

Pre-Feasibility Study

DATES PROCESSING PLANT



Turn Potential into Profit

Small & Medium Enterprise Development
Authority

Government of Pakistan

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1 INTRODUCTION

Dates have been cultivated since ancient times in various parts of the world. Normally it thrives under the rigorous climate of sub-tropical desert. Date processing enjoys a high economic importance in the world. Dates are among the most valuable fruits and consumed in large quantity, all across the world. Date is an erect palm to 100 or 120 ft (30.5-36.5 m), the trunk clothed from the ground up with upward pointing, overlapping, persistent, woody leaf bases. After the first 6 to 16 years, numerous suckers will arise around its base. The feather-like leaves, up to 20 ft (6 m) long, are composed of a spiny petiole, a stout midrib, and slender, gray-green or bluish-green pinnae 8 to 16 in (20-40 cm) long, and folded in half lengthwise. Each leaf emerges from a sheath that splits into a network of fibers remaining at the leaf base. Small fragrant flowers (the female whitish, the male waxy and cream colored), are borne on a branched spadix divided into 25 to 150 strands 12 to 30 in (30-75 cm) long on female plants, only 6 to 9 in (15-22.5 cm) long on male plants. One large inflorescence may embrace 6,000 to 10,000 flowers. Some date palms have strands bearing both male and female flowers; others may have perfect flowers. As the fruits develop, the stalk holding the cluster may elongate 6 ft (1.8 m) while it bends over because of the weight. The fruit is oblong, 1 to 3 in (2.5-7.5 cm) long, dark-brown, reddish, or yellowish-brown when ripe with thin or thickish skin, thick, sweet flesh (astringent until fully ripe) and a single, cylindrical, slender, very hard stone grooved down one side.

Dates are unique as they constitute a set of properties and characteristics, which distinguish them from all major fruits. It is consumed in at least three major stages of majority: from fresh, crisp to succulent, to soft pliable. A fully tree ripened date is self-preserving for months and can be stored or transported as a concentrated food source. Most of the dozen or more species of the genus *Phoenix* (family *Palmae*) are grown as ornamental palms indoors or out. Only the common date, *P. dactylifera* L., is cultivated for its fruit. Often called the edible date, it has few alternate names except in regional dialects. To the French, it is *dattier*; in German, it is *dattel*; in Italian, *datteri*; or *dattero*; in Spanish, *datil*; and, in Dutch, *dadel*. The Portuguese word is *tamara*. In Saudi Arabia it is *Nahil* and in Pakistan it is called *Kajoor* in Urdu.

1.1 Project Brief

The proposed project is about establishing a Dates Processing & Packaging plant. The Dates processing project is aiming at value addition, to increase the quality and shelf life of Dates. Its processing includes fumigation, sorting washing, drying, grading and finally packaging. The entire process flow is suggested to be semi automatic requiring both skilled and unskilled workers. The proposed project has market edge of supplying hygienically treated Dates to various parts of the country and also has an export potential. Further value addition to processed Dates could be done through glazed or stuffed with nuts/sweets, chocolate, and especially designed packaging has an additional marketing edge.

Dates processing unit established in trading hub will also provide services to other traders/exporters of Dates, this is another aspect of this establishment as service provider to third party.

1.2 Opportunity Rationale

The Dates fruit, which is produced largely in the hot arid region of southern Asia and North Africa, is marketed all over the world as a high value confectionery or fruit, and remains an extremely important subsistence crop in most of the desert regions. Major producers of Date are Egypt, Iran, Saudi Arabia, United Arab Emirates, Pakistan, Algeria, Sudan, Oman, Libya etc.

Dates are one of the most important cash fruit crops of Pakistan. Dates are cultivated over an area of 81,991ha in Pakistan with an annual production of 0.496 million tons in year 2005-06. Most of the Dates produced in Pakistan is cultivated in Balochistan and Sindh provinces. Major Dates producing areas in the country are Turbat, Panjgur, Gwadar, Khairpur, and D.I. Khan.

Balochistan contributes considerably to the date production of the country and it is having a 50% share of the total production. This quantity not only signifies the importance of the date crop as raw yield but also its value addition to exhaust excessive availability and to tap international market to fetch more foreign exchange. Mekran Belt is having a significant share to the gross date production of Balochistan. It has a 45% share of the total country's production. The region has been historically renowned by the production of different varieties of Dates. Climatic and geographical location of this region is most suitable for the growth of Dates palm and produces high quality yield.

Pakistan is the 5th major date producer and fourth largest date exporter of the world. Major buyers of Pakistani Dates include India, Canada, USA, Germany, UK, Denmark, Australia, Bangladesh, Nepal, Sri Lanka, South Africa, Dubai, Japan, China, South Korea, North Korea etc.

Dry or soft Dates are used directly or with fillings of almonds, walnuts, candied orange and lemon peel. They are used in Arab breads, cakes and other dessert items. Recent innovations include chocolate-covered Dates and products like sparkling Dates juice, used in some Islamic countries, for special and religious occasions such as Ramadan.

The overall market share of Pakistani Dates in the world is around 18%, which is a huge proportion. Dates grown in Pakistan have a huge national and international market demand regardless of the fact that major share of our export fetch low value because of substandard, irregular processing and lack of value addition.

1.3 Viable Economic Size (Processing Capacity)

This designed study proposed a plant with 200kgs per hour processing capacity. The proposed capacity would be viable under the mentioned parameters. The total operational days of plant are calculated as 300 days per annum or 25days a month with 10hrs shift per day. Under these assumptions the proposed plant would be producing 2000kgs of processed Dates per day and annual production would be 600,000kgs.

1.4 Plant and Machinery

The recommended machinery for Dates processing plant is:

Machinery Type:	Semi-Automatic
Plant Capacity:	2000Kgs/10 hrs

Availability: Local

1.5 Total Project Cost

Total project cost for setting up a Dates processing unit is estimated to be Rs. 20.321 Million. The total cost is composed of 18.143 Million of capital cost, and 2.178 Million of working capital cost.

1.6 PROJECT OUTPUT

The end product would be hygienically washed, treated, graded and packaged Dates in short the processed Dates. The Dates will be treated and packed on internationally acceptable standards, hence improving the quality of Dates. Such processed Dates have export potential and will certainly increase the capital inflows of the economy.

1.7 Key Success Factors

Traditionally the Dates from Balochistan and other parts of the country are distributed through a well established network of dry fruits mandies without any treatment, which in cumulates huge loss inform of taste, shape and unhygienic conditions. Whereas proposed facility encourages processed and hygienically packed Dates that will not only enhance the shelf life, minimize losses and will fetch good profits.

The main success factors for the facility are:

- I. Availability of raw material at low prices,
- II. Little competition as no such facility is present in the Dates producing areas, and
- III. Hygienically treated, packed and high Quality Dates will bring more revenues from exports and even from the local market.

2 CURRENT INDUSTRY STRUCTURE

The table given below ranks the Dates producing countries of the world.

Table 2 Major Dates Producing Countries

S.No	COUNTRY	ANNUAL DATES PRODUCTION IN TONNES (2004-05)
1	Egypt	1,100,000
2	Iran	880,000
3	Saudi Arabia	830,000
4	United Arab Emirates	760,000
5	Pakistan	650,000
6	Iraq	650,000
7	Algeria	450,000
8	Sudan	330,000
9	Oman	240,000
10	Libya	140,000
11	Others	140,000

Source: FAO STAT 2005

2.1 Dates Producing Areas of Pakistan

Date is a growing business both locally as well as globally. Pakistan is the fifth largest Dates producing country worldwide. The production of Dates in Pakistan was around 650,000 metric tons in year 2004-05, where as a decline was observed from 650,000 metric tons to 496,576 metric tons in 2005-06.

Table 2-1 Province wise Dates production

PROVINCE	AREA (Hectares)	PRODUCTION (Tones) 2005-06
Balochistan	48136	252,317
Sindh	26681	192,810
Punjab	5797	42,580
N.W.F.P	1377	8,869

Ministry of Food, Agriculture and Livestock, Pakistan.

The table shows that Balochistan has dedicated the largest area for the production of Dates as compare to other provinces of Pakistan hence producing half of country's total date production.

2.2 Procurement Seasons

The procurement seasons for the different kinds of Dates are listed in a table below

Table 2-2 Province wise Procurement Seasons of Dates

Province	Variety	Procurement Period
Balochistan	Begum Jhangi	20 th August – 30 th September
	Mazawati	1 st September – 30 th September
	Gogna	15 th July – 7 th August
	Jansor	20 th August – 15 th September
	Deshtiari	15 th July – 7 th August
	Kharaba	1 st October – 30 th November
	Assil	25 th July – 31 st August
Sindh	Fasil	15 th July – 7 th August
	Karbalai	-----//-----
	Kubra	-----//-----
	Valeti	-----//-----
	Assil	25 th July – 31 st August
Province	Variety	Procurement Period
Punjab	Dorn	1 st August – 31 st August
NWFP	Dhakki	7 th August – 31 st August

The above mentioned procurement periods may vary by 10 – 20 days due to climatic conditions. The mentioned purchased period is considered as most suitable with reference to freshness and bargain opportunity of the stock.

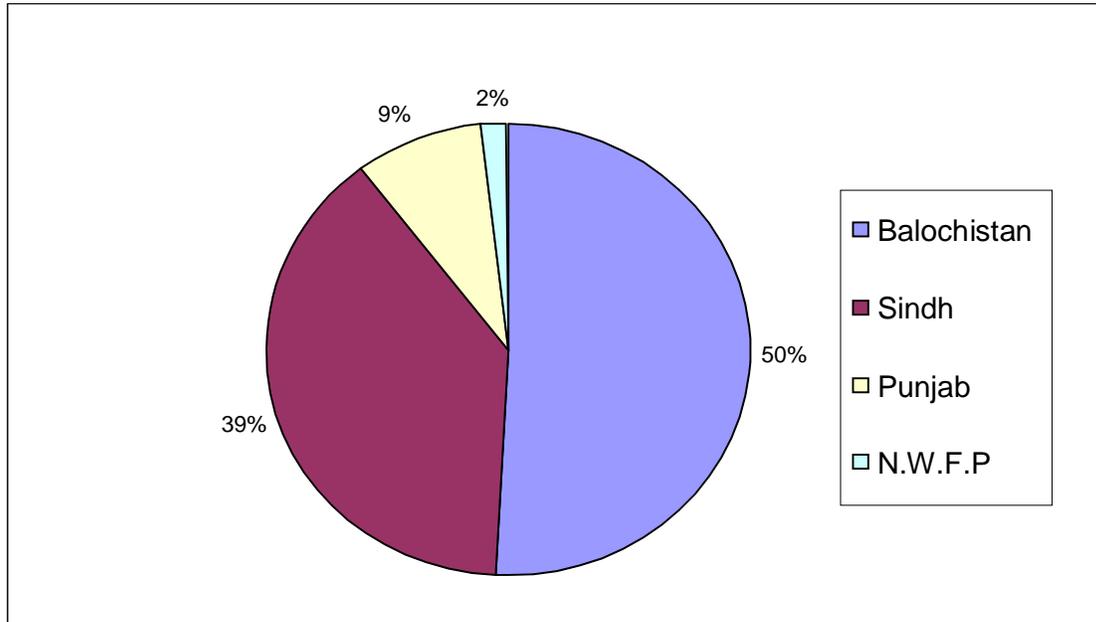
2.3 Pakistan's Dates Production

Pakistan is basically an agriculture based economy and having multi crop supportive agro ecological zones. In 2005-06, Pakistan produced 496,576 tonnes of Dates on an area of 81,700 hectares. The over all date production of Pakistan is dividend over the four provinces.

2.4 Province wise Dates production

Among all other provinces, Balochistan is the major contributor of the over all date's production in Pakistan. Balochistan produces around 50% (252,317 tonnes, 2005-06) of total Pakistan's production, where as Sindh produces around 192,810 tonnes, Punjab 42,580 tonnes and NWFP 8,869 tonnes.

Provinces wise Percentage of Dates Production in year2005-06



2.5 Dates Production in Balochistan

Balochistan produces 252,317 tonnes of Dates annually and this output comes from different areas of the province. Many districts of Balochistan have supportive agro ecological zones for the production of Dates. The table listed below includes district wise production of Dates, along with the area under cultivation.

Table 2-5 Dates Producing Areas of Balochistan

District	Area (Hectares)	Production (Tones)
Panjgoor	19955	97700
Turbat	24207	140576
Kharan	1121	4436
Gwadar	1874	7480
Khuzdar	548	140
Chagai	287	1596
Bolan	45	91
Sibi	25	30
Lasbella	25	68
Nasirabad	24	116
Jhal Magsi	15	34
Jaffarabad	10	50
Total	48,136	252,317

According to the data Turbat, Panjgoor, and Gawadar are among the major producers of Dates in the province.

2.6 Major Varieties of Dates Production in Pakistan

It is reported that around 300 varieties of Dates are being produced in Pakistan. Among the varieties Begam Jangi of Balochistan, Aseel of Sindh and Dhakki of Dera Ismail Khan has great demand in international and widely acceptable in our local market. This is very unfortunate that we are not optimizing demand and lagging behind the real profit due to lack of processing facilities.

The origins of major varieties, which are mainly produced, are as under

Table 2-6 Various Varieties of Dates in Pakistan

Province	Variety
Balochistan	Begum Jhangi, Mazawati, Gogna, Jansor, Deshtiari, Kharaba, Assil
Sindh	Fasil, Karbalai, Kubra, Valeti, Assil
Punjab	Dorn
NWFP	Dakki

The table shows diversified varieties of Dates produced in our country. The availability of different varieties calls for establishment of Dates processing plants in order to exploit country's domestic resources optimally.

3 Existing Marketing Scenario

The date fruit, which is produced largely in the hot arid region of southern Asia and North Africa, is marketed all over the world as a high value confectionery or fruit, and remains an extremely important subsistence crop in most of the desert regions.

Date trading is a growing business both locally as well as globally, annual world production of Date was 6.7 Million Tons in 2004 (FAO Statistics). Pakistan is the fifth largest Dates producing country of the world. The production of Dates in Pakistan was around 496,576 metric tons in year 2005-06 whereas in the same year the production of Dates in Balochistan was 252,317metric tons.

Demand potential for the Dates is quite high because of its association with the religious events of both Hindus and Muslims within the country and out side the neighbouring countries. For Islamic countries Holly month of Ramadan is the peak season of Dates consumption, whereas as per nutritional values, its products are used round the year. Dates are well known for its nutrition and high vitamin contents of A, B and C, it also has high

mineral contents, and carbohydrates. Dried Dates contain 1.9 percent protein, 70.6 percent carbohydrates, 2.5 percent fat, 13 percent water, 1.2 percent minerals and 10 percent fibre.

3.1 Major Dates Importing Countries of the world

The total trade in Dates is more than half a billion dollars. This figure is not very big, yet the historical pattern shows an increasing trend of trade in Dates. The world wide demands for Dates makes this fruit an attractive option to grow, process and export.

Table 3-1 Dates Importing Countries

WORLD IMPORT OF DATES (QUANTITY: THOUSAND METRIC TONNES)			
Name of County	1998	1999	2000
World	556	655	478
Australia	3.7	5.3	4.1
Bangladesh	13.4	19.2	15.0
Canada	5.7	5.2	4 0
China	4.1	6.5	6.6
Hong Kong	4.5	3.8	5.9
France	22.8	20.8	23.5
Germany	6.1	6.0	6.5
India	244.0	238.2	192.6
Indonesia	9.0	10.0	13.3
Italy	6.2	6.1	6.4
Malaysia	10.0	13.8	2.8
Niger	5.8	9.0	8.6
Pakistan	30.6	23.0	29.5
Russian Federation	2.8	5.2	8.8
Spain	4.9	5.0	5.3
Sri Lanka	7.9	14.5	10.0
Turkey	5.4	3.7	8.5
U.A.E.	100.0	180.0	43.9
United Kingdom	10.1	13.5	10.4
U.S.A.	3.6	5.0	4.6
<i>Source: FAO/UN</i>			

Looking at the major buying countries in 1999, INDIA was the largest importer with market share of 30%. All the major importers fall in the category of developed countries with exception of India, Pakistan and Bangladesh. Although Pakistan is the fifth largest producer of Dates yet it is among the importer's list just due to lack of modern production techniques, well organized post harvest management and processing facilities.

3.2 Major Dates Exporting Countries of the world

Iran, Pakistan, Saudi Arabia, Tunisia, UAE, Iraq, Algeria, Israel, France, Egypt are the top exporting countries of Dates; Iran produces about 900,000 metric tons of Dates, which accounts for around 14 percent of global output. It has 214,000 hectares of palm trees under cultivation and 185,000 hectares harvested area that is about 17 percent of world date harvested area. About 12 percent of Dates produced in Iran were exported during 2001-2002 and large quantities were consumed domestically.

3.3 Dates Exports from Pakistan

Pakistan appeared on the map of date exporting countries in the beginning of 80s in the last century. Major buyers of Pakistani Dates include Canada, SA, Germany, UK, Denmark, Australia, India, Bangladesh, Nepal, Sri Lanka, South Africa, Dubai, Japan, China, South Korea and North Korea etc. Pakistan produces more than 600,000 metric tonnes of Dates and is among the top 5 producers of Dates in the world and can supply both dry and fresh Dates. Pakistan's total export of Dates has crossed US\$ 36 million in 2006-07.

Table 3-3 Exports from Pakistan

Year	Fresh Dates		Dried Dates	
	Qty Tons	Value 000 \$	Qty Tons	Value 000 \$
2001-02	4654	2080	72817	25546
2002-03	3353	1655	67791	23449
2003-04	2645	1284	62784	21449
2004-05	4108	2037	79946	27114
2005-06	4023	2681	85326	29669

Source: Federal Bureau of Statistics, Government of Pakistan, Karachi.

The export data shows that Pakistan's fresh Dates export is very small compared to dried Dates. There is a big gap between production and export figures. Pakistan on an average export 10 % of Dates production and 90 % crop production is either consumed locally or wasted. This means that export of Dates can be increased through modern Dates processing lines, post harvest management and handling practices.

3.4 Import of Dates in Pakistan

The yearly demand of Dates is about 10,000 tonnes, but in Ramadan it jumps to 40,000 tonnes in Karachi only. To fill the gap, Pakistan imports Dates from Iran and Iraq. According to available data, in the year 2000 Pakistan has imported 30,000 tonnes of Dates, and the same trend has been observed in the previous years. The shortage of Dates occur as large quantity of stocks are wasted because of limited & far-flung processing facilities, huge revenues could be exploited only through fumigation and storing.

4 PROCESSING

Dates are processed to deliver neat, cleaned, sized and healthy product which is free of insects or any harmful bacteria. Primarily, these are picked in such a way that may not be contaminated with dust or sand of the farm. Then these are kept in clean crates for transportation to the processing plants. Care is also taken during transportation that these Dates are not open to dust or any filthy substances of the road. At the plant side these are fumigated, sorted, washed, dried and graded before packing. At times, tabling is also carried out with wet towels to clean and produce uniform sizes of Dates. General process is shown in the flow diagram along with comprehensive details.

4.1 Storage of raw material

Before Dates go into processing these have to be stored properly in order to avoid flavor losses, texture modifications, weight loss etc. that can take place over a period of storing.

The following rules are generally observed for the purpose.

- Dates are kept in shade
- Unprocessed Dates are protected from dust, heat and contamination and also protected from attack of rodents, insects etc.
- At each delivery these are checked for color, texture, taste and flavour

4.2 Fumigation

Dates become infected with insects during transportation and storage, which could result in spoilage of fruit. Fumigation is carried out to prevent fruits from insects and keep the fruit fit for human consumption. The method consists of keeping Dates in an air tight chamber and exposing them to a noxious gas for 72 hours. Amongst various fumigants methyl bromide (CH₃Br) is most commonly used presently because it is highly noxious to insects. It is also injurious to human beings as such proper precautions are to be taken before entering fumigated chambers. Fumigation by gases can be carried out at atmospheric pressure and under vacuum. The penetration of gases is more intense under vacuum condition and time effective but expensive method.

Since past few years, tablets of hydrogen-phosphide, under the trade name Phostoxyn have gained popularity because it is easy to apply and suitable for small rooms or stags covered by polythene plastic sheets and left for about 9 days. These tablets consisting of aluminium phosphide, ammonium carbonate and paraffin, upon contact with air releases hydrogen phosphide, the active component. The ammonium carbonate is decomposed into ammonia and carbon dioxide, jointly acting as a warning and fire suppressing agent. The residue of tablet is a powder which can be removed after treatment.

Fumigation at atmospheric pressure is carried out under enclosures of tarpaulin or plastic or in permanent store room equipped with air tight doors, air circulation system and exhaust fans. 50 to 60 tablets of 3 gms standard are used to fumigate 1000 cubic ft storage space.

The process of dumping/fumigation keeps on going on one hand while from the other side; the fumigated Dates are then passed to the other section, which is initial sorting.

4.3 Initial Sorting

The initial sorting is done manually where the workers sort the fumigated Dates according to its condition and size. The rotten ones are separated and rest of sorted stock is further passed on via conveyer belts to the next step that is washing.

4.4 Conveyer Belt

The conveyer belt with steel edges is used to transport the Dates to the next section. This special belt is made up of aluminium to keep the quality of Dates consistently good and avoid rust.

4.5 Washing

In this section the Dates passes through rotatory washing drums with water showering nozzles. The water is then automatically drained through it from the small pores in the conveyer belt.

4.6 Drying

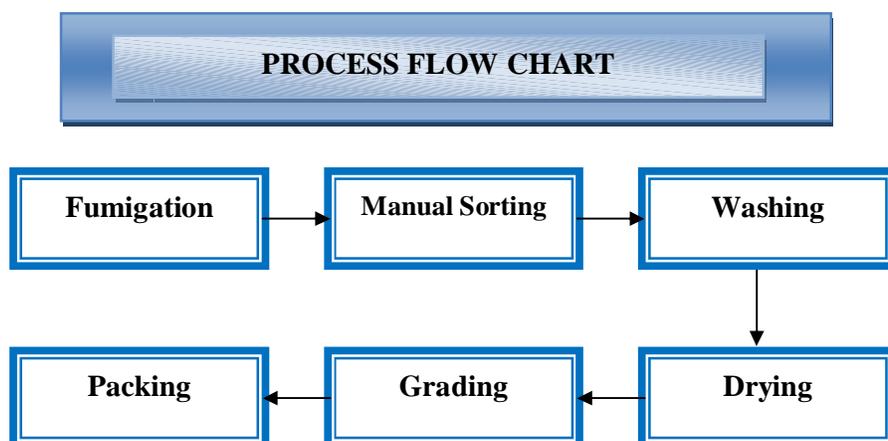
This is the final processing stage where the washed Dates are dried using diesel or gas fired. Ovens by applying heat though blowing hot air on it from different angles. The dried dates are then transported through another 15 feet conveyer belt which takes it to the packing section while graded manually on the way.

4.7 Grading

Dates are graded to produce homogenous quality and size according to the specifications of national / international market or specific standards. Dates are graded manually in shape, size, colour, skin and even flesh. Colour, size and test vary with respect to their varieties. Grading is market driven, this step/stage of processing is done in manner according to market. The rejected Dates are sold for by-products manufacturing.

4.8 Packaging

The processed Dates are packed by the shrink wrap machine in plastic bags for additional protection and preservation of moisture, before being placed in boxes. The boxes could be of different design and weights (1kg, 2kg, 5kg etc) based on consumer's demand. The boxes of 1 and 2 kg are used in this project as a bench mark.



5 PROJECT INPUTS

5.1 Proposed Capacity

The yearly production capacity of the plant will be 600,000 Kgs of Dates, based on single-shift production, which could be further optimized with double shift and employing extensive staff. For financial projection Capacity utilization will be 60% in the first year; and increased at a rate of 5% annually and will be capped at 95%.

5.2 Land

The total land requirement would be of 10,000 Sqfts. to install various facilities of the project, inclusive of storage, processing & packaging hall, and office.

5.3 Suitable Locations

Dates processing units are recommended to be installed next to the growing area while considering other mandatory inputs i.e. availability of human resource, electricity and water etc. Another essential aspect is access to the market, easy access to market should be considered and studied thoroughly.

5.4 Machinery and Equipment

The details of machinery required for the date processing is provided in the following table. The table includes the description of different machinery component along with their quantity and costs. The machinery is available locally.

Table 5-4 Details of machinery and equipment

Machinery & Equipment	Description/Quantity
1. Fumigation Rooms	
Total rooms	7
Each room size	15 × 12 sqfts
Racks	Material, Channel 4"×2", Angle Iron 2' ×2"
Rack capacity	To accommodate 400 crater, Plastic Total Dates = 2000 Kg / Room
2. Plastic Crates	
Size	2 × 1 sqfts
Quantity	2800
3. Washing Tub	
	Concrete Tank with tiles (civil work)
Washing drums	Capacity 250 / batch
Drum size	Dia 2.5 × 5 sqfts
Material	Stainless Steel
Drive units	Reduction Gear with 5 HP motor
4. Sorting/Packing Table	
Size	18 × 6 sqfts
Rejection channel	on both sides of the table.

Machinery & Equipment	Description/Quantity
5. Trays for Oven Feeding	
Size	2 × 1 sqfts
Material	Stainless Steel
Quantity	100
6. Oven	
Firing Chamber	
Size	5 × 5 sqfts
Insulation	Glass Wool
Burner	Diesel 0 Gas fired
Hot air dryer	7 × 4 sqfts
Rack for tray (S/S) stacking	-
Hot Air calculation blower	-
7. Shrink Wrap Machine	
Four Heaters	-
Blower	-
8. Machinery Cost	
Plant Cost	RS 7,695,000
Installation cost	RS 1000,000
Transportation cost	RS 200,000
Generator 10 KVA	RS 350,000
Transformer 50 KV	RS 1,000,000
Total Cost	RS 9,345,000

5.5 Office and Equipment

Table 5.5-1 Office Equipment

Description	Qty	Cost/Unit	Total Amount (PKR)
Computer	1	30,000	30,000
Printer	1	6,000	6,000
Telephone	6	500	3,000
Fax Machine with Extra Phone Line	1	12,000	12,000
Total			51,000

Table 5.5-2 Furniture & Fixture

Description	Total Amount (PKR)
Furniture	30,000
Three Air conditioners (1.5 Ton Window)	72,000
Total	10,2000

5.6 Human Resource Requirements

The possible human resource requirements for the project are provided in the following table:

Table 5-6 Human Resource Details

Designation	Number	Per Month Salary (Rs)	Annually (Rs)
Manager	1	35,000	420,000
Food technologist	1	30,000	360,000
Accounts Officer	1	12,000	144,000
Skilled workers	4	9,900	475,200
Semi-skilled	6	7,500	540,000
Watch Man	1	6,000	72,000
Sweepers	2	3,000	72,000
Driver	1	6,000	72,000
			Rs. 2,155,200

The anticipated work force includes 17 employees consisting of 1 manager, 1 food technologist, 1 accounts officer, 4 skilled workers, 6 semi-skilled, 1 watch man, 1 driver and 2 sweepers.

5.7 Duties of the unskilled labour

1. Loading & unloading of raw materials and finished products.
2. Washing, grading and packaging.
3. Feeding the machines with raw materials.
4. Stacking the finished products from the machines.

5.8 Duties of skilled labour

1. Operating the machinery.
2. Maintenance of machinery
3. Manage un skilled workers
4. Ensured effective & efficient supplies

5.9 Infrastructure Requirement

The infrastructure requirements of the project will be:

- a. Power
- b. Water
- c. Railway/Road
- d. Telecommunication

6 Land and Building Requirement

Table 6-1 Land Cost

Description	Cost/sq.ft	Area in sq.ft	Total Cost (Rs.)
Land	200	10,000	2,000,000

Table 6-2 Building Construction Cost

Description	Cost/sq.ft	Area in sq.ft	Total Cost (Rs.)
Office Building (12*14 per room)*3	2,000	504	1,008,000
Fumigation Rooms	1,260	1300	1,638,000
Warehouse	1000	1,000	1,000,000
Processing Hall/Building	1260	1300	1,638,000
Total			5,284,000

Table6-3 Office Vehicle

Description	Qty	Cost/Unit	Total Cost (Rs.)
Shahzor	1	1,200,000	1,200,000
Registration		24,000	24,000
Total Cost			1,224,000

7 PROJECT ECONOMICS

7.1 Project Cost

Table 7-2 Project Cost

Capital Investment	Rs. in actuals
Land	2,000,000
Building/Infrastructure	5,284,000
Machinery & equipment	9,345,000
Office equipment	51,000
Furniture Fixture	102,000
Office Vehicle	1,224,000
Pre Operating cost	136,800
Total Capital Costs	18,142,800
Working Capital	Rs. in actual
Raw material inventory	1,150,000
Upfront insurance payment	528,450
Cash	500,000
Total Working Capital	2,178,450
Total Investment	20,321,250

7.2 Project Returns

Table 7-2 Project Returns

	Project
IRR	33%
Payback	4.38 yrs

7.3 Capital Structure of the project

Table 7-3 Project Financing

Initial Financing		Amount
Total Investment		20,321,250
Equity	60%	12,193,276
Long-term Debt	40%	8,127,974

8 Project Financial Statements

8.1 Statement Summaries

Financial Evaluation of Pre-feasibility Dates Processing Plant

SMEDA

Key Variables		
Total Investment in Project		20,321,250
Equity	60%	12,193,275
Debt	40%	8,127,974
Lease	0%	-
Interest Rate		20%
Debt Tenure		5
Total Number of Employees		17

Rs. in actuals

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Free Cash Flow to Equity (FCFE)	(1,599,262)	391,586	3,381,431	4,631,091	7,015,727	12,389,758	15,931,019	20,305,124	23,935,585	32,664,897
Free Cash Flow to Firm (FCFF)	(283,953)	3,953,477	5,847,358	7,166,222	9,633,903	12,389,758	15,931,019	20,305,124	23,935,585	44,478,267
Profit margin on sales	-3%	6%	11%	16%	20%	25%	27%	30%	32%	34%
ROE	-5%	11%	23%	36%	47%	56%	64%	71%	74%	77%
Times interest earned	0.68	2.16	4.77	9.89	25.39	-	-	-	-	-

	Equity	Project
Internal Rate of Return (IRR)	38%	33%
Modified Internal Rate of Return (MIRR)*	27%	22%
Payback Period (yrs)	4.54	4.38
Net Present Value (NPV)	@ 16% 29,454,218	@ 12% 39,870,422

*Re-investment rate has been taken to be the interest on cash in bank, which in this case is 2%

Initial Investment

Capital Investment	Rs. in actuals
Land	2,000,000
Building/Infrastructure	5,284,000
Machinery & equipment	9,345,000
Furniture & fixtures	102,000
Office vehicles	1,224,000
Office equipment	51,000
Pre-operating costs	136,800
Total Capital Costs	18,142,800

Working Capital	Rs. in actuals
Raw material inventory	1,150,000
Upfront insurance payment	528,450
Cash	500,000
Total Working Capital	2,178,450

Total Investment	20,321,250
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Initial Financing	Rs. in actuals
Debt	8,127,974
Equity	12,193,275

Income Statement										SMEDA
	Rs. in actuals									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue	20,700,000	25,657,500	30,401,250	35,837,175	42,056,273	49,160,818	57,265,709	66,499,971	73,310,737	80,641,811
Cost of goods sold	15,066,150	17,750,609	20,006,734	22,447,348	25,085,658	27,935,774	31,012,773	34,332,767	36,167,511	38,018,651
Gross Profit	5,633,850	7,906,891	10,394,516	13,389,827	16,970,614	21,225,043	26,252,936	32,167,204	37,143,226	42,623,160
<i>General administration & selling expenses</i>										
Administration expense	1,254,000	1,316,700	1,382,535	1,451,662	1,524,245	1,600,457	1,680,480	1,764,504	1,852,729	1,945,366
Utilities expense	76,800	84,360	92,670	101,805	111,846	122,885	135,020	148,362	163,029	179,154
Travelling & Comm. expense (phone, fax, etc.)	228,000	239,400	251,370	263,939	277,135	290,992	305,542	320,819	336,860	353,703
Office vehicles running expense	244,800	269,280	296,208	325,829	358,412	394,253	433,678	477,046	524,751	577,226
Office expenses (stationary, etc.)	45,600	47,880	50,274	52,788	55,427	58,198	61,108	64,164	67,372	70,741
Promotional expense	103,500	128,288	152,006	179,186	210,281	245,804	286,329	332,500	366,554	403,209
Insurance expense	528,450	475,605	422,760	369,915	317,070	264,225	211,380	158,535	105,690	52,845
Professional fees (legal, audit, etc.)	20,700	25,658	30,401	35,837	42,056	49,161	57,266	66,500	73,311	80,642
Depreciation expense	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400
Amortization expense	27,360	27,360	27,360	27,360	27,360	-	-	-	-	-
Miscellaneous expense	621,000	769,725	912,038	1,075,115	1,261,688	1,474,825	1,717,971	1,994,999	2,199,322	2,419,254
Subtotal	4,486,610	4,720,655	4,954,022	5,219,835	5,521,921	5,837,200	6,225,174	6,663,828	7,026,017	7,418,539
Operating Income	1,147,240	3,186,236	5,440,494	8,169,992	11,448,693	15,387,843	20,027,762	25,503,376	30,117,209	35,204,620
Other income	5,000	3,916	20,251	39,505	53,666	93,100	159,889	234,930	314,614	441,552
Earnings Before Interest & Taxes	1,152,240	3,190,152	5,460,745	8,209,497	11,502,360	15,480,943	20,187,651	25,738,307	30,431,823	35,646,173
Interest expense	1,695,302	1,476,855	1,145,012	830,448	452,972	-	-	-	-	-
Earnings Before Tax	(543,062)	1,713,297	4,315,733	7,379,049	11,049,388	15,480,943	20,187,651	25,738,307	30,431,823	35,646,173
Tax	-	257,452	949,461	1,623,391	2,430,865	3,405,808	4,441,283	5,662,427	6,695,001	7,842,158
NET PROFIT/(LOSS) AFTER TAX	(543,062)	1,455,845	3,366,272	5,755,658	8,618,523	12,075,136	15,746,368	20,075,879	23,736,822	27,804,015
Balance brought forward		(543,062)	912,783	2,139,528	3,947,593	6,283,058	9,179,097	12,462,732	16,269,306	20,003,064
Total profit available for appropriation	(543,062)	912,783	4,279,055	7,895,186	12,566,116	18,358,194	24,925,465	32,538,611	40,006,128	47,807,079
Owner's withdrawals	-	-	2,139,528	3,947,593	6,283,058	9,179,097	12,462,732	16,269,306	20,003,064	23,903,539
Balance carried forward	(543,062)	912,783	2,139,528	3,947,593	6,283,058	9,179,097	12,462,732	16,269,306	20,003,064	23,903,539

Balance Sheet											SMEDA
											Rs. in actuals
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Assets											
<i>Current assets</i>											
Cash & Bank	500,000	-	391,586	1,633,490	2,316,988	3,049,657	6,260,318	9,728,605	13,764,423	17,696,944	26,458,302
Accounts receivable	-	1,701,370	1,905,103	2,303,784	2,722,127	3,201,101	3,748,648	4,373,693	5,086,261	5,745,646	6,326,817
Finished goods inventory	-	655,050	741,987	836,102	937,911	1,047,965	1,166,851	1,295,197	1,433,676	1,506,980	1,584,110
Equipment spare part inventory	-	-	-	-	-	-	-	-	-	-	-
Raw material inventory	1,150,000	1,428,656	1,696,644	2,004,560	2,357,773	2,762,334	3,225,059	3,753,620	4,147,462	4,572,577	-
Pre-paid insurance	528,450	475,605	422,760	369,915	317,070	264,225	211,380	158,535	105,690	52,845	-
Total Current Assets	2,178,450	4,260,681	5,158,080	7,147,851	8,651,869	10,325,281	14,612,254	19,309,650	24,537,511	29,574,990	34,369,229
<i>Fixed assets</i>											
Land	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
Building/Infrastructure	5,284,000	5,019,800	4,755,600	4,491,400	4,227,200	3,963,000	3,698,800	3,434,600	3,170,400	2,906,200	2,642,000
Machinery & equipment	9,345,000	8,410,500	7,476,000	6,541,500	5,607,000	4,672,500	3,738,000	2,803,500	1,869,000	934,500	-
Furniture & fixtures	102,000	91,800	81,600	71,400	61,200	51,000	40,800	30,600	20,400	10,200	-
Office vehicles	1,224,000	1,101,600	979,200	856,800	734,400	612,000	489,600	367,200	244,800	122,400	-
Office equipment	51,000	45,900	40,800	35,700	30,600	25,500	20,400	15,300	10,200	5,100	-
Total Fixed Assets	18,006,000	16,669,600	15,333,200	13,996,800	12,660,400	11,324,000	9,987,600	8,651,200	7,314,800	5,978,400	4,642,000
<i>Intangible assets</i>											
Pre-operation costs	136,800	109,440	82,080	54,720	27,360	-	-	-	-	-	-
Total Intangible Assets	136,800	109,440	82,080	54,720	27,360	-	-	-	-	-	-
TOTAL ASSETS	20,321,250	21,039,721	20,573,360	21,199,371	21,339,629	21,649,281	24,599,854	27,960,850	31,852,311	35,553,390	39,011,229
Liabilities & Shareholders' Equity											
<i>Current liabilities</i>											
Accounts payable	-	1,254,506	1,484,791	1,686,378	1,905,953	2,144,998	2,405,122	2,688,072	2,978,550	3,151,461	2,914,414
Short term debt	-	1,099,262	-	-	-	-	-	-	-	-	-
Total Current Liabilities	-	2,353,768	1,484,791	1,686,378	1,905,953	2,144,998	2,405,122	2,688,072	2,978,550	3,151,461	2,914,414
<i>Other liabilities</i>											
Deferred tax	-	-	257,452	1,027,950	1,027,950	1,027,950	822,360	616,770	411,180	205,590	-
Long term debt	8,127,974	7,035,740	5,725,058	4,152,240	2,264,858	-	-	-	-	-	-
Total Long Term Liabilities	8,127,974	7,035,740	5,982,510	5,180,190	3,292,808	1,027,950	822,360	616,770	411,180	205,590	-
<i>Shareholders' equity</i>											
Paid-up capital	12,193,275	12,193,275	12,193,275	12,193,275	12,193,275	12,193,275	12,193,275	12,193,275	12,193,275	12,193,275	12,193,275
Retained earnings	-	(543,062)	912,783	2,139,528	3,947,593	6,283,058	9,179,097	12,462,732	16,269,306	20,003,064	23,903,539
Total Equity	12,193,275	11,650,214	13,106,059	14,332,803	16,140,868	18,476,333	21,372,372	24,656,008	28,462,581	32,196,339	36,096,815
TOTAL CAPITAL AND LIABILITIES	20,321,250	21,039,721	20,573,360	21,199,371	21,339,629	21,649,281	24,599,854	27,960,850	31,852,311	35,553,390	39,011,229

Cash Flow Statement											SMEDA
											Rs. in actuals
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<i>Operating activities</i>											
Net profit	-	(543,062)	1,455,845	3,366,272	5,755,658	8,618,523	12,075,136	15,746,368	20,075,879	23,736,822	27,804,015
Add: depreciation expense	-	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400	1,336,400
amortization expense	-	27,360	27,360	27,360	27,360	27,360	-	-	-	-	-
Deferred income tax	-	-	257,452	770,498	-	-	(205,590)	(205,590)	(205,590)	(205,590)	(205,590)
Accounts receivable	-	(1,701,370)	(203,733)	(398,682)	(418,343)	(478,974)	(547,547)	(625,045)	(712,568)	(659,385)	(581,172)
Finished good inventory	-	(655,050)	(86,937)	(94,115)	(101,809)	(110,053)	(118,886)	(128,347)	(138,479)	(73,304)	(77,131)
Raw material inventory	(1,150,000)	(278,656)	(267,988)	(307,916)	(353,213)	(404,561)	(462,725)	(528,562)	(393,841)	(425,115)	4,572,577
Advance insurance premium	(528,450)	52,845	52,845	52,845	52,845	52,845	52,845	52,845	52,845	52,845	52,845
Accounts payable	-	1,254,506	230,285	201,587	219,574	239,045	260,125	282,950	290,478	172,911	(237,047)
Other liabilities	-	-	-	-	-	-	-	-	-	-	-
Cash provided by operations	(1,678,450)	(507,027)	2,801,530	4,954,249	6,518,473	9,280,585	12,389,758	15,931,019	20,305,124	23,935,585	32,664,897
<i>Financing activities</i>											
Change in long term debt	8,127,974	(1,092,235)	(1,310,682)	(1,572,818)	(1,887,382)	(2,264,858)	-	-	-	-	-
Change in short term debt	-	1,099,262	(1,099,262)	-	-	-	-	-	-	-	-
Issuance of shares	12,193,275	-	-	-	-	-	-	-	-	-	-
Purchase of (treasury) shares	-	-	-	-	-	-	-	-	-	-	-
Financing activities	20,321,250	7,027	(2,409,943)	(1,572,818)	(1,887,382)	(2,264,858)	-	-	-	-	-
<i>Investing activities</i>											
Capital expenditure	(18,142,800)	-	-	-	-	-	-	-	-	-	-
Investing activities	(18,142,800)	-	-	-	-	-	-	-	-	-	-
NET CASH	500,000	(500,000)	391,586	3,381,431	4,631,091	7,015,727	12,389,758	15,931,019	20,305,124	23,935,585	32,664,897
Cash balance brought forward		500,000	-	391,586	1,633,490	2,316,988	3,049,657	6,260,318	9,728,605	13,764,423	17,696,944
Cash available for appropriation	500,000	-	391,586	3,773,018	6,264,581	9,332,715	15,439,414	22,191,337	30,033,728	37,700,007	50,361,841
Owner's withdrawals	-	-	-	2,139,528	3,947,593	6,283,058	9,179,097	12,462,732	16,269,306	20,003,064	23,903,539
Cash carried forward	500,000	-	391,586	1,633,490	2,316,988	3,049,657	6,260,318	9,728,605	13,764,423	17,696,944	26,458,302

9 Key Assumptions

Table 9-1 Cost of Goods Sold per Unit of Production

COGS 1 (Raw material per unit)	Rs. 35
COGS 2 (Packing cost and Fumigation Overhead per unit)	Rs. 5
COGS growth rate per annum	5%

Table 9-2 Production Related Assumptions

Production capacity per year	600,000 Kg
Sale price per unit in year 1	Rs. 60
Sale price growth rate per annum	10%
Production capacity utilization in first year	60%
Production capacity utilization growth rate	5%
Maximum production capacity utilization	95%

Table 9-3 Economic Related Assumptions

Inflation rate	10%
Wage growth rate	10%
Electricity Growth Rate	10%
Water Price Growth Rate	10%

Table 9-4 Financing Assumptions

Interest rate on long term debt	20%
Project Debt Component	40%
Project Equity Component	60%
Tax rate (15% sales tax + 7% income tax)	22%
Required rate of return on equity	16%
WACC	12%
Owners Withdrawals	50% of available cash

Table 9-5 Expense Assumptions

Administrative benefit expense	10% of administrative expense
Travelling expense	15% of administrative expense
Communication expense	5% of administrative expense
Office vehicle running expense	20% of vehicle cost
Office expense	4% of administrative expense
Promotional Expense	0.5% of revenue
Machinery & equipment insurance rate	5%

Office vehicle insurance rate	5%
Professional Fee (Legal, Audit etc)	0.1% of revenue
Bad debt expense	3% of revenue
Pre-Operational Expense	Rs. 136,800

Table 9-6 Depreciation Rates

Building & Infrastructure	5%
Furniture & fixtures	10%
Machinery	10%
Office equipment	10%
Office Vehicle	10%

Table 9-7 Cash Flow Assumptions

Accounts Receivables Cycle (In Days)	30
Accounts Payable Cycle (In Days)	30
Initial cash on hand	Rs. 500,000