DETAILED PROJECT REPORT

BAJRA FLOUR MANUFACTURING UNIT.

INDIAN INSTITUTE OF FOOD PROCESSING TECHNOLOGY

Ministry of Food Processing Industries, Govt. of India

Thanjavur

2021

Contents

Project At a Glance		
1	Name of the Project	Bajra flour
2	Name of the entrepreneur/FPO/SHG/Cooperative	
3	Nature of proposed project	Proprietorship/Company/ Partnership
4	Registered office	
5	Project site/location	
6	Names of Partner (if partnership)	
7	No of shareholders (if company/FPC)	
8	Technical advisor	
9	Marketing advisor/partners	
10	Proposed project capacity	150 MT/annum (55, 65, 75,90 & 100% capacity utilization in the 2nd, 3rd, 4th ,5th & 6th years' onwards respectively
11	Raw materials	Bajra Grain
12	Major product outputs	Bajra flour
13	Total project cost (Lakhs)	18.52
	Land development, building & civil construction	5.18
	Machinery and equipment	7.68
	Utilities (Power & water facilities)	0.8
	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.90
	Contingencies	1.20
	Working capital margin	1.86
14	Working capital Management (In Lakhs)	
	Second Year	5.58
	Third Year	6.59
	Fourth Year	8.99
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	6.48
	Promoter's contribution (min 20%)	4.44
	Term loan (45%)	7.6
16	Debt-equity ratio	1.22 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	13.92
	3rd year	18.04
	4th year	22.16
18	Average DSCR	2.16
	Benefit Cost Ratio	2.07
	Term Loan Payment	7 Years with 1 year grace period
	Pay Back Period for investment	2 Years

Note: All the data/contents of this DPR are taken from the available information on IIFPT site.

1 GENERAL OVERVIEW OF BAJRA PRODUCTION, CLUSTERS, POST-HARVEST MANAGEMENT AND VALUE ADDITION IN INDIA

1.1 INTRODUCTION

Cereal grains (or simply grains) are small, hard and edible dry seeds that grow on grass-like plants called cereals. They are a staple food in most countries, and provide more food energy worldwide than any other food group, by far. Grains have played a major role in human history, and grain agriculture is one of the main advancements that fueled the development of civilization. They are eaten by humans, and also used to feed and fatten up livestock. Then grains can be processed into various different food products.

Cereals form a major portion of human diet and are an important source of starch and other dietary carbohydrates (dietary fibre), which play an important role in the energy requirement and nutrient intake of human. The millets are with higher fibre content, and their protein quality and mineral composition contribute significantly to nutritional security of a large section of population residing in the millet growing areas, considered to be the most disadvantaged groups. Millets are most recognised nutritionally for being a good source of minerals magnesium, manganese and phosphorus. Research has linked magnesium to a reduced risk for heart attack and phosphorus is important for the development of body tissue and energy metabolism. Millets are also rich in phytochemicals, including phytic acid, which is believed to lower cholesterol, and phytate, which is associated with reduced cancer risk. Thus, millets are strategic in terms of their food, nutritional and livelihood security and their role in local agro-ecosystems.

A whole grain consists of 3 main parts:

- Bran: The hard, outer layer of the grain. It contains fibre, minerals and antioxidants.

- Germ: The nutrient-rich core that contains carbs, fats, proteins, vitamins, minerals, antioxidants and various phytonutrients. The germ is the embryo of the plant, the part that gives rise to a new plant.
- Endosperm: The biggest part of the grain contains mostly carbs (in the form of starch) and protein.
- A refined grain has had the bran and germ removed, leaving just the endosperm

Food uses of millets have, however, been confined only to traditional consumers; limited especially to areas of their cultivation, and still have remained underutilized. Processing them using traditional as well as contemporary methods for preparation of value added and convenience products would certainly diversify their food uses. Their exploitation for preparation of ready-to-use or ready-to-cook products would help in increasing the consumption of millets among non-millet consumers and thereby nutritional security.

Millets are a group of highly variable small-seeded grasses, widely grown around the world as cereal crops or grains for fodder and human food. Millets are important crops in the semiarid tropics of Asia and Africa (especially in India, Mali, Nigeria, and Niger), with 97% of millet production in developing countries. The crop is favored due to its productivity and short growing season under dry, high-temperature conditions.

Millets are indigenous to many parts of the world. The most widely grown millet is pearl millet, which is an important crop in India and parts of Africa. Finger millet, proso millet, and foxtail millet are also important crop species.

1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF BAJRA

Pearl millet (*Pennisetum glaucum*) is the most widely grown type of millet. Grown in Africa and the Indian subcontinent since prehistoric times, it is generally accepted that pearl millet originated in Africa and was subsequently introduced into India. The earliest archaeological records in India date to 2000 BC, so domestication

in Africa must have taken place earlier. Its origin has been traced to tropical Africa. The center of diversity for the crop is in the Sahel zone of West Africa. Cultivation subsequently spread to east and southern Africa, and southern Asia. Records exist for cultivation of pearl millet in the United States in the 1850s, and the crop was introduced into Brazil in the 1960s. Cultivation also spread throughout eastern and southern parts of Africa. Pearl millet is widely grown in the northeastern part of Nigeria (especially in Borno and Yobe states). It is a major source of food to the local villagers of that region. The crop grows easily in that region due to its ability to withstand harsh weather conditions like drought and flood.

Pearl millet is well adapted to production systems characterized by drought, low soil fertility, and high temperature. It performs well in soils with high salinity or low pH. Because of its tolerance to difficult growing conditions, it can be grown in areas where other cereal crops, such as maize or wheat, would not survive.
Today pearl millet is grown on over 260,000 km² worldwide. It accounts for approximately 50% of the total world production of millets.

1.3 VARIETIES

Bajra pearl millet is just one of many types of millet. Some other popular varieties of millet are: Varieties of Bajra growing in India are:

- Pearl Millet: Bajra also known as cumbu, pearl millet is the predominant crop in India. It has the same quantity of protein as wheat. The protein contains a high proportion of prolamine followed by the globulin and albumins. Pearling of bajra to about 8% polish leaves most of the germs intact and the nutritive value is not seriously affected. Pearling improves appearance and taste of the products. The grain is sometimes eaten after it is parched, the product being similar to popcorn. The grain is also suitable for the preparation of malt. It is consumed after dehusking and cooked

in the same way as rice. More commonly it is ground into flour and made into chappathi. It is also made into thin porridge.

- Sorghum Millet: Sorghum, commonly known as Jowar in India, is used to make rotis and other Indian bread. Organic jowar is a rich source of iron, protein, and fibre, and can help lower cholesterol levels due to the presence of policosanols. It is recommended to people with wheat intolerance.
- Finger Millet: Finger millet is a red-coloured grain that is popularly called ragi. A healthy substitute for rice and wheat, it has the goodness of protein and amino acids. Ragi is also used to make cookies and halwa. It is also gluten-free and should be given to growing kids for brain development.
- Foxtail Millet: Foxtail millet is a good source of blood sugar balancing carbohydrates that make it beneficial for sugar and heart patients. It is available in the form of semolina and rice flour. Also known as kakum/kangni, it is a great source of iron and calcium and is believed to boost immunity.
- Barnyard Millet: Sanwa, or barnyard, is another type of millet that is nutritionally dense with high fibre content. If you are planning to lose weight, then incorporating it into your diet can do wonders for your overall well being. Sanwa is rich in calcium and phosphorous, which helps in bone building.
- Broomcorn Millet: Proso/Broomcorn millet is good for balancing blood sugar levels and has a low glycemic index. It is popularly called Chena in India and is used as bird feed.
- Little Millet: Little millet goes by several names, including Moraiyo, Kutki, Shavan, and Sama. It is loaded with B-vitamins and minerals such as calcium, iron, zinc, and potassium. It is used in several traditional dishes of South India and is often substituted for rice.
- Amarnath Millet: One of the lesser-known **types of millets** is Amaranth, also known as Rajgira, Ramdana, and Chola. This millet is high on protein and helps fight hair loss and greying. Amaranth also reduces cholesterol levels and the risk of cardiovascular disease. It is high in calcium, antioxidants, and other minerals.

- Buckwheat Millet: Buckwheat is one of the most popular **types of millets** in India and is often used during the fasting period of Navratras. Also called Kuttu, it is diabetic friendly and lowers blood pressure. It is beneficial for good cardiovascular health and should be incorporated into your diet if you want to lose weight. Buckwheat also protects against breast cancer, childhood asthma, and gallstones. It is popularly ground into a fine powder to make bread, puris, and cheelas.
- Kodo Millet: Kodo millet or Kodon is easily digestible and contains higher amounts of lecithin. It is vital for strengthening the nervous system. Among other vitamins and minerals, kodu is a fantastic source of B vitamins, especially niacin, B6, and folic acid. It contains minerals such as calcium, iron, potassium, magnesium, and zinc. Since kodu is gluten-free, it is excellent for people who are gluten intolerant. When consumed regularly by postmenopausal women, it can relieve signs of cardiovascular diseases such as high blood pressure and cholesterol levels.

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Bajra pearl millet is only one of numerous sorts of millet. Some other famous assortments of millet are fonio, finger millet (ragi), Job's tears, foxtail, and kodo millet. Most millets have noteworthy dietary profiles, including bajra. Here's the normal nourishing profile of 1 cup (170 grams) of cooked millet:

Nutritional value:

- Calories: 201
- Protein: 6 grams
- Fat: 1.7 grams
- Carbs: 40 grams
- Fiber: 2 grams
- Sodium: 286 mg

- Folate: 8% of the Daily Value (DV)
- Iron: 6% of the DV
- Magnesium: 18% of the DV
- Thiamine: 15% of the DV
- Niacin: 14% of the DV
- Phosphorus: 14% of the DV
- Zinc: 14% of the DV
- Riboflavin: 11% of the DV
- Nutrient B6: 11% of the DV

- Cooked millet is a decent wellspring of protein and carbs and a good wellspring of fiber. It's likewise a decent wellspring of nutrients and minerals. Generally, millet is a nutritious sugar source.
- It's additionally without gluten and an appropriate decision for individuals with celiac illness or those after a without gluten diet — as long as you guarantee that you're buying an item that is affirmed without gluten.
- Bajra is high in advantageous plant synthetic compounds like cell reinforcements, polyphenols, and phytochemicals, which are all known for adding to ideal human wellbeing from various perspectives.
- Be that as it may, the presence of helpful polyphenols may likewise hinder a portion of the minerals in bajra, for example, iron and zinc, from being completely consumed by your body.
- Like most millets, bajra is a supplement thick wellspring of protein, carbs, nutrients, minerals, and useful plant synthetics.
- Millets are an ideal food for people suffering from chronic diseases such as diabetes and heart diseases. Millets are rich in fiber, which helps in digestion and can relieve bowel issues. Regular consumption of millets helps in preventing gastrointestinal problems and other diseases related to kidney and liver.

1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-

Bajra (*Pennisetum glaucum*) or Pearl millet is an important nutria-cereal or coarse grain cereals suitable for rainfed and dryland agriculture. It is 70-90 days duration crop best suitable for sandy, black and loamy soils with good drainage. It is mainly grown in Kharif or rainy season in the States of Rajasthan, Haryana, Uttar Pradesh, Madhya Pradesh, Gujarat, Maharashtra and Karnataka. It is also grown in summer in a few districts of Gujarat, Uttar Pradesh and Rajasthan. Bajra is consumed both as grain and used for fodder purpose. Bajra is staple diet in many States of India. The "Bajra ke Roti" is an important part of Indian cuisine in Rajasthan, Haryana and other parts of North India. With ovoid grains of 3 – 4 mm length pearl millet has the largest kernels of all varieties of millet (not including sorghum) which can be nearly white, pale yellow, brown, grey, slate blue or purple. The 1000-seed weight can be anything from 2.5 to 14 g with a mean of 8 g. The height of the plant ranges from 0.5 – 4 m.

Cultivation and Bearing:-

Bajra is a highly drought resistance crop. It is the coarsest of all food grains. The bajra, also known as cow grass, rice grass, ditch millet, Native Paspalum, or Indian Crown Grass originates in tropical Africa, and it is estimated to have been domesticated in India 3000 years ago. The grain is covered with a horny seed coat which should be removed before cooking. Bajra popularly known as Pearl millet, cattail millet or bulrush belongs to the family Graminea. The crop is cultivated for grain as well as for fodder in the arid region of Africa and Asia and as a pasture in U.S.A. It is originated in India or Africa. It is grown all over India except Assam and part of northeast India.

Bajra is grown mostly in warm and dry climate. It is highly drought tolerant and, therefore, can be grown in areas where rainfall is scanty and erratic.

It is well thrive in areas receiving only 40 to 50 centimetre annual rainfall. The crop has a wide adaptability as it may grow under different day lengths, temperature and moisture stress. Most of the varieties developed in India are photosensitive which helps in growing the crop during monsoon, rabi and arid season. It requires low annual rainfall ranging between 40-50 cm and dry weather. The crop may tolerate drought but cannot withstand high rainfall of 90 cm or above.

Light soils of low inherent fertility good drainage, mild salinity are best type for this crop. Crop does not tolerate soil acidity. Bajra is grown from gravelly and stony upland poor soils to loam soils. Deep, loamy, fertile soils, rich in organic matter, are preferred for satisfactory growth. Well-drained soils with adequate moisture supply are required for uninterrupted growth of this crop.

During dry periods, irrigations are required every 4-7 days depending on the severity of the drought and type of soil. The crop needs very fine tilt because the seeds are too small. 2-3 harrowings and a ploughing is followed so that a fine tilth may be obtained to facilitate the sowing and proper distribution of seed at appropriate depth.

Sowing time:- Most appropriate time of sowing is middle or last week of July
Seed rate and Spacing:-
4-5 kg/ha for drilling method
2.5-3 kg/ha for dibbling method
spacing 40 –45 cm between rows, 10 –15 cm within rows.
Seed treatment- The organo-mercurial compound Ceresan, Agrosan should be used @ 2.5-3 kg/ha to control seed borne diseases

Generally, the crop requires low quantity of nutrients. But All India Co-ordinated Millet Improvement Project has proved that new plant types of bajra especially hybrids respond to very high doses of fertilizers.

Under rainfed areas application of organic manures such as FYM or compost

helps in increasing the crop yield at the rate of 150-200 quintals/ha 80 –100 kg N:40-50 kgP:40-50kgK is recommended dose for hybrid variety.

Fertilizers are applied in split doses, half of nitrogen, full phosphorus and potash should be basal placed at the time of sowing. The organic manures must be applied 20 days before the sowing of the seeds for full decomposition. One fourth dose of nitrogen should be applied about 30 days and 60 days after sowing.

Bajra is grown rainfed and crop being drought resistant hardly needs any irrigation, however it is observed that the yield may be significantly increased by irrigating the crop at critical growth stages like maximum tillering, flowering and grain filling stage. Therefore, light irrigations and efficient drainage is very essential for bajra production. First irrigation at 25-30 DAS and second irrigation at 40-45 DAS. Drain out the excessive rain water from the field during heavy and continuous rains.

The crop is harvested when grains become hard enough and contain moisture. Two methods are adopted for harvesting the crop Cutting ear-head

i) from standing crop followed by cutting of remaining plants later

ii) Cutting of entire plants by sticks and stalking the plants for five days in sun for obtaining grains. Grains are separated either by beating the ear-heads with sticks or by trampling the ear-heads under bullock feet.

The separated grains must be cleaned and dried in sun to bring about 12-14% moisture after which the grains may be bagged and stored in a moisture proof store.

Irrigated crop yields 30-35 quintals/ha, while unirrigated crop yield 12-15 quintals/ha.

1.6 PROCESSING & VALUE ADDITION:-

Bajra is a customary Hindi name for the Pennisetum glaucum crop — otherwise called pearl millet. It's moreover known as dukn, cumbu, gero, sanio, kambu, babala, or bulrush millet. The grain is essentially developed in Africa and India, where it's a significant wellspring of nourishment. Notwithstanding, it's likewise developed and expended in numerous different spots far and wide. Bajra alludes to the palatable seeds of pearl millet plants. They develop in different shades of white, yellow, dark, earthy colored, and pale blue purple. The seeds are regularly cooked as an oat grain or now and then finely ground and utilized as a flour.

Higher fibre content millets contribute significantly to the nutritional protection of a wide section of the population living in millet growing areas, considered the most vulnerable communities, and their protein quality and mineral composition contribute significantly. Millets are best known nutritionally for being a healthy source of magnesium, manganese and phosphorus minerals. Research has linked magnesium to a reduced risk of heart attack, and for body tissue growth and energy metabolism, phosphorus is essential. Millets are also abundant in phytochemicals, including phytic acid, which is thought to reduce cholesterol, and phytate, which is associated with a decreased risk of developing cancer. Therefore, in terms of their food, nutritional and livelihood protection and their position in local agro-ecosystems, millets are strategic.

However, the food uses of millets were restricted to conventional consumers only; they were limited, in particular, to their cultivation areas and were still underutilized. Their food uses will definitely be diversified by processing those using conventional as well as contemporary methods for the preparation of value added and convenience items. Their exploitation for the preparation of ready-to-use or ready-to-cook items will lead to the increase of millet consumption among non-millet consumers and thus to food protection.

India is one of the major countries dominating the millets market in Asia Pacific, followed by China. Bajra has the same quantity of protein as wheat. The protein contains a high proportion of prolamine followed by globulin and albumins. Pearling improves appearance and taste of the products. It is consumed after de-husking and cooked in the same way as rice. More commonly, it is ground into flour and made into *chapaties*. It is also made into thin porridge. The grain is sometimes eaten after it is parched. The product is similar to popcorn. The grain is suitable for the preparation of malt. An intoxicating drink is obtained from its malted seeds.

2. MODEL BAJRA FLOUR PROCESSING UNDER FME SCHEME

2.1 LOCATION OF THE PROPOSED PROJECT AND LAND

The entrepreneur must provide description of the proposed location, site of the project, distance from the targeted local and distant markets; and the reasons/advantages thereof i.e. in terms of raw materials availability, market accessibility, logistics support, basic infrastructure availability etc. The major bajra producing states are Rajasthan, Uttar Pradesh, Gujarat, Madhya Pradesh, Haryana, Maharashtra, Karnataka and Others.

2.2 INSTALLED CAPACITY OF THE BAJRA FLOUR PROCESSING UNIT

The maximum installed capacity of the Bajra flour manufacturing unit in the present model project is proposed as 150 tonns/annum or 500 kg/day Bajra flour. The unit is assumed to operate 300 days/annum @ 8-10 hrs/day the 1styear is assumed to be construction/expansion period of the project; and in the 2nd year 55 percent capacity, 3rd year 65 percent capacity, 4th year 75 percent capacity, 5th year 90 percent capacity & 6th year onwards 100 percent capacity utilization is assumed in this model project.

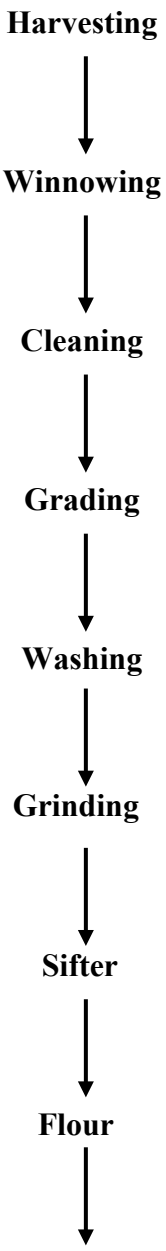
2.3 RAW MATERIAL REQUIREMENTS FOR THE UNIT

A sustainable food processing unit must ensure maximum capacity utilization and thus requires an operation of minimum 280-300 days per year to get reasonable profit. Therefore, ensuring uninterrupted raw materials supply requires maintenance of adequate raw material inventory. The processor must have linkage with producer organizations preferably FPCs through legal contract to get adequate quantity and quality of raw materials which otherwise get spoiled. In the Bajra flour manufacturing project, the unit requires 336.11 kg/day, 397.22 kg/day, 458.33 kg/day, 550 Kg/day &

611.11 kg/day Bajra grains at 55, 65, 75, 90 & 100 percent capacity utilization, respectively.

2.4 MANUFACTURING PROCESS OF THE BAJRA FLOUR

Flow chart for bajra flour:



PRIMARY PROCESSING OF BAJRA

Cleaning and Grading

Cleaning the Pearl Millet: The first milling steps involve equipment that separates grain from seeds and other grains, removes foreign materials that might have originated during the farmer's harvest such as metal, sticks, stones and straw; and scours the kernels of Pearl Millet. It can take as many as six steps. The machines that clean the grain are collectively called the cleaning house.

- Magnetic separator – The grain first passes by a magnet that removes ferrous metal particles. It will pass through other metal detectors after milling to ensure that no metal pieces are in the finished product. Magnets are also positioned throughout the milling process and at the last step prior to load-out.
- Separator – Vibrating or rotating drum separators remove bits of wood, straw and almost anything else too big or too small to be the desired grain.
- Aspirator – Air currents act as a vacuum to remove dust and lighter impurities.
- De-stoner – Using gravity, the machine separates the heavy material from the light to remove stones that may be the same size as the desired grain.
- Disc separator – The grain passes through a separator that identifies the size of the kernels even more closely. It rejects anything longer, shorter, more round, more angular or in any way a different shape. Scourer – The scourer removes outer husks, dirt in the kernel crease and any smaller impurities with an intense scouring action. Currents of air pull all the loosened material away.
- Impact Entoleter – Centrifugal force breaks apart any unsound kernels or insect eggs and aspiration rejects them from the mill flow. From the entoleter, the sound Pearl Millet flows to grinding bins, large hoppers that control the feeding of the Pearl Millet to the actual milling process.

- Color Separator – Newer mills may also utilize electronic color separators to simplify the cleaning process.

Grinding Pearl Millet:

The Pearl Millet kernels are now ready to be milled into flour. The modern milling process is a gradual reduction of the Pearl Millet kernels through a process of grinding and sifting. This science of analysis, blending, grinding, sifting and blending again results in consistent end products.

Pearl Millet kernels are measured or fed from the bins to the "roller mills", corrugated cylinders made from chilled steel. The rolls are paired and rotate inward against each other, moving at different speeds. Passing through the corrugated "first break" rolls begins the separation of bran, endosperm (starch) and germ.

There are about five roller mills or breaks in the system. Again, the goal is to remove the endosperm from the bran and the germ. Each break roll must be set to get as much pure endosperm as possible. The "break" rolls, each have successively finer corrugations. After each trip through the break rolls, the grist is sent back upstairs to drop through sifters. The system reworks the coarse stocks from the sifters and reduces the Pearl Millet particles to granular "middlings" that are as free from bran as possible.
In some mills double high roller mills eliminate elevating and sifting the product between two successive passages in the milling process, thus increasing efficiency.

Sifters- The broken particles of Pearl Millet are elevated through pneumatic tubes and then dropped into huge, vibrating, box-like sifters where they are shaken through a series of bolting cloths or screens to separate the larger from the smaller particles.

Inside the sifter, there may be as many as 27 frames, each covered with either a nylon or stainless steel screen, with square openings that get smaller and smaller the farther down they go. Up to six different sizes of particles may come from a single sifter.

Blending: The flour is separated from the fibre and the process is repeated again.

Finished product testing:

After milling, lab tests are run to ensure that the flour meets specifications. Millers also conduct routine monitoring of indicator natural organisms. Although dry flour does not provide an environment that is conducive to microbial growth, it is important to understand that flour is a minimally processed agricultural ingredient and is not a ready-to-eat product. Flour is not intended to be consumed raw. The heat processes of baking, frying, boiling and cooking are adequate to destroy any pathogens that may be present in flour and reduce the potential risk of food borne illness.

`

Packaging of Product:

The packaging is carried out in a much simple process then milling, the Pearl millet flour is fed to holding tank of the packaging machine, which simply seals one end of continuous packaging first, then it simply fills the packet as per required weight & seals the other end, generating the required packet.

2.5 MARKET DEMAND AND SUPPLY FOR BAJRA FLOUR

India, led by China, is one of the major countries dominating the millet market in the Asia Pacific. The amount of protein Bajra has is the same as wheat. A high proportion of prolamine, followed by globulin and albumins, is found in the protein. Pearling enhances the look and taste of the products. Until dehusked and prepared in the same way as rice, it is eaten. More regularly, it is ground into flour and turned into sheets. It is rendered into thin porridge as well. After it is parched, the grain is occasionally consumed. The commodity is equivalent to popcorn. The grain is suited for malt preparation. From its malted seeds, an intoxicating drink is obtained. The size of the global demand for millets was US$ 9,407. In 2018, 8 million and is anticipated to rise at a CAGR of 4. 6 per cent to cross US$ 14,026 from 2019 to 2027. By 2027, 3 million.

Millets are small-seeded grasses that are commonly cultivated as cereal crops or grains for food and human food throughout the world.

The global production of millet has been estimated at 27.8 million tons. With a 41.0 percent global market share, India is the largest global producer. The importance of millet as a food staple, particularly in India, has declined over the last two decades due to various factors, including growing incomes, increasing urbanization, and government policies. More than 50 percent of millet production, as opposed to its use only as a staple, is currently finding its way into alternative uses. Demands for food and beverage products are further driven by the increasing population, which in turn contributes to growth in the millet market in India. The bakery sector is one of the fastest-growing sectors of consumer goods with high demand opportunities for foreign businesses. Due to its immense potential for value addition, especially within the food processing industry, the Indian food sector has emerged as a high growth and high-profit sector.

The global millets market was valued at US$ 9,407. 8 million in 2018 and is expected to grow at a CAGR of 4. 6% from 2019 to 2027 to reach US$ 14,026. 3 million by 2027. Millets are small-seeded grasses widely grown across the world as cereal crops or grains for fodder and human food.

The global millet production was estimated at 27.8 million tons. India is the largest global producer with a 41.0% global market share. In the last two decades, the importance of millet as food staples, particularly in India, has been declining due to various factors, including rising incomes, growing urbanization, and government policies. More than 50% of the millet production is currently finding its way into alternative uses as opposed to its consumption only as a staple. The growing population is further propelling the demands for food and beverage products, which in turn leads to the millets market growth in India. The bakery industry is among the fastest-growing consumer goods sectors with strong market potential for international companies. The Indian food sector has emerged as high growth and high-profit sector due to its immense potential for value addition, particularly within the food processing industry.

The global millet consumption has declined at a rate of 0.9% and expected to witness positive movement during the forecast period. India, Niger, and China are the largest producers of millet in the world, accounting for more than 55% of global production. For many years, India was the world's major producer of millet. However, in recent years, millet production has increased dramatically in Africa.

2.6 MARKETING STRATEGY FOR BAJRAFLOUR

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

2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Bajra flour 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 grain processing unit by adding new flour processing line. Therefore, land and civil infrastructures are assumed as already available with the entrepreneurs.

- Herewith in this DPR, we have considered the assumptions as listed below in the tables of different costs, which may vary as per region, seasons and machinery designs and supplier.
    1. Bajra cost considered @ Rs.10/-per kg.
    2. 1 kg Bajra will produce 90% recovery.
    3. 1 Batch size is approximately 500 kg.
    4. No. of hours per day are approximately 8-10 hours.
    5. Batch yield is 95%.

Detailed Project Assumptions		
Parameter	Assumption	
Capacity of the Bajra flour Unit	150	MT/annum
Utilization of capacity	1st Year Implementation, 55% in second, 65% in third, 75% in fourth year, 90% in fifth & 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	10	
Average sale prices per Kg	55	Rs/kg
Pulp extraction	90	
BAJRA FLOUR	1 kg Bajra flour from 1.22 kg Bajra grain	

2.8 FIXED CAPITAL INVESTMENT

2.8.1 MACHINERY AND EQUIPMENT

Sr No.	Equipment	Quantity	Capacity	Area (in feet)	Price (Rs. In Lacs)
1	Silo	1	2500 kg	5 ft dia.	3.4
2	Winnowing machine	1	Suitable	0.6	0.6
3	Vibrating pre-cleaner	1	100 kg/hour	4*4	0.8

4	Heavy duty Pulverizer mill	1	cont.	4*3	1.2
5	Sifter	1	cont.	4*4	0.75
6	Cont. sealing machine	1	Suitable	4*3	0.25
7	Batch coding machine	1	Suitable		0.12
8	Weighing balance	1	Suitable		0.06
9	Accessories	1	Suitable		0.5
				Total	7.68

2.8.2 OTHER COSTS:-

Utilities and Fittings:-

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

Other Fixed Assests:

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

Pre-operative expenses

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

Contingency cost to be added as approx.1.2 Lac.

So total startup cost at own land & Premise may be somewhat similar to 18.52 lacs. This is according to survey done at X location India. This may vary on location, situation and design change over.

2.9 WORKING CAPITAL REQUIREMENTS

Particulars	Period	Year 2 (55%)	Year 3 (65%)	Year 4 (75%)
Raw material stock	7 days	0.45	0.53	0.73
Work in progress	15 days	0.90	1.06	1.45
Packing material	15 days	0.23	0.27	0.36
Finished goods' stock	15 days	1.65	1.95	2.66
Receivables	30 days	3.30	3.89	5.31
Working expenses	30 days	0.92	1.08	1.48
Total current assets		7.44	8.79	11.98
Trade creditors		0.00	0.00	0.00
Working capital gap		7.44	8.79	11.98
Margin money (25%)		1.86	2.20	3.00
Bank finance		5.58	6.59	8.99

2.10 TOTAL PROJECT COST AND MEANS OF FINANCES

Particulars	Amount in Lakhs
i. Land and building (20 x 17.5 x 12 ft -LxBxH)	5.18
ii. Plant and machinery	7.68
iii. Utilities & Fittings	0.8
iv. Other Fixed assets	0.9
v. Pre-operative expenses	0.90
vi. Contingencies	1.20
vii. Working capital margin	1.86
Total project cost (i to vii)	18.52
Means Of finance	
i. Subsidy	6.48
ii. Promoters Contribution	4.44
iii. Term Loan (@10%)	7.59

2.11 MANPOWER REQUIREMENTS

Total Monthly Salary (Rs.)	No	Wages	Total Monthly	Total Annualy
Supervisor (can be the owner)	1	18000	18000	216000
Technician	1	14000	14000	168000
Helper	1	5500	5500	66000
Semi-skilled	2	7600	15200	182400
Sales man	1	8000	8000	96000
			60700	728400

2.12 EXPENDITURE, REVENUE AND PROFITABILITY ANALYSIS

	Particulars	1st Year	2nd Year	3rd Year	4th Year	5th year	6th year
A	Total Installed Capacity (MT)	183 MT Bajra grains/Annum	82.5	97.5	112.5	135	150
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%
B	**Expenditure (Rs. in Lakh)**	0					
	Bajra grains (Av. Price @ Rs. 10/Kg)	0.00	10.08	11.92	13.75	16.50	18.33
	Packaging materials	0.00	2.48	2.93	3.38	4.05	4.50
	Utilities (Electricity, Fuel)	0.00	0.55	0.65	0.75	0.90	1.00
	Salaries (1st yr only manager's salary)	2.16	7.28	7.28	7.28	7.28	7.28
	Repair & maintenance	0.00	0.70	0.80	0.90	0.90	0.90
	Insurance	0.30	0.30	0.30	0.30	0.30	0.30
	Miscellaneous expenses	0.50	2.30	2.30	2.30	2.30	2.30
	Total Expenditure	**2.96**	**23.69**	**26.18**	**28.66**	**32.24**	**34.62**
C	**Total Sales Revenue (Rs. in Lakh)**	**0.00**	**45.38**	**53.63**	**61.88**	**74.25**	**82.50**
	Sale of Bajra flour (Av. Sale Price @ Rs.55/kg)	0.00	45.38	53.63	61.88	74.25	82.50
D	**PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows**	**-2.96**	**21.68**	**27.45**	**33.21**	**42.01**	**47.88**
	Depreciation on civil works @ 5% per annum	0.26	0.25	0.23	0.22	0.21	0.20
	Depreciation on machinery @ 10% per annum	0.77	0.69	0.62	0.56	0.50	0.45
	Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06	0.05
	Interest on term loan @ 12%	0.79	0.76	0.73	0.70	0.66	0.62
	Interest on working capital @ 12%	0.00	0.67	0.79	1.08	1.08	1.08
E	Profit after depreciation and Interest (Rs. in Lakh)	**-4.90**	**19.88**	**25.77**	**31.66**	**40.57**	**46.55**

F	Tax (assumed 30%) (Rs. in Lakh)	**0.00**	**5.96**	**7.73**	**9.50**	**12.17**	**13.97**
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	**-4.90**	**13.92**	**18.04**	**22.16**	**28.40**	**32.59**
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	0.79	0.76	0.73	0.70	0.66	0.62
I	Coverage available (Rs. in Lakh)	0.79	0.76	0.73	0.70	0.66	0.62
J	Total Debt Outgo (Rs. in Lakh)	0.26	0.29	0.32	0.35	0.39	0.43
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)	-3.75	14.96	18.98	23.02	29.18	33.29
M	Payback Period	2.5 Years					
	(on Rs. 18.52 Lakhs initial investment)						

2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	928,644.01	128,820.74	96,578.98	32,241.76	896,402.25
2	896,402.25	128,820.74	93,225.83	35,594.90	860,807.35
3	860,807.35	128,820.74	89,523.96	39,296.77	821,510.57
4	821,510.57	128,820.74	85,437.10	43,383.64	778,126.93
5	778,126.93	128,820.74	80,925.20	47,895.54	730,231.39
6	730,231.39	128,820.74	75,944.07	52,876.67	677,354.72
7	677,354.72	128,820.74	70,444.89	58,375.85	618,978.87
8	618,978.87	128,820.74	64,373.80	64,446.94	554,531.94
9	554,531.94	128,820.74	57,671.32	71,149.42	483,382.52
10	483,382.52	128,820.74	50,271.78	78,548.96	404,833.57

11	404,833.57	128,820.74	42,102.69	86,718.05	318,115.52
12	318,115.52	128,820.74	33,084.01	95,736.72	222,378.79
13	222,378.79	128,820.74	23,127.39	105,693.34	116,685.45
14	116,685.45	128,820.74	12,135.29	116,685.45	(0.00)
		1,803,490.34	874,846.32	928,644.01	(928,644.01)

2.14

ASSET'S DEPRECIATION

Assets' Depreciation (Down Value Method)							Amounts in Lakhs	
Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
Civil works	5.18	4.92	4.67	4.44	4.22	4.01	3.81	3.62
Depreciation	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18
Depreciated value	4.92	4.67	4.44	4.22	4.01	3.81	3.62	3.44
Plant & Machinery	7.68	6.91	6.22	5.60	5.04	4.53	4.08	3.67
Depreciation	0.77	0.69	0.62	0.56	0.50	0.45	0.41	0.37
Depreciated value	6.91	6.22	5.60	5.04	4.53	4.08	3.67	3.31
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	13.66	12.51	11.47	10.53	9.68	8.90	8.19	7.55
Depreciation	1.15	1.04	0.94	0.86	0.78	0.71	0.64	0.59
Depreciated value	12.51	11.47	10.53	9.68	8.90	8.19	7.55	6.96

2.15

FINANCIAL ASSESSMENT OF THE PROJECT

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

Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year	
Capital cost (Rs. in Lakh)	18.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Recurring cost (Rs. in Lakh)	2.96	23.69	26.18	28.66	32.24	34.62	34.62	34.62	
Total cost (Rs. in Lakh)	21.48	23.69	26.18	28.66	32.24	34.62	34.62	34.62	236.11
Benefit (Rs. in Lakh)	0.00	45.38	53.63	61.88	74.25	82.50	82.50	82.50	
Total Depreciated value of all assets (Rs. in Lakh)								6.96	
Total benefits (Rs. in Lakh)	0.00	45.38	53.63	61.88	74.25	82.50	82.50	89.46	489.59
Benefit-Cost Ratio (BCR): (Highly Profitable project)	**2.074**								
Net Present Worth (NPW):	253.48								

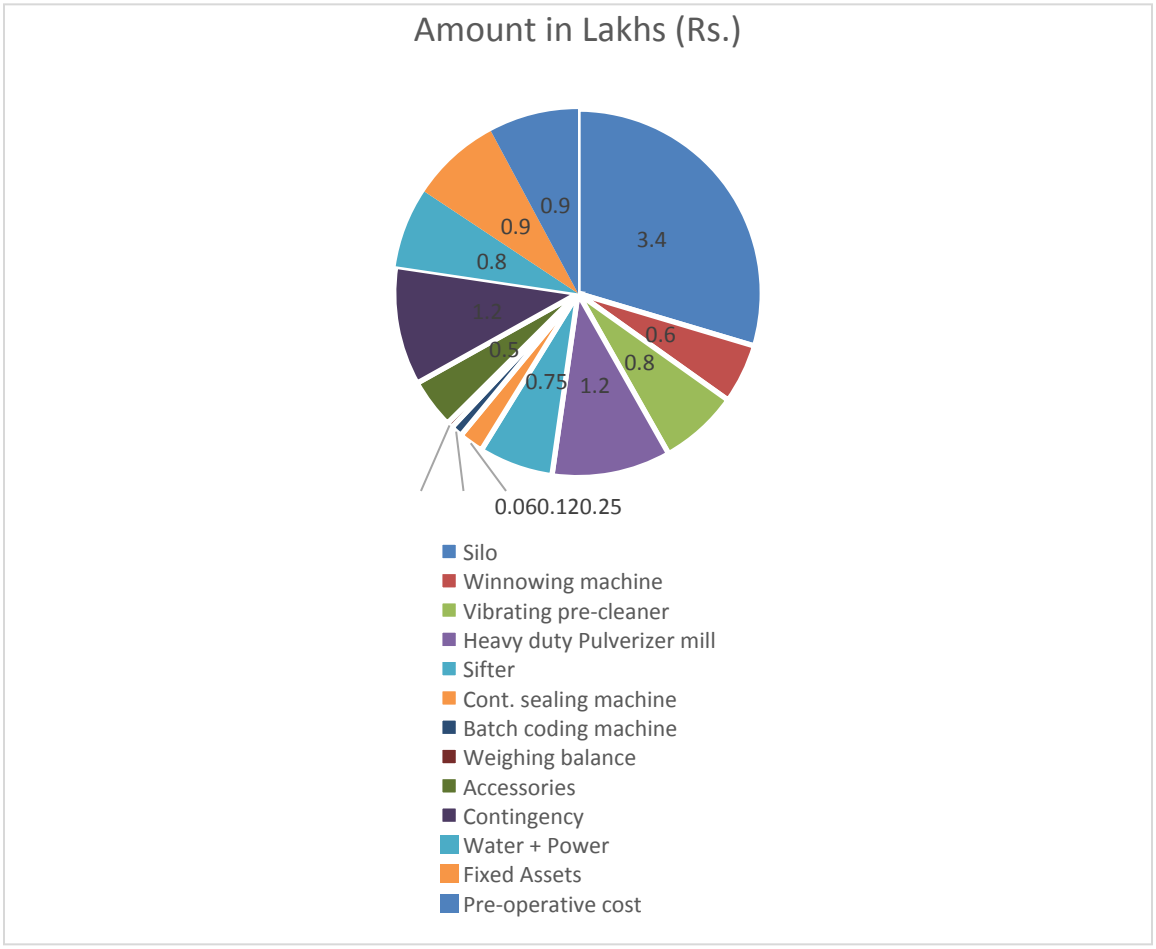
2.16 BREAK EVEN ANALYSIS

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

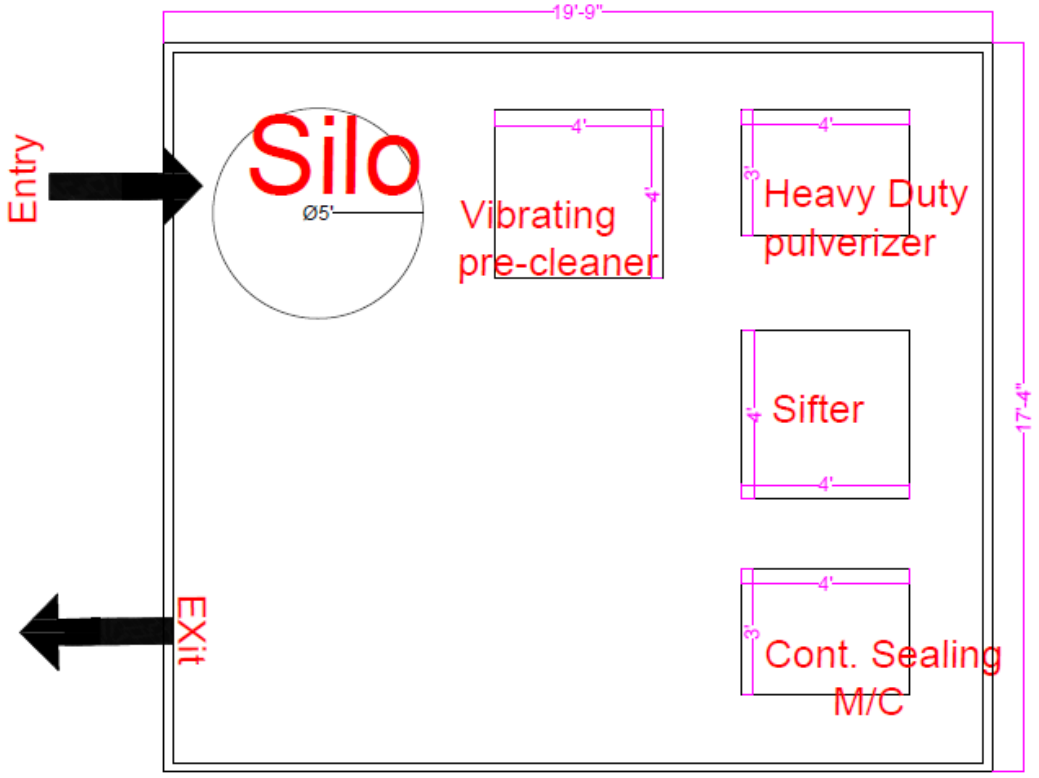
Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%	100%	100%
Production MT/Annum		82.5	97.5	112.5	135	150	150	150
Fixed Cost (Rs. in Lakh)								
Permanent staff salaries	7.284	7.284	7.284	7.284	7.284	7.284	7.284	7.284
Depreciation on building @ 5% per annum	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18
Depreciation on machinery @ 10% per annum	0.77	0.69	0.62	0.56	0.50	0.45	0.41	0.37
Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06	0.05	0.05	0.04
Interest on term loan	0.79	0.76	0.73	0.70	0.66	0.62	0.58	0.53
Insurance	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Fixed Cost (Rs. in Lakh)	**9.52**	**9.38**	**9.25**	**9.13**	**9.02**	**8.91**	**8.80**	**8.69**
Sales Revenue (Rs. in Lakh)	**0**	**45.375**	**53.625**	**61.875**	**74.25**	**82.5**	**82.5**	**82.5**
Variable Cost (Rs. in Lakh)								
Bajra Grains (Av. Price @ Rs.10/Kg)	0.00	10.08	11.92	13.75	16.50	18.33	18.33	18.33
Packaging materials	0.00	2.48	2.93	3.38	4.05	4.50	4.50	4.50
Casual staff salaries	0.00	5.78	5.78	5.78	5.78	5.78	5.78	5.78
Utilities (Electricity, Fuel)	0.00	0.55	0.65	0.75	0.90	1.00	1.00	1.00
Repair & maintenance	0.00	0.70	0.80	0.90	0.90	0.90	0.90	0.90
Miscellaneous expenses	0.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Interest on working capital @ 12%	0.00	0.67	0.79	1.08	1.08	1.08	1.08	1.08
Total Variable Cost (Rs. in Lakh)	**0.50**	**22.26**	**24.87**	**27.64**	**31.21**	**33.60**	**33.60**	**33.60**

Break Even Point (BEP) in terms of sales value (Rs. in Lakhs)	-	5.45	5.36	4.95	5.94	5.78	5.78	4.95

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



2.18 TYPICAL BAJRA FLOUR MANUFACTURING UNIT LAYOUT



2.19 MACHINERY SUPPLIERS

There are many machinery suppliers available within India for Grains based flour processing machineries and equipment. Some of the suppliers are:

1. Bajaj Process pack Limited, Noida, India 0
2. Shriyan Enterprises. Mumbai, India

3. LIMITATIONS OF MODEL DPR & GUIDELINES FOR ENTREPRENEURS

3.1 LIMITATIONS OF THE DPR

i. This DPR has provided only the basic standard components and methodology to be adopted by an entrepreneur while submitting a proposal under the Formalization of Micro Food Processing Enterprises Scheme of MoFPI.

ii. This DPR is made to provide general methodological structure not for specific entrepreneur/crops/location. Therefore, information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of business, background of proposed project, location, raw material base/contract sourcing, entrepreneur's own SWOT analysis, market research, rationale of the project for specific location, community advantage/benefit, employment generation etc are not given in detail.

iii. The present DPR is based on certain assumptions on cost, prices, interest, capacity utilization, output recovery rate and so on. However, these assumptions in reality may vary across places, markets and situations; thus the resultant calculations will also change accordingly.

3.2 GUIDELINES FOR THE ENTREPRENEURS

i. The success of any prospective food processing project depends on how closer the assumptions made in the initial stage are with the reality of the targeted market/place/situation. Therefore, the entrepreneurs must do its homework as realistic as possible on the assumed parameters.

ii. This model DPR must be made more comprehensive by the entrepreneur by including information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of entrepreneur's business, project location, raw material costing base/contract sourcing, detailed market research, comprehensive dehydrated product mix

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

iii. The entrepreneur must be efficient in managing the strategic, financial, operational, material and marketing aspects of a business. In spite of the assumed parameter being closely realistic, a project may become unsustainable if the entrepreneur does not possess the required efficiency in managing different aspects of the business and respond effectively in changing situations.

iv. The machineries should be purchased after thorough market research and satisfactory demonstration.

v. The entrepreneur must ensure uninterrupted quality raw materials' supply and maintain optimum inventory levels for smooth operations management.

vi. The entrepreneur must possess a strategic look to steer the business in upward trajectory.

vii. The entrepreneur must maintain optimum (not more or less) inventory, current assets. Selecting optimum source of finance, not too high debt-equity ratio, proper capital budgeting and judicious utilization of surplus profit for expansion is must.

viii. The entrepreneur must explore prospective markets through extensive research, find innovative marketing strategy, and maintain quality, adjust product mix to demand.

ix. The entrepreneur must provide required documents on land, financial transaction, balance sheet, further project analysis as required by the competent authority for approval.

x. The entrepreneur must be hopeful and remain positive in attitude while all situations.

Contact Us

Director

Indian Institute of Food Processing Technology

(Ministry of Food Processing Industries, Government of India)

Pudukkottai Road, Thanjavur - 613 005, Tamil Nadu

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

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