

PM Formalization of Micro Food Processing Enterprises Scheme

DETAILED PROJECT REPORT FOR ONION PASTE PROCESSING



AATMANIRBHAR BHARAT

Indian Institute of Food Processing Technology
Ministry of Food Processing Industries
Pudukkottai Road, Thanjavur, Tamil Nadu 613005
Website: <http://www.iifpt.edu.in>
Email: info@iifpt.edu.in
Call: +91 4362 228155

Contents

Sr. No.	Topic	Page
	The Project at a Glance	3
1	General Overview of Onion production, Clusters, PHM and value addition in India	
	1.1 Introduction	4
	1.2 Origin, Distribution and Production of Onion	5
	1.3 Varieties	5
	1.4 Health benefits and Nutritional Importance	6
	1.5 Cultivation, Bearing & Post-Harvest Managements	7
	1.6 Processing and Value Addition in India	12
2	Model Onion paste processing under FME Scheme	
	2.1 Location of Proposed project and land	16
	2.2 Installed capacity of Onion paste processing plant	16
	2.3 Raw Material requirement for The Unit	16
	2.4 Manufacturing Process	17
	2.5 Market Demand & supply for Onion paste	19
	2.6 Marketing strategy for Onion products	21
	2.7 Detailed Project Assumptions	21
	2.8 Fixed capital Investments	
	2.8.1 Plants and Machinery	23
	2.8.2 Other Costs	23
	2.9 Working Capital Requirements	24
	2.10 Total Project Cost & means of finances	25
	2.11 Manpower Requirements	25
	2.12 Expenditure, Revenue and Profitability Analysis	26
	2.13 Repayment Schedule	27
	2.14 Assets depreciation	28
	2.15 Financial Assessment of project	29
	2.16 Break even analysis	30
	2.17 Pie chart	32
	2.18 Plant Layout	33
	2.19 Machinery suppliers	34
3	Limitations of Model DPR & Guidelines for Entrepreneurs	
	3.1 Limitations of Model DPR	35
	3.2 Guidelines for Entrepreneurs	35

Project At a Glance

1	Name of the Project	Onion 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 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	Onion
12	Major product outputs	Onion paste
13	Total project cost (Lakhs)	20.27
	Land development, building & civil construction	5.18
	Machinery and equipments	8.81
	Utilities (Power & water facilities)	0.8
	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.90
	Contingencies	1.20
	Working capital margin	2.48
14	Working capital Management (In Lakhs)	
	Second Year	7.44
	Third Year	8.79
	Fourth Year	11.99
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	7.09
	Promoter's contribution (min 20%)	4.45
	Term loan (45%)	8.71
16	Debt-equity ratio	1.95 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	29.59
	3rd year	32.51
	4th year	38.89
18	Average DSCR	2.16
	Benefit Cost Ratio	1.91
	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 ONION PRODUCTION, CLUSTERS, POST-HARVEST MANAGEMENT AND VALUE ADDITION IN INDIA

1.1 INTRODUCTION

The **onion** (*Allium cepa* L., from Latin *cepa* "onion"), also known as the **bulb onion** or **common onion**, is a vegetable that is the most widely cultivated species of the genus *Allium*.

Its close relatives include the garlic, scallion, shallot, leek, chive, and Chinese onion. This genus also contains several other species variously referred to as onions and cultivated for food, such as the Japanese bunching onion (*Allium fistulosum*), the tree onion (*A. ×proliferum*), and the Canada onion (*Allium canadense*). The name "wild onion" is applied to a number of *Allium* species, but *A. cepa* is exclusively known from cultivation. Its ancestral wild original form is not known, although escapes from cultivation have become established in some regions.^[4] The onion is most frequently a biennial or a perennial plant, but is usually treated as an annual and harvested in its first growing season.

The onion plant has a fan of hollow, bluish-green leaves and its bulb at the base of the plant begins to swell when a certain day-length is reached. The bulbs are composed of shortened, compressed, underground stems surrounded by fleshy modified scale (leaves) that envelop a central bud at the tip of the stem. In the autumn (or in spring, in the case of overwintering onions), the foliage dies down and the outer layers of the bulb become dry and brittle. The crop is harvested and dried and the onions are ready for use or storage. The crop is prone to attack by a number of pests and diseases, particularly the onion fly, the onion eelworm, and various fungi which can cause rotting. Some varieties of *A. cepa*, such as shallots and potato onions, produce multiple bulbs.

Onions are cultivated and used around the world. As a food item, they are usually served cooked, as a vegetable or part of a prepared savoury dish, but can also be

eaten raw or used to make pickles or chutneys. They are pungent when chopped and contain certain chemical substances which irritate the eyes.

1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF ONION

Onions are one of the oldest vegetables in continuous cultivation dating back to at least 4,000 BCE. The ancient Egyptians are known to have cultivated this crop along the Nile River. There are no known wild ancestors, however; the center of origin is believed to be Afghanistan and the surrounding region. Onions are among the most widely adapted vegetable crops. They can be grown from the tropics to subarctic regions. This adaptation is primarily due to differing response to day length. Onions are grouped into three groups based on their response to hours of day length. The short-day varieties bulb with day lengths of 10-13 hours, intermediate varieties bulb with day lengths of 13-14 hours and long-day onions with day lengths greater than 14 hours.

1.3 VARIETIES

Onion Varieties India are as follows:

- **White Onion:** Bhima Shubra, Bhima Shweta, Bhima Safed, Pusa White Round, Arka Yojith, Pusa White Flat, Udaipur 102, Phule Safed, N25791, Agrifound White.
- **Red onion:** Bhima Super, Bhima Red, Bhima Raj, Bhima Dark Red, Bhima Shakti, Punjab Selection, Pusa Red, N2-4-1, Pusa Madhavi, Arka Kalyan, Arka Lalima.
- **Small Onion:** Agrifound Rose, Arka Bindu
- **Spanish Brown:** Bhima Light Red, Bhima Kiran, Phule Suvarna, Arka Niketan, Arka Kirthiman.
- **Multiplier Onion:** Co 1, Co 2, MDU 1, Agrifound Red.

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Nutritional value:

Onion is rich in nutrition and per 100 gram contains:

- Moisture 88g
- Carbohydrate 8.1 g
- Carotene 0.02mg
- Vitamin B2 0.02mg
- Protein 1.1g
- Crude fiber 0.9g
- Vitamin B1 0.03mg
- Vitamin C 8mg

CONSTITUENTS AND HEALTH BENEFITS OF ONIONS

Health benefits:

Onions also have many potential health benefits.

- Raw onion is known to lower the production of LDL (bad cholesterol) and keep your heart healthy.
- The vitamin C (which remains intact while they are in the raw form) along with the phytochemicals present in onions helps build immunity.
- Quercetin, a powerful compound found in onions, has been suggested to play a role in preventing cancer, especially stomach and colorectal cancers.
- Chromium, also present in this root vegetable, may help regulate blood sugar.

- A mixture of onion juice and honey (which helps make it less pungent) is said to be effective as a cure for fever, common cold, allergies, etc.
- Keep a small piece of onion under the nostrils and inhale, to stop or slow down a nose bleed.
- Folate in onions also helps with depression and aids sleep and appetite.
- The vitamin C helps formation of collagen that is responsible for skin and hair health.
- Antibacterial and anti-inflammatory properties of onions have been proven. One study also suggested that freshly chopped raw onions have these anti-bacterial properties, not chopped onion which has been allowed to sit for a day or two.
- Chewing raw onions improve our oral health (though your breath may stink). They help eliminate bacteria that can lead to tooth decay and gum issues.

1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-

The onion plant has been grown and selectively bred in cultivation for at least 7,000 years. It is a biennial plant, but is usually grown as an annual. Modern varieties typically grow to a height of 15 to 45 cm (6 to 18 in). The leaves are yellowish- to bluish green and grow alternately in a flattened, fan-shaped swathe. They are fleshy, hollow, and cylindrical, with one flattened side. They are at their broadest about a quarter of the way

up, beyond which they taper towards a blunt tip. The base of each leaf is a flattened, usually white sheath that grows out of the basal plate of a bulb. From the underside of the plate, a bundle of fibrous roots extends for a short way into the soil. As the onion matures, food reserves begin to accumulate in the leaf bases and the bulb of the onion swells.

In the autumn, the leaves die back and the outer scales of the bulb become dry and brittle, so the crop is then normally harvested. If left in the soil over winter, the growing point in the middle of the bulb begins to develop in the spring. New leaves appear and a long, stout, hollow stem expands, topped by a bract protecting a developing inflorescence. The inflorescence takes the form of a globular umbel of white flowers with parts in sixes. The seeds are glossy black and triangular in cross section.

Cultivation and Bearing:-

Onions can be grown from seeds, seedlings and bulblets. Red loam to black soils with good drainage facilities is highly favourable for cultivation of onion. Onion performs well at a soil pH 6-7 and mild season without extremes of heat and cold. The medium sized bulbs are sown during April – May and October – November. Bulb needs sufficient soil moisture during growing period but heavy rains during bulb germination and bulb formation affects the crop growth. 1000 kg bulb/ha is required. Seeds rate is generally @ 8kg/ha. Seed sowing is the most common method practiced for irrigated crop as it results in high yield and large size bulbs. In plains, seeds are sown during October-November for a rabi crop. In hills, seeds are sown from March to June. Seeds are first sown in well prepared nursery beds of 90-120 cm width, 7.5-10.0 cm height and convenient length. Ratio between nursery area and main field is about 1:20. Seed rate varies from 8 to 10 kg/ha. Seedlings of 15 cm height and 0.8 cm neck diameter are ideal for transplanting and this is achieved in 8 weeks. However, it varies from 6-10 weeks depending on soil, climate and receipt of rain. There is a practice of topping seedlings at the time of transplanting if seedlings are over-grown. The land is ploughed to a fine tilth and ridges and furrows are formed at 45 cm spacing and bulbs or seedlings are

planted in rows of 20 cm spacing and 12 cm between plants. Irrigation is given at the time of planting of seedlings and on the third day and later at weekly intervals.

The mature plants' neck can no longer support the weight of the foliage, thus it falls over and plants doesn't put on new leaves, leaves start drying and the plant is resistant to pull out of the ground. Irrigation is stopped at maturity about one to two weeks before harvest to prevent bulbs from being water logged. Bulbs are harvested during the cooler part of the day (early morning and late evening) but not on a wet day. This will prevent the occurrence of brown stains and black mould. Fork can be used to loosen the bulbs before pulling the top by hand. Care must be taken when pulling out but avoid damaging the bulbs. Onions shouldn't be pulled until at least 50% of the plants have lodged. Lodging occurs when the onion plant has fallen over. After lodging, bulb size increases by about 25-33%. In order to ensure that the bulb isn't harvested until it is fully bulbed, it is recommended to carry out a pulling test. Pulling test involves gently pulling the individual plant from the ground. If the plant comes out of the ground easily then it is ready for harvest but if not it is an indication that the root is still very active and bulbing isn't complete. Avoid pulling onions and leaving them in the sun when the temperature are very high (80%- 90%) because they can get sunscald. Clip off the top of the foliage approximately 1 inch above the bulb and trim the roots. This will prevent the bulb from decaying and sprouting during storage. Also, if wet onions are placed in boxes, it takes longer for them to cure properly and the high moisture encourages diseases development, rooting and sprouting. Yield is about 12-16 t/ha in 70 to 90 days.

Harvesting

- Onion is ready for Harvesting in 3-5 months and 2-3 months after transplanting for dry and green onion respectively.
- Green onion are harvested when they are just ready for earthing.
- Plants are uprooted by hand and their roots are cut.
- They are washed and bundled as per market requirement.

Post-harvest management:-

There are some vegetable handling management after harvesting to avoid post-harvest losses.

Following are Post-harvesting handling practices:

- **Harvesting methods**

- There are two methods for harvesting:

- by hand digging

- by machine harvesting

- In machine harvesting, time will save & quick harvesting is carried out.

- **Curing**

- Curing is essential operation after harvesting.

- It will remove excess moisture from the outer skin and neck of onion bulbs.

- It increase storage life of onion bulbs.

- Curing also helps in improving colour of the skin.

- Usually 10 to 15 days or so will be sufficient for curing the onion bulbs.

- **Post-harvest treatment**

- In onion firstly done,

- Sprouting in stored onion is always a serious problem. To avoid sprout inhibition, suppressant like Isopropyl N-Chlorophenyl Carbamate (CPIC), TNCB, MH are used.

- The irradiation process has also been found effective for sprout inhibition.

- **Use of irradiation improves shelf-life of onions**

- Exposure of onion bulbs after harvesting when bulbs are in dormant stage with 60-90 Gy inhibit their sprouting regardless of crop season, environmental condition and type of storage.

- However, to reduce the microbial and other losses, combined use of irradiation with improved storage and providing the irradiation facilities at production level are to be considered.
- Onions when spoiled if not disposed off immediately cause nuisance and environmental pollution. Such spoiled bulbs, scales, peels and rejected portion of onion bulbs from processing units form a large quantity and thus conversion of this into compost or manure or vermin compost is suitable alternative.

• **Grading**

- After curing, onions are graded and classified by grading machine and hand.
- Before storage, doubled, broken, rotten bulbs having undesirable features are removed.
- Grading and classification are necessary for both local market as well as for export.
- Delhi market prefers big sized bulbs, Calcutta, Patna and Lucknow prefers medium size bulbs and Bhubaneswar, Guwahati prefer small sized Onion.

• **Packaging**

- Jute bags are used for onion packaging for sending to distant markets by trucks, trains or even by air.
- Generally 40 kg capacity jute bags are used for transport within country, whereas for export, jute bags of 8-25 kg capacity are used.
- Onion should be packed in 14-15 kg capacity cane baskets for export purpose.
- Packing should be small for easy handling during transit and may vary according to market demand.
- Onions are packed in jute (hessian) bags for transporting to yard or brought as loose.
- For safe handling, 40 kg open mesh jute bags having 200-300 g weight should be used in domestic market.
- For export, common big onions are packed in 5-25 kg size open mesh jute bags. Bangalore Rose and multiplier onions are packed for export in 14-15 kg wooden baskets.

- Nylon net bags, when used for packing have resulted in less storage loss because of good ventilation

- **Storage**

- In Maharashtra, Gujarat, Haryana and Western Uttar Pradesh large-scale storage of onions is taken in conventionally-designed structures.
- In other states, the storage is taken only on small scale but now showing increasing trend after the post-harvest technology and improved storage structures have been popularized by NHRDF.
- Traditional storage practices result in substantial losses in stored onions; hence use of improved storage structures as well as use of good storer varieties, judicious use of fertilizers, timely irrigation and post-harvest technology is essential to reduce the losses in stored onions.

- **Transportation**

- Onion stocks are transported in bullock carts, tractor trolleys and trucks as also railway wagons are used for longer distance movement within the country.
- Onions are transported in ventilated ships as well as sailing vessels / motorboats for export to Gulf and South-East Asian countries.
- It is also shipped in 3.5m containers or 7m containers by loading on ships.

1.6 PROCESSING & VALUE ADDITION:-

- Onion offers a huge potential of Onion across the world.
- Due to lower yields, though India has the highest area under onion, it stands second in the production of onion in the world. Hence, there is a lot of potential for increasing the production of onion by improving the yields.
- India is also the largest exporter of onion and hence, it is crucial to improve the yields for enhancing the export level, so that it helps in earning foreign exchange for the exchequer of the country.

Onion is used for treating digestion problems including loss of appetite, upset stomach, and; for treating heart and blood vessel problems including chest pain (angina) and high blood pressure; and for preventing “hardening of the arteries” (atherosclerosis). It is also used for treating sore mouth and throat, whooping cough, bronchitis, asthma, dehydration, intestinal gas, parasitic worms, and diabetes. Some people use it as a diuretic to increase urine output.

Onion offers a huge potential for value creation through processing. Advances in the field of processing makes it possible to produce different value added products from onion i.e. minimally processed ready to use or ready to cook fresh onion, onion paste, dehydrated onion flakes, onion powder, onion oil, onion vinegar, onion sauce, pickled onion, onion wine and beverages etc. Minimally processed onions are peeled and/or cut onions which retain its freshness. Availability of minimally processed onions to cook or ready to use purpose reduces the overall food preparation time. Alternatively, onions are used by way of frozen onion rings where the raw onions are sliced into rings, freeze dried and stored in a suitable packaging material under low temperatures. The frozen onion rings have a long storage life of 12 months and can be readily used for direct consumptions or for adding to soups and dressings. Onion paste is another product where the onion is grounded yet retaining its freshness. Dehydrated onion flakes can be processed into onion powder by proper grinding. Onion powder dissolves very easily and reconstitute quickly compared to onion flakes. It is successfully used in the preparation of baked products like pizza and bread, and also for spicing up grilled chicken. Onion oil is another flavoring substance which is widely used in the seasoning of processed products and is also used as a natural used preservative in some food products. Onion salt is another common ingredient in the spice mix and can be used at the place of table salt to offer a refreshing new taste to the household.

Processing of onion into different value-added products would reduce the post-harvest losses and reduce the bulk and transportation cost. Different value-added products from onion and garlic are minimally processed products, dehydrated flakes, powder, paste, pickle, oil etc.

Some of the value added products from onions are:

- **Minimally Processed Products:** Though onion is regularly used in the Indian kitchens, peeling and cutting is time taking and cumbersome. Availability of minimally processed onion for ready to cook or ready to use purpose obviates peeling and cutting before food preparation there by reducing overall food preparation time. Minimally processed onion is prepared by peeling and cutting which retain its freshness. Peeling and cutting can be done either manually or mechanically. Although peeled onion offers convenience, due to the removal of protective layer by peeling, storage life will be dwindled.
- **Dehydrated Flakes:** Dehydration decreases water activity of the material, reduces microbiological activity, and minimizes physical and chemical changes during its storage and also extends the shelf-life. Due to this, dehydration is one of the most common processes used to improve food stability. Although onion and garlic are semi-perishable crops, dehydration in to flakes would decrease bulk to store and transport besides increasing shelf life. Flakes are prepared by peeling, cutting, pre-treating and drying using different drying techniques (sun/solar, hot air/vacuum oven, microwave, fluidized bed, freeze drying, infra red etc.). Pretreatment before drying improves quality of dried product, prevents browning, accelerates drying rate and also retains volatile compounds. Selection of proper drying technique is important to maintain quality of the product and get profit.
- **Powder:** Powder can be prepared by grinding the dehydrated flakes. Powder dissolves very easily and reconstitute quickly compared to flakes. Powder offer convenience to add to preparation of baked products like pizza and bread, soups and also for spicing up different grilled products. High quality garlic powder is also used in medicinal preparations. Due to its hygroscopic nature, it picks up moisture and form in to cakes. Proper packing is required to avoid moisture absorption. Anti caking agents can also be added to store for longer duration. Powder can further be converted in to different

products like garlic bread mix, soup mix, curry mixes etc by adding different spices in optimized ratios.

- **Paste:** Paste can be prepared by peeling and grinding, as it contains high moisture, proper packaging and storage conditions are required to store for longer duration without any microbial spoilage. Addition of preservatives or thermal treatments can be followed to store it for longer duration. Onion contains more moisture compared to garlic and require proper care while preparing paste and packing. Packaging material plays a crucial role in storage of the paste. Both temperature and duration of storage will affect the total color of paste, microbial growth and nutritional changes.
- **Pickle:** An age old practice to preserve the vegetables is by means of a process called pickling. Pickling of onion and garlic can be done in two ways. Vinegar based pickling and oil based pickling with spices. Oil based pickle can be prepared as other pickles (mango, lemon etc) by adding different spices as per the desired taste. However, addition of pH regulators is important to keep the pH below 4, which is important to store for longer time without any microbial growth.
- **Oil:** Onion and garlic contains very small quantity of oil. This can be extracted by solvent extraction method or super critical fluid extraction technique. Oil is used as a flavoring substance, preservative and also as a medicine. As the oil contains specific pungent aroma, encapsulation of oil is also done to reduce the pungent flavor while consuming
- **Other Products:** As the onions are rich in sugars and other nutrients they can be processed into onion vinegar and onion wine. Onion can also be processed into onion beverage and onion sauce.

2. MODEL ONION 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 onion paste processing unit are in the production clusters of onion growing states/Areas such as the major onion producing states are Maharashtra, Karnataka, Gujarat, Bihar, Madhya Pradesh and Andhra Pradesh, where adequate quantities of surplus raw materials can be available for processing.

2.2 INSTALLED CAPACITY OF THE ONION PASTE PROCESSING UNIT

The maximum installed capacity of the Onion paste manufacturing unit in the present model project is proposed as 150 tonnes/annum or 500 kg/day Onion 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 Onion paste manufacturing project, the unit requires 406.21 kg/day,

480.07 kg/day, 553.92 kg/day, 664.71 Kg/day & 738.57 kg/day Onion vegetable at 55, 65, 75, 90 & 100 percent capacity utilization, respectively. The Onion must be harvested from plant; and then stored below 6°C temperature.

2.4 MANUFACTURING PROCESS OF THE ONION PASTE

PREPARATION OF ONION PASTE:

1. For preparation of Onion paste, Onions are weighed, and washed.
2. Onions are depeeled in Onion peeling machine.
3. Blanching of peeled onions 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, pulping of onion take place in Pupler.
5. After pulping, grinded in vegetable grinding machine.
6. Then heating in thermic fluid kettle with scraper, add salt, oil and acetic acid or preservatives to onion mixture and mix well.
7. Mixture is processed in colloid mill to make homogeneous paste.
8. Filling of onion paste in polyethylene pouches, glass bottles, plastic bottles, etc.

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

Flow chart for Onion paste:

Harvesting



Receiving



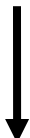
Washing



Peeling



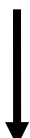
Blanching

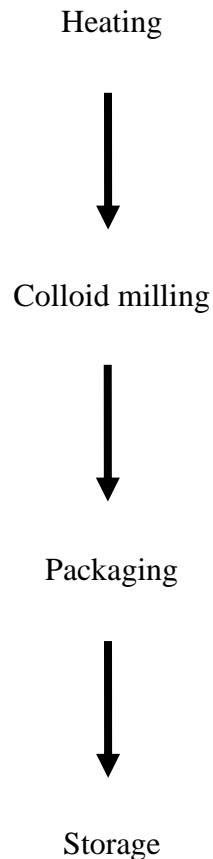


Pulping



Grinding





2.5 MARKET DEMAND AND SUPPLY FOR ONION PASTE

Onion is the main crop grown all over the world especially in the Asia. It belongs to the family, Amaryllidaceous, and the genus, Alliums. Alliums are perennial herbs having bulbous and scented underground stems. This genus includes garlic, shallot, chives, leeks, and even a non-edible species grown only for its showy. The common garden onions are in the species, *A. cape*. There are various varieties of onion each with their own unique flavour, ranging from mildly sweet to very strong i.e. red, yellow, white and green. It can be eaten fried, dried, raw, cooked or roasted. They are usually used to flavour salads, spreads, stir-fry, dips, soups and other dishes since ancient times in various cultures, onions on every continent have

been growing in their natural habitat. Ancestors in Asia have become familiar with its stability and started to grow as a food. Swenson (2008) reported that the ancient Egyptians worshipped the onion, having faith in its spherical shape and concentric rings that represented eternity. Alliums species (onion bulbs and fresh shoots) are grown for the production of seeds, sets and as fresh shoots for green salad in open, sunny and dry mountain slopes of these countries. Onions vary in colour, size, firmness, pungency shape, stiffness of outer neck and dry skins and may be consumed as uncooked or pickled.

Onion is used for many food products like meat sausages, gravies, curry dishes 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 onion paste can basically; you can produce the onion paste as the small-scale basis. Generally, the packing comes as 100 gms and 200 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 onion paste is very good and can be supplied on a commercial scale in bulk. In all the regions of the state, onions 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 Onion paste has good market potential.

The onion based value added products such as paste, powder, flakes or vacuumed packed are part and parcel of daily consumption pattern both in rural and urban India. These products fall under commonly consumed culinary products across households. Therefore, demand for onion paste, powder, flakes are always are prevalent across length and breadth of the country throughout the year. Dehydrated onion flakes & powder can be used in soups, sauces, salad sprinkles, seasoning, pizza and other purposes. Paste also has huge demand in culinary and other purposes. Vacuum packed onion has increased shelf life and can be used/ consumed at later stage.

There is a huge demand for Indian onion in the world. Indian onions are mostly exported in the form of dehydrated onion, canned onion and onion pickle. Onions in India are processed into different forms of products: onion paste, onion sauce, pickled onion, onion wine, onion powder, onion oil, dehydrated onion flakes and beverages etc. By rough estimate, around 6.75 % of onion produced is going for processing. There is increasing demand for onion processed products due to its convenience to handle and use for customers and added onion values for manufacturers.

2.6 MARKETING STRATEGY FOR ONION 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 Onion products.

2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Onion 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. Onion cost considered @ Rs8/-per kg.
2. 1 kg Onion will produce 70% 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	
Parameter	Assumption	
Capacity of the Onion 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	8	
Average sale prices per Kg	90	Rs/kg
Pulp extraction	70	

2.8 FIXED CAPITAL INVESTMENT

2.8.1 MACHINERY AND EQUIPMENT

Sr No.	Equipment	Quantity	Capacity	Price (Rs. In Lacs)
1	Washing tank	1	200 liter	0.4
2	Onion peeler	1	200 kg/hr	1.6
3	Blanching kettle Gas operated	1	300 Liter	0.8
4	Vegetable Pulper	1	100 kg/hr	0.2
5	Vegetable Griding machine	1	100 kg/hr	0.3
6	Thermic fluid kettle with scraper	1	150 liter	1.8
7	Colloid mill	1	continuous	1.3
8	Finished product storage tank	1	150 liter	0.4
9	Paste filling machine	1	Suitable	1.1
10	Cont. sealing machine	1	Suitable	0.35
11	Weighing balance	1	Suitable	0.06
12	Accessories	1	Suitable	0.5
			Total	8.81

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 20.27 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	0.60	0.71	0.97
Work in progress	15 days	1.21	1.43	1.95
Packing material	15 days	0.45	0.53	0.73
Finished goods' stock	15 days	2.23	2.63	3.59
Receivables	30 days	4.46	5.27	7.18
Working expenses	30 days	0.97	1.14	1.56
Total current assets		9.92	11.72	15.98

Trade creditors		0.00	0.00	0.00
Working capital gap		9.92	11.72	15.98
Margin money (25%)		2.48	2.93	4.00
Bank finance		7.44	8.79	11.99

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	8.81
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	2.48
Total project cost (i to vii)	20.27
Means Of finance	
i. Subsidy	7.09
ii. Promoters Contribution	4.46
iii. Term Loan (@10%)	8.71

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	4th Year	5th year	6th year
A	Total Installed Capacity (MT)	222 MT Onion/Annum	82.5	97.5	112.5	135	150
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%
B	Expenditure (Rs. in Lakh)	0					
	Onion (Av. Price @ Rs.8/Kg)	0.00	9.75	11.52	13.29	15.95	17.73
	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 6 per Kg)	0.00	4.95	11.70	13.50	16.20	18.00
	Utilities (Electricity, Fuel)	0.00	0.74	0.87	1.00	1.20	1.34
	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	29.96	39.43	43.95	50.59	55.01
C	Total Sales Revenue (Rs. in Lakh)	0.00	74.25	87.75	101.25	101.25	101.25
	Sale of Onion Paste (Av. Sale Price @ Rs.90/kg)	0.00	74.25	87.75	101.25	101.25	101.25
D	PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows	-2.96	44.29	48.32	57.30	50.66	46.24
	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	0.88	0.79	0.71	0.64	0.58	0.52
	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%	0.91	0.87	0.84	0.80	0.76	0.71

	Interest on working capital @ 12%	0.00	0.89	1.05	1.44	1.44	1.44
E	Profit after depreciation and Interest (Rs. in Lakh)	-5.13	42.28	46.44	55.56	49.05	44.75
F	Tax (assumed 30%) (Rs. in Lakh)	0.00	12.68	13.93	16.67	14.72	13.43
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	-5.13	29.59	32.51	38.89	34.34	31.33
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	0.91	0.87	0.84	0.80	0.76	0.71
I	Coverage available (Rs. in Lakh)	0.91	0.87	0.84	0.80	0.76	0.71
J	Total Debt Outgo (Rs. in Lakh)	0.30	0.33	0.37	0.41	0.45	0.50
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)	-3.87	30.73	33.55	39.83	35.19	32.10
M	Payback Period	2.5 Years					
	(on Rs. 34.07 Lakhs initial investment)						

2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	871,580.81	120,904.98	90,644.40	30,260.57	841,320.23
2	841,320.23	120,904.98	87,497.30	33,407.67	807,912.56
3	807,912.56	120,904.98	84,022.91	36,882.07	771,030.49
4	771,030.49	120,904.98	80,187.17	40,717.81	730,312.68
5	730,312.68	120,904.98	75,952.52	44,952.46	685,360.23
6	685,360.23	120,904.98	71,277.46	49,627.51	635,732.71
7	635,732.71	120,904.98	66,116.20	54,788.78	580,943.94

8	580,943.94	120,904.98	60,418.17	60,486.81	520,457.13
9	520,457.13	120,904.98	54,127.54	66,777.44	453,679.69
10	453,679.69	120,904.98	47,182.69	73,722.29	379,957.40
11	379,957.40	120,904.98	39,515.57	81,389.41	298,568.00
12	298,568.00	120,904.98	31,051.07	89,853.91	208,714.09
13	208,714.09	120,904.98	21,706.27	99,198.71	109,515.38
14	109,515.38	120,904.98	11,389.60	109,515.38	(0.00)
		1,692,669.68	821,088.88	871,580.81	(871,580.81)

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	8.81	7.93	7.14	6.42	5.78	5.20	4.68	4.21
Depreciation	0.88	0.79	0.71	0.64	0.58	0.52	0.47	0.42
Depreciated value	7.93	7.14	6.42	5.78	5.20	4.68	4.21	3.79
Other Fixed	0.80	0.68	0.58	0.49	0.42	0.35	0.30	0.26

Assets									
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	14.79	13.53	12.39	11.35	10.42	9.57	8.79	8.09	
Depreciation	1.26	1.14	1.03	0.94	0.85	0.77	0.70	0.64	
Depreciated value	13.53	12.39	11.35	10.42	9.57	8.79	8.09	7.45	

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)	20.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Recurring cost (Rs. in Lakh)	2.96	29.96	39.43	43.95	50.59	55.01	55.01	55.01	
Total cost (Rs. in Lakh)	23.23	29.96	39.43	43.95	50.59	55.01	55.01	55.01	352.19
Benefit (Rs. in Lakh)	0.00	74.25	87.75	101.25	101.25	101.25	101.25	101.25	
Total Depreciated value of all assets (Rs. in Lakh)								7.45	
Total benefits (Rs. in Lakh)	0.00	74.25	87.75	101.25	101.25	101.25	101.25	108.70	675.70
Benefit-Cost Ratio (BCR): (Highly Profitable project)	1.919								
Net Present Worth (NPW):	323.50								

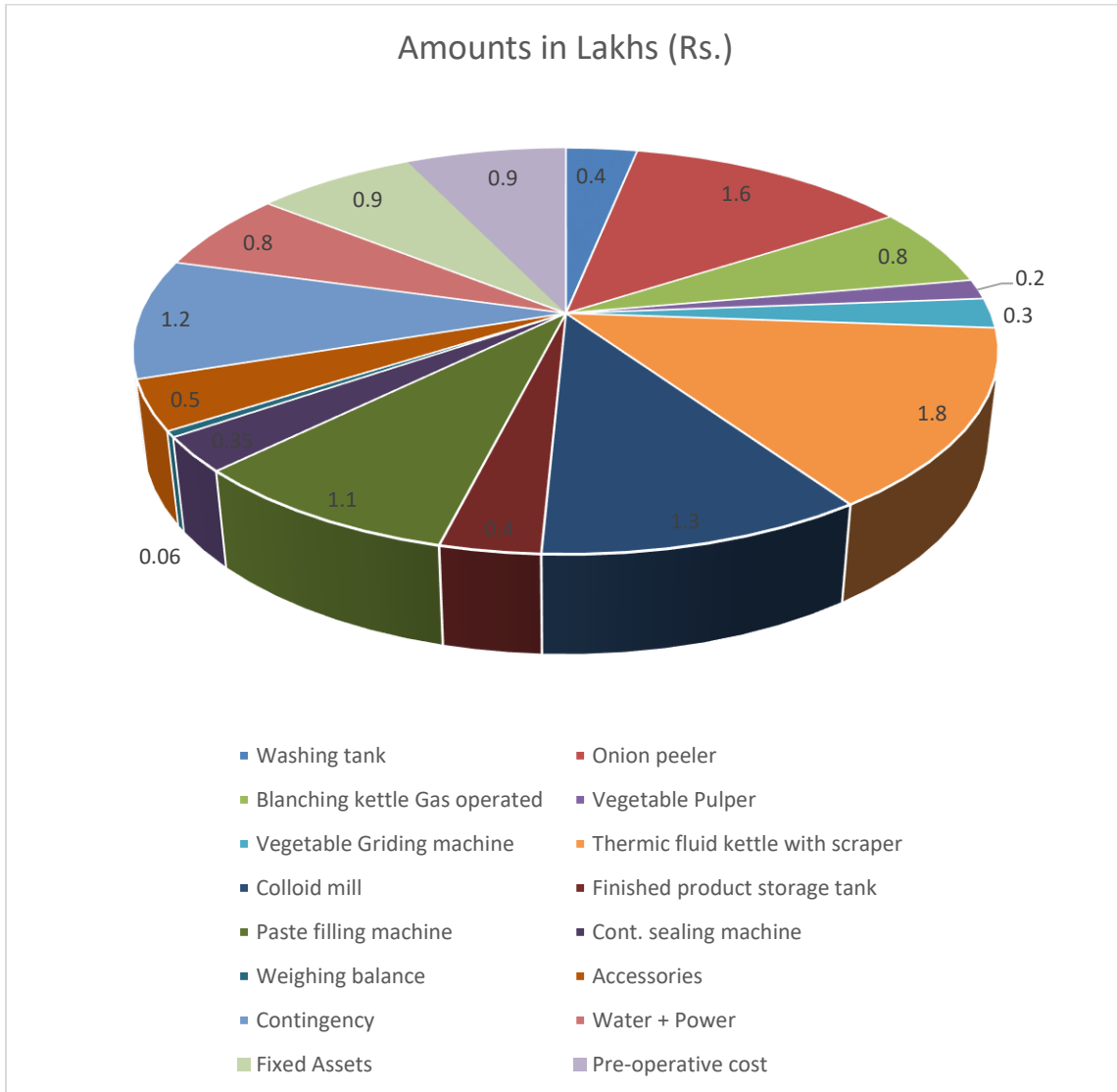
2.16 BREAK EVEN ANALYSIS

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.

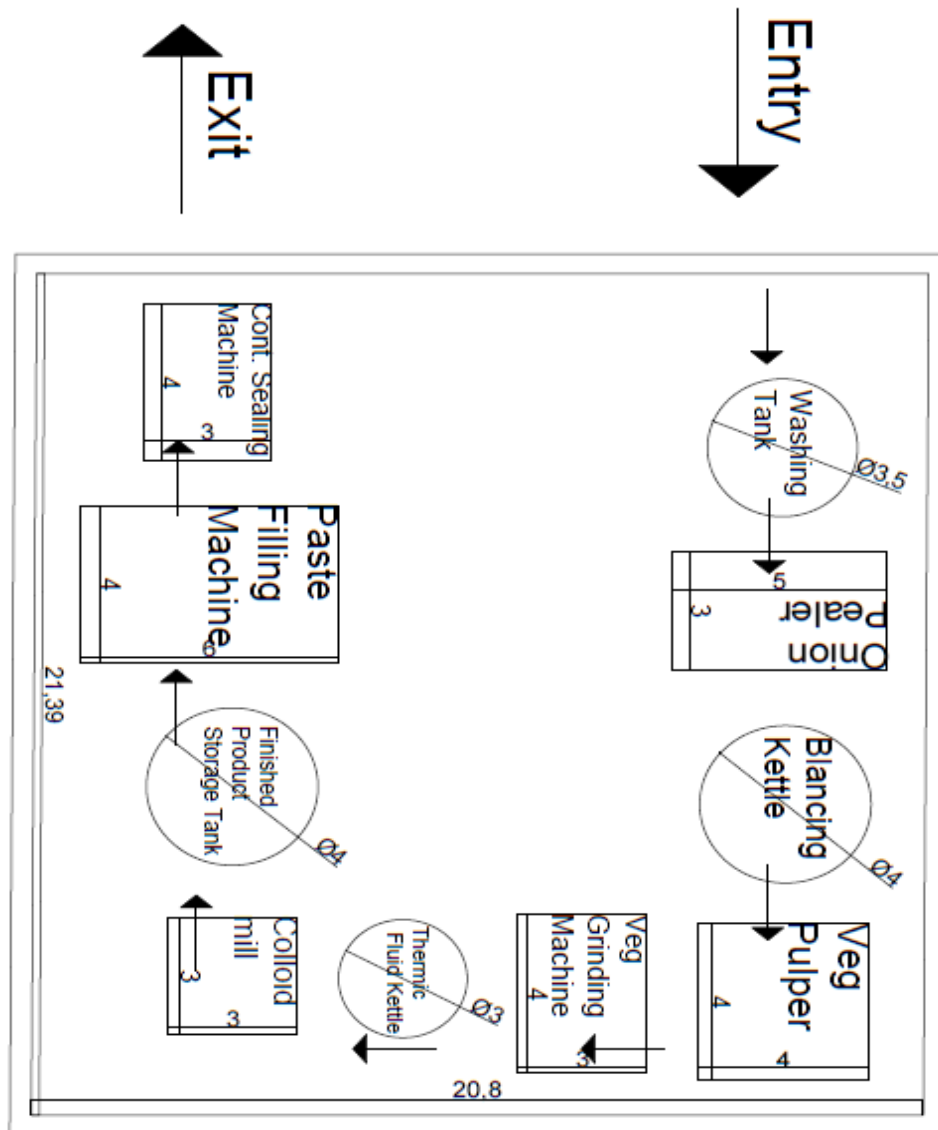
Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%	100%	100%
Production MT/Annum		82.5	97.5	112.5	135	150	150	150
Fixed Cost (Rs. in Lakh)								
Permanent staff salaries	7.284	7.284	7.284	7.284	7.284	7.284	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	0.88	0.79	0.71	0.64	0.58	0.52	0.47	0.42
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	0.91	0.87	0.84	0.80	0.76	0.71	0.66	0.60
Insurance	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Fixed Cost (Rs. in Lakh)	9.75044404	9.59992	9.45828656	9.32388	9.19515	9.0706502	8.94901	8.8289
Sales Revenue (Rs. in Lakh)	0	74.25	87.75	101.25	101.25	101.25	101.25	101.25
Variable Cost (Rs. in Lakh)								
Onion (Av. Price @ Rs. 8/Kg)	0.00	9.75	11.52	13.29	15.95	17.73	17.73	17.73
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	4.95	5.85	6.75	8.10	9.00	9.00	9.00
Casual staff salaries	0.00	5.78	5.78	5.78	5.78	5.78	5.78	5.78
Utilities (Electricity, Fuel)	0.00	0.74	0.87	1.00	1.20	1.34	1.34	1.34

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	0.89	1.05	1.44	1.44	1.44	1.44	1.44
Total Variable Cost (Rs. in Lakh)	0.50	28.75	32.54	36.54	41.83	45.35	45.35	45.35
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)	-	8.91	8.78	8.10	8.10	7.09	7.09	6.08

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



2.18 TYPICAL ONION PASTE MANUFACTURING UNIT LAYOUT



2.19 MACHINERY SUPPLIERS

There are many machinery suppliers available within India for Vegetables based beverage 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.



Contact Us

Director

Indian Institute of Food Processing Technology

(Ministry of Food Processing Industries, Government of India)

Pudukkottai Road, Thanjavur - 613 005, Tamil Nadu

Phone No.: +91- 4362 - 228155, Fax No.:+91 - 4362 – 227971

Email: director@iifpt.edu.in; Web: www.iifpt.edu.in

