JACKFRUIT PROCESSING & ITS PRODUCTS

1. INTRODUCTION:

India could be wasting jackfruit worth Rs 2,000 crore. The actual loss could be much higher. In the impoverished Garo Hills region of Meghalaya alone, jackfruit worth Rs 434 crore was wasted in 2012. To reduce wastage of nutritious jackfruit initiates value addition process. Farmers and people are consuming the nutrient rich jackfruit in less quantity. The raw material is tremendously available. Home-made industries existed in Maharashtra, Karnataka etc., where it was used for making papads and chakka varitti in Kerala. The price is Rs.150/kg for pulp and jack powder is Rs. 250/kg.

2. PRODUCT & ITS APPLICATION:

Jams: A certificate of approval for production has to be obtained under the Fruit Products Order (FPO) the minimum soluble solids shall be 68%. The minimum fruit pulp content shall be 45%. When raspberries and strawberries are used, the minimum quantities shall be 25%. Only sugar, dextrose, invert sugar, liquid glucose, either singly or in combination can be used as sweetening agents. Jams shall not contain tartaric acid, agar or gelatin. The product should be free from mold and fungal growth. It should be free from any fermented odor, coliforms, and salmonella and streptococci bacteria. If dried fruits are used, they shall be declared on the label. It can contain permitted flavors,colors and preservatives Chips Acidity of oil used as oleic acid - maximum 0.12% Peroxide value of oil used - nil.

3. DESIRED QUALIFICATIONS FOR PROMOTER:

Anyone can start this project. The promoter should get Jackfruit Products Making Training Course. The training both theoretical and practical know how in the production of pickles, Jams, squashes, jelly, halwa and other allied items. Items Included: Squash, Syrup, Jam, Jelly, Halwa, Wine, Pickle, Pappadam, Murukku, Honey Jackfruit, Jackfruit Preserve, Jackfruit Thera, Chakkakkuru Thoran Parippu, Chakkakkuru Puttupodi, Chakkakkuru Avalose Podi, Chakkakkuru Sambar Parippu, Dried Chakka Chula, Chakka Chips, etc.

4. INDUSTRY LOOKOUT AND TRENDS

Fresh-cut produce is sold in open-air markets and food stands in many Asian countries and is increasingly being sold in supermarkets. Fresh-cut fruits, in particular, have gained popularity in urban centres of the region. Often these products are displayed without the benefits of refrigeration so their shelf-life is frequently not extended beyond the day of display.The market for fresh-cut products in Japan and Republic of Korea has shown a steady growth trend since the late 1980s and 1990s respectively (Kim 2007). While the food service industry for school meals and restaurants is the main user of fresh-cut products in these countries, demand for them has grown in retail markets. Fresh-cut vegetables for cooking constitute the largest part of the fresh-cut produce industry in both countries. Fresh-cut salads are another major category as consumers perceive them to be healthy. Fresh-cut fruits continue to show a rapid growth trend in these countries. However, with increasing demand for fresh-cuts at the retail level, the fresh-cut industry in Japan and Republic of Korea is facing challenges to extend shelf-life and enhance food safety.

5. MARKET POTENTIAL AND MARKETING ISSUES, IF ANY:

Sri Lanka is the world leader in jackfruit cultivation with 40% of their produce being converted into ready-to-eat food items. More than 5,000 people are engaged in jackfruit trade and there are 14 institutions that train farmers and traders on jackfruit in Sri Lanka. While jackfruits in Karnataka are sold at Rs 7 - 10 per kg, it fetches about $20 - 30 in Mexico. Though, jackfruit is available in plenty in the state, it has been neglected by farmers and traders. Around 300 million numbers of jack fruit is produced in Tamil Nadu and Kerala every year. At an average weight of 5 kilograms a piece, the total quantity is estimated at

1.5 million tons. Much of the product is wasted. The project aims to utilize the resources mainly raw and ripe fruit and convert them into a more acceptable product. The products that are being considered for processing and as a result of value addition are: Jack fruit jam from ripe fruit, Jack chips from tender raw fruit, Enrobed jack from the dried ripe fruit. The major market outlets are the "A" and "B" class stores. The product also finds placement in self-service counters and departmental stores. Bakeries can also sell the product.

6. RAW MATERIAL REQUIREMENTS:

Raw material requirement for Jack Fruit Jam are Jack fruit, Sugar, Pectin, flavors, preservatives, etc. For Jack Fruit Chips, Raw Jack Fruit, Oil, Salt and spices, etc. For Enrobed tidbits, Ripe Jack Fruit, Jaggery, Sugar, Cardamom green, Packaging material requirement are Primary packing material – 200 ml cups with foil and lid, Cartons and straps, the plant will be in operation for one shift a day. The product mix would be as follows: 200 kilograms of jam from one tonne of the ripe fruit. 200 kilograms of chips from 800 kilograms of the raw fruit. 100 kilograms of enrobed jack tidbits from 250 kilograms of the ripe fruit. The time period required for achieving full capacity utilization is one year. Sales revenue with an ex-factory selling price at Rs. 60.00 per kilogram of jams, and Rs. 70.00 per kilogram each for tidbits and chips, the total sales revenue would be Rs. 99.00 lakhs per annum.

7. MANUFACTURING PROCESS:

Jack fruit is a highly fibrous fruit. It has a thick wasted skin enclosing seeded fruit pods to which also adhere lots of fibrous tissue. Peeling and cleaning of the fruit to make it fit for processing is a difficult laborious process. Careful investigation reveals that the recovery of juice from the fruit that could be used for processing into jams is a maximum extent of 10% of the weight of the fruit. Thus a fruit weighing 5 kilograms yields about 500 grams of the juice that can be converted into jams. The second aspect is the strong flavor of the fruit that makes it unpalatable. The flavor has to be removed to a large extent by exhaustion during the process. After extraction of the juice and pulp in the pulper, the extracted mass is taken to the kettle where it is cooked under the influence of jacketed steam. Sugar is then added in desired quantities and the mass further cooked with constant stirring till a thick fluid mass is formed with a reading of 65 to 70 degrees brix on the brix meter. After cooking, the

required quantities of citric acid, pectin, flavors (cardamom) and colors are added and the mass stirred thoroughly. The mass after homogenous mixing is emptied into steel containers from where they are poured into cups of 200 grams capacity. On cooling, the jam sets. The cup is sealed after placing a foil paper at its top. The cup is covered with a lid, and placed in cartons, strapped prior to dispatch. For production of chips, tender raw fruit is taken. After removing the fibrous matter, the slices are dried in the tray drier. After drying, they are fried in the thermostat frier, shaken to remove excess oil and dusted with salt and spices before being packed in the packing machine. For production of enrobed jack tidbits, the ripe fruit is cut into small squares of uniform size. They are then dipped into a vessel containing sugar or jaggery solution with the former highly concentrated at 70 to 75 degrees brix. The tidbits are dried in the tray drier and packed in the packing machine. Jams are packed in 200 gram polyethylene cups. Jack chips are packed in 50 grams, 100 grams and multiples thereof in polypropylene or laminated polyester-poly pouches. Enrobed jack is packed in laminated polyester-poly pouches.

8. MANPOWER REQUIREMENT :

The enterprise requires 15 employees as detailed below**:**

Sr. No.	**Designation**	**SALARY**	**Salary _**	**Number of Employees**				
	Working Staff		**PER .....**	**Year-1**	**Year-2**	**Year-3**	**Year-4**	**Year-5**
1	Production Manager	18000	18000	1	1	1	1	1
2	Operators	20000	36000	3	3	3	3	3
3	Helpers	12000	60000	6	6	6	8	8
			114000	10	10	10	12	12
1	Fixed Staff:							
Sr. No.	**Designation**	**SALARY**	**Salary _**	**Number of Employees**				
2	Admin Manager	15000	15000	1	1	1	1	1
3	Accounts/Assistant	12500	12500	1	1	1	1	1
4	Office Boy	9000	9000	1	1	1	1	1
	Sub-Total		36500	3	3	3	3	3

	Total		150500	13	13	13	15	15

9. IMPLEMENTATION SCHEDULE:

The project can be implemented in 4 months' time as detailed below:

Sr. No.	Activity	Time Required
1	Acquisition of premises	2.00
2	Construction (if applicable)	2.50
3	Procurement & installation of Plant & Machinery	2.50
4	Arrangement of Finance	1.00
5	Recruitment of required manpower	1.00
	Total time required *(some activities shall run concurrently)*	4.00

10. COST OF PROJECT:

Sr. No.	Particulars	₹ in Lacs
1	Land	0.00
2	Building	0.00
3	Plant & Machinery	12.00
4	Furniture, other Misc. Equipments	1.50
5	Other Assets including Preliminary / Pre-operative expenses	1.20
6	Margin for Working Capital	19.80
	Total	**34.50**

11. MEANS OF FINANCE:

	Particulars	₹ in Lacs
1	Promoter's contribution	8.63
2	Bank Finance	25.88
	Total	**34.50**

12. WORKING CAPITAL CALCULATION:

Sr. No.	Particulars	Gross Amt	Margin %	Margin Amt	Bank Finance
1	Inventories	9.90	0.25	2.48	7.43
2	Receivables	4.95	0.25	1.24	3.71
3	Overheads	4.95	100%	4.95	0.00
4	Creditors	-		0.00	0.00
	Total	19.80		8.66	11.14

13. LIST OF MACHINERY REQUIRED:

1 Jams: A Stainless steel working tools B Juice extractor or pulper C Steam jacketed kettle D Stirrer with motor and gear box E Bottle washing machine F Stainless steel working tables G Baby boiler and accessories. 2 Jack fruit chips: A Thermostat fryers B Coating pan 3 Enrobed Jack Tidbits a Coating pan Listed above B Tray drier with two trolleys and 72 trays C Packing machine 5 Laboratory equipment, etc.

Sr. No.	Particulars	UOM	Qtty	Rate (₹)	Value (₹ in Lacs)
	Plant &Machinery / Equipments				
a)	***Main Machinery***				
1	Jams Unit	NOS	1	3.00	3.00
2	Chips Unit	NOS	1	2.50	2.50
3	Enrobed Tidbits Unit	NOS	1	2.50	2.50
4	Testing, Packing Machine	L.S.	1	1.00	1.00
5	Utility Equipments	L.S.	1	2.00	2.00
	Installation, Taxes And Transportation	L.S.		1.00	1.00
	Sub-Total				**12.00**
	Furniture / Electrical Installations				

a)	Office Furniture	LS	1	50000	0.50
b)	Stores Cupboard	LS	1	50,000	0.50
c)	Computer & Printer	LS	1	50000	0.50
	Sub Total				**1.50**
	Other Assets				
a)	Preliminary And Preoperative				1.20
	Sub-Total Other Assets				1.20
	Total				**14.70**

All the machines and equipments are available from local manufacturers. The entrepreneur needs to ensure proper selection of product mix and proper type of machines and tooling to have modern and flexible designs. It may be worthwhile to look at reconditioned imported machines, dies and tooling. Some of the machinery and dies and tooling suppliers are listed here below:

1. Fry-Tech Food Equipments Private Limited
   S. No. 4, Raviraj Industrial Estate,
   Bhikhubhai Mukhi Ka Kuwa Bharwadvash,
   Ramol, Ahmedabad - 380024,
   Gujarat, India

2. Hindustan Vibrotech Pvt. Ltd.
Office No. 2, Ground Floor,
   Vrindavan Building, Vile Parle East,
Mumbai – 400057,
   Maharashtra, India

3. Electrons cooling systems Pvt. Ltd.

S-27, SIDCO Industrial Estate
Kakkalur Industrial Estate
Tiruvallur – 602003,
Tamil Nadu, India

4. Springboard Enterprises India Ltd.
1st, 2nd & 3rd Floor,
Plot No. 7, 8 & 9,
Garg Shopping Mall,
Service Centre, Rohini Sector 2
New Delhi – 110085,
Delhi, India

5. Flour Tech Engineers Private Limited
Plot No. 182, Sector 24,
Faridabad - 121005,
Haryana, India

6. P Square Technologies
3, Swami Mahal,
Gurunanak Nagar,
Off. Shankarsheth Road Bhavani Peth,
Pune - 411002,
Maharashtra, India

7. Ricon Engineers
10 To 13, Bhagwati Estate,
Near Amraiwadi Torrent Power,
Behind Uttam Dairy,
Rakhial, Ahmedabad - 380023,
Gujarat, India

8. Kamdhenu Agro Machinery
Plot No. 6, Near Power House,
Wathoda Road Wathoda,
Nagpur - 440035,
Maharashtra, India

14. PROFITABILITY CALCULATIONS:

Sr. No.	Particulars	UOM	Year-1	Year-2	Year-3	Year-4	Year-5
1	Capacity Utilization	%	60%	70%	80%	90%	100%
2	Sales	₹. In Lacs	59.40	69.30	79.20	89.10	99.00
3	Raw Materials & Other direct inputs	₹. In Lacs	44.57	52.00	59.42	66.85	74.28
4	Gross Margin	₹. In Lacs	14.83	17.30	19.78	22.25	24.72
5	Overheads except interest	₹. In Lacs	3.90	4.15	4.64	4.78	4.88
6	Interest @ 10 %	₹. In Lacs	2.59	2.59	1.73	1.29	1.04
7	Depreciation @ 30 %	₹. In Lacs	3.60	2.52	1.84	1.44	1.08
8	**Net Profit before tax**	₹. In Lacs	**4.74**	**8.05**	**11.58**	**14.73**	**17.72**

The basis of profitability calculation:

This unit may generate 99 Lacks revenue per year. The growth of selling capacity will be increased 10% per year. (This is assumed by various analysis and study; it can be increased according to the selling strategy.)

Turnover per year 1 Jack Fruit jam 60000 kgs @ Rs.60.00 Rs. 36.00 lakhs 2 Jack fruit chips 60000 kgs Rs.70.00 Rs. 42.00 lakhs 3 Enrobed tidbits 30000 kgs Rs.70.00 Rs. 21.00 lakhs Total 15000 kgs Rs. 99.00 Lakhs

Energy Costs are considered at Rs 7 per Kwh and fuel cost is considered at Rs. 65 per litre. The depreciation of plant is taken at 10-12 % and Interest costs are taken at 14 -15 % depending on type of industry.

15. BREAKEVEN ANALYSIS:

The project shall reach cash break-even at 23.93 % of projected capacity as detailed below:

Sr. No.	Particulars	UOM	Value
1	Sales at full capacity	₹. In Lacs	99.00
2	Variable costs	₹. In Lacs	74.28
3	Fixed costs incl. interest	₹. In Lacs	5.92
4	BEP = FC/(SR-VC) x 100 =	% of capacity	23.93%

16. STATUTORY / GOVERNMENT APPROVALS

The Ministry of Food Processing Industries has been operating several plan schemes for the development of processed food sector in the country during the 10th Plan. One of the schemes relates to the Technology Up-gradation/ Establishment/ Modernization of food processing industries.

The Indian food processing industry is regulated by several laws which govern the aspects of sanitation, licensing and other necessary permits that are required to start up and run a food business. The legislation that dealt with food safety in India was the Prevention of Food Adulteration Act, 1954 (hereinafter referred to as "**PFA**"). The PFA had been in place for over five decades and there was a need for change due to varied reasons which include the changing requirements of our food industry. The act brought into force in place of the PFA is the Food Safety and Standards Act, 2006 (hereinafter referred to as "**FSSA**") that overrides all other food related laws.

FSSA initiates harmonization of India's food regulations as per international standards. It establishes a new national regulatory body, the Food Safety and Standards Authority of India (hereinafter referred to as "**FSSAI**"), to develop science based standards for food and to regulate and monitor the manufacture, processing, storage, distribution, sale and import of food so as to ensure the availability of safe and wholesome food for human consumption. Entrepreneur may contact State Pollution Control Board where ever it is applicable.

All food imports will therefore be subject to the provisions of the FSSA and rules and regulations which as notified by the Government on 5th of August 2011 will be applicable.

Key Regulations of FSSA

A. Packaging and Labelling
B. Signage and Customer Notices
C. Licensing Registration and Health and Sanitary Permits

17. BACKWARD AND FORWARD INTEGRATIONS

The objective of the scheme is to provide effective and seamless backward and forward integration for processed food industry by plugging the gaps in supply chain in terms of availability of raw material and linkages with the market. Under the scheme, financial assistance is provided for setting up of primary processing centers/ collection centers at farm gate and modern retail outlets at the front end along with connectivity through insulated/ refrigerated transport.

The Scheme is applicable to perishable horticulture and non-horticulture produce such as, fruits, vegetables, dairy products, meat, poultry, fish, Ready to Cook Food Products, Honey, Coconut, Spices, Mushroom, Retails Shops for Perishable Food Products etc. The Scheme would enable linking of farmers to processors and the market for ensuring remunerative prices for agri produce.

The scheme is implemented by agencies/ organizations such as Govt. / PSUs/ Joint Ventures/ NGOs/ Cooperatives/ SHGs / FPOs / Private Sector / individuals etc.

Backward Linkage:

- Integrated Pack-house(s) (with mechanized sorting & grading line/ packing line/ waxing line/ staging cold rooms/cold storage, etc.)
- Pre Cooling Unit(s)/ Chillers
- Reefer boats

- Machinery & equipment for minimal processing and/or value addition such as cutting, dicing, slicing, pickling, drying, pulping, canning, waxing, etc.
- Machinery & equipment for packing/ packaging.

Forward Linkage:

- Retail chain of outlets including facilities such as frozen storage/ deep freezers/ refrigerated display cabinets/cold room/ chillers/ packing/ packaging, etc.
- Distribution centre associated with the retail chain of outlets with facilities like cold room/ cold storage/ ripening chamber
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18. TRAINING CENTERS AND COURSES

There are few specialised Institutes provide degree certification in Food Technology, few most famous and authenticate Institutions are as follows:

1. Indian Institute of Food Science & Technology,
   Plot No.1, Near Maa-Baap ki Dargah,Opp to Nath Seeds,
   Paithan Road Aurangabad
   Aurangabad - 431005
   Maharashtra, India

2. MIT College of Food Technology, Pune
   Gate.No.140, Raj Baugh Educational Complex,
   Pune Solapur Highway,
   Loni Kalbhor, Pune – 412201
   Maharashtra, India

3. CSIR - Central Food Technological Research Institute (CFTRI)
   Cheluvamba Mansion, Opp. Railway Museum,
   Devaraja Mohalla, CFTRI Campus, Kajjihundi, Mysuru ,Karnataka – 570020

Udyamimitra portal (link : www.udyamimitra.in) can also be accessed for handholding services viz. application filling / project report preparation, EDP, financial Training, Skill Development, mentoring etc.

Entrepreneurship program helps to run business successfully is also available from Institutes like Entrepreneurship Development Institute of India (EDII) and its affiliates all over India.

Disclaimer:

Only few machine manufacturers are mentioned in the profile, although many machine manufacturers are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.