

PM Formalisation of Micro food processing Enterprises Scheme

DETAILED PROJECT REPORT FOR MORINGA SEED OIL PROCESSING UNIT



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1. THE PROJECT AT A GLANCE

1	Name of the Project	Moringa seed oil
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	30 MT/annum (55, 65, 75,85, 95 and 100% capacity utilization in the 2nd, 3rd, 4th, 5th, 6th & 7th year onwards respectively
11	Raw materials	Dried Moringa Seeds
12	Major product outputs	Moringa seed Oil
13	Total project cost (Lakhs)	24.22
	Land development, building & civil construction	6
	Machinery and equipment	7.86
	Utilities & Fittings	1.2
	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.90
	Contingencies	1.20
	Working capital margin	6.16
14	Working capital Management (In Lakhs)	
	Second Year	18.49
	Third Year	21.85
	Fourth Year	29.79



15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	8.48
	Promoter's contribution (min 20%)	6.06
	Term loan %	9.69
16	Debt-equity ratio	1.60 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	66.59
	3rd year	80.42
	4th year	93.91
18	Average DSCR	2.18
	Benefit Cost Ratio	1.551799676
	Term Loan Payment	7 Years with 1 year grace period
	Pay Back Period for investment	2 Years

2. GENERAL OVERVIEW AND INTRODUCTION

2.1 INTRODUCTION

- ✓ It grows best in direct sunlight under 500 meters altitude. It tolerates a wide range of soil conditions, but prefers a neutral to slightly acidic (pH. 6.3-7.0), well-drained sandy or loamy soil. Minimum annual rainfall requirements are estimated at 250 mm with maximum at over 3,000 mm, but in waterlogged soil the roots have a tendency to rot. (In areas with heavy rainfall, trees can be planted on small hills to encourage water run-off).
- ✓ Presence of a long taproot makes it resistant to periods of drought. Trees can be easily grown from seed or from cuttings. Temperature ranges are 25-35 °C (0-95 °F), but the tree will tolerate up to 48 °C in the shade and it can survive a light frost.
- ✓ Moringa seeds have no dormancy period, so they can be planted as soon as they are mature and they will retain the ability to germinate for up to one year. Moringa trees will flower and fruit annually and, in some regions, twice annually. During its first year, a Moringa tree will grow up to five meters in height and produce flowers and fruit. Left alone, the tree can eventually reach 12 m in height with a trunk 30 cm wide; however, the



tree can be annually cut back to one meter from the ground. The tree will quickly recover and produce leaves and pods within easy reach. Within three years a tree will yield 400-600 pods annually and a mature tree can produce up to 1,600 pods.

- ✓ Moringa (*moringa oleifera*) is a fast-growing, drought-resistant tree of the family Moringaceae, native to the Indian subcontinent. Common names include moringa, drumstick tree horseradish tree, and ben oil tree or benzolive tree. Moringa is a fast-growing softwood tree indigenous to sub-Himalayan tracts of Northern India.
- ✓ A middle-sized soft tree with thick corky bark. Leaves compound, with pale green leaflets when young, become darker when older and yellow at the fall period. Generally planted in the home stead, also use as hedge as cuttings propagate easily, found as escape in the forest. Flowers small, whitish , honey scented. Fruit is a capsule about 9-20 inch. long
- ✓ The moringa tree is grown mainly in semiarid, tropical, and subtropical areas, corresponding in the United States to USDA hardiness zones 9 and 10. Moringa is a sun- and heat-loving plant, and does not tolerate freezing or frost. Moringa is particularly suitable for dry regions, as it can be grown using rainwater without expensive irrigation techniques.
- ✓ It is widely cultivated for its young seed pods and leaves, used as vegetables and for traditional herbal medicine. It is also used for water purification. Although listed as an invasive species in several countries, moringa has "not been observed invading intact habitats or displacing native flora", so "should be regarded at present as a widely cultivated species with low invasive potential.
- ✓ All parts of the Moringa tree (leaves, seeds, roots and flowers) are suitable for human consumption. The leaves, which are rich in protein, minerals, β -carotene and antioxidant



compounds, are used not only for human and animal nutrition but also in traditional medicine.

2.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF MORINGA

- ✓ Moringa oleifera is believed to be native to sub-Himalayan tracts of northern India but is now found worldwide in the tropics and sub-tropics.
- ✓ Moringa is the economically most valuable species and is native to south asia, where it grows in the Himalayan foothills but is widely cultivated across the tropics. Nine species occur in eastern Ethiopia, northern Kenya, and Somalia of which eight are endemic to Africa.
- ✓ India is the prime producer of Moringa (Drumstick) with an annual production of 2.2 million tonnes of tender fruits from an area of 43,600 ha leading to the productivity of around 51 tonnes per ha.

2.3 VARIETIES

- ✓ Periyakulam 1 and 2 (PKM1 and PKM2) are the two most common and commercially viable annual varieties for pod production. They were developed by the Horticulture Research Station of Tamil Nadu Agricultural University (TNAU) in southern India.

Important variety of Moringa

- Moringa ruspoliana
- Moringa rivae
- Moringa borziana
- Moringa pygmaea
- Moringa arborea
- Moringa longituba
- Moringa peregrina
- Moringa hildebrandtii



- Moringa ovalifolia
- Moringa drouhardii
- Moringa concanensis
- Drumstick tree
- Cabbage-tree

3. HEALTH BENEFITS AND NUTRITIONAL INFORMATION

HEALTH BENEFITS OF MORINGA

- ✓ Moringa is nutritious and rich in fiber, vitamins and minerals.
- ✓ Moringa has a natural anti-diabetic and anti-cancer properties.
- ✓ A multitude of studies have demonstrated that dietary fiber & MUFA-PUFA quantity comparison to SFA protects against heart attacks and strokes.
- ✓ Diet rich in moringa prevent digestive disorders and it regulates bowel activity.
- ✓ Moringa olifera is rich in various antioxidants, including quercetin & Chlorogenic acid.
- ✓ Moringa leaf can increase blood antioxidants level.
- ✓ Moringa leaves may lead to reduce blood sugar levels.
- ✓ In animal & Test tube studies it is shown that moringa olifera has some anti-inflammatory properties & work is going on further studies on human.
- ✓ Moringa olifera lowers cholesterol levels, potentially reducing the risk of heart disease.
- ✓ Moringa leaves are rich in many important nutrients including protein, Vitamin B6, Vitamin C, Riboflavin & iron.
- ✓ Used to combat malnutrition, especially among infants and nursing mothers.
- ✓ **Carbohydrates:** 100 g of fresh moringa contains 3.76 g carbs, most of which is insoluble fiber an indigestible form of dietary carbohydrates. Insoluble fiber provides bulk to stool, and can help prevent constipation and the development of hemorrhoids.



- ✓ **Fats:** It contains 0.12 g of fat in a 100 g moringa. Most of the fat is monounsaturated fat (46.4 mg) and polyunsaturated fat (27.21 mg) and lower quantity in saturated fat (29.05 mg). moringa is a good source of monounsaturated fat and polyunsaturated fat. It is associated with increases HDL(good) cholesterol and decreases LDL(bad) cholesterol. It is good for those suffering from hypercholesterolemia (high cholesterol), atherosclerosis (hardening of the arteries). There has been substantial discussion in health and research settings about the relative risks and benefits of the different types of fat in coconut and coconut oil.
- ✓ **Protein:** Moringa provides 2.76 g protein per 100 g.
- ✓ **Vitamins and minerals:** A moringa contain important vitamin and minerals that helps our body to maintain a healthy heart and overall body. Moringa contain important minerals like iron, zinc, potassium, phosphorus and calcium. Moringa also contain important vitamins like vitamin A, vitamin C and vitamin E.

NUTRITIONAL FACTS ABOUT MORINGA

The following nutrition information is provided by the ICMR for 100 g moringa.

Energy	29.4 kcal
Carbohydrate	3.76 g
Protein	2.62 g
Total fat	0.12 g
Saturated fatty acid	29.05 mg
Monounsaturated fatty acid	46.4 mg
Polyunsaturated fatty acid	27.21 mg
Vitamin A	2.88 mcg
Vitamin C	71.86 mg
Vitamin B1	0.04 mg
Vitamin B2	0.07 mg
Vitamin B3	0.62 mg



Vitamin B5	0.57 mg
Vitamin B6	0.12 mg
Vitamin B7	4.29 mcg
Vitamin E	0.31 mg
Calcium	33.3 mg
Sodium	22.38 mg
Iron	0.73 mg
Zinc	0.31 mg
Potassium	419 mg
Phosphorus	52.87 mg

4. CULTIVATION, BEARING & POST HARVEST MANAGEMENT

- ✓ **IN THE NURSERY:** Use poly bags with dimensions of about 18 cm in height and 12 cm in diameter. The soil mixture for the sacks should be light, i.e., 3 parts soils to 1 part sand. Plant two or three seeds in each sack, one to two centimetres deep. Keep moist but not too wet. Germination will occur within 5 to 12 days, depending on the age of the seed and pre-treatment method used. Remove extra seedlings, leaving one in each sack. Seedlings can be out-planted when they are 60-90 cm high. When out-planting, cut a hole in the bottom of the sack big enough to allow the roots to emerge. Be sure to retain the soil around the roots of the seedling.

- ✓ To encourage rapid germination, one of three pre-seeding treatments can be employed:
 1. Soak the seeds in water overnight before planting.
 2. Crack the shells before planting.
 3. Remove shells and plant kernels only.

- ✓ **IN THE FIELD:** If planting a large plot, it is recommended to first plough the land. Prior to planting a seed or seedling, dig a planting pit about 50cm in depth and the same



in width. This planting hole serves to loosen the soil and helps to retain moisture in the root zone, enabling the seedlings' roots to develop rapidly. Compost or manure at the rate of 5kg per pit can be mixed with the fresh topsoil around the pit and used to fill the pit. Avoid using the soil taken out of the pit for this purpose: fresh topsoil contains beneficial microbes that can promote more effective root growth. The day before out-planting, water the filled pits or wait until a good rain before out-planting seedlings. Fill in the hole before transplanting the seedling. In areas of heavy rainfall, the soil can be shaped in the form of a mound to encourage drainage. Do not water heavily for the first few days. If the seedlings fall over, tie them to stick 40cm high for support.

- ✓ **DIRECT SEEDING:** If water is available for irrigation (i.e., in a backyard garden), trees can be seeded directly and grown anytime during the year. Prepare a planting pit first, water, and then fill in the pit with topsoil mixed with compost or manure before planting seeds. In a large field, trees can be seeded directly at the beginning of the wet season.
- ✓ **GROWING FROM CUTTINGS:** Use hard wood, not green wood, for cuttings. Cuttings should be 45cm to 1.5m long and 10cm thick. Cuttings can be planted directly or planted in sacks in the nursery. When planting directly, plant the cuttings in light, sandy soil. Plant one-third of the length in the ground (i.e., if the cutting is 1.5m long, plant it 50cm deep). Do not over water; if the soil is too heavy or wet, the roots may rot. When the cuttings are planted in the nursery, the root system is slow to develop. Add phosphorus to the soil, if possible, to encourage root development. Cuttings planted in a nursery can be out-planted after 2 or 3 months.
- ✓ **SPACING:** For intensive Moringa production, plant the tree every 3 m in rows 3 m apart. To ensure sufficient sunlight and airflow, it is also recommended to plant the trees in an east-west direction. When the trees are part of an alley-cropping system, there should be 10 m between the rows. The area between trees should be kept free of weeds.



- ✓ Trees are often spaced in a line one meter or less apart in order to create living fence posts. Trees are also planted to provide support for climbing crops such as pole beans, although only mature trees should be used for this purpose since the vine growth can choke off the young tree.
- ✓ Moringa trees can be planted in gardens; the tree's root system does not compete with other crops for surface nutrients and the light shade provided by the tree will be beneficial to those vegetables which are less tolerant to direct sunlight. From the second year onwards, Moringa can be inter-cropped with maize, sunflower and other field crops. Sunflower is particularly recommended for helping to control weed growth. However, Moringa trees are reported to be highly competitive with eggplant (*Solanum melongena*) and sweet corn (*Zea mays*) and can reduce their yields by up to 50%.
- ✓ **PINCHING THE TERMINAL TIPS:** When the seedlings reach a height of 60cm in the main field, pinch (trim) the terminal growing tip 10cm from the top. This can be done using fingers since the terminal growth is tender, devoid of bark fiber and brittle, and therefore easily broken. A shears or knife blade can also be used. Secondary branches will begin appearing on the main stem below the cut about a week later. When they reach a length of 20 cm, cut these back to 10 cm. Use a sharp blade and make a slanting cut. Tertiary branches will appear, and these are also to be pinched in the same manner. This pinching, done four times before the flowers appear (when the tree is about three months old), will encourage the tree to become bushy and produce many pods within easy reach. Pinching helps the tree develop a strong production frame for maximizing the yield. If the pinching is not done, the tree has a tendency to shoot up vertically and grow tall, like a mast, with sparse flowers and few fruits found only at the very top.
- ✓ For annual Moringa types, directly following the end of the harvest, cut the tree's main trunk to about 90 cm from ground level. About two weeks later 15 to 20 sprouts will appear below the cut. Allow only 4-5 robust branches to grow and nib the remaining sprouts while they are young, before they grow long and harden. Continue the same



pinching process as done with new seedlings so as to make the tree bushy. After the second crop, the trees can be removed and new seedlings planted for maximum productivity.

- ✓ For perennial Moringa types, remove only the dead and worn out branches every year. Once in four or five years, cut the tree back to one meter from ground level and allow re-growth.
- ✓ **WATERING:** Moringa trees do not need much watering. In very dry conditions, water regularly for the first two months and afterwards only when the tree is obviously suffering. Moringa trees will flower and produce pods whenever there is sufficient water available. If rainfall is continuous throughout the year, Moringa trees will have a nearly continuous yield. In arid conditions, flowering can be induced through irrigation.
- ✓ **FERTILIZING:** Moringa trees will generally grow well without adding very much fertilizer. Manure or compost can be mixed with the soil used to fill the planting pits. Phosphorus can be added to encourage root development and nitrogen will encourage leaf canopy growth. In some parts of India, 15 cm-deep ring trenches are dug about 10cm from the trees during the rainy season and filled with green leaves, manure and ash. These trenches are then covered with soil. This approach is said to promote higher pod yields. Research done in India has also showed that applications of 7.5 kg farmyard manure and 0.37 kg ammonium sulphate per tree can increase pod yields threefold.
- ✓ **PESTS AND DISEASES:** Moringa is resistant to most pests. In very water-logged conditions, Diplodia root rot can occur. In very wet conditions, seedlings can be planted in mounds so that excess water is drained off. Cattle, sheep, pigs and goats will eat Moringa seedlings, pods and leaves. Protect Moringa seedlings from livestock by installing a fence or by planting a living fence around the plantation. A living fence can be grown with *Jatropha curcas*, whose seeds also produce an oil good for soap-making.



For mature trees, the lower branches can be cut off so that goats will not be able to reach the leaves and pods. Termites can be a problem, especially when cuttings are planted.

- ✓ **HARVEST MANAGAMENT:** Apply mulches of castor oil plant leaves, mahogany chips, tephrosia leaves or Persian lilac leaves around the base of the plants. Heap ashes around the base of seedlings. Dry and crush stems and leaves of lion's ear or Mexican poppy and spread the dust around the base of plants. In India, various caterpillars are reported to cause defoliation unless controlled by spraying. The budworm *Noordia moringae* and the scale insects *Diaspidotus* sp. and *Ceroplastodes cajani* are reportedly able to cause serious damage. Also mentioned as pests in India are *Aphis craccibora*, the borer *Diaxenopsis apomecynoides* and the fruit fly *Gitonia* sp. Elsewhere in the world, where *Moringa* is an introduced tree, local pests are less numerous.
- ✓ **HARVESTING:** When harvesting pods for human consumption, harvest when the pods are still young (about 1cm in diameter) and snap easily. Older pods develop a tough exterior, but the white seeds and flesh remain edible until the ripening process begins.
- ✓ When producing seed for planting or for oil extraction, allow the pods to dry and turn brown on the tree. In some cases, it may be necessary to prop up a branch that holds many pods to prevent it breaking off. Harvest the pods before they split open and seeds fall to the ground. Seeds can be stored in well-ventilated sacks in dry, shady places.
- ✓ For making seed oils, harvest seedlings, growing tips or young leaves. Older leaves must be stripped from the tough and wiry stems. These older leaves are more suited to making dried leaf powder since the stems are removed in the pounding and sifting process.

5. PROCESSING & VALUE ADDITION:-

There are several products can be made of *Moringa* as listed below.

- ✓ Moringa Milk



- ✓ Moringa Oil
- ✓ Moringa vegetables (sabji)
- ✓ Moringa Chutney
- ✓ Moringa Pickles
- ✓ Moringa tea
- ✓ Moringa leaf powder
- ✓ Moringa Coffee
- ✓ Moringa Capsules (Superfood)
- ✓ Latte mixes
- ✓ Fusion sweets using different parts of the tree

Apart from Edible products, it is used for beauty products also.

- ✓ Moringa Hair Oil
- ✓ Moringa Face massage Cream
- ✓ Moringa Cream for Body
- ✓ Moringa Skin care cream / Oil
- ✓ Moringa soaps

Even after extraction of oil from seeds, it can be sold in market at approx. 70/- per kg rate, which reduces the cost of moringa seed oil.

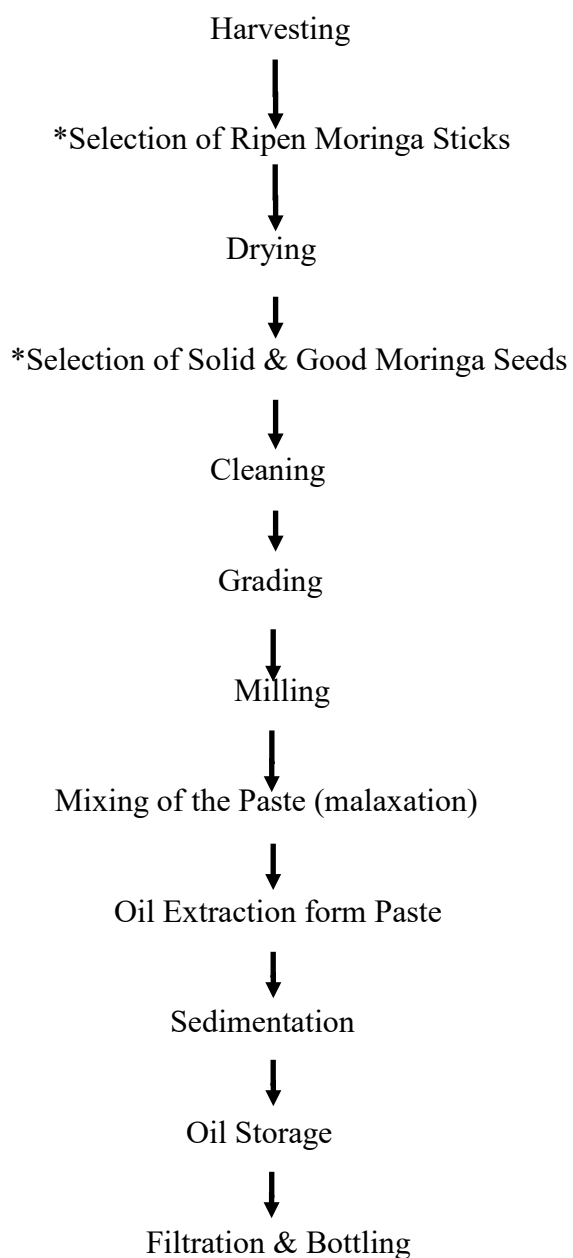
6. MANUFACTURING PROCESS OF THE MORINGA SEED OIL

Moringa oil is derived from the seeds of Moringa oleifera, a small tree native to the Himalayan mountains.

6.2 Flow Chart for Moringa Seed Oil

Manufacturing

The typical Procedure for manufacturing of Moringa Seed Oil is as below:



*** Marked points are established Critical Control Points**

Harvesting and Transport

- ✓ In normal-ripening varieties the time to start harvesting can be judged by the color of the fruit skin. When there are no green moringa fruits left on the tree, perhaps only some fruits at color-change, oil biosynthesis has ceased and harvesting can begin.



- ✓ Improper handling during these phases can result in undesirable enzymatic reactions and the growth of yeasts and molds.
- ✓ When stored before processing, the fruits must be spread in shallow layers and kept in well-ventilated, cool, dry areas. Storing of the fruits in jute sacks has to be avoided. To ensure that the moringa fruits retain the quality characteristics they possessed at the time of harvesting they must be delivered immediately to the extraction plant for processing.

Drying

- ✓ Green Fleshy fruits are subjected to dry first for Oil manufacturing purpose. The outer flesh is then used for powder processing purpose or as cattle feeding.

Milling

- ✓ Moringa seed after drying is made up of approximately 2/3 solid material, and 1/3 oil. The objective of the first true step of moringa seed oil production, crushing the dries seeds, is to produce a paste with easily extracted oil droplets. Two types of machines are used to crush moringa seeds: stone mills and stainless-steel hammer mills. Each has advantages.
- ✓ Hammer mills generally consists of a metal body that rotates at high speed, hurling the seeds against a metal grate. The major advantage of metal crushers is their speed and continuous operation, which translate into high output, compact size, and low cost.

Mixing of the Moringa Seed Paste (Malaxation)

- ✓ Malaxation prepares the paste for separation of the oil from the mass. This step is particularly important if the paste was produced in a hammer mill. The mixing process optimizes the amount of oil extracted through the formation of larger oil droplets and a reduction of the oil-water emulsion.
- ✓ The paste is slowly mixed, bringing small droplets of oil in contact with each other to form larger droplets. This improves the extractability of the oil. Optimally, the malaxator is designed to assure thorough mixing, leaving no portion unmixed. Malaxation usually requires



45 minutes to one hour. The longer the contact between the oil and the fruit water, the more the final polyphenol content of the oil is reduced.

- ✓ The temperature of the paste during malaxation is very important. It should be warm (26° to 30° C, which is still cold to the touch) to improve the viscosity of the oil and improve extractability. Temperatures above 30° C can cause problems such as loss of fruit flavors, increases in bitterness, and increases in astringency.

7. 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 there of i.e. in terms of raw materials availability, market accessibility, logistics support, basic infrastructure availability etc.
- ✓ The ideal locations for establishment of exclusive Moringa Seed Oil processing unit are in the production clusters of Moringa growing states/Areas such as Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, Telangana, Maharashtra & Gujarat.

8. MARKET DEMAND AND SUPPLY FOR MORINGA BASED PRODUCTS

- ✓ The greenery base products especially moringa like, consumption is picking up due to increasing income and changing food habits. Therefore, demand for these products are prevalent across length and breadth of the country throughout the year.
- ✓ Moringa Seed Oil & other products if highlighted properly for all these health benefits can occupy significant cold products market.



- ✓ The global oil (& other adjuncts) value is expected to reach a mammoth one by 2023, recording an anticipated high CAGR during the forecast period (2018-2023).... A very few market giants dominate the global **market** occupying the major selling market.
- ✓ Only thing to be done over here is to replace the existing products with moringa & other green veg. related products with proper demonstration.

9. MARKETING STRATEGY FOR MORINGA SEED OIL.

- ✓ **Marketing strategy** is a long-term, forward-looking approach and an overall game plan of any organization or any business with the fundamental goal of achieving a sustainable competitive advantage by understanding the needs and wants of customers.
- ✓ The increasing urbanization and income offer huge scope for marketing of fruit base products. Urban organized platforms such as departmental stores, malls, super markets can be attractive platforms to sell well packaged and branded Moringa Based products.

10.DETAILED PROJECT ASSUMPTIONS

Detailed Project Assumptions		
Parameter	Assumption	
Capacity of the Moringa Seed oil Unit	30	MT/annum
Utilization of capacity	1st Year Implementation, 55% in second, 65% in third, 75% in fourth year, 85% in fifth, 95% in sixth & 100 % from seventh year onwards	
Working days per year	300	days
Working hours per day	10	hours
Interest on term and working capital loan	12%	



Repayment period	Seven year with one year grace period is considered.	
Average prices of raw material	300	
Average sale prices per kg	1500	Rs/kg
Oil extraction	33.33	
moringa Seed Oil	1 kg Moringa oil form 3.15 kg dried moringa Seeds	

- ✓ This model DPR for manufacturing 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 unit by adding new line.
- ✓ 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. Dried Moringa Seed cost considered @ Rs. 300/- per kg.
 2. Yield from moringa seed to Oil is considered as 33.33 %, which may vary depend on degree of cleanliness of the seed, and seed purchase is assumed as a bulk & in that 5% approx. will be eliminated as a rejection due to over ripened, decayed, diseased, rotten, wet etc.
 3. Machinery cost may also vary from vendor to vendor.
- ✓ Land and civil infrastructures are assumed as already available with the entrepreneurs.



11. PROJECT START-UP COSTING SHEETS

Land and Building.

Land and Civil Infrastructures	
1. Land 500 sq. ft	Assumed land already developed and has 500 sq. ft. built in area. Rs. 4.00 Lakhs
2. Built up processing area 300 Sq. Ft.	
Total	Rs. 6.00 Lakhs

- Land and civil infrastructures are assumed as already available with the entrepreneurs.

Still we have considered approx. 6 lac Rs. as a construction cost for safer side of the entrepreneur.

Machinery and Equipment: - Rs. 7.86 Lacs

Machinery and Equipment				
Sr. No	Equipment	Quantity	Capacity	Amount (in Lakhs)
1	Hammer Miller	1	100 kg/h	1.4
2	Malaxator	1		1
3	Oil expeller	1	100 kg/h	1.5
4	Vertical centrifuge machine	1	100 L	0.8
5	Oil Settling Tank	1	150 L	0.3
6	Oil storage tank with heater	1	500 L	1.2
7	Load cell base Oil filling machine	1	Suitable	0.8
8	Induction sealer	1	Suitable	0.3
9	Weighing balance	1	10 kg	0.06
10	Accessories	1	Standard	0.5
	TOTAL			7.86



Other costs:-

Utilities and Fittings:-

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

Other Fixed Assets:-

Other Fixed Assets	
1. Furniture & Fixtures	Rs. 1.2 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. 1.1 Lac.

So total start up cost at own land & Premise may be somewhat similar to **18.39 lacs**. This is according to survey done at X location India. This may vary on location, situation and design change over.

Working capital requirement (in Lacs)

Particulars	Period (Days)	55%	65%	75%
		Year 2	Year 3	Year 4
Raw material stock	3	2.98	3.53	4.81
Work in progress	6	5.97	7.05	9.62
Packing material	10	0.15	0.18	0.24
Finished goods' stock	5	5.14	6.07	8.28
Receivables	10	10.28	12.15	16.57
Working expenses	7	0.13	0.15	0.20
Total current assets		24.65	29.13	39.72
Trade creditors		0.00	0.00	0.00
Working capital gap		24.65	29.13	39.72
Margin money (25%)		6.16	7.28	9.93
Bank finance		18.49	21.85	29.79

12.INSTALLED CAPACITY OF THE MORINGA SEED OIL MANUFACTURING UNIT

The maximum installed capacity of the Moringa Seed Oil manufacturing unit in the present model project is proposed as 30 tons/annum or 100 kg/day Moringa Seed Oil manufacturing. The unit is assumed to operate 300 days/annum @ 8-10 h/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 and 4th year onwards 75 percent capacity utilization is assumed in this model project.



Total Project Cost and Means of Finance (Rs. in Lakhs)

Particulars	Amount in Lakhs
i. Land and building (20 x 32 x 12 ft -LxBxH)	6
ii. Plant and machinery	7.86
iii. Utilities & Fittings	1.2
iv. Other Fixed assets	0.9
v. Pre-operative expenses	0.90
vi. Contingencies	1.20
vii. Working capital margin	6.16
Total project cost (i to vii)	24.22
Means of finance	
i. Subsidy	8.48
ii. Promoters Contribution	6.06
iii. Term Loan (@10%)	9.69

Manpower Requirement

Total Monthly Salary (Rs.)	No	Wages	Total Monthly	Annual Amount
Supervisor (can be the owner)	1	15,000	15,000	1,80,000
Technician	1	12,000	12,000	1,44,000
Semi skilled	1	6,000	6,000	72,000
Sales man	1	6,000	6,000	72,000
Total			39,000	4,68,000



13.EXPENDITURE, REVENUE & PROFITABILITY ANALYSIS.

		Year						
	Particulars	1	2	3	4	5	6	7
A	Total Installed Capacity (MT)	94.5 MT moringa seed / annum	16.5	19.5	22.5	25.5	28.5	30
	Capacity utilization (%)	Under Const.	55%	65%	75%	85%	95%	100%
B	Expenditure (Rs. in Lakh)	0						
	moringa seed (Avg. Price @ Rs. 120/kg)	0.00	155.93	184.28	212.63	240.98	269.33	283.50
	Packaging materials	0.00	2.48	2.34	2.70	3.06	3.42	3.60
	Utilities (Electricity, Fuel)	0.00	0.37	0.44	0.51	0.58	0.65	0.68
	Salaries (1st yr only manager's salary)	1.80	4.68	4.68	4.68	4.68	4.68	4.68
	Repair & maintenance	0.00	0.70	0.80	0.90	0.90	0.90	0.90
	Insurance	0.30	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	2.30
	Total Expenditure	2.60	166.75	195.14	224.01	252.79	281.57	295.96
C	Total Sales Revenue (Rs. in Lakh)	0.00	264.00	312.00	360.00	408.00	456.00	456.00
	Sale of moringa	0.00	264.00	312.00	360.00	408.00	456.00	456.00



	seed oil (Avg. Sale Price @ Rs.1600/kg)							
D	PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows	-2.60	97.25	116.86	135.99	155.21	174.43	160.04
	Depreciation on civil works @ 5% per annum	0.30	0.29	0.27	0.26	0.24	0.23	0.23
	Depreciation on machinery @ 10% per annum	0.79	0.71	0.64	0.57	0.52	0.46	0.46
	Depreciation on other fixed assets @ 15% per annum	0.18	0.15	0.13	0.11	0.09	0.08	0.08
	Interest on term loan @ 12%	1.01	0.97	0.93	0.89	0.84	0.50	0.79
	Interest on working capital @ 12%	0.00	2.22	2.62	3.58	3.58	3.58	3.58
E	Profit after depreciation and Interest (Rs. in Lakh)	-4.87	95.13	114.89	134.15	153.51	173.15	158.47
F	Tax (assumed 30%) (Rs. in Lakh)	0.00	28.54	34.47	40.25	46.05	51.95	47.54
G	Profit after depreciation, Interest & Tax (Rs.	-4.87	66.59	80.42	93.91	107.46	121.21	110.93



	in Lakh)							
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	1.01	0.97	0.93	0.89	0.84	0.50	0.79
I	Coverage available (Rs. in Lakh)	1.01	0.97	0.93	0.89	0.84	0.50	0.79
J	Total Debt Outgo (Rs. in Lakh)	0.34	0.37	0.41	0.45	0.50	7.62	0.55
K	Debt Service Coverage Ratio (DSCR)	3.00	2.62	2.28	1.97	1.69	0.07	1.44
	Average DSCR	2.18						
L	Cash accruals (PBDIT- Interest-Tax) (Rs. in Lakh)	-3.61	67.74	81.46	94.85	108.31	121.98	111.71
M	Payback Period	2.5 Years						
	(on Rs. 26.40 Lakhs initial investment)							



14. REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	9,68,882.16	1,34,402.54	1,00,763.74	33,638.80	9,35,243.36
2	9,35,243.36	1,34,402.54	97,265.31	37,137.23	8,98,106.13
3	8,98,106.13	1,34,402.54	93,403.04	40,999.50	8,57,106.63
4	8,57,106.63	1,34,402.54	89,139.09	45,263.45	8,11,843.17
5	8,11,843.17	1,34,402.54	84,431.69	49,970.85	7,61,872.32
6	7,61,872.32	1,34,402.54	79,234.72	55,167.82	7,06,704.50
7	7,06,704.50	1,34,402.54	73,497.27	60,905.27	6,45,799.23
8	6,45,799.23	1,34,402.54	67,163.12	67,239.42	5,78,559.81
9	5,78,559.81	1,34,402.54	60,170.22	74,232.32	5,04,327.49
10	5,04,327.49	1,34,402.54	52,450.06	81,952.48	4,22,375.01
11	4,22,375.01	1,34,402.54	43,927.00	90,475.54	3,31,899.47
12	3,31,899.47	1,34,402.54	34,517.54	99,885.00	2,32,014.47
13	2,32,014.47	1,34,402.54	24,129.50	1,10,273.04	1,21,741.43
14	1,21,741.43	1,34,402.54	12,661.11	1,21,741.43	(0.00)
		18,81,636	9,12,753	9,68,882	(9,68,882)

15.ASSETS' DEPRECIATION (DOWN VALUE METHOD)

Particulars	Year							
	1	2	3	4	5	6	7	8
Civil works	6.00	5.70	5.42	5.14	4.89	4.64	4.41	4.19
Depreciation	0.30	0.29	0.27	0.26	0.24	0.23	0.22	0.21
Depreciated value	5.70	5.42	5.14	4.89	4.64	4.41	4.19	3.98
Plant & Machinery	7.86	7.07	6.37	5.73	5.16	4.64	4.18	3.76
Depreciation	0.79	0.71	0.64	0.57	0.52	0.46	0.42	0.38
Depreciated value	7.07	6.37	5.73	5.16	4.64	4.18	3.76	3.38



Other Fixed Assets	1.20	1.02	0.87	0.74	0.63	0.53	0.45	0.38
Depreciation	0.18	0.15	0.13	0.11	0.09	0.08	0.07	0.06
Depreciated value	1.02	0.87	0.74	0.63	0.53	0.45	0.38	0.33
All Assets	15.06	13.79	12.65	11.61	10.67	9.82	9.04	8.33
Depreciation	1.27	1.15	1.04	0.94	0.85	0.78	0.71	0.64
Depreciated value	13.79	12.65	11.61	10.67	9.82	9.04	8.33	7.69

16.FINANCIAL ASSESSMENT OF THE PROJECT

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

Particulars	Year								
	1	2	3	4	5	6	7	8	
Capital cost (Rs. in Lakh)	24.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Recurring cost (Rs. in Lakh)	2.60	166.75	195.14	224.01	252.79	295.96	295.96	295.96	
Total cost (Rs. in Lakh)	26.82	166.75	195.14	224.01	252.79	295.96	295.96	295.96	1753.40
Benefit (Rs. in Lakh)	0.00	264.00	312.00	360.00	408.00	456.00	456.00	456.00	
Total Depreciated value of all assets (Rs. in Lakh)								7.69	
Total benefits (Rs. in Lakh)	0.00	264.00	312.00	360.00	408.00	456.00	456.00	463.69	2719.69
Benefit-Cost Ratio (BCR): (Highly Profitable project)	1.551								
Net Present Worth (NPW):	966.29								

17.BREAK-EVEN ANALYSIS



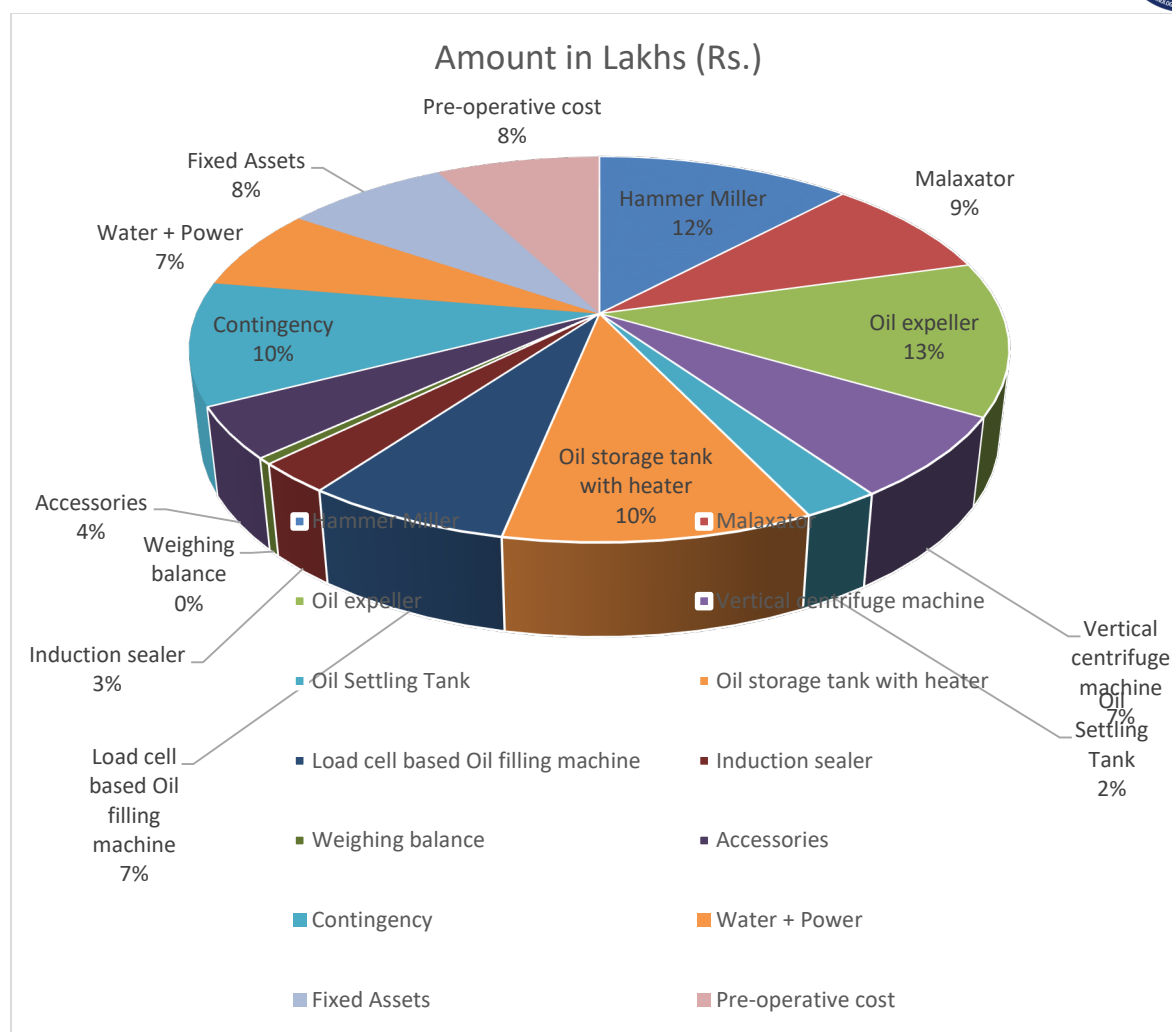
Sr. No.	Particulars	Year							
		1	2	3	4	5	6	7	8
	Capacity utilization (%)	Under Const.	55%	65%	75%	85%	95%	100%	100%
	Production MT/Annum		16.5	19.5	22.5	25.5	28.5	28.5	28.5
A	Fixed Cost (Rs. in Lakh)								
	Permanent staff salaries	4.68	4.68	4.68	4.68	4.68	4.68	4.68	4.68
	Depreciation on building @ 5% per annum	0.30	0.29	0.27	0.26	0.24	0.23	0.22	0.21
	Depreciation on machinery @ 10% per annum	0.79	0.71	0.64	0.57	0.52	0.46	0.42	0.38
	Depreciation on other fixed assets @ 15% per annum	0.18	0.15	0.13	0.11	0.09	0.08	0.07	0.06
	Interest on term loan	1.01	0.97	0.93	0.89	0.84	0.79	0.73	0.67
	Insurance	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Total Fixed Cost (Rs. in Lakh)	7.254	7.098	6.951	6.812	6.678	6.548	6.421	6.295
B	Sales Revenue (Rs. in Lakh)	0	264	312	360	408	456	456	456
C	Variable Cost (Rs. in Lakh)								
	Dried Moringa Seeds (Av. Price @ Rs.300/Kg)	0.00	155.93	184.28	212.63	240.98	269.33	269.33	269.33
	Packaging materials	0.00	2.48	2.93	3.38	3.83	4.28	4.28	4.28
	Casual staff salaries	0.00	3.18	3.18	3.18	3.18	3.18	3.18	3.18
	Utilities (Electricity, Fuel)	0.00	0.37	0.44	0.51	0.58	0.65	0.65	0.65
	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	2.22	2.62	3.58	3.58	3.58	3.58	3.58
	Total Variable Cost (Rs. in Lakh)	0.50	166.87	196.24	226.16	255.03	283.90	283.90	283.90
D	Break Even Point (BEP)								
	as % of sale	-	12.00	10.00	8.00	8.00	7.00	7.00	6.00



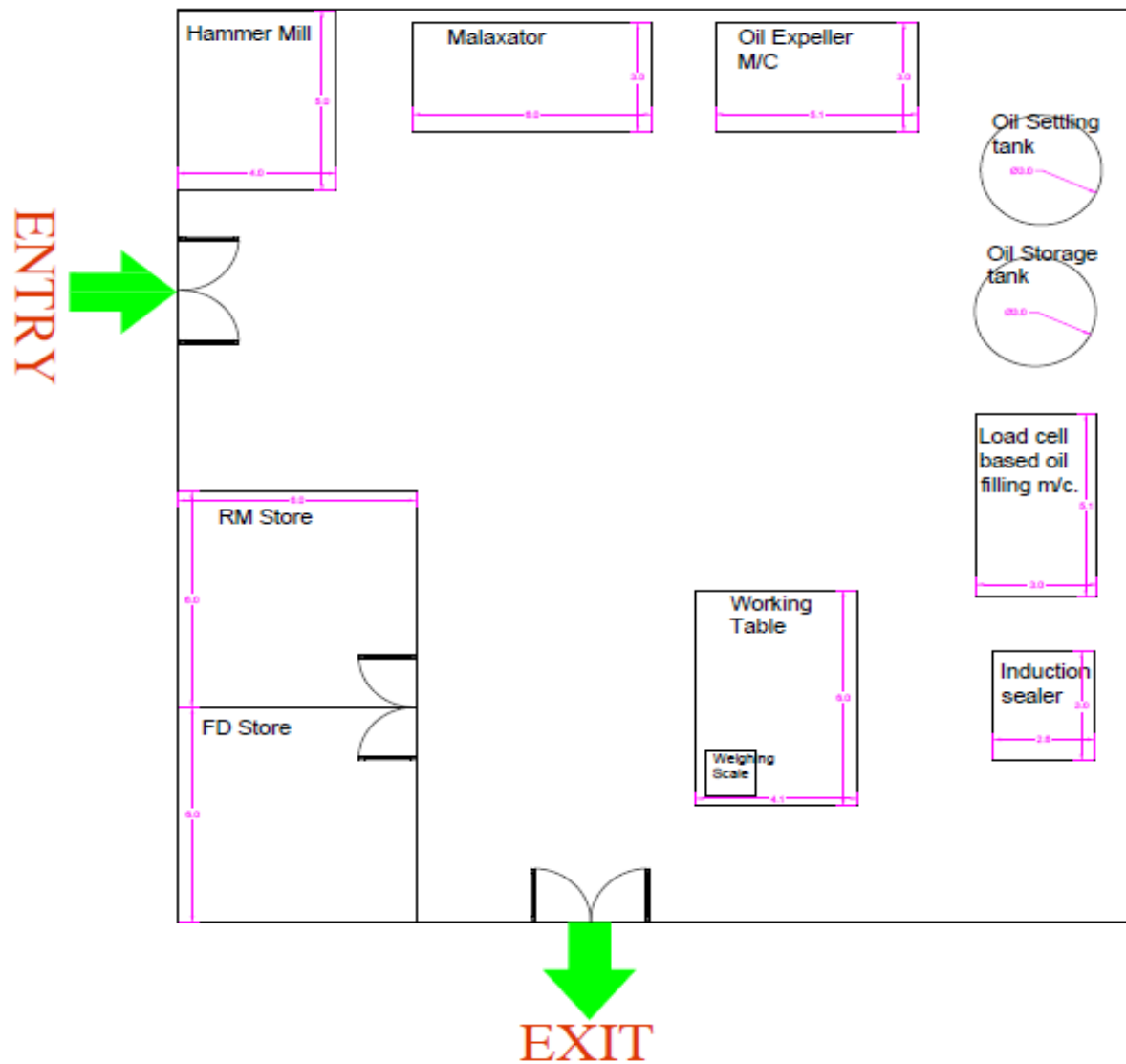
Break Even Point (BEP) in terms of sales value (Rs. in Lakhs)	-	31.68	31.20	28.80	32.64	31.92	31.92	27.36
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18. RAW MATERIAL REQUIREMENTS FOR THE UNIT

- ✓ 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 Moring seed Oil manufacturing project, the unit requires 173 kg/day, 204 kg/day and 236 kg/day dried seeds at 55, 65 and 75 percent capacity utilization, respectively.
- ✓ If there are shortages in supply, then the entrepreneur can use other seasonal seeds / Spices for same purpose to achieve maximum capacity utilization for higher economic efficiency.
- ✓ The fruit must be plucked from plant at mature stage; and then stored below 6°C temperature.
 - a. Pie chart for better understanding of expenses of each head.



19. TYPICAL MORINGA SEED OIL MANUFACTURING UNIT LAYOUT



- The figures depicted here are in feet.



20.MACHINERY SUPPLIERS

There are many machinery suppliers available within India for Green vegetables base products processing machineries and equipments. Some of the suppliers are:

1. Bajaj Process pack Limited, Noida, India
2. Shriyan Enterprises. Mumbai, India

21.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.



22.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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