

PM Formalization of Micro Food Processing Enterprises Scheme

DETAILED PROJECT REPORT FOR KAIR SANGARI PICKLE PROCESSING



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1. THE PROJECT AT A GLANCE

1	Name of the Project	Kair-sangari Pickle
2	Name of the entrepreneur/FPO/SHG/Cooperative	
3	Nature of proposed project	Proprietorship/Company/ Partnership
4	Registered office	
5	Project site/location	
6	Names of Partner (if partnership)	
7	No of share holders (if company/FPC)	
8	Technical advisor	
9	Marketing advisor/partners	
10	Proposed project capacity	150 MT/annum (55, 65, 75,90 and 100% capacity utilization in the 2nd, 3rd, 4th year, 5th year and 6th year onwards respectively
11	Raw materials	Kair-sangari
12	Major product outputs	Kair-sangari Pickle
13	Total project cost (Lakhs)	26.97
	Land development, building & civil construction	4.4
	Machinery and equipments	7.98
	Utilities (Power & water facilities)	0.8
	Miscellaneous fixed assets	0.5
	Pre-operative expenses	0.50
	Contingencies	1.00
	Working capital margin	11.79
14	Working capital Management (In Lakhs)	
	Second Year	35.37
	Third Year	41.80
	Fourth Year	56.99
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	9.438970962
	Promoter's contribution (min 20%)	5.393697692
	Term loan (45%)	12.13581981
16	Debt-equity ratio	2.25:1
17	Profit after Depreciation, Interest & Tax	
	2nd year	66.35
	3rd year	79.97
	4th year	93.59

18	Average DSCR	2.16
	Benefit Cost Ratio	1.98
	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

- Kair is one of the important multipurpose woody species of desert and arid regions of Indian subcontinent, Africa & Saudi Arabia.
- It is an important constituent of desert eco systems & plays an important role in rural economy of the peoples of the northwest arid regions of the Indian sub continent.
- Sangari, botanically known as *Prosopis cineraria*, grows in dry, arid desert regions. Sangari are the bean-like pods of the khejri tree, which is a member of the pea family. All parts of the khejri tree, from the bark to flowers and leaves, are edible. Sangari pods, also known as “desert beans”, are used as a vegetable, and are particularly prized for their unique taste and nutritional benefits.
- Sangari pods grow on the khejri tree, which is a thorny evergreen that grows to around 5 meters in height. The slender pods are green when unripe, and turn a chocolate brown upon maturing. Each pod measures from 8 centimeters to 25 centimeters in length. The pods contain as many as 25 oval-shaped seeds embedded in a sweet, dry, yellow pulp. Sangari pods offer an earthy, nutty flavor that has spice-like notes of cinnamon and mocha.
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- The Scientific name of Khejri is *Prosopis cineraria*. Khejri (*Prosopis cineraria*) is one of the most common tree species found in India especially in western Rajasthan, It plays a vital role in preserving the ecosystem of arid and semi-arid areas, mainly in the Thar Desert. The tree is frost and drought resistant and tolerates extreme temperature ranging from 40–45°C in summer to less than 10°C in winter. It is capable of growing in areas of rainfall ranging from 100–600 mm. The tree can withstand the hottest winds, the driest season and stay alive where other plants cannot survive.
- It is a very useful tree, possessing great vitality and rapid growth in its natural zone and considerable power of reproduction from coppice shoots, so renowned as “Queen of the Desert”, Khejri is known by many local names in zonal districts of Rajasthan, popularly it is called khejri or khejra. It is also called jant or janti in areas like Alwar, Sikar, Jhunjhunu, Churu, Jaipur, Bharatpur, Karoli, Dholpur, Samal village in Udaipur, and Banswara and Dungarpur districts of Rajasthan.
- Khejri is a versatile tree of Arid and Semi-Arid Zone in Rajasthan. It provides green leaves, dry leaves (loong) and green and fresh pods, dried pods (sangari and kho-kha) that can be utilized for food, fodder, firewood, timber, medicine and mesquite gum etc. In addition to providing feed in times of scarcity, long is highly nutritious, increasing both the quality and quantity of milk-yield in cows, buffaloes and goats. Whereas, the medicinal value of khejri tree has been mentioned in ancient Ayurveda literature. The unripe green pods of khejri, locally known as „sangaria“ or “sangar”, Sangari, which grow plentiful in Rajasthan. Sangari used as a vegetable in fresh and dried form, and ripe pods (khokha) are utilized for fresh consumption and for the flour preparation. Fresh sangaris are plucked, dried carefully and stored for usage round the year by local population.

2.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF KAIR-SANGARI

- Sangari is found in the desert regions of India, Afghanistan, Iran, Pakistan and Africa. It is mainly found in the Thar Desert of Rajasthan in India, where it is said to have originated. Because Sangari grows abundantly where other plants cannot, even flourishing on sand dunes, it is a plant product that is highly prized in the dry, arid regions where it is found.
- Sangari is used by nomadic people of the desert, as well as by villagers. Sangari was supposedly first used as a food source when famine-struck villagers of Rajasthan had nothing to eat. In the Rajputana famine of 1868 to 1869 in India the people of Rajasthan depended on everything from the bark of the khejri tree, to the carbohydrate and protein-rich Sangari pods, for sustenance.
- *Prosopis cineraria* originated from the Thar Desert of India and Pakistan. It spread southwards to Tamil Nadu, eastwards to West Bengal, and westwards to Afghanistan and Iran. Isolated populations are found in Oman, Yemen, United Arab Emirates, and Saudi Arabia, and it has been introduced to Abu Dhabi and Somalia. It is often found scattered in agricultural fields and is an important part of dry zone agroforestry systems in India. *Prosopis cineraria* grows more slowly than other *Prosopis* species. It performs poorly outside its native range and it is not known to have become naturalized.
- *Prosopis cineraria* is found from sea level, up to 600 m altitude. It grows well where annual rainfall is in the range of 400-800 mm but it is also adapted to very dry conditions (down to 75-250 mm) that prevail on dunes or sandy plains.

- It can survive drought periods of 6-8 months. Thanks to its deep taproot, the tree is able to extract the water from the water table. Trees older than 7 years were reported to be able to grow under rainfed management in the United Arab Emirates. However, the sudden death of mature trees has been reported in India, which may have been caused by the overexploitation of ground water for irrigation. In arid areas, *Prosopis cineraria* will preferentially grow on dune lows, followed by sandy plains and dune tops.
- *Prosopis cineraria* grows better where average daily temperatures range from 4°C to 28°C. It is slightly frost hardy (-6°C) and tolerates daily temperatures up to 50°C. It naturally grows on coarse sandy soils but cannot survive a long time on pure sandy soils.
- It can adapt to a variety of soils provided they allow the taproot to go deep in the soil layers and the soil is well-drained. Some ecotypes of *Prosopis cineraria* can grow on very saline soils. Its adaptation to soil salinity (up to 11.5 dS/m) could be attributed to a mechanism of ion exchange between roots and leaves. It does well on (very) alkaline soils as well *Prosopis cineraria* is a full sunlight species.
- *Prosopis cineraria*, also known as ‘Ghaf’, is a species of flowering tree in the pea family, Fabaceae. It is native to arid portions of Western Asia and the Indian Subcontinent, including Afghanistan, Bahrain, Iran, India, Oman, Pakistan, Saudi Arabia, the United Arab Emirates and Yemen. Its leaves are shattered and stripy along its branch. It can be found in desert places where it can survive. It is an established introduced species in parts of Southeast Asia, including Indonesia.
- It is the national tree of the United Arab Emirates, where it is known as Ghaf. Through the Give a Ghaf campaign its citizens are urged to plant it in their gardens to combat desertification and to preserve their country's heritage. The desert village of Nazwa in the UAE is home to the Al Ghaf Conservation Reserve.

- It is also the state tree of Rajasthan (where it is known as Khejri), Western Uttar Pradesh (where it is known as Chhonkara) and Telangana (where it is known as *Jammi*) in India.
- A large and well-known example of the species is the Tree of Life in Bahrain – approximately 400 years old and growing in a desert devoid of any obvious sources of water.
- The texture of the bark of the Khejri tree is quite similar to the one in the Neem tree – rough and cracked. The dried fruit of the tree is used as Sangari. People who appreciate Rajasthani food must have heard of Kair Sangari. While Kair grows on a bush, Sangari is derived from the Khejri tree. It fruits in summer. Sangari is a pendulous bean-like pod. These pods are used as fodder. Some documents suggest that the bark of Khejri was used as a flour during the Famine of Rajputana in 1869. Even today the bark is used in treating many skin conditions like leprosy, boils, and itching. It is used in treating asthma in Ayurveda. The flowers of this tree are consumed by pregnant women along with sugar. The farmers are happy to have this tree in the field because its root enriches the soil, there by helping increase the crop yield.
- The tree is a hardy tree that requires less care which explains why it can be easily sighted in Thar desert. It can survive in cold & severe hot conditions with a temperature range of 5-47 C. The tree is well known for its ability to bind the soil. Its roots can attain a considerable depth in search of the water sources. Khejri tree is found in areas that receive annual rainfall less than 75-80 cm. This is one of the secrets for its survival in the hot and harsh climate. As per a report by Central Arid Zone Research Institute in 2015, the Khejri tree is gradually losing its ground. The area covered by this tree has come down significantly. It is being said that in the past, this tree was found in Punjab. But with increased water availability, the scenario has changed. It is unlikely to be found where the annual rainfall exceeds 100 cm.

- A number of reasons are being provided against this phenomenon but these are just theories. We still don't know the exact cause. It wouldn't be incorrect to say that changes in the lifestyle of the rural areas from agrarian to modern are one of the major causes. New sources of water, availability of modern fertilizers have brought in changes bound to impact old ways. Even then, a significant landscape in Rajasthan is covered by the Khejri tree. The tree takes a long time to grow and unless we plant a lot more trees now it is unlikely the situation will change. Central Arid Zone Research Institute (CAZRI) in Jodhpur is involved in doing research on the Khejri tree.
- Kair Sangari Pickle is a very unique and popular pickle from Rajasthani cuisine. It is a flavorful dry mix of Kair and Sangari pickled in Indian spices.
- Kair is a small sour shrub berry having appearance of small balls. And Sangari are long green beans which resembles a thin stick and are pods of the Khejri tree. These unique varieties of berries and beans grow only in arid deserts of Rajasthan.
- Kair berries are quite sour and unfit for eating. They need to be soaked in buttermilk or salt water to reduce their sourness. They are then dried in sun after washing. Similarly Sangari beans are dried after boiling and can be used for a long period.
- Kair Sangari Pickle is quite spicy and tangy. It goes very well on the side of any Indian curry & bread or rice and is a hugely popular delicacy in Rajasthan.

3. HEALTH BENEFITS AND NUTRITIONAL INFORMATION

- Sangari also have many potential health benefits. Eating oranges may lower your risk of heart disease, cancer, and kidney stones.

- Despite the economic importance of *Prosopis* spp. as food, plants have been used in traditional medicine to treat various human ailments since ancient history. *Prosopis* spp. is one of these plants that possess many medicinal properties and used to cure many diseases. Studies showed that leaves and seeds were largely used to treat many diseases such as diarrhea, inflammation, measles, diabetes and prostate disorders.

Health benefits:

- Sangari beans are abundant in protein, fiber and minerals like potassium, magnesium, calcium, zinc and iron.
- They also contain a compound called saponins, which boost immunity in the body.
- It improves blood circulation while increasing immunity. Vitamin-D present in it strengthens bones. It works by activating the dull pulse fibers of the body.
- Numerous people around the world, especially in Africa and Asia, are suffering from protein deficiency due to lack of protein-rich food. *P. cineraria* have 16.5–18.25% protein content. On other hand, legumes contain 18–35% protein, and cereals contain 10–15% protein.
- Therefore, *Prosopis* seeds are considered a potential and cheap source of protein for industrial use, especially in developing Afro–Asian countries and can be an alternate protein source for solving the protein-energy-malnutrition problem. The protein content, *P. cineraria* contains reasonable amount of ash (5.34%), and fiber (20.93%). Chemical composition of pods is varied between individual trees that it influenced by a wide range of environmental factors. The *P. cineraria* pods have low moisture content (8.55%) that may be advantageous in increasing of the pods shelf-life, 18% protein, 1.89% oil, 5.34% ash and 20.93% fiber. The *P. cineraria* seed contains 10.6% oil, 28.6%

of the oil are saturated fatty esters, 68.3% are unsaturated fatty esters, and 3.1% are methyl hydroxy fatty ester. Moreover, the seed oil is rich in oleic acid (31.3%) along with linoleic acid (32.1%).

- Oil and seeds of *P.cineraria* show an absence of keto, cyclopropenoid, and epoxy fatty acids or any evidence for the presence of trans-unsaturation or the presence of conjugation. In addition, the tree leaves have a good source of macro minerals as calcium (2.43%), phosphorus (0.16%) and potassium (0.41%). So, it can be used as good food during the mineral deficient periods.
- It is also adorned with abortifacient & laxative properties.
- Bark is used for treatment gastrointestinal & respiratory ailments.
- Fresh leaves paste is used to cure blister, Boils, and ulcers of mouth in case of animals.
- Root part is used to cure ant dysenteric & smoke of leaves is used to cure eye infections.
- Bark of the tree had been proven useful against asthma, Bronchitis, leucoderma, dysentery, leprosy, rheumatism, muscle tremors & Piles.
- Blooming flower of tree is blended with sugar and consumed to prevent the miscarriage.
- Whereas twig and flower part works as anti-diabetic agent, this tree is a bucket of neutraceutical components.
- It is carminative, tonic, emmenagogue, aphrodisiac, alexipharmic, improves the appetite, good for rheumatism, lumbago, hiccough, cough and asthma.
- In Ayurveda, capers are hepatic stimulants and have been used for arteriosclerosis, as a diuretic, and as a kidney disinfectant

- The alcoholic extract of fruit pulp and root bark possesses antihelminthic activity.
- Alkaloids (good anesthetic and spasmolytic activity),
- Saponin (boost immunity system of the body, lowering the cholesterol level in the body and reducing the risk of intestinal cancer),
- Tannins (produce anthelmintic activity).
- Zinc (relevant to the nutritional aspect as zinc supplementation in diabetes mellitus have antioxidant effect),
- Magnesium (important for proper functioning of every organ like heart, muscle, and kidney),
- Iron (used in anemia, tuberculosis and growth disorder), calcium and phosphorous (useful for the bone, teeth, and ligament related disorder).
- Moreover, studies show that the alkaloid mixture of *P. cineraria* in a dose of 1 mg/kg decreased the blood pressure and immediate mortality of dogs. In contrast, extensive damage to the liver, spleen, kidney, lung, and heart was observed on histological examination of mice given the same alkaloid mixture .
- Kair has been used in traditional medicine for centuries. Indian tribes have utilized fruits, roots, and bark to concoct various remedies. In Ayurveda, capers are hepatic stimulants and have been used for arteriosclerosis, as a diuretic, and as a kidney disinfectant.
- According to a study published in the Indian Journal of Traditional Knowledge, the plant acts as a carminative, tonic, emmenagogue, appetite stimulant and aphrodisiac. Parts of the plant have treated rheumatism, cough, and asthma. Pickled fruits treat constipation and other stomach ailments.

- Another report titled A Medicinal Potency of Capparis decidua mentions additional uses: The bark treats inflammation and acute pain, whereas the roots treat fever and the buds alleviate boils. In Sudan, parts of the shrub remedy jaundice and joint infections.
- The stems of kair shrubs have cytotoxic activities, as they markedly inhibit the proliferation of metastatic cancer cells.
- The alkaloids in the plant extracts display anti-diabetic activities.
- Kair shrub stems have hepatoprotective properties.
- Supplementing the diets of 15 hyperlipidemic adults with unripe kair fruits caused a significant reduction in plasma triglycerides, total lipids and phospholipid concentration.
- Plant extracts significantly reduced plaque formation in the aortas of cholesterol-fed rabbits.

3.2 Nutritional Information Table

Kair-Sangari Nutrition :- Values per 100 gm.

Principle	Nutrition Value	% RDA
Energy	41.6 Kcal	7 %
Fat	15 g	23%
Carbohydrates, by difference	1.8 g	1.6 %
Protein	8.6 g	17 %
Sugar	2 g	--
Vitamins		
Vitamin A	135 mcg	3%
Vitamin B9 – Folic acid	0.2 mcg	--
Vitamin C	7.81 mg	12%

Electrolytes		
Potassium	7.5 mg	1%
Sodium	0.1 mg	--
Minerals		
Iron	0.1 mg	--
Phosphorous	57 mg	--
Manganese	0.3mg	1.3%

4. CULTIVATION, BEARING & POST HARVEST MANAGEMENT

- P. cineraria* is a small tree, ranging in height from 3–5 m (9.8–16.4 ft). Leaves are bipinnate, with seven to fourteen leaflets on each of one to three pinnae. Branches are thorned along the internodes. Flowers are small and creamy-yellow, and followed by seeds in pods. The tree is found in extremely arid conditions, with rainfall as low as 15 cm (5.9 in) annually; but is indicative of the presence of a deep water table. As with some other *Prosopis* spp., *P. cineraria* has demonstrated a tolerance of highly alkaline and saline environments.
- The tree is not to be confused with the similar looking Chinese lantern tree, *Dichrostachys cinerea*, which can be told apart by its flowers. While the Chinese lantern tree has bicolored pink-yellow flowers, the true Shami tree only has yellow-colored bristled flowers like most other mesquites.
- Plants raised through seeds show 90.0% survival under field conditions. About 20 gm seeds/ha are required. Seeds are pretreated with concentrated H₂SO₄ for 15-20 minutes and sown in polybag at 2.0 cm depth during May and subsequently one month old seedling is transplanted in the field during July-August at 5m X 5m spacing in field.

4.1 Cultivation and Bearing:-

- *Prosopis cineraria* readily reproduces by root suckers or by seeds. The seed remains viable during decades. It is hardcoated and thus requires soaking in tepid water during 24 h or scarification prior to sowing. Sowing can be done in nursery and the seedlings transplanted 2-3 months after germination. A tree density of 50-100 trees/ha has been recommended in agroforestry systems and silvopastoral systems. Weeding is necessary during the first year until trees are well established. Early pruning is advised to encourage straight growth. The tree responds well to irrigation, tolerating up to 50% sea water. Growth of new foliage, flowering and fruiting occurs during the driest months (March-June) when other plants become leafless and dormant.
- It has ability to grow in semi-arid and arid marginal environments receiving low rain fall of 250-500 mm/annum and yet it produces profuse flowering and fruiting.
- The soil with 2:2:1 ratio of sand : clay : FYM is best for plant growth and increasing biomass. Soil mixture with 50% clay is preferred.
- Plants raised through seeds show 90.0% survival under field conditions. About 20 gm seeds/ha are required. Seeds are pretreated with concentrated H₂SO₄ for 15-20 minutes and sown in polybag at 2.0 cm depth during May and subsequently one month old seedling is transplanted in the field during July-August at 5m X 5m spacing in field.
- The land is prepared by ploughing 3-4 times with disc plough and the soil is brought to a fine tilth. The land is divided into plots of convenient size. The main and subirrigation channels are laid out. Pits of 45cm X 45cm X 45cm size are dug at a spacing of 5m X 5m and should be filled with top soil and well decomposed FYM in the ratio of 1:1.
- In India, trees are generally lopped during winter, storing the sun-dried leaves for dry season fodder.

- *P. cineraria* as a leguminous tree has importance in improving soil fertility through fixing atmospheric nitrogen. Litter fall production for *P. cineraria* and decomposition rate are considered the highest comparing with other arid trees, and that build up soil organic matter contents under its canopy, increase soluble calcium and available phosphorus and decrease soil pH. Therefore, farmers tend to grow field crops under its canopy to boost the growth and productivity of their crops.
- *P. cineraria* is a xerophytic plant that is well adapted to dry and arid environment. Under the conditions of drought, the tree produces more flowers and fruits. In areas of its natural distribution, the annual rainfall ranges between 100 up to 500 mm annually, whereas the optimum density is confined to areas receiving 350–400 mm. The climate is characterized by extremes summer temperature varies from about 40–48°C. It can tolerate frost and withstand low temperature less than 10°C in the winter season.
- The tree grows on a variety of soils. It is seen at its best on alluvial soils consisting of various mixtures of sand and clay. In arid areas, the growth is better in dune lows than in sandy plains. Good drainage is very essential. *P. cineraria* can grow under highly saline and alkaline soils. However, it is relatively salt tolerant at seed germination whereas seedling emergence was found to be reduced to 50% in soil with a salinity of 7.6 dS m⁻¹ and a further increase in salt concentration was detrimental to seed germination.

4.2 Planting in the Field

- **Land Preparation and Manure Application :** The land is prepared by ploughing 3-4 times with disc plough and the soil is brought to a fine tilth. The land is divided into plots of convenient size. The main and subirrigation channels are laid out. Pits of 45cm X 45cm X 45cm size are dug at a spacing of 5m X 5m and should be filled with top soil and well decomposed FYM in the ratio of 1:1.

- **Transplanting and Optimum Spacing** : One month old seedlings is transplanted in field conditions.
- **Intercropping System** : Intercropping of crops like pearl millet and cluster bean could be grown.
- **Irrigation Practices** : The crop requires monthly irrigation for achieving maximum growth of above and below ground biomass and bark yield.
- **Weed Control** : Weeding and hoeing is done manually after every 15-20 days in rainy season and after rains, at same intervals upto 3-4 years of age.
- **Disease and Pest Control**: No serious insects and pests were observed in this plant in the early stage except termite attack.

4.3 Post-harvest management:-

- Fruits are graded according to their size and color. All the diseased, deformed, bruised and unripe fruits are sorted out.
- Ethylene gas is used for treating the unripe sangaris such that they develop yellow or sangari color.
- Do not leave harvested fruit out in the hot sun;
- Do not pick cold, wet fruit. When wet turgid fruit is handled the oil
- Glands can be ruptured. The released oil burns the fruit surface (oleocellosis) and also stimulates fungal spores to germinate. The burn Marks can take 2-3 days to develop;

- Wear cotton gloves when harvesting. This reduces chances of getting injured.
- Use picking bags. This reduces damage as a result of abrasion on
- Wooden or metal picking bins and allows fruit to be gently lowered into
- Bulk harvesting bins;
- Do not leave stems on fruit or damage buttons by “plugging”;
- Use clean, smooth harvesting bins;
- Make sure packing line equipment is cleaned regularly. This reduces dirt and wax buildup which can cause fruit abrasion;
- Reduce packing line abrasion by using foam, rubber and smooth belts to Cushion fruit;
- Remove old and rotten fruit regularly from the packing shed and surrounds;
- Treat harvested fruit with a registered fungicide within 24hrs of harvest;
- It is a perennial slow growing tree. It takes about 7 to 8 years for flowering, fruiting and bark production
- Scrapping of bark from the older branches is done in the month of November by knife and stored in dry shady and ventilated place in gunny bags for marketing.

5. PROCESSING & VALUE ADDITION:-

- The unripe / ripe fruits of Kair are generally not eaten fresh due to their acrid taste, but can be converted in to a variety of by-products after processing. The pickles are the most commonly and widely utilized post- harvest product of Kair.
- The processed fruits can be utilized directly for preparation of pickles or as a vegetable or can be dehydrated for off-season utilization. Because of acrid taste, the fruits are not utilized directly but they are utilized only after processing.
- The method of processing of Kair is given below in the form of flow sheet. Kair-Sangari is one of the most popular dishes incorporating the fruit. Dehydrated Kair is one of the important ingredients of ‘Panchkuta’, a dehydrated mixture of sangaria, Kair, Kachri, kumat and mango / kamal kakri. The method of processing of kair is given below in the form of flow sheet.

Salt

Vegetables do not ferment when they are covered with strong brine or packed with a fairly large quantity of salt. Spoilage is prevented by adding sufficient common salt, bringing its final concentration in the material from 15 to 20 percent. At this high salt concentration, mould and even lactic acid-forming bacteria do not grow. This method of preservation is only applicable to vegetables which contain very little sugar because sufficient lactic acid cannot be formed by fermentation to act as preservative.

Pickles in oil

These are pickles containing some edible oil and are highly popular in India. Usually oil pickles are highly spiced. Cauliflower, lime, mango, turnip pickles, etc are prepared in this manner. The method of preparation of some of the oil pickles vary in different parts of the country. In north India, rapeseed or mustard oil is commonly used, but in south, gingelly (sesame) or groundnut oil is preferred.

Spices

Spices are added practically to all pickles, the quantity added depending upon the kind of fruit or vegetable taken and the kind of flavor desired. The spices generally used are bay leaves, cardamom, dry mango powder, hing (Asafoetida), chilies, cinnamon, clove, coriander, ginger, mustard, black pepper, cumin, turmeric, garlic, mint, fennel, etc. These should be of good quality and should be stored in tin cans in a cool and dry place.

Spices used should be good quality, clean and free of mould and insects. They are either roasted or fried before adding to the pickle mixture. The amount and type of spices added depends on personal taste.

Vinegar

In vinegar pickles, vinegar acts as a preservative. In order to ensure satisfactory results, the final concentration of acid as acetic acid, in the finished product should not be less than 2 percent. To avoid dilution of the vinegar by the water liberated from the tissues, the vegetables are generally placed in strong vinegar of about 10 percent acidity for several days before final packing. This treatment also helps to expel the gases present in the intercellular spaces of the vegetable tissue.

6. MANUFACTURING PROCESS OF THE KEIR-SANGARI PICKLE

The following processing method/sequence to be taken care while processing the Kair-Sangari pickle.

- Kair fruit washed and left to soak in Buttermilk for three days at room temperature. This helps in the removal of Kair's bitterness.
- Instead of Buttermilk, Beaten curd mixed with 1 cup of water and 2 teaspoons of salt can be used.
- Starting on the second night, soak Sangari separately in water overnight.

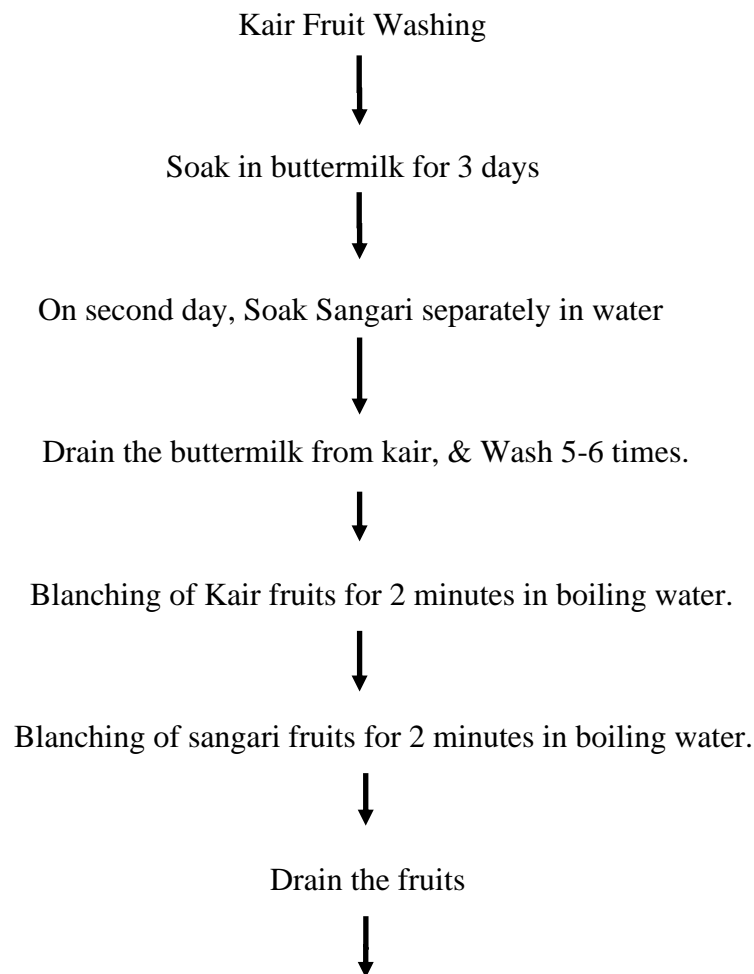
- Drain the buttermilk or curd and wash the kair fruits 5-6 times with water for further processing purpose.
- Then add Kair to boiling water and boil for 2 minutes. Then cover with a lid and let it blanch for 5 minutes.
- Drain the water from Sangari as well, and boil it separately in new water for 2 minutes. Again leave it covered with a lid for 5 minutes.
- Drain the water from both Kair & Sangari. Spread them out on a clean cloth or paper and let them dry completely.
- Heat 3 Tablespoons Mustard Oil in a pan and fry the Kair & Sangari in it.
- Let the mixture cool down fully.
- Now grind the whole spices i.e. Rai (Black Mustard Seeds), Dana Methi (Whole Fenugreek Seeds), Split Yellow Mustard (Sarson ke Beej), Saunf (Fennel Seeds), and Kalonji (Nigella Seeds). Add these to the Kair & Sangari.
- Also add Amchur (Dry Mango Powder), Haldi (Turmeric Powder), Red Chilli Powder, Salt, and Heeng (Asafoetida) to the mixture.
- Mix all the ingredients well and transfer the mixture to a jar.
- Add the remaining Mustard Oil to the jar. Make sure not to overfill, and leave some space at the top.
- Store the pickle at room temperature. Stir with a spoon 2-3 times a day.

- Kair Sangari achar will be ready in 8-10 days. Store it at room temperature and serve it along with any Indian meal.

6.2 Flow Chart for Keir-Sangari Pickle

Manufacturing

The typical Procedure for manufacturing of kair-sanagri Pickle is as below:



Heat 3 TBSp of Mustard oil & Fry the Kair & sangari



Cool the Mixture



Mix all the spices & other ingredients



Transferr the whole material in jar & Fill till neck with mustard oil.



Store in a cool, dry & hygienic place, stirr 2-3 times a day with spoon.



Kair-Sangari pickle will be ready within 8-10 days.

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 Kair-Sangari processing unit are in the production clusters of Kair - sangari growing states.

8. MARKET DEMAND AND SUPPLY FOR KAIR - SANAGRI BASED PRODUCTS

- The spices based products especially kair-Sangari like, consumption is picking up due to increasing income and changing food habits. Therefore, demand for spice based products are prevalent across length and breadth of the country throughout the year.
- Kair-sanagri pickle & other products if highlighted properly for all these health benefits can occupy significant products market.
- The global pickles (& other adjuncts) market 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 dominates the global **market** occupying the major selling market.
- Only thing to be done over here is to replace the existing products with kair-sangari & other spices related products with proper demonstration.

9. MARKETING STRATEGY FOR KAIR-SANGARI PICKLE.

- ✓ **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 offers huge scope for marketing of fruit based products. Urban organized platforms such as departmental stores, malls, super markets can be attractive platforms to sell well packaged and branded Kair-Sangari Based products.

10.DETAILED PROJECT ASSUMPTIONS

Parameter	Assumption	
Capacity of the Mustard sauce mfg. Unit	150	MT/ annum
Utilization of capacity	1st Year Implementation, 70% in second, 80% in third and 90% in fourth 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	20	
Average sale prices per Kg	240	Rs/kg
Pulp extraction	95	
Kair-Sangari Pickle	1 Kg Kair-Sangari Pickle from 0.600 kg Kair-Sangari mixture	

- ✓ 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. Kair – Sanagri cost considered @ Rs. 20/- per kg.
 2. Mixed Spices Cost considered @ Rs. 130/- per kg.
 3. Mustard Oil cost considered @ Rs. 140/- per kg.
 4. Yield is considered as 90 %, 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 etc.
 5. Machinery cost may also vary from vendor to vendor.

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

- ✓ We took less sugar content as fruit is itself more sweet, cost can be reduced by increasing sugar content.

11. PROJECT START-UP COSTING SHEETS

Land and Building.

Land and Civil Infrastructures	
1. Land 800 sq. ft	Assumed land already developed and has 550 sq. ft. built in area. Rs. 4.40 Lakhs
2. Built up processing area 550 Sq. Ft.	
Total	Rs. 4.40 Lakhs

- Land and civil infrastructures are assumed as already available with the entrepreneurs. Still we have considered approx. 4.4 Lac Rs. as a construction cost for safer side of the entrepreneur.

Machinery and Equipment: - Rs. 7.98 Lacs

Sr. No	Equipment	Capacity	Quantity	Power KW	Area Sq. Feet	Amount (in Lakhs)
1	Washing Table	Std.	1	0	4*4	0.4
2	Soaking Tank	1000 Ltr	5	0	3.8 ft dia	5.5
3	Gas operated Cooking Kettle	200 ltr	1	0	3.5 ft dia	1
4	Batch Coding Machine	Suitable	1	0.25	--	0.12
5	Weighing Balance	Suitable	1	0.25	4 Sq. Ft	0.06
6	Accesories	Suitable	1	0	--	0.9
	TOTAL					7.98

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. 0.5 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.	0.5 LAC
Total preoperative expenses	0.5 LAC

Contingency cost to be added as approx. 1.0 Lac.

So total start up cost at own land & Premise may be somewhat similar to **26.97 Lac.** 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)

		55%	65%	75%
Particulars	Period	Year 2	Year 3	Year 4
Raw material stock	15 days	5.33	6.30	8.59
Work in progress	15 days	10.66	12.60	17.18
Packing material	15 days	3.30	3.90	5.32
Finished goods' stock	15 days	9.02	10.67	14.54
Receivables	30 days	18.05	21.33	29.09
Working expenses	30 days	0.79	0.93	1.27
Total current assets		47.15	55.73	75.99
Trade creditors		0.00	0.00	0.00
Working capital gap		47.15	55.73	75.99
Margin money (25%)		11.79	13.93	19.00
Bank finance		35.37	41.80	56.99

12.INSTALLED CAPACITY OF THE KAIR-SANGARI PICKLE MANUFACTURING UNIT

The maximum installed capacity of the KAIR-SANGARI PICKLE manufacturing unit in the present model project is proposed as 150 tons/annum or 500 kg/day Kair-Sangari manufacturing. The unit is assumed to operate 300 days/annum @ 8-10 hrs/day. The 1st year is assumed to be

construction/expansion period of the project; and in the 2nd year 55 percent capacity, 3rd year 65 percent capacity 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)	4.4
ii. Plant and machinery	7.98
iii. Utilities & Fittings	0.8
iv. Other Fixed assets	0.5
v. Pre-operative expenses	0.50
vi. Contingencies	1.00
vii. Working capital margin	11.79
Total project cost (i to vii)	26.97
Means Of finance	
i. Subsidy	9.44
ii. Promoters Contribution	5.39
iii. Term Loan (@10%)	12.14

Manpower Requirement

Total Monthly Salary (Rs.)	No	Wages	Total Monthly
Supervisor (can be the owner)	1	15000	15000
Technician	1	12000	12000
Semi skilled	2	7600	15200
Helper	1	5500	5500
Sales man	1	8000	8000
Total			55700

13.EXPENDITURE, REVENUE & PROFITABILITY ANALYSIS.

		150	MT				
	95.445						
	Particulars	1st Yr	2nd Yr	3rd Yr	4th Yr	5th yr	6th yr
A	Total Installed Capacity (MT)	95.445 MT Kair-sangari/Annum	82.5	97.5	112.5	135	150
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%
B	Expenditure (Rs. in Lakh)	0					
	kair-sangari(Av. Price @ Rs. 20/Kg)	0.00	9.90	11.70	13.50	16.20	18.00
	Mixed Spice @ Rs. 130/kg	0.00	20.81	24.59	28.37	34.05	37.83
	Mustard Oil @ Rs. 140/Kg	0.00	21.48	25.39	29.30	35.15	39.06
	Other materials @ 8/kg	0.00	2.48	2.93	3.38	4.05	4.50
	Packaging materials	0.00	36.30	42.90	49.50	59.40	66.00
	Utilities (Electricity, Fuel)	0.00	0.27	0.32	0.37	0.44	0.49
	Salaries (1st yr only manager's salary)	1.80	6.43	6.43	6.43	6.43	6.43
	Repair & maintenance	0.00	0.70	0.80	0.90	0.90	0.90
	Insurance	0.30	0.30	0.30	0.30	0.30	0.30
	Miscellaneous expenses	0.50	2.30	2.30	2.30	2.30	2.30
	Total Expenditure	2.60	100.97	117.65	134.34	159.22	175.81
C	Total Sales Revenue (Rs. in Lakh)	0.00	198.00	234.00	270.00	324.00	360.00
	Sale of Kair-sangari pickle (Av. Sale Price @ Rs.240/kg)	0.00	198.00	234.00	270.00	324.00	360.00
D	PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows	-2.60	97.03	116.35	135.66	164.78	184.19
	Depreciation on civil works @ 5% per annum	0.22	0.21	0.20	0.19	0.18	0.17
	Depreciation on machinery @ 10% per annum	0.80	0.72	0.65	0.58	0.52	0.47
	Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06	0.05
	Interest on term loan @ 12%	1.26	1.22	1.17	1.12	1.06	0.99
	Interest on working capital @	0.00	4.24	5.02	6.84	6.84	6.84

	12%						
E	Profit after depreciation and Interest (Rs. in Lakh)	-5.00	94.79	114.24	133.70	162.95	182.50
F	Tax (assumed 30%) (Rs. in Lakh)	0.00	28.44	34.27	40.11	48.89	54.75
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	-5.00	66.35	79.97	93.59	114.07	127.75
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	1.26	1.22	1.17	1.12	1.06	0.99
I	Coverage available (Rs. in Lakh)	1.26	1.22	1.17	1.12	1.06	0.99
J	Total Debt Outgo (Rs. in Lakh)	0.42	0.47	0.51	0.57	0.63	0.69
K	Debt Service Coverage Ratio (DSCR)	3.00	2.62	2.28	1.97	1.69	1.44
	Average DSCR	2.16					
L	Cash accruals (PBDIT- Interest-Tax) (Rs. in Lakh)	-3.86	67.38	80.90	94.43	114.83	128.45
M	Payback Period	2.5 Years					
	(on Rs. 17.65 Lakhs initial investment)						

14. REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	1,213,581.98	168,347.10	126,212.53	42,134.57	1,171,447.41
2	1,171,447.41	168,347.10	121,830.53	46,516.57	1,124,930.84
3	1,124,930.84	168,347.10	116,992.81	51,354.29	1,073,576.54
4	1,073,576.54	168,347.10	111,651.96	56,695.14	1,016,881.40
5	1,016,881.40	168,347.10	105,755.67	62,591.43	954,289.97
6	954,289.97	168,347.10	99,246.16	69,100.94	885,189.02
7	885,189.02	168,347.10	92,059.66	76,287.44	808,901.58

8	808,901.58	168,347.10	84,125.76	84,221.34	724,680.24
9	724,680.24	168,347.10	75,366.75	92,980.36	631,699.89
10	631,699.89	168,347.10	65,696.79	102,650.31	529,049.58
11	529,049.58	168,347.10	55,021.16	113,325.94	415,723.63
12	415,723.63	168,347.10	43,235.26	125,111.84	290,611.79
13	290,611.79	168,347.10	30,223.63	138,123.47	152,488.32
14	152,488.32	168,347.10	15,858.78	152,488.32	0.00
		2,356,859	1,143,277	1,213,582.0	(1,213,581.98)

15.ASSETS' DEPRECIATION

Assets' Depreciation (Down Value Method)	Amounts in Lakhs							
	1st yr	2nd yr	3rd yr	4th yr	5th yr	6th yr	7th yr	8th yr
Particulars								
Civil works	4.40	4.18	3.97	3.77	3.58	3.40	3.23	3.07
Depreciation	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15
Depreciated value	4.18	3.97	3.77	3.58	3.40	3.23	3.07	2.92
Plant & Machinery	7.98	7.18	6.46	5.82	5.24	4.71	4.24	3.82
Depreciation	0.80	0.72	0.65	0.58	0.52	0.47	0.42	0.38
Depreciated value	7.18	6.46	5.82	5.24	4.71	4.24	3.82	3.44
Other Fixed Assets	0.80	0.68	0.58	0.49	0.42	0.35	0.30	0.26
Depreciation	0.12	0.10	0.09	0.07	0.06	0.05	0.05	0.04
Depreciated value	0.68	0.58	0.49	0.42	0.35	0.30	0.26	0.22
All Assets	13.18	12.04	11.01	10.08	9.24	8.47	7.78	7.15
Depreciation	1.14	1.03	0.93	0.84	0.77	0.69	0.63	0.57
Depreciated value	12.04	11.01	10.08	9.24	8.47	7.78	7.15	6.57

16.FINANCIAL ASSESSMENT OF THE PROJECT

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

Particulars	1st yr	2nd yr	3 rd yr	4th yr	5th yr	6th yr	7th yr	8th yr	
Capital cost (Rs. in Lakh)	26.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Recurring cost (Rs. in Lakh)	2.60	100.97	117.65	134.34	159.22	175.81	175.81	175.81	
Total cost (Rs. in Lakh)	29.57	100.97	117.65	134.34	159.22	175.81	175.81	175.81	1069.19
Benefit (Rs. in Lakh)	0.00	198.00	234.00	270.00	324.00	360.00	360.00	360.00	
Total Depreciated value of all assets (Rs. in Lakh)								6.57	
Total benefits (Rs. in Lakh)	0.00	198.00	234.00	270.00	324.00	360.00	360.00	366.57	2112.57
Benefit-Cost Ratio (BCR): (Highly Profitable project)	1.976								
Net Present Worth (NPW):	1043.38								

17.BREAK-EVEN ANALYSIS

Break-Even Analysis

Sr. No.	Particulars	1st yr	2nd yr	3 rd yr	4th yr	5th yr	6th yr	7th yr	8th yr
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%	100%	100%
	Production MT/Annum		82.5	97.5	112.5	135	150	150	150
A	Fixed Cost (Rs. in Lakh)								
	Permanent staff salaries	6.432	6.432	6.432	6.432	6.432	6.432	6.432	6.432
	Depreciation on building @ 5% per annum	0.22	0.21	0.20	0.19	0.18	0.17	0.16	0.15
	Depreciation on machinery @ 10% per annum	0.80	0.72	0.65	0.58	0.52	0.47	0.42	0.38

	Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06	0.05	0.05	0.04
	Interest on term loan	1.26	1.22	1.17	1.12	1.06	0.99	0.92	0.84
	Insurance	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Total Fixed Cost (Rs. in Lakh)	9.13	8.98	8.83	8.69	8.55	8.42	8.28	8.15
B	Sales Revenue (Rs. in Lakh)	0	198	234	270	324	360	360	360
C	Variable Cost (Rs. in Lakh)								
	Kair-Sangari (Av. Price @ Rs.20/Kg)	0.00	9.90	11.70	13.50	16.20	18.00	18.00	18.00
	mixed spices @ 130 per kg	0.00	20.81	24.59	28.37	34.05	37.83	37.83	37.83
	Mustard Oil @ 140 per kg	0.00	21.48	25.39	29.30	35.15	39.06	39.06	39.06
	Other ingredients	0.00	2.48	2.93	3.38	4.05	4.50	4.50	4.50
	Packaging materials	0.00	36.30	42.90	49.50	59.40	66.00	66.00	66.00
	Casual staff salaries	0.00	4.93	4.93	4.93	4.93	4.93	4.93	4.93
	Utilities (Electricity, Fuel)	0.00	0.27	0.32	0.37	0.44	0.49	0.49	0.49
	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	4.24	5.02	6.84	6.84	6.84	6.84	6.84
	Total Variable Cost (Rs. in Lakh)	0.50	103.11	120.57	139.08	163.96	180.55	180.55	180.55
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. 26.97 in Lakhs)	-	23.76	23.40	21.60	25.92	25.20	25.20	21.60

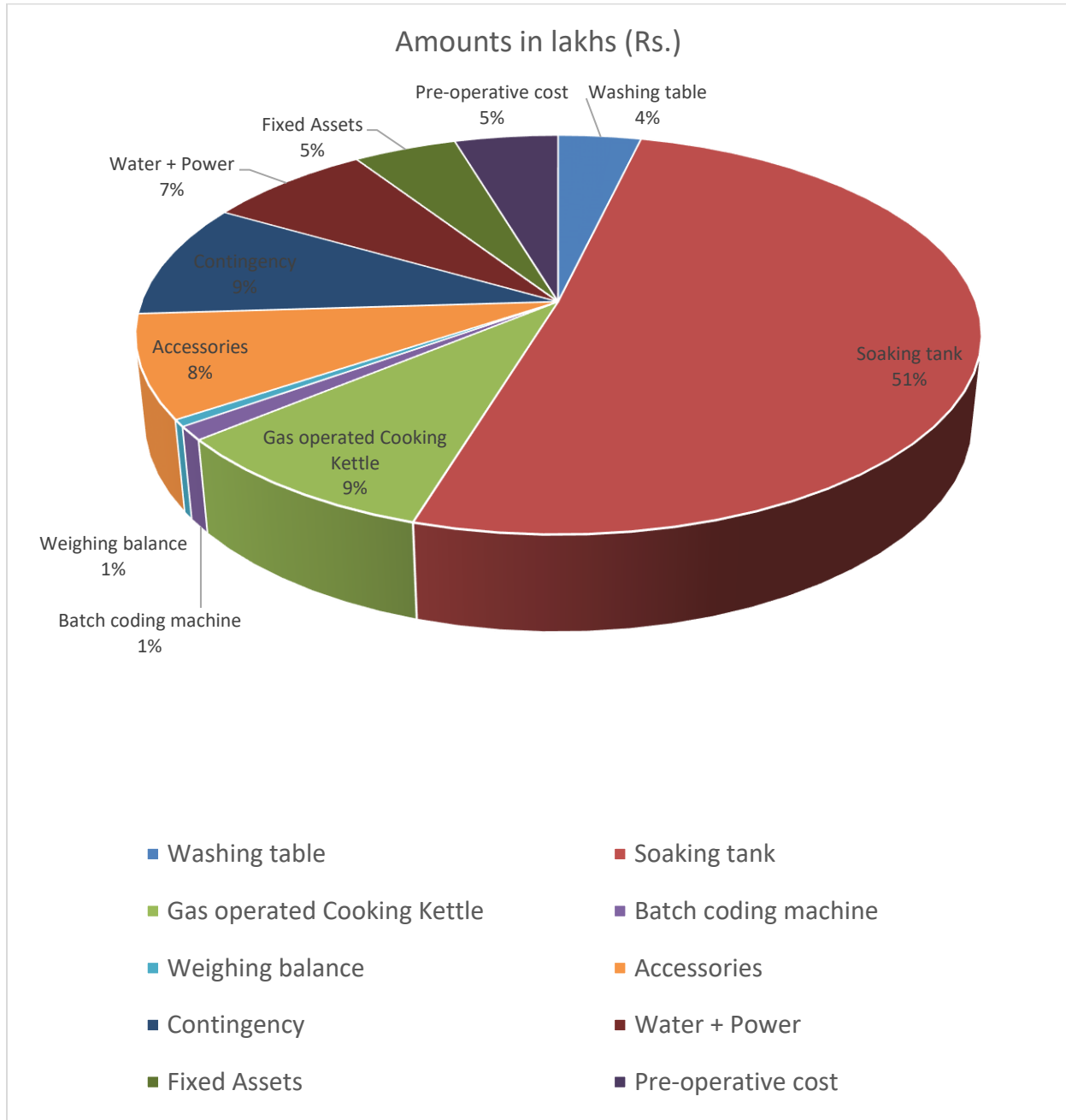
18. RAW MATERIAL REQUIREMENTS FOR THE UNIT

- 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.

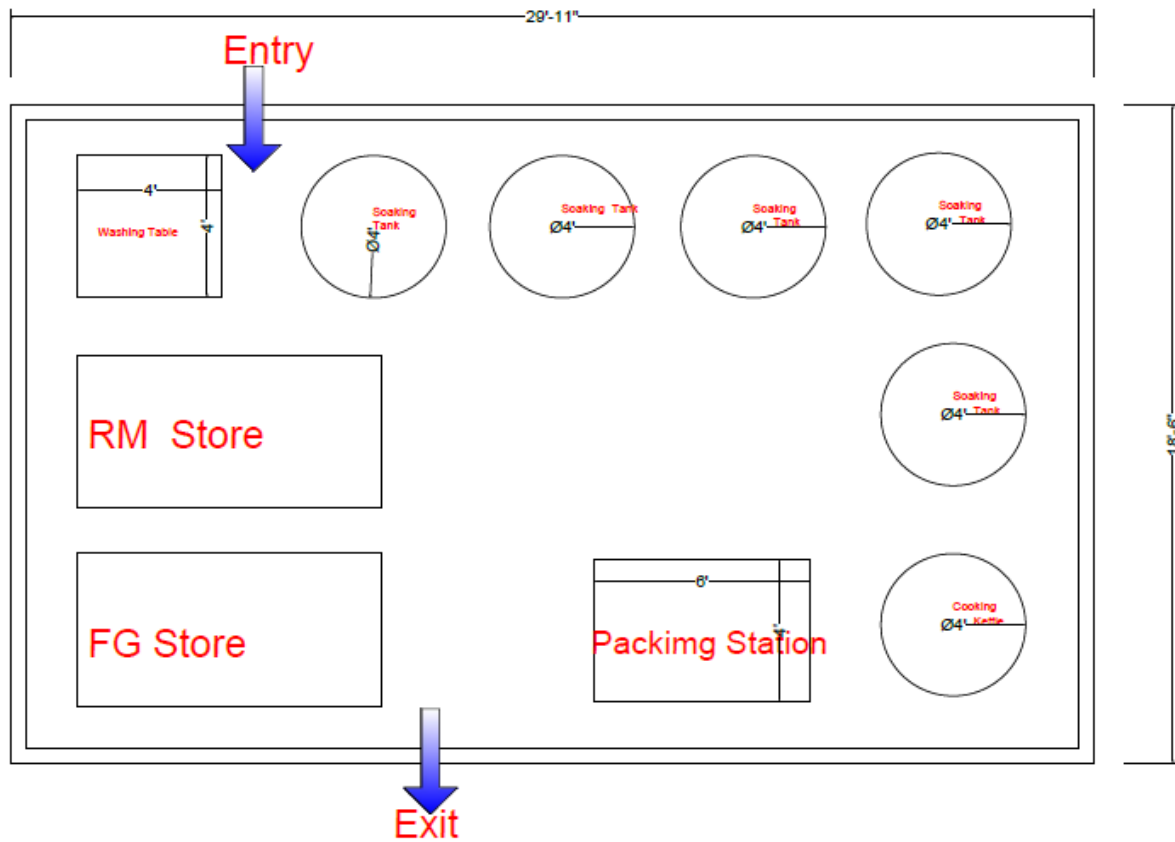
Therefore, ensuring uninterrupted raw materials supply requires maintenance of adequate raw material inventory.

- 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 Kair-Sangari Pickle manufacturing project, the unit requires 175 kg/day, 207 kg/day and 239 kg/day raw ripened fruit 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 KAIR-SANGARI MANUFACTURING UNIT LAYOUT



- The figures depicted here are in feet.

20.MACHINERY SUPPLIERS

There are many machinery suppliers available within India for fruits based beverage 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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