

PM Formalization of Micro Food Processing Enterprises Scheme

DETAILED PROJECT REPORT FOR DEHYDRATED PEAR SLICE PROCESSING



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Project At a Glance

1	Name of the Project	Dehydrated pear slice
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 & 100% capacity utilization in the 2nd, 3 rd , 4 th , 5 th & 6 th years' onwards respectively
11	Raw materials	Pear Fruit
12	Major product outputs	Dehydrated pear slice
13	Total project cost (Lakhs)	35.69
	Land development, building & civil construction	5.18
	Machinery and equipment	15.43
	Utilities (Power & water facilities)	0.8
	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.90
	Contingencies	1.20
	Working capital margin	11.28
14	Working capital Management (In Lakhs)	
	Second Year	33.85
	Third Year	40.01
	Fourth Year	54.56
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	9.99
	Promoter's contribution (min 20%)	9.28
	Term loan (45%)	16.41
16	Debt-equity ratio	1.77 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	175.51
	3rd year	209.29
	4th year	243.06
18	Average DSCR	2.16
	Benefit Cost Ratio	2.05
	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 PEAR PRODUCTION, CLUSTERS, POST-HARVEST MANAGEMENT AND VALUE ADDITION IN INDIA

1.1 INTRODUCTION

Pears are fruits produced and consumed around the world, growing on a tree and harvested in late Summer into October. The pear tree and shrub are a species of genus *Pyrus*, in the family Rosaceae, bearing the pomaceous fruit of the same name

Pear (*Pyrus communis L.*), a typical fruit of temperate climates, with delicate pleasant taste and smooth, has a wide acceptance throughout the world. By its shape, it inspires designers and architects.

The pear is mainly consumed *in natura*, pies, cakes, accompanying strong cheese or carpaccio, risotto, jams, and ice creams and is a great fruit to be consumed in diets because of its low caloric value. It has high nutritional value with reasonable amounts of vitamins A, B1, B2, B3, and C and minerals like sodium, potassium, phosphorus, calcium, magnesium, and iron. It has a lot of fiber, giving excellent results in the treatment of constipation and intestine inflammation. Many recommend pears to cure anomalies such as cystitis and kidney stones.

Belonging to the genus *Pyrus*, which originated in the Tertiary period, in Western China, the pear had its dispersion from northern Italy, Switzerland, former Yugoslavia, Germany, Greece, Moldova, and Ukraine to the East, in countries such as Iran, Uzbekistan, China, Japan, Korea, and Bhutan. Commercially, it is divided into two major groups: European and Asian pears. The first, with elongated and full-bodied texture, and the second, with sandy texture and rounded body, make this fruit the ninth in world production, being mainly a commodity in China.

1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF PEAR

The name pear is derived from Latin, *pera* or *pira*, with some variants like in French as *poire*, in German as *peer*, and in Greece as *acras* as wild type and *apios* as cultivated pear.

The pear, of *Pyrus* L., gender is a fruit of big importance for the agriculture of latitude moderate countries, being cultivated on a large scale in China, Western Europe, and the United States.

The genus is thought to have originated in present-day Western China in the foothills of the Tian Shan, a mountain range of Central Asia, and to have spread to the north and south along mountain chains, evolving into a diverse group of over 20 widely recognized primary species, The enormous number of varieties of the cultivated European pear (*Pyrus communis* subsp. *communis*), are without doubt derived from one or two wild subspecies (*P. c.* subsp. *pyraster* and *P. c.* subsp. *caucasica*), widely distributed throughout Europe, and sometimes forming part of the natural vegetation of the forests.

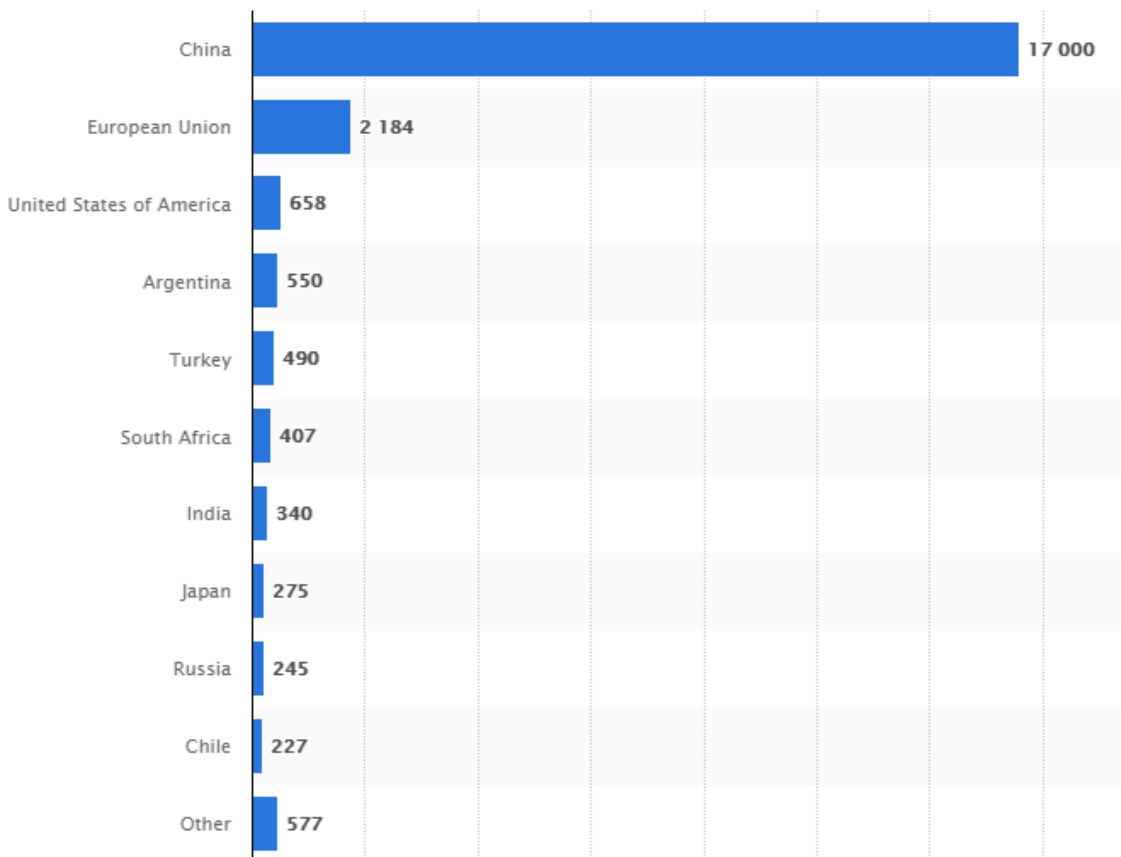
Asian species with medium to large edible fruit include *P. pyrifolia*, *P. ussuriensis*, *P. × bretschnideri*, *P. × sinkiangensis*, and *P. pashia*. Other small-fruited species are frequently used as rootstocks for the cultivated forms.

Pears are some of the oldest fruit in existence. According to the Nanjing Agricultural University, pears likely originated during the tertiary period, approximately 65 to 55 million years ago. Indeed, dried pears were found in Swiss caves dating back to the Ice Age. It's speculated that species in the large *Pyrus* genus come from Europe, North Africa and Asia Minor. Even today, each of these regions cultivates distinct varieties from the other. Asian pears likely predate Occidental, or, European pears.

India received pears from China several centuries ago. Peach and pear came to India during the early years of the Eastern Han period (25AD to 220AD).

Though a staggering 3,000+ varieties of pear exist in the world, India cultivates approximately 24 varieties throughout Jammu and Kashmir, Uttar Pradesh, and Himachal Pradesh. India’s pear season ranges from **late summer** to **early winter**.

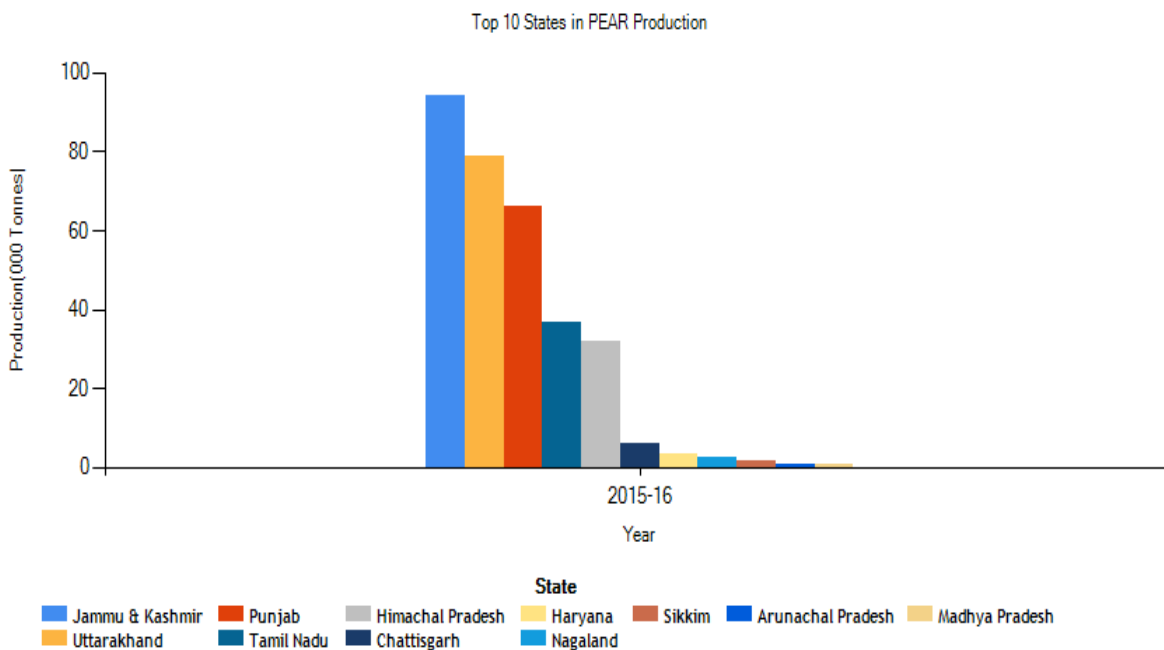
Data from the UN’s Food and Agriculture Organization and statista reveal that China dominates the world pear market, producing almost 17 million tons. This is 15 times as much fruit as the second highest country, European Union, US, Argentina, Spain, and Turkey are other major producers.



Global leading Pear Producing countries in 2019/2020 (in 1,000 metric tons)

Source: Statista

Top Ten Pear Producing states in India



Source: National Horticulture Board

1.3 VARIETIES

Varieties of Pear grown across India:

1. *William Bartlett:*

These pears, grown in Uttar Pradesh and Jammu and Kashmir, are hailed as some of the juiciest of all of the types. Indeed, one bite of a ripe Bartlett may cause its sticky sweet juice to dribble down the chin. Bartlett pears are one of the softest types, so do not expect them to hold their shape when cooked. Instead, use this variant to make pear butter or cream.

2. *Red Bartlett:*

Similar to Bartlett pears, this type grows in Himachal Pradesh and Uttar Pradesh during the mid-season. This variety will grow brighter as it ripens, and give a floral aroma.

How early it's picked determines texture: if picked when fully ripe on the tree, the texture will be grainy. If picked at maturity, the texture is smoother and the taste is sweeter.

3. *Conference:*

This late, tall-necked variety hailing from Britain grows in Uttar Pradesh and Himachal Pradesh. In early stages of ripeness, conference pears are crisp but grow buttery smooth at peak ripeness. Do not wait for this variety to turn golden yellow, as this indicates overripeness.

4. *Bosc:*

India doesn't grow this variety, but does import them. Boscs are crisp, sweet, and honey-like with a spicy edge. They hold their shape when heated, making them ideal for use in desserts and for poaching. Boscs are tastiest in the early stages of ripening.

5. *Comice:*

A sweet variety with a creamy texture, grown in Himachal Pradesh and Uttar Pradesh. Those preferring a headier, aromatic, and sweeter type of pear should select this type. These pears hold shape when cooked.

6. *D'Anjou:*

Jammu and Kashmir grow D'anjous during the early season. This type has a bright, almost citrusy taste and stays in tact for grilling, poaching, and baking. D'Anjous will *not* change color upon ripening, and instead remain brightly green.

7. *Seckel:*

Though small, this type packs a strong sugary punch. Its sweetness has earned it the moniker, "sugar pear." A deep blush indicates its ripeness, and the fruit should yield to the touch near the stem. Seckels grow in Himachal Pradesh during the early season.

8. *Flemish beauty:*

These pears, found during the late season in the high hills of Himachal Pradesh, radiate green skin and a large flush of red. As it ripens, the green deepens to yellow. Flemish beauties are fickle, as their taste and potential depend greatly on the picking's timing. Sometimes the flesh is tender and buttery; other times, grainy and insipid.

9. *Starking delicious:*

This mid-season variety grows in Himachal Pradesh. The texture is firm, smooth and juicy. It's touted by growers as being "Bartlett quality," and perhaps most importantly for any farmer, blight-free.

10. *Winter Nellis:*

Himachal Pradesh and Uttar Pradesh grow this type in the late season. Though the flesh is quite firm, the taste is sweet and juicy. The firmness allows for cooking while holding shape. The fruit turns yellowish green when ripe, and is also highly aromatic.

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Nutritional value:

Composition of Pear (100g edible portion) by fresh weight basis

Nutrients	Quantity per 100g
Energy	58 kCal
Protein	0.38 g
Total lipid	0.12g
Saturated Fat	0.029g
Trans Fat	-
Polyunsaturated Fat	0.029 g
Monounsaturated Fat	0.026 g

Total Carbohydrate	15.46 g
Dietary Fiber	3.1 g
Sugars	9.8 g
Cholesterol	0 mg
Sodium	1 mg
Calcium	9 mg
Iron	0.17 mg
Potassium	119 mg
Vitamin A	1 mcg
Vitamin C	4.2 mg

Carbohydrate:

Pears are a great source of insoluble fiber, containing almost 6 grams (22% of the recommended daily amount) in one medium-size fruit. Fiber is the indigestible part of carbohydrate that helps promote bowel regularity and can reduce bad cholesterol.

Pears are high in fructose and other sugars. However, they have a low glycemic index of 38 and glycemic load of 4.

Fat:

Pears contain negligible amounts of both saturated and unsaturated fats.

Protein:

Pears contain very little protein and are not a complete source of all essential amino acids, but they do contain trace amounts of the amino acids leucine, lysine, and glutamic acid.

Vitamins and Minerals:

Pears are a good source of vitamin C, containing approximately 13% of the daily value. One pear contains about 6% of the daily recommended amount of copper and 6% of the

daily recommended amount of potassium. The skin of a pear is where a large portion of its fiber resides, as well as a high concentration of nutrients, so it's best to eat this fruit with the skin on.

Copper is important for the formation of connective tissue in the body as well as healthy brain and nervous system function. Potassium supports muscle function and nervous system communication.

CONSTITUENTS AND HEALTH BENEFITS OF PEAR

Pears have an abundance of health benefits.

Let us take a look at them below.

a) Promote Gut Health

Pears are an excellent source of soluble and insoluble fiber, which are essential for digestive health. These fibers help maintain bowel regularity by softening and bulking up stool.

One medium-sized pear (178 grams) packs 6 grams of fiber — 22% of your daily fiber needs. Additionally, soluble fibers feed the healthy bacteria in your gut. As such, they're considered prebiotics, which are associated with healthy aging and improved immunity. Fiber may help relieve constipation.

b) Helps repair cells

Pear contains appreciable amount of Vitamin C. This vitamin is important for cell growth and repair as well as preventing oxidative damage. Vitamin C has been shown to support immune function, aid in the healing of cuts and bruises, and even protect against infectious diseases.

In addition, pear skin contains flavonoids, phenolics, and triterpenes that have antioxidant and anti-inflammatory properties.

c) Reduce Risk of Diabetes

Anthocyanin-rich fruits like red pears was associated with a 23% lower risk of type 2 diabetes. The fiber in pears slows digestion, giving your body more time to break down and absorb carbs. This can also help regulate blood sugar levels, potentially helping prevent and control diabetes.

d) Lowers Risk of Chronic disease

Pears are high in fiber can improve digestive health and reduce odds of developing coronary heart disease, stroke, hypertension, diabetes, and some gastrointestinal diseases.

e) Anti-cancer effect

Pears contain various compounds that exhibit anticancer properties. Anthocyanin and cinnamic acid contents have been shown to fight cancer. Pears protect against some cancers, including those of the lung, stomach, and bladder

Flavonoid-rich fruits like pears may also safeguard against breast and ovarian cancers,

f) Improve heart health

Pears may lower your risk of heart disease. Their procyanidin antioxidants may decrease stiffness in heart tissue, lower LDL (bad) cholesterol, and increase HDL (good) cholesterol.

The peel contains an important antioxidant called quercetin, which is benefit heart health by decreasing inflammation and reducing heart disease risk factors like high blood pressure and cholesterol levels.

g) Helps in weight loss

Pears are low in calories, high in water, and rich in fiber. This combination helps in weight loss.

1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-

The pear is native to coastal and mildly temperate regions of the Old World, from Western Europe and North Africa east across Asia. It is a medium-sized tree, reaching 10–17 m (33–56 ft) tall, often with a tall, narrow crown; a few species are shrubby.

The leaves are alternately arranged, simple, 2–12 cm (1–4 ½ in) long, glossy green on some species, densely silvery-hairy in some others; leaf shape varies from broad oval to narrow lanceolate. Most pears are deciduous, but one or two species in Southeast Asia are evergreen. Most are cold-hardy, withstanding temperatures as low as –25 to –40 °C (–13 to –40 °F) in winter, except for the evergreen species, which only tolerate temperatures down to about –15 °C (5 °F).

The flowers are white, rarely tinted yellow or pink, 2–4 centimeters (1–1 ½ in) diameter, and have five petals. Like that of the related apple, the pear fruit is a pome, in most wild species 1–4 cm (½–1 ½ in) diameter, but in some cultivated forms up to 18 cm (7 in) long and 8 cm (3 in) broad; the shape varies in most species from oblate or globose, to the classic pyriform "pear shape" of the European pear with an elongated basal portion and a bulbous end.

The fruit is composed of the receptacle or upper end of the flower stalk (the so-called calyx tube) greatly dilated. Enclosed within its cellular flesh is the true fruit: five 'cartilaginous' carpels, known colloquially as the "core". From the upper rim of the receptacle are given off the five sepals, the five petals, and the very numerous stamens.

Cultivation and Bearing:-

Growing Parameters	
Temperature	10-25°C
Rainfall	50-75 mm
Sowing Temperature	10-18 °C
Harvesting Temperature	18-25 °C

Soil:

It can be grown on variety of soil ranging from sandy loam to clay loam. It gives the best results when grown in deep, well drained, fertile soil without having any hard pan up to 2 meter depth. pH of soil should not be more than 8.7.

Time of Sowing:

Planting is completed in January Month. One year old plants are used for planting.

Spacing:

Plants are planted at distance of 8 x 4 m. Before planting, clear land and remove remains of earlier plants. Then levelled land properly and give gentle slope for water drainage.

Sowing Depth:

Dig a pit of 1 x 1 x 1 m size and fill pits one month before planting in November month with top soil and add well rotten farm yard manure and then allow it to settle. Finally pit should be filled with sub soil mixed with 10-15 kg of well decomposed cow dung, 500 kg SSP and drench the pit with Chlorpyrifos@50ml/10 liters of water per pit. After planting, irrigation should be done.

Method of Sowing:

For planting, square or rectangular planting can be adopted. In hilly areas contour system of planting is used for cultivation.

Planting:

- Plant pear trees in early spring. Order bare root plants in mid-winter so that they arrive in time.
- You'll need full sun for best fruit set and fertile, well-drained soil as well as good air circulation.
- If you live outside of the dry western regions, you should choose fire blight-resistant types and rootstocks.
- Plan to plant at least two varieties of pear trees, as they will need to be cross-pollinated to produce fruit. Make sure the varieties are compatible with each other.
- Space standard-size trees 20 to 25 feet apart. Space dwarf trees 12 to 15 feet apart.
- For container-grown trees, remove the plant from its pot and remove any circling roots by laying the root ball on its side and using shears to cut through the roots.
- For grafted trees, position the inside of the curve of the graft union away from the sun when planting.
- Dig a hole that is a few inches deeper and wider than the spread of the roots. Set the tree on top of a small mound of soil in the middle of the hole. Be sure to spread the roots away from the trunk without excessively bending them. Do not add fertilizer or topsoil to the hole.

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.

- Pears require a temperature of 5 to 6°C and humidity of 85-90% such that they can be stored for 4 – 8 weeks.
- Do not leave harvested fruit out in the hot sun;
- Do not pick cold, wet fruit. When wet turgid fruit is handled the oil
- Glands can be ruptured. The released oil burns the fruit surface (oleocellosis) and also stimulates fungal spores to germinate. The burn Marks can take 2-3 days to develop;
- Wear cotton gloves when harvesting. This reduces puncture marks from Fingernails and jewellery;
- Use picking bags. This reduces damage as a result of abrasion on
- Wooden or metal picking bins and allows fruit to be gently lowered into Bulk harvesting bins;
- Do not leave stems on fruit or damage buttons by “plugging”;
- Use clean, smooth harvesting bins;
- Make sure packing line equipment is cleaned regularly. This reduces dirt and wax buildup which can cause fruit abrasion;
- Reduce packing line abrasion by using foam, rubber and smooth belts to Cushion fruit;
- Remove old and rotten fruit regularly from the packing shed and surrounds;
- Treat harvested fruit with a registered fungicide within 24hrs of harvest;

1.5 PROCESSING & VALUE ADDITION:-

Pear can be cleaned and packaged as whole or precut forms for fresh use. Minimally processed ready-to-use fresh produce is more perishable than intact produce. Thus, it is important to start with a high quality raw material and strictly apply the necessary processing and storage requirements for such perishable products. Minimally processed pear product can be fresh, RTS beverages, and dehydrated slices packaged in modified atmosphere conditions among which the former is more common.

After the fruits are harvested, sorted, and cleaned with sanitizers as described in the previous section, can also be cut into smaller pieces or slices for further processing. It is important to note that cutting must be done with sharp knives to decrease the degree of physical injuries to the tissues. The cut slices may be treated with antimicrobial and antioxidant solutions or blanched to retard microbial and oxidative degradations in the product. If whole pear fruits are to be packaged, they must be rinsed with water containing appropriate sanitizers to reduce the microbial load on them. Moisture on the surface can increase microbial decay of the product. Pear is consumed as fresh or processed into different forms including frozen, canned, or dried.

Frozen Pear:

Pear can be frozen to increase its shelf life. Freezing inhibits growth of microorganisms and retards degradative biochemical and enzymatic reactions in the product. The process involves sorting, grading, washing, blanching, draining, freezing, and packaging. Frozen pear can be presented in one of the following forms: whole pear, Diced pear and others. Thus, depending on the type of the product to be produced, a size reduction is applied to trimmed, sorted/graded, and cleaned pear. Blanching is one of the most critical steps in freezing of pear. It involves brief immersion of the fresh product in water at 85–100°C or steaming at 100°C primarily to inactivate enzymes such as lipoxygenases (LO), peroxidases (PO), and polyphenol oxidases (PPO), which cause degradations in color, flavor, texture, and nutritional value. It also kills vegetative microbial cells and decreases any pesticide residues on the product. Blanched pear is cooled and usually packaged before freezing, although individual quick freezing of unpackaged pear can also be done followed by packaging.

Dehydrated Pear:

Mature pear is preferred for production of dehydrated fenugreek. The pear is graded and sorted carefully to remove bruised, damaged fruits, older or decayed before washing. The pear are dried at 80°C until the moisture content drops to below 6.5%. Drying can also be conducted with microwaves at 750 W power level,

which can be advantageous in terms of drying time, energy consumption, ascorbic acid, and color. Premium quality dried pear can be produced by freeze drying which retains the valuable nutrients and color to a larger extent.

Dehydrated pear slices are a dehydrated version of Pear 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. Pear's suitability for drying is fair to good.

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 fruit/vegetable in boiling water and salt solution to extend the shelf life of fruits. Dehydration significantly reduces the cost of transportation and storage due to reduced weight and volume of dehydrated fruits. Unlike fresh fruit, dehydrated fruits do not require refrigeration during storage.

Canned pear:

Harvested pear in crates, directly from the field or in boxes, can be preserved by canning. Pear is cleaned, sorted, and graded to remove the diseased, decayed, damaged or rotten followed by washing. Washing is generally done by the bubble washer with water with additional sprays or through a tank on a mesh belt to remove soil, dirt, and insects thoroughly.

2. MODEL DEHYDRATED PEAR SLICE 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 pear growing states are Jammu and Kashmir, Uttarakhand, Punjab, Tamil Nadu, Himachal Pradesh, Chhattisgarh, Haryana and Nagaland.

2.2 INSTALLED CAPACITY OF THE DEHYDRATED PEAR SLICE PROCESSING UNIT

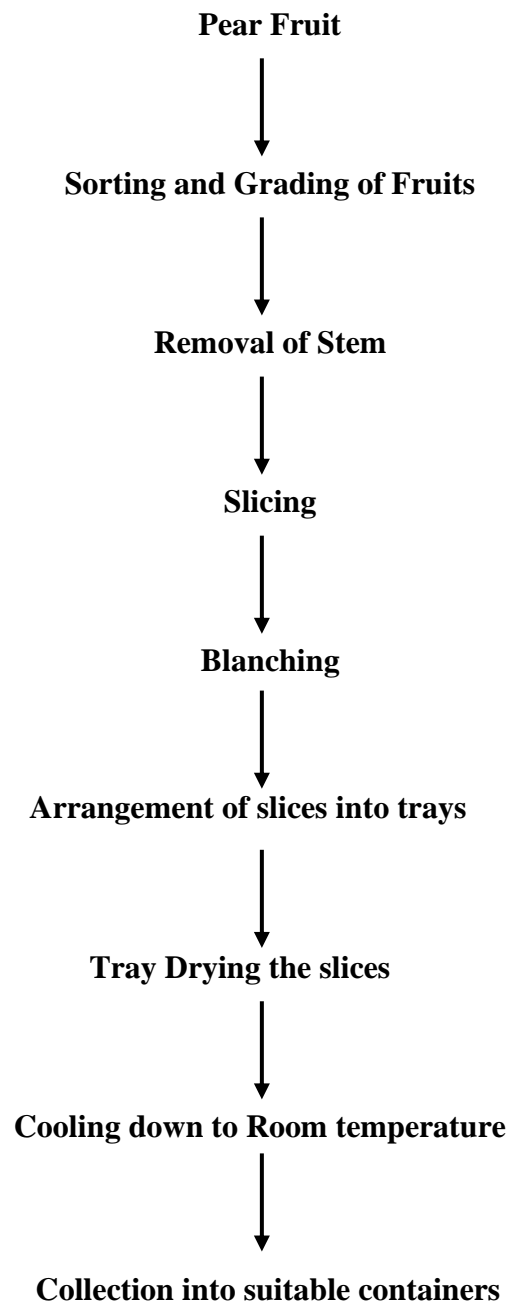
The maximum installed capacity of the Dehydrated pear slice manufacturing unit in the present model project is proposed as **150 tons/annum** or 500 kg/day Dehydrated pear slice. The unit is assumed to operate 300 days/annum @ 8-10 hours/day the 1st year is assumed to be construction/expansion period of the project; and in the 2nd year 55 percent capacity, 3rd year 65 percent capacity, 4th year 75 percent capacity, 5th year 90 percent capacity & 6th year onwards 100 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 pear slice manufacturing project, the unit requires **916.6 kg/day, 1083.3 kg/day, 1250 kg/day, 1500 Kg/day & 1666.66 kg/day Pear fruits at 55, 65, 75, 90 & 100 percent capacity utilization, respectively.**

2.4 MANUFACTURING PROCESS OF THE DEHYDRATED PEAR SLICE

Flow chart for dehydrated pear slice:



↓

Packaging

Selection of Pear

The fruits are plucked when they mature turns green to light green or yellow. The variety and maturity of fruit influence the flavor and keeping quality of its finished product. Fully ripe fruits are harvested for freezing, canning and drying. All pears soften extremely quickly, making them vulnerable to bruising and subsequent rotting. So Gently pick the ripened fruits from the tree. The fruits should be harvested in the morning hours.

Sorting

Sorting is the process of grouping according to size, shape, colour and weight. Sorting covers two main separate processing operations:

- a. Removal of damaged fruit and any foreign bodies (which might have been left behind after washing).
- b. Qualitative sorting based on organoleptic criteria and maturity stage. Mechanical sorting for size is usually not done at the preliminary stage. The most important initial sorting is for variety and maturity.

Clean and bright coloured pear should be preferred. Ruptured or bruised skin with bacterial or fungal infected pears are not recommended.

Washing

Washing and sanitizing the fruits is required to remove the pesticide residues, plant debris and other possible contamination as well as microorganisms responsible for quality loss and decay. Generally immersed in tap water whereas sanitizing agents are added to process water to effectively reduce the microbial loads on the fruit surface. Pears are seldom washed. Washing with water must be accompanied with brushing, rubbing, and

forcing the water against the fruit and into crevices. Detergents are frequently used in the wash or rinse water. Dirt and microorganisms are removed by washing with Chlorine dioxide water (10-100 ppm) and again rinsed with water in fruit washing tank. Fluming in cold water reduces contact with the air and reduces bruising of soft fruit and is a retardant to oxidation if an antioxidant is used.

Blanching

Blanching is done to preserve a good colour and softens the fruits so that it dries more quickly later on, also it inactivates the enzymes and reduce the number and activity of microbes. The length of time needed to blanch varies with the type of fruit, the size of the pieces and the number of pieces blanched at any one time. If blanching done for too long, they lose their colour and taste. Blanch the pears in the boiling water for about 30 to 60 seconds. This keeps thing skin from becoming tough. Then cool slightly by running the cold water over them. The fruits will have swollen slightly.

Slicing

Slicing of Pears can be done manually or mechanically. In manual process, it should be done with hands using a serrated knife.

Mechanically, it can be done using a Fruit slicer machine. Pear fruits are sliced into thin slices for quick moisture reduction.

Drying

•Tradition Drying Method: Sun Drying

Drying of pears takes place by utilizing the heat energy radiated by sun. The sliced pears are spread on any available space and allowed under sun until it is completely dried.

The pears are dried under sun for 3 to 7 days and the final moisture content of the dried pear slices shall not exceed 6%.

• Other improved drying methods like solar drying, tunnel drying, tent drying and osmotic drying methods are also used.

Packaging

The dehydrated pear slice can be packed using the form fill sealer in plastic or foil bags. It can also be packed in tins, glass and plastic containers.

2.5 MARKET DEMAND AND SUPPLY FOR DEHYDRATED PEAR SLICE

Pear isn't as beloved or well known in India as the mango, but it's an important temperate crop second only to the apple. These fruits tend to be available in shops year-round, if only because India imports them during the off-seasons. Produce shops large and small will offer a few varieties at any given time.

International trade of pears is highly focused both as exporting and importing countries. 92% of world exports was concentrated in ten countries (Argentina, the Netherlands, China Belgium, Italy, United States of America, South Africa, Spain and Portugal).

Furthermore, these countries have very specific markets. The Netherlands, Belgium, Italy and Spain export to the European continent and Russia. In turn, Brazil is the main importing country of pears from Portugal. In the case of China, it is observed that its market is shaped by Asian countries, although its exports to Russia have increased in the last few years, taking advantage of the Russian veto in the European Union. Hong Kong is also a re-exporting market in the same way as the countries described previously in the European bloc.

The surplus demand for healthy food products among the consumers has been creating lucrative growth opportunities. In order to cater to the

increasing demand for natural and healthy food ingredients, food manufacturers are emphasizing to include dehydrated fruits/vegetables in their product line. Dehydrated fruit/vegetables retain 100% of the nutrition content of fresh fruit/vegetables while it only takes half of the space, which offers manufacturers with better convenience to transport food items from one place to another. Apart from convenience in transportation, dehydrated fruits are rich in nutrients and dietary fibre content which have been helping the market gain traction. India is the world's 2nd largest producer of fruits in the world next only to China. But the fruit and vegetable processing industry in India is highly decentralized. A large number of units are in the small-scale sector, having small capacities up to 250 tonnes per annum though big Indian and multinational companies have capacities in the range of 30 tonnes per hour or so. Hence India now ranks only third in the production of Dried and Preserved fruits/vegetables. In Dried and Preserved fruit market high return is usually in the export market, especially Europe. The export customers are mostly ready-to-eat food manufacturers and hotel chains in those countries. Any economic slowdown in Europe or other export markets would negatively affect the businesses of export customers which in turn would affect the order quantity and hence the Dried and preserved fruit market. The dried and preserved fruit market of India is expected to grow at a CAGR of 16% by the year 2020. The supportive agro-climatic conditions, potential domestic market, cost competitiveness, and government support are some of the key factors which will drive the growth of this industry.

The demand for Pear Value-added product is more due to the ease of availability of product to the consumer. On the basis of form the pear ingredient market is segmented into dehydrated slices and RTS beverages. Dehydrated pear slices has special properties which provide various health benefits such as anti-oxidant properties, acts as a anti-inflammatory substances and has the ability to maintain good digestive system.

Research have shown that Dehydrated pear slices helps in the nourishment of the intestine as it is rich in fiber and act as a natural laxative. Moreover, the market is

also driven by the increasing awareness among the consumers about the health benefits associated with pear products. Pear is used as treatment for diabetes, heart health, cancer, inflammation and weight loss.

Unfortunately, those in the south may not get the best tasting European pears compared to residents in the north. This is because of India's limited ability to transport and package these perishable, sensitive fruits across long distances. Furthermore, the hardest, underripe fruits hold up best for long hauls, making the bounty sub-par on arrival in India's southern regions.

2.6 MARKETING STRATEGY FOR DEHYDRATED PEAR SLICE

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 pear products.

2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Dehydrated pear slice 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. Pear cost considered @ Rs.80/-per kg.
2. 1 kg Pear will produce 33% recovery.
3. 1 Batch size is approximately 500 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 pear slice Unit	150	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	80	
Average sale prices per Kg	600	Rs/kg
Pulp extraction	33	
DEHYDRATED PEAR SLICE	1 kg Dehydrated pear slice from 3.3 kg Apricot	

2.8 FIXED CAPITAL INVESTMENT

2.8.1 MACHINERY AND EQUIPMENT

Sr No.	Equipment	Capacity	Quantity	Price (Rs. In Lacs)
1	Cold store	1	9000 kg	8
2	Washing tank	1	500 liter	0.6

3	Blanching kettle	1	200 liter	0.6
4	Fruit Pitting machine	1	Suitable	1
5	Solar dryer	1	600 Kg	2
6	Pulverizer	1	Suitable	1.4
7	Centrifugal sifter with screens	1	Suitable	0.25
8	Induction sealer	1	Suitable	0.3
9	Shrink tunnel	1	Suitable	0.35
10	Cont. sealing machine	1	Suitable	0.25
11	Batch coding machine	1	Suitable	0.12
12	Weighing balance	1	Suitable	0.06
13	Accessories	1	Suitable	0.5
1	Cold store	1	9000 kg	8
			Total	15.43

2.8.2 OTHER COSTS:-

Utilities and Fittings:-

Utilities and Fittings	
1. Water	Rs. 0.8Lacs 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.	0.9 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 35.69 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	3	4.21	4.98	6.79
Work in progress	6	8.42	9.95	13.57
Packing material	10	0.60	0.71	0.97
Finished goods' stock	7	10.48	12.38	16.89
Receivables	14	20.96	24.77	33.78
Working expenses	14	0.47	0.55	0.76
Total current assets		45.14	53.35	72.74
Trade creditors		0.00	0.00	0.00
Working capital gap		45.14	53.35	72.74
Margin money (25%)		11.28	13.34	18.19
Bank finance		33.85	40.01	54.56

2.10 TOTAL PROJECT COST AND MEANS OF FINANCES

Particulars	Amount in Lakhs
i. Land and building (20 x 32 x 12 ft - LxBxH)	5.18
ii. Plant and machinery	15.43
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	11.28
Total project cost (i to vii)	35.69
Means Of finance	
i. Subsidy	9.99
ii. Promoters Contribution	9.28
iii. Term Loan (@ 10%)	16.42

2.11 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
Helper	1	5500	5500	66000
Semi-skilled	2	7600	15200	182400
Sales man	1	8000	8000	96000
			60700	728400

2.12 EXPENDITURE, REVENUE AND PROFITABILITY ANALYSIS

	Particulars	1st Year	2nd Year	3rd Year	4th Year	5th year	6th year
A	Total Installed Capacity (MT)	500 MT Pear /Annum	82.5	97.5	112.5	135	150
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%
B	Expenditure (Rs. in Lakh)	0					
	Pear (Av. Price @ Rs. 80/Kg)	0.00	220.00	260.00	300.00	360.00	400.00
	Packaging materials	0.00	9.90	11.70	13.50	16.20	18.00
	Utilities (Electricity, Fuel)	0.00	0.41	0.48	0.56	0.67	0.74
	Salaries (1st yr only manager's salary)	2.16	7.28	7.28	7.28	7.28	7.28
	Repair & maintenance	0.00	0.70	0.80	0.90	0.90	0.90
	Insurance	0.30	0.30	0.30	0.30	0.30	0.30
	Miscellaneous expenses	0.50	2.30	2.30	2.30	2.30	2.30
	Total Expenditure	2.96	240.89	282.87	324.84	387.65	429.53
C	Total Sales Revenue (Rs. in Lakh)	0.00	495.00	585.00	675.00	810.00	900.00
	Sale of Dehydrated pear slice (Av. Sale Price @ Rs.600/kg)	0.00	495.00	585.00	675.00	810.00	900.00
D	PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows	-2.96	254.11	302.13	350.16	422.35	470.47
	Depreciation on civil works @ 5% per annum	0.26	0.25	0.23	0.22	0.21	0.20
	Depreciation on machinery @ 10% per annum	1.54	1.39	1.25	1.12	1.01	0.91
	Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06	0.05
	Interest on term loan @ 12%	1.71	1.65	1.58	1.51	1.43	1.34
	Interest on working capital @ 12%	0.00	4.06	4.80	6.55	6.55	6.55

E	Profit after depreciation and Interest (Rs. in Lakh)	-6.59	250.72	298.98	347.23	419.63	467.97
F	Tax (assumed 30%) (Rs. in Lakh)	0.00	75.22	89.69	104.17	125.89	140.39
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	-6.59	175.51	209.29	243.06	293.74	327.58
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	1.71	1.65	1.58	1.51	1.43	1.34
I	Coverage available (Rs. in Lakh)	1.71	1.65	1.58	1.51	1.43	1.34
J	Total Debt Outgo (Rs. in Lakh)	0.57	0.63	0.69	0.77	0.85	0.93
K	Debt Service Coverage Ratio (DSCR)	3.00	2.62	2.28	1.97	1.69	1.44
	Average DSCR	2.16					
L	Cash accruals (PBDIT- Interest-Tax) (Rs. in Lakh)	-4.67	177.24	210.86	244.48	295.03	328.74
M	Payback Period	2.5 Years					
	(on Rs. 35.69 Lakhs initial investment)						

2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	1,641,958.43	227,771.13	170,763.68	57,007.45	1,584,950.97
2	1,584,950.97	227,771.13	164,834.90	62,936.23	1,522,014.74
3	1,522,014.74	227,771.13	158,289.53	69,481.60	1,452,533.14
4	1,452,533.14	227,771.13	151,063.45	76,707.68	1,375,825.46
5	1,375,825.46	227,771.13	143,085.85	84,685.28	1,291,140.18
6	1,291,140.18	227,771.13	134,278.58	93,492.55	1,197,647.62
7	1,197,647.62	227,771.13	124,555.35	103,215.78	1,094,431.85
8	1,094,431.85	227,771.13	113,820.91	113,950.22	980,481.63

9	980,481.63	227,771.13	101,970.09	125,801.04	854,680.58
10	854,680.58	227,771.13	88,886.78	138,884.35	715,796.23
11	715,796.23	227,771.13	74,442.81	153,328.32	562,467.91
12	562,467.91	227,771.13	58,496.66	169,274.47	393,193.44
13	393,193.44	227,771.13	40,892.12	186,879.01	206,314.43
14	206,314.43	227,771.13	21,456.70	206,314.43	(0.00)
		3,188,795.83	1,546,837.41	1,641,958.43	(1,641,958.43)

2.14 ASSET'S DEPRECIATION

Assets' Depreciation (Down Value Method)	Amounts in Lakhs							
	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
Particulars								
Civil works	5.18	4.92	4.67	4.44	4.22	4.01	3.81	3.62
Depreciation	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18
Depreciated value	4.92	4.67	4.44	4.22	4.01	3.81	3.62	3.44
Plant & Machinery	15.43	13.89	12.50	11.25	10.12	9.11	8.20	7.38
Depreciation	1.54	1.39	1.25	1.12	1.01	0.91	0.82	0.74
Depreciated value	13.89	12.50	11.25	10.12	9.11	8.20	7.38	6.64
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	21.41	19.49	17.75	16.18	14.76	13.47	12.31	11.25
Depreciation	1.92	1.74	1.57	1.42	1.29	1.16	1.06	0.96
Depreciated value	19.49	17.75	16.18	14.76	13.47	12.31	11.25	10.30

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	8th year	
Capital cost (Rs. in Lakh)	35.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Recurring cost (Rs. in Lakh)	2.96	240.89	282.87	324.84	387.65	429.53	429.53	429.53	
Total cost (Rs. in Lakh)	38.65	240.89	282.87	324.84	387.65	429.53	429.53	429.53	2563.48
Benefit (Rs. in Lakh)	0.00	495.00	585.00	675.00	810.00	900.00	900.00	900.00	
Total Depreciated value of all assets (Rs. in Lakh)								10.30	
Total benefits (Rs. in Lakh)	0.00	495.00	585.00	675.00	810.00	900.00	900.00	910.30	5275.30
Benefit-Cost Ratio (BCR): (Highly Profitable project)	2.058								
Net Present Worth (NPW):	2711.81								

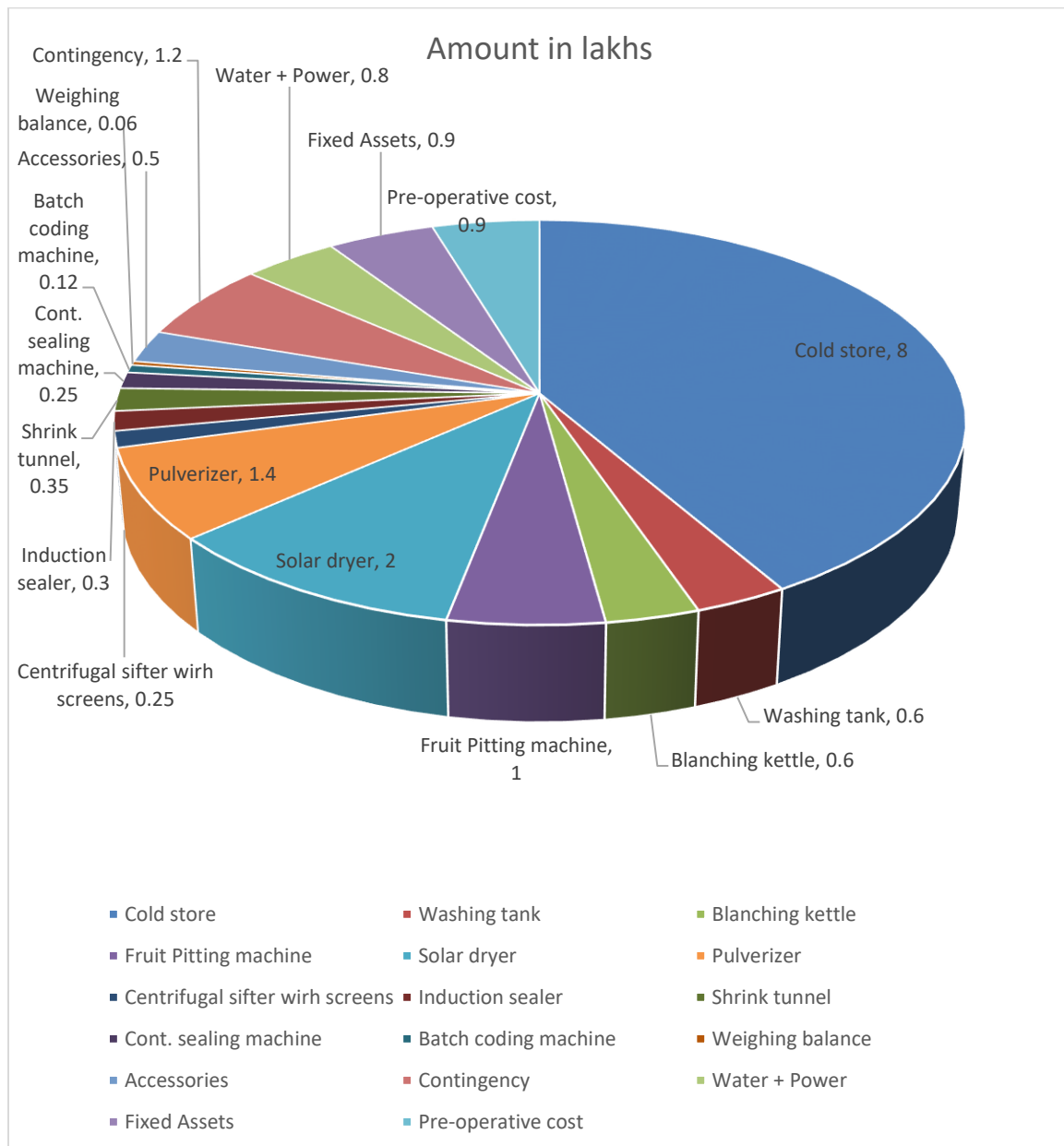
2.16 BREAK EVEN ANALYSIS

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.

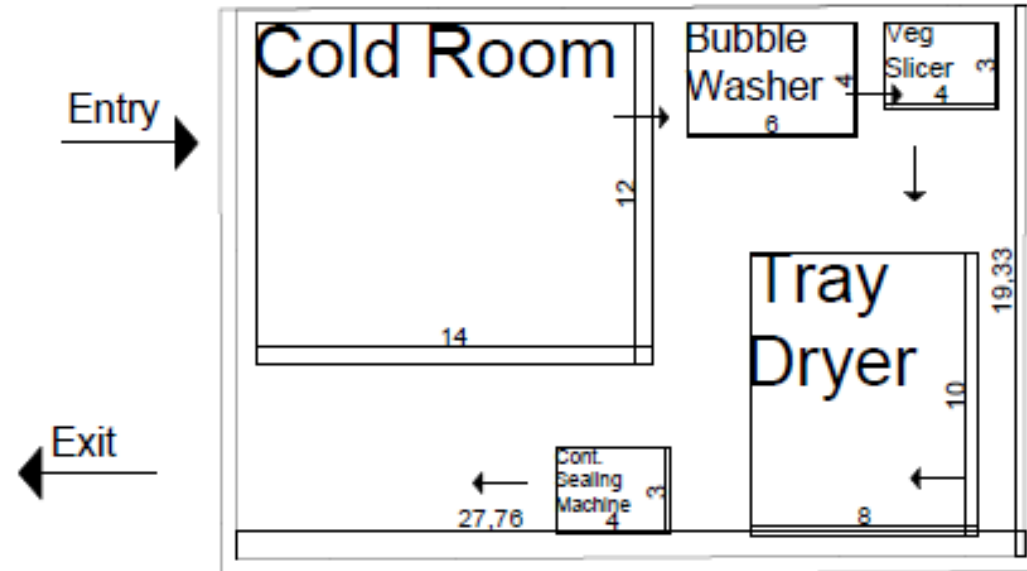
Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%	100%	100%
Production MT/Annum		82.5	97.5	112.5	135	150	150	150
Fixed Cost (Rs. in Lakh)								
Permanent staff salaries	7.284	7.284	7.284	7.284	7.284	7.284	7.284	7.284
Depreciation on building @ 5% per annum	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18
Depreciation on machinery @ 10% per annum	1.54	1.39	1.25	1.12	1.01	0.91	0.82	0.74
Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06	0.05	0.05	0.04
Interest on term loan	1.71	1.65	1.58	1.51	1.43	1.34	1.25	1.14
Insurance	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Fixed Cost (Rs. in Lakh)	11.21	10.96	10.73	10.51	10.30	10.09	9.88	9.67
Sales Revenue (Rs. in Lakh)	0	495	585	675	810	900	900	900
Variable Cost (Rs. in Lakh)								
Pear (Av. Price @ Rs.80/Kg)	0.00	220.00	260.00	300.00	360.00	400.00	400.00	400.00
Packaging materials	0.00	9.90	11.70	13.50	16.20	18.00	18.00	18.00
Casual staff salaries	0.00	5.78	5.78	5.78	5.78	5.78	5.78	5.78
Utilities (Electricity, Fuel)	0.00	0.41	0.48	0.56	0.67	0.74	0.74	0.74
Repair & maintenance	0.00	0.70	0.80	0.90	0.90	0.90	0.90	0.90
Miscellaneous expenses	0.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00

Interest on working capital @ 12%	0.00	4.06	4.80	6.55	6.55	6.55	6.55	6.55
Total Variable Cost (Rs. in Lakh)	0.50	242.85	285.57	329.29	392.10	433.97	433.97	433.97
Break Even Point (BEP)								
as % of sale	-	12.00	10.00	8.00	8.00	7.00	7.00	6.00
Break Even Point (BEP) in terms of sales value (Rs. in Lakhs)	-	59.40	58.50	54.00	64.80	63.00	63.00	54.00

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



2.18 TYPICAL DEHYDRATED PEAR SLICE MANUFACTURING UNIT LAYOUT



2.19 MACHINERY SUPPLIERS

S.no	Name of the company	Machineries
1.	<p>MMM Buxabhoy & Co 140 Sarang Street 1st Floor, Near Crawford Market, Mumbai, India. Tel: +91 22 2344 2902 Fax: +91 22 2345 2532 Email: yusufs@vsnl.com; mmmb@vsnl.com;</p>	Packaging and labelling machines
2.	<p>Acufil Machines S. F. No. 120/2, Kalapatty Post Office, Coimbatore - 641 035, Tamil Nadu, India. Tel: +91 422 2666108/2669909 Fax: +91 422 2666255 Email : acufilmachines@yahoo.co.in</p>	Dryer; Packaging and labelling machines

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4.	Planters Energy network (PEN) No 5, Power House, 3rd Street, N R T Nagar, Theni 625531, Tamil Nadu, India Tel: +91 4546 255272 Fax: +91 4546 25527	Dryer
5.	Premium Engineers Pvt Ltd Plot No 2009, Phase IV, GIDC Vatva, Ahmedabad 382445, India. Tel: +91 7925830836 Fax: +91 7925830965	Dryer; Milling & grinding machinery
6.	Central Institute of Agricultural Engineering, Nabi Bagh Berasia Road, Bhopal 462 038 Madhya Pradesh, India. Tel: +91 755 2737191 Fax: +91 755 2734016	Slicing machinery; Cleaning machinery; Milling & grinding machinery
7.	Gardners Corporation 158 Golf Links, New Delhi 110003, India. Tel: +91 11 3344287/3363640 Fax: +91 11 3717179	Slicing machinery; Cleaning machinery; Milling & grinding machinery; Packaging and labelling machines
8.	Rajan Universal Exports Post Bag no 250, 162 Linghi Chetty Street, Chennai 600 001, India. Tel: +91 44 25341711/25340731/25340751 Fax: +9144 25342323	Cleaning machinery; Milling & grinding machinery

9.	<p>Gurdeep Packaging Machines Harichand Mill compound, LBS Marg, Vikhroli, Mumbai 400 079, India.</p> <p>Tel: +91 22 2578 3521/577 5846/579 5982 Fax: +91 22 2577 2846</p>	Packaging and labelling machines
10.	<p>Rank and Company A-p6/3, Wazirpur Industrial Estate, Delhi – 110 052, India.</p> <p>Tel: +91 11 7456101/ 27456102 Fax: +91 11 7234126/7433905 E-mail: R ank@poboxes.com</p>	Dryers

3. LIMITATIONS OF MODEL DPR & GUIDELINES FOR ENTREPRENEURS

3.1 LIMITATIONS OF THE DPR

- i. This DPR has provided only the basic standard components and methodology to be adopted by an entrepreneur while submitting a proposal under the Formalization of Micro Food Processing Enterprises Scheme of MoFPI.
- ii. This DPR is made to provide general methodological structure not for specific entrepreneur/crops/location. Therefore, information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of business, background of proposed project, location, raw material base/contract sourcing, entrepreneur's own SWOT analysis, market research, rationale of the project for specific location, community advantage/benefit, employment generation etc are not given in detail.
- iii. The present DPR is based on certain assumptions on cost, prices, interest, capacity utilization, output recovery rate and so on. However, these assumptions in reality may vary across places, markets and situations; thus the resultant calculations will also change accordingly.

3.2 GUIDELINES FOR THE ENTREPRENEURS

- i. The success of any prospective food processing project depends on how closer the assumptions made in the initial stage are with the reality of the targeted market/place/situation. Therefore, the entrepreneurs must do its homework as realistic as possible on the assumed parameters.
- ii. This model DPR must be made more comprehensive by the entrepreneur by including information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of entrepreneur's business, project location, raw material costing base/contract sourcing, detailed market research, comprehensive dehydrated product mix based on demand, rationale of the project for specific location, community advantage/benefit from the project, employment generation, production/availability of the raw materials/crops in the targeted area/clusters and many more relevant aspects for acceptance and approval of the competent authority.

- iii. The entrepreneur must be efficient in managing the strategic, financial, operational, material and marketing aspects of a business. In spite of the assumed parameter being closely realistic, a project may become unsustainable if the entrepreneur does not possess the required efficiency in managing different aspects of the business and respond effectively in changing situations.
- iv. The machineries should be purchased after thorough market research and satisfactory demonstration.
- v. The entrepreneur must ensure uninterrupted quality raw materials' supply and maintain optimum inventory levels for smooth operations management.
- vi. The entrepreneur must possess a strategic look to steer the business in upward trajectory.
- vii. The entrepreneur must maintain optimum (not more or less) inventory, current assets. Selecting optimum source of finance, not too high debt-equity ratio, proper capital budgeting and judicious utilization of surplus profit for expansion is must.
- viii. The entrepreneur must explore prospective markets through extensive research, find innovative marketing strategy, and maintain quality, adjust product mix to demand.
- ix. The entrepreneur must provide required documents on land, financial transaction, balance sheet, further project analysis as required by the competent authority for approval.
- x. The entrepreneur must be hopeful and remain positive in attitude while all situations.



Contact Us

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