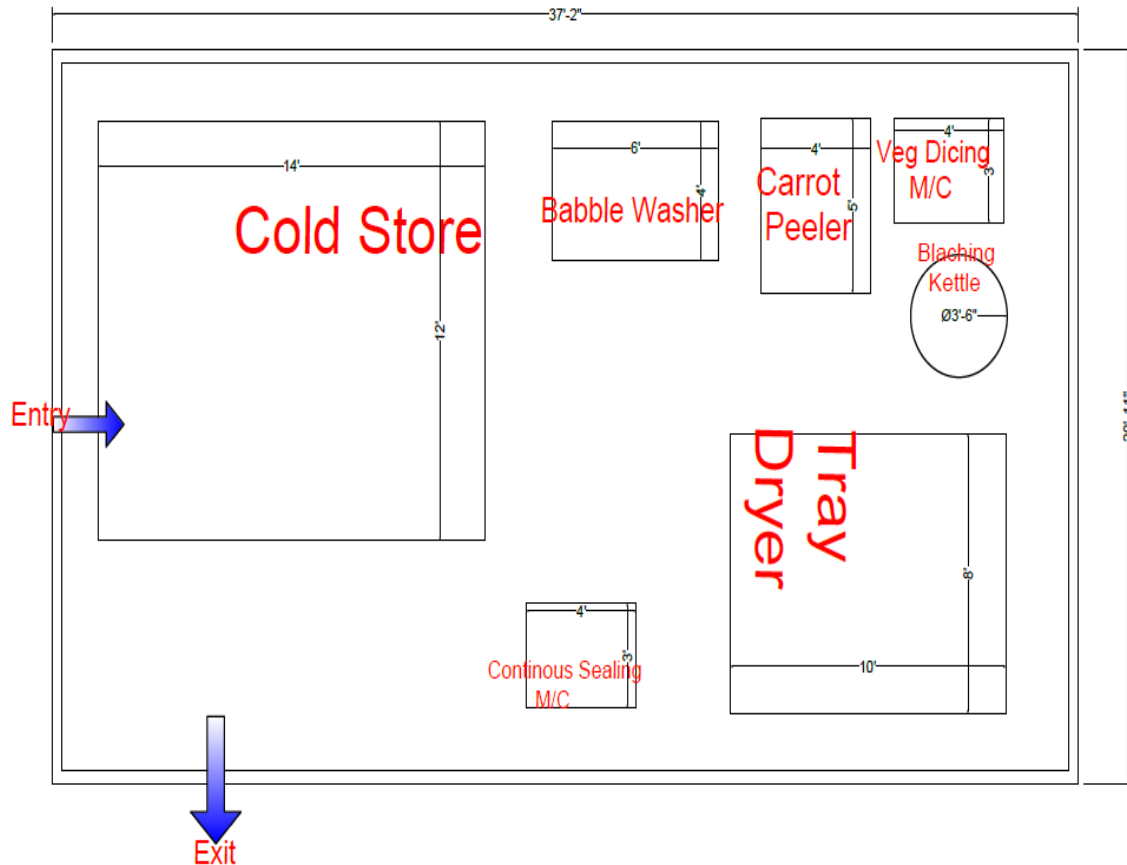
Particulars	1st Year	2nd year	3 rd year	4th year	5th year
Capacity utilization (%)	Under Const.	55%	65%	75%	90%
Production MT/Annum		41.25	48.75	56.25	67.5
Fixed Cost (Rs. in Lakh)					
Permanent staff salaries	6.06	6.06	6.06	6.06	6.06
Depreciation on building @ 5% per annum	0.27	0.25	0.24	0.23	0.22
Depreciation on machinery @ 10% per annum	2.47	2.23	2.00	1.80	1.62
Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06
Interest on term loan	1.98	1.91	1.83	1.75	1.65
Insurance	0.3	0.3	0.3	0.3	0.3
Total Fixed Cost (Rs. in Lakh)	11.19	10.85	10.52	10.21	9.92
Sales Revenue (Rs. in Lakh)	0.0	144.4	170.6	196.9	236.3
Variable Cost (Rs. in Lakh)					
Carrot (Av. Price @ Rs. 15/Kg)	0.00	59.06	69.80	80.54	96.65
Packaging materials	0.00	2.48	2.93	3.38	4.05
Casual staff salaries	0.00	4.56	4.56	4.56	4.56
Utilities (Electricity, Fuel)	0.00	2.41	2.85	3.29	3.95
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	1.74	2.06	2.80	2.80
Total Variable Cost (Rs. in Lakh)	0.50	72.95	84.99	97.47	114.91
Break Even Point (BEP)					
as % of sale	-	12.00	10.00	8.00	8.00
Break Even Point (BEP) in terms of sales value (Rs. in Lakhs)	-	17.33	17.06	15.75	18.90

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



2.18 TYPICAL DEHYDRATED CARROT PIECES MANUFACTURING UNIT LAYOUT



2.19 MACHINERY SUPPLIERS

There are many machinery suppliers available within India for fruits based dehydration 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.



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