

PM Formalization of Micro Food Processing Enterprises Scheme

DETAILED PROJECT REPORT FOR GINGER PASTE PROCESSING



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Project At a Glance

1	Name of the Project	Ginger paste
2	Name of the entrepreneur/FPO/SHG/Cooperative	
3	Nature of proposed project	Proprietorship/Company/ Partnership
4	Registered office	
5	Project site/location	
6	Names of Partner (if partnership)	
7	No of share holders (if company/FPC)	
8	Technical advisor	
9	Marketing advisor/partners	
10	Proposed project capacity	150 MT/annum (55, 65, 75,90 & 100% capacity utilization in the 2nd, 3 rd , 4 th , 5 th & 6 th years' onwards respectively
11	Raw materials	Ginger
12	Major product outputs	Ginger paste
13	Total project cost (Lakhs)	29.01
	Land development, building & civil construction	5.18
	Machinery and equipments	15.51
	Utilities (Power & water facilities)	0.8
	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.90
	Contingencies	1.20
	Working capital margin	4.52
14	Working capital Management (In Lakhs)	
	Second Year	13.57
	Third Year	16.04
	Fourth Year	21.87
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	10.00
	Promoter's contribution (min 20%)	6.38
	Term loan (45%)	12.62
16	Debt-equity ratio	1.97 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	44.62
	3rd year	54.54
	4th year	64.46
18	Average DSCR	2.16
	Benefit Cost Ratio	2.04
	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 GINGER PRODUCTION, CLUSTERS, POST-HARVEST MANAGEMENT AND VALUE ADDITION IN INDIA

1.1 INTRODUCTION

Ginger (*Zingiber officinale*), Roscoe belonging to the Family *Zingiberaceae*, is a Perennial herb with thick tuberous rhizomes. Its roots are used as spice in cooking throughout the world. Ginger contains up to 3% of an essential oil that causes the fragrance of the spice. The pungent taste of ginger is due to gingerol, zingerone and shogool. It is one of the earliest known treasured spices esteemed for its pungency and aroma, viewed as a healing gift from God by Indian Ayurvedic systems.

Ginger is well-known as spice and flavoring agent for food. Ginger is used in cooking, in various forms such as immature ginger, mature fresh ginger, dry ginger, ginger oil, ginger oleoresin, dry-soluble ginger, ginger paste and ginger emulsion. It is rich in secondary metabolites, namely the oleoresin, contributing widely pungency and flavors. Ginger, which belongs to family *Zingiberaceae*, is an important tropical horticultural plant and an important spice crop used in various medicinal and culinary preparations. Besides, ginger is very popular in the food industry as an additive to ginger ale, candies, pastries and cakes.

1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF GINGER

Ginger originated from Maritime Southeast Asia. It is a true cultigen and does not exist in its wild state. The most ancient evidence of its domestication is among the Austronesian peoples where it was among several species of ginger cultivated and exploited since ancient times. They cultivated other gingers including turmeric (*Curcuma longa*), white turmeric (*Curcuma zedoaria*), and bitter ginger (*Zingiber zerumbet*). The

rhizomes and the leaves were used to flavor food or eaten directly. The leaves were also used to weave mats. Aside from these uses, ginger had religious significance among Austronesians, being used in rituals for healing and for asking protection from spirits. It was also used in the blessing of Austronesian ships.

Ginger was carried with them in their voyages as canoe plants during the Austronesian expansion, starting from around 5,000 BP. They introduced it to the Pacific Islands in prehistory, long before any contact with other civilizations. Reflexes of the Proto-Malayo-Polynesian word *laqia are still found in Austronesian languages all the way to Hawaii. They also presumably introduced it to India along with other Southeast Asian food plants and Austronesian sailing technologies, during early contact by Austronesian sailors with the Dravidian-speaking peoples of Sri Lanka and South India at around 3,500 BP. It was also carried by Austronesian voyagers into Madagascar and the Comoros in the 1st millennium CE.

From India, it was carried by traders into the Middle East and the Mediterranean by around the 1st century CE. It was primarily grown in southern India and the Greater Sunda Islands during the spice trade, along with peppers, cloves, and numerous other spices.

India is the largest producer and consumer of ginger contributing about 31% of total global production followed by China, Nepal, Indonesia, Nigeria, and Thailand. In the countries such as Canada, U.K, U.S.A. ginger is used in soft drink manufacturing industry, baking industry and meat processing industry up to a great extent but it rarely used for cooking. Ginger brine is most popular in Japan. Orissa, Kerala, Karnataka, Arunachal Pradesh, West Bengal, Sikkim and Madhya Pradesh are the major ginger producing states in India. Among which Kerala contribute 33 per cent to the total production by which it has prove to be the largest ginger producing state in India. Cochin ginger and Calicut ginger are the popular Indian ginger varieties in the world market. India produces 6,83,000 tons of ginger per annum that is almost 1/3rd of world's total production (FAO). 30 per cent of total production of ginger in India is transferred to dry ginger, 50 per

cent is taken as fresh or green ginger and the rest part is used as seed materials. Kerala is the largest producer of dry ginger in India, which has taken a major share in export.

1.3 VARIETIES

Some common varieties of ginger found in India are mentioned below:

- **Common Ginger:** Common ginger is a world-famous spice or herb, known for its aromatic and pungent rhizomes. It has significant medicinal and culinary uses.

Botanical Name: *Zingiber Officinale*

Other Names: True ginger, Jengibre, Jenjibre dulce, Ginger, Adrak, and Kion

- **Beehive Ginger:** Beehive Ginger is famous as an ornamental plant due to its unique skep-beehive like yellow inflorescences that become red once mature. All parts have a strong gingery fragrance, leaves and rhizomes are ingredients in making local dishes and appetizers.

Botanical Name: *Zingiber spectabile*

Other Names: Ginger Wort, Malaysian Ginger

- **Bitter Ginger:** Also known as shampoo ginger, it tastes bitter as compared to the common ginger and added in food flavoring and appetizers. It's used primarily in herbal medicines and making shampoos.

Botanical Name: *Zingiber zerumbet*

Other Names: Pinecone Ginger, Itter Ginger, Broad-leaved Ginger, Martinique Ginger, Pinecone Lily, Lempoyang, and Wild ginger

- **Myoga Ginger:** In Japan, Myoga Ginger's flowers and young shoots are used as a tasty garnish on various food. It has a zesty and spicy flavor with a strong, pungent aroma. Myoga also finds many uses in Korean cuisines.

Botanical Name: *Zingiber mioga*

Other Name: Japanese Ginger

Some other modified varieties of ginger that are cultivated in India are suprabha, suruchi, suravi, subhada, himagiri, athira, karthika, aswathy.

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Nutritional value:

1 tablespoon of fresh ginger has:

- 4.8 calories
- 1.07 grams (g) of carbohydrate
- 0.12 g of dietary fiber
- 0.11 g of protein
- 0.05 g fat
- 0.1 g of sugar

Vitamins and minerals present in fresh ginger in trace amounts:

- Vitamin B3 and B6
- Iron

- Potassium
- Vitamin C
- Magnesium
- Phosphorus
- Zinc
- Folate
- Riboflavin
- Niacin

CONSTITUENTS AND HEALTH BENEFITS OF GINGERS

Health benefits:

- It has a warming effect and stimulates circulation.
- It inhibits rhinovirus, which can cause the common cold.
- It inhibits such bacteria as Salmonella, which cause diarrhea, and protozoa, such as Trichomonas.
- In the intestinal tract, it reduces gas and painful spasms.
- It may prevent stomach ulcers caused by nonsteroidal anti-inflammatory drugs, such as aspirin and ibuprofen.
- It reduces pain and inflammation, making it valuable in managing arthritis, headaches, and menstrual cramps.

1. Contains Gingerol, which has powerful medicinal properties:

Ginger has a very long history of use in various forms of traditional and alternative medicine. It's been used to aid digestion, reduce nausea, and help fight the flu and common cold, to name a few of its purposes.

The unique fragrance and flavor of ginger come from its natural oils, the most important of which is gingerol. Gingerol is the main bioactive compound in ginger. It's responsible for much of ginger's medicinal properties.

Gingerol has powerful anti-inflammatory and antioxidant effects, according to research. For instance, it may help reduce oxidative stress, which is the result of having an excess amount of free radicals in the body.

2. Treat Nausea

Ginger appears to be highly effective against nausea.

It may help relieve nausea and vomiting for people undergoing certain types of surgery. Ginger may also help chemotherapy-related nausea, but larger human studies are needed.

However, it may be the most effective when it comes to pregnancy-related nausea, such as morning sickness.

3. Help in Weight loss

Ginger may play a role in weight loss.

Research indicated that ginger could also help reduce body mass index (BMI) and blood insulin levels. High blood insulin levels are associated with obesity.

Ginger's ability to influence weight loss may be related to certain mechanisms, such as its potential to help increase the number of calories burned or reduce inflammation.

4. Help with Osteoarthritis

Osteoarthritis (OA) is a common health problem.

It involves degeneration of the joints in the body, leading to symptoms such as joint pain and stiffness.

Only mild side effects, such as a dissatisfaction with the taste of ginger, were observed.

Another study found that a combination of topical ginger, mastic, cinnamon, and sesame oil can help reduce pain and stiffness in people with OA of the knee.

5. Lower blood sugars and improve heart disease risk factors

Ginger may have powerful anti-diabetic properties.

It also dramatically improved hemoglobin A1c (HbA1c), a marker for long-term blood sugar levels. HbA1c was reduced by 10% over a period of 12 weeks.

There was also a 28% reduction in the Apolipoprotein B/ApolipoproteinA-I ratio and a 23% reduction in malondialdehyde (MDA), which is a byproduct of oxidative stress. A high ApoB/ApoA-I ratio and high MDA levels are both major risk factors for heart disease.

2019 literature review also concluded that ginger significantly reduced HbA1c in people with type 2 diabetes.

Ginger has been shown to lower blood sugar levels and improve various heart disease risk factors in people with type 2 diabetes.

6. Treat Chronic indigestion

Chronic indigestion is characterized by recurrent pain and discomfort in the upper part of the stomach.

It's believed that delayed emptying of the stomach is a major driver of indigestion. Interestingly, ginger has been shown to speed up emptying of the stomach.

7. Reduced Menstrual Pain

Dysmenorrhea refers to pain felt during the menstrual cycle.

One of the traditional uses of ginger is for pain relief, including menstrual pain.

More recent studies have also concluded that ginger is more effective than a placebo and equally as effective as drugs such as mefenamic acid and acetaminophen/caffeine/ibuprofen (Novafen).

8. Lower cholesterol level

High levels of LDL (bad) cholesterol are linked to an increased risk of heart disease.

Research findings supported that ginger extract lowered LDL (bad) cholesterol to a similar extent as the cholesterol-lowering drug atorvastatin.

9. Prevent cancer

Ginger has been treated as an alternative remedy for several forms of cancer.

The anti-cancer properties are attributed to gingerol, which is found in large amounts in raw ginger. A form known as [6]-gingerol is viewed as especially powerful anti-carcinogenic compound.

Research showed that ginger extract per day significantly reduced pro-inflammatory signaling molecules in the colon.

Ginger may be effective against other gastrointestinal cancers such as pancreatic cancer and liver cancer.

It may be effective against breast cancer and ovarian cancer as well.

10. Improve brain functions and protect against Alzheimer’s disease

Oxidative stress and chronic inflammation can accelerate the aging process. They’re believed to be among the key drivers of Alzheimer’s disease and age-related cognitive decline.

Studies suggest that the antioxidants and bioactive compounds in ginger can inhibit inflammatory responses that occur in the brain.

There’s also some evidence that ginger can help enhance brain function directly.

In addition, numerous studies show that ginger can help protect against age-related decline in brain function.

11. Help Fight Infections

Gingerol can help lower the risk of infections.

In fact, ginger extract can inhibit the growth of many different types of bacteria.

According to research, it’s very effective against the oral bacteria linked to gingivitis and periodontitis. These are both inflammatory gum diseases.

Fresh ginger may also be effective against the respiratory syncytial virus (RSV), a common cause of respiratory infections.

1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-

Ginger, *Zingiber officinale*, is an erect, herbaceous perennial plant in the family Zingiberaceae grown for its edible rhizome (underground stem) which is widely used as a spice. The rhizome is brown, with a corky outer layer and pale-yellow scented center. The above ground shoot is erect and reed-like with linear leaves that are arranged alternately on the stem. The shoots originate from a multiple bases and wrap around one another. The leaves can reach 7 cm (2.75 in) in length and 1.9 cm (0.7 in) broad. Flowering heads are borne on shorter stems and the plant produces cone shaped, pale yellow flowers. The ginger plant can reach 0.6–1.2 m in height (2–4 ft) and is grown as an annual plant. Ginger may also be referred to as true ginger, stem ginger, garden ginger or root ginger and it is believed to have originated in the Southeast Asia. Ginger (*Solanum tuberosum*) is the most important food crop of the world. Ginger is a temperate crop grown under subtropical conditions in India. The ginger is a crop which has always been the ‘poor man’s friend’. Ginger is being cultivated in the country for the last more than 300 years. For vegetable purposes it has become one of the most popular crops in this country. Potatoes are an economical food; they provide a source of low cost energy to the human diet. Potatoes are a rich source of starch, vitamins especially C and B1 and minerals. They contain 20.6 per cent carbohydrates, 2.1 per cent protein, 0.3 per cent fat, 1.1 per cent crude fibre and 0.9 per cent ash. They also contain a good amount of essential amino acids like leucine, tryptophane and isoleucine etc. The spice has a slightly biting taste and is used, usually dried and ground, to flavour breads, sauces, curry dishes, confections, pickles, and ginger ale. The fresh rhizome, green ginger, is used in cooking. The peeled rhizomes may be preserved by boiling in syrup. In Japan and elsewhere, slices of ginger are eaten between dishes or courses to clear the palate. Ginger is used medically to treat flatulence and colic.

The leafy stems of ginger grow about a metre high. The leaves are 6 to 12 inches (15 to 30 cm) long, elongate, alternate in two vertical rows, and arise from sheaths enwrapping the stem. The flowers are in dense conelike spikes about 1 inch thick and

2 to 3 inches long that are composed of overlapping green bracts, which may be edged with yellow. Each bract encloses a single, small, yellow-green and purple flower.

Though it is grown in many areas across the globe, ginger is "among the earliest recorded spices to be cultivated and exported from southwest India". India holds the seventh position in ginger export worldwide, however is the "largest producer of ginger in the world". Regions in southwest and Northeast India are most suitable for ginger production due to their warm and humid climate, average rainfall and land space.

Ginger has the ability to grow in a wide variety of land types and areas, however is best produced when grown in a warm, humid environment, at an elevation between 300 and 900m, and in well-drained soils at least 30 cm deep. A period of low rainfall prior to growing and well-distributed rainfall during growing are also essential for the ginger to thrive well in the soil.

Ginger produced in India is most often farmed through homestead farming. Since most ginger crops are produced on homestead farms, the farm employees are mostly family members or other local members of the community. Gendered roles within ginger farming are distributed quite evenly and fairly. From land preparation to seed storage, all works of ginger cultivation in India are generally done by both female and male farmers. Male farmers are widely known as the ones who purchase seeds, do the ploughing, and mulching, while female farmers usually do weeding and both genders share the work of hoeing, digging, planting, manure application, and harvesting. This being said, since these farms are family run the distribution of work is more dependent on the family situation rather than gender. For example, if there are more men in the family then there would be more men working on the farm, but if there are an equal number of men and women, or less men than woman then there would be more women seen working on the farm. Who does the selling of the ginger varies throughout different cities and states in India. In Meghalaya, Mizoram, and Nagaland (all in the Northeast of India) woman are important benefactors in the sale of ginger, but in Sikkim which is also in the Northeast region, men play a larger role than women do in the sale of ginger.

Cultivation and Bearing:-

Ginger grows well in warm and humid climate and is cultivated from sea level to an altitude of 1500 m above sea level. Ginger can be grown both under rain fed and irrigated conditions. For successful cultivation of the crop, a moderate rain fall at sowing time till the rhizomes sprout, fairly heavy and well distributed showers during the growing period and dry weather for about a month before harvesting are necessary. Ginger thrives best in well drained soils like sandy loam, clay loam, red loam or lateritic loam. A friable loam rich in humus is ideal. However, being an exhausting crop it is not desirable to grow ginger in the same soil year after year.

The best time for planting ginger in the West Coast of India is during the first fortnight of May with the receipt of pre- monsoon showers. Under irrigated conditions, it can be planted well in advance during the middle of February or early March. Early planting with the receipt of summer showers results in higher yield and reduces disease incidence.

The land is to be ploughed 4 to 5 times or dug thoroughly with receipt of early summer showers to bring the soil to fine tilth. Beds of about 1 m width, 30 cm height and of convenient length are prepared with an inter - space of 50 cm in between beds. In the case of irrigated crop, ridges are formed 40 cm apart. In areas prone to rhizome rot disease and nematode infestations, solarization of beds for 40 days using transparent polythene sheets is recommended.

Ginger is cultivated as rain fed crop in high rainfall areas (uniform distribution for 5 to 7 months) and irrigated crop in less rainfall areas where distribution is not uniform. Ginger requires 1300-1500 mm of water during its crop cycle. The critical stages for irrigation are during germination, rhizome initiation (90 DAP) and rhizome development stages (135 DAP). The first irrigation should be done immediately after planting and subsequent irrigations are given at intervals of 7 to 10 days in conventional

irrigation (based on prevailing weather and soil type). Sprinklers and drip system can also be employed for better water use efficiency and enhanced yield.

Ginger attains full maturity in 210-240 days after planting. Harvesting of ginger for vegetable purpose starts after 180 days based on the demand. However, for making dry ginger, the matured rhizomes are harvested at full maturity i.e. when the leaves turn yellow and start drying. Irrigation is stopped one month before harvest and the rhizome clumps are lifted carefully with a spade or digging fork. In large scale cultivations, tractor or power tiller drawn harvesters are also used. The dry leaves, roots and soil adhering on the rhizomes are manually separated. Late harvest is also practiced, as the crop does not deteriorate by leaving it for some months underground. In India, domestic market prefers fresh green ginger for culinary use while two types of dried ginger i.e. bleached and unbleached are produced for export purpose. The most important criteria in assessing the suitability of ginger rhizomes for particular processing purposes is the fibre content, volatile-oil content and the pungency level. The relative abundance of these three components in the fresh rhizome is governed by its state of maturity at harvest.

Post-harvest management:-

Postharvest Diseases:

Postharvest disease in ginger is normally due to rough harvesting and handling practices which result in injury to the skin and flesh of the rhizome (Table 3). Holding ginger at a less than optimal temperature and relative humidity (RH) will accelerate postharvest decay. Postharvest losses from diseases are caused by various microorganisms. Decay can be kept to a minimum by following careful harvesting and handling practices, sanitation of the wash water, curing of the rhizomes after washing to promote wound healing, application of a postharvest fungicide, and holding the rhizomes at 12.5°C (55°F) and 70 to 75% RH.

Post-harvest Disorders

Sprouting: Ginger rhizomes will sprout at temperatures above 15.6°C (60°F). Sprouting may begin after several weeks storage at ambient temperature. The rate of sprouting grows as the temperature increases. There is no effective chemical sprout inhibitor for ginger.

Chilling Injury: Physiological disorder that results in pitting and sunken lesions on the rhizome surface, shriveling, softening, flesh darkening, and postharvest decay. Ginger rhizomes are very sensitive to chilling injury or low temperature breakdown if stored below 12°C (54°F).

Shriveling/desiccation: This is a common postharvest disorder of ginger held under low relative humidity (RH) conditions (i.e. less than 65% RH). Shriveling of the rhizome becomes noticeable after the loss of more than 10% of the initial harvest weight. On the other hand, surface mould will begin to grow at a RH above 90% and sprouting will be stimulated, especially if the temperature is above 16°C. In order to minimize weight loss and avoid surface mould, an optimum relative humidity range of 70 to 75 percent is recommended for storing ginger.

Harvest methods:

Ginger is almost entirely harvested by hand, although mechanical digging devices are available for use on large-scale planting. The initial step in harvesting is to remove a significant portion of the senescent foliage to make the rhizomes more accessible. Ginger is dug by hand using a fork to loosen the soil around the crown of the plant. The process is done carefully in order to avoid damaging the rhizomes. The rhizomes are gently pulled out of the soil using the remaining length of stem as a handle. Ginger harvested early will still have an actively growing green stem attached to the rhizome which needs to be snapped or cut off slightly above the point of attachment to the rhizome. Ginger is then pre-graded in the field for any unmarketable, damaged or diseased rhizome. Harvesting during very wet or very dry

conditions is not desirable as this will increase the amount of skinning and make removal of the rhizomes from the soil much more difficult.

Pre-cooling conditions:

Forced-air or room cooling to 12 to 14 °C (54 to 57 °F) should be used.

Preparation for market:

Relatively clean bulbs sold in the domestic market may not require any further cleaning. However, ginger intended for export must be thoroughly cleaned before packing. The ginger intended for long term storage should be washed immediately after harvest and then cured. Ginger should be scrubbed by hand or with a soft-bristled brush in clean water sanitized with 150 ppm hypochlorous acid. Care is required during cleaning to prevent bulb breakage, which increases decay and shrinkage. A fungicide treatment benomyl (500 ppm) or thiabendazole (1000 ppm) can also be applied in the wash tank or as a separate overhead spray application after cleaning. Remove all damaged and injured bulbs. The remaining marketable bulbs should be sorted according to size and overall appearance. The ginger surface should be clean, bright yellow-brown and appear fresh. It should not be wilted or have any evidence of sprouting. Export quality ginger should be smooth and firm, with uniform shape and size, be free from insect damage and decay, and have a uniform peel colour typical of the variety. The internal flesh should be firm and uniformly cream or pale-yellow coloured, without any indication of darkening.

Curing:

Ginger intended for storage should be cured by drying the rhizomes in air at ambient temperature (22°C to 26°C or 71°F to 79°F) and 70% to 75% RH for several days to allow the skin to thicken and the cut surfaces to suberize. Curing will help reducing postharvest weight loss and decay. After curing, the ginger should be kept in wellventilated containers for long-term storage.

Packaging:

Ginger of roughly similar size should be packed in each market container. The container should be strong, well ventilated, and capable of being stacked without damaging the bulbs. For the domestic market, wooden crates provide better protection to the ginger than mesh or synthetic sacks. For the export market ginger bulbs should be placed in a clean, strong, well-ventilated fibre board carton. The surface of the bulbs should be thoroughly dry prior to packing.

Optimum storage conditions:

Mature ginger rhizomes can be stored at 12 to 14 °C (54 to 57 °F) with 85 to 90% RH for 60 to 90 days. Storage at 13 °C (55 °F) with 65% RH leads to extensive dehydration and a wilted appearance (Paull and Chen 2015). Holding ginger at ambient temperatures will result in high moisture loss, surface shriveling and sprouting of the rhizome.

1.6 PROCESSING & VALUE ADDITION:-

Ginger is used in three forms namely, fresh or green ginger, whole dry ginger and split dry ginger. Fresh ginger are sometimes unsuitable for converting to the dry spice, due to its initial high moisture content causing difficulty in drying and thus a heavy wrinkled product is obtained with low volatile oil content. Fresh ginger suffers from weight loss, shrinkage, sprouting and rotting during storage after 3 to 4 weeks of harvesting. This spoilage can be overcome by processing fresh produce to some value added products.

Ginger is consumed worldwide as flavouring agent which is used extensively in food, beverage and confectionary industries in the products such as marmalade, pickles, chutney, ginger beer, ginger wine, liquors, and other bakery products. In South India, ginger is used in the production of a candy called Injimirappa meaning ginger candy in Tamil optimized the protocol for production of instant ginger candy with a slice thickness of 5.0-25.0 mm and blanching time of 10-30 minutes. Further, standardized the recipe for the

preparation of ginger preserve from 70 percent sugar concentration and ginger candy from 75 percent sugar concentration. Similarly, also optimized osmo-convective process conditions for preparation of honey ginger candy. Bhuyan and Prasad (1990) evaluated the effect of varied drying temperature (70-90°C) on the quality of dried ginger and optimized ginger drying at 60 to 70°C air temperature. Further, studied the drying characteristics of ginger (peeled whole, sliced, treated and control) by employing open air sun drying, solar cabinet drying and mechanical tray drying (65°C) methods and drying time with optimization of mechanical tray drying of peeled untreated sliced ginger. According to Eze and Agbo (2011), solar dried unpeeled ginger contains 7.0% moisture which was within the standard (6-9%) acceptable limits as compare to open air dried ginger attaining 17.0% moisture content.

The various value added products prepared from ginger are ginger oil, oleoresin, ginger candy, ginger preserve, ginger puree, ginger powder, ginger beer and ginger paste.

Some value added products from ginger are:

Ginger Oil: The main application of the ginger oil is in confectionery, beverages, and baked products. The demand of ginger oil is ever increasing whether as beverages in its own right or as a complement to alcoholic drinks such as whisky or rum is estimated to have good increase.

Instant Ginger Powder Drink: The instant ginger powder in the present is comprised of a powdery concentrate composition containing non-polymer catechins, and is taken as a reconstituted beverage by dissolving it in a liquid such as deionized water or hot water. The demand of ginger based beverage will ever increasing due to its health benefits. It has good export, global and domestic demand.

Ginger Processing (Peeling, Drying, Grinding, Bleaching of Fresh Ginger): The ginger of commerce is prepared from the underground stem or rhizome of *Zingiberofficinale* Rescue. It is also used for medicinal purposes. Major ginger-producing areas of the world are

India, Malaya, China, West Africa, and the West Indies. Two types of edible ginger are grown, the large type known locally as Chinese ginger and the small type known as Japanese Ginger

Dry Ginger to Green Ginger: Ginger is consumed all over the world, particularly in tropical and warm countries. Ginger tea is regarded as a carminative to exes an ailing stomach and is used for this purpose throughout the world. Ginger is used for producing ginger oil and oleoresin

Glazing & Preservation of Ginger: Preserved ginger in its crystalline form is used as a sweetmeat when preserved in syrup. It is mainly used as a dessert in its own right although it is also some time incorporated in such products as cakes, fruits salads, yoghurt for ice cream...

Ginger Powder: Powder ginger has very good domestic as well as export market. It can be used as pharmaceuticals for the production of herbal medicines in the treatment of cold fever. It can be used as additive for the food supplement. candy, ginger preserve, ginger puree, ginger powder, ginger beer and ginger paste.

2. MODEL GINGER PASTE PROCESSING UNDER FME SCHEME

2.1 LOCATION OF THE PROPOSED PROJECT AND LAND

The entrepreneur must provide description of the proposed location, site of the project, distance from the targeted local and distant markets; and the reasons/advantages thereof i.e. in terms of raw materials availability, market accessibility, logistics support, basic infrastructure availability etc. The ideal locations for establishment of exclusive ginger paste processing unit are in the production clusters of ginger growing states/Areas such as The major ginger producing states are Assam, Maharashtra, West Bengal, Gujarat, Kerala, Meghalaya, Mizoram, Karnataka, Nagaland, Uttarakhand and where adequate quantities of surplus raw materials can be available for processing.

2.2 INSTALLED CAPACITY OF THE GINGER PASTE PROCESSING UNIT

The maximum installed capacity of the Ginger paste manufacturing unit in the present model project is proposed as 150 tonnes/annum or 500 kg/day Ginger paste. 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, 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 Ginger paste manufacturing project, the unit requires 309.07 kg/day,

365.27 kg/day, 421.46 kg/day, 505.76 Kg/day & 562 kg/day Ginger vegetable at 55, 65, 75, 90 & 100 percent capacity utilization, respectively. The Ginger must be harvested from plant; and then stored below 6°C temperature.

2.4 MANUFACTURING PROCESS OF THE GINGER PASTE

PREPARATION OF GINGER PASTE:

1. For preparation of Ginger paste, Gingers are weighed, and washed.
2. Gingers are deskinning in Ginger skin peeling machine.
3. Blanching of deskinning gingers is done. Most vegetables and some fruits are blanched before processing to inhibit enzyme activity and to help preserve the color. The material is cut into appropriate sized pieces and blanched in blanching unit for 15 minutes.
4. After blanching, crushing of ginger take place in Crusher/Miller.
5. After crushing, grinded in vegetable grinding machine.
6. Then heating in thermic fluid kettle with scraper, add salt, oil and acetic acid or preservatives to ginger mixture and mix well.
7. Mixture is processed in colloid mill to make homogeneous paste.
8. Filling of ginger paste in polyethylene pouches, glass bottles, plastic bottles, etc.

The typical Procedure for manufacturing of Ginger paste is as below:

Flow chart for Ginger paste:

Harvesting



Receiving



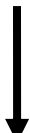
Washing



Skin peeling



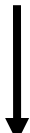
Blanching



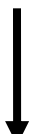
Crushing/milling



Grinding



Heating



Colloid milling



Packaging



Storage

2.5 MARKET DEMAND AND SUPPLY FOR GINGER PASTE

Ginger and garlic are important commercial crops with versatile applications. As a condiment, ginger is used for flavoring many food products like tomato sauce or ketchup, salad dressings, meat sausages, gravies, pickles, curry dishes and so on. It is also used in many medicines as it helps digestion and absorption of food and has antiseptic properties. Ginger - based products have very wide ranging applications in many industries like food processing, pharmaceutical, soft drinks, meat canning, confectionery, Soup making and so on. It is, therefore, necessary to assess market for the contemplated products before finalizing the production capacity. There are good export prospects as well. The cooking-paste market is estimated at Rs 55-70 crore and is growing at 30 per cent. The reason behind it, the cooking paste segment is now catering to working professionals who are pressed for time and not just housewives. The ginger paste can basically; you can produce the ginger paste as the small-scale basis. Generally, the packing comes as 50 gms

and 100 gms packets. The market is widespread, especially in rural areas. It is ready to use item. Generally, all households consume this item widely. In urban areas, the demand for ginger paste is very good and can be supplied on a commercial scale in bulk. Ginger Paste is mainly used as a condiment in various food preparations and also serve as a carminative and gastric stimulant in many medicine preparations. As a condiment, it is used for flavoring mayonnaise and Tomato Ketch-up sauce, Salads, meat sausages, chutney, pickles, Biryani, Fried Rice etc. In all the regions of the state, garlic and ginger are grown abundantly and consumed as such. It is consumed daily, in every house. In present days customers are more attracted towards instant foods, instant mixes, spices etc. The ginger and garlic paste has good market potential.

2.6 MARKETING STRATEGY FOR GINGER PASTE

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

2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Ginger paste 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 Vegetable processing unit by adding new paste manufacturing line. Therefore, land and civil infrastructures are assumed as already available with the entrepreneurs.

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

1. Ginger cost considered @ Rs.25/-per kg.
2. 1 kg Ginger will produce 95% 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 Ginger Paste Unit	150	MT/annum
Utilization of capacity	1st Year Implementation, 55% in second, 65% in third, 75% in fourth year, 90% in fifth years, & 100% in sixth years onwards respectively.	
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	25	
Average sale prices per Kg	140	Rs/kg
Pulp extraction	0.92	
GINGER PASTE	1.12 Kg Ginger for 1 kg Ginger paste	

2.8 FIXED CAPITAL INVESTMENT

2.8.1 MACHINERY AND EQUIPMENT

Sr No.	Equipment	Quantity	Capacity	Price (Rs. In Lacs)
1	Cold store	1	9000 kg	8
2	Washing tank	1	200 liter	0.6
3	Skin peeling machine	1	200 kg/hr	1.2
4	Blanching kettle Gas operated	1	300 Liter	0.8
5	Crusher/miller	1	100 kg/hr	0.4
6	Vegetable Griding machine	1	100 kg/hr	0.3
7	Thermic fluid kettle with scraper	1	150 liter	1.6
8	Colloid mill	1	continuous	1.3
9	Finished product storage tank	1	150 liter	0.4
10	Cont. sealing machine	1	Suitable	0.35
11	Weighing balance	1	Suitable	0.06
12	Accessories	1	Suitable	0.5
			Total	15.51

2.8.2 OTHER COSTS:-

Utilities and Fittings:-

Utilities and Fittings	
1.Water	Rs. 0.8 Lacs total
2.Power	

Other Fixed Assests:

Other Fixed Assets	
1. Furniture & Fixtures	Rs. 0.9 LacS 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 29.01 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	Year 2 (55%)	Year 3 (65%)	Year 4 (75%)
Raw material stock	7 days	1.23	1.46	1.99
Work in progress	15 days	2.47	2.92	3.98
Packing material	15 days	0.90	1.06	1.45
Finished goods' stock	15 days	4.12	4.86	6.63
Receivables	30 days	8.23	9.73	13.27
Working expenses	30 days	1.14	1.35	1.84
Total current assets		18.09	21.38	29.16

Trade creditors		0.00	0.00	0.00
Working capital gap		18.09	21.38	29.16
Margin money (25%)		4.52	5.35	7.29
Bank finance		13.57	16.04	21.87

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	15.51
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	4.52
Total project cost (i to vii)	29.01
Means Of finance	
i. Subsidy	10.00
ii. Promoters Contribution	6.38
iii. Term Loan (@10%)	12.62

2.11 MANPOWER REQUIREMENTS

Total Monthly Salary (Rs.)	No	Wages	Total Monthly	Total Annualy
Supervisor (can be the owner)	1	18000	18000	216000
Technician	1	14000	14000	168000
Semi skilled	2	7600	15200	182400
Helper	1	5500	5500	66000
Sales man	1	8000	8000	96000
			60700	728400

2.12 EXPENDITURE, REVENUE AND PROFITABILITY ANALYSIS

	Particulars	1st Year	2nd Year	3rd Year	4 th Year	5th year	6th year
A	Total Installed Capacity (MT)	168 MT Ginger/Annum	82.5	97.5	112.5	135	150
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%
B	Expenditure (Rs. in Lakh)	0					
	Ginger (Av. Price @ Rs.25/Kg)	0.00	23.18	27.40	31.61	37.93	42.15
	Oil @ Rs. 130/kg	0.00	3.22	3.80	4.39	5.27	5.85
	Other materials	0.00	0.72	0.85	0.98	1.18	1.31
	Packaging materials (Rs 12 per Kg)	0.00	9.90	11.70	13.50	16.20	18.00
	Utilities (Electricity, Fuel)	0.00	1.15	1.36	1.57	1.88	2.09
	Salaries (1st yr only manager's salary)	2.16	7.28	7.28	7.28	7.28	7.28
	Repair & maintenance	0.00	0.70	0.80	0.90	0.90	0.90
	Insurance	0.30	0.30	0.30	0.30	0.30	0.30
	Miscellaneous expenses	0.50	2.30	2.30	2.30	2.30	2.30
	Total Expenditure	2.96	48.75	55.79	62.83	73.24	80.18
C	Total Sales Revenue (Rs. in Lakh)	0.00	115.50	136.50	157.50	157.50	157.50
	Sale of Onion Paste (Av. Sale Price @ Rs.140/kg)	0.00	115.50	136.50	157.50	157.50	157.50
D	PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows	-2.96	66.75	80.71	94.67	84.26	77.32
	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	1.55	1.40	1.26	1.13	1.02	0.92
	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%	1.31	1.27	1.22	1.16	1.10	1.03
	Interest on working capital @ 12%	0.00	1.63	1.92	2.62	2.62	2.62
E	Profit after depreciation and Interest (Rs. in Lakh)	-6.20	63.74	77.91	92.08	81.87	75.12
F	Tax (assumed 30%) (Rs. in Lakh)	0.00	19.12	23.37	27.62	24.56	22.54
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	-6.20	44.62	54.54	64.46	57.31	52.58
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	1.31	1.27	1.22	1.16	1.10	1.03
I	Coverage available (Rs. in Lakh)	1.31	1.27	1.22	1.16	1.10	1.03
J	Total Debt Outgo (Rs. in Lakh)	0.44	0.48	0.53	0.59	0.65	0.72
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)	-4.27	46.36	56.12	65.88	58.60	53.75
M	Payback Period	2.5 Years					
	(on Rs. 29.01 Lakhs initial investment)						

2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	1,262,086.16	175,075.56	131,256.96	43,818.60	1,218,267.56
2	1,218,267.56	175,075.56	126,699.83	48,375.73	1,169,891.82
3	1,169,891.82	175,075.56	121,668.75	53,406.81	1,116,485.01
4	1,116,485.01	175,075.56	116,114.44	58,961.12	1,057,523.89
5	1,057,523.89	175,075.56	109,982.48	65,093.08	992,430.82
6	992,430.82	175,075.56	103,212.80	71,862.76	920,568.06

7	920,568.06	175,075.56	95,739.08	79,336.48	841,231.58
8	841,231.58	175,075.56	87,488.08	87,587.48	753,644.10
9	753,644.10	175,075.56	78,378.99	96,696.57	656,947.53
10	656,947.53	175,075.56	68,322.54	106,753.02	550,194.51
11	550,194.51	175,075.56	57,220.23	117,855.33	432,339.18
12	432,339.18	175,075.56	44,963.28	130,112.29	302,226.90
13	302,226.90	175,075.56	31,431.60	143,643.96	158,582.93
14	158,582.93	175,075.56	16,492.63	158,582.93	(0.00)
		2,451,057.84	1,188,971.69	1,262,086.16	(1,262,086.16)

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	5.18	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	15.51	13.96	12.56	11.31	10.18	9.16	8.24	7.42
Depreciation	1.55	1.40	1.26	1.13	1.02	0.92	0.82	0.74
Depreciated value	13.96	12.56	11.31	10.18	9.16	8.24	7.42	6.68

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	21.49	19.56	17.82	16.24	14.81	13.52	12.35	11.29
Depreciation	1.93	1.74	1.58	1.43	1.29	1.17	1.06	0.96
Depreciated value	19.56	17.82	16.24	14.81	13.52	12.35	11.29	10.33

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)	29.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Recurring cost (Rs. in Lakh)	2.96	48.75	55.79	62.83	73.24	80.18	80.18	80.18	
Total cost (Rs. in Lakh)	31.97	48.75	55.79	62.83	73.24	80.18	80.18	80.18	513.13
Benefit (Rs. in Lakh)	0.00	115.50	136.50	157.50	157.50	157.50	157.50	157.50	
Total Depreciated value of all assets (Rs. in Lakh)								10.33	
Total benefits (Rs. in Lakh)	0.00	115.50	136.50	157.50	157.50	157.50	157.50	167.83	1049.83
Benefit-Cost Ratio (BCR): (Highly Profitable project)	2.046								
Net Present Worth (NPW):	536.70								

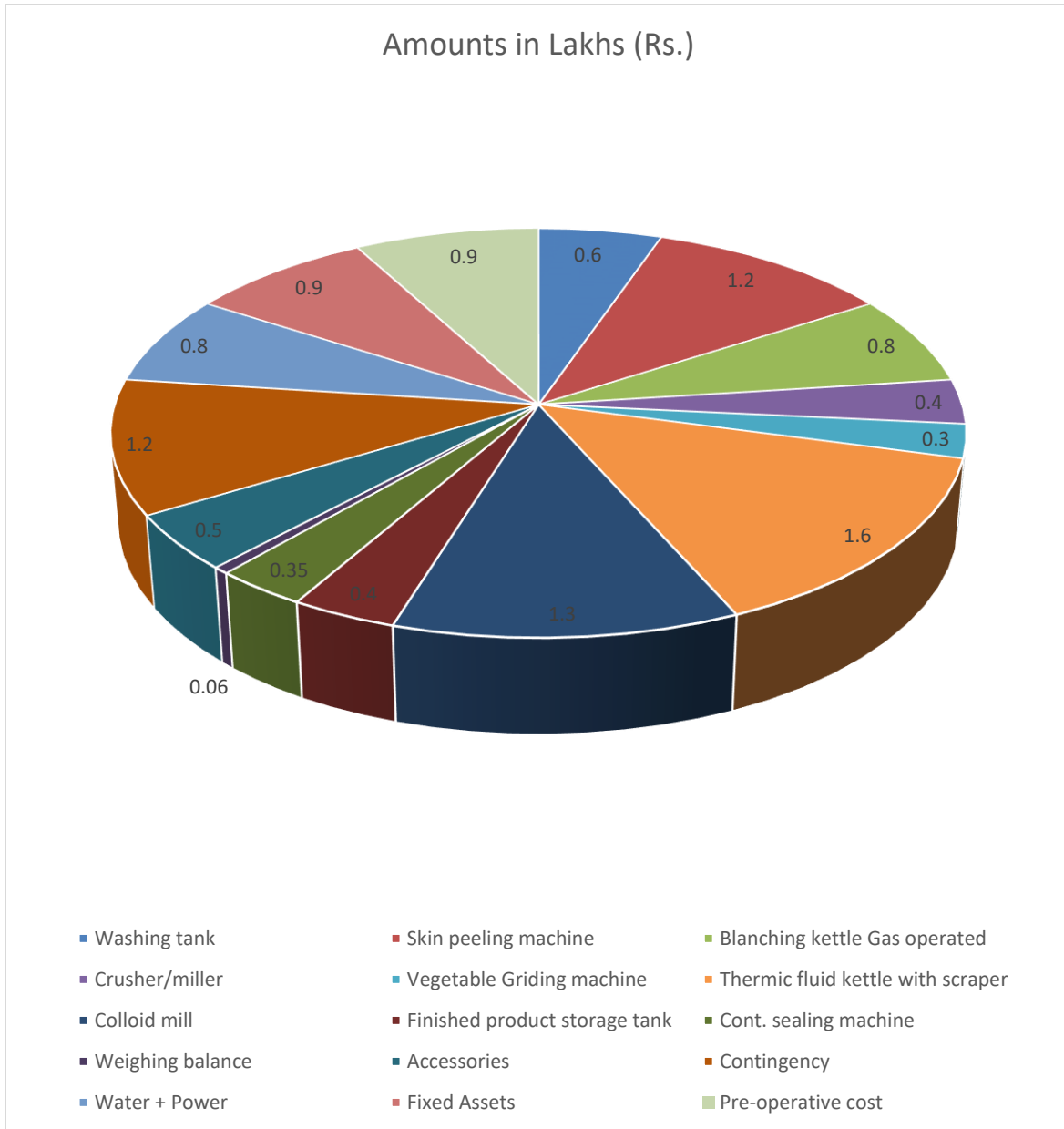
2.16 BREAK EVEN ANALYSIS

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.

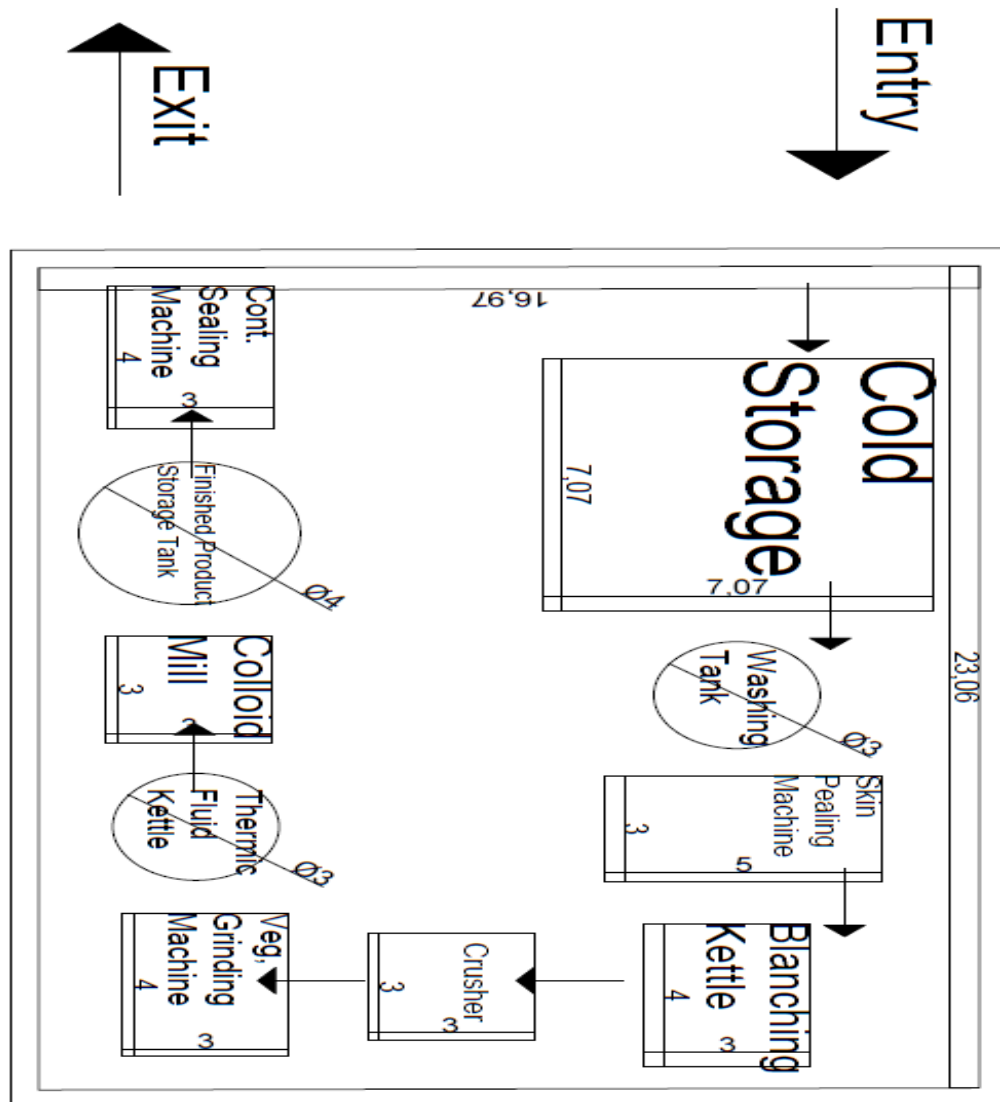
Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%	100%	100%
Production MT/Annum		82.5	97.5	112.5	135	150	150	150
Fixed Cost (Rs. in Lakh)								
Permanent staff salaries	7.284	7.284	7.284	7.284	7.284	7.284	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	1.55	1.40	1.26	1.13	1.02	0.92	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	1.31	1.27	1.22	1.16	1.10	1.03	0.96	0.87
Insurance	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Fixed Cost (Rs. in Lakh)	10.82	10.59	10.37	10.17	9.97	9.78	9.60	9.42
Sales Revenue (Rs. in Lakh)	0	115.5	136.5	157.5	157.5	157.5	157.5	157.5
Variable Cost (Rs. in Lakh)								
Ginger (Av. Price @ Rs. 25/Kg)	0.00	23.18	27.40	31.61	37.93	42.15	42.15	42.15
Oil @ 130 per kg	0.00	3.22	3.80	4.39	5.27	5.85	5.85	5.85
Other ingredients	0.00	0.72	0.85	0.98	1.18	1.31	1.31	1.31
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	1.15	1.36	1.57	1.88	2.09	2.09	2.09

Repair & maintenance	0.00	0.70	0.80	0.90	0.90	0.90	0.90	0.90
Miscellaneous expenses	0.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Interest on working capital @ 12%	0.00	1.63	1.92	2.62	2.62	2.62	2.62	2.62
Total Variable Cost (Rs. in Lakh)	0.50	48.28	55.62	63.36	73.77	80.70	80.70	80.70
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)	-	13.86	13.65	12.60	12.60	11.03	11.03	9.45

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



2.18 TYPICAL GINGER PASTE MANUFACTURING UNIT LAYOUT



2.19 MACHINERY SUPPLIERS

There are many machinery suppliers available within India for Vegetables based paste processing machineries and equipment. Some of the suppliers are:

1. Bajaj Process pack Limited, Noida, India
2. Shriyan Enterprises. Mumbai, India
3. Jwala Technocrats, Boiser, Maharashtra, 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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