



Model Detailed Project Report

APPLE JAM PROCESSING UNIT

*Under the Formalization of Micro Food Processing Enterprises Scheme
(Ministry of Food Processing Industries, Government of India)*



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1. The Project at a Glance

1. Name of the proposed project	:	Apple Jam Processing Unit
2. Name of the entrepreneur/FPO/SHG/Cooperative	:	
3. Nature of proposed project	:	Proprietorship/Company/Partnership
4. Registered office	:	
5. Project site/location	:	
6. Names of Partner (if partnership)	:	
7. No of share holders (if company/FPC)	:	
8. Technical advisor	:	
9. Marketing advisor/partners	:	
10. Proposed project capacity	:	100 MT/annum (70, 80 & 90% capacity utilization in the 2 nd , 3 rd and 4 th years' onwards respectively)
11. Raw materials	:	Apple fruit
12. Major product outputs	:	Apple Jam
13. Total project cost	:	Rs. 34 Lakhs
• Land development, building & civil construction	:	Rs. 2.00 Lakhs (only for expansion of existing built-up area)
• Machinery and equipments	:	Rs. 18 Lakhs
• Utilities (Power & water facilities)	:	Rs. 2 Lakhs
• Miscellaneous fixed assets	:	Rs. 1 Lakh
• Pre-operative expenses	:	Rs. 0.55 Lakhs
• Contingencies	:	Rs. 1.00 Lakhs
• Working capital margin	:	Rs. 9.45Lakhs
14. Working capital requirement		
• 2 nd year		Rs. 28.35 Lakhs
• 3 rd year		Rs. 32.40 Lakhs
• 4 th year		Rs. 36.44 Lakhs
15. Means of Finance		
• Subsidy grant by MoFPI (max 10 lakhs)	:	Rs. 10.00 Lakhs
• Promoter's contribution (min 20%)	:	Rs. 10.00 Lakhs
• Term loan (45%)	:	Rs. 14.00 Lakhs
16. Debt-equity ratio	:	1.40:1
17. Profit after Depreciation, Interest & Tax		
• 2 nd year	:	Rs. 67.91 Lakhs
• 3 rd year	:	Rs. 79.59 Lakhs
• 4 th year	:	Rs. 91.27 Lakhs
18. Average DSCR	:	27.09
19. Benefit-Cost Ratio	:	1.81
20. Term loan repayment	:	7 Years with 1 year grace period
21. Payback period for investment	:	2 Years

2. General Overview of Apple Production, Post Harvest Management and Value Addition in India

2.1. Introduction

Apple (*Malus domestica*) is one of the most consumed fruit crops in the world. The major production areas are the temperate regions, however, because of its excellent storage capacity it is transported to distant markets covering the four corners of the earth. India is known as the second largest fruits and vegetables producer in the world followed by China. India, during 2017-18 has produced about 97358 Thousand MT fruits and 184394 Thousand MT vegetables in about 6506 Thousand Ha and 10259 Thousand Ha areas, respectively (Horticultural Statistics At a Glance, 2018, MoA&FW, GoI). In spite of this, the per capita availability of fruit in India is 107 gm/day which is below the recommended 120 gm/day. India's share of global exports of fresh fruits and processed fruit products is also quite meager compared with other major fruit producers of the world (Bung, 2012). Unfortunately, fruits and vegetables being perishable in nature get wasted to the tune of 20-30 per cent in the supply chain due to improper handling, transportation and poor post harvest management; and only 2 per cent are processed in to value added products and the rest is consumed as fresh. Therefore, processing of fruits and vegetables offers immense scope for wastage minimization and value addition; thus can generate significant income and employment in Indian agrarian economy.

In India, apple is one of the important fruit crops cultivated in temperate areas and has huge potential for value addition and entrepreneurship development. In India, 20-30% of apple fruits are spoiled due to improper handling, transportation and processing and therefore, processing and value addition is extremely needed. There has been an increasing appreciation and understanding of the link between dietary fruit intake and improved health in humans. The widespread and growing intake of apples and apple juice/ jam products and their rich phytochemical profile suggest their important potential to affect the health of the populations.

2.2. Origin, Distribution and Production of Apple

Apple is a temperate climate fruit. The tree originated in Central Asia, where its wild ancestor, *Malus sieversii*, is still found today. They are now found in parts of Europe and Asia where temperate climates exist. The leading apple growing country is China, producing about 41 percent of the world's apples, followed by the United States. In India total apple production was 2326.91 thousand metric tons in 301.00 thousand ha areas during 2017-18 (Horticultural Statistics at A Glance 2017-18).

2.3. State-wise Apple Production and Area in India

India with its wide range of soil and climate conditions is ideal for growing large varieties of fruits, both indigenous and the ones introduced from abroad. Today India is the largest producer of fruits. In India, apple is mostly grown in Jammu & Kashmir, Himachal Pradesh and Uttarakhand. Apple cultivation also extended to Arunachal Pradesh, Nagaland, Sikkim. Apples are mostly consumed as fresh fruit but a small part of the production is processed into jellies, juices, canned slices, candies. The state wise apple production in India is given below:

States/UTs	Area	Production
1. Jammu & Kashmir	158.15	1808.33
2. Himachal Pradesh	112.63	446.57
3. Uttarakhand	25.32	58.66
4. Arunachal Pradesh	4.66	7.35
5. Others	0.28	6.00
Total India	301.04	2326.91

Source: Horticultural Statistics at A Glance 2017-18, GoI

2.4. Apple Varieties

Almost all apple varieties need to be cross pollinated, although some varieties, such as Liberty, Empire, Jonathan, Jonagold, Gala, Golden Delicious, Rome and Granny Smith are self-fruitful, but they still set more fruit through cross pollination. Therefore the grower should plant

different apple cultivars together in the same orchard. Also there are some cultivars which produce sterile pollen and cannot be used as pollinizers (Mutsu, Jonagold). Usually, in an apple orchard, every four rows is a pollinizer variety or within a row, every fifth semi-dwarf tree is a pollinizer. The maximum allowed distance between the tree and its pollinizer is 25 meters.

Table 2: Apple Varieties Cultivated in India	
Category	Varieties
1. Clonal rootstocks	M 9, M 26, M7, MM 106, MM 11
2. Scab resistant	Prima, Priscilla, Sir Prize, Jonafree, Florina, Macfree, Nova Easy Grow, Coop 12, Coop 13 (Redfree), Nova Mac, Liberty, Freedom, Firdous, Shireen
3. Hybrids	Lal Ambri (Red Delicious x Ambri), Sunehari (Ambri x Golden Delicious), Chaubattia Princess, Chaubattia Anupam (Early Shanburry x Red Delicious), Ambred (Red Delicious x Ambri), Ambrich (Richared x Ambri), Ambroyal (Starking Delicious x Ambri)
4. Low Chilling	Michal, Schlomit, Anna, Tamma, Vered, Neomi, Tropical Beauty, Parlin's Beauty
5. Pollinizing	Tydeman's Early, Red Gold, Golden Delicious, Mc Intosh, Lord Lambourne, Winter Banana, Granny Smith, Starkspur Golden, Golden Spur
Source: National Horticulture Board	

2.5. Health Benefits and Nutritional Value of Apple

- i. Apple fruit is notable for its impressive list of phytonutrients, and antioxidants. Studies suggest that its components are essential for optimal growth, development, and overall wellness.
- ii. Apples are low in calories; 100 g of fresh fruit slices provide just 50 calories. They, however, contain no saturated fats or cholesterol. Nonetheless, the fruit is rich in dietary fiber, which helps prevent absorption of dietary-LDL or bad cholesterol in the gut. The fiber also saves the colon mucous membrane from exposure to toxic substances by binding to cancer-causing chemicals inside the colon.

iii. Apples are rich in antioxidant phytonutrients *flavonoids* and *polyphenolics*. The total measured antioxidant strength (ORAC value) of 100 g apple fruit is 5900 TE. Some of the important flavonoids in apples are quercetin, epicatechin, and procyanidin B2.

iv. Additionally, they are also good in tartaric acid that gives tart flavor to them. Altogether, these compounds help the body protect from harmful effects of free radicals.

v. Apple fruit contains good quantities of vitamin-C and β -carotene. Vitamin C is a powerful natural antioxidant. Consumption of foods rich in vitamin-C helps the body develop resistance against infectious agents and scavenge harmful, pro-inflammatory free radicals from the body.

vi. Further, apple fruit is an ideal source of B-complex vitamins such as riboflavin, thiamin, and pyridoxine (vitamin B-6). Together, these vitamins help as co-factors for enzymes in metabolism as well as in various synthetic functions inside the human body.

vii. Apples also carry small quantities of minerals like potassium, phosphorus, and calcium. Potassium is an important component of cell and body fluids helps controlling heart rate and blood pressure; thus, counters the bad influences of sodium.

Apples' Nutritional Value per 100 gm

- Amount Carbohydrates 13.81 g
- Sugars 10.39 g
- Dietary fiber 2.4 g
- Fat 0.17 g
- Protein 0.26 g
- Vitamin A equiv. 3 μ g 0%
- Thiamin (Vit. B1) 0.017 mg
- 1% Riboflavin (Vit. B2)
- 0.026 mg 2%
- Niacin (Vit. B3) 0.091 mg 1%

- Pantothenic acid (B5) 0.061 mg 1%
- Vitamin B6 0.041 mg 3%
- Folate (Vit. B9) 3 µg 1%
- Vitamin C 4.6 mg 8%
- Calcium 6 mg 1%
- Iron 0.12 mg 1%
- Magnesium 5 mg 1%
- Phosphorus 11 mg 2%

2.6. Cultivation, Post-Harvest Management and Storage of Apple

Growing apples at up to 2500 m from mean sea level is supposed to be beneficial for earning good profit. An apple orchard requires an avg. temp of 20 to 26 °C during the growth period along with 100 to 120 cm annual rainfall. It is notable that fog or heavy rainfall during fruit maturity period is the main cause of improper fruit growth. Also, note that apple farming should be avoided in such area where heavy winds are expected.

Land Selection and its Preparation in Apples Farming

A proper site selection for cultivating apple is an important task. If climate supports, then with good farm management skill, anyone can produce quality apples in high quantities.

Soil Requirement

Apple can be cultivated in all types of soil. However, a loamy soil, rich in all essential organic matter along with well-drainage power is considered as the best soil for apple farming. Also, it should have pH, ranging between 5.5 to 6.8 with proper aeration. It is a good thing to go for at least one soil test to find out the suitability and soil fertility for apple farming. It will also help in determining any deficiency of micronutrients so that proper supplementation at the time of land preparation can be done.

Land Preparation

Commercial apple farming must be done on well-drained soil with decent layout and deep ploughing. Weeds from the preceding crop should be removed, if present.

Propagation Method

Generally, Apples are propagated with the help of tongue grafting and budding methods. It should be from the genuine and registered nurseries in your local. They should be transplanted properly when these nursery grown seedlings become ready or suitable for transplantation in apple orchard. For planting apples, pit is dug having proper size with dimension one meter each. A mixture of rotten cow dung manure, 40 kg along with 50 gm of malathion dust and 500 gm of superphosphate is should be incorporated to each pit for good development of apple tree. An immediate irrigation should be done, just after transplantation of apples on the apple orchards. Also, a planting pollinator must be provided between the main plantation for obtaining decent apple fruit production

Spacing

Spacing in apple orchard is mainly depended on the apple varieties and planting method, used for the cultivation. By planting apple trees keeping a proper distance, it is possible to plant about 300 to 1200 no's of apple plant per hectare land.

However, there are mainly 4 types of density planting, usually followed by the growers.

- i. With the help of Ultra high density (UHD) method of planting, about 1200 apple plants per hectare can be cultivated.
- ii. With the help of high density (HD) method of planting, about 600 to 1200 apple plants per hectare can be cultivated.
- iii. By using moderate density plantation, 300 to 600 apple plants per hectare can be cultivated.

iv. By following low-density plantation in apple cultivation, 300 apple plants per hectare can be cultivated.

Watering Apple Trees

An apple tree requires about 120 cm rainfall per annum. So, providing this much of water is beneficial for more production of apples. Watering in apple orchard must be on a schedule basis for about 20 irrigation per year. Watering should be done frequently in the summer season at an interval of a week whereas, in winter, irrigation should be carried out at an intervals of three to four weeks or even more.

Growing Apples/Planting Season

Usually, apples are planted in the winter season, mostly in the month of January and February. Since apples thrive their best in the cool region at chilling temp. Apples should be planted in the square or hexagonal planting system. If planting is done in the hilly area or valleys, the counter planting method is good in those sloppy areas.

Apple Harvesting

Generally, apple orchard begins fruit bearing after about 7 to 8 years of plantation. However, it is mainly depended on the variety of apple. Generally, an apple tree gives fruit for about more than 35 years. In the beginning, there is less fruit production; but, after about 8 years of starting fruit bearings, fruit production will increase up to 15 years. Thereafter, this production will remain stable for about 35 years. Presently, there are many types of apple, easily available in the market that can produce fruits for more than 35 years constantly depending on the surroundings atmospheres.

Yield

The yield of apple farming depends on numbers of factors like the agroclimatic conditions of the atmosphere (cooling, sunlight, wind flow, etc), type of soil, variety of apple and farm

management skills. However, averagely about 12 to 18 tonnes of apple per hectare can be easily obtained after a good establishment and it can be increased latterly in the following years.

Post Harvest Management and Storage

An apple continues to live and respire even after it is picked. Although respiration cannot be halted completely, the objective of postharvest cooling is to slow the process and thus increase storage life. Preferred cooling method are forced air, hydrocooling (room cooling acceptable); optimum temperature is 30 to 40°F depending on variety; freezing temperature is 29°F; optimum humidity is 90 to 95%; storage life is up to 12 months.

2.7. Processing and Value Addition of Apple

The fresh apple fruits have limited shelf life; therefore, it is necessary to process fresh fruits in to different value added products to increase its availability over an extended period and to stabilize the price during the glut season. The processed products have good potential for internal as well as external trade. Seasonal losses in surplus apple fruits can be avoided by processing into different value added products that make them more attractive to the buyer and/or more readily usable to the consumer. Apples can be eaten as raw as well as a vital ingredient in numbers of sweets like apple crisp, apple crumbles, apple cake, and apple pie. Apart from this, apples are also processed into beverages and sugar based products like jam jelly.

3. Model Apple Jam Processing Unit under PM-FME Scheme

3.1. Introduction

India's spreads (jam, jelly & other spreads) market stood at \$ 211 million in 2016. It is expected to grow at a CAGR of over 16%, in value terms to reach \$ 527 million by 2022, on the back of increasing demand for convenience food and innovative food items. Moreover, the boost in demand for spreads can be attributed to changing breakfast patterns, rising demand for packaged food and expanding middle class in the country. All the above stated factors along with accelerating demand for innovation in terms of tasty and healthy spreads in India are anticipated to positively impact the market over the course of next five years.

The Central Sector scheme for Formalization of Micro Enterprises in food processing sector under Ministry of Food Processing Industries is an important scheme useful for formalization and mainstreaming the unorganized home based or micro food processing units. The scheme is useful for expansion of the existing units in terms of capacity and technology through installation of new machineries and additional civil infrastructures.

Establishment or expansion in terms of apple based jam processing unit is an attractive option in potential apple growing states in India as apple is a highly nutritious crop. A model generalized DPR is therefore, prepared for expansion of the existing unformalized jam processing units that can include apple based jam as product line. A detailed account of model DPR prepared on the basis of certain generalized assumptions, is discussed in the sequent sections.

An entrepreneur can use this model DPR template and modify according to his/her need in terms of capacity, location, raw materials availability etc. If there are shortages in per day/annual apple availability, then the entrepreneur can use pulp of other seasonal fruits for pulp to achieve maximum capacity utilization for higher economic efficiency.

3.2. Form of the Business Enterprise

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

3.3. Background of the Promoters/Owners and Required Documents

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

3.4. Background of the Proposed Project

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

3.5. Location of the Proposed Project and Land

The entrepreneur must provide description of the proposed location, site of the project, distance from the targeted local and distant markets; and the reasons/advantages thereof i.e. in terms of raw materials availability, market accessibility, logistics support, basic infrastructure availability etc. The entrepreneur must mention whether project is proposed in self owned land or rented/allotted land in any industrial park or private location. Accordingly, he/she must provide ownership document, allotment letter/ lease deed. Land clearance certificate must be from village authority/municipality or any other concerned authority. The ideal locations for establishment of exclusive apple jam processing unit are in the production clusters of the major apple growing states such as Jammu & Kashmir, Himachal Pradesh, Uttarakhand & Arunachal Pradesh where

adequate quantities of surplus raw materials can be available for processing. However, in other states of India multi fruit based jam unit with apple as one of the raw materials can be established.

3.6. Installed Capacity

The maximum installed capacity of the apple jam unit in the present model project is proposed as 100 tonnes/annum or 333 kg/day jam. 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 70 percent capacity, 3rd year 80 percent capacity and 4th year onwards 90 percent capacity utilization is assumed in this model project.

3.7. Raw Material Requirements for the Unit

Items	Basic Composition	2 nd Year 70% Capacity /annum	3 rd Year 80% Capacity /annum	4 th Year 90% Capacity /annum
i. Apple pulp	0.67 Kg	46900 Kg	53600 Kg	60300 Kg
ii. Sugar	0.50 Kg	35000 Kg	40000 Kg	45000 Kg
iii. Pectin	0.01 Kg	700 Kg	800 Kg	900 Kg
iv. Citric acid	0.003 Kg	210 Kg	240 Kg	270 Kg
v. Sodium benzoate	0.00005 Kg	3.5 Kg	4.0 Kg	4.5 Kg
Total Jam	1 Kg	70000 Kg	80000 Kg	90000 Kg

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 current model apple jam project, the unit requires 195 kg/day, 223 kg/day and 251 kg/day raw apple at 70, 80 and 90 percent capacity utilization, respectively. If there are shortages in supply, then the entrepreneur can use other seasonal fruits for pulp extraction to achieve maximum capacity utilization for higher economic efficiency.

3.8. Product Profile of the Unit

In the present processing unit, the targeted product output is apple jam. If there are shortages in supply of apple, then entrepreneur can use pulp of other seasonal fruits for pulp and jam processing in the same machinery set up to achieve maximum capacity utilization for higher economic efficiency.

3.9. Manufacturing Process of Apple Jam

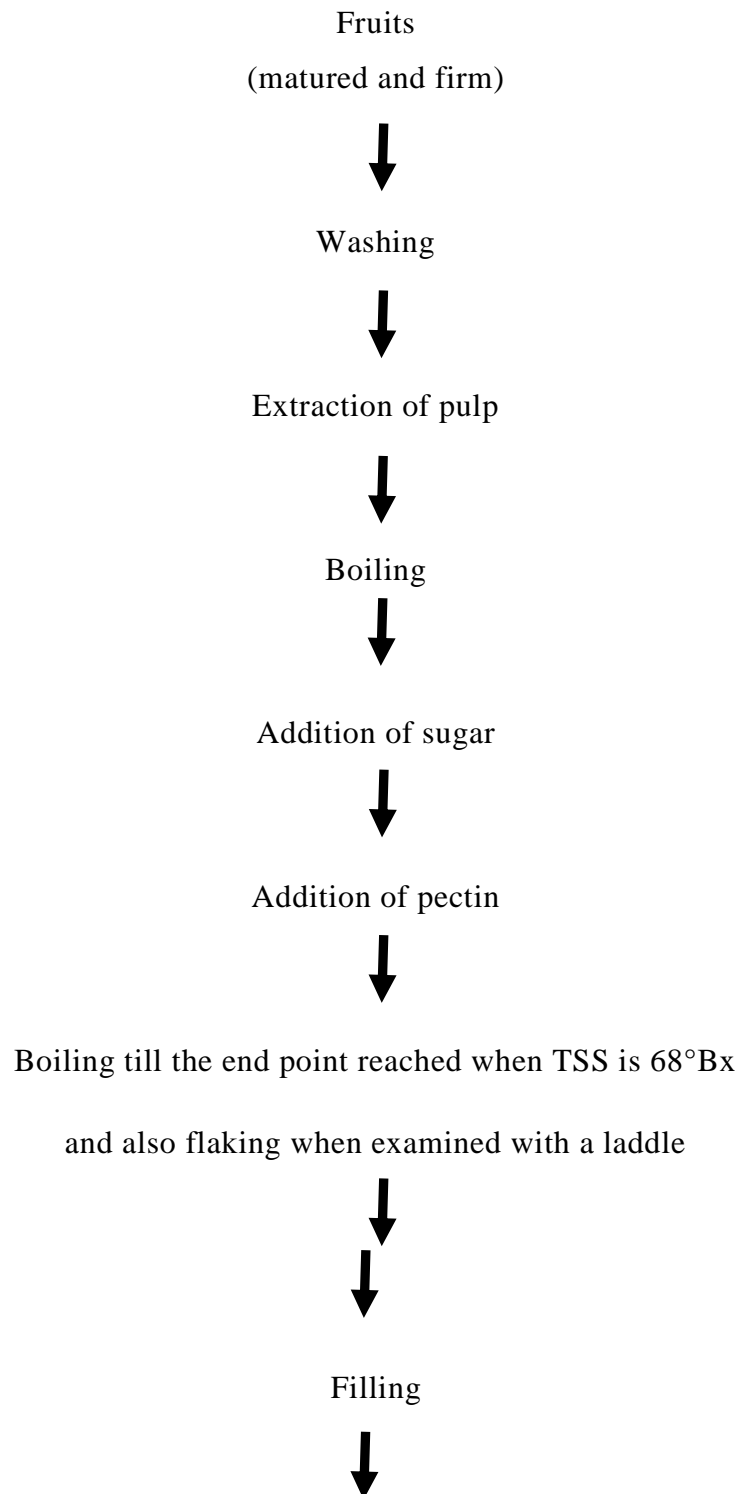
Jam is a product made by boiling fruit pulp with sufficient sugar to a reasonably thick consistency, firm enough to hold the fruit tissues in position. Fruits like mango, apple, guava, pineapple, grapes, oranges and banana are suitable for jam making. Jams may be made from a single fruit, or from a combination of two or more fruits. High concentration of sugar facilitates preservation. Fresh fruits give the best jams. Pectin is the main ingredient in the fruit which gives a set to the jam, it is preferable to use some immature fruits.

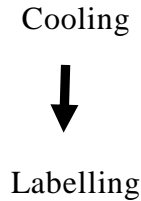
Method of preparation

1. **Ingredients required:** Ingredients required per kg jam are fruit pulp 670 gm, sugar 500 gm, citric acid 3 gm, pectin 50 gm (pectin calculated based on the TSS present in fruit pulp, sugar and grade of pectin) and sodium benzoate 0.05 gm.
2. **Selection of fruit:** Select matured and firm fruits with good colour and flavour. Fruit is washed thoroughly to remove any adhering dust and dirt.
3. **Pulping:** The edible portion of the fruit is separated and pulped extracted.
4. **Addition of sugar and acid:** Sugar is added to the fruit pulp. Citric acid is added.
5. **Boiling:** Combine pulp, sugar and citric acid and boil to partially concentrate the product by evaporation of excess moisture. The end product is judged by checking the TSS of 65-68° Brix (or) to the final temperature reaching 106°C and by practice it is noted by the flaking at the laddle end.
6. **Pectin:** Pectin is added to obtain good consistency. Pectin is always mixed with 10 times its weight of sugar to facilitate easy dispersion of pectin in the pulp.

7. Filling: Prepared jam is filled in sterilised bottles and sealed.

Flow Sheet for Preparation of Jam





3. 10. Technology Accessibility

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

3.11. Market Demand and Supply for Fruit Jam

Spreads market (jam, jelly & other spreads) in India stood at \$ 211 million in 2016. It is expected to grow at a CAGR of over 16%, in value terms to reach \$ 527 million by 2022, on the back of increasing demand for convenience food and innovative food items. Moreover, the boost in demand for spreads can be attributed to changing breakfast patterns, rising demand for packaged food and expanding middle class in the country. All the above stated factors along with accelerating demand for innovation in terms of tasty and healthy spreads in India are anticipated to positively impact the market over the course of next five years. Innovative product development with new flavors of untraditional fruits and organic products is an opportunity for fruit jam, jelly, and preserves market players. Another opportunity is the penetration of the developing urban markets for jams, jellies, and preserves. Therefore, new entrepreneurs have ample scope to enter in to the new market segments/areas with innovative products.

3.12. Marketing Strategy for Jam

The increasing urbanization and income offers huge scope for marketing of fruit based jam. Urban organized platforms such as departmental stores, malls, super markets can be attractive platforms to sell well packaged and branded apple based jam. Processors can also have tie-up with hotels and restaurants for supply.

3.13. Detailed Project Assumptions

This model DPR for apple jam processing unit is basically prepared as a template based on certain assumptions that may vary with capacity, location, raw materials availability etc. An entrepreneur can use this model DPR format and modify as per requirement and suitability. The assumptions made in preparation of this particular DPR are given in Table 4. This DPR assumes expansion of existing unit by adding new apple based jam processing line. Therefore, land and civil infrastructures are assumed as already available with the entrepreneur.

Parameter	Value Assumed
Capacity of the jam processing unit	: 100 MT/annum jam
Utilization of capacity	: 1 st year implementation, 70% in 2 nd year, 80% in 3 rd year and 90% in 4 th year onwards.
Working days per year	: 300 days
Working hours per day	: 8-10 hrs.
Interest on term and working capital loan	: 12%
Repayment period	: Seven years with one year grace period is considered.
Average prices of raw material	: Rs. 80/Kg apple.
Average sale prices	: Rs. 280/Kg jam
Recovery	: 0.84 kg fruit gives 0.67 kg pulp which in turn gives 1 kg jam.

3.14. Fixed Capital Investment

3.14.A. Land & Building

The DPR is for FME scheme to upgrade/formalize existing micro enterprises which already has land & built-up area. However, they can invest to expand the built-up area (Table 6) as required.

Table 5: Land and Civil Infrastructures	
i. Land 10000Sqft	Assumed land already developed and has 6000sq m built in area. So additional 1000 sq ft can be built in @ Rs. 200/sq ft
ii. Built-up processing area 6000sq ft	
iii. Storage area 1000 sq ft	
	Rs. 2.00 Lakhs
Total	Rs. 2.00 Lakhs

3.14.B. Machinery & Equipment: Rs. 18 Lakhs

Table 6: Machineries and Equipments					
S.No.	Descriptions	Power required	Area required (Sq.ft)	Qty	Amount (Rs. in lacks)
1.	Washer Capacity 40 kg/hr	3 HP	25	1	1.5
2.	Fruit Pulper/extractor Capacity 40 kg / hr	3 HP	16	1	2.0
3.	Boiler Steam out put 10 kg Working pressure 10 bar maximum	3 HP	100	1	3.0
4.	Steam Kettle Capacity 100 lit/hr	3 HP	25	1	1.5
5.	Vacuum Pan Capacity 200 lit/hr	7 HP	30	1	3.0
6.	Cooling Tank Capacity 100 liter	-	25	1	1.0
7.	Pouch Filling Unit Capacity 500 pouch/hr	1 HP	25	1	2.0
8.	Piston filler unit Capacity 100 lit/hr	2 KW	75	1	4.0

3.14.C. Utilities and Fittings

Table 7: Utilities and Fittings	
i. Power	Rs. 2.00 Lakhs
ii. Water	

3.14.D. Other Fixed Assets

Table 8: Other Fixed Assets	
i. Furniture and Fixtures	Rs. 1 Lakh
ii. Plastic trays capacity	
iii. Electrical fittings	

3.14.E. Pre-operative Expenses

Table 9: Pre-operative Expenses	
Legal expenses, start-up expenses, establishment cost, consultancy fee, trial runs, & others	Rs.55000
Total Pre-operative Expenses	Rs.55000

3.14.F. Total Fixed Capital Investment

Total Fixed Capital Investment = (Land & Building + Machinery & Equipment+ Utilities and Fittings + Other Fixed Assets + Pre-operative Expenses) = Rs. (2+18+2+1+0.55) Lakhs= Rs.23.55 Lakhs

3.15.Working Capital Requirement

Working capital is critical input in apple jam unit as raw materials are seasonal and thus need to maintain high inventories.

Table 10: Working Capital Requirement (Rs. in Lakh)				
Particulars	Period	Year 2 (70%-70 MT)	Year 3(80%-80 MT)	Year 4 (90%-90 MT)
Raw material stock	7 days	1.80	2.06	2.31
Work in progress	15 days	4.90	5.60	6.30
Packing material	15 days	0.70	0.80	0.90
Finished goods' stock	15 days	9.80	11.20	12.60
Receivables	30 days	19.60	22.40	25.20

Working expenses	30 days	1.00	1.14	1.28
Total current assets		37.80	43.20	48.59
Trade creditors		0	0	0
Working capital gap		37.80	43.20	48.59
Margin money (25%)		9.45	10.80	12.15
Bank finance		28.35	32.40	36.44

3.16. Total Project Cost and Means of Finance

Table 11: Total Project Cost and Means of Finance(Rs. in Lakhs)	
Particulars	Amount
i. Land and building	2.00
ii. Plant and machinery	18.00
iii. Utilities& Fittings	2.00
iv. Other Fixed assets	1.00
v. Pre-operative expenses	0.55
vi. Contingencies	1.00
vii. Working capital margin	9.45
Total project cost (i to vii)	34
Means of finance	
i. Subsidy	10
ii. Promoter's contribution	10
iii. Term loan	14

3.17. Manpower Requirement

Table 12: Manpower Requirement		
Particulars	No. & Wage	Total Monthly Salary (Rs.)
i. Manager (can be the owner)	1 @ Rs. 20000	20000
ii. Skilled worker	2 @ Rs. 10000	20000
iii. Semi skilled	2 @ Rs. 7500	15000
iv. Helper	1 @ Rs. 5000	5000

v. Sales man	1 @ Rs. 7500	7500
Total	7 persons	Rs. 67500/- per month

Note: Manager, two skilled workers are permanent staffs only (Salary Rs. 40000/month). Others are causal staffs.

3.18. Expenditure, Revenue and Profitability Analysis

Table 13: Expenditure, Revenue and Profitability Analysis									
	Particulars	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year
A	Total Installed Capacity	100 MT/Year Apple Jam							
	Capacity utilization (%)	Under const. (0%)	70 MT (70 %)	80 MT (80 %)	90MT (90 %)	90 MT (90 %)	90 MT (90 %)	90 MT (90 %)	90 MT (90 %)
B	Expenditure (Rs. in Lakh)								
	1.Total Raw Material	0.00	77.16	88.18	99.20	99.20	99.20	99.20	99.20
	i. Raw apple @ Rs. 80/kg av. wholesale price for pulp	0.00	46.90	53.60	60.30	60.30	60.30	60.30	60.30
	ii. Sugar @40/kg	0.00	14.00	16.00	18.00	18.00	18.00	18.00	18.00
	iii. Pectin @ Rs 2200/kg	0.00	15.40	17.60	19.80	19.80	19.80	19.80	19.80
	iv. Citric acid @Rs 400/kg	0.00	0.84	0.96	1.08	1.08	1.08	1.08	1.08
	v. Sodium benzoate @Rs 500/kg	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	2. Packaging materials @ Rs. 10/500 gm glass bottle	0.00	14.00	16.00	18.00	18.00	18.00	18.00	18.00
	3. Utilities (Electricity, Fuel)	0.00	4.20	4.80	5.40	5.40	5.40	5.40	5.40
	4. Salaries (1 st yr only manager's salary)	2.40	8.10	8.10	8.10	8.10	8.10	8.10	8.10
	5. Repair & maintenance	0.00	0.50	0.57	0.64	0.64	0.64	0.64	0.64
	6. Insurance	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	7. Miscellaneous expenses	0.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	Total Expenditure	3.20	106.26	119.95	133.64	133.64	133.64	133.64	133.64
C	Total Sales Revenue (Rs. in Lakh)	0.00	196.00	224.00	252.00	252.00	252.00	252.00	252.00
	Sale of Apple Jam @ Rs. 280/Kg	0.00	196.00	224.00	252.00	252.00	252.00	252.00	252.00
D	PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows	-3.20	89.74	104.05	118.36	118.36	118.36	118.36	118.36
	Depreciation on civil works @ 5% per annum	0.10	0.09	0.09	0.09	0.08	0.07	0.07	0.07
	Depreciation on machinery @ 10% per annum	1.80	1.62	1.46	1.31	1.18	1.06	0.96	0.86
	Depreciation on other fixed assets @ 15% per annum	0.15	0.13	0.11	0.09	0.08	0.07	0.05	0.05
	Interest on term loan @ 12%	1.68	1.68	1.44	1.20	0.96	0.72	0.48	0.24
	Interest on working capital @ 12%	0.00	3.40	3.89	4.37	4.37	4.37	4.37	4.37
E	Profit after depreciation and Interest (Rs. in Lakh)	-6.93	82.82	97.06	111.3	111.69	112.07	112.43	112.77

F	Tax (assumed 18%) (Rs. in Lakh)	0.00	14.91	17.47	20.03	20.10	20.17	20.24	20.30
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	-6.93	67.91	79.59	91.27	91.59	91.90	92.19	92.47
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	-3.20	71.43	82.69	93.96	93.89	93.82	93.75	93.69
I	Coverage available (Rs. in Lakh)	-3.20	71.43	82.69	93.96	93.89	93.82	93.75	93.69
J	Total Debt Outgo (Rs. in Lakh)	1.68	3.68	3.44	3.20	2.96	2.72	2.48	2.24
K	Debt Service Coverage Ratio (DSCR)	-1.90	19.41	24.04	29.36	31.72	34.49	37.80	41.83
	Average DSCR	27.09							
L	Cash accruals (PBDIT- Interest-Tax) (Rs. in Lakh)	-4.88	69.75	81.25	92.76	92.93	93.1	93.27	93.45
M	Payback Period (on Rs. 30 Lakhs initial investment)	2 Years							

3.19. Repayment Schedule

Year	Outstanding loan at start of yr.	Disbursement	Total outstanding Loan	Surplus for repayment	Interest payment	Repayment of principal	Total outgo	o/s Loan at the end of the yr.	Balance left
1	0	14	14	-3.20	1.68	0	1.68	14	-4.88
2	14		14	71.43	1.68	2	3.68	12	67.75
3	12		12	82.69	1.44	2	3.44	10	79.25
4	10		10	93.96	1.20	2	3.20	8	90.76
5	8		8	93.89	0.96	2	2.96	6	90.93
6	6		6	93.82	0.72	2	2.72	4	91.10
7	4		4	93.75	0.48	2	2.48	2	91.27
8	2		2	93.69	0.24	2	2.24	0	91.45

13.20.Assets' Depreciation

Particulars	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year	6 th Year	7 th Year	8 th Year
Civil works	2.00	1.90	1.81	1.72	1.63	1.55	1.48	1.41
Depreciation	0.10	0.09	0.09	0.09	0.08	0.07	0.07	0.07
Depreciated value	1.90	1.81	1.72	1.63	1.55	1.48	1.41	1.34
Plant & Machinery	18	16.20	14.58	13.12	11.81	10.63	9.57	8.61
Depreciation	1.80	1.62	1.46	1.31	1.18	1.06	0.96	0.86
Depreciated value	16.20	14.58	13.12	11.81	10.63	9.57	8.61	7.75
Other Fixed Assets	1.00	0.85	0.72	0.61	0.52	0.44	0.37	0.32
Depreciation	0.15	0.13	0.11	0.09	0.08	0.07	0.05	0.05
Depreciated value	0.85	0.72	0.61	0.52	0.44	0.37	0.32	0.27
All Assets	21	18.95	17.11	15.45	13.96	12.62	11.42	10.34
Depreciation	2.05	1.84	1.66	1.49	1.34	1.2	1.08	0.98
Depreciated value	18.00	16.20	14.59	13.15	11.85	10.68	9.63	8.69

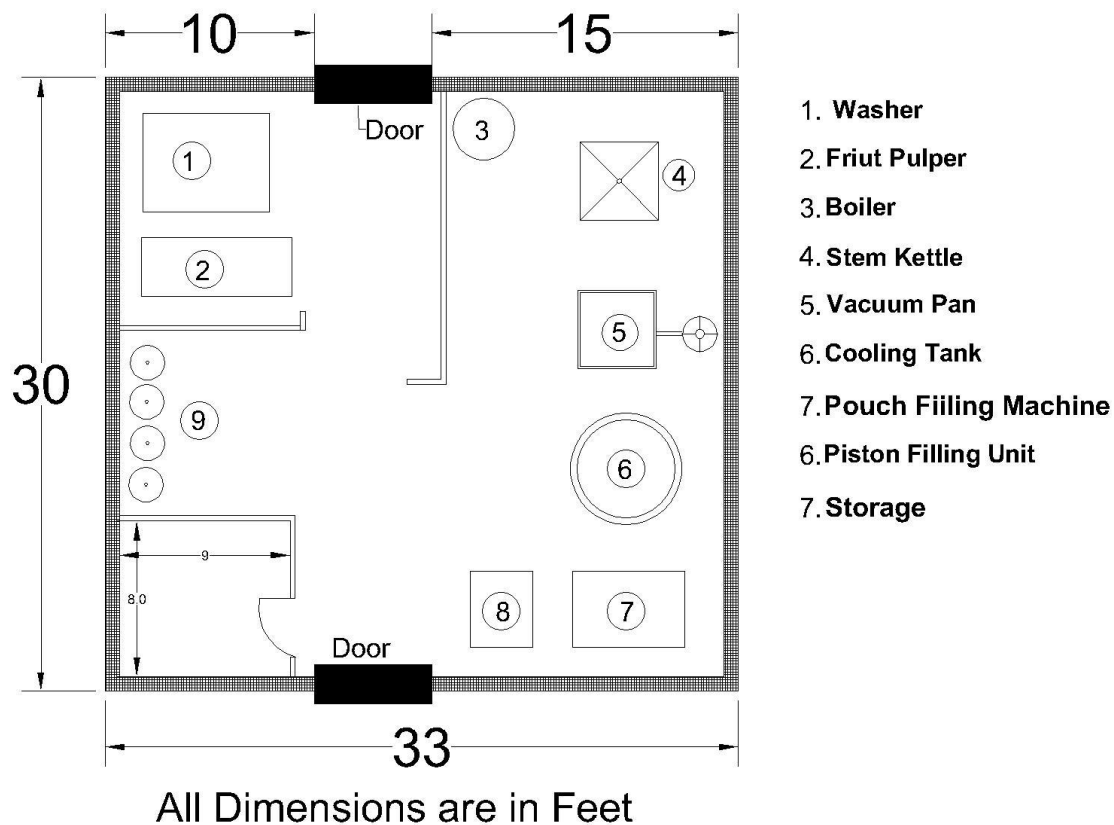
3.21. Financial Assessment of the Project

Sl.	Particulars	1 st Yr	2 nd Yr	3 rd Yr	4 th Yr	5 th Yr	6 th Yr	7 th Yr	8 th Yr	
i.	Capital cost (Rs. in Lakh)	34.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
ii.	Recurring cost (Rs. in Lakh)	3.20	106.26	119.95	133.64	133.64	133.64	133.64	133.64	
iii.	Total cost (Rs. in Lakh)	37.20	106.26	119.95	133.64	133.64	133.64	133.64	133.64	
iv.	Benefit (Rs. in Lakh)	0.00	196.00	224.00	252.00	252.00	252.00	252.00	252.00	
v.	Total Depreciated value of all assets (Rs. in Lakh)								8.69	
vi.	Total benefits (Rs. in Lakh)	0.00	196.00	224.00	252.00	252.00	252.00	252.00	260.69	
	Benefit-Cost Ratio (BCR): 1.81 (Highly Profitable project)									
	Net Present Worth (NPW): 757.08									

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

Table 17: Break-Even Analysis									
Sl.	Particulars	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year
	Capacity utilization	Under const. (0%)	70 MT (70 %)	80 MT (80 %)	90MT (90 %)	90 MT (90 %)	90 MT (90 %)	90 MT (90 %)	90 MT (90 %)
A	Fixed Cost(Rs. in Lakh)								
	Permanent staff salaries	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80
	Depreciation on civil works @ 5% per annum	0.10	0.09	0.09	0.09	0.08	0.07	0.07	0.07
	Depreciation on machinery @ 10% per annum	1.80	1.62	1.46	1.31	1.18	1.06	0.96	0.86
	Depreciation on other fixed assets @ 15% per annum	0.15	0.13	0.11	0.09	0.08	0.07	0.05	0.05
	Interest on term loan @ 12%	1.68	1.68	1.44	1.20	0.96	0.72	0.48	0.24
	Insurance	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Total Fixed Cost(Rs. in Lakh)	8.83	8.62	8.2	7.79	7.40	7.02	6.66	6.32
B	Sales Revenue(Rs. in Lakh)	0.00	196.00	224.00	252.00	252.00	252.00	252.00	252.00
C	Variable Cost(Rs. in Lakh)								
	Total Raw Material	0.00	77.16	88.18	99.20	99.20	99.20	99.20	99.20
	Packaging materials @ Rs. 10/500 gm glass bottle	0.00	14.00	16.00	18.00	18.00	18.00	18.00	18.00
	Casual staff salaries	0.00	3.30	3.30	3.30	3.30	3.30	3.30	3.30
	Utilities (Electricity, Fuel)	0.00	4.20	4.80	5.40	5.40	5.40	5.40	5.40
	Repair & maintenance	0.00	0.50	0.57	0.64	0.64	0.64	0.64	0.64
	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	3.40	3.89	4.37	4.37	4.37	4.37	4.37
	Total Variable Cost (Rs. in Lakh)	0.50	104.56	118.74	132.91	132.91	132.91	132.91	132.91
D	Break Even Point (BEP) as % of sale	-	9.43	7.79	6.54	6.21	5.89	5.59	5.31
	Break Even Point (BEP) in terms of sales value (Rs. in Lakhs)	-	18.42	17.45	16.48	15.65	14.84	14.09	13.38

3.22. Plant Layout



3.23. Machinery Suppliers

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

- i. Shiva Engineers, Pune, Maharashtra
- ii. Jwala Techno Engineering Pvt. Ltd. Thane, Maharashtra
- iii. Zigma Machinery and Equipments Solutions, Coimbatore, Tamil Nadu
- iv. Sagar Engineering Works. Sindhudurga, India
- v. Jupiter Scientific Company, Salem, India
- vi. M/s Sri Bramha Industries, Trichy,
- vii. India Guru Engineers, Pune, Maharashtra

Note: This is a selective list of suppliers and does not imply endorsement by IIFPT

4. Limitations of the Model DPR and Guidelines for Entrepreneurs

4.1. Limitations of the Model DPR

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

4.2. Guidelines for the Entrepreneurs

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

base/contract sourcing, entrepreneurs own SWOT analysis, detailed market research, comprehensive product mix based on demand, rationale of the project for specific location, community advantage/benefit from the project, employment generation, production/availability of the raw materials/crops in the targeted area/clusters and many more relevant aspects for acceptance and approval of the competent authority.

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

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

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

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

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

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

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

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