

DETAILED PROJECT REPORT
DEHYDRATED OKRA MANUFACTURING UNIT.



INDIAN INSTITUTE OF FOOD PROCESSING TECHNOLOGY

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Project At a Glance

1	Name of the Project	Dehydrated Okra
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	60 MT/annum (55, 65, 75,90 & 100% capacity utilization in the 2 nd , 3 rd , 4 th , 5 th & 6 th years' onwards respectively
11	Raw materials	Okra vegetable
12	Major product outputs	Dehydrated okra leaves
13	Total project cost (Lakhs)	30.54
	Land development, building & civil construction	5.18
	Machinery and equipments	16.58
	Utilities (Power & water facilities)	0.8
	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.90
	Contingencies	1.20
	Working capital margin	4.98
14	Working capital Management (In Lakhs)	
	Second Year	14.95
	Third Year	17.67
	Fourth Year	24.10
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	9.92
	Promoter's contribution (min 20%)	6.87
	Term loan (45%)	13.74
16	Debt-equity ratio	2.00 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	53.18
	3rd year	62.27
	4th year	73.70
18	Average DSCR	2.16
	Benefit Cost Ratio	2.41
	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 OKRA PRODUCTION, CLUSTERS, POST-HARVEST MANAGEMENT AND VALUE ADDITION IN INDIA

1.1 INTRODUCTION

Bhendi (*Abelmoschus esculentus*) is a common vegetable in India. The common names are Ladies Finger, Okra, Bhindi (Hindi), Dhenras (bengali), Vendai (Tamil), bhindo (Gujarati), Bendekayi (Kannada), Ventaykka (Malayalam), Asra-pattraka (Sanskrit), etc. It is an annual erect herb 0.9 to 2.1 m in height, hairy, with 3 to 5 lobed palmately cordate leaves. The plants bear 12.5 to 30cm pyramidal pods.

It is predominantly a crop of tropics and subtropics. The crop is cultivated for its young tender fruits, used in curry and soups after cooking. It is a good source of vitamins A and B, protein and minerals. It is also an excellent source of iodine and is useful for the treatment of goiter. Fruits are also dried or frozen for use during off -season. Dry fruit skin and fibres are used in manufacture of paper, card board and fibres. Root and stem are used for clearing cane juice for preparation of jaggery.

The major bhendi (okra) producing states are Uttar Pradesh, Bihar, West Bengal, Odisha, Assam, Andhra Pradesh and Karnataka.

1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF OKRA

Okra is an allopolyploid of uncertain parentage. However, proposed parents include *Abelmoschus ficulneus*, *A. tuberculatus* and a reported "diploid" form of okra. Truly wild (as opposed to naturalized) populations are not known with certainty, and the species may be a cultigen. The geographical origin of okra is disputed, with supporters of South Asian, Ethiopian and West African origins. The Egyptians and Moors of the 12th and

13th centuries used the Arabic word for the plant, *bamya*, suggesting it had come into Egypt from Arabia, but earlier it was probably taken from Ethiopia to Arabia. The plant may have entered southwest Asia across the Red Sea or the Bab-el-Mandeb straight to the Arabian Peninsula, rather than north across the Sahara, or from India. One of the earliest accounts is by a Spanish Moor who visited Egypt in 1216 and described the plant under cultivation by the locals who ate the tender, young pods with meal. From Arabia, the plant spread around the shores of the Mediterranean Sea and eastward. The plant was introduced to the Americas by ships plying the Atlantic slave trade by 1658, when its presence was recorded in Brazil. It was further documented in Suriname in 1686. Okra may have been introduced to southeastern North America from Africa in the early 18th century. By 1748, it was being grown as far north as Philadelphia. Thomas Jefferson noted it was well established in Virginia by 1781. It was commonplace throughout the Southern United States by 1800, and the first mention of different cultivars was in 1806.

1.3 VARIETIES

There are different varieties of okra growing worldwide. Varieties of okra growing worldwide are described below.

- **BABY BUBBA HYBRID:** This plant is appreciated for its small size and suitability for cultivation in containers and small garden plots. Plants are 3-4 feet tall with a diameter of up to 24 inches. Dark green fruits grow up to three inches in length and mature in about 53 days, making this cultivar an excellent choice for cooler climates with shorter growing seasons.
- **BLONDY:** Dwarf plants reach up to four feet and bear three-inch, pale green, spineless pods in about 50 days. This is another excellent option for cool locales with short growing seasons, as well as patio pots and small spaces.

- **BURGUNDY:** Attractive green leaves contrast with burgundy stems and six- to eight-inch fruit, making this a particularly attractive ornamental option. Plants mature in 49-60 days. Pods may pale in color during cooking.
- **CAJUN DELIGHT:** An excellent choice for a short growing season in cooler climates, this hybrid matures in 50-55 days. It will reach a maximum height of four feet. Dark green pods are 3-5 inches long and slightly curved.

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Nutritional value:

One cup of fresh okra contains:

Calories: 31

Protein: 2 grams

Fat: 0 grams

Carbohydrates: 7 grams

Fiber: 3 grams

Sugar: 1 gram

Dehydrated okra are a good source of:

Potassium

Magnesium

Vitamin A

Calcium

Folate

Okra chips also contain vitamin K1, which helps maintain good bone strength and may contribute to preserving your blood vessels, reducing the risk of coronary heart disease.

CONSTITUENTS AND HEALTH BENEFITS OF OKRAS

Potential Health Benefits of Okra Chips:

Okra chips are a potential source of vitamins and minerals. These nutrients offer a variety of health boosting effects, and research continues to study other potential benefits.

Health benefits:

Fight Cancer

Antioxidants are natural compounds that help your body fight off molecules called free radicals that can damage cells. Free radicals are most well-known for causing oxidation damage, which can eventually lead to cancer.

Okra contains antioxidants called polyphenols, including vitamins A and C. It also contains a protein called lectin which may inhibit cancer cell growth in humans. Studies using concentrated compounds from okra showed they inhibited the growth of breast cancer cells by up to 63%. Further research is needed for definitive proof of okra's cancer-blocking properties.

Support Heart and Brain Health

Polyphenols decrease your risk of heart problems and stroke by preventing blood clots and reducing free radical damage. The antioxidants in okra may also benefit your brain by reducing brain inflammation.

Mucilage—a thick, gel-like substance found in okra—can bind with cholesterol during digestion so it is passed from the body. An eight-week study conducted on mice showed lower blood **cholesterol levels** after they were fed a high-fat diet containing okra powder.

Control Blood Sugar

Various studies have shown okra may help control **blood sugar levels**. Researchers believe okra may help prevent sugar from being absorbed during digestion.

In one study, rats given purified okra and liquid sugar had fewer blood sugar spikes than rats in the control group. More evidence is needed to confirm that okra helps control blood sugar levels in humans.

Prenatal Support

One cup of okra has 15% of the daily value of **folate**, a helpful nutrient for pregnant women. Folate helps reduce the risk of neural tube defects, which can affect the brain and spine of developing fetuses.

1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-

The species is a perennial, often cultivated as an annual in temperate climates, often growing to around 2 meters (6.6 ft) tall. As a member of the Malvaceae, it is related to such species as cotton, cocoa, and hibiscus. The leaves are 10–20 centimetres (3.9–7.9 in) long and broad, palmately lobed with 5–7 lobes. The flowers are 4–8 centimetres (1.6–3.1 in) in diameter, with five white to yellow petals, often with a red or purple spot at the base of each petal. The pollens are spherical with approximately 188 microns diameter. The fruit is a capsule up to 18 centimetres (7.1 in) long with pentagonal cross-section, containing numerous seeds.

Abelmoschus esculentus is cultivated throughout the tropical and warm temperate regions of the world for its fibrous fruits or pods containing round, white seeds. It is among the most heat- and drought-tolerant vegetable species in the world and will tolerate soils with heavy clay and intermittent moisture, but frost can damage the pods. In cultivation, the seeds are soaked overnight prior to planting to a depth of 1–2 centimeters (0.39–0.79 in). It prefers a soil temperature of at least 20 °C (68 °F) for germination which occurs between six days (soaked seeds) and three weeks. Seedlings require ample water. The seed pods rapidly become fibrous and woody and, to be edible as a vegetable, must be harvested when immature, usually within a week after pollination. Okra is available in two varieties, green and red. Red okra carries the same flavor as the more popular green okra and differs only in color. When cooked, the red okra pods turn green.

The most common disease afflicting the okra plant is verticillium wilt, often causing a yellowing and wilting of the leaves. Other diseases include powdery mildew in dry tropical regions, leaf spots, and root-knot nematodes.

Cultivation and Bearing:-

Bhendi requires long warm growing season during its growing period. It gives good yield in warm humid condition. It grows best within a temperature range of 24-27°C. It can be successfully grown in rainy season even in heavy rainfall area. Bhendi is highly susceptible to frost injury. Seeds fail to germinate when temperature is below 20° C.

Bhendi can be grown in a wide range of soils. However, it grows best in loose, friable, well-drained sandy loam soils rich in organic matter. It also gives good yield in heavy soils with good drainage. A pH range of 6.0-6.8 is considered as optimum. Alkaline, saline soils and soils with poor drainage are not good for this crop.

The optimum time of seed sowing varies greatly depending upon climate, varieties and their temperature requirement for growth. Normally the crop is sown between January-March and June- August. The exact month of sowing depends on the region.

Irrigation frequency in bhendi crop varies with the season and the soil type. Bhendi is grown without irrigation in rainy season in high rainfall area where distribution of rainfall is uniform throughout the growing season. A light irrigation is given soon after seed sowing to ensure good germination. The crop is irrigated at an interval of 4-5 days in summer. Moisture stress at fruit setting stage reduces the fruit quality and the yield. Normally the crop is irrigated by adopting the furrow method of irrigation.

The fruits are ready for harvest in about 45-60 days after seed sowing depending upon variety and season. Size of the pod and stage at which it is harvested varies with variety/hybrid and market preference. Generally, medium sized (7-10 cm long) tender pods, which can be easily snapped from the plant, are harvested. As all the fruits do not mature at the same time, harvesting is carried out once in 3-4 days. Frequent picking promotes fruit development and prevents the pods from growing too large.

Post-harvest management:-

There are some vegetable handling management after harvesting to avoid post-harvest losses. Following are Post-harvesting handling practices:

- Vegetables are graded according to their size and color. All the diseased, deformed, bruised and unripe fruits are sorted out.
- Do not leave harvested vegetable out in the hot sun;
- Do not pick cold, wet fruit. When wet turgid vegetable is handled the oil glands can be ruptured. The released oil burns the vegetable surface (oleocellosis) and also stimulates fungal spores to germinate. The burn Marks can take 2-3 days to develop;
- Wear cotton gloves when harvesting. This reduces chances of getting injured.
- Use picking bags. This reduces damage as a result of abrasion on wooden or metal picking bins and allows vegetable to be gently lowered into bulk harvesting bins;
- Do not leave stems on vegetable or damage buttons by “plugging”;
- Use clean, smooth harvesting bins;

- Make sure packing line equipment is cleaned regularly. This reduces dirt and wax buildup which can cause vegetable abrasion;
- Reduce packing line abrasion by using foam, rubber and smooth belts to Cushion vegetable;
- Remove old and rotten vegetable regularly from the packing shed and surrounds;
- Treat harvested vegetable with a registered fungicide within 24hrs of harvest;

Okra has short shelf life and cannot be stored for longer time. The okra fruit should be stored at 7- 10°C and 90% relative humidity to increase the shelf life. For local markets the fruits are filled in jute bags, whereas for distant markets the fruits are packed in perforated paper cartons.

The Packaging Institute International (PII) defines packaging as the enclosure of products, items or packages in a wrapped pouch, bag, box, cup, tray, can, tube, bottle or other container. It is the most vital steps for the success of the dehydration industry. It protects the dried food from oxygen, moisture (gain or loss), light, microorganisms, and pests. Good packaging and storage techniques are crucial. After the dehydrated okra are checked and found to be thoroughly dry and cool, they are packed immediately for storage.

1.6 PROCESSING & VALUE ADDITION:-

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

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

2. MODEL DEHYDRATED OKRA PROCESSING UNDER FME SCHEME

2.1 LOCATION OF THE PROPOSED PROJECT AND LAND

The entrepreneur must provide description of the proposed location, site of the project, distance from the targeted local and distant markets; and the reasons/advantages thereof i.e. in terms of raw materials availability, market accessibility, logistics support, basic infrastructure availability etc. The major okra producing states are Uttar Pradesh, Bihar, West Bengal, Odisha, Assam, Andhra Pradesh and Karnataka.

2.2 INSTALLED CAPACITY OF THE DEHYDRATED OKRA PROCESSING UNIT

The maximum installed capacity of the Dehydrated okra leaves manufacturing unit in the present model project is proposed as 60 tonnes/annum or 200 kg/day Dehydrated okra leaves. 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.

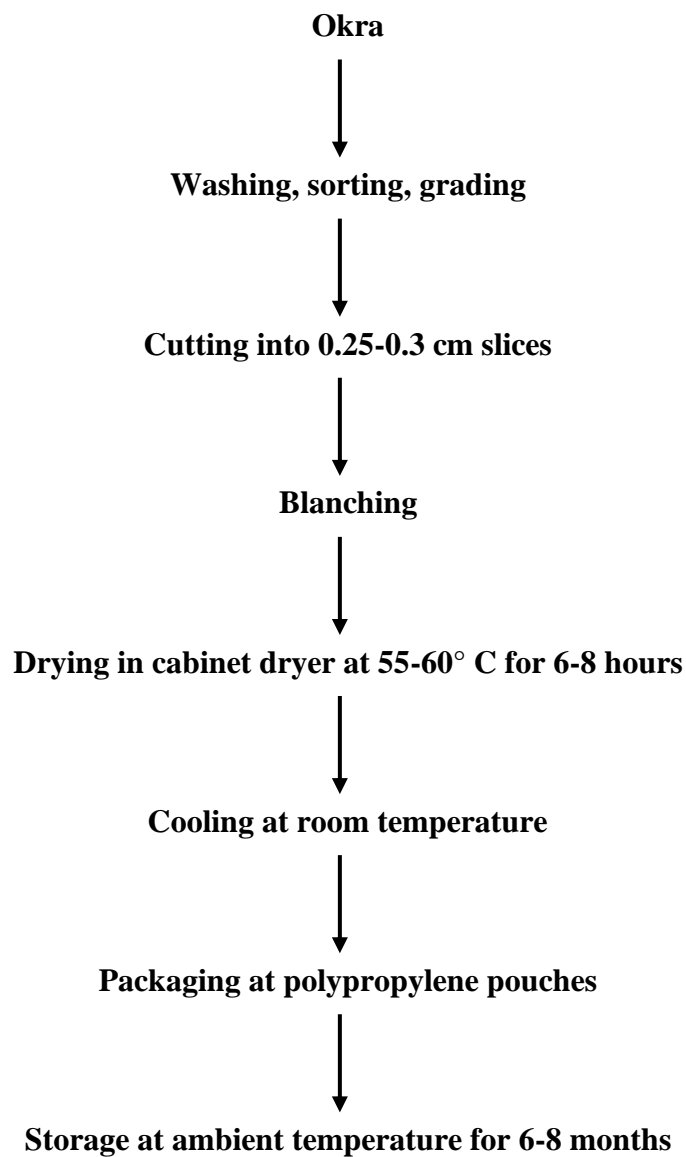
2.3 RAW MATERIAL REQUIREMENTS FOR THE UNIT

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 Dehydrated okra leaves manufacturing project, the unit requires 687.5 kg/day, 812.5 kg/day, 937.5 kg/day, 1125 Kg/day & 1250 kg/day Okra vegetable at 55, 65, 75, 90 & 100 percent capacity utilization, respectively.

2.4 MANUFACTURING PROCESS OF THE DEHYDRATED OKRA

Flow chart for dehydrated okra:



Pre-processing of okra:

Pre-drying processing means to prepare the raw product for drying or dehydration and include raw product preparation and colour preservation. Okra preparation includes selection and sorting, washing, cutting into the appropriate form, and blanching. Okra is selected; sorted according to size, maturity, and soundness; and then washed to remove dust, dirt, insect matter, mold spores, plant parts, and other material that might contaminate or affect the colour, aroma, or flavour. Next, the product is cut into the appropriate shape or form (i.e., halves, slices, cubes, etc.). Okra is blanched by immersion in hot water (95 to 100 °C [203 to 212 °F]) or exposure to steam. Then they are treated with sulphite solutions to retard enzymatic browning. Sulphites and Sulphur dioxide. Sulphur dioxide gas and sodium or potassium sulphite, bisulphite or metabisulphite are the most common forms used. Commonly used levels: 0.005-0.2% In addition to colour preservation, the presence of a small amount of sulphite in blanched, cut okra improves storage stability and makes it possible to increase the drying temperature during dehydration, thus decreasing drying time and increasing the drier capacity without exceeding the tolerance for heat damage.

Post-dehydration treatments:

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

protect the product against moisture, light, air, dust, micro flora, foreign odour, insects, and rodents; provide strength and stability to maintain original product size, shape, and appearance throughout storage, handling, and marketing; and consist of materials that are approved for contact with food. Cost is also an important factor in packaging. Package types include cans, plastic bags, drums, bins, and cartons, and depend on the end-use of the product.

2.5 MARKET DEMAND AND SUPPLY FOR DEHYDRATED OKRA

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

2.6 MARKETING STRATEGY FOR DEHYDRATED OKRA

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

2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Dehydrated okra 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 dehydration processing line. Therefore, land and civil infrastructures are assumed as already available with the entrepreneurs.

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

1. Okra cost considered @ Rs.20/-per kg.
2. 1 kg Okra will produce 16% recovery.
3. 1 Batch size is approximately 200 kg.
4. No. of hours per day are approximately 8-10 hours.
5. Batch yield is 95%

Detailed Project Assumptions		
Parameter	Assumption	
Capacity of the Dehydrated okra Unit	60	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	20	
Average sale prices per Kg	400	Rs/kg
Pulp extraction	16	
DEHYDRATED OKRS	6.25 Kg Okra for 1 kg Dehydrated okra	

2.8 FIXED CAPITAL INVESTMENT

2.8.1 MACHINERY AND EQUIPMENT

Sr No.	Equipment	Capacity	Quantity	Price (Rs. In Lacs)
1	Cold store sq. meter	1	15000 Kg	10
2	Rotary type washing machine	1	200 kg/hr/ 100 liter batch	0.8
3	Vegetable cutter/slicer	2	200 kg/hr	0.8
4	Blanching kettle Gas operated	1	100 Liter	1.2

5	Dryer	1	120 kg /batch	2.2
6	Induction sealer	1	Suitable	0.3
7	Shrink tunnel	1	Suitable	0.35
8	Continuous sealing machine	1	Suitable	0.25
9	Batch coding machine	1	Suitable	0.12
10	Weighing balance	1	Suitable	0.06
11	Accessories	1	Suitable	0.5
			Total	16.58

2.8.2 OTHER COSTS:-

Utilities and Fittings:-

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

Other Fixed Assets:

Other Fixed Assets	
1. Furniture & Fixtures	Rs. 0.9 lac total
2. Plastic tray capacity	
3. Electrical fittings	

Pre-operative expenses

Pre-operative Expenses	
Legal expenses, Start-up expenses, Establishment cost, consultancy fees, trials and others.	0.9 LAC
Total preoperative expenses	0.9 LAC

Contingency cost to be added as approx.1.2 Lac.

So total startup cost at own land & Premise may be somewhat similar to 30.54 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	1.85	2.19	2.98
Work in progress	15 days	3.70	4.38	5.97
Packing material	15 days	0.18	0.21	0.29
Finished goods' stock	15 days	4.50	5.32	7.25
Receivables	30 days	9.00	10.64	14.50
Working expenses	30 days	0.71	0.83	1.14
Total current assets		19.94	23.56	32.13
Trade creditors		0.00	0.00	0.00
Working capital gap		19.94	23.56	32.13
Margin money (25%)		4.98	5.89	8.03
Bank finance		14.95	17.67	24.10

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	16.58
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	4.98
Total project cost (i to vii)	30.54
Means Of finance	
i. Subsidy	9.93
ii. Promoters Contribution	6.87
iii. Term Loan (@10%)	13.75

2.11 MANPOWER REQUIREMENTS

Total Monthly Salary (Rs.)	No	Wages	Total Monthly	Total Annualy
Supervisor (can be the owner)	1	15000	15000	180000
Technician	1	12000	12000	144000
Helper	1	5500	5500	66000
Sales man	1	8000	8000	96000
			40500	486000

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)	375 MT Okra/Annum	33	39	45	54	60
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%
B	Expenditure (Rs. in Lakh)	0					
	Okra (Av. Price @ Rs.20/Kg)	0.00	41.25	48.75	56.25	67.50	75.00
	Sulphur dioxide @ Rs. 150/kg	0.00	0.09	0.11	0.12	0.15	0.16
	Other materials (Rs. 3/kg)	0.00	0.02	0.02	0.03	0.03	0.04
	Packaging materials (Rs 6 per Kg)	0.00	1.98	4.68	5.40	6.48	7.20
	Utilities (Electricity, Fuel)	0.00	1.31	1.55	1.79	2.14	2.38
	Salaries (1st yr only manager's salary)	1.80	4.86	4.86	4.86	4.86	4.86
	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	2.60	52.81	63.37	71.94	84.66	93.14
C	Total Sales Revenue (Rs. in Lakh)	0.00	132.00	156.00	180.00	216.00	240.00
	Sale of Dehydrated okra (Av. Sale Price @ Rs.400/kg)	0.00	132.00	156.00	180.00	216.00	240.00
D	PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows	-2.60	79.19	92.63	108.06	131.34	146.86
	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	1.66	1.49	1.34	1.21	1.09	0.98
	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%	1.43	1.38	1.33	1.26	1.20	1.12

	Interest on working capital @ 12%	0.00	1.79	1.79	1.79	1.79	1.79
E	Profit after depreciation and Interest (Rs. in Lakh)	-6.07	75.97	89.65	105.29	128.78	144.50
F	Tax (assumed 30%) (Rs. in Lakh)	0.00	22.79	26.89	31.59	38.63	43.35
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	-6.07	53.18	62.75	73.70	90.15	101.15
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	1.43	1.38	1.33	1.26	1.20	1.12
I	Coverage available (Rs. in Lakh)	1.43	1.38	1.33	1.26	1.20	1.12
J	Total Debt Outgo (Rs. in Lakh)	0.48	0.53	0.58	0.64	0.71	0.78
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)	-4.03	55.02	64.42	75.21	91.51	102.39
M	Payback Period	2.5 Years					
	(on Rs. 30.54 Lakhs initial investment)						

2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	1,332,159.97	184,796.14	138,544.64	46,251.51	1,285,908.47
2	1,285,908.47	184,796.14	133,734.48	51,061.66	1,234,846.80
3	1,234,846.80	184,796.14	128,424.07	56,372.07	1,178,474.73
4	1,178,474.73	184,796.14	122,561.37	62,234.77	1,116,239.96
5	1,116,239.96	184,796.14	116,088.96	68,707.19	1,047,532.77
6	1,047,532.77	184,796.14	108,943.41	75,852.73	971,680.04
7	971,680.04	184,796.14	101,054.72	83,741.42	887,938.62

8	887,938.62	184,796.14	92,345.62	92,450.53	795,488.09
9	795,488.09	184,796.14	82,730.76	102,065.38	693,422.71
10	693,422.71	184,796.14	72,115.96	112,680.18	580,742.53
11	580,742.53	184,796.14	60,397.22	124,398.92	456,343.61
12	456,343.61	184,796.14	47,459.74	137,336.41	319,007.20
13	319,007.20	184,796.14	33,176.75	151,619.39	167,387.81
14	167,387.81	184,796.14	17,408.33	167,387.81	(0.00)
		2,587,146.00	1,254,986.03	1,332,159.97	(1,332,159.97)

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	16.58	14.92	13.43	12.09	10.88	9.79	8.81	7.93
Depreciation	1.66	1.49	1.34	1.21	1.09	0.98	0.88	0.79
Depreciated value	14.92	13.43	12.09	10.88	9.79	8.81	7.93	7.14
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	22.56	20.52	18.68	17.02	15.51	14.15	12.92	11.80
Depreciation	2.04	1.84	1.66	1.50	1.36	1.23	1.12	1.01
Depreciated value	20.52	18.68	17.02	15.51	14.15	12.92	11.80	10.79

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)	30.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Recurring cost (Rs. in Lakh)	2.60	52.81	63.37	71.94	84.66	93.14	93.14	93.14	
Total cost (Rs. in Lakh)	33.14	52.81	63.37	71.94	84.66	93.14	93.14	93.14	585.34
Benefit (Rs. in Lakh)	0.00	132.00	156.00	180.00	216.00	240.00	240.00	240.00	
Total Depreciated value of all assets (Rs. in Lakh)								10.79	
Total benefits (Rs. in Lakh)	0.00	132.00	156.00	180.00	216.00	240.00	240.00	250.79	1414.79
Benefit-Cost Ratio (BCR): (Highly Profitable project)	2.417								
Net Present Worth (NPW):	829.45								

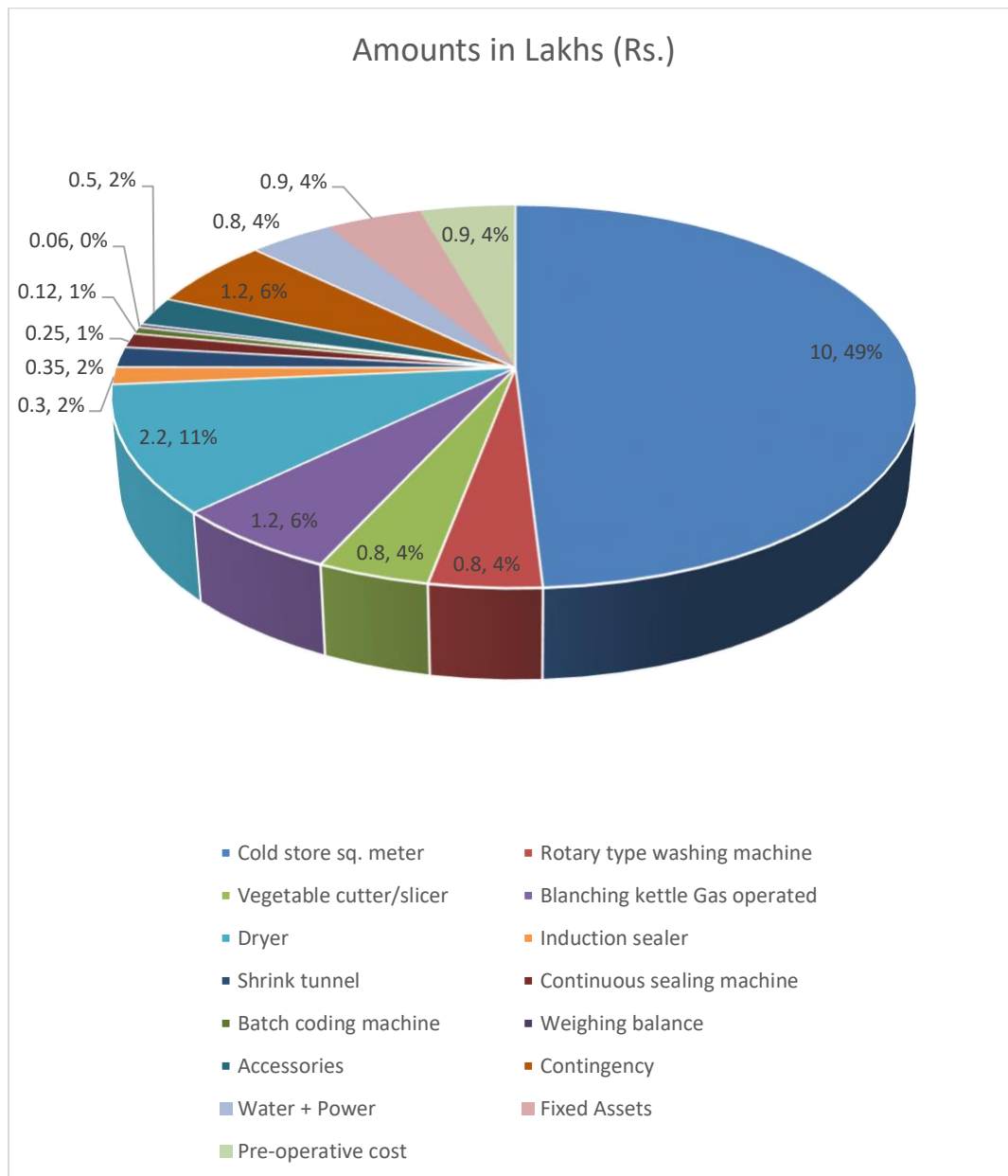
2.16 BREAK EVEN ANALYSIS

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.

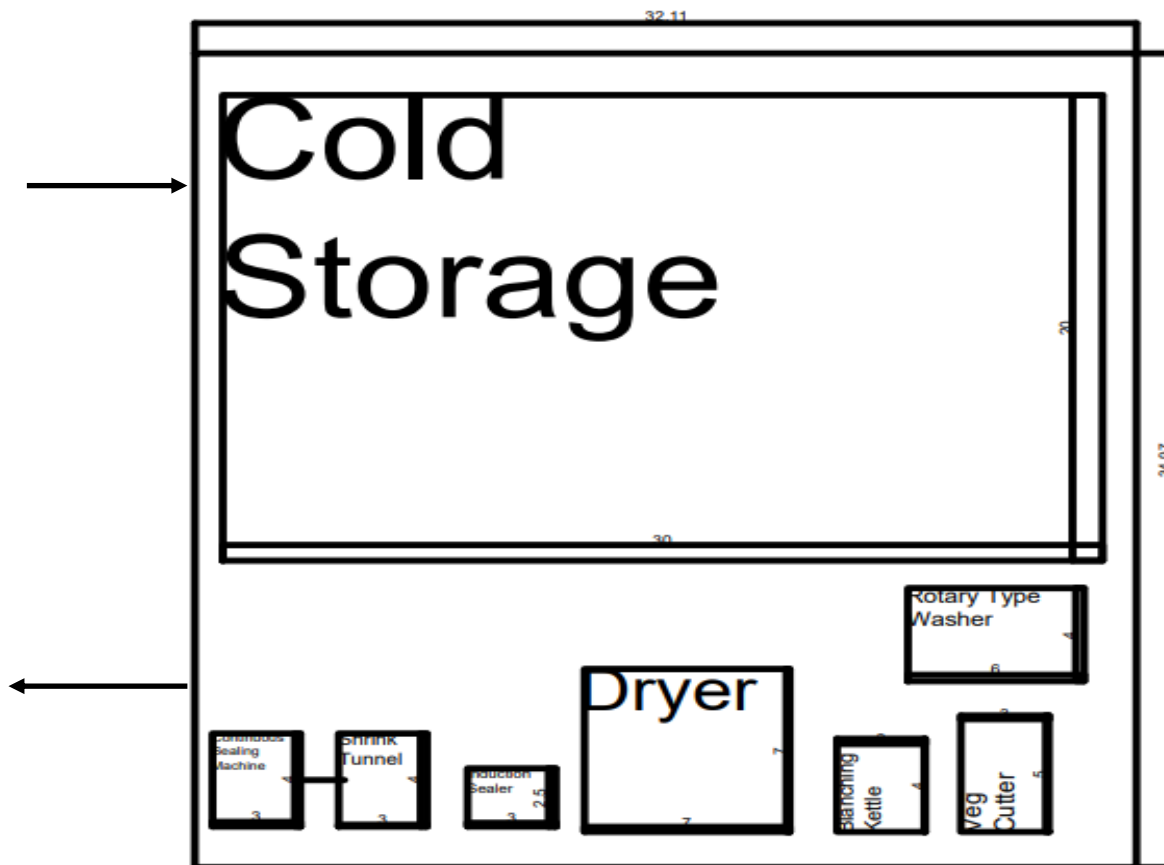
Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%	100%	100%
Production MT/Annum		33	39	45	54	60	60	60
Fixed Cost (Rs. in Lakh)								
Permanent staff salaries	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86
Depreciation 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	1.66	1.49	1.34	1.21	1.09	0.98	0.88	0.79
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	1.43	1.38	1.33	1.26	1.20	1.12	1.04	0.95
Insurance	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Fixed Cost (Rs. in Lakh)	8.62	8.38	8.14	7.92	7.71	7.51	7.31	7.12
Sales Revenue (Rs. in Lakh)	0	132	156	180	216	240	240	240
Variable Cost (Rs. in Lakh)								
Dehydrated okra (Av. Price @ Rs. 20/Kg)	0.00	41.25	48.75	56.25	67.50	75.00	75.00	75.00
Sulphur dioxide @ 150 per kg	0.00	0.09	0.11	0.12	0.15	0.16	0.16	0.16
Other ingredients @3/Kg	0.00	0.02	0.02	0.03	0.03	0.04	0.04	0.04
Packaging materials	0.00	1.98	2.34	2.70	3.24	3.60	3.60	3.60
Casual staff salaries	0.00	3.36	3.36	3.36	3.36	3.36	3.36	3.36

Utilities (Electricity, Fuel)	0.00	1.31	1.55	1.79	2.14	2.38	2.38	2.38
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	1.79	1.79	1.79	1.79	1.79	1.79	1.79
Total Variable Cost (Rs. in Lakh)	0.50	52.50	60.72	68.94	81.12	89.23	89.23	89.23
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)	-	15.84	15.60	14.40	17.28	16.80	16.80	14.40

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



2.18 TYPICAL DEHYDRATED OKRA 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 0
2. Shriyan Enterprises. Mumbai, India

3. LIMITATIONS OF MODEL DPR & GUIDELINES FOR ENTREPRENEURS

3.1 LIMITATIONS OF THE DPR

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

3.2 GUIDELINES FOR THE ENTREPRENEURS

- i. The success of any prospective food processing project depends on how closer the assumptions made in the initial stage are with the reality of the targeted market/place/situation. Therefore, the entrepreneurs must do its homework as realistic as possible on the assumed parameters.
- ii. This model DPR must be made more comprehensive by the entrepreneur by including information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of entrepreneur's business, project location, raw material costing base/contract sourcing, detailed market research, comprehensive dehydrated product mix

based on demand, rationale of the project for specific location, community advantage/benefit from the project, employment generation, production/availability of the raw materials/crops in the targeted area/clusters and many more relevant aspects for acceptance and approval of the competent authority.

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



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