PM Formalisation of

Micro Food Processing Enterprises (PM-FME) Scheme

MODEL DETAILED PROJECT REPORT

PROCESSING OF TURMERIC POWDER

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CHAPTER 1: THE PROJECT AT A GLANCE

1.	Name of the proposed project	:	Turmeric powder Processing Unit
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 Partners (if partnership)	:	
7.	No. of share holders (if company/FPC)	:	
8.	Technical advisor	:	
9.	Marketing advisor/partners	:	
10.	Proposed project capacity	:	120 MT/ annum (60%, 70%, 80% &90% capacity utilization in the 2nd, 3rd, 4th & 5th years respectively)
11.	Raw materials	:	Turmeric
12.	Major product outputs	:	Turmeric powder
13.	Total Project Cost	:	Rs. 35.90 Lakhs
	• Land development, building & civil construction(only for expansion of existing built-up area)	:	*Rs 2.00 Lakhs*
	• Machinery and equipments	:	*Rs 20.00 Lakhs*
	• Utilities (Power & water facilities)	:	*Rs 2.00 Lakhs*
	• Miscellaneous fixed assets	:	*Rs 2.00 Lakhs*
	• Pre-operative expenses	:	*Rs 0.25 Lakhs*
	• Contingencies	:	*Rs 2.00 Lakhs*
	• Working capital margin	:	*Rs 7.65 Lakhs*
14.	Working capital requirement		
	• 2 nd year	:	*Rs 30.59 Lakhs*
	• 3 rd year	:	*Rs 37.63 Lakhs*
	• 4 th year	:	*Rs 42.99 Lakhs*
15.	Means of Finance		
	• Subsidy grant by MoFPI (max 10 lakhs)	:	*Rs 10.00 Lakhs*
	• Promoter's contribution (min 20%)	:	*Rs 7.90 Lakhs*
	• Term loan (42%)	:	*Rs 18.00 Lakhs*
16.	Debt-equity ratio	:	2.28:1
17.	Profit after Depreciation, Interest & Tax		
	• 2 nd year	:	*(Rs 0.81 Lakhs)*
	• 3 rd year	:	*Rs 15.58 Lakhs*
	• 4 th year	:	*Rs 19.85 Lakhs*
18.	Average DSCR	:	6.97
19.	Benefit-Cost Ratio	:	1.12
20.	Term loan repayment	:	7 years with 1year grace period
21.	Payback period for investment	:	4 years

CHAPTER 2

General Overview of Production, Post Harvest Management and Value Addition of Turmeric in India

2.1 Introduction

Turmeric (*Curcuma longa* L.) is one of the oldest cultivated crops which has been grown in India for several thousand years. Turmeric, the main spice powder in the Indian cuisine, is considered by many to be the most powerful herb on the planet at fighting and potentially reversing disease. Turmeric is an erect perennial crop, but it is grown as an annual crop. The leafy shoot rarely exceeds one meter in height. The primary tuber at the base of the aerial stem bears rhizome which is the economic portion called as bulb and fingers. Turmeric is traditionally well known for its culinary and medicinal properties. It is one of the multiuse products having many valuable properties and uses. It is extensively used in food, textile, medicine and cosmetic industries. Turmeric can be grown in the tropical and subtropical countries. It is grown throughout the world particularly in the tropical countries. Though it is grown in many countries, it is not commercially exploited in most of the countries.

India is the largest producer, consumer and exporter of turmeric in the world. Turmeric was cultivated over an area of 1.94 lakh ha in India with a production of 10.51 lakh tonnes during 2016-17. The global production of turmeric is around 11 lakh tonnes per annum. India dominates the world production scenario contributing 78% followed by China (8%), Myanmar (4%) and Nigeria and Bangladesh together contributing to 6% of the global production. India is virtually a monopoly supplier to the world with a share of about 76 per cent of the total global output and 90 per cent of the global trade. Major turmeric exporting countries are India, Thailand, Taiwan, and several other Southeast Asian, Central and Latin American countries.

During 2000-01 the export of turmeric was 44,627 tonnes and was increased to 51500 tonnes in 2006-07. Export earnings have increased from Rs. 11558 Lakhs in 2000-01 to Rs.16480 Lakhs in 2006-07. The UAE, Bangladesh, Srilanka, USA and Japan are the major markets for Indian turmeric. India enjoys a monopoly position with a share of 90 percent in the International trade for turmeric. However China, Peru and Thailand are emerging as stiff competitors in the recent years.

The potential for value added products provides an extremely viable opportunity for sustainable promotion of rural as well as urban livelihoods. Processing of Turmeric into value added products at small scale/ village level and selling to the markets directly/ tying up with big aggregators will help both the farmers and the consumers.

Therefore, processing of Turmeric into value added products such as Turmeric powder can ensure nutritional and food security, improved profitability and also offers huge scope for entrepreneurship development at micro, small or medium scale levels using effective government schemes such as PM-Formalization of Micro Food Processing Enterprises Scheme of MoFPI, Government of India.

2.2 Origin and distribution of Turmeric

While there is speculation that turmeric may have originated from South or South-East Asia, its center of domestication is certainly the Indian subcontinent. Curcuma longa and several other species of the curcuma genus grow wild in the forests of Southern Asia including India, Indonesia, Indochina, nearby Asian countries, and some Pacific Islands including Hawaii. All of these areas have traditional culinary and medicinal uses going back to pre-history.

In the Indian Ayurveda system of medicine, turmeric is known as strengthening and warming to the whole body. Traditional uses in India include to improve digestion, to improve intestinal flora, to eliminate worms, to relieve gas, to cleanse and strengthen the liver and gallbladder, to normalize menstruation, for relief of arthritis and swelling, as a blood purifier, to warm and promote proper metabolism correcting both excesses and deficiencies, for local application on sprains, burns, cuts, bruises, insect bites and itches, for soothing action in cough and asthma, as antibacterial and anti-fungus, and in any condition of weakness or debility.

Turmeric is eaten as a food both raw and cooked throughout Asia. While turmeric root looks much like ginger root, it is less fibrous and is more chewable, crunchy, and succulent. The fresh root (not the powder) has a mildly sweet and nutty favor mixed with its bitter flavor. As a result, it is not unpleasant to eat and not difficult to chew. It is sometimes chewed plain or chopped up and put in salads raw. Traditional use includes mashing/grinding it in a mortar to make a paste to mix with other turmeric powders for flavoring in curries. In modern times, the most common use is of the dried root powder as the base of most curries in India and other nearby countries.

Different Turmeric cultivars in the world

There are two dominant types of turmeric found on the world market: 'Madras', and 'Alleppey', both named after the regions of production in India. The orange-yellow flesh Alleppey turmeric

is predominantly imported by the United States, where users prefer it as a spice and a food colorant. Alleppey turmeric contains about 3.5% to 5.5% volatile oils, and 4.0% to 7.0% curcumin. In contrast, the Madras type contains only 2% of volatile oils and 2% of curcumin.

The Madras turmeric is preferred by the British and Middle Eastern markets for its more intense, brighter and lighter yellow color, better suited for the mustard paste and curry powder or paste used in oriental dishes. Turmeric produced in the Caribbean, Central and South America has low curcumin and volatile oil contents, and is darker; it is not desired by the U.S. importers. The Bengal type is preferred for use in dyes in India. It is interesting to note that in the United States, turmeric is considered as a spice by the food industry, whereas it is classified as a food colorant by the FDA.

However, the increasing demand for natural products as food additives makes turmeric an ideal candidate as a food colorant, thus increasing demand for it. Additionally, recent medical research demonstrating the anti-cancer and anti-viral activities of turmeric may also increase its demand in Western countries

2.3 Production of Turmeric in India

India is the largest producer, consumer and exporter of turmeric in the world, accounting for about 80 per cent of world production and 60 per cent of world exports. Indian turmeric is considered to be the best in the world market because of its high curcumin content. Favourable weather conditions prevailing in major turmeric growing areas and the important steps taken by the Turmeric powders Board including educational programmes for growers on improved methods have led to increase in productivity of turmeric. Besides these high yielding varieties released over the years had their own contribution.

Table 1: Area, production and productivity of Turmeric in India

Years	Area (In ' 000 hectare)	Production (In ' 000 MT)	Productivity (In MT/ hectare)
2006-07	178.5	786.8	4.4
2007-08	175.3	794.4	4.5
2008-09	190.7	877.2	4.6
2009-10	184.4	918.9	5
2010-11	222.9	1237.4	5.6

2011-12	218.7	1166.8	5.3
2012-13	194.2	986.8	5.1
2013-14	232.7	1189.9	5.1
2014-15	184.4	830.4	4.5
2015-16	186	943	5.1
2016-17	222	1132	5

2.3.1 Production and yield of Turmeric in major states in India

Major turmeric producing states in India are the southern states of Telangana, Andhra Pradesh, Tamil Nadu and Karnataka, the eastern states of Orissa and West Bengal, and the western state of Maharashtra.

Table 2: State-wise share in area and production

State	Area	Percent share	Production	Percent share
Tamil Nadu	29306	15.15	112590	10.71
Telangana	50000	25.85	255000	24.67
Andhra Pradesh	16570	8.57	134122	12.76
Karnataka	14994	7.75	76490	7.28
Gujarat	4100	2.12	65500	6.23
West Bengal	18000	9.31	45500	4.33
Orissa	3233	1.67	35759	3.40
Mizoram	7204	3.73	27816	2.65
Assam	17059	8.82	17025	1.62
Hariyana	1500	0.78	22000	2.09
Others	31429	16.25	259358	24.26
Total	193395	100.00	1051160	100.00

2.4 Composition and Nutritional value of Turmeric

Table 3: Composition & Nutritive Value of Turmeric (per 100 g of edible portion), fresh weight basis

Principle	Nutrient Value	Percentage of RDA
Energy	354 Kcal	17%
Carbohydrates	64.9 g	50%
Protein	7.83 g	14%
Total Fat	9.88 g	33%
Cholesterol	0 mg	0%
Dietary Fiber	21 g	52.5%
Vitamins		
Folates	39 µg	10%
Niacin	5.140 mg	32%
Pyridoxine	1.80 mg	138%
Riboflavin	0.233 mg	18%
Vitamin A	0 IU	0%
Vitamin C	25.9 mg	43%
Vitamin E	3.10 mg	21%
Vitamin K	13.4 µg	11%
Electrolytes		
Sodium	38 mg	2.5%
Potassium	2525 mg	54%
Minerals		
Calcium	183 mg	18%
Copper	603 µg	67%
Iron	41.42 mg	517%
Magnesium	193 mg	48%
Manganese	7.83 mg	340%
Phosphorus	268 mg	38%
Zinc	4.35 mg	39.5%

Source: USDA National Nutrient Database

2.5 Health benefits of Turmeric

Turmeric has healing properties. Besides flavoring food, use to purify the blood and skin conditions remedy is probably the most common use of Turmeric in Ayurveda. The main organs that turmeric treats are the skin, heart, liver and lungs. Turmeric is used for epilepsy

and bleeding disorders, skin diseases, to purify the body-mind, and to help the lungs expel Kapha.

Activities of Turmeric include: Alterative, analgesic, antibacterial, anti-inflammatory, anti-tumor, anti-allergic, antioxidant, antiseptic, antispasmodic, appetizer, astringent, cardiovascular, carminative, cholagogue, digestive, diuretic, stimulant, and vulnerary. Therapeutic uses of Turmeric include treatment of Anemia, cancer, diabetes, digestion, food poisoning, gallstones, indigestion, IBS, parasites, poor circulation, staph infections, and wounds.

Turmeric helps to regulate the female reproductive system and purifies the uterus and breast milk. Turmeric reduces fevers, diarrhea, urinary disorders, insanity, poisoning, cough, and lactation problems in general. Turmeric is used to treat external ulcers that respond to nothing else. Turmeric decreases Kapha and so is used to remove mucus in the throat, watery discharges like leucorrhea, and any pus in the eyes, ears, or in wounds, etc. In Ayurvedic cooking, turmeric is everywhere, this multifaceted wonder turmeric powder helps to detoxify the liver, balance cholesterol levels, fight allergies, stimulate digestion, boost immunity, enhance the complexion. It is also an antioxidant Ayurveda recognizes turmeric as a heating powder, contributing bitter, pungent and astringent tastes.

It is a natural antiseptic and antibacterial agent, useful in disinfecting cuts and burns. When combined with cauliflower, it has shown to prevent prostate cancer and stop the growth of existing prostate cancer. It may prevent melanoma and cause existing melanoma cells to die. Turmeric reduces the risk of childhood leukemia and is a natural liver detoxifier. It may prevent metastases from occurring in many different forms of cancer. Turmeric can prevent and slow the progression of Alzheimer's disease by removing amyloyd plaque buildup in the brain. It is a potent natural anti-inflammatory that works as well as many anti-inflammatory drugs but without the side effects and hence it is a natural treatment for arthritis and rheumatoid arthritis. Turmeric is a natural painkiller and aids in fat metabolism and helps in weight management. Turmeric speeds up wound healing and assist in remodeling of damaged skin and it may help in the treatment of psoriasis and other inflammatory skin conditions.

2.6 Turmeric Varieties in India

There are about 30 turmeric varieties grown in India. Among them Alleppey and Madras (Perianadan) are of great commercial importance. Some of the improved varieties are: CO-11983, BSR-11986, Krishna, Roma, Suroma, Ranga, Rasmi, Megha Turmeric-1, Suguna, Sudarshana, Suranjana, Duggirala, Kodur, Suvarna, Varna, IISR Prabha, IISR Pratibha,

Rajendra Sonia etc. Description of some of the varieties is given below:

Table 4: Some of the commercial and improved varieties	
Alleppey	Highly coloured variety.It is grown in Kerala and is marketed as Alleppey turmeric.
Duggirala	A long duration type (9 months), major variety of Andhra Pradesh. Rhizomes are bright yellow in colour. Grown mostly in Guntur district. Yield of raw material 25 tons./ha.
Armoor	Mostly grown in Nizamabad district of Andhra Pradesh. Medium duration type. Yield of raw material 25-30 tons/ha.
Suvarna	This is a high yielding type released by IISR, Calicut. It has yield potential of 43 tons/ha. It has also high curcumin content of 8.7%

Table 5: Yield characteristics of improved turmeric varieties

Sl. No	Variety	Mean yield (fresh) (t/ha)	Crop duration (days)	Dry recovery (%)	Curcumin (%)	Oleoresin (%)	Essential oil (%)
1	Suvarna	17.4	200	20.0	4.3	13.5	7.0
2	Suguna	29.3	190	12.0	7.3	13.5	6.0
3	Sudarsana	28.8	190	12.0	5.3	15.0	7.0
4	IISR Prabha	37.5	195	19.5	6.5	15.0	6.5
5	IISR Prathibha	39.1	188	6.2	6.5	16.2	6.2
6	Co-1	30.0	285	19.5	3.2	6.7	3.2
7	BSR-1	30.7	285	20.5	4.2	4.0	3.7
8	Krishna	9.2	240	16.4	2.8	3.8	2.0
9	Sugandham	15.0	210	23.3	3.1	11.0	2.7
10	Roma	20.7	250	31.0	9.3	13.2	4.2

11	Suroma	20.0	255	26.0	9.3	13.1	4.4
12	Ranga	29.0	250	24.8	6.3	13.5	4.4
13	Rasmi	31.3	240	23.0	6.4	13.4	4.4
14	Rajendra Sonia	42.0	225	18.0	8.4	-	5.0
15	Supreme	35.4	210	19.3	6.0	16.0	4.0
16	IISR Kedaram	34.5	210	18.9	5.5	13.6	3.0

2.7 Cultivation and Harvesting of Turmeric

2.7.1 Climatic and soil requirements

Turmeric can be grown in diverse tropical conditions from sea level to 1500 m above sea level, at a temperature range of 20-35o C with an annual rainfall of 1500 mm or more, under rain-fed or irrigated conditions. Though it can be grown on different types of soils, it thrives best in well-drained sandy or clay loam soils with a pH range of 4.5-7.5 with good organic status.

2.7.2. Land preparation

The land is prepared with the receipt of early monsoon showers. The soil is brought to a fine tilth by giving about four deep ploughing. Hydrated lime @ 500 - 1000 kg/ha has to be applied for laterite soils based on the soil pH and thoroughly ploughed. Immediately with the receipt of pre-monsoon showers, beds of 1.0 m width, 30 cm height and of convenient length are prepared with spacing of 50 cm between beds. Planting is also done by forming ridges and furrows.

2.7.3. Propagation and planting

Whole or split mother and finger rhizomes are used for planting and well developed healthy and disease free rhizomes are to be selected. The seed rhizomes are treated with mancozeb 0.3% (3 g/L of water) for 30 minutes, shade dried for 3-4 hours and planted. A seed rate of 2,500 kg of rhizomes is required for planting one hectare of turmeric.

2.7.4. Manuring & mulching

Farmyard manure (FYM) or compost @ 30-40 t/ha is applied by broadcasting and ploughing at the time of preparation of land or as basal dressing by spreading over the beds or in to the pits at the time of planting. Organic manures like oil cakes can also be applied @ 2 t/ha. In such case, the dosage of FYM can be reduced.

The crop is to be mulched immediately after planting with green leaves @ 12-15 t/ha. Mulching may be repeated @ 7.5 t/ha at 40 and 90 days after planting after weeding, application of fertilizers and earthing up

2.7.5. Weeding & irrigation

Weeding has to be done thrice at 60, 90 and 120 days after planting depending upon weed intensity. In the case of irrigated crop, depending upon the weather and the soil conditions, about 15 to 23 irrigations are to be given in clayey soils and 40 irrigations in sandy loams.

2.7.6. Mixed cropping

Turmeric can be grown as an intercrop in coconut and arecanut plantations. It can also be raised as a mixed crop with chillies, colocasia, onion, brinjal and cereals like maize, ragi, etc.

2.7.7. Harvesting

Well managed turmeric crop is ready for harvest in seven to nine months depending on the variety and time of sowing. The crop is generally harvested during January to March. On maturity, the leaves turn dry and are light brown to yellowish in colour. Usually the land is ploughed and the rhizomes are gathered by hand picking or the clumps are carefully lifted with a spade. Harvested rhizomes are cleaned of mud and other extraneous matter adhering to them. The average yield per acre is 8 -10 tonnes of green turmeric. Fingers are separated from mother rhizomes. Mother rhizomes are usually kept as seed material. The green turmeric is cured for obtaining dry turmeric.

Rhizomes for seed purpose are generally stored by heaping in well ventilated rooms and covered with turmeric leaves. The seed rhizomes can also be stored in pits with saw dust, sand along with leaves of Stychnos nux-vomica. The pits are to be covered with wooden planks with one or two openings for aeration.

2.8 Post Harvest Operations, Processing and Storage of Turmeric

2.8.1 Post harvest operations for Turmeric

The harvested turmeric rhizomes before entering into the market is converted into a stable commodity through a number of post harvest processing operations like boiling, drying and polishing. Boiling of turmeric is taken up within 3 or 4 days after harvest. The fingers and bulbs (or mother rhizomes) are separated and are cured separately, since the latter take a little longer to cook. The dry recovery of the different turmeric varieties vary widely ranging from 19 to 23%.

a. Boiling

Boiling is the first post harvest operation to be performed at the farm level which involves cooking of fresh rhizomes in water until soft before drying. Boiling destroys the vitality of fresh rhizomes, avoids the raw odour, reduces the drying time and yields uniformly coloured product. In the traditional method, a vessel made of galvanized iron sheet is used for turmeric boiling. Boiling of turmeric rhizomes is carried out till froth forms and white fumes come out of the pan with a characteristic odour. Boiling is considered complete by pressing a pointed stick in to the rhizomes with slight pressure. The other indications of the completion of boiling process are softness and easy breaking of rhizomes when pressed between the fore finger and thumb and a yellow interior instead of red one. An effective cooking time of 45 to 60 minutes for fingers and 90 minutes for mother rhizomes is considered essential. Overcooking and under cooking are found to affect the quality of the rhizome.

Improved turmeric boiler using steam boiling technique is followed when large quantities of turmeric are to be cured. The TNAU model of improved steam boiler for turmeric consists of a trough, inner perforated drums and lid. The outer drum is made of 18 SWG thick mild steel to a size of 122 x 122 x 55 cm. A lid is provided with hooks for easy lifting and also provided with an inspection door. For easy draining and cleaning, an outlet is placed at the bottom of the drum. Four numbers of inner drums of 48 x 48 x 45 cm size are provided in the outer drum. The capacity of four inner drum is 100 kg. The inner drums are provided with a leg for a height of 10 cm, so that the rhizomes will not come in contact with water filled for about 6-8 cm depth in the outer drum. The outer drum is placed with more than half of its depth below the ground level by digging a pit, which serves as a furnace. This furnace is provided with two openings, one for feeding the fuel and the other one for removing the ash and unburnt.

After placing the turmeric boiler in the furnace, about 75 litres of water is added (6-8 cm depth). About 55 - 70 kg of well washed rhizome is taken in each inner drum and placed in the boiler and the lid is placed in position. Using the available agricultural waste materials, mostly, the turmeric leaves, fire is put in the furnace. During the boiling process, it takes about 25 minutes to produce steam and boil the initial batch of rhizomes and 10 - 15 minutes for the subsequent batches. Through the inspection door, the stage of boiling of the rhizome is assessed by pressing the rhizomes with a hard pin / needle. Using a long pole, the lid is removed and the inner drums are lifted one by one.

For the next batch, about 20 litres of water is added to the outer drum, depending on the water lost by evaporation. The next batch of rhizomes is loaded in all the drums and heating is continued. At the end of the boiling process, all the drums need to be cleaned free of mud and soil to avoid damage and enhance the life of the gadget. The capacity of the boiler is about 100 kg per batch and the fuel requirement is 70 – 75 kg of agricultural waste materials.

b. Drying

The cooked fingers are dried in the sun by spreading in 5-7 cm thick layers on the drying floor. A thin layer is not desirable, as the colour of the dried product may be adversely affected. During night time, the material should be heaped or covered. It may take 10-15 days for the rhizome to become completely dry. The bulbs and fingers are dried separately, the former takes more time to dry. Turmeric should be dried on clean surface to ensure that the product does not get contaminated by extraneous matter. Care should be taken to avoid mould growth on the rhizomes. Rhizomes are turned intermittently to ensure uniformity in drying.

Solar tunnel driers covered by UV stabilized semi-transparent polyfilm sheet of 200 microns thickness can also be used for drying of turmeric. The solar radiation is transmitted through plastic sheet, which has a transmissivity of 90%. The UV sheet is transparent to the short wave radiations and opaque to long wave radiations. During the sunshine hours the short wave radiations are entrapped through the UV sheet, heated by the black absorber at the bottom and is converted into long wave radiation. This conversion of short wave radiation to long wave radiation causes an increase in the temperature inside the drier. Heat is transferred from the absorber to the air above the absorber. The heated air from the bottom while passing over the products absorbs the moisture. Solar radiation which passes through the transparent cover of

the drier, also heats the products in the drier. This enhances the temperature and drying rate of the produce inside the drier than in the ambient condition.

The yield of the dry product varies from 20-25% depending upon the variety and the location where the crop is grown. The starch gelatinized during boiling shrink and during the drying process intercellular spaces increase, enhancing water diffusion and reducing the drying time.

c. Polishing and colouring

Dried turmeric has poor appearance and rough dull outer surface with scales and root bits. The appearance is improved by smoothening and polishing the outer surface by manual or mechanical rubbing. Polishing is done till the recommended polish of 7-8% is achieved. Usually 5 to 8% of the weight of turmeric is the polishing wastage during full polishing and 2 to 3% during half polishing. Polishing of dried turmeric also helps in removing the wrinkles. Manual polishing consists of rubbing the dried turmeric fingers on a hard surface. Manual polishing gives rough appearance and dull colour to the dried rhizome. In an improved method, polishing is done by using hand or power operated drum mounted on a central axis, the sides of which are made of expanded metal screen. When the drum filled with turmeric is rotated, polishing is effected by abrasion of the surface against each other as they roll inside the drum. The colour of the processed turmeric influences the price of the produce. Hence, to obtain attractive product, turmeric powder is sprinkled during the last phase of polishing.

d. Storage

Cleaning, grading, packing and Storage Although Indian turmeric is considered to be the best in the world, about 90% of the total produce is consumed internally and only a small portion of the production is exported.

Turmeric of commerce is described in three ways:

- Fingers: These are the lateral branches or secondary ‘daughter’ rhizomes which are detached from the central rhizome before curing. Fingers usually range in size from 2.5 to 7.5 cm in length and may be over 1 cm in diameter.
- Bulbs: These are central ‘mother’ rhizomes, which are ovate in shape and are of shorter length and having larger diameter than the fingers.
- Splits: Splits are the bulbs that have been split into halves or quarters to facilitate curing and subsequent drying.

Turmeric being a natural produce, is bound to gather contaminants during various stages of processing. The spice is also cleaned to remove such foreign materials. A sifter, destoner, and an air screen separator will help remove materials such as stones, dead insects, excreta, and other extraneous matter. Cleaned and graded material is packed generally in new double burlap gunny bags and stored over wooden pallets in a cool, dry place protected from light. The stores should be clean and free from infestation of pests and harborage of rodents. It is not recommended to apply pesticides on the dried/polished turmeric to prevent storage pests.

2.8.2 Processing of Turmeric Powder

a. Grinding

The polished turmeric fingers are subjected to grinding. Grinding is one of the most common operations used to prepare turmeric powder for consumption and resale. The main aim of particular spice grinding is to obtain smaller particle sizes, with good product quality in terms of flavour and color. There are different ambient grinding mills and methods available for this process; such as hammer mill, attrition mill and pin mill. In India, traditionally, plate mills and hammer mills are used for turmeric grinding.

b. Sieving

Ground spices are size sorted through screens, and the larger particles can be further ground. The screens usually used are 60 - 80 mesh size.

c. Packing

The turmeric powder is packed in packaging materials that deal with the common deteriorating factors of turmeric powder such as hygroscopicity, loss of aroma/ flavour, discoloration, insect infestation and microbial contamination. The volatile oil present in the spice product has a tendency to react with the inner/ contact layer of the packaging material, at times leading to a greasy and messy package with smudging of the printed matter. The packaging material should therefore be grease and oil resistant and compatible with the product.

For bulk packaging, Flexible Intermediate Bulk Containers (FIBCs) commonly known as Jumbo bags with capacity up to 1 Tonne are prevalent. For institutional packages, materials such as Laminated flexible pouches and plastic woven sacks are used. In case of retail packs,

Printed flexible pouches (pillow type, gusseted type, and stand-up pouches) and lined cartons are the most common forms, with materials such as Polyester/ metalized polyester/ LDPE, BOPP/ LDPE, BOPP/ metalized polyester/ LDPE, Polyester/ Al foil/ LDPE.

CHAPTER 3

MODEL TURMERIC POWDER PROCESSING UNIT UNDER PM-FME SCHEME

3.1 Introduction

The Central Sector scheme for Formalization of Micro Enterprises in Food Processing sector under Ministry of Food Processing Industries, Government of India is an important scheme that offers for formalization and mainstreaming the unorganized home based or micro food processing units. The scheme is useful for expansion of the existing units in terms of capacity and technology through installation of new machineries and additional civil infrastructures. Further, the scheme promotes establishment of new micro units on the principle of ODOP (One District One Product).

Establishment or expansion of Turmeric powder Processing Unit is an attractive option in potential Turmeric growing states in India as Turmeric is a major cash crop cultivated across India. A model generalized DPR is therefore, prepared for expansion of existing unformalized Turmeric powder Processing Unit. A detailed account of the model DPR prepared on the basis of certain generalized assumptions is discussed in the sequent sections. An entrepreneur can use this model DPR template and modify according to his/her need in terms of capacity, location, raw materials availability etc.

3.2 Form of the Business Enterprise

The entrepreneur concerned must specify about the form of his/her business organization i.e. whether Sole Proprietorship, Cooperative, FPO/FPC, SHG Federation, Partnership Firm or Company and accordingly attach all the required documents. The documents may be registration certificate, share holding pattern, loan approval certificate etc as specified in the FME scheme guidelines.

3.3 Background of the Promoters/ Owners and Required Documents

The detailed bio-data of promoter/promoters inter-alia name, fathers name, age, qualification, business experience, training obtained, contact number, email, office address, permanent address, share holding pattern, definite sources of meeting the commitment of promoters contribution, details of others business along with certified balance sheet and profit loss account for the last 3- 4 years, tax registration, PAN Number, income tax return etc for 3-4 years and other requirements as specified in the FME guidelines must be provided with the DPR.

3.4 Background of the Proposed Project

The entrepreneur must specify whether it is a new project or expansion of the existing project. If new project is proposed then the reason to go in to the project and if expansion of the existing project, the must specify what kind of expansion is proposed in terms of capacity, product, machines, civil infrastructure etc.

3.5 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 entrepreneur must mention whether project is proposed in self owned land or rented/allotted land in any industrial park or private location. Accordingly, he/she must provide ownership document, allotment letter/ lease deed.

Land clearance certificate must be from village authority/ municipality or any other concerned authority. The ideal locations for establishment of exclusive Turmeric powder Processing Units are in the production clusters of the major Turmeric growing states such as Andhra Pradesh, Telengana, Karnataka, Tamil Nadu, Punjab, Bihar, Gujarat, Haryana, Maharashtra, Madhya Pradesh, Orissa, Uttar Pradesh and Uttarakhand where adequate quantities of surplus Turmeric will be available for processing.

3.6 Installed Capacity

The maximum installed capacity of the Turmeric powder Processing Unit in the present model project is proposed as 120 tonnes/ annum. 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 60 percent capacity, 3rd year 70 percent capacity, 4th year 80 percent capacity and 5th year onwards 90% capacity utilization is assumed in this model project.

3.7 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 deteriorated. In the current model Turmeric powder processing project, the unit requires 1.2 Tonnes/ day, 1.4

Tonnes/ day, 1.6 Tonnes/ day and 1.8 Tonnes / day of Turmeric at 60, 70, 80 and 90 percent capacity utilization, respectively.

3.8 Product Profile of the Unit

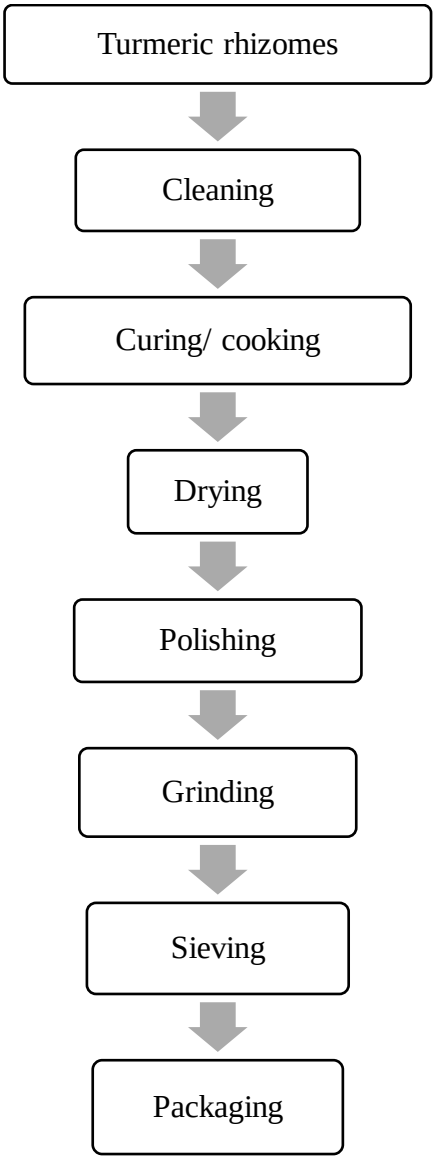
In the present model Turmeric powder processing unit, the targeted product output is taken as Turmeric powder. Indian turmeric is considered the best in the world market because of its high curcumin content.

The increasing global demand for natural products as food additives makes turmeric an ideal candidate as a food colorant, thus increasing demand for it. It is used in diversified forms as a condiment, flavouring and colouring agent and as a principal ingredient in Indian culinary as such and in curry powder. Additionally, recent medical research demonstrating the anti-cancer and anti-viral activities of turmeric may also increase its demand in Western countries. Hence it finds use in the drug industry and cosmetic industry. The increasing demand for natural products as food additives makes turmeric as ideal produce as a food colourant.

More recently, organically cultivated turmeric is gaining prominence because of its medicinal properties as well as harmful chemical-free nature. This implies that the processing methods should also be based on mechanized, physical and biological processes to maintain the vital quality of organic ingredient throughout each step of its processing.

Therefore, value addition of turmeric has great potential in terms of maintaining the nutritive quality of the product, turmeric powder, and minimizing post-harvest loses and enhancing the non seasonal availability.

3.9 Manufacturing Process of Turmeric powder



3.10 Technology Accessibility

IIFPT and its liaison offices at Guwahati and Bhatinda have all the technical knowhow on Turmeric powder processing. These technologies are available through training, incubation and consultancy. The entrepreneur can first avail training or consultancy and then undergo business incubation before venturing into the business. Other than IIFPT, NIFTEM, CFTRI and other institutes also have the technical knowledge and training facilities.

3.11 Market Demand and Supply

Turmeric has to be cured and dried within 4 days after harvest. The harvested turmeric rhizomes before entering into the market is converted into a stable commodity through a number of post harvest processing operations like boiling, drying and polishing. Boiling of turmeric is taken

up within 3 or 4 days after harvest. Due to poor, traditional and unscientific post harvest and processing practices, the color and the prized nutraceutical value are lost. To compensate, harmful chemicals are added to give artificial colour to the product which eventually harm a consumer, rather than benefitting them with medicinal and health benefits.

With its significant usage in day-to-day cooking and cosmetic purposes as well as gaining significance in usage in Nutraceutical and pharmaceutical industry, the demand for good quality and hygienically processed turmeric powder is very huge and vast. Value addition to a commodity with a view to provide health and wellness to its consumers is now becoming a priority. Present day consumer's preference for natural, chemical free/ organic products and the principle of 'using food as medicine' will be the driving force for the spice processing industry to produce good quality spice products like turmeric powder that still retain the desirable color, flavour and nutritive value. Given this trend and the current inclination of people for traditional spice products, Turmeric powder processing has immense growth potential market both in national & international market.

3.12 Marketing Strategy

The increasing urbanization offers huge market for readily available Turmeric powder packaged attractively and merchandised in organized urban platforms such as departmental stores, malls, super markets.

The producer may also enter into agreements for supplying to big players or retailers in their brand name or as private labels.

The producer may also enter into agreements with nutraceutical companies, ayurvedic pharmaceutical companies as well as cosmetic companies for supplying them with turmeric powder.

Export market is a major avenue for Turmeric powder, provided good hygienic production and compliant attractive packaging. Further there are several e-commerce companies that sell good quality produce, which can be utilized.

3.13 Detailed Project Assumptions

This model DPR for Turmeric powder Processing 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 Table 6.

This DPR assumes expansion of existing unit by adding new Turmeric powder line. Therefore, land and civil infrastructures are assumed as already available with the entrepreneur.

Table 6: Detailed Project Assumptions		
Parameter	Value	
Assumed Capacity of the Turmeric powder processing unit :	120 MT/ annum	
Utilization of capacity :	Year 1	Implementation
	Year 2	60%
	Year 3	70%
	Year 4	80%
	Year 5 onwards	90%
Working days per year:	300 days	
Working hours per day:	8-10 hours	
Interest on term loan Interest on working capital loan	12.00% 12.00%	
Repayment period	Seven years with one year grace period is considered.	
Average price of raw material:	Rs. 40/ kg	
Average sale price of product	Rs. 260/ kg	

3.14 Fixed Capital Investment

3.14. A. Land & Building

This DPR is for FME scheme to upgrade/ formalize existing micro enterprises which already has land & built-up area. However, they can invest to expand the built-up area (Table 7) as required.

Table 7: Land and Civil Infrastructures	
i. Land 1000 Sq ft	Assumed land already developed and has 6000 sq ft built in area. So additional 1000 sq ft can be built in @ Rs. 200/sq ft Rs. 2,00,000
ii. Built-up processing area 6000 sq ft	
iii. Storage area 1000 sq ft	
Total	Rs. 2,00,000

3.14. B. Machinery & Equipment: Rs. 20.00 Lakhs

Table 8: Machineries & Equipments						
S.No	**Description**	**Power required**	**Area reqd (Sq.ft)**	**Unit Price, (Rs.)**	**Qty**	**Amount (Rs. In Lakhs)**
1.	Weighing scale	2 HP	100	100000	1	1.00
2.	Washer	2 HP	50	250000	1	2.50
3.	Curing boiler with furnace	2 HP	100	150000	1	1.50
4.	Dryer	5 HP	200	600000	1	6.00
5.	Polisher	5 HP	300	100000	1	1.00
6.	Grinder	10 HP	100	400000	1	4.00
7.	Siever	5 HP	50	150000	1	1.50
8.	Packing machine	2 HP	100	250000	1	2.50
	Total					**20.00**

3.14. C. Utilities and Fittings

Table 9: Utilities and Fittings	
Power	Rs. 1.20 Lakhs
Water	Rs. 0.80 Lakhs
Total	Rs. 2.00 Lakhs

3.14. D. Other Fixed Assets

Table 10: Other Fixed Assets	
Furniture and fixtures	Rs. 2.00 lakhs
Utensils, trays, thermometer, refractometer, etc	
Total	Rs. 2.00 Lakhs

3.14. E. Pre-operative Expenses

Table 11: Pre-operative Expenses	
Legal expenses, start-up expenses, establishment cost, consultancy fee, trial runs, & others	Rs. 25,000.00
Total Pre-operative Expenses	Rs. 25,000.00

3.14. F. Total Fixed Capital Investment

Total Fixed Capital Investment = (Land & Building + Machinery & Equipment+ Utilities and Fittings + Other Fixed Assets + Pre-operative Expenses)

= Rs. (2.00+20.00+2.00+2.00+0.25) = **Rs. 26.25 Lakhs**

3.15. Working Capital Requirement

Table 12: Working Capital Requirement (Rs. In lakhs)				
Particulars	**Period**	**year 2 (70% - 70 MT)**	**year 3 (80% - 80 MT)**	**year 4 (90% - 90 MT)**
Raw material stock	7 days	3.00	3.50	4.00
Packing material	15 days	0.30	0.35	0.40
Work in progress	15 days	6.63	7.93	9.03
Finished goods' stock	15 days	6.36	7.87	8.98
Receivables	30 days	14.30	17.98	20.58
Total current assets		30.59	37.63	42.99
Trade creditors		0.00	0.00	0.00
Working capital gap		30.59	37.63	42.99
Margin money (25%)		7.65	9.41	10.75
Bank finance		22.94	28.22	32.24

3.16. Total Project Cost and Means of Finance

Table 13: Total Project Cost and Means of Finance (Rs. In lakhs)	
Particulars	**Amount**
i. Land and building	2.00
ii. Machinery and equipments	20.00
iii. Utilities & Fittings	2.00
iv. Miscellaneous Fixed assets	2.00
v. Pre-operative expenses	0.25
vi. Contingencies	2.00
vii. Working capital margin	7.65
Total project cost (i to vii)	**35.90**
Means of finance	
i. Subsidy	10.00
ii. Promoter's contribution	7.90
iii. Term loan	18.00

3.17. Manpower Requirement

Table 14: Manpower Requirement			
Particulars	**No. of persons**	**Monthly Wage (Rs.)**	**Total Monthly Salary (Rs.)**
i. Manager (can be the owner)	1	20000	20000
ii. Skilled worker	2	10000	20000
iii. Semi skilled	3	7500	22500
iv. Helper	3	5000	15000
v. Salesman	1	7500	7500
Total	10		85000

Note: Only the manager and two skilled workers are permanent staffs (Salary Rs. 40000/ month). Others are causal staffs.

3.18. Expenditure, Revenue and Profitability Analysis

Table 15: Expenditure, Revenue and Profitability Analysis									
	Particulars	**1st year**	**2nd year**	**3rd year**	**4th year**	**5th year**	**6th year**	**7th year**	**8th year**
A	**Total Installed Capacity**	120 MT/Year Turmeric powder							
	Capacity utilization (%)	Under const. (0%)	72 MT (60%)	84 MT (70%)	96 MT (80%)	108 MT (90%)	108 MT (90%)	108 MT (90%)	108 MT (90%)
B	**Expenditure (Rs. in Lakh)**								
	Turmeric (Av. Price @ Rs. 40/ Kg)	0.00	144.00	168.00	192.00	216.00	216.00	216.00	216.00
	Packaging materials @ Rs. 10/ Unit	0.00	7.20	8.40	9.60	10.80	10.80	10.80	10.80
	Utilities (Electricity, Fuel)	0.00	3.64	4.04	4.43	4.82	4.82	4.82	4.82
	Salaries (1st yr only manager's salary)	2.40	7.14	7.91	8.67	9.44	9.44	9.44	9.44
	Repair & maintenance	0.00	0.69	0.69	0.69	0.69	0.69	0.69	0.69
	Insurance	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Miscellaneous expenses	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Total Expenditure	3.20	163.47	189.84	216.19	242.55	242.55	242.55	242.55
C	**Total Sales Revenue (Rs. in Lakh)**								
	Sale of Turmeric powder @ Rs. 260/ kg	0.00	171.60	215.80	247.00	278.20	280.80	280.80	280.80
D	**PBDIT** (Total Sales Revenue-Total Expenditure) (Rs. in Lakh)	-3.20	8.13	25.96	30.81	35.65	38.25	38.25	38.25
	Depreciation on civil works @ 5% per annum	0.10	0.10	0.09	0.09	0.08	0.08	0.07	0.07

	Depreciation on machinery @ 10% p.a	2.02	1.82	1.64	1.47	1.32	1.19	1.07	0.97
	Depreciation on other fixed assets@ 15% p.a	0.91	0.77	0.65	0.56	0.47	0.40	0.34	0.29
	Interest on term loan @ 12% p.a	2.15	2.15	1.91	1.56	1.18	0.82	0.46	0.11
	Interest on working capital @ 12% p.a	0.00	2.75	3.39	3.87	4.35	4.38	4.38	4.38
E	**Profit after Depreciation and Interest** (Rs. in Lakh)	-8.38	0.54	18.28	23.26	28.25	31.38	31.93	32.43
F	Tax (assumed 25%) (Rs. in Lakh)	0.00	1.35	2.70	3.41	4.27	4.52	4.62	4.76
G	**Profit after depreciation, Interest & Tax** (Rs. in Lakh)	-8.38	-0.81	15.58	19.85	23.98	26.86	27.31	27.67
H	Surplus available for repayment (PBDIT-Interest on Working Capital -Tax) (Rs. in Lakh)	-3.20	4.03	19.87	23.53	27.03	29.35	29.25	29.11
I	Coverage available (Rs. in Lakh)	-3.20	4.03	19.87	23.53	27.03	29.35	29.25	29.11
J	Total Debt Outgo (Rs. in Lakh)	2.15	4.15	3.91	3.56	3.18	2.82	2.46	2.11
K	**Debt Service Coverage Ratio (DSCR)**	-1.49	0.97	5.08	6.61	8.50	10.41	11.89	13.80
	Average DSCR	6.97							
L	**Cash accruals (PBDIT- Interest-Tax)** (Rs. in Lakh)	-5.35	4.63	21.35	25.84	30.20	32.91	33.17	33.38
M	**Payback Period** (on Rs. 35.90 Lakhs initial investment)	4 years							

3.19. Repayment Schedule

Table 16: Repayment Schedule (Rs. in Lakh)									
Year	**Outstanding loan at start of yr.**	**Disbursement**	**Total outstanding Loan**	**Surplus for repayment**	**Interest payment**	**Repayment of principal**	**Total outgo**	**o/s Loan at the end of the yr.**	**Balance left**
1	0	14	14	-3.20	2.15	0	2.15	14	-5.35
2	14		14	4.03	2.15	2	4.15	12	-0.12
3	12		12	19.87	1.91	2	3.91	10	15.96
4	10		10	23.53	1.56	2	3.56	8	19.97
5	8		8	27.03	1.18	2	3.18	6	23.85
6	6		6	29.35	0.82	2	2.82	4	26.53
7	4		4	29.25	0.46	2	2.46	2	26.79
8	2		2	29.11	0.11	2	2.11	0	27.00

3.20. Assets' Depreciation

Table 17: Assets' Depreciation (Written Down Value Method) (Rs. in Lakh)								
Particulars	**1st Year**	**2nd Year**	**3rd Year**	**4th Year**	**5th Year**	**6th Year**	**7th Year**	**8th Year**
Civil works	2.02	1.92	1.82	1.73	1.64	1.56	1.48	1.41
Depreciation	0.10	0.10	0.09	0.09	0.08	0.08	0.07	0.07
Depreciated value	1.92	1.82	1.73	1.64	1.56	1.48	1.41	1.34
Plant & Machinery	20.19	18.17	16.35	14.71	13.24	11.92	10.73	9.66
Depreciation	2.02	1.82	1.64	1.47	1.32	1.19	1.07	0.97
Depreciated value	18.17	16.35	14.71	13.24	11.92	10.73	9.66	8.69
Other Fixed Assets	6.04	5.13	4.36	3.71	3.15	2.68	2.28	1.94
Depreciation	0.91	0.77	0.65	0.56	0.47	0.40	0.34	0.29
Depreciated value	5.13	4.36	3.71	3.15	2.68	2.28	1.94	1.65
All Assets	28.25	25.22	22.53	20.15	18.03	16.16	14.49	13.01
Depreciation	3.03	2.69	2.38	2.12	1.87	1.67	1.48	1.33
Depreciated value	25.22	22.53	20.15	18.03	16.16	14.49	13.01	11.68

3.21. Financial Assessment of the Project

Table 18: Benefit Cost Ratio (BCR) and Net Present Worth (NPW)										
S. No	**Particulars**	**1st year**	**2nd year**	**3rd year**	**4th year**	**5th year**	**6th year**	**7th year**	**8th year**	
i	Capital cost (Rs. in Lakh)	28.25	0	0	0	0	0	0	0	
ii	Recurring cost (Rs. in Lakh)	3.20	163.47	189.84	216.19	242.55	242.55	242.55	242.55	
iii	Total cost (Rs. in Lakh)	31.45	163.47	189.84	216.19	242.55	242.55	242.55	242.55	1571.15
iv	Benefit (Rs. in Lakh)	0.00	171.60	215.80	247.00	278.20	280.80	280.80	280.80	
v	Total Depreciated value of all assets (Rs. in Lakh)								11.68	
vi	Total benefits (Rs. in Lakh)	0.00	171.60	215.80	247.00	278.20	280.80	280.80	292.48	1766.68
	Benefit-Cost Ratio (BCR): 1.12 (Profitable Project) **Net Present Worth (NPW): 195.53**									

3.22. Break Even Analysis of the Project

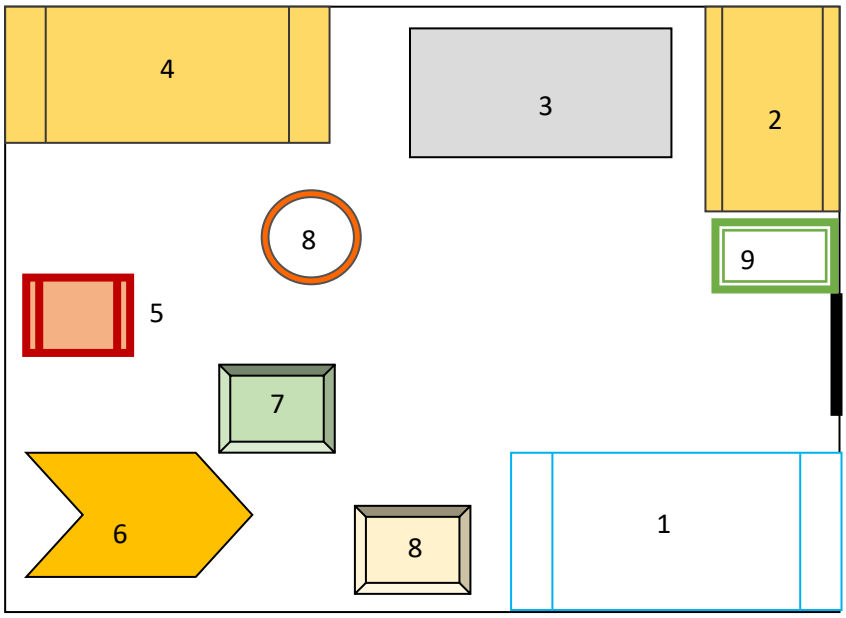
Break Even analysis indicates costs-volume-profit relations in the short run. This is the level at which the firm is in no loss no profit situation.

Table 19: Break-Even Analysis

S.No	Particulars	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year
	Capacity utilization	Under const. (0%)	72 MT (60%)	84 MT (70%)	96 MT (80%)	108 MT (90%)	108 MT (90%)	108 MT (90%)	108 MT (90%)
A	**Fixed Cost (Rs. in Lakh)**								
	Permanent staff salaries	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
	Depreciation on building @ 5% p.a	0.10	0.10	0.09	0.09	0.08	0.08	0.07	0.07
	Depreciation on machinery @ 10% p.a	2.02	1.82	1.64	1.47	1.32	1.19	1.07	0.97
	Depreciation on other fixed assets @ 15% p.a	0.91	0.77	0.65	0.56	0.47	0.40	0.34	0.29
	Interest on term loan 12% p.a	2.15	2.15	1.91	1.56	1.18	0.82	0.46	0.11
	Insurance	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Total Fixed Cost (Rs. in Lakh)	8.03	7.69	7.14	6.53	5.9	5.34	4.79	4.29
B	**Sales Revenue (Rs. in Lakh)**	0.00	171.60	215.80	247.00	278.20	280.80	280.80	280.80
C	**Variable Cost (Rs. in Lakh)**								
	Turmeric (Average Price @ Rs.40/ kg)	0.00	144.00	168.00	192.00	216.00	216.00	216.00	216.00
	Packaging materials @ Rs.10/ Unit	0.00	7.20	8.40	9.60	10.80	10.80	10.80	10.80
	Casual staff salaries	0.00	4.59	4.59	4.59	4.59	4.59	4.59	4.59
	Utilities (Electricity, Fuel)	0.00	3.64	4.04	4.43	4.82	4.82	4.82	4.82

	Repair & maintenance	0.00	0.69	0.69	0.69	0.69	0.69	0.69	0.69
	Miscellaneous expenses	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Interest on working capital (12%)	0.00	2.75	3.39	3.87	4.35	4.38	4.38	4.38
	Total Variable Cost (Rs. in Lakh)	0.50	163.37	189.61	215.68	241.75	241.78	241.78	241.78
D	**Break Even Point (BEP) as % of sale**	0.00	93.44%	27.26%	20.85%	16.19%	13.69%	12.28%	10.99%
	Break Even Point (BEP) in terms of sales value (Rs. in Lakhs)		160.34	58.83	51.50	45.03	38.43	34.47	30.87

3.23 Plant Layout



1 Storage 6 Grinder
2 Washer 7 Sieving
3 Curing 8 Packing
4 Dryer 9 Weighing scale
5 Polisher

3.24. Machinery Suppliers

The entrepreneur must provide tentative supplier list and quotations with respect to his project. However, there are many machinery suppliers available within India for Turmeric powder processing machineries and equipments. Some of the suppliers are:

1. MMM Buxabhoy & Co, 140 Sarang Street 1st Floor, Near Crawford Market Mumbai India
   Tel: +91 22 2344 2902; Fax: +91 22 2345 2532
2. Acufil Machines S. F. No. 120/2, Kalapatty Post Office Coimbatore - 641 035 Tamil Nadu India Tel: +91 422 2666108/2669909 Fax: +91 422 2666255 Email : acufilmachines@yahoo.co.in
3. Bombay Engineering Works, 1 Navyug Industrial Estate, 185 Tokersey Jivraj Road Opposite Swan Mill, Sewree (W) Mumbai 400015

Tel: +91 22 24137094/24135959 Fax: +91 22 24135828

4. Planters Energy network (PEN) No 5, Power House 3rd Street N R T Nagar Theni 625531 Tamil Nadu India
   Tel: +91 4546 255272 Fax: +91 4546 25527
5. Premium Engineers Pvt Ltd Plot No 2009, Phase IV, GIDC Vatva, Ahmedabad 382445 India
   Tel: +91 79 25830836 Fax: +91 79 25830965
6. Central Institute of Agricultural Engineering Nabi Bagh Berasia Road Bhopal 462 038 Madhya Pradesh India
   Tel: +91 755 2737191 Fax: +91 755 2734016
7. Eastend Engineering Company 173/1 Gopal Lal Thakur Road
   Calcutta 700 035 India
   Tel: +91 33 25536937 Fax: +91 33 23355667
8. Gardners Corporation 158 Golf Links New Delhi 110003 India
   Tel: +91 11 3344287/3363640 Fax: +91 11 3717179
9. Rajan Universal Exports Post Bag no 250 162 Linghi Chetty Street
   Chennai 600 001 India
   Tel: +91 44 25341711/25340731/25340751 Fax: +91 44 25342323
10. Gurdeep Packaging Machines, Harichand Mill compound LBS Marg,
    Vikhroli, Mumbai 400 079 India
    Tel: +91 22 2578 3521/577 5846/579 5982 Fax: +91 22 2577 2846

CHAPTER 4

LIMITATIONS OF THE MODEL DPR AND GUIDELINES FOR ENTREPRENEURS

4.1. Limitations of the Model DPR

i. This model 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 is a model DPR 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.

iv. This particular DPR is made on three components of means of finance i.e. grant, owner's contribution and loan/debt as followed in many central sector schemes.

4.2. 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 base/contract sourcing, entrepreneurs own SWOT analysis, detailed market research, comprehensive 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.

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