Pre-Feasibility Study

TOMATO PASTE AND FRUIT PULP

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Government of Pakistan

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1 INTRODUCTION

1.1 General Brief

Agriculture sector is the backbone of Pakistan's economy employing 44 % of the work force. Nature has blessed Pakistan with an ideal climate for growing a large variety of vegetables and fruits. Agricultural sector is directly or indirectly contributing 25% towards GDP. According to Agriculture Department, 30% of vegetables/fruits are wasted due to negligence and lack of processing facilities, which could convert them into non-perishable form, permitting its transportation and storage without wastage. With the spread of education, change in habits of populace, growth in working women force and increase in per capita income & urbanization, the demand for processed vegetable/fruit products is increasing progressively.

Tomato is a rich source of vitamin A & C and is cultivated over vast area of land in the world. It has its origin from Themistition, city of Mexico where it was named as Tomatile. Then its cultivation was started in Central America and subsequently shifted to Europe. In Indo-Pak sub continent, its utility is growing year by year resulting into more cultivation. It is popular due to its color, taste & food value. Tomato has long been processed into Ketchup in Italy, Turkey, Greece, USA and European countries. It is used in large quantity at household and restaurants in the shape of tomato juice, tomato puree and paste. These products are also gaining popularity in Pakistan.

Like Tomato, fruits are delicious in taste and are abundantly available in their respective ripe seasons and are also a source of vitamins, proteins and carbohydrates. Fruits like Mango, Guava, Apricot, Strawberry, etc. are processed into pulp, paste, juices, squashes and jam. These products are used as part of food item by the people all over the world.

1.2 Project Brief

The proposed project has been designed as a medium scale-processing unit. It describes the processing facilities for Tomato Paste and Pulps of fruits like Apple, Mango Guava etc. with processing capacity of 5-10 ton per hour of fresh Tomato/Fruits.

This feasibility has been made specifically to produce products, such as tomato paste and fruits pulp of Mango, Apple. However Guava, Strawberry, Apricot, etc. have potential demand with local fruit/vegetable processors as well as the retail market, so they can also be produced by using the following set up of business. Introduction of vegetable and fruit processing facilities in the country can contribute in reducing the dependence of local industry on imported tomato paste. The paste is currently being imported mainly from China, Turkey and Iran. In Pakistan, processing of vegetables and fruit products is a viable and profitable business opportunity that is yet to be fully exploited.

Proposed sales of different products to different market segments under this project is as follows:

Table 1-1 Proposed sales

Fruit Pulp	Local Sales[1]	Export Sales
Tomato Paste	70%	30%
Mango	40%	60%
Apple	40%	60%

1.3 Opportunity Rationale

Agriculture sector is the backbone of Pakistan's economy employing 44 % of the work force. Nature has blessed Pakistan with an ideal climate for growing a large variety of vegetables and fruits. Agricultural sector is directly or indirectly contributing 25% towards GDP. Pakistan has a total fruit production of about 5900881 tones and total vegetable production of about 6171986 tones. The production of fruits and vegetables in Pakistan has often not been accompanied by better post-harvest management and by appropriate modernization of the processing techniques. The traditional fruit and vegetable dehydration industries preserve a large quantity of various fruits and vegetables, by using traditional methods. The fruits and vegetables are dehydrated by exposing them to strong sunshine and hot wind. These poor post harvest management causes huge loses to local growers. [2]

According to Agriculture Department, 30% of vegetables/fruits are wasted due to negligence and lack of processing facilities, which could convert them into non-perishable form, permitting its transportation and storage without wastage. With the spread of education, change in habits of populace, growth in working women force and increase in per capita income & urbanization, the demand for processed vegetable/fruit products is increasing progressively.

In Pakistan, processing of vegetables and fruits products is a viable and profitable business opportunity that is yet to be fully exploited. Currently growers are not familiar with latest processing techniques that can add value to the products and bring lot of foreign exchange through exports. The introduction of agro food based common facility centers enables to minimize the post harvest losses. Introduction of such facility can increase the income of the growers and as well as exports from the country.

1.4 Viable Economic Size

A tomato paste and fruit pulp processing plant can be designed with a wide range of optimal processing capacity and product mix. However, it is suggested that the viable economic processing unit should have 5,000 kg – 10,000 kg of tomato or fruit processing capacity per hour. Processing plant used for the purpose of this pre-feasibility study has an annual production capacity of 400 tons of tomato paste. And

[1] *Local sales will consist of sales to local processors/hotels*

[2] *Source: Economic Survey of Pakistan 2004-05*

9120 tons of fruit pulp. It is assumed to run the plant at 40% of the full capacity in first year. Production break up for this capacity is given below:

Table 1-2 Viable Economic Size

Fruit	Per hour processing capacity	Production
Mango	10	4800
Tomato	5	400.8
Apple	5	4320
Total		**9520.8**

1.5 Project Cost

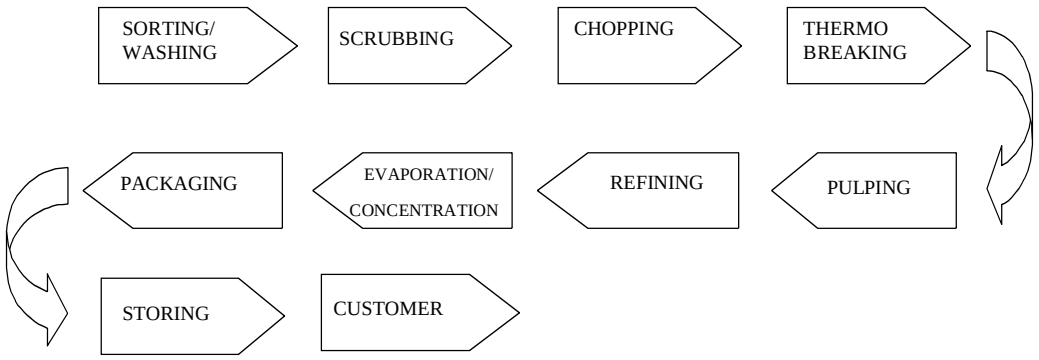
The approximate cost of the proposed project is worked out to be Rs. 155.73 million

1.6 Implementation Period

One (1) Year

2 PROCESS FLOW

2.1 Process Flow Chart



2.2 Process & Products

PASTE & PULP is differentiated mainly on the basis of BRIX[3] and water contents.

Table 2.1: - Total BRIX in Tomato Paste/Puree and Fruit Pulp

Tomato Paste	30%-32%
Tomato Puree	12%-15%
Fruit Pulp	10%-26%

HOT BREAK is a method where in tomatoes/selected fruits are heated by passing through a steam heated tubular heater. This method gives better yield of pulp having higher viscosity without being separated into juice & pulp. This process also kills microorganism.

COLD BREAK is a method where tomatoes are not heated to get the pulp. The pulp obtained through Cold Break process is of lower quality when compared to pulp obtained by Hot Break.

[3] *is the measure of solid contents in Pulp*

As regards the end use, there is no hard and fast rule for hot process or cold process. Generally, hot process is preferred as it gives a better aroma, better yield and is in use for production of processed products by the Industry.

3 CURRENT INDUSTRY STRUCTURE

3.1 Major Players

A large number of fruit and vegetable processing entities are in operation both in organized sector and informal sub-sector. Major processors are Shezan International Ltd., Mitchell's Fruit Farms Ltd., Ahmed Food Industries (Private) Ltd., Nestle Milkpak Limited, S.A. Rehman & Co., Benz Industries Ltd., Rafhan Best Foods Limited and Hamdard Fruit Products. According to the estimates of Export Promotion Bureau (EPB), at present, the capacity for the production of fruit juices/preserves, canned fruits, tomato products, syrups, squashes and processed vegetables are estimated at about 100,000 tons per annum

Other Fruits and Vegetable processors are Shangrila Foods, National Foods, Tops Fruit, Salman Foods and Kinza Foods.

3.2 Hubs of Fruit Processing Units

Most of the fruit/vegetable processing units are located in and around Lahore, Islamabad, Karachi, Hyderabad, Hattar and Sargodha. A few factories are also located in small towns and working on very small scale near Lahore and Sahiwal.

3.3 World's Tomato/Fruits Processing Industry

Competition has intensified as world exports of fresh tomatoes from key suppliers have been increasing in recent years. It is noteworthy that the major exporters of fresh tomatoes are also major importers. Over the last decade, China's exports of tomato products have grown immensely. From 2001-2005, China's fresh tomato production has grown 31.2 percent, according to the Food and Agriculture Organization of the United Nations. China currently produces about 25.37 percent of the world's tomato production. United States is the world's second leading producer of tomatoes, after China they have a growth rate of 27.6 percent and produces about 10.23 percent of the world's tomato production.

Table 3-1 Leading Tomato's Producers (Production in Tons)[4]

Producers	2005
China	31,644,040
USA	12,766,000
Turkey	9,700,000
Italy	7,814,899
Egypt	7,600,000
India	7,600,000
Spain	4,473,573
Iran	4,200,000

[4] source: FAO stat data base for agriculture production & trade

Brazil	3,303,530
Mexico	2,148,130

Table 3-2 Tomato's Production in Pakistan

2004	2005	Share (In world)	Prod. Growth
412786	412900	0.33%	53.6%

4 MARKET

4.1 The Country

The growth of the manufacturing sector has averaged more than 8% over the last 40 years. In manufacturing, cotton yarn & textiles is the leading sector, followed by food processing industries, largely based on indigenous raw materials.

Agriculture is still the mainstay of the economy. The geographical location provides a large variety of agricultural crops used for both food and raw material for industries. Fruits of Pakistan are unique in taste, aroma and are mostly organic as very low quantities of chemicals are used in their cultivation. Moreover, vegetables/fruits are not genetically modified. In addition to the local market, the markets of Afghanistan and Central Asian Republics can be effectively catered from Pakistan. Pakistan is a member of both the Economic Co-operation Organization (ECO) and the South Asian Association for Regional Co-operation (SAARC), which further expands the potential of the target market enabling the establishment of economic size fruits and vegetables processing plants for industrial activity.

In Pakistan, processing of vegetables and fruit products is a viable and profitable business opportunity that is yet to be fully exploited. Vegetables/Fruits processing industry, in general, is showing signs of healthy growth with expanding product range and increased acceptability in the local market. Favorable natural environment, increasing population, rising demand for processed vegetables and fruits, and lower cost of the factor of production are some of the factors that can contribute towards sustained high growth rate in this particular sector.

Products, such as tomato paste/puree and fruits pulp of Mango, Guava, Strawberry, Apricot, etc. have potential demand with local fruit/vegetable processors as well as the retail market. Rise of the fast food industry in the country is also having a significant impact on the demand for tomato and fruit products. It is expected that this trend will continue in the near future, and increase the consumption of processed fruit/vegetable products significantly.

Vegetable and Fruit juice industry has become one of the world's major agriculture based businesses. Pakistan is presently exporting processed vegetable and fruit products worth US$ 3 million which is 0.06% of the total existing world market of US$ 5 billion.[5]

Local vegetables & fruits processing market still has room for further expansion. Per capita consumption is still very low as compared to developed countries. For example, US consumption of tomato paste per capita is 30 kg per year, EU countries

[5] Source: Federal Bureau of Statistics Pakistan

consume 15 kg per capita, and Turkey consumes 1 Kg Per capita. As compared to these figures per capita consumption in Pakistan is negligible. It shows that there is still big potential for demand from the local market, which is expected to rise with the passage of time.

Introduction of vegetable and fruit processing facilities in the country can contribute in reducing the dependence of local industry on imported fruit pulps and processed vegetables.

Table 4-1 Production of Tomatoes (Quantity in 000 tons) in Pakistan

Year	Punjab	Sindh	NWFP	Balochistan	Total
1997-1998	65.3	32.4	123.1	104.5	325.3
1998-1999	68.9	32.4	130.5	100.2	332.0
1999-2000	71.6	30.8	138.1	42.7	283.2
2000-2001	60.8	32.9	140.0	36.1	269.8
2001-2002	62.2	32.8	146.2	52.9	294.1
2002-2003	65.2	35	148.3	57.8	306.3
2003–2004	64	35.7	157.4	155.6	415.78
2004–2005	64	33.9	146.8	181.6	426.2

4.2 Potential Markets

The markets for vegetable/fruit processed products are:

- Local Market: According to estimates about 95% of the processed products (puree, paste, pulps, jams, jelly and juices) are sold in the local market. The proposed project has very wide market for processors, hotel industry and retail sellers of tomato and fruit products.
- Export Market: There is great potential of vegetable/fruit processed products in Middle East, Far East, UK, European Countries, USA and Malaysia.

Table 4-1 Leading Tomatoes Importers (Quantity in Tons)

Importers	2004
USA	1,126,683
Germany	614,714
France	435,155
UK	334,684
Russian Federation	207,755
Saudi Arabia	253,548
Netherlands	226,318
Canada	166,295
Spain	68,056
United Arab Emirates	77,872

Table 4-2 Leading Tomatoes Exporters (Quantity In Tons)

Exporters	2004
Spain	1,023,028
Mexico	895,126

Netherlands	77,188
Syria Arab Republic	259,945
Jordan	237,859
Turkey	235,364
United States Of America	222,79
Belgium	204,503
Canada	137,163
Morocco	107,365

Table 4-2 Fresh Tomato (Quantity in Tons)

Pakistan	Imports	Exports
2003	328	2,413
2004	512	1,566

Retail Supply of Tomato Paste

Demand of tomato paste and fruits pulp exists in the Pakistani market. Major portion of the produce is sold as intermediary products and only a small portion is processed and sold as tomato paste/puree in the retail market. Only the leading food processors have branded products in the market.

4.3 Growth, Trends and Target Customers

An annual growth of 5 to 10% is expected in the light of discussions and survey conducted. The target market of tomato paste and fruit pulp is as follows:

1. Food processors: Vegetable and fruit processors all over the world now prefer to purchase quality paste from the open market instead of self production, resultantly diversifying them to add more products into their product line.
2. Hotels and Restaurants
3. Export market in Middle East, Malaysia and European Countries.
4. Working women
5. Households run by working women.
6. In International market Rotterdam in Holland has emerged as a trading hub for mango pulp/puree in Europe and from where mango pulp/puree is being supplied to many other parts of Europe.

On the basis of interviews with some of the representatives of the processors & hotels, following processors are the potential buyers of tomato paste/puree and fruit pulp as raw material for their intermediary products:

- Ahmed Foods
- Shangrila Foods
- Mitchell's Fruit
- Rafhan Best Foods
- Shezan International
- Nestle Milk Pak
- S. A. Rehman
- National Foods
- Tops Fruit

- Salman Food
- Hotels & Fast Food Restaurants like PC & Avari
- KFC, Pizza Hut, McDonald, Salt & Pepper, etc.

4.4 Demand & Supply Gap

Specific data for paste and pulp production and its demand in local market is not available. However, the present production capacity of Tomato, Canned Vegetables & Food Products is approximately 100,000 Tons per annum as reported by EPB.

The existing processors foresee no change in supply. The products of the proposed project will have no difficulty in penetrating in the market, because of the increased demand due to the following reasons:

1. Increasing portion of working women.
2. Changed recipes for cooking by the housewives.
3. Preference by the processors to buy intermediary products instead of in-house manufacturing.
4. Expansion of fast food industry in the country.

5 RAW MATERIAL REQUIREMENT

5.1 Raw Material Requirements

The raw materials required for a vegetable and fruit processing unit is:

- Fresh Tomatoes, Mangoes, Guava, Strawberry, Apricot, Apple, Banana, Plums etc.
- Preservative including Citric Acid, Potassium Metabisulphate or Sodium Benzoate.

5.2 Packaging Requirements

Packing requirements for the end consumers are:

- Retail Customers: Tin Packs, Pouch Packs and Glass Bottles
- Processors: Large Plastic Containers
- Hotel Industry: Large Tin Packs, Plastic Drums
- Exports: Aseptic pack for foreign processors/bulk consumers

In the initial stage the unit will start with bulk supply to processors/ hotel industry and smaller segment of the export market then it would gradually move into retail sales.

5.3 Availability of Raw Material

Small-scale farmers and wholesale market commission agents in vegetable and fruit markets are the major suppliers of raw material in the local processing industry. Tomato and various fruits (the primary raw materials), salt, preservatives etc. (secondary raw materials) are available locally. Metal containers, pouches and glass bottles (Packing material) are also available locally.

Aseptic packing is used for obtaining long shelf life for products without preservatives. Further, for this pack filling, imported packing machinery would be required which will cost around Rs. 20-25 Million.

5.4 Availability Period of Tomatoes and other Fruits in Pakistan

The data regarding availability period of tomatoes & certain selected fruits in Pakistan, is given in the following table:

Table 5.1: -Bar diagram showing periods of availability of Tomatoes & Fruits[6]

Description	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Tomato	■	■	■			■	■					
Guava	■	■						■	■			
Strawberry				■	■							
Mango							■	■				
Apricot							■	■				
Apple	■	■								■	■	■
Banana											■	■
Peach						■	■					
Plum						■	■	■				
Pear									■	■		

5.5 Production of Tomatoes and Fruits

Data on production of tomatoes and various other fruits during 2001-02 is as under:

Table 5.2: - Production of Tomatoes & Fruits[7] (000' tons)

Item	Punjab	Sind	NWFP	Balochistan	Pakistan
Tomato	64.5	48.3	161.59	193.6	468.146
Mango	139.17	352.42	3.2	64.79	1753.91
Banana	114.01	134.74	13.7	3.6	1634.77
Apple	3.6	0.5	126.6	220.086	3512.32

5.6 Raw Material Prices

Raw material prices at farm and vegetable & fruit commission agents during peak season have been collected from the processors through personal interview and data is narrated as follows:

Table 5.3: - Raw material prices[8]

Raw material	Rs. Per Kg	Rs. Per Ton
Mango	11	11,000
Tomato	3	3,000
Apple	5	5,000

5.7 Products Production Capacity

Table 5.4: - Products and estimated production

Items	Estimated Production of Paste/Fruit Pulp at 100% Capacity	
	Tons	%

[6] *Source: Market information*

[7] *Source: Agriculture Statistics of Pakistan 2005-2006*

[8] *Source: Economics & Marketing Department, Government of Pakistan*

Tomato Paste	400	100
Fruits Pulp		
Mango Pulp	4800	33
Apple Pulp	4320	67

5.8 Expected Sale Price

Table 5.5: - Expected sales price of the end products[9]

Items	Local Sale Price of Product Per Kg.(Rs.)	Export Sale Price of Product Per Kg.(Rs.)
Tomato Paste	47	30.6
Mango Pulp	35	60
Apple Pulp	26	35

5.9 Expected Yield from Raw Material

Yield specifies the percentage of output (Finished Product) as compared to the input (Raw Material). Yield is mainly dependent on the following factors:

1. Strict quality control on raw material and production processes.
2. Type of plant
3. Processing methodology

Following table shows the expected yield from different fruits and vegetables.

Table 5.6: - Expected Yield from Raw Material[10]

Items	Recovery (In Percentage)
Tomato Paste	16
Mango Pulp	60
Apple Pulp	90

5.10 Waste Management

The project has no environmental hazards and waste management shall be as under:

- Waste water to be drained out by its connection with the main drain.
- Waste material like stone/skin can be sold as scrap.

6 HUMAN RESOURCE REQUIREMENTS

6.1 Number of Officers and Staff Required

For processing the plant following administrative and production staff will be required

Table 6.1: Number of Staff & Officers required

	No.	Per month	Annually
Production Staff			

[9] *Source: Market survey*
[10] *Source: Technical Survey*

Production Manager	1	30,000	360,000
Quality control In charge	1	20,000	240,000
Deputy Production Manager	1	20,000	100,000
Shift In charge	1	12,000	60,000
Production Supervisor	1	8,500	42,500
Process In charge	1	10,000	50,000
Boiler Engineer	1	24,000	120,000
Electrical Engineer	1	24,000	120,000
Mechanical Supervisor	1	16,000	80,000
			1,172,500
Administrative Salaries			
Chief Executive	1	55,000	660,000
Manager Finance & Admn.	1	30,000	360,000
Accounts Officer	1	15,000	180,000
Administration Officer	1	15,000	180,000
Accountant	1	10,000	120,000
Accounts Assistant	1	8,000	96,000
Computer Operator	1	8,000	96,000
Peon	1	4,000	48,000
Gardener	1	3,500	42,000
Security Guards	2	4,000	96,000
			1,878,000
Marketing Staff			
Manager Marketing	1	30,000	360,000
Assistant Manager Marketing	1	15,000	180,000
Marketing Executives	2	10,000	240,000
skilled/semi skilled workers	10	4,500	315,000
			1,095,000

6.2 Working Time

Table 6.2: - Working Time Estimates

Description	Time
Working days per month: Tomato Paste Manufacturing Fruits Pulp/Paste Manufacturing	24 16 hours in 2 shifts[11] for 30 days 16 hours in 2 shift for 110 days
Working hours per month: Tomato Paste Manufacturing Fruits Pulp/Paste Manufacturing	 30 days (384 hours) 30 days (192 hours)

[11] *Due to flooded supply of Tomato in peak season, the operations would be off two shifts of 8 hours each*

7 MACHINERY AND EQUIPMENT

7.1 Available Options of Machinery & Equipment

7.1.1 Machinery Fabricators

Both Local and imported plants can be selected for the project. Local fabricators use local and imported material and parts (available locally).But imported machinery is more reliable then local machinery in quality and results however local machinery or a mix of local and imported machinery can be selected for this plant . [12]

Table 7-1 Machinery & Equipment

Plant & Machinery	Qty	Total cost(in rupees)	In Millions
Receiving And Treatment Line			
Washer inoxall swp 50	1	4,750,000	4.75
Elevator 3b	1	940,000	0.94
Brushing machine 3b	1	1,300,000	1.3
Chopper mod. 4	1	1,080,000	1.08
Pitter mango creamer	1	1,300,000	1.3
Cooker hb 300	1	3,740,000	3.74
Jumbo creamer pulper/refiner	1	1,800,000	1.8
300 l bin + l.r.	1	140,000	0.14
Monix pump 5v	1	360,000	0.36
Mixing tank sms 2000/i	1	650,000	0.65
Monix pump 6v	1	430,000	0.43
Connections pre assembling	1	1,080,000	1.08
Electric board	1	1,300,000	1.3
Scaffolding	1	650,000	0.65
Tomato Concentration & Aseptic Filling			
Evaporator frumaco	1	16,300,000	16.3
Mixing tank sms 1000/i	1	580,000	0.58
Monix pump 55v	1	350,000	0.35
Deaerator 3/1500/s	1	1,340,000	1.34
Sterilizer stth 1500/b	1	11,230,000	11.23
Aseptic tank 500 l	1	2,450,000	2.45
Filler c.a.f. 1h/1" review	1	6,160,000	6.16
C.a.f./c.f. S. 200 kg bags	1	650,000	0.65
Connections pre assembling	1	500,000	0.5
Cip Line			
Sanitation mobile group	1	980,000	0.98

[12] *For this report we assume that the weighing machine would be outsourced by the factory, but it can also be purchased to full fill the requirement and can be obtain for Rs 2,000,000*

Hydro cleaner	1	480,000	0.48
Spare Parts			
Recommended spare parts for 2 years	1	1,220,000	1.22
Laboratory			
Packing & delivery charges	1	3,960,000	3.96
Supervision and commissioning	1	3,240,000	3.24
Other Machinery (Boiler, Water Treatment Plant, Cooling Water System, Chill Water System, Tube well etc.)	1	20,000,000	20
Total	**29**	**88,960,000**	**88.96**

Local machinery can be obtained from the following sources

For Vegetable and Fruit Processing

i. Installation & Fabrication Engineers (Private) Limited
21/22 K. M. Ferozepur Road, Lahore
ii. Unique Engineering works (Private) Limited,
233-S, Industrial Estate, Township, Lahore
iii. Central Engineering Services (Private) Limited,
119-S Industrial Estate, Township, Lahore
iv. Two Star
Industrial Estate, Township, Lahore

For Refrigeration Machinery

i. Pakistan Air-conditioning Engineering Co. (Private) Limited
Gardee Trust Building, Napier Road, Lahore
ii. Kold Kraft,
Industrial Estate, 247-S Kot Lakhpat, Lahore

7.1.2 Imported Machinery Suppliers

Imported Plant of Italian and Chinese origin is available comprising of main sections of the plant only, which is to be supplemented with certain local components. Offices of suppliers of foreign plants for paste and fruits pulp production machinery are located at:

i. Burtuzi, Lahore Cantt
ii. Tetra Pak, Upper Mall, Lahore

Local Machinery along with foreign components is recommended for good quality, better efficiency and lower cost.

7.2 Selected Plant and Process Flow

The selected processing plant is capable of processing tomatoes & fruits to produce paste & pulp. The plant comprises of imported components (available locally) and some locally manufactured equipment & parts. The fruits that would be processed are mangoes, apple etc.

The nomenclature of plant and production system is explained below:

7.2.1 Sorting Belt Conveyor

This is a rubber conveyor belt with stainless steel structure. Belt is made from food grade rubber. As vegetable and fruits require frequent washings, motor and gearbox are also covered by stainless steel sheet. It is a 2 ft. wide and 15 ft. long conveyor with 2 HP electric motor. Tomato and fruits are dumped manually at one end of the belt. The sorting is done manually by workers standing along side the belt.

7.2.2 Washing Tub with Re-circulation Pump

This is a stainless steel tub with conical bottom having high pressure water nozzles, which are fed by a water re-circulation pump. A float valve maintains the water level in the tank. Tank is 4x8 ft fitted with 3 HP stainless steel re-circulation pump.

7.2.3 Elevator

This is for lifting of fruit from washing tank to the scrubber. It is made of stainless steel and is 10 feet long.

7.2.4 Scrubber

It consists of stainless steel tank with Nylon brushes to scrub/wash hard skin fruits such as mangoes or apples. Tank is 4x6 ft with water spray arrangements. Scrubber is not required for soft skin vegetable/fruits, i.e. tomatoes or peaches etc.

7.2.5 Bypass Conveyor - 10 Feet Long

As soft skin fruit is not passed through the scrubber, so a by-pass conveyor system is installed to avoid its passing through the scrubber. By-pass consists of two chutes and a rubber belt conveyor.

7.2.6 Main Elevator

To minimize pumping, machines are placed one above the other and gravity flow is used. Main elevator lifts vegetables/fruits to 20 ft above ground. It is 2 ft wide and 30 ft long steel flight conveyor with all parts of stainless steel.

7.2.7 Feeding Conveyors

Fruit at the top can be channeled into two paths. Soft fruit without pit is sent to chopper. Fruits with stone, such as mangoes or apricots etc. are sent to pulpers. A set of two conveyors is installed with proper chutes to direct the fruit to the relevant machine.

7.2.8 Chopper

Vegetable/fruits without stone, such as tomatoes and apples are passed through a crusher, instead of a pulper. This is a high-speed machine, which cuts vegetable/fruits into small pieces.

7.2.9 Thermo Break

It is a screw conveyor with steam jacket to heat the material. Here the fruit is heated to 90ºC before making pulp.

7.2.10 Pulpers

The pulper consists of a heavy-duty metallic cylinder in a horizontal axis with perforations. A screen of mesh is wrapped around the cylinder. Number of brushes rotates inside the cylinder and pulp is passed through the screen. The seed and skin do not pass through the screen and is rejected at the end. A limited quantity of water is also used to wash the pit and skin. Two pulpers are proposed to process up to 2,000 Kg of mangoes per hour.

7.2.11 Refiner

It is similar in nature to pulper but has a much finer screen to remove seed and skin etc.

7.2.12 Waste Conveyor

A screw conveyor of stainless steel is used to convey the waste from refiner to waste cart.

7.2.13 Balance Tank

The pulp from the refiner is stored for a short duration before it is pumped to the evaporator. A 1,000-litre tank with an agitator is used for this purpose.

7.2.14 Monix Pump

A variable flow positive displacement pump with progressive cavity is used to feed the raw pulp to the evaporator. These pumps are imported and are available locally.

7.2.15 Concentrator

The boiling of the pulp takes place at 40ºC under high vacuum. The heating surface of the evaporator is wiped with an agitator blade so that the pulp does not stick to the sides. In this system, a very good quality concentrated pulp of tomato or other fruits are obtained. All parts coming in contact with vegetable/fruits are stainless steel of food grade finish.

7.2.16 Packaging & Storage

Aseptic packing and processors requires the pulp to be stored in bulk in 200 liters drums with polyethylene lining as the pulp is stored for long time before it is reused and thus requires adoption of proper preservation method.

Chemical preservatives are added to prevent the growth of microorganism during storage. Though it is an economical method of storage, the quality of the pulp stored by chemicals is not as good as the quality of frozen pulp. It is better to freeze the pulp and store around minus 20ºC. In order to store the product for future sale, refrigeration machinery and chilling room building has been included in the project cost.

7.2.17 Other Items

Other items of plant and machinery are as under:

1. Electrical motors, control cables and cables trays
2. Steel structure, stairs, walkways etc

3. Boiler 2,000 Kg/hr at 150 PSIG with water treatment plant. A second hand boiler can also be used.

Standby power generator of 150 KVA (used generator has been recommended).

8 FURNITURE AND FIXTURES

Apart from the above stated machinery following office equipment and furniture will be required for the operation of the proposed project

Table 8-1 Detail of Office Equipment and Furniture

Description	Qty	Per unit cost	Total
Office Equipment			
Computers P4	6	25,000	150,000
Printer	1	12,000	12,000
External Modem	1	5,000	5,000
Switch D-Link	1	10,000	10,000
Split Air-conditioner 2 Ton	2	25,000	50,000
Mini Telephone Exchange	1	20,000	20,000
Telephone Sets	10	500	5,000
Fax Machine	1	10,000	10,000
Furniture and Fixture			
Work Stations	10	6,500	65,000
Chairs	30	600	18,000
Sofa Set	1	5,500	5,500
Net Working & Electrification	1	50,000	50,000
Total	**65**	**170,100**	**400,500**

9 LAND AND BUILDING REQUIREMENTS

9.1 Total Land Requirement & Building Covered Area

Land Cost	Area (sq ft)	Kanal
Required Land	108,000 (3 Acre)	24
Rate per kanal		250,000.00
Total cost		**6,000,000**

Table 8.1: Building Covered Area

Factory Covered	Area sq.ft	Construction Cost. Rs/sq.ft	Total Cost
Processing Hall/Sorting/cold storage	27,240	1,000	27,240,000
Mosque	900	800	720,000
Canteen/ changing room/Toilets	2,400	600	1,440,000

Gate office	216	600	129,600
Office Building	1,290	800	1,032,000
Total Covered Area	**32,046**		**30,561,600**
Free space (construction cost 8% of total building cost)	**75,954**	8.00%	**2,444,928**
Total	**108,000**		**33,006,528**

Covered area will be around 7.15 kanals and the residual is left open for parking of carriers, storage of waste material and future expansion.

9.2 Suitable Location for the Project

On the basis of availability of fresh fruits and tomatoes and close proximity to the market, the project can be set up in any of the following areas of the country:

Table 8.2: - Province and location of project

Province	Location
Punjab	Central Punjab
Sind	Hyderabad Division
NWFP	Malakand Division & Dargai
Balochistan	Loralai Division

However, on the basis of low price of fresh tomato in Punjab during May crop, the more lucrative place is central Punjab from Bhai Pharu to Sahiwal belt.

The other considerable factors while selecting the location of the project are:

1. Availability of other fruits also in abundance and also at acceptable price in the area.
2. Presence of soft water,
3. Availability of skilled labor.
4. Location of main processors to whom the products are to be sold.
5. Presence of hotel and fast food industry.
6. Availability of retail market.
7. Easy access to roads.
8. Availability of utilities required for the project.

9.3 Utilities Required

- Electricity
- Gas or Furnace Oil or Coal
- Water
- Telephone
- Fax

10 PROJECT ECONOMICS

Table 10-1- Project Cost

Description	Cost
Land	6,000,000
Building	33,006,528
Office Equipment:	400,500
Plant & Machinery:	88,960,000
Vehicle	1,100,000
Preliminary Expenses	1,973,000
Subtotal	**131,440,028**
Working Capital	24,266,166
Total Project Cost	**155,706,194**

Table 9.2: Financing Plan

Financing	Ratio	Rs
Sponsors Equity	60%	93,423,716
Debt	40%	62,282,478

Table 9.3: Project Returns

	Project
IRR	55%
NPV (Rs)	289,318.10
Payback Period (Years)	2.34

11 STRATEGIC FACTORS

11.1 Key Success Factors

- Effective quality control in operations
- Competitive price of end products
- Abundant supply of raw material
- Cost efficiency through better management
- Media campaign for the awareness of the retail customers
- Availability of low cost skilled labor

11.2 Threats

- Crop failure
- Influence of major local and foreign brands operating in the market
- Change in the Government regulations
- Shrinkage of retail customer market over a period of time
- Fruit and vegetable growers are usually unable to get right prices for their good quality fruits/vegetables. The year of good harvest gives them more loss because of low prices in the local market.

12 FINANCIAL ANALYSIS

12.1 Projected Income Statement

Rupees (ooo)

	Year - I	Year - II	Year - III	Year - IV	Year - V	Year - VI	Year - VII	Year - VIII	Year - IX	Year - X
Sales/Revenue	241,373	273,717	310,396	354,659	405,269	463,141	529,323	588,209	933,831	988,473
Cost of Sales	68,077	64,088	62,822	62,167	62,733	63,671	65,147	67,132	69,229	71,940
Gross Profit	173,297	209,630	247,573	292,492	342,536	399,471	464,176	521,077	864,602	916,533
Operating Expenses:										
Administrative Expenses	2,058	2,422	2,664	2,931	3,224	3,546	3,901	4,291	4,617	5,079
Marketing Expenses	141,962	155,067	169,470	185,306	202,728	221,907	243,030	258,944	393,842	400,165
Operating Profit	29,277	52,140	75,439	104,256	136,584	174,018	217,245	257,842	466,142	511,289
Financial Charges	8,502	7,630	6,758	5,886	5,014	4,142	3,270	2,398	1,526	654
L C + Bank Charges	100	110	121	133	146	161	177	195	214	236
Profit before Taxation	20,675	44,401	68,561	98,237	131,423	169,715	213,798	255,249	464,402	510,400
Taxation **20%**	4,135	8,880	13,712	19,647	26,285	33,943	42,760	51,050	92,880	102,080
Profit after Taxation	16,540	35,520	54,849	78,589	105,139	135,772	171,038	204,199	371,521	408,320
Acc. Profit b/f	-	16,540	52,061	106,909	185,499	290,637	426,409	597,448	801,647	1,173,168
Accumulated Profit c/f	**16,540**	**52,061**	**106,909**	**185,499**	**290,637**	**426,409**	**597,448**	**801,647**	**1,173,168**	**1,581,488**

12.2 Projected Cash flow Statement

Rupees (000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Profit before Financial Charges & Taxation	29,277	52,140	75,439	104,256	136,584	174,018	217,245	257,842	466,142	511,289
Amortization	197	178	160	144	129	117	105	94	85	76
Depreciation	19,702	16,013	13,050	10,666	8,798	7,250	6,001	4,992	4,300	3,614
	49,176	68,331	88,649	115,066	145,511	181,385	223,351	262,928	470,527	514,980
Working Capital Change	35,548	(887)	899	803	750	669	558	980	(8,407)	1,480
Cash from other Sources										
Owners	93,424	-	-	-	-	-	-	-	-	-
Bank Finance	62,282	-	-	-	-	-	-	-	-	-
	155,706	-	-	-	-	-	-	-	-	-
Total Sources	240,430	67,444	89,548	115,869	146,261	182,053	223,909	263,908	462,119	516,460
Applications:										
Fixed Assets	129,467	-	-	1,000	-	-	-	1,000	-	-
Preliminary Expenses	1,973									
Re -Payment of Loan	14,730	13,858	12,986	12,114	11,242	10,370	9,498	8,626	7,754	6,882
L C Charges	100	110	121	133	146	161	177	195	214	236
Tax	4,135	8,880	13,712	19,647	26,285	33,943	42,760	51,050	92,880	102,080
	150,405	22,848	26,819	32,894	37,673	44,474	52,435	60,871	100,849	109,198
Cash Increase/(Decrease)	**90,025**	**44,597**	**62,729**	**82,974**	**108,588**	**137,579**	**171,474**	**203,037**	**361,271**	**407,262**
Opening Balance	-	90,025	134,622	197,351	280,325	388,913	526,492	697,966	901,003	1,262,273
Closing Balance	**90,025**	**134,622**	**197,351**	**280,325**	**388,913**	**526,492**	**697,966**	**901,003**	**1,262,273**	**1,669,536**
	90025	134622	197351	280325	388913	526492	697966	901003	1262273	1669536

12.3 Projected Balance Sheet

Rupees "000"

	Year - I	Year - II	Year - III	Year - IV	Year - V	Year - VI	Year - VII	Year - VIII	Year - IX	Year - X
Tangible Fixed Assets	109,765	93,751	80,702	71,035	62,237	54,987	48,986	44,994	40,694	37,080
Preliminary Expenses	1,776	1,598	1,438	1,294	1,165	1,049	944	849	764	688
Current Assets:										
Accounts Receivable	8,046	9,124	10,347	11,822	13,509	15,438	17,644	19,607	31,128	32,949
Cash in Hand / Bank	90,025	134,622	197,351	280,325	388,913	526,492	697,966	901,003	1,262,273	1,669,536
	209,611	**239,095**	**289,837**	**364,477**	**465,824**	**597,966**	**765,539**	**966,453**	**1,334,860**	**1,740,252**
Owners Equity:										
Capital	93,424	93,424	93,424	93,424	93,424	93,424	93,424	93,424	93,424	93,424
Accumulated Profit	16,540	52,061	106,909	185,499	290,637	426,409	597,448	801,647	1,173,168	1,581,488
Long Term Loan	49,826	43,598	37,369	31,141	24,913	18,685	12,456	6,228	-	-
Current Liabilities:										
Current Portion of Long Term Loan	6,228	6,228	6,228	6,228	6,228	6,228	6,228	6,228	6,228	-
Accounts Payable	43,593	43,785	45,907	48,185	50,622	53,220	55,983	58,926	62,039	65,341
	209,611	**239,095**	**289,837**	**364,477**	**465,824**	**597,966**	**765,539**	**966,453**	**1,334,860**	**1,740,252**

13 KEY ASSUMPTIONS

Table 13-1 Economy related Assumptions

Electricity Growth Rate	10%
Wage Growth Rate	10%

Table 13-2 Cash Flow Assumptions

Accounts Receivable cycle	30 days
Accounts Payable cycle	15 days
Raw Material Inventory	3 days
Finished Goods Inventory	15 days
Equipment and Spare Parts Inventory	30 days

Table 13-3 Expense Assumptions

Purchase Price Per Kg (Tomato)	Rs. 2-4
Average Purchase Price per Kg (Various Fruits)	Rs.5-12
Purchase Price Growth Rate	5%
Maintenance Expense (% of plant and Machinery and Building)	1%
Machine Maintenance Growth Rate	10%
Fuel Cost per year	Rs. 500,000
Freight charges Dubai	35 per kg
Freight charges UK	77 per kg

Table 13-4 Financial Assumptions

Project Life (years)	10
Debt Ratio	40%
Equity Ratio	60%
Interest Rate on Long Term Loan	14%
Interest Rate on Short Term Loan	14%
Debt Tenure (Years)	10