



**PRE-FEASIBILITY STUDY  
DEHYDRATED FRUITS AND  
VEGETABLES  
(BATCH DRYER)**



**Agriculture Department  
Government of Punjab**

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## Acronyms

Acronym	Description
CPEC	China Pakistan Economic Corridor
GST	General Sales Tax
IMF	International Monetary Fund
IRR	Internal Rate of Return
LPG	Liquefied Petroleum Gas
NPV	Net Present Value
SMEDA	Small and Medium Enterprise Development Authority
UK	United Kingdom
USA	United States of America

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## **Disclaimer**

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## 1.0 EXECUTIVE SUMMARY

Processing of fresh vegetables and fruits is carried out to produce high value added products that have a prolonged shelf life and offer convenience of transport, storage and sourcing to the final consumers. Dehydration adds value to fresh fruits and vegetables by removing water.

Dehydrated vegetables and fruits are produced and traded in large quantities around the world. International trade of dehydrated horticultural products has been increasing over the years. In 2015, the total export market of dehydrated vegetables was USD 15.4 billion; including trade of USD 11.1 billion of dried leguminous vegetables and USD 4.3 billion of other whole/cut dried or powdered vegetables. International trade of dried fruits during the same year was USD 2.3 billion. Dried peaches, pears, prunes, apricots and variety of other fruits constitute this market. Exports of dehydrated fruits and vegetables have been growing over the years which offer an attractive opportunity for investors. It also opens a window for the vegetables and fruits farmers of Punjab to sell their surplus produce that is available in large quantities during peak production seasons and usually gets wasted. The subject document presents the findings of the pre-feasibility of establishing a fuel-powered dehydration unit for fruits and vegetables to be sold in export markets.

The dehydrated products selected for the purpose of this study include dehydrated mango, apple, peas, onion and garlic. Production capacity of 5 tons per day dehydrated product has been assumed on three shifts basis. Different products will be processed during different months corresponding to their peak production seasons to get maximum benefit of low prices during those periods.

The project has been proposed to be established in Multan to be close to the mango production areas. Onion, garlic and peas are also produced in and around Multan. Apple will be procured mainly from Balochistan. The project has a total cost of PKR 290 million. It is proposed to be financed with 100% investor's equity. Working capital constitutes 56% of the total project cost. The project is assumed to operate at 60% capacity utilization during the first year of operations and is expected to generate revenues of PKR 449 million and gross profit of PKR 158 million. Net after-tax profit is PKR 85.3 million.

The project is found to be financially feasible with an IRR of 47.51% and a positive NPV of PKR 342.6 million. The viability is sensitive to fluctuation in vegetables/fruits prices and the selling prices of the frozen products in international markets. Summary Sheet provides information on key highlights of the project.

## 1.1 Project Summary Sheet

<b>Project's Concept</b>	
Objective	The project aims to produce dehydrated fruits and vegetables using fuel-based dehydration technology
Product Line	Dehydrated mango, apple, peas, onion and garlic
Operative Capacity	5 Tons dehydrated products per day (3 shifts basis)
Location	Multan
Target Market	Export market
Technology Employed	Atmospheric dehydration technology using multistage dehydrator

<b>Project Cost (PKR Million)</b>	
Total Project Cost	290.0
Capital Cost	126.2
Working Capital	163.8

<b>Financing Plan (PKR Million)</b>		<i>% Share</i>
Equity	290.0	100%

<b>First Year's Summary Income Statement (PKR Million)</b>		<i>% of Revenues</i>
Revenues	449.0	100.0%
Cost of Sales	291.0	64.8%
Gross Profit	158.1	35.2%
Operating Costs	26.7	6.0%
Earnings Before Interest and Tax	131.4	29.3%
Tax	7.3	1.6%
<b>Net Income</b>	<b>85.4</b>	<b>19.0%</b>

<b>Financial Feasibility</b>	
Internal Rate of Return (IRR)	47.51%
Net Present Value (NPV) @ 20%	342,600,007
Payback Period (years)	2.95

<b>Conclusion</b>	
The project is financially viable keeping in view all the bases and assumptions used for marketing, technical and financial assessments/calculations.	

## 2.0 INTRODUCTION

### 2.1 Context

With a population of over 190 million people, Pakistan is the sixth most populous country and the 43<sup>rd</sup> largest economy in the world. In the current global economic scene, Pakistan is being seen as the top emerging market economy in South Asia that is progressing towards a more advanced stage through rapid growth and industrialization. Pakistan is being classified as one of the Next Eleven (N-11) countries that have the potential to become one of the world's large economies in the 21<sup>st</sup> century. Economic growth of the country has been on a rise during recent years; being 4.0% in 2014 and 4.2% in 2015. The IMF projects that the growth trend will continue and reach 5.2% by the year 2020. The World Bank projects that by 2018, Pakistan's economic growth will increase to 5.4% due to greater inflow of foreign investment from China-Pakistan Economic Corridor (CPEC). Government is determined to capitalize on the emerging growth trend and is working hard to ensure implementation of all the necessary steps in the right direction to increase the flow of private sector investment. Strengthened macroeconomic outlook, improved law and order situation and facilitative government policies are contributing to improve the investment climate for foreign and local investment to flow to further expedite economic growth.

For private sector investment to flow, identifying and providing information about the feasible business opportunities is an important starting point. Investment promotion materials are developed to introduce the investors to potential business opportunities, provide basic information about the projects' capital and operational costs and work out basic financial feasibility of the presented propositions. Agriculture, being the mainstay of Pakistan's economy, offers host of attractive opportunities which can be converted by the investors into profitable businesses. The current document discusses pre-feasibility of one of such options.

### 2.2 Agriculture Sector Overview

Pakistan is an agricultural country. Agriculture accounts for 20.9 percent of the GDP and provides livelihood to 43.5 percent of the rural population. Agriculture GDP is derived from four major subsectors. Livestock is the biggest contributor to GDP accounting for 56.3 percent of the total value in 2014-15. Crops was the second largest sector accounting for 39.6 percent share; followed by two smaller subsectors, Fishing and Forestry, respectively accounting for 2.1 percent and 2.0 percent shares respectively. The distribution is shown in Figure 1.

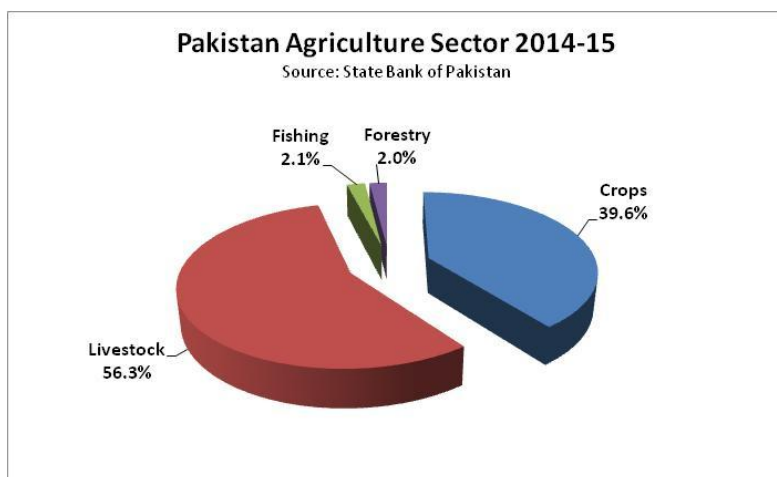


Figure 1 - Pakistan Agriculture Subsectors Distribution

The crops subsector is further divided into three categories. 'Important Crops' accounted for 64.5 percent, 'Other crops' 28.1 percent and 'Cotton Ginning' 7.4% of the total value of crops in 2014-15. Horticultural crops, including fruits, vegetables and condiments are included in the 'Other crops' category.

Punjab is the most populated province and the largest agriculture producer in the country. Figure 2 and Figure 3 provide a comparison of Punjab's contribution with that of other provinces in different commodity groups during the year 2014-15.

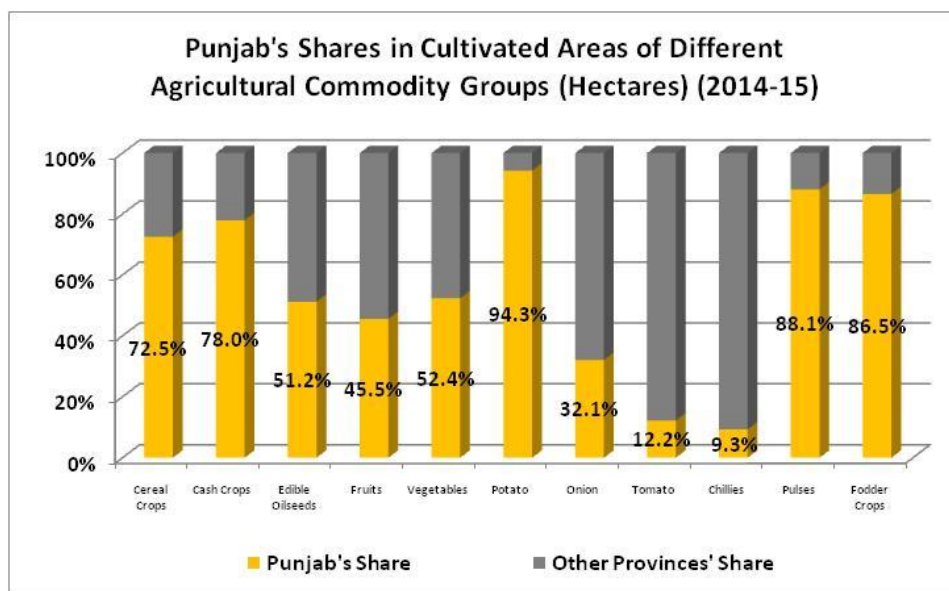


Figure 2 - Punjab's Share in Cultivated Areas of Different Commodity Groups

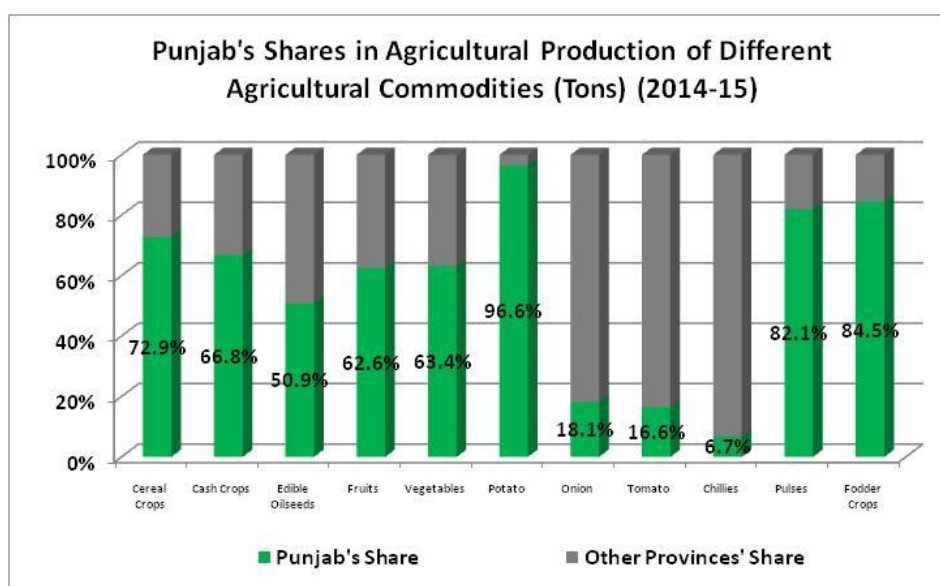


Figure 3 - Punjab's Share in Production of Different Commodity Groups

Punjab holds the biggest shares in cultivated areas and productions of majority of the agricultural commodities. Cereal crops<sup>1</sup> were cultivated over an area of 10.13 million hectares to obtain a produce of 27.32 million tons. That translated into 72.5% share in cultivated area and 72.9% share of the overall national production of cereal crops. Similarly, the province has a leading position in cash crops<sup>2</sup> where it produced 51.5 million tons that accounted for 66.8% of the national production. Pakistan's total production of edible oilseeds<sup>3</sup> was 581 thousand tons of which 51% was contributed by Punjab. In horticultural production as well, Punjab maintains a leading position. Fruits cultivation in Pakistan was spread over an area of 775 thousand acres to produce 6.79 million tons. Punjab held a share of 45.5% in total cultivated area and 62.6% in total production. Vegetable production in Punjab was 1.96 million tons that accounted for 63.4% share of the total national production. In case of potato, Punjab held the lion's shares of 93.4% and 96.6% in total national cultivated area and total production. A similar situation also exists for pulses and fodder crops where the Punjab's shares in total national production respectively were 82% and 84.5%.

In some horticultural commodities, Punjab exists as a smaller producer. These include onion, tomato and chillies where the province respectively holds 18.1%, 16.6% and 6.7% shares in the total national production.

### 2.2.1 Horticulture Sector of Punjab

The horticulture basket of Punjab is diverse containing large variety of fruits, vegetables and condiments.<sup>4</sup> Pakistan's total horticultural production in 2014-15 was 15.84 million tons obtained from a total cultivated area of 1.46 million hectares. Fruits

<sup>1</sup>Includes Wheat, Rice, Maize, Jowar, Bajra and Barley

<sup>2</sup> Includes Cotton, Sugarcane, Tobacco, Jute, Sugar beet, Guar and Sunhemp

<sup>3</sup> Includes Rapeseed, Mustard, Canola, Sesame, Groundnut, Soybean, Sunflower and Safflower

<sup>4</sup> Include onion, garlic, coriander, chillies and turmeric



accounted for 44.4% whereas vegetables accounted for 44.9% of the total national horticultural production. The vegetables included potato as the major product accounting for 56% of the total vegetables production. Condiments accounted for 10.7% of the total national horticultural production. Figure 4 shows the split.

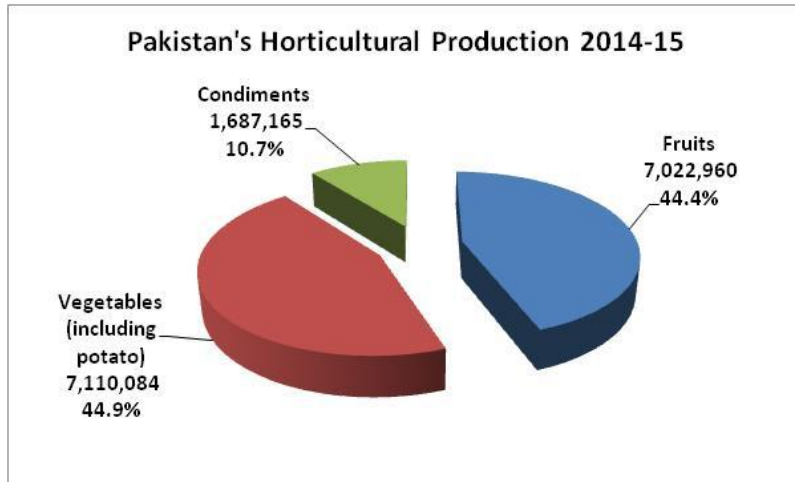


Figure 4 - Punjab's Horticultural Production Distribution

Punjab is the major contributor in most of the horticulture product categories. In 2014-15, Punjab's total horticultural production was 10.67 million tons which accounted for 67.4% of the total national production. During the same year, 63.7% of the national fruit production was contributed by Punjab. Citrus and mango are the two main contributors in Punjab's total fruit production. Punjab's share in national vegetable production (excluding potatoes) was 62.8%. Figure 5 to Figure 8 show the share of Punjab in total national production of different horticultural products of the country.

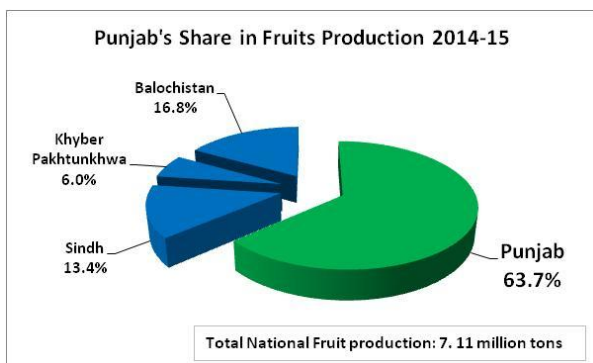


Figure 5 - Punjab's Share in Fruit Production

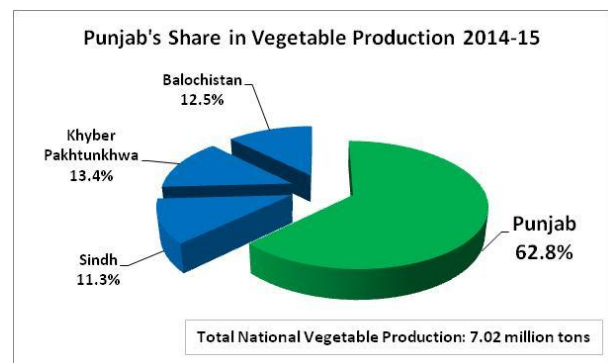


Figure 6 - Punjab's Share in Vegetable Production

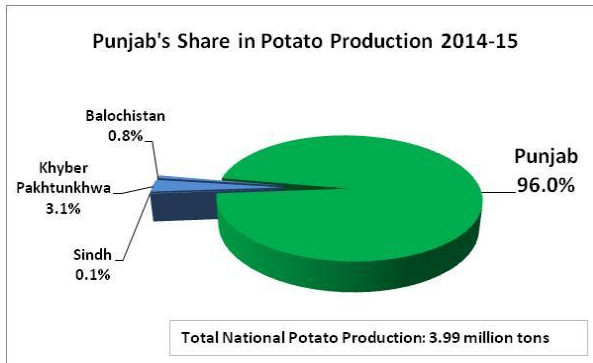


Figure 7 - Punjab's Share in Potato Production

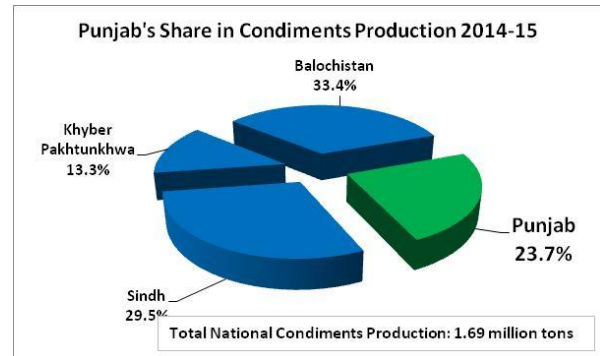


Figure 8 - Punjab's Share in Condiments Production

Punjab enjoys a monopolistic position in potato production by producing 3.83 million tons and claiming 96% share in the total national production in 2014-15. 'Condiments' is the only horticultural product category where Punjab is not the leading producer. In 2014-15, the province produced 0.4 million tons of condiments to contribute 23.7% to the national condiments basket.

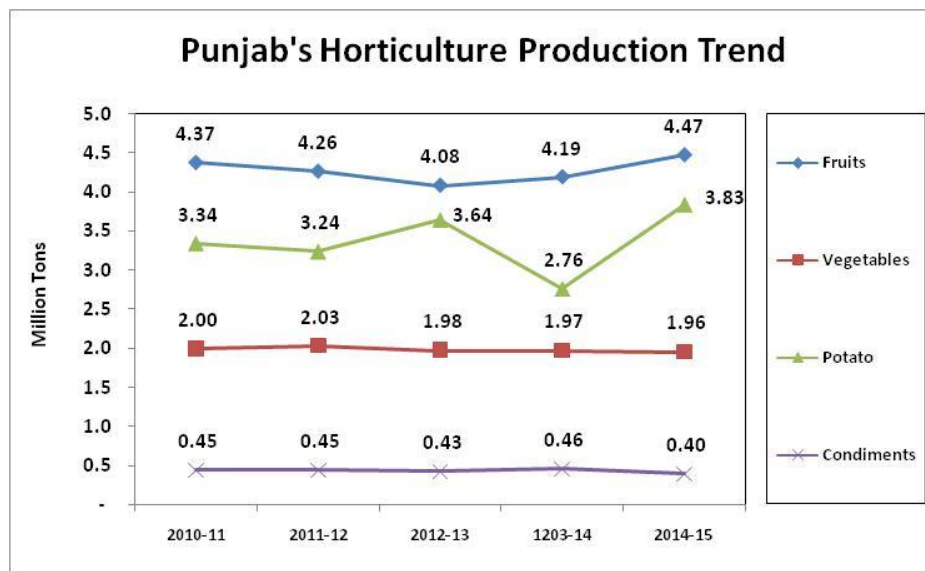


Figure 9 - Punjab's Horticultural Production Trend 2011-15

During the five years from 2011 to 2015, the horticultural production of Punjab has been almost stable. Fruit production increased by 2.3% whereas potato production increased by 14.8%. There was a drop of 2.3% in vegetables production and decrease of 10.3% in condiments production during the five year period. Figure 9 shows five-year horticulture production trend of Punjab.

### 3.0 DEHYDRATION OF FRUITS AND VEGETABLES

Fruits and vegetables are perishable products with limited shelf life. Dehydration is one of the oldest and an economical and simple mean of extending the shelf life of fruits and vegetables. Surplus horticultural produce available at cheaper rates at peak production time in the season can be preserved to be used during off season. The dehydrated-product is economical to produce/pack, and can be stored in much lesser space than that required for the fresh, canned or frozen product. Moreover, it is stable at ordinary storage condition. The reduced weight and volume of dehydrated horticultural products also reduce the transportation costs. With high quality dehydrated foods being prepared and an increased preference for instant and convenience foods, the potential of dehydrated fruits and vegetables is increasing with time.

Dehydration is the simple technique of removing the high water content in the fresh fruits and vegetables by exposing them to high temperatures. The reduced moisture of the dehydrated product stops microbial activity and the corresponding chemical changes resulting in preservation of the product. Dehydration processes differ by type of the drying method used which is driven by the type of food and the characteristics of the final product.



The dehydrated products are source of concentrated minerals, salts and sugars offruits and vegetables. However, loss of heat sensitive vitamins occurs when sliced/diced cut fruit/vegetables are exposed to hot air during drying process.

### 3.1 Fruits/Vegetables Dehydration ProcessFlow

The process of dehydration of fruits and vegetables is carried out in different steps. In general, the entire process can be seen as divided into three main processes; preparation, drying or dehydration and post-drying. Simplified process flow to prepare dehydrated fruits/vegetables is shown in Figure 10.

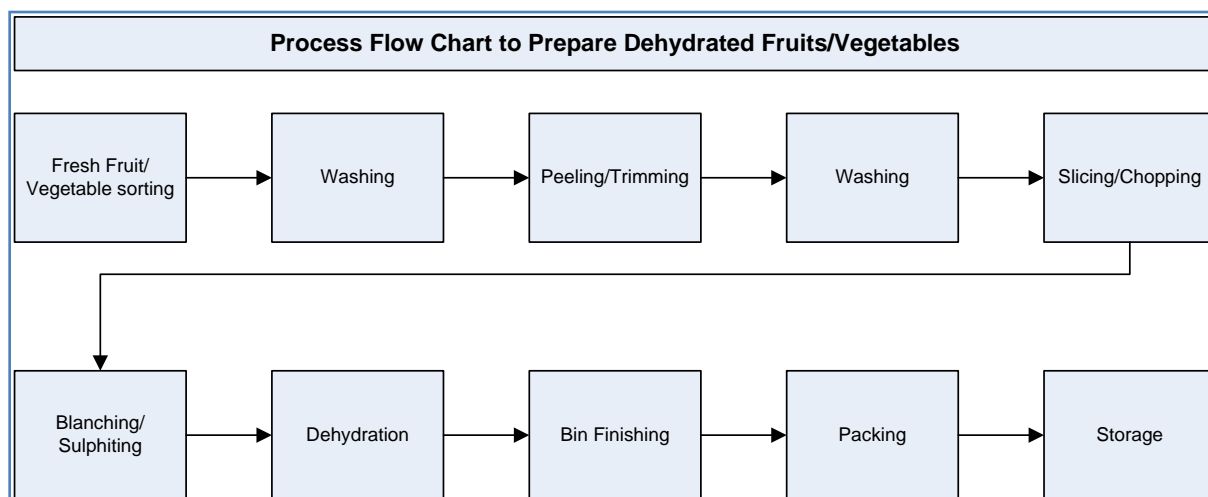


Figure 10 - Process Flow Chart to Prepare Dehydrated Fruits/Vegetables

#### 3.1.1 Fruits/Vegetables Preparation Processes

Pre-drying stage involved preparation of raw materials. This is done to increase effectiveness and efficiency of drying process, maintain the quality of the final product in terms of its color and physical appearance and also to prepare the final product in a form demanded by the market.

- The fresh fruit/vegetables are selected and sorted according to their size, ripeness and soundness. Blemished/damaged pieces are removed carefully.
- The sorted fruit/vegetables are passed through washer and peeler. Odd shape fruits like mango may also be hand peeled. The peeled raw material is trimmed, washed and sliced or diced mechanically. If required, coring<sup>5</sup> is also carried out. Thin, uniform, peeled slices dry fastest. If the whole fruit is desired to be dried, skin of the fruit is cracked to enhance the drying process.
- After peeling, washing and slicing/dicing operation, all the vegetables except onion, peppers and mushrooms are blanched by immersing in boiling water for 2-4 minutes or passed through a blancher (steaming chamber). Some of the fruits also need blanching treatment. This treatment helps preserve color and flavor of the product by deactivating the enzymes. Exposure to sulfur environment retards the browning of fruits. Similarly, after washing, peeling and slicing, the prepared fruits are subjected to Sulfuring or Sulfiting. For uniform application of Sulfur

<sup>5</sup>Removal of seeds in the center of fruits (apple, pear, etc.)



Dioxide gas to the cut surface of fruits, Sulfuration is accomplished in closed (hermetic) chambers. For sulfating, the fruits/vegetables are dipped into 1-2% Sodium Bisulfite solution for 1-3 minutes. Sulfuring process must be closely controlled so that enough Sulfur is present to maintain the physical and nutritional properties of the product throughout its shelf life but not large enough that it adversely affects flavor, aroma, etc.

### 3.1.2 Drying/Dehydration Process

Drying/Dehydration is the heart of the whole process and involves the application of heat to vaporize water from the vegetable/fruit tissue, and some means of removing water vapors after its separation from the product being dried. Air is the most common medium for transferring heat to a drying tissue and convection is the mainly-involved mode of heat transfer. Energy has to be supplied for raising temperature and blowing air in a fuel based dehydrator, whereas sun radiant energy is used in case of sun drying and solar dehydration. Time, temperature, moisture content of the air (humidity) and amount of air blown to remove the evaporated water are important factors which determine the efficacy of the drying/dehydration process. Vegetables and fruits are mostly dehydrated between 60 and 70C. Drying is generally started with higher temperatures in the first hour or so, and is turned down after the first hour.

The three different processes for drying/dehydration have their own merits and demerits and are narrated below:

**Solar Drying:** Solar drying is a common and cost-effective method in which the heat energy of sun is used to remove the moisture from the product. Sun drying is limited to climates where hot sun and dry atmosphere is available. The climatic conditions of Pakistan allow effective use of this method of drying. The process involves spreading the prepared fruit or vegetable on racks, trays, roofs or even ground in the sun till they are dried. Sun drying process offers the advantages of simplicity and low capital and operational cost. Solar dryers may be direct, indirect or hybrid. Solar drying may be carried out using a direct or indirect solar dryer.

**Atmospheric dehydration:** This type of dehydration may be carried out in batch or continuous processes. Batch process uses kiln, tower or cabinet dryers while the continuous process uses drying tunnel, continuous belt, etc., to move the product from one end to the other. The prepared and treated material is spread on trays and stacked on trolleys. These trolleys, loaded with prepared/pre-treated material, are placed in the tunnel, consisting of a long chamber constructed by special bricks.



Figure 11 – Tunnel Dehydrator

Heated air with controlled conditions of temperature and humidity is passed over the food in batch dryers while in continuous processes food is passed through the tunnel and hot air is passed using counter-current or co-current flow to eliminate moisture from the product. Temperature, humidity, air velocity, direction of air flow, type of dryer and type and size of the food are the major factors in defining the effectiveness and efficiency of the dehydration process.

Atmospheric dehydration is the most widely used commercial method of fruit and vegetable dehydration. This drying process easily allows reducing the moisture to the levels required for ensuring the required shelf life.

**Sub-atmospheric dehydration:** This type of dehydration occurs at low external pressure by creating vacuum to remove moisture at less than the boiling point under ambient conditions. It includes vacuum shelf, vacuum drum, vacuum belt and freeze dryers. This process requires higher capital and operational costs and is thus used only for material which may deteriorate due to oxidation by exposure to air.

### 3.1.3 Post-Drying(Finishing) Processes

- Treatment of the dehydrated product varies according to the type of fruit or vegetable and the intended use of the product. The treatments may include conditioning, screening, inspection and packaging.
- Conditioning is required since sometimes, due to different sizes/shapes of the pieces and their location in the dryer, during dehydration, the moisture content of the different portions within the same batch differs. The conditioning process is carried out to ensure uniform distribution of this residual moisture. The product



is kept under conditioning for two to five days. The excess moisture contained in a part of the product is absorbed by the drier part leading to the equilibrium and product consistency.

- Screening is carried out to remove any unwanted size of the dehydrated product (known as 'fines'). Inspection is done to remove any foreign material, discolored pieces or pieces with some other defects.
- After drying and cooling, the dehydrated material is packed in poly bags and sealed. Packaging is mostly common to all dehydrated products and important to protect the shelf life of the product. Packaging must protect the product against moisture, light, air, dust, foreign odor, insects and rodents and must be strong enough to maintain the product's size, shape and appearance throughout storage, handling and marketing. Packaging must be in a food grade material.

## 4.0 MARKET ANALYSIS

Dehydrated products have sale potential in both local and export markets.

### 4.1 Local Market

Locally, the spices manufacturers are the largest consumers of dehydrated vegetables and condiments. The dried products are sold in the same form as well as used as raw material for developing different recipes of spice mixes. With increasing disposable incomes in the middle and upper middle segments of the society, the consumption of spices and the related products is on a rise. This increasing demand is in turn creating an increased demand for dehydrated products.

In addition to spice manufacturers, the dehydrated products have a market where they are used as substitute of fresh products. For example, the use of onion and garlic powders, dried fenugreek leaves, dried coriander leaves, etc. are in common use by the local consumers. The dehydrated products offer an added convenience to housewives in storage, preparation and serving of food. However, the demand for these products in the local market is small because fresh produce is available during most of the months during the year and people prefer to use fresh products due to their higher quality perception and lower prices.

There are many institutional buyers of dehydrated products in the country. Pakistan Army is the most important institution in this regard which generates a high demand of dehydrated vegetables and condiments. During exercises or war situations, the army personnel have limited access to routine supply of fresh vegetables and fruits. In such situations, dehydrated products are used to meet the nutritional needs of the army personnel. Pakistan International Airlines (PIA) is another important consumer of dehydrated vegetables and condiments which uses these as raw material for their food operations. Hotels and restaurants represent another important group of consumers of dehydrated vegetable and fruit products.

### 4.2 Export Market

Dried fruits and vegetables is a major category in the world export market of horticultural products.

#### 4.2.1 Dried Vegetables International Trade

International trade of edible vegetables, roots and tubers is reported under broader code HS 07. Total world export market of edible vegetables in 2015 was USD 65.6 billion. Overall export growth of this category during the 9-year period from 2007 to 2015 was 47.4%. There are fourteen subcategories (at 4-digit HS code level); two of which represent the trade of dried vegetables. Export trend of the last five years in these two categories is shown in Figure 12 and Figure 13.

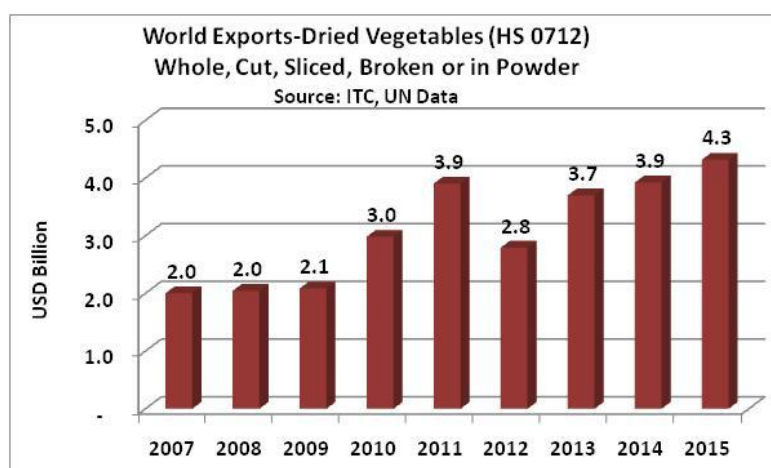


Figure 12 - World Exports of Dried Vegetables

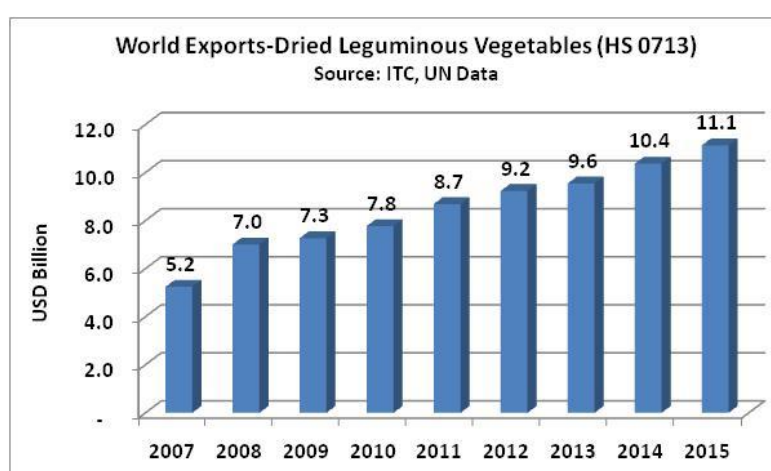


Figure 13 - World Exports of Dried Leguminous Vegetables

The world market of dried vegetables as whole, cut, sliced, broken or powdered form was USD 4.3 billion in 2015 increasing from USD 2.0 billion in 2007; translating into an overall growth of 116%. The dried leguminous vegetables market is much larger. In 2015, total exports in this category were USD 11.12 billion. During the period from 2007 to 2015, overall growth rate in this category was 112%; which means an average annual growth rate of around 12%.

International trade under the HS 0712 is reported under six subcategories (at 6-digit HS code level). The categories and the exported quantities and values are shown in Table 1.

Product code	Product label	Export Value - 2015 (000 USD)	Growth % (2007-15)
'071239	Dried mushrooms and truffles, whole, cut, sliced, broken or in powder	1,586,938	373%
'071290	Dried vegetables and mixtures of vegetables, whole, cut, sliced, broken or in powder	1,416,041	16%
'071232	Dried wood ears "Auricularia spp.", whole, cut, sliced, broken or in powder	672,757	1031%

'071220	Dried onions, whole, cut, sliced, broken or in powder	492,748	60%
'071233	Dried jelly fungi "Tremella spp.", whole, cut, sliced, broken or in powder	85,008	420%
'071231	Dried mushrooms of the genus "Agaricus", whole, cut, sliced, broken or in powder	63,858	8%
<b>Total</b>		<b>4,317,350</b>	<b>116%</b>

Table 1 - Dried Vegetables World Exports in Different Subcategories

Dried mushrooms and truffles is the largest category accounting for 36.8% of the total export value under this category. It is followed by dried vegetables and their mixtures which account for 32.8% share. Dried onion is a relatively smaller product accounting for 11.4% share. Figure 14 shows the product segmentation.

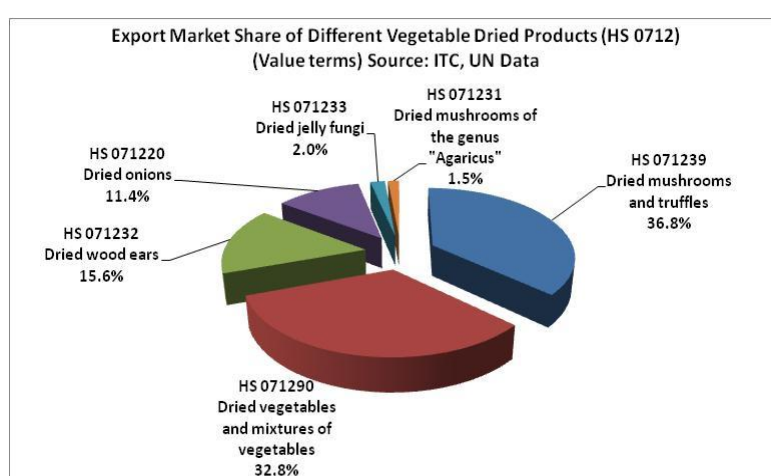


Figure 14 - Export Market Segments of Dried Vegetable Products - 2015

Though mushrooms are produced in Pakistan, the country is not a large producer of these products. Similarly, products like wood ears and jelly fungi are not produced in the country. In this context, the two categories more relevant for Pakistani producers of dried vegetables are dried onions (HS 071220) and 'Other' dried vegetables<sup>6</sup> reported under HS 071290; for which abundant supply of raw material is available in the country. From 2007 to 2015, the export market of dried onion grew by 60% and that of other dried vegetables grew by 16%. Compared to these, the largest category of mushrooms and truffles grew by 373% during the same period.

#### 4.2.1.1 Dried Onions and Other Dried Vegetables/Mixture

Dried onion (HS 071220) export was a USD 493 million market in 2015. The export market exhibited a continuous growth trend during the period from 2009 to 2015; increasing by 55% and representing a yearly average growth of around 9%. Compared to that, the export market of Other Dried Vegetables/Mixture of Vegetables (HS 071290) was a three times larger market with a total size of USD 1.41

<sup>6</sup> Under HS 071290, different types of dried vegetables are reported by different trading countries. Some common products include dried garlic, tomatoes, carrot, spinach, capsicum, broccoli, celery stalks bamboo shoots, parsley, olives, and dried vegetables nes. (not elsewhere specified)

billion in 2015. The market however showed a relatively modest growth rate of 24% during the period from 2009 to 2015. Unlike dried onion, the exports of 'Other dried vegetables' did not follow a continuously increasing trend. The exports increased from 2009 to 2011 and since then decreased till 2014. The export trends are shown in Figure 15.

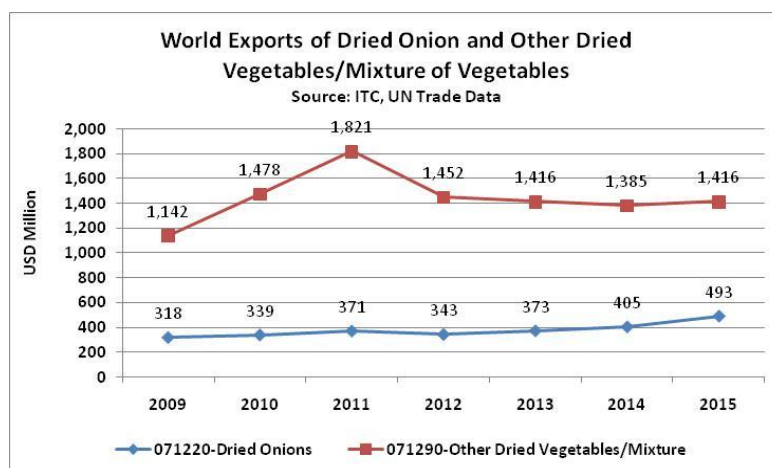


Figure 15 - World Exports of Dried Onions and Other Dried Vegetables/Mixture

Dried onion is exported by large number of countries. In 2015, India was the largest exporter with exports of USD 129 million to claim 26% share of international market. It was followed by USA with exports of USD 90 million with 18% share. Tanzania, Egypt, China and Germany were the next major players with 18%, 8%, 7% and 5% shares respectively. Market shares of the major exporting countries of dried onion are shown in Figure 16.

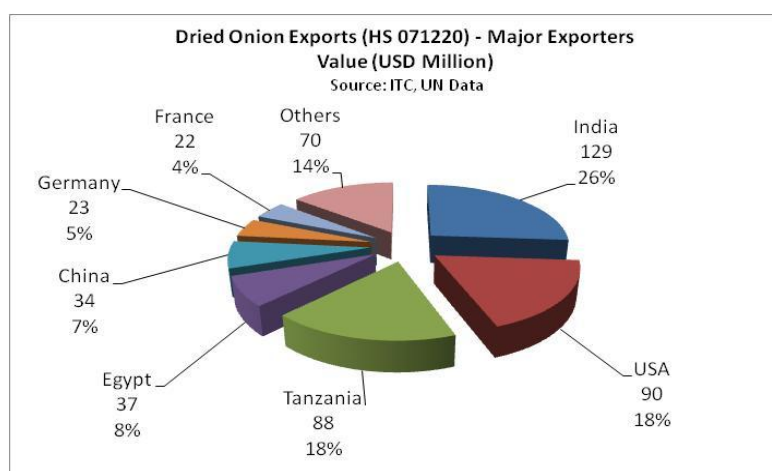


Figure 16 - Dried Onion Major Exporting Countries

In the market of 'Other' dried vegetables, the leading exporting country was China with exports of USD 603 million claiming a large share of 42%. Other important exporters included developed countries. USA, Germany and Netherlands were the second, third and fourth largest exporters with 9%, 8% and 7% market shares. Market shares of the top exporters of 'Other' dried vegetables is shown in Figure 17.

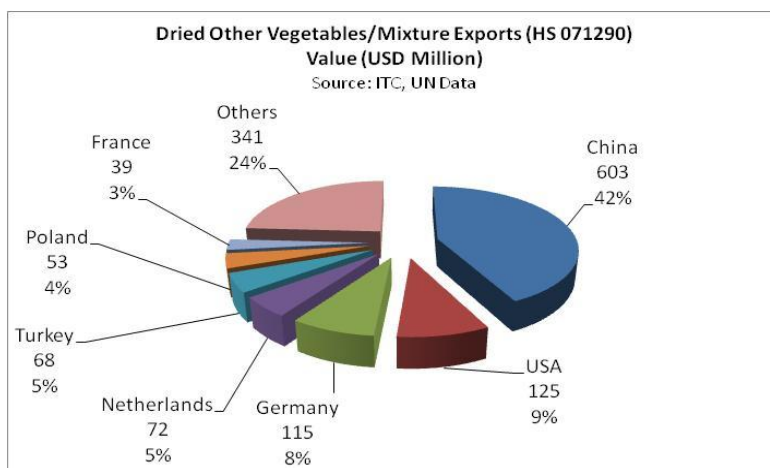


Figure 17 - Other Dried Vegetables Major Exporting Countries

#### 4.2.1.2 Dried Peas

International trade under the HS 0713 is reported under twelve subcategories (at 6-digit HS code level). This includes products like peas, chickpeas, beans and lentils. Total world exports reported in 2015 under this category were of USD 11.13 billion. Overall growth in the exports of these products from 2007 to 2015 was 112%. This pre-feasibility study has only considered peas as one of its prospective products since other products are classified as grains.

The international trade of dried peas is classified under HS 071310 (Dried, shelled peas "PisumSativum", whether or not skinned or split). Dried Peas was the second largest category under total exports of 0713 category with a share of 18%. Total world exports of this product were USD 2.0 billion in 2015; increasing from USD 1.14 billion in 2007; representing an overall growth of 75% and an average annual growth rate of around 9%. Figure 18 shows the global export trend of dried peas.

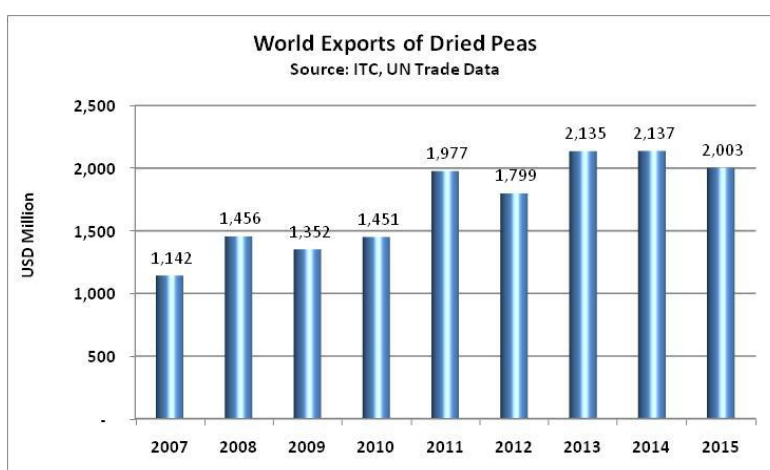


Figure 18 - Dried Peas World Exports Trend



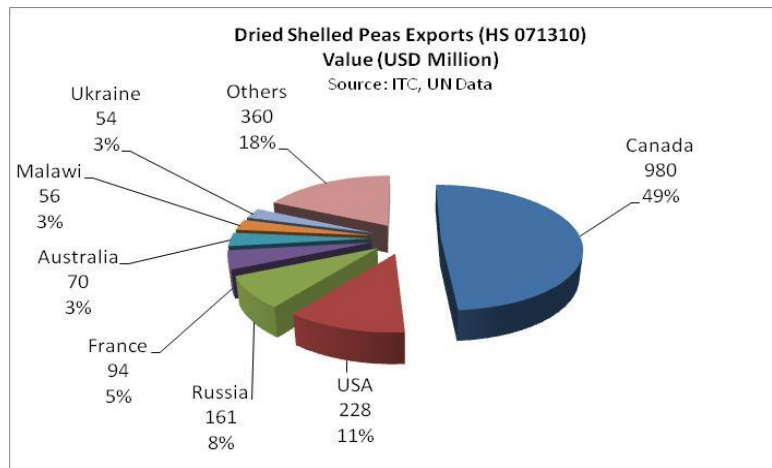


Figure 19 - Dried Peas Major Exporting Countries

Major exporters of dried peas were all the developed countries. Canada was the largest exporter with USD 980 million exports and share of 49%. USA was the second largest exporter with 11% share; followed by Russia, France and Australia. Malawi was the only exporting country which was from Africa, a less developed continent. Market shares of leading exporters are shown in Figure 19.

#### 4.2.2 Dried Fruits International Trade

International trade of dried fruits is reported under the main category HS 0813. Total exports of dried fruits in 2015 were USD 2.38 billion. The main category is divided into four products. Dried peaches, pears, papayas (HS 081340) was the largest product accounting for 37.5% of the total exports of dried fruits in 2015. Dried prunes and dried apricots respectively accounted for 25.9% and 16.7% shares respectively. Dried apple was the smallest category with exports of USD 103 million and share of 4.3% of total exports of dried fruits. Share of the four categories of the exported dried fruits is shown in Figure 20.

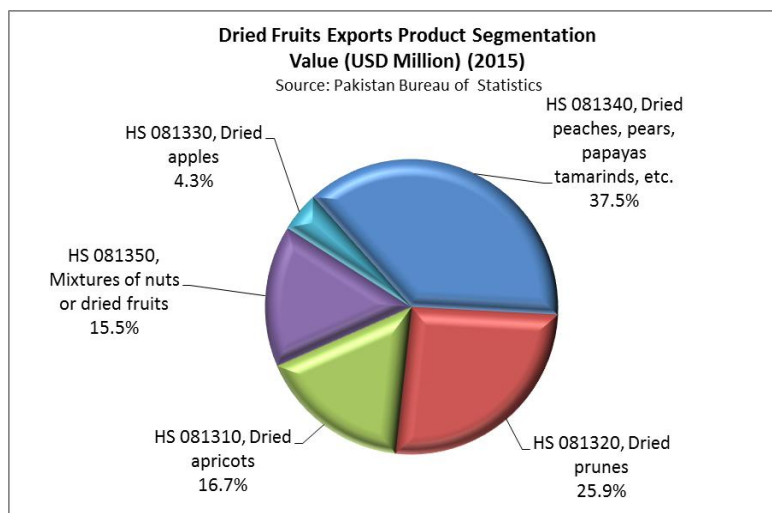


Figure 20 –World Dried Fruits Exports- Sub-products Shares

The global export market of dried fruits has been on a rise during the last ten years. The exports increased from USD 1.55 billion in 2007 to USD 2.38 billion in 2015; which represents an increase of 54% and an average increase of about 6% per annum. Figure 21 shows the international dried fruits exports trend. Increasing trend of global market offers good opportunity to the investors to reap handsome profits by investing in this sector.

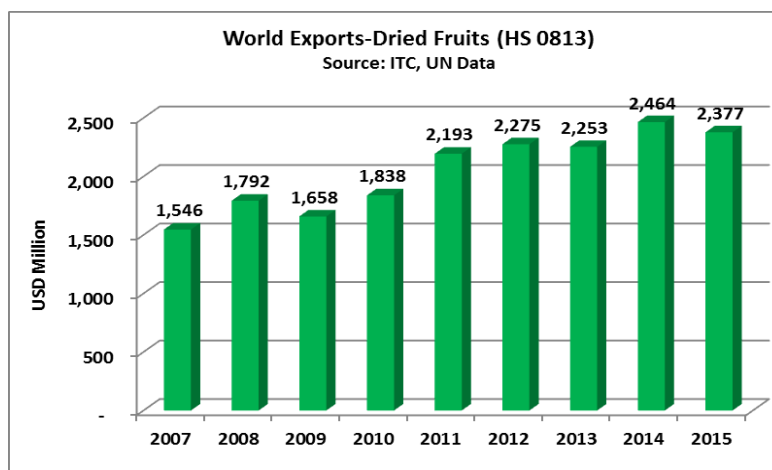


Figure 21 – World Exports Trend of Dried Fruits

International export market of dried fruits is dominated by few countries. In 2015, the top eight countries accounted for two third of the total global exports. Turkey and USA were the two largest exporters; each accounting for 14% share of the global market with exports of around USD 320 million. Chile was the third largest exporter with exports of USD 238 million and market share of 10%. Other major market players were Thailand, Germany, China, Spain and Vietnam. Export market shares of major exporters of dried fruits are shown in Figure 22.

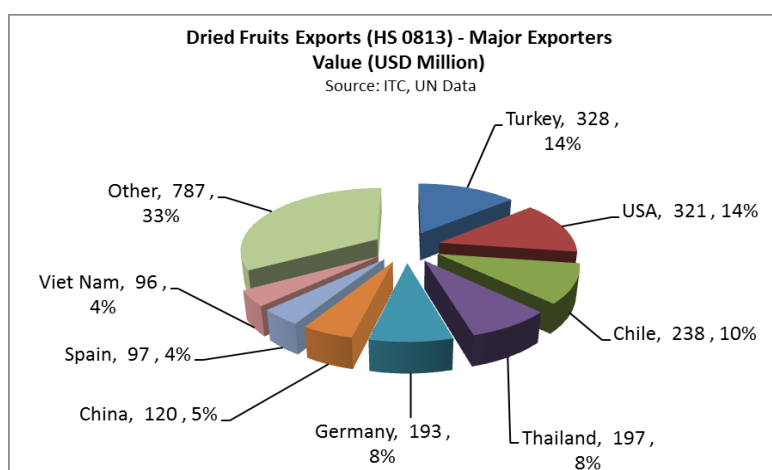
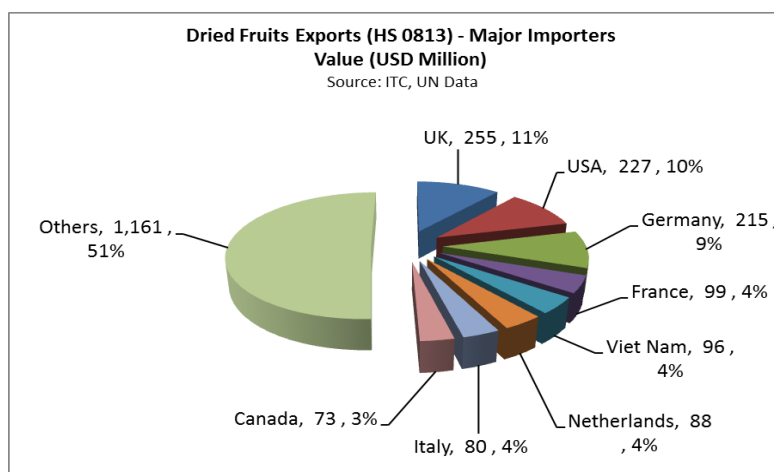


Figure 22 – Global Dried Fruits Exports – Major Exporters

Major importers of dried fruits mostly include the developed countries. UK was the largest importing country; buying 11% of the total value of global dried fruits exports. It was followed by USA, Germany and France with shares of 10%, 9% and 4% respectively. The import distribution was more diversified compared to that of

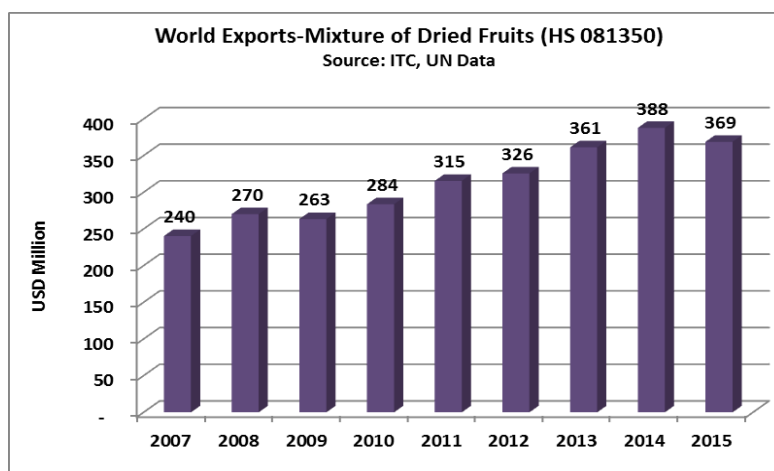
exports since the ‘others’ category accounted for 51% of the total imports of dried fruits. Figure 23 shows the shares of the top importing countries of dried fruits.



**Figure 23 – Dried Fruits Exporters – Major Exporters**

#### 4.2.2.1 Mixture of Dried Fruits International Trade

Global market trends show that exports under the category of ‘Mixture’ of dried fruits have been increasing over the past decade. The exports increased by 62% from USD 240 million in 2007 to USD 388 million in 2014 and fell in the following year to USD 369 million. Figure 24 shows the export trend.



**Figure 24 – World Exports Trend of Mixture of Dried Fruits**

Growing global market shows the opportunity for investment in this sector. Looking at the major market players, Germany was the largest exporter with 26.5% share; followed by Italy, USA and France with 12.5%, 9.3% and 8.1% shares respectively. UK was the largest importing country with 22.5% share of the total international trade of mixture of dried fruits. It was followed by Germany, France, Belgium and Kazakhstan, with shares of 8.6%, 8.5%, 6.5% and 4.9% respectively.

#### 4.2.2.2 Dried Apple International Trade

Dried apple is a smaller product in the global export market of dried fruits. In 2015, total exports of dried apple were USD 103 million that were 4.3% of the total dried

fruits exports of the world. Exports have been almost stable during the last ten years. Figure 25 shows the trend.

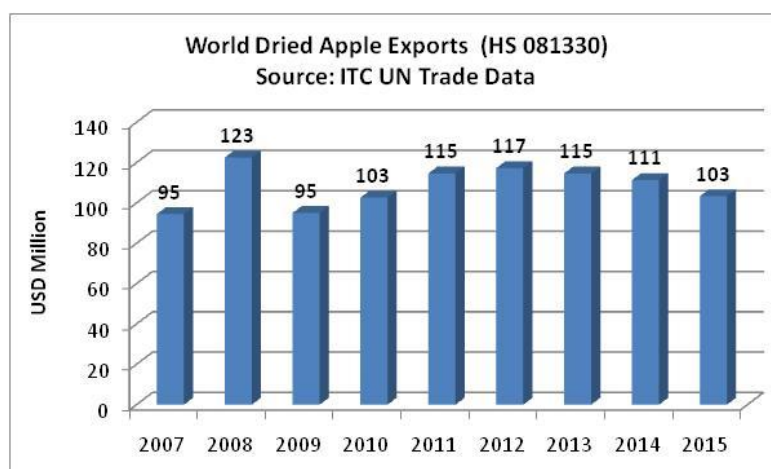


Figure 25 - Dried Apples World Exports Trend

Chile was the largest exporter of dried apples in 2015; with exports of USD 32 million and market share of 31%. Other major exporting countries included USA, Italy, Germany, Argentina and Turkey. Export market shares of the leading exporters of dried apples are shown in Figure 26.

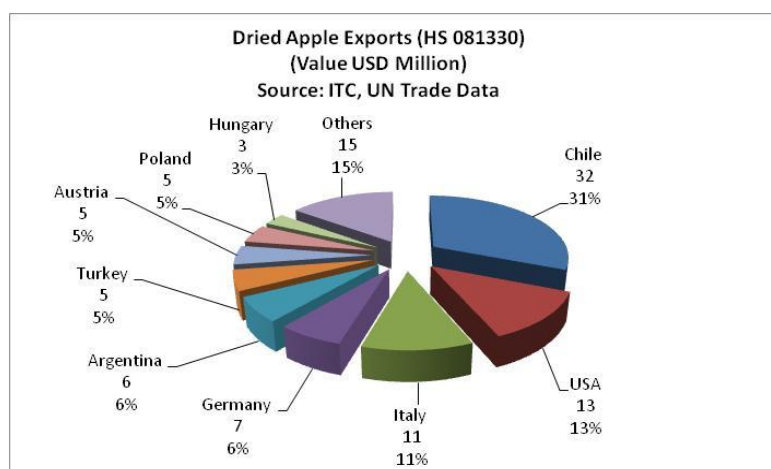


Figure 26 - Dried Apples Major Exporting Countries

## 4.3 Pakistan's Trade of Dried Fruits and Vegetables

### 4.3.1 Pakistan's Exports of Dried Vegetables

Though not very pronounced, but Pakistan does have a presence in the international market of dried vegetables. In 2015, the country exported 76,397 tons of dried vegetable products earning PKR 1.84 billion (USD 18 million). Exports in different product categories are summarized in Table 2.

HS Code	Description	Quantity (kg)	Value (000 PKR)	Share in Value
07122000	Onion. Whole Dried Cut	75,883,842	1,564,985	82.7%

07123100	Mushroom Genus Agaricus Dried	24,785	211,944	11.2%
07123200	Woodear Dried Whole Cut	2,100	4,879	0.3%
07123300	Jelly Fungi Dry Cut Whole	20	6	0.0%
07123900	Other Truffle Dry Cut	378,414	103,476	5.5%
07129000	Other Vegetables Mixture Dried	54,270	5,127	0.3%
07131000	Peas Dried Shelled	51,000	2,642	0.1%
07139010	Black Metpe Dry Whole	2,230	241	0.0%
<b>Total</b>		<b>76,396,661</b>	<b>1,893,300</b>	<b>100.0%</b>

*Source: Pakistan Bureau of Statistics*

**Table 2 - Pakistan's International Trade of Dried Vegetables-2015**

Major share of these exports were constituted by dried onion which in value terms accounted for 82.7% of the total. In quantity terms, the share of dried onion in the total exports of dried vegetables was more than 99%. Other important category of Pakistani exports was Dried Mushrooms of Genus Agaricus. In 2015, 24.7 tons of mushrooms were exported to earn PKR 212 million (USD 2 million); accounting for 11.2% share of the total exports.

#### *4.3.1.1 Pakistan's Dried Onion Exports*

Looking at the five-year exports of dried onions, a continuously rising trend is observed. Exports from Pakistan witnessed phenomenal increase from PKR 6 million in 2012 to PKR 1.56 billion in 2015; an increase of 260 times. In quantity terms, this increase was even higher, increasing from 23 tons in 2012 to around 76,000 tons in 2015.<sup>7</sup> Export growth from 2014 to 2015 mainly originated from increased exports to UAE and Malaysia. Figure 27 and Figure 28 show five-year trends of dried onion exports value and quantity from Pakistan.

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<sup>7</sup> Although these are the official export figures, these should be used with the following consideration. Apparently, the export figures of dried onion appear to be very high. For having 75,000 tons of dried onion, at 10-11% yield, it requires more than 700,000 tons of fresh onion. It is unlikely that such a high share of the local onion production is converted into dried onion and exported. One way of explaining these figures can be the possibility that fresh onion exports are mistakenly reported under this category of dried onions. The possibility is also supported by looking at the unit export price which comes out to be PKR 20 per kg which is an unrealistically low price for dried onion. However, this can be the price of fresh onion.

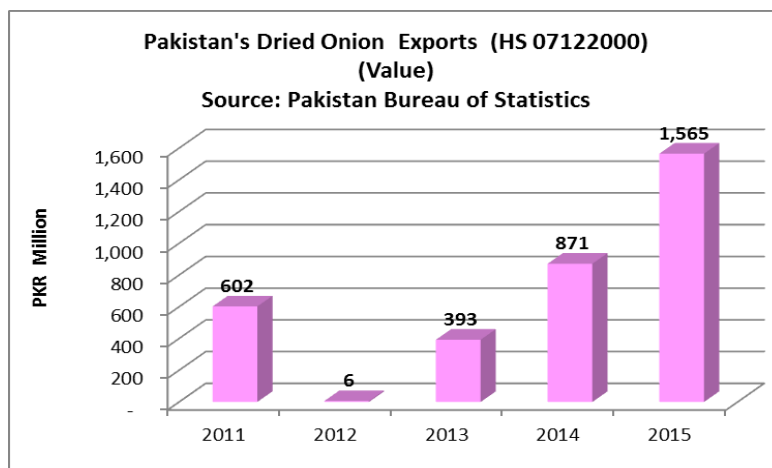


Figure 27 – Pakistan’s Dried Onion Exports Value Trend

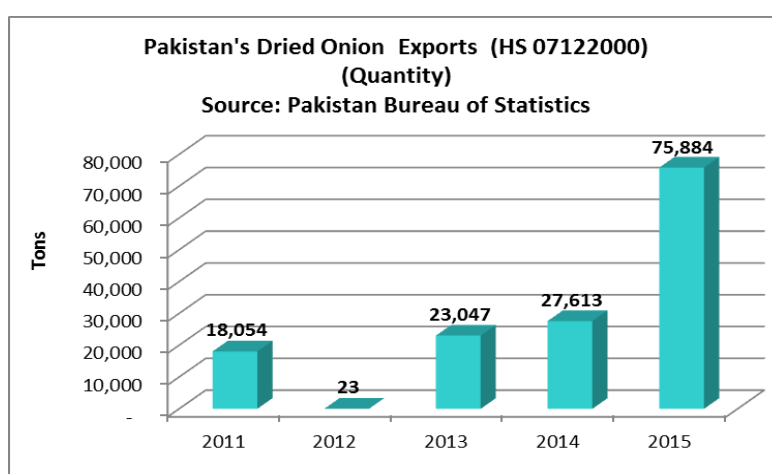


Figure 28 – Pakistan’s Dried Onion Exports Quantity Trend

78% of the total dried onion exports of Pakistan were sent to UAE and Malaysia; with respective shares of 44% and 33%. Other importing countries were Sri Lanka, Oman, Bangladesh and Bahrain. Figure 29 shows the shares of different importers. It can be observed that almost all the counties importing dried onion from Pakistan were from Asia or from Far East regions. No developed country from European or American continents was importing this product from Pakistan.

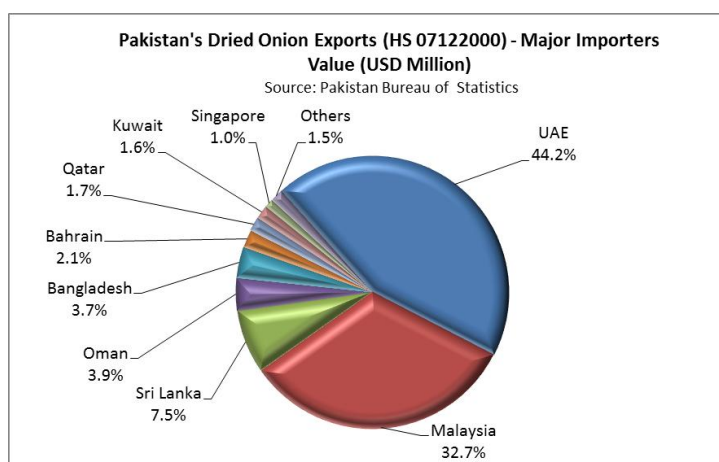


Figure 29 – Pakistan’s Dried Onion Exports- Major Importers



Compared to that, the major countries importing dried onion from India and China are the developed countries. In 2015, top importers of dried onion from India were Germany, UK, USA, Poland and Belgium, accounting for 16%, 10%, 9%, 7% and 6% shares of India’s total exports. Similarly, China’s biggest trading partners of dried onion were USA, Germany and Australia, accounting for 22%, 11% and 10% shares respectively. Pakistan’s current focus has been the markets which are less quality conscious. That leaves the room to improve the quality perception of the local product and start targeting high end markets to fetch higher prices and harvest more profits.

#### 4.3.1.2 Pakistan’s Other Dried Vegetables Exports

Looking at Pakistan’s exports in other dried vegetables, a declining trend is observed in all the product categories. Figure 30 shows the trends. This decline is in spite of the fact that the global market of all of these products has been increasing during these years.

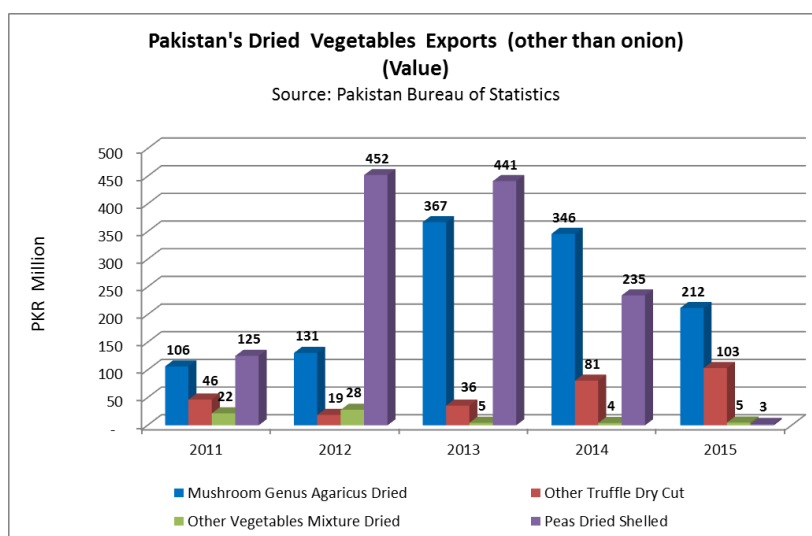


Figure 30 – Pakistan’s Dried Vegetables (other than onion) Exports

Pakistan has small exports under HS 071290, Other Vegetables Mixture Dried. In 2015, country’s total exports were 54.3 tons worth PKR 5.1 million. Germany was the main buyer accounting for 97% of the total export quantity. Other buying country was USA. In 2014, total exports were PKR 4.3 million. Germany was the largest buyer with 53% share of export quantity. Other countries importing this product from Pakistan were China, Saudi Arabia and USA.

#### 4.3.1.3 Pakistan’s Exports of Dried Peas

Pakistan’s exports of dried peas have not followed a consistent trend during the last five years. The exports rose from PKR 125 million in 2011 to a high value of PKR 452 million in 2012; following which there was a decline till it dropped to only PKR 3 million in 2015. In terms of quantity, Pakistan’s exports of dried peas were 6,488 tons

in 2012 which dropped to only 51 tons in 2015. Peas export value and quantity trends are shown in Figure 31 and Figure 32.

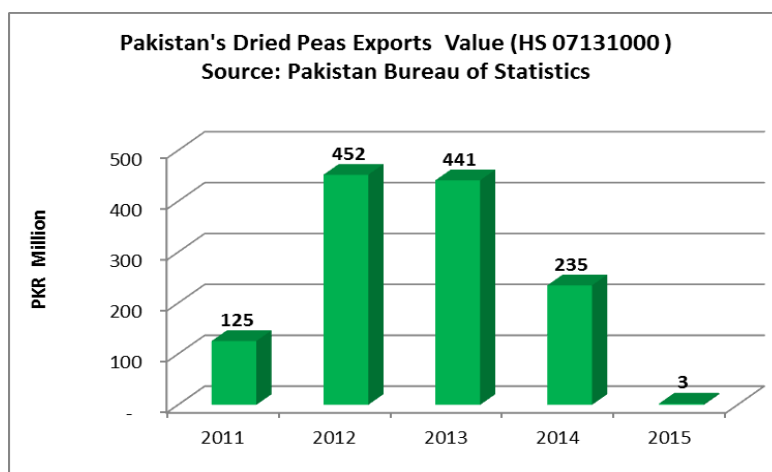


Figure 31 – Pakistan’s Export Trend of Dried Peas (Value)

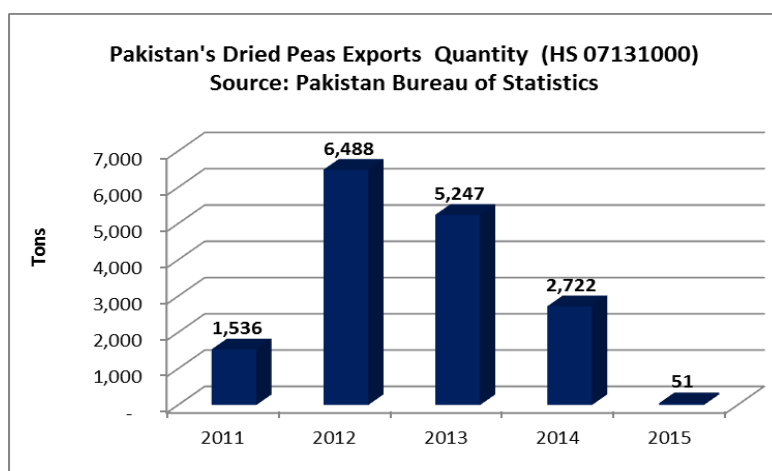


Figure 32 – Pakistan’s Export Trend of Dried Peas (Quantity)

Major buyer of Dried Peas from Pakistan is Afghanistan. In 2015, it accounted for 99% of the total exports with the balance being imported by Senegal and France. Drop in exports of dried peas from Pakistan is mainly due to withdrawal of NATO forces from Afghanistan. Pakistan has a small presence in the export market of ‘Other’ Dried Leguminous Vegetables (HS 07139090). China was the main buyer of the total exports of PKR 24.5 accounting for 99% share. Small quantities were sent to UAE.

### 4.3.2 Pakistan’s Exports of Dried Fruits

Pakistan has a small presence in the international dried fruits market. In 2015, it exported 1,963 tons of dried fruits; worth PKR 665 million. Exports of different dried fruits products and their relative shares in total exports are provided in Table 3.

HS Code	Description	Quantity (kg)	Value (000 PKR)	Share in Value
08131000	Apricots Dried	636,425	215,340	32.4%

08133000	Apples Dried	227	409	0.1%
08134010	Tamarind	4,753	385	0.1%
08134020	Cherries Dried	32,910	25,371	3.8%
08134050	Plum (Aaloocha)	174,736	67,118	10.1%
08134070	Raisins	835,172	222,885	33.5%
08134090	Other Fruit Dried	216,688	117,232	17.6%
08135000	Mixture of Nuts, Dried Fruits	61,827	16,862	2.5%
<b>Total</b>		<b>1,962,738</b>	<b>665,602</b>	<b>100.0%</b>

Table 3 – Pakistan’s Exports of Dried Fruits

The largest share in the total dried fruit exports was that of raisins; with exports of 835 tons and PKR 223 million. Dried apricot was the second largest product accounting for 32.4% of the total value of Pakistan’s dried fruit exports in 2015. ‘Other’ dried fruit accounted for 17.6% share. Dried mango is the most important product in this investment proposal. The trade data does not provide segregated information of this product. None of the major mango producing countries (India, Thailand, Philippines, Mexico, Pakistan) report this product separately. Therefore, exact reporting of dried mango exports is not found but there is a high probability that this product is reported under HS 081340. Dried apple is a very small product accounting only for 0.1% of the total export value.

Pakistan’s dried fruits exports have followed an overall increasing trend over the last five years. Exports increased from 1,645 tons in 2011 to 1,963 tons in 2015; representing an increase of 19%. The export value increased from PKR 410 million to PKR 666 million during the same period; representing an increase of 62%. A higher percent increase in value compared to that of quantity indicates an increase in average unit price of dried fruits products during this period. Value and quantity export trends are shown in Figure 33.

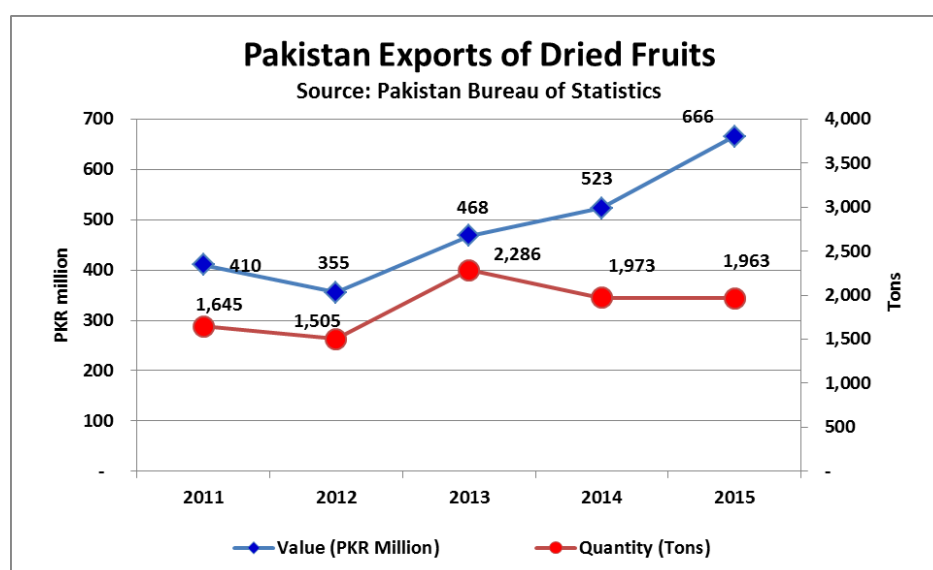


Figure 33 – Pakistan’s Dried Fruits Export Trends (Value & Quantity)

4.3.2.1 Pakistan's Exports of Dried Apricots, Peaches, Plums, etc.

Pakistan's exports of dried apricots increased from PKR 159 million in 2011 to PKR 215 million in 2015 which represents an increase of 35%. In terms of quantity, there was a decrease in exports of dried apricots from 644 tons to 636 tons. Average per kilogram price increased from PKR 247 in 2011 to PKR 338 in 2015. Figure 34 and Figure 35 shows the value and quantity export trends of Dried Apricots, Peaches, Plums, etc.

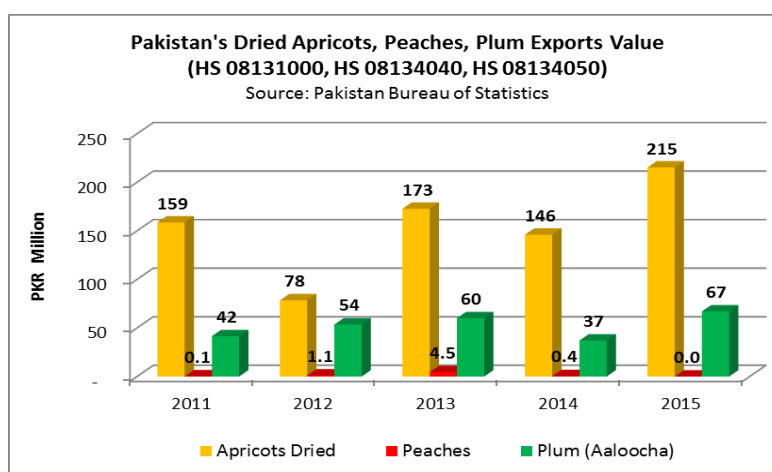


Figure 34 – Pakistan's Exports Value of Dried Apricots, Peaches, Plums

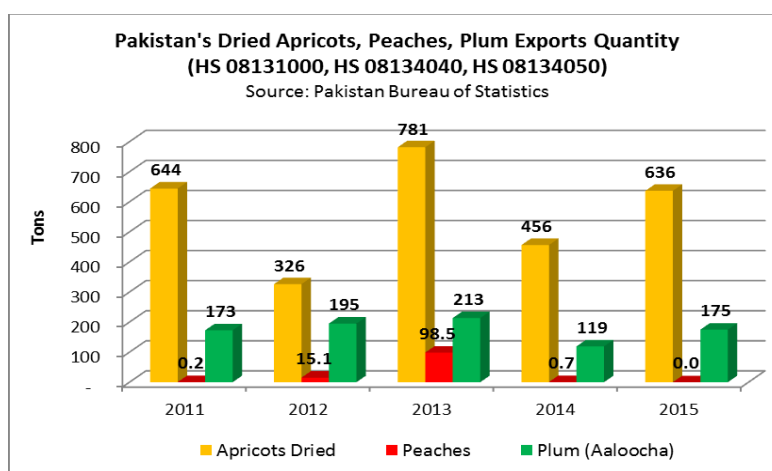


Figure 35 – Pakistan's Exports Quantity of Dried Apricots, Peaches, Plums

Pakistan's export of plum (Aaloocha)<sup>8</sup> during the period 2011-15 remained stable without many fluctuations. Dried peach was a smaller export product touching the maximum of 98 tons of exports in 2013 and dropping to insignificant values in the next two years.

Major buying countries of dried apricot from Pakistan were mainly from European continent. UK was the largest buyer accounting for 31% of the total Pakistani exports.

<sup>8</sup>Aaloocha is the local name of a smaller sized plum which is converted into dehydrated products; the larger plum fruit is consumed in fresh form

It was followed by Germany and Netherlands with 17% and 14.6% shares respectively. USA, Saudi Arabia and Bangladesh were the other important buying countries of dried apricot from Pakistan. Export split between different markets is shown in Figure 36.

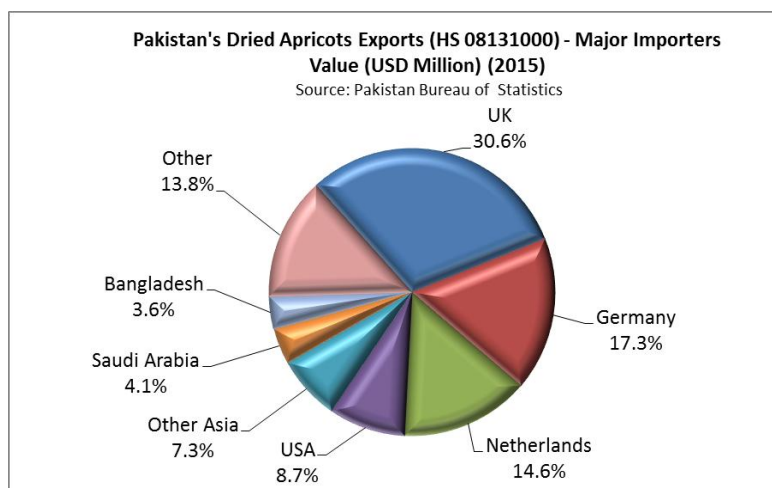


Figure 36 – Pakistan’s Dried Apricot Exports-Major Importers

In case of dried plums, USA was the largest importer partner of Pakistan; buying 46.6% of the product exported by Pakistan. Bangladesh accounted for 31% and UK 11% share of the total exports of dried plum. Market distribution is shown in Figure 37.

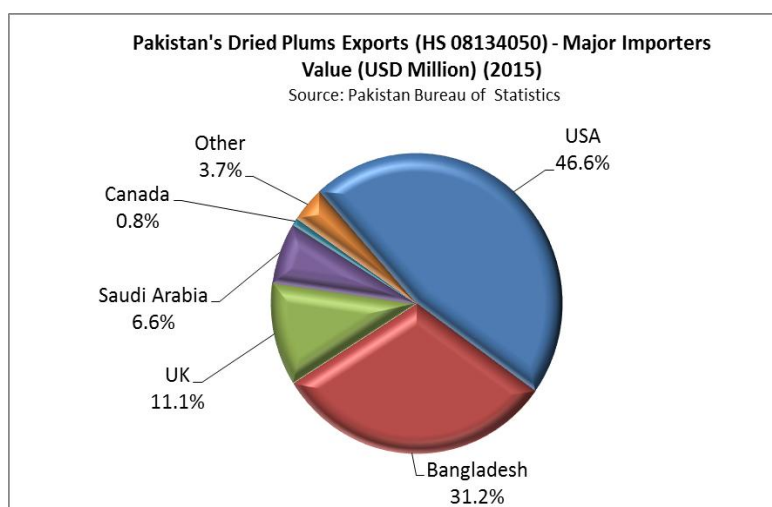


Figure 37 – Pakistan’s Dried Plum Exports – Major Importers

#### 4.3.2.2 Pakistan’s Exports of Dried Apples and Raisins

Pakistan exports small quantities of dried apples. During the five year period from 2011 to 2015, the dried apples exports touched a high of 13.9 tons in 2014; worth PKR 2.1 million and dropped to insignificant value of PKR 0.4 million in the following year. Figure 38 and Figure 39 shows Pakistan’s export trends of dried apples and raisins.

The exports of raisins have followed an increasing trend during the period 2011-15. The export value increased from PKR 122 million in 2011 to PKR 223 million in 2015;

representing an increase of 83%. From 2014 to 2015, there was an increase in export quantity by 5% whereas there was a drop in export quantity by 23%. Average per kilogram export price increased from PKR 195 to PKR 266.

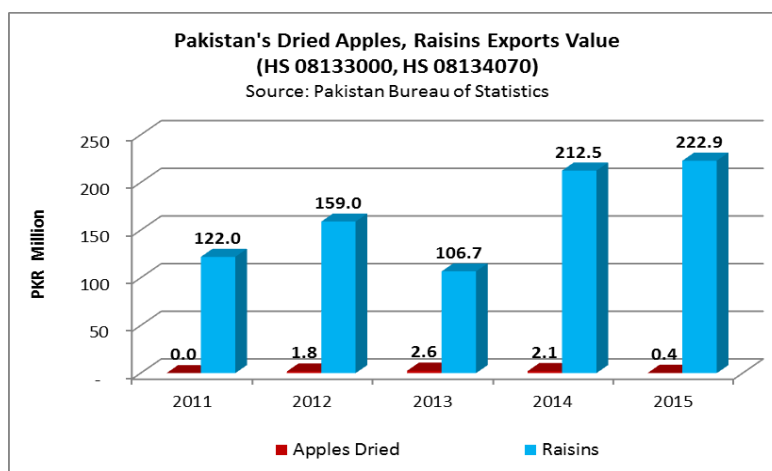


Figure 38 – Pakistan’s Exports of Dried Apples and Raisins (Value)

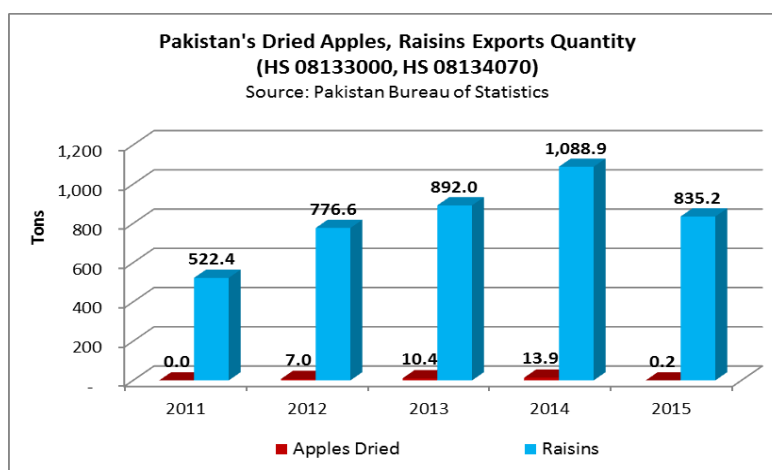


Figure 39 – Pakistan’s Exports of Dried Apples and Raisins (Quantity)

#### 4.3.2.3 Pakistan’s Exports of ‘Other’ Dried Fruits and Mixture of Dried Fruits

Pakistan’s exports of ‘Other’ dried fruits have been higher than the mixture of dried fruits during most of the years. Figure 40 and Figure 41 show Pakistan’s export trends in terms of value and quantity of the two products.



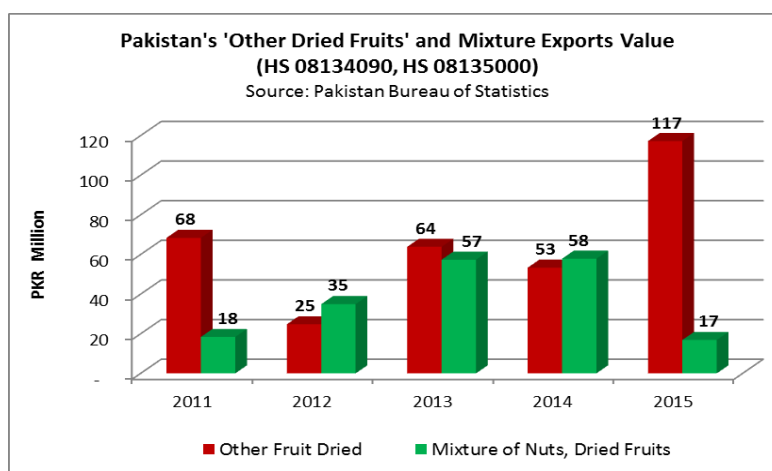


Figure 40 – Pakistan's 'Other' and Mixture Dried Fruits Exports (Value)

There was an increase in export value of 'other' dried products from PKR 68 million to PKR 117 million during five year period which was an increase of 72%; whereas during the same period, the export quantity decreased by 10%. This indicates a sharp increase in average unit price. Dried mango is a high value added product that may have been reported under this category during this period. Increase in unit price may be due to this product.

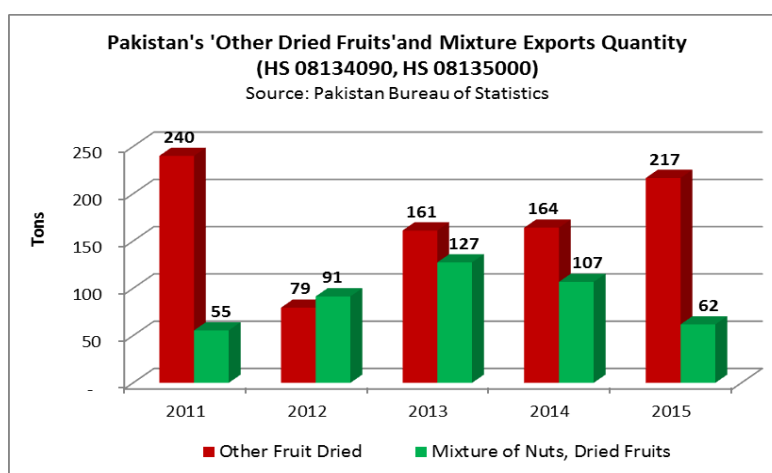


Figure 41 – Pakistan's 'Other' and Mixture Dried Fruits Exports (Quantity)

Exports of 'mixture' of dried fruits increased from 2011 to 2013 and decreased in the following two years.

Major countries importing 'other' dried fruits from Pakistan were Australia, Germany and Bahrain accounting for 20%, 16% and 15% shares respectively. Major import partners in 'mixture' of dried fruits were Maldives, UK and UAE. Maldives alone accounted for 49% of the total Pakistani exports of the product. The export market distribution of 'other' dried fruits and 'mixture' of dried fruits is shown in Figure 42 and Figure 43.

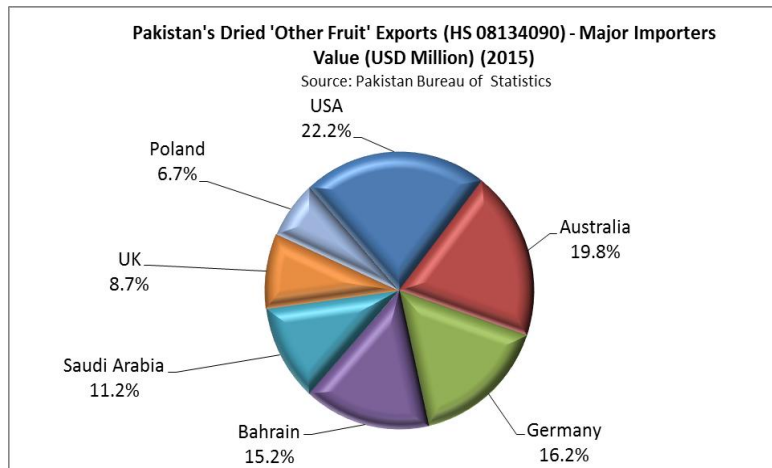


Figure 42 – Pakistan's 'Other' Dried Fruits Exports – Major Importers

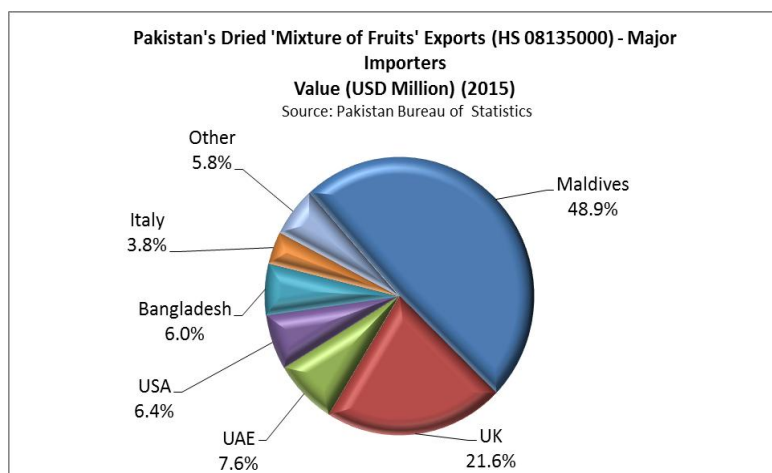


Figure 43 – Pakistan's Mixture of Dried Fruits Exports – Major Importers

## 5.0 RAW MATERIAL AVAILABILITY

The products considered for dehydration include mango, apple, peas, onion and garlic. There is abundant availability of these fruits and vegetables for producing the value added dehydrated products. Major share of the produce is consumed in the local market. Some products are also sold in export market. A significant share of fruits and vegetables in Pakistan is lost due to lack of proper post-harvest practices. Use of inappropriate harvesting techniques, inadequate storage, lack of proper transportation and marketing inefficiencies are the key reasons for high post-harvest losses of the horticultural produce of Pakistan. As per the estimates these losses may go as high as 20-25%. Even using an optimistic figure of 10%, the total loss of fruits and vegetables in Pakistan come out to be 1.58 million tons. Even if we use a low average price of PKR 2,000 per ton, the total monetary loss due to post harvest losses is more than PKR 3 billion per annum. With the same calculation, estimate of the fruits and vegetables lost in Punjab will be about 1.0 million tons that will translate into about PKR 2 billion per annum.

Establishment of value addition facilities like dehydration plants will help reduce these post-harvest losses. A portion of this potentially lost horticultural production will be saved by being processed in such facilities.

### 5.1 Raw Material Availability

#### 5.1.1 Mango

Mango is a major fruit produced in Punjab. In 2014-15, Pakistan's total mango production was 1.72 million tons. Of that, 1.31 million tons were produced in Punjab which represented 76% of the total national production. The bulk production of mango is consumed in the local market; however, it is also an important export product. Mango's production is concentrated in the districts of South Punjab. Multan is the biggest mango producing district of Punjab accounting for one third of the total. Muzaffargarh and Rahimyar Khan are the second and the third largest mango producing districts. Together, the top three districts account for about 70% of the total mango production in Punjab.



District	Production 2013-14 (tons)	Production Share
Multan	425,303	34.0%
Muzaffargarh	232,704	18.6%
Rahimyar Khan	226,560	18.1%
Khanewal	175,127	14.0%

Bahawalpur	44,999	3.6%
Vehari	30,084	2.4%
Bahawalnagar	18,341	1.5%
Other Districts	98,850	7.9%

Table 4 - Mango Producing Districts in Punjab

### 5.1.2 Peas

Peas is an abundantly produced vegetable in Pakistan. In 2014-15, total national production of peas was 139,233 tons. Punjab is the largest producer of peas producing 107,005 tons and accounting for 77% of the total national production. Peas production in Punjab has followed an increasing trend over the past five years; increasing from 69,277 tons in 2010-11 to 139,233 tons in 2014-15; exhibiting an overall growth of 54% and a compounded annual growth rate of 9.1%.



District	Production 2013-14 (tons)	Production Share
Sahiwal	3,461	31.3%
Chiniot	2,647	24.0%
Okara	1,165	10.5%
Gujranwala	776	7.0%
Sheikhupura	688	6.2%
Toba Tek Singh	584	5.3%
Other Districts	1,724	15.6%

Table 5 - Peas Producing Districts in Punjab

Peas are produced in almost all districts of Punjab. However its major production hubs include Sahiwal, Chiniot and Okara districts which together account for about two third of the total production of peas in Punjab.

### 5.1.3 Onion

Onion is the largest condiment produced in Pakistan. Total national production in 2014-15 was 1.67 million tons of which 0.3 million tons was supplied by Punjab; translating into 18% share of national production. Onion production has been on a decline during the past years. During the period 2011-2015, national onion production decreased by 2.9% and Punjab's production by 3.8%.



District	Production 2013-14 (tons)	Production Share
Khanewal	33,923	9.5%
Bhakkar	25,629	7.1%
Bahawalpur	24,707	6.9%
Rahimyar Khan	20,129	5.6%
Okara	19,089	5.3%
Rajanpur	19,036	5.3%
Lodhran	18,074	5.0%
Bahawalnagar	17,092	4.8%
Other Districts	181,121	50.5%

Table 6 - Onion Producing Districts in Punjab

Onion is produced in all districts of Punjab. However, its major production clusters are in southern districts. District Khanewal is the largest producer of onion; followed by Bhakkar, Bahawalpur, Rahimyar Khan and Okara.

#### 5.1.4 Garlic

Garlic is an important condiment produced in all districts of Punjab. National production increased from 55,308 tons in 2010-11 to 72,987 tons in 2014-15, an overall increase of 32%. Production increase during the same period in Punjab was only 3.3%; increasing from 24,257 tons to 25,079 tons.



District	Production 2013-14 (tons)	Production Share
Sialkot	2,822	12.4%
Narowal	2,397	10.5%
Khanewal	2,159	9.5%
Gujranwala	1,932	8.5%
Faisalabad	1,540	6.8%
Pakpattan	1,321	5.8%
Attock	1,252	5.5%
Sahiwal	1,077	4.7%
Other Districts	8,257	36.3%

Table 7 - Garlic Producing Districts in Punjab

Major garlic producing districts are located in central Punjab. Sialkot is the largest district accounting for 12.4% share of the garlic's total provincial production. Narowal, Khanewal, Gujranwala and Faisalabad respectively account for 10.5%, 9.5%, 8.5% and 6.8% shares of the total provincial production.



### 5.1.5 Apple

Apple is produced in Balochistan and Khyber Pakhtunkhwa. Punjab has a negligible share in national apple production. Pakistan's apple production in 2014-15 was 616,748 tons. Balochistan had a share of 84.7% in national production; followed by Khyber Pakhtunkhwa with 14.6% share. KillaSaifullah, Mastung, Zhob and Pishin are the major apple producing districts of Balochistan. In KP, Swat is the largest apple producing district.



## 5.2 Raw Material Prices

The prices Pricing used for different products is discussed below:

### 5.2.1 Mango Prices

Mango production in Punjab comprises of different varieties. Chaunsa is the main mango variety produced in Punjab and thus it has been considered as the target variety for dehydration. Chaunsa starts selling into market in June and continues till the middle of October. Prices generally drop in July and August and increase in the following months. Figure 44 shows the wholesale price trends of mango. Prices in July, August and September are lower than other months. Therefore, these three months have been selected as the processing months for mango. In addition, the prices start dropping in the latter half of June. Therefore, the last fifteen days of June have also been included for processing mango. Thus, the total days for processing mango in this study have been assumed to be 98.

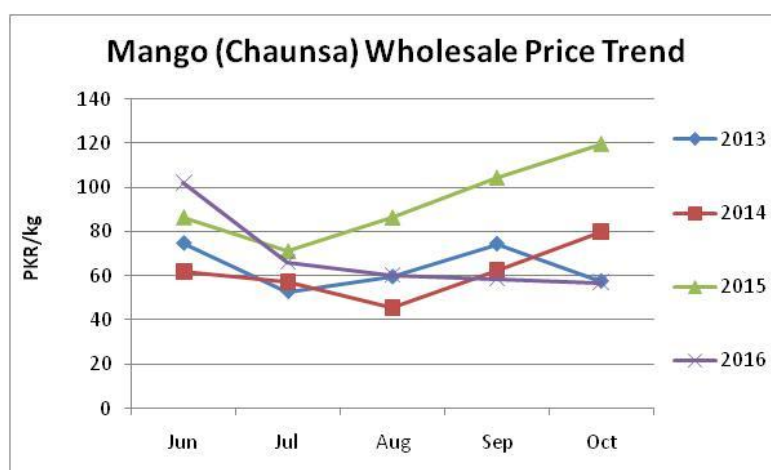


Figure 44 - Mango Wholesale Price Trend

### 5.2.2 Apple Prices

Golden apple variety will be processed to prepare dried apple. Apple production starts in September and continues till the end of October. The surplus production is stored in cold stores and sold in the later months as per the need of the market.





Figure 45 - Apple Wholesale Price Trend

Figure 45 shows that apple's prices are the lowest in September and increase in the later months October and November. Thus, the best months to source apple for processing are these three months. Thus, apple processing will be carried during the months of October and November. During September, the facility will be used for processing mango. Total processing days of apple will be 56.

### 5.2.3 Onion Prices

Onion is harvested in Punjab in December and January. The price trend of onion is seen to be inconsistent during different years. However, January and December are seen as two months in which price is lower compared to other months. Therefore, these two months are selected for processing onion. The processing days of onion will be 54.

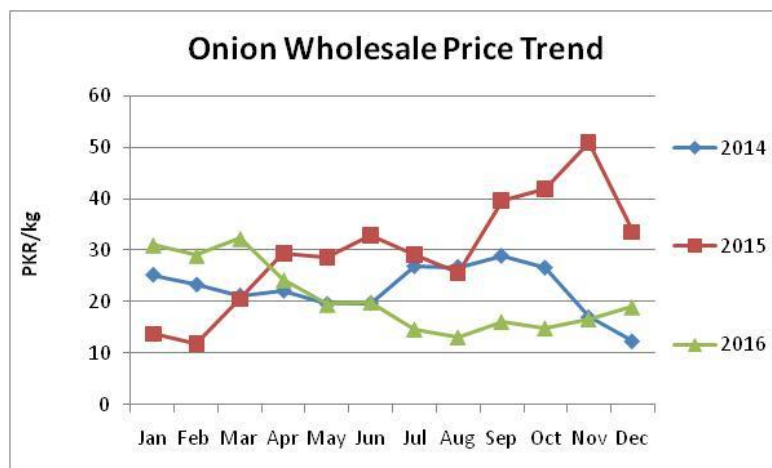


Figure 46 - Onion Wholesale Price Trend

### 5.2.4 Peas Prices

The harvesting of peas crop starts in December and continues till the end of April. The price trend of peas was seen to be very consistent during the three years. Figure 47 shows the trend.



Figure 47 - Peas Wholesale Price Trend



It was seen that the price of peas was lowest in the months of February during different years. Therefore, the processing of peas will be done during the months of February and March. Total processing days for peas will be 54.

### 5.2.5 Garlic Prices

Garlic is harvested in April and continues till the end of June. Consequently, the price is the lowest in April and increases in the following months. Garlic processing will be started in April and will continue till the middle of June. Total processing days for garlic will be 68.



Figure 48 - Garlic Wholesale Price Trend

## 5.3 Raw Material Prices Used in the Study

The raw material prices used in this study have been based on the following approach:

- For each commodity, an average of the prices of the processing months was calculated.
- The price was discounted by a factor since the available wholesale price data is based on auction prices in fruit and vegetable markets. Procurement of fruit and vegetables for processing can also be done directly from the farmer to avoid middleman's commission and other associated marketing costs and fees. In fact it is a regular practice of the processing units to procure directly from the farmers. Thus the raw material price was obtained by discounting the wholesale prices by a factor of 30% for all the products.

With the above approach, the raw material prices calculated for different commodities are listed in Table 8.

Commodity	Months	Average Wholesale Price (Rs/kg)	Discounted price (80%)
Mango	June, July, August, September	67.4	54
Apple	October November	59.8	48
Peas	February, March	38.7	31
Onion	December, January	25	20
Garlic	April, May June	124	99

Table 8 - Fruits/Vegetables (Raw Material) Prices

### 5.4 Dehydration Calendar

The viability of fruit and vegetable processing business greatly depends on the price of the raw material since it constitutes the major cost of the final product. It is therefore very important that the fruits and vegetable are procured during the months when there is maximum supply available with the lowest prices of the year. For that, the monthly wholesale price data of the last three years was analyzed. The processing months for each of the target products have been decided on the basis of that data. A dehydration calendar of the whole year was developed on that basis. Based on the above discussion, the dehydration calendar for the proposed facility is shown in Figure 49.

Dehydration Calendar												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Onion	Peas		Garlic			Mango			Apple		Onion	
27 days	54 days		68 days			98 days			56 days		27 days	

Figure 49–Proposed Dehydration Calendar



## 6.0 PRODUCTS' SELLING PRICES

The study has been conducted with the assumption that the final dehydrated products will be sold in export markets. Consequently, export market prices have been used as the selling prices of the final products. Information for that has been obtained mainly from Trade Map data of ITC (International Trade Center).<sup>9</sup> For some products where specific information was not available, some primary sources from the local market have been consulted and information from known international trading websites has been used. Average values of the selling prices have been considered. Overall, a conservative approach has been adopted in assuming the selling prices and prices towards the lower end have been used for the purpose of calculations.

### 6.1 Proposed Selling Prices

#### 6.1.1 Dried Mango Prices

Specific details on selling price of dried mangoes are not available from Trade Map data. Therefore, the price has been estimated from industry's sources. In addition, the international trading sites data has been reviewed. India is an important exporter of dried mango. Some figures of Indian exports were also reviewed. Based on this research, average selling price of dried mango for the purpose of this pre-feasibility study has been assumed to be Rs 700 per kg.

#### 6.1.2 Dried Apple Prices

The data of dried apple is reported separately in Trade Map and thus was used for estimating the price of final product. Table 9 shows the dried apple export data.

Exporter	Exports (000 USD)	Export Value (tons)	Export Price (USD/ton)	Price (Rs/kg)
Chile	32,118	5,362	5,990	629
USA	12,970	3,526	3,678	386
Italy	11,298	3,867	2,922	307
Germany	6,768	1,029	6,577	553
Austria	5,018	427	11,752	1,234
UK	1,439	605	2,379	566

Table 9 - Dried Apple Export Prices of Major Exporting Countries

Export price range for some of the top exporters of dried apples is quite broad; going as high as Rs 1,234/kg and as low as Rs 307/kg. Price of majority of the exporting countries was found to be clustering around the figure of Rs 500/kg. Online prices of dried apples was also looked into at alibaba.com and a similar trend was observed where the prices were starting from around USD 3-4 per kilogram; however some

<sup>9</sup>[http://www.trademap.org/Country\\_SelProduct\\_TS.aspx](http://www.trademap.org/Country_SelProduct_TS.aspx)

quote went as higher as USD 30. In line with these trends, the price of dried apple for making calculations was assumed to be Rs 500 per kilogram.

### 6.1.3 Dried Peas Prices

The selling price of dried peas has been obtained from international trading websites. It ranges between USD 2500 to USD 5000 tons. Based on that, an average price of Rs 300 per kg has been assumed.

### 6.1.4 Dried Onions Prices

Export price of dried onions by major exporting countries is listed in Table 10.

Exporting Country	Export Value (USD million)	Quantity (Tons)	USD/ton	PKR/ton
India	129,333	48,650	2,658	279
USA	90,090	33,639	2,678	281
Tanzania	88,088	9,665	9,114	957
Egypt	36,881	13,116	2,812	295
China	33,773	12,257	2,755	289
Germany	22,738	6,821	3,334	350
France	21,734	8,631	2,518	264
Belgium	9,291	3,314	2,804	294

Table 10 - Dried Onions Export Prices of Major Exporting Countries

While the price of some countries like Tanzania is reported as high as Rs 957/kg, there are others like France which have an export price of Rs 264/kg. The price appears to be clustering around Rs 280/kg. This was also the average export price of India. In this context, the export price of dried onion has been estimated as Rs 280 per kg.

### 6.1.5 Dried Garlic Prices

Segregated data of world trade of dried garlic is not available. However, the export data of China was available. That was used as the basis to ascertain the price of dried garlic. In addition, online price data from international websites was also used which shows a per kg price range going from USD 1-4. Based on the available statistics, the selling price of dried garlic powder was assumed to be Rs 320/kg.

	Export Value (000 USD)	Quantity (tons)	Price (USD/ton)	Price (Rs/kg)
China's exports to world	474,952	185,525	2,560	269
USA exports to world	9,882	3,052	3,238	340

Table 11 - Dried Garlic Export Prices of China and USA



## 7.0 THE PROPOSED BUSINESS

### 7.1 Purpose of the Business

The proposed business focuses on processing locally produced fruits and vegetables to produce dehydrated products. Five commodities, mango, apple, peas, onion and garlic have been included in this study. The final dehydrated products will be sold in the export markets. The project will directly contribute towards adding value to the agriculture sector of Punjab by reducing post-harvest losses and converting the farm produce into high value added products. Local farmers will also benefit by finding the opportunity to sell part of their surplus production which otherwise is lost due to low demand in peak production seasons.

### 7.2 Product Line

The product line of dehydrated fruits, vegetables and condiments is quite broad. Five products have been selected to be processed in the proposed facility. These include:

1. Dried Mango (Chaunsa)
2. Dried Apple (Golden Delicious)
3. Dried Peas
4. Dried Onion
5. Dried Garlic

Selection of this product line is based on the following rationale:

- Horticultural products are seasonal and not available round the year. Therefore, it is not possible to run the plant on single product and multiple products have to be selected. Selection of fruits, vegetables and condiments was made with the approach to keep the plant running for the whole year. The peak season of the selected commodities do not have much overlap with each other.
- Export market demand in terms of its overall size and growth rate has been considered as a key factor. Dried onion, dried peas, dried apple are have defined, large international markets. However, Pakistan's performance in those markets is way below its potential. Similarly, dried mango is a popular product which is exported by all the major mango producing countries, but not by Pakistan; though fresh mango is exported in large quantities.
- The product line had to include higher value added products since dehydration using fuel entails high production costs. That necessitates selling the product at higher price to keep the proposition viable. However, along with that, some lower value added products like dried onion was also included to increase the number of production days and help increase project's viability.

- Abundant availability of local raw material is the other important factor for selection of the above-mentioned products. All those products are produced in large quantities in Punjab. For some products like garlic which the current production volumes are not very large, it has been assumed that the establishment of this facility will make the local farmers increase the production of the commodity in demand.
- It was also considered that the selected product line should include most of those horticultural products which are produced in Punjab so that the farmers of Punjab and the local agriculture get the main benefit. In the selected product line, except for apple, the other four products are produced in Punjab and the intention of the proposed project is to use the local production as raw material.

### 7.3 Proposed Location

The proposed dehydration project should ideally be located at a place closer to production centers of the target fruits and vegetables. The prime target product in this study is mango that will be processed during 29% of the available production days. In that context, Multan is the most suitable district since 34% of the total mango production is comes from Multan. The project will be able to easily source mangoes for dehydration from this production hub. Muzaffargarh is the second largest mango producing district which borders with Multan and can also act as a supplier of mango for the project. Other products are onion, garlic and peas to be sourced mainly from Punjab and apple which is to be sourced from Balochistan and KP. For these products as well, district Multan is a suitable location. Khanewal is the largest onion producing district of Punjab which borders with Multan. Bahawalpur and

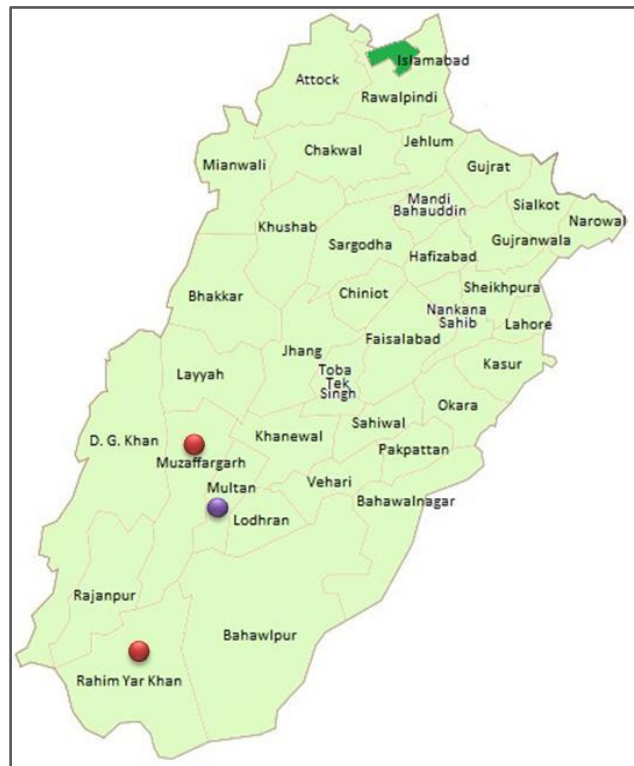


Figure 50 – Project’s Location on Map of Punjab

Rahimyar Khan respectively are the third and fourth largest onion producers. Thus, the project can access onion directly from the production areas. In case of peas, Sahiwal is the largest producer (31% share) which is not far from Multan. Similarly, for garlic, Khanewal accounts for 9.5% of the total production of Punjab and can supply raw material to it. Apples for dehydration have to come from other provinces. Multan is closer to apple production areas in Balochistan compared to Lahore or other districts in central or northern Punjab.

The other factor that should be considered for location is being close to the main highways. It is important in the context that major share of the production has been assumed to be destined for export markets. Similarly, proximity to CPEC route is also important to open the possibility of contributing towards

#### 7.4 Plant Capacity

Fruit and Vegetable Dehydration plants are available in range of capacities. The investor can select a plant on the basis of market demand and the technical considerations of the target products for dehydration. Capacities generally quoted by the machinery suppliers fall in the range of one to two tons of dehydrated product per day (three shifts basis). Increasing capacity of such units is not complicated since most of the components of the plant come as stand-alone units with defined capacities. Overall plant capacity can thus be increased just by addition of individual machines at the required process stages. However, for some machines like tunnel dryer, which operate on continuous process, capacity enhancement decisions are more challenging.

For the purpose of this pre-feasibility study, the plant capacity has been proposed as production of 5 tons dehydrated product per day. Justification for this has been based on the following factors:

- The pre-feasibility study has been developed in the context of attracting foreign investors to invest in projects that will be developed along the CPEC route. Higher capacity dehydration projects are expected to be more profitable than the smaller ones. This will make the project more attractive for the foreign investors.
- The dehydrated products processed in the proposed unit will be sold in the export market which shows healthy growth rates. Pakistan's current performance in those markets is below its true potential. A large project will be able to tap that opportunity more successfully.
- Some smaller dehydration units are already functional in Punjab and other provinces. The study will provide information and help evaluate and demonstrate the commercial viability of dehydrations units of higher capacity. The information will be useful for the existing units for a possible up-gradation of their existing capacities.

Using average yields, obtaining 5 tons of dehydrated product will require processing about 40-45 tons of fresh fruits and vegetables per day.

## 7.5 Project Cost

The project has a total cost of PKR 288 million. Details of different cost components are shown in Table 12 and discussed in the following pages.

Cost Item	Cost (PKR)
Land	17,500,000
Preparation Machinery	14,210,250
Dehydration Machinery	27,000,000
Finishing Machinery	3,650,000
Allied Machinery	7,800,000
Building & Civil Works	40,625,000
Office Equipment & Furniture	4,145,000
Vehicles	2,000,000
Pre-operating expenses	9,261,250
<b>Capital Investment</b>	<b>126,191,500</b>
<b>Working Capital</b>	<b>163,806,768</b>
<b>Total Project Cost</b>	<b>289,998,268</b>

Table 12 - Project Cost Details

### 7.5.1 Land and Building

Total land requirement for the project has been estimated to be 30,550 square feet which is equal to around 7 kanals.<sup>10</sup> Space requirement and the associated civil construction cost are presented in Table 13.

	Space Requirement (sq. ft.)	Construction Cost (Rs/sq.ft.)	Building & Civil Works Cost (Rs)
Processing hall	5,000	1,500	7,500,000
Fruit Storage	10,000	1,500	15,000,000
Finished product storage	6,000	1,500	9,000,000
Generator room	500	1,200	600,000
Office space	2,000	2,500	5,000,000
Open spaces	7,050	500	3,525,000
<b>Total</b>	<b>30,550</b>		<b>40,625,000</b>

Table 13 - Land and Building Cost Details

### 7.5.2 Machinery and Equipment

The costing of the project has been done on the basis of local and imported machinery and equipment. The proposed fruits/ vegetables dehydration unit is based

<sup>10</sup>Kanal is the commonly used unit for land measurement in Punjab. One Kanal is equal to 4500 square feet. Eight Kanals (36000 square feet) constitute one acre of land.

on locally manufactured machinery and equipment. Some components of the plant, such as instrumentation systems, are imported. List of machinery along with the cost is provided in Table 14.

<b>Plant Section</b>	<b>Cost (Rs)</b>
Preparation Machinery	14,210,250
Dehydration Machinery	27,000,000
Finishing Machinery	3,650,000
Allied Machinery & Equipment	7,800,000
<b>Total Machinery (PKR)</b>	<b>52,660,250</b>

**Table 14 - Machinery & Equipment Cost**

Details of machinery and equipment in three sections are provided in Table 15 to Table 17.

#### 7.5.2.1 Preparation Machinery Details

<b>Machine</b>	<b>Origin</b>	<b>No.</b>	<b>Cost (PKR)</b>	<b>Total Cost</b>
Feeding Conveyor	Local	2	400,000	800,000
Sorting Conveyor	Local	1	500,000	500,000
Rotary Washer	Local	1	650,000	650,000
Onion Peeler	Chinese	2	1,149,750	2,299,500
Apple Peeler/Corer	Local	2	450,000	900,000
Pea Sheller	Chinese	2	600,000	1,200,000
Garlic Bulb Breaker	Local	1	450,000	450,000
Garlic Peeler	Chinese	2	480,375	960,750
Mango Peeler/Slicer	Local	4	400,000	1,600,000
Slicer	Local	2	250,000	500,000
Chopper	Local	1	450,000	450,000
Air Compressor	Local	1	800,000	800,000
Dehumidifier	Local	2	800,000	1,600,000
Blancher	Local	2	700,000	1,400,000
Working tables (SS) 4 ft X 10 ft & Tubs	Local	1	100,000	100,000
<b>Total</b>				<b>14,210,250</b>

**Table 15 – Preparation Machinery Details**

#### 7.5.2.2 Dehydration Machinery Details

Under normal conditions, dehydration will be carried out using multistage dehydrator and there will be no requirement to use cabinet dehydrators. However, for some products which require longer times to dehydrate, there may be a need to use cabinet dehydrators to adjust moisture in the final product. Need for this additional process will be more during the days when humidity levels are higher.

<b>Machine</b>	<b>Origin</b>	<b>No.</b>	<b>Cost (PKR)</b>	<b>Total Cost</b>
Multistage Tunnel Dehydrator	Local	1	19,000,000	19,000,000

Cabinet Dehydrators	Local	2	4,000,000	8,000,000
<b>Total</b>				<b>27,000,000</b>

**Table 16 – Dehydration Machinery Details**

### 7.5.2.3 Finishing Machinery Details

Machine	Origin	No.	Cost (PKR)	Total Cost
Grinder	Local	1	150,000	150,000
Weighing and Packing Machine (for pieces)	Local	1	1,500,000	1,500,000
Weighing and Packing Machine (for powdered products)	Local	1	1,000,000	1,000,000
Bar Code printer	Chinese	1	1,000,000	1,000,000
<b>Total</b>				<b>3,650,000</b>

**Table 17 – Finishing Machinery Details**

### 7.5.2.4 Allied Machinery Details

Machine	Origin	No.	Cost (PKR)	Total Cost
Steam Generator	Local	1	1,500,000	1,500,000
Laboratory Equipment	Local	1	500,000	500,000
Tube well	Local	1	800,000	800,000
Fork Lifter	Chinese	1	2,500,000	2,500,000
Generator (50 KVA)	Chinese	1	2,000,000	2,000,000
Pallets set	Local	1	500,000	500,000
<b>Total</b>				<b>7,800,000</b>

**Table 18 – Allied Machinery Details**

## 7.5.3 Office Equipment and Furniture

Office equipment and furniture is required for administrative and production staff. It includes furniture, interior decoration and IT equipment. Details are presented in Table 19.

Item	No.	Cost	Total Cost (Rs)
Office Furniture	1	1,500,000	1,500,000
Office Interior	1	1,500,000	1,500,000
Laptop Computers	4	70,000	280,000
Desktop Computers	10	50,000	500,000
Printers	5	25,000	125,000
Telephone sets	20	2,000	40,000
Miscellaneous	1	200,000	00,000
<b>Total</b>			<b>4,145,000</b>

**Table 19 - Office Equipment and Furniture Cost**

## 7.5.4 Pre-Operating Expenses

Pre-operating expenses include the cost of utility connections, registration and licenses, salaries of the personnel that will be hired before the plant operations start



and the operational expenses, such as travelling, office expenses, etc. Summary of pre-operating expenses is provided in Table 20.

Pre-Operating Costs	Cost (Rs)
Registration, licenses, etc.	1,000,000
Consultancies for civil works, etc.	2,531,250
Utility Connections/Installation	4,200,000
Salaries	1,080,000
Admin. Expenses	450,000
<b>Total (Rs)</b>	<b>9,261,250</b>

Table 20 - Pre-Operating Costs

### 7.5.5 Working Capital

Initial working capital requirement has been worked out with the approach that marketing efforts will be required to penetrate the export markets following which sales will start flowing. Thus, the funds requirement for fruits/vegetables (which constitute the biggest cost component) has been calculated for six months. A similar approach has been taken for packing material. For utility costs and salaries as well, a safer time period of six months has been followed. An allocation of 2% of the machinery cost has been made for spare parts. Initial working capital requirements have been calculated for 60% capacity utilization as per the assumed capacity utilization schedule. Table 21 shows the working capital requirement.

Cost Item	Cost (PKR)	Basis
Fruits/Vegetables	126,479,011	6 months
Packing Material	4,950,000	6 months
Chemicals	92,400	6 months
Electricity bills	3,365,438	6 months
Gas charges	1,969,920	6 months
Salaries	15,090,000	6 months
Spares	1,860,000	2% of Machinery
Starting Cash Balance	10,000,000	
<b>Total Working Capital</b>	<b>163,806,768</b>	

Table 21 - Working Capital Details

## 7.6 Operating Assumptions

### 7.6.1 Revenue Assumptions

The project's revenue is obtained by selling five dried horticultural products (dried mango, dried apple, dried peas, dried onion, dried garlic) in export markets. Processing of these products will be carried out in months as per the dehydration calendar. At 100% capacity, operating 330 days a year, the plant will produce 1.65 million tons of dehydrated products. Detail is provided in Table 22.

## Pre-Feasibility Study - Dehydrated Fruits and Vegetables

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Dried Mango	-	-	-	-	-	70,000	140,000	140,000	140,000	-	-	-	490,000
Dried Apple	-	-	-	-	-	-	-	-	-	140,000	140,000	-	280,000
Dried Peas	-	130,000	140,000	-	-	-	-	-	-	-	-	-	270,000
Dried Onion	135,000	-	-	-	-	-	-	-	-	-	-	135,000	270,000
Dried Garlic	-	-	-	140,000	135,000	65,000	-	-	-	-	-	-	340,000
<b>Total</b>	<b>135,000</b>	<b>130,000</b>	<b>140,000</b>	<b>140,000</b>	<b>135,000</b>	<b>135,000</b>	<b>140,000</b>	<b>140,000</b>	<b>140,000</b>	<b>140,000</b>	<b>140,000</b>	<b>135,000</b>	<b>1,650,000</b>

Table 22 - Operating Revenue Details

### 7.6.1.1 Export Prices of Dehydrated Products

Product	Export Price (Rs/kg)
Dried Mango	700
Dried Apple	500
Dried Peas	300
Dried Onion	280
Dried Garlic	320

Table 23 - Export Sale Price of Dehydrated Products

Based on the above assumptions, revenues during the first year of the project were calculated to be PKR 449 million. Detailed revenue calculations are presented in Annex II-A. Annual growth in export market selling prices has been assumed to be 10%.

### 7.6.1.2 Capacity Utilization Schedule

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
60%	80%	100%	100%	100%	100%	100%	100%	100%	100%

Table 24 - Capacity Utilization Schedule

## 7.6.2 Costs Assumptions

### 7.6.2.1 Fruits/Vegetables Cost

The cost of fruits and vegetables is calculated on the basis of yields of dehydrated products from fresh raw materials. Table 25 shows the yields and the requirement of fresh fruits/vegetables for producing the five dehydrated products.

Product	Yield	Fruit Required (kg/kg dried product)
Dried Mango	15%	6.67
Dried Apple	14%	7.14
Dried Peas	14%	7.14
Dried Onion	11%	9.09
Dried Garlic	28%	3.57

Table 25 - Dried Products Yields from Fresh Products

#### 7.6.2.1.1 Raw Material Prices

The fruits/vegetables costs were calculated on the basis of wholesale prices of the five commodities in Multan market. Average of the prices of the commodity during the

processing months has been used. Table 26 shows the prices used for calculating fruits/vegetables cost:

Product	Cost (Rs/kg)
Dried Mango	49.4
Dried Apple	47.8
Dried Peas	31.0
Dried Onion	20.0
Dried Garlic	95.6

Table 26 - Fruits/Vegetables (Raw Material) Prices

Annual growth in raw material prices was assumed to be 10%. Based on the above-mentioned data, the total fruits and vegetables cost during the first year of operations was Rs257 million. Detailed calculations are shown in Annex II-B

#### 7.6.2.2 Chemicals Cost

Chemicals cost constitutes a small percentage of total direct cost. Sodium Bisulfite is used in the production of dried mango and dried apple. Cost of chemical per ton of dried product is Rs 400. The other processing cost is derived from LPG consumption in the blanching process carried out for peas. Total cost of chemicals during first year of production (60% capacity utilization) comes out to be PKR0.2 million. Chemicals cost has been assumed to grow at 10% per year.

#### 7.6.2.3 Packaging Cost

Packaging cost has been assumed to be Rs 10 per kg of dried product. On that basis, total packaging cost during first year of production (60% capacity utilization) comes out to be Rs9.9 million. Packaging cost has been assumed to grow at 10% per year.

#### 7.6.2.4 Electricity Cost

Electricity cost has been calculated on the basis of overall plant load of 250 KVA as per the load requirement for different products and the capacity utilization assumptions during each year. B2 Industrial supply tariff has been applied to calculate the monthly bill. An annual increase of 10% in electricity cost has been assumed. Latest electricity tariff is attached as Annex II-C

#### 7.6.2.5 LPG Cost

Liquefied Petroleum Gas (LPG) will be used as the main heating source for drying of fruits and vegetables. Heat requirement for dehydration varies with the amount of moisture in different horticultural products. Consequently, different products require different dehydration hours to attain the desired moisture levels in the final product.

LPG Cost	Dehydration hours	Operational Days	Total hours per year	Unit LPG Consumption (kg/hour)	Consumption of LPG (kg)	Cost (Rs)

Dried Mango	16	98	1,568	12	18,816	1,693,440
Dried Apple	12	56	672	12	8,064	725,760
Dried Peas	10	54	540	12	6,480	583,200
Dried Onion	6	54	324	12	3,888	349,920
Dried Garlic	8	68	544	12	6,528	587,520
<b>Total</b>		<b>330</b>	<b>3,648</b>		<b>43,776</b>	<b>3,939,840</b>

Table 27 shows the annual LPG cost calculation for the five target products for this pre-feasibility study; using a unit LPG cost of PKR 90 per kg.

LPG Cost	Dehydration hours	Operational Days	Total hours per year	Unit LPG Consumption (kg/hour)	Consumption of LPG (kg)	Cost (Rs)
Dried Mango	16	98	1,568	12	18,816	1,693,440
Dried Apple	12	56	672	12	8,064	725,760
Dried Peas	10	54	540	12	6,480	583,200
Dried Onion	6	54	324	12	3,888	349,920
Dried Garlic	8	68	544	12	6,528	587,520
<b>Total</b>		<b>330</b>	<b>3,648</b>		<b>43,776</b>	<b>3,939,840</b>

Table 27 – LPG Cost Calculation

### 7.6.3 Depreciation/Amortization

Straight line depreciation method has been applied to calculate the depreciation cost. Different rates applied to different types of assets are shown in Table 28.

Asset Type	Annual Rate
Land	0%
Machinery and Equipment	10%
Building & Civil Works	5%
Office Equipment	20%
Vehicles	20%

Table 28 - Depreciation Rates

### 7.6.4 Human Resource Plan

The project will require human resource in all important functions. Overall management will be carried out by CEO/Plant Manager who will be assisted by procurement, production, quality assurance, marketing, administration, accounts and maintenance teams. Qualified operators will be engaged to manage the dehydration operations whereas semiskilled labor will be engaged in fruits/vegetables pre-drying preparation and packaging activities. Total manpower requirement has been worked out to be 106 of which 77 will be engaged in production-related activities and 29 in administrative activities. Human resource requirements and the associated costs for administrative and production functions is presented in Table 29 to Table 31.

HR Cost	Cost -Year 1 (PKR)
Production Staff Cost	20,400,000
Administration Staff Cost	9,780,000
<b>Total</b>	<b>30,180,000</b>

Table 29 - Human Resource Cost (consolidated)

#### 7.6.4.1 Administrative Staff Details

Designation	No.	Salary (Rs/month)	Total (Rs/month)	Salary per annum
CEO/Plant Manager	1	150,000	150,000	1,800,000
Admin Officer	1	50,000	50,000	600,000
Accounts Officer	1	50,000	50,000	600,000
Accounts Assistant	1	30,000	30,000	360,000
Marketing Officers	2	50,000	100,000	1,200,000
Marketing Assistants	2	30,000	60,000	720,000
Storekeeper	1	50,000	50,000	600,000
Store Assistant	1	30,000	30,000	360,000
Security Guards	10	15,000	150,000	1,800,000
Driver	2	20,000	40,000	480,000
Office Boys	3	15,000	45,000	540,000
Sweepers	2	15,000	30,000	360,000
Gardeners	2	15,000	30,000	360,000
<b>Total Administrative Staff</b>	<b>29</b>		<b>815,000</b>	<b>9,780,000</b>

Table 30 – Administrative Staff Details

#### 7.6.4.2 Production Staff Details

Designation	No.	Salary (Rs/month)	Total (Rs/month)	Salary per annum
Production Manager	1	100,000	100,000	1,200,000
Procurement Officers	2	50,000	100,000	1,200,000
Procurement Assistants	2	30,000	60,000	720,000
Quality Assurance Officers	3	50,000	150,000	1,800,000
Shift Supervisors	3	40,000	120,000	1,440,000
Plant Operators	12	25,000	300,000	3,600,000
Plant Helpers	9	15,000	135,000	1,620,000
Maintenance Technicians	3	30,000	90,000	1,080,000
Maintenance Helpers	3	15,000	45,000	540,000
Loading/Unloading Labor	15	15,000	225,000	2,700,000
Product preparation labor	16	15,000	240,000	2,880,000
Packing labor	9	15,000	135,000	1,620,000
<b>Total Production Staff</b>	<b>78</b>		<b>1,700,000</b>	<b>20,400,000</b>

Table 31 – Production Staff Details

### 7.6.5 Financial Assumptions

No. of Projection Years	10
Discount Rate used for calculating NPV	20%

## 7.7 Financial Feasibility Analysis

### 7.7.1 Financial Feasibility

The project of Dehydration of Fruits and Vegetables is found to be financially feasible. Financial feasibility results are summarized in Table 32.

<b>IRR</b>	47.51%
<b>NPV (PKR)</b>	342,600,007
<b>Payback Period (years)</b>	2.95

Table 32 - Financial Feasibility Results

### 7.7.2 Profitability Ratios

	Amount (PKR)	Percent
<b>Sales</b>	449.0	100.0%
Cost of Sales	291.0	64.8%
<b>Gross Profit</b>	158.1	35.2%
Operating Costs	26.7	6.0%
<b>Earnings Before Interest and Taxes</b>	131.4	29.3%
<b>Net Profit</b>	85.4	19.0%

Table 33 – Profitability Ratios

### 7.7.3 Ratio Analysis

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Gross Profit Margin	35.2%	36.4%	37.1%	37.2%	37.2%	37.3%	37.3%	37.4%	37.4%	37.4%
Net Profit Margin	19.0%	21.0%	22.2%	22.3%	22.4%	22.7%	22.8%	22.8%	22.9%	23.0%
Current Ratio	3.6	3.8	4.5	4.9	5.3	5.5	5.6	5.7	5.8	713.9
ROI	23.3%	28.6%	33.1%	30.8%	29.6%	29.0%	28.7%	28.6%	28.6%	28.8%



### 7.7.4 Projected Income Statement

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<b>Operating Revenues</b>	449,040,000	658,592,000	905,564,000	996,120,400	1,095,732,440	1,205,305,684	1,325,836,252	1,458,419,878	1,604,261,865	1,764,688,052
<b>Direct Costs</b>										
Fruits/Vegetables	252,958,022	371,005,098	510,132,010	561,145,211	617,259,732	678,985,705	746,884,276	821,572,704	903,729,974	994,102,971
Chemicals and Processing Cost	199,380	292,424	402,083	442,291	486,520	535,172	588,690	647,559	712,315	783,546
Packing material	9,900,000	14,520,000	19,965,000	21,961,500	24,157,650	26,573,415	29,230,757	32,153,832	35,369,215	38,906,137
Direct Electricity	4,888,125	7,169,250	9,857,719	10,843,491	11,927,840	13,120,624	14,432,686	15,875,955	17,463,550	19,209,905
LPG cost	2,363,904	3,467,059	4,767,206	5,243,927	5,768,320	6,345,152	6,979,667	7,677,634	8,445,397	9,289,937
Payroll Production	20,400,000	22,032,000	23,794,560	25,698,125	27,753,975	29,974,293	32,372,236	34,962,015	37,758,976	40,779,694
Maintenance cost	247,262	362,650	494,523	535,733	576,944	618,154	659,364	700,574	741,785	782,995
<b>Total Direct Cost</b>	<b>290,956,692</b>	<b>418,848,482</b>	<b>569,413,101</b>	<b>625,870,278</b>	<b>687,930,980</b>	<b>756,152,515</b>	<b>831,147,675</b>	<b>913,590,272</b>	<b>1,004,221,212</b>	<b>1,103,855,185</b>
<b>Gross Profit</b>	<b>158,083,308</b>	<b>239,743,518</b>	<b>336,150,899</b>	<b>370,250,122</b>	<b>407,801,460</b>	<b>449,153,169</b>	<b>494,688,577</b>	<b>544,829,606</b>	<b>600,040,654</b>	<b>660,832,867</b>
<b>Operating Costs</b>										
Payroll Admin	9,780,000	10,562,400	11,407,392	12,319,983	13,305,582	14,370,029	15,519,631	16,761,201	18,102,097	19,550,265
Fixed Electricity	1,842,750	2,002,545	2,176,361	2,365,444	2,571,150	2,794,961	3,038,488	3,303,490	3,591,884	3,905,762
Depreciation	8,526,275	8,526,275	8,526,275	8,526,275	8,526,275	7,297,275	7,297,275	7,297,275	7,297,275	7,297,275
Amortization	1,852,250	1,852,250	1,852,250	1,852,250	1,852,250	-	-	-	-	-
Marketing Cost	2,541,000	1,613,700	879,135	937,612	1,000,464	1,068,057	1,140,786	1,219,084	1,303,423	1,394,317
Office maintenance Cost	972,900	1,025,190	1,096,209	1,172,755	1,255,302	1,344,367	1,440,515	1,544,363	1,656,587	1,777,922
Licensing/Regulatory Fee	250,000	262,500	275,625	289,406	303,877	319,070	335,024	351,775	369,364	387,832
Legal/Professional Fee	300,000	315,000	330,750	347,288	364,652	382,884	402,029	422,130	443,237	465,398
Vehicle fuel & maintenance	660,000	726,000	798,600	878,460	966,306	1,062,937	1,169,230	1,286,153	1,414,769	1,556,245
<b>Total Operating Costs</b>	<b>26,725,175</b>	<b>26,885,860</b>	<b>27,342,597</b>	<b>28,689,472</b>	<b>30,145,858</b>	<b>28,639,579</b>	<b>30,342,977</b>	<b>32,185,472</b>	<b>34,178,635</b>	<b>36,335,017</b>
<b>Earnings before interest and taxes</b>	<b>131,358,133</b>	<b>212,857,658</b>	<b>308,808,302</b>	<b>341,560,649</b>	<b>377,655,602</b>	<b>420,513,590</b>	<b>464,345,600</b>	<b>512,644,134</b>	<b>565,862,019</b>	<b>624,497,850</b>
Interest	-	-	-	-	-	-	-	-	-	-
<b>Earnings before taxes</b>	<b>131,358,133</b>	<b>212,857,658</b>	<b>308,808,302</b>	<b>341,560,649</b>	<b>377,655,602</b>	<b>420,513,590</b>	<b>464,345,600</b>	<b>512,644,134</b>	<b>565,862,019</b>	<b>624,497,850</b>
Tax	45,975,347	74,500,180	108,082,906	119,546,227	132,179,461	147,179,757	162,520,960	179,425,447	198,051,707	218,574,248
<b>Net Operating Income</b>	<b>85,382,786</b>	<b>138,357,478</b>	<b>200,725,396</b>	<b>222,014,422</b>	<b>245,476,141</b>	<b>273,333,834</b>	<b>301,824,640</b>	<b>333,218,687</b>	<b>367,810,312</b>	<b>405,923,603</b>
Balance brought forward	-	76,844,508	193,681,787	315,525,747	430,032,135	540,406,621	650,992,364	762,253,603	876,377,832	995,350,516
Total profit available for appropriation	85,382,786	215,201,986	394,407,183	537,540,169	675,508,276	813,740,455	952,817,004	1,095,472,290	1,244,188,144	1,401,274,118
Dividend	8,538,279	21,520,199	78,881,437	107,508,034	135,101,655	162,748,091	190,563,401	219,094,458	248,837,629	280,254,824
<b>Balance carried forward</b>	<b>76,844,508</b>	<b>193,681,787</b>	<b>315,525,747</b>	<b>430,032,135</b>	<b>540,406,621</b>	<b>650,992,364</b>	<b>762,253,603</b>	<b>876,377,832</b>	<b>995,350,516</b>	<b>1,121,019,295</b>

### 7.7.5 Projected Balance Sheet

<b>ASSETS</b>	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<b>Current Assets</b>											
Cash	10,000,000	121,566,742	180,280,694	202,414,912	296,599,787	383,587,949	464,335,079	542,049,830	618,549,185	695,411,064	489,757,598
Raw material	131,521,411										
Advance Processing Charges	20,425,358										
Short term securities		-	-	-	-	-	-	-	-	-	-
Accounts Receivables		224,520,000	329,296,000	452,782,000	498,060,200	547,866,220	602,652,842	662,918,126	729,209,939	802,130,933	882,344,026
Spare Parts inventory	1,860,000	1,953,000	2,050,650	2,153,183	2,260,842	2,373,884	2,492,578	2,617,207	2,748,067	2,885,470	3,029,744
<b>Total Current Assets</b>	<b>163,806,768</b>	<b>348,039,742</b>	<b>511,627,344</b>	<b>657,350,095</b>	<b>796,920,829</b>	<b>933,828,053</b>	<b>1,069,480,499</b>	<b>1,207,585,163</b>	<b>1,350,507,191</b>	<b>1,500,427,467</b>	<b>1,375,131,368</b>
<b>Fixed Assets</b>											
Land	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000
Dehydrator	27,000,000	24,300,000	21,600,000	18,900,000	16,200,000	13,500,000	10,800,000	8,100,000	5,400,000	2,700,000	-
Building & Civil Works	40,625,000	38,593,750	36,562,500	34,531,250	32,500,000	30,468,750	28,437,500	26,406,250	24,375,000	22,343,750	20,312,500
Allied Machinery and Equipment	25,660,250	23,094,225	20,528,200	17,962,175	15,396,150	12,830,125	10,264,100	7,698,075	5,132,050	2,566,025	-
Office Equipment & Furniture	4,145,000	3,316,000	2,487,000	1,658,000	829,000	-	-	-	-	-	-
Vehicles	2,000,000	1,600,000	1,200,000	800,000	400,000	-	-	-	-	-	-
<b>Net Fixed Assets</b>	<b>116,930,250</b>	<b>108,403,975</b>	<b>99,877,700</b>	<b>91,351,425</b>	<b>82,825,150</b>	<b>74,298,875</b>	<b>67,001,600</b>	<b>59,704,325</b>	<b>52,407,050</b>	<b>45,109,775</b>	<b>37,812,500</b>
<b>Other Assets</b>											
Pre-operating Expenses	9,261,250	7,409,000	5,556,750	3,704,500	1,852,250	-	-	-	-	-	-
Contingencies											
<b>Total Other Assets</b>	<b>9,261,250</b>	<b>7,409,000</b>	<b>5,556,750</b>	<b>3,704,500</b>	<b>1,852,250</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>TOTAL ASSETS</b>	<b>289,998,268</b>	<b>463,852,717</b>	<b>617,061,794</b>	<b>752,406,020</b>	<b>881,598,229</b>	<b>1,008,126,928</b>	<b>1,136,482,099</b>	<b>1,267,289,488</b>	<b>1,402,914,241</b>	<b>1,545,537,242</b>	<b>1,412,943,868</b>
<b>LIABILITIES</b>											
<b>Current Liabilities</b>											
Accounts Payables		97,009,941	133,381,739	146,882,005	161,567,826	177,722,039	195,491,467	215,037,616	236,538,141	260,188,459	1,926,306
Short term loan											
<b>Total Current Liabilities</b>	<b>-</b>	<b>97,009,941</b>	<b>133,381,739</b>	<b>146,882,005</b>	<b>161,567,826</b>	<b>177,722,039</b>	<b>195,491,467</b>	<b>215,037,616</b>	<b>236,538,141</b>	<b>260,188,459</b>	<b>1,926,306</b>
<b>Long Term Liabilities</b>											
Long term debt	-	-	-	-	-	-	-	-	-	-	-
<b>Long term debt</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Equity</b>											
Paid up Capital	289,998,268	289,998,268	289,998,268	289,998,268	289,998,268	289,998,268	289,998,268	289,998,268	289,998,268	289,998,268	289,998,268
Retained Earnings		76,844,508	193,681,787	315,525,747	430,032,135	540,406,621	650,992,364	762,253,603	876,377,832	995,350,516	1,121,019,295
<b>Total Equity</b>	<b>289,998,268</b>	<b>366,842,776</b>	<b>483,680,055</b>	<b>605,524,015</b>	<b>720,030,403</b>	<b>830,404,889</b>	<b>940,990,632</b>	<b>1,052,251,871</b>	<b>1,166,376,100</b>	<b>1,285,348,784</b>	<b>1,411,017,563</b>
<b>TOTAL LIABILITIES</b>	<b>289,998,268</b>	<b>463,852,717</b>	<b>617,061,794</b>	<b>752,406,020</b>	<b>881,598,229</b>	<b>1,008,126,928</b>	<b>1,136,482,099</b>	<b>1,267,289,488</b>	<b>1,402,914,241</b>	<b>1,545,537,242</b>	<b>1,412,943,868</b>

### 7.7.6 Projected Cash Flow Statement

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<b>Operating Activities</b>											
<b>Net Income</b>		<b>85,382,786</b>	<b>138,357,478</b>	<b>200,725,396</b>	<b>222,014,422</b>	<b>245,476,141</b>	<b>273,333,834</b>	<b>301,824,640</b>	<b>333,218,687</b>	<b>367,810,312</b>	<b>405,923,603</b>
Depreciation		8,526,275	8,526,275	8,526,275	8,526,275	8,526,275	7,297,275	7,297,275	7,297,275	7,297,275	7,297,275
Amortization		1,852,250	1,852,250	1,852,250	1,852,250	1,852,250	-	-	-	-	-
Change in raw material inventories	(131,521,411)	131,521,411	-	-	-	-	-	-	-	-	-
Change in advance processing charges	(20,425,358)	20,425,358	-	-	-	-	-	-	-	-	-
Change in spares inventory	(1,860,000)	(93,000)	(97,650)	(102,533)	(107,659)	(113,042)	(118,694)	(124,629)	(130,860)	(137,403)	(144,274)
Change in Accounts Receivables		(224,520,000)	(104,776,000)	(123,486,000)	(45,278,200)	(49,806,020)	(54,786,622)	(60,265,284)	(66,291,813)	(72,920,994)	(80,213,093)
Change in Accounts Payables		97,009,941	36,371,798	13,500,266	14,685,821	16,154,213	17,769,428	19,546,149	21,500,524	23,650,318	(258,262,153)
<b>Cash from operations</b>	<b>(153,806,768)</b>	<b>120,105,021</b>	<b>80,234,151</b>	<b>101,015,655</b>	<b>201,692,909</b>	<b>222,089,817</b>	<b>243,495,221</b>	<b>268,278,151</b>	<b>295,593,814</b>	<b>325,699,508</b>	<b>74,601,358</b>
<b>Financing Activities</b>											
Short term debt principle repayment											
Long term debt principle repayment		-	-	-	-	-	-	-	-	-	-
Addition to short term debt											
Additions to long term debt											
Issuance of shares	289,998,268										
<b>Net cash from financing activities</b>	<b>289,998,268</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Investing Activities</b>											
Capital Expenditure	(126,191,500)										
<b>Cash from investing activities</b>	<b>(126,191,500)</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Net Cash</b>	<b>10,000,000</b>	<b>120,105,021</b>	<b>80,234,151</b>	<b>101,015,655</b>	<b>201,692,909</b>	<b>222,089,817</b>	<b>243,495,221</b>	<b>268,278,151</b>	<b>295,593,814</b>	<b>325,699,508</b>	<b>74,601,358</b>
Cash balance brought forward	-	10,000,000	121,566,742	180,280,694	202,414,912	296,599,787	383,587,949	464,335,079	542,049,830	618,549,185	695,411,064
Cash investment in securities		-	-	-	-	-	-	-	-	-	-
Cash available for appropriation	10,000,000	130,105,021	201,800,893	281,296,349	404,107,821	518,689,604	627,083,170	732,613,230	837,643,643	944,248,693	770,012,422
Dividend	-	8,538,279	21,520,199	78,881,437	107,508,034	135,101,655	162,748,091	190,563,401	219,094,458	248,837,629	280,254,824
<b>Cash carried forward</b>	<b>10,000,000</b>	<b>121,566,742</b>	<b>180,280,694</b>	<b>202,414,912</b>	<b>296,599,787</b>	<b>383,587,949</b>	<b>464,335,079</b>	<b>542,049,830</b>	<b>618,549,185</b>	<b>695,411,064</b>	<b>489,757,598</b>

### 7.7.7 NPV and IRR Calculations

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Net Cash Flow (Rs)	10,000,000	120,105,021	80,234,151	101,015,655	201,692,909	222,089,817	243,495,221	268,278,151	295,593,814	325,699,508	74,601,358
Total Investor Cash outflow (Rs)	(289,998,268)										
Net Cash flows (Rs)	(289,998,268)	120,105,021	80,234,151	101,015,655	201,692,909	222,089,817	243,495,221	268,278,151	295,593,814	325,699,508	74,601,358
Accumulated Cash flows (Rs)		(169,893,248)	(89,659,097)	11,356,558	213,049,467	435,139,284	678,634,505	946,912,656	1,242,506,470	1,568,205,977	1,642,807,335
Payback period (years)		1.00	1.00	0.95	-	-	-	-	-	-	-
<b>IRR</b>	<b>47.51%</b>										
<b>NPV (Rs)</b>	<b>342,600,007</b>										
<b>Payback (years)</b>	<b>2.95</b>										

## 7.8 Sensitivity Analysis

Sensitivity of project's viability in terms of NPV was analyzed with respect to changes in different revenue and cost components. In addition, project's capacity to absorb debt cost was also analyzed. While studying the effect of one variable, all other variables have been assumed to be constant.

### 7.8.1 Project's Sensitivity to Sales Price Growth Rate

Sales prices of the final products have been assumed to grow at 10% per annum. The export market sale prices are driven by global demand-supply dynamics and the project does not have any control on those. Therefore a sensitivity analysis was carried out to know the fluctuations beyond which the project becomes infeasible. Drop in NPV with a drop in sales price growth rate are shown in Figure 51.

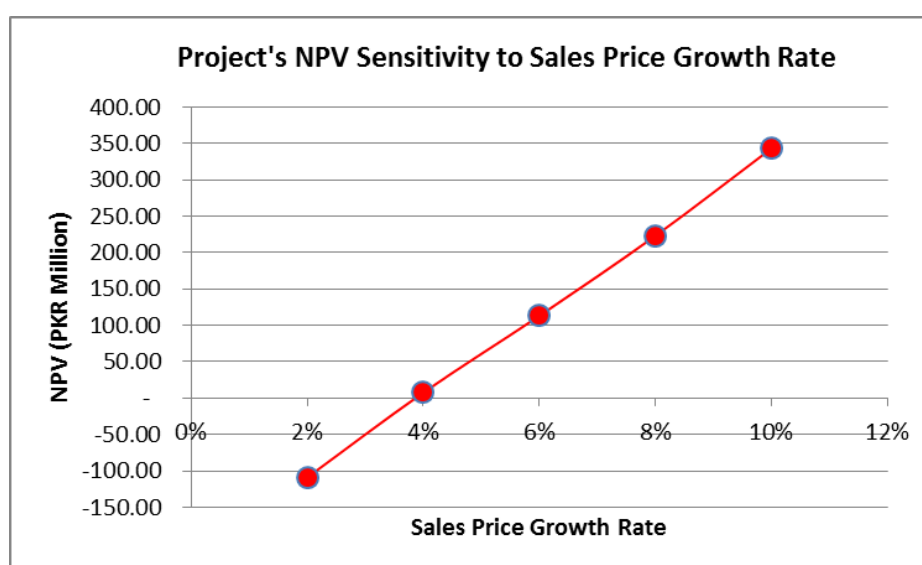


Figure 51 – Project's Sensitivity to Sales Price Growth Rate

The project remains in the feasible range as long as the sales prices of the final products grow above 3% per annum. Below this value, the project becomes financially unviable.

### 7.8.2 Project's Sensitivity to Raw Material Growth Rate

Raw material prices have been assumed to grow at 10% per annum. Just like market sale prices, the raw material (fresh vegetables) prices are also driven by demand-supply dynamics and the project does not have any control on those. Therefore a sensitivity analysis was carried out to know the fluctuations beyond which the project becomes infeasible. Project's profitability directly decreases with increase in raw material prices. Drop in NPV with increase in annual growth rate of fresh vegetables prices is shown in Figure 52.

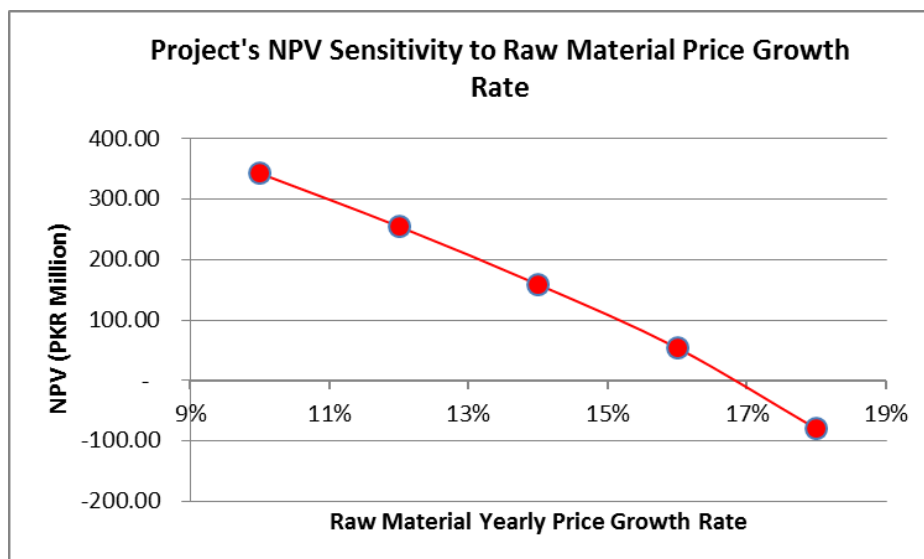


Figure 52 – Project’s Sensitivity to Raw Material Price Growth Rate

Project was found to be financially viable up to annual increase of about 16.9% in the prices of fresh vegetables/fruits. The threshold is quite above the average inflation rate and thus the risk to project’s viability due to increase in raw material prices should not be considered high.

### 7.8.3 Project’s Sensitivity to Land Price

The project assumes that land will be available in special economic zones at rates lower than the market rates. Impact on project’s viability was analyzed in case the assumption could not materialize and the project has to be established on land available on market rates. Figure 53 shows the results.

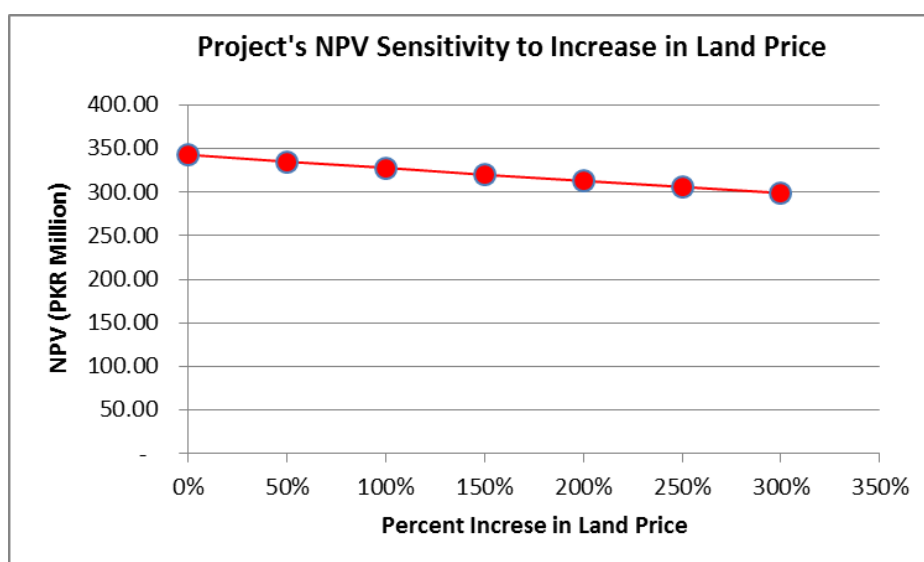


Figure 53 – Project’s Sensitivity to Increase in Land Price

The project’s viability is seen to be fairly insensitive with increase in land prices. NPV remains positive even if land is acquired at four times of the cost that has been used in project’s calculations. It is because the share of land cost in total project cost is very small (6%).



### 7.8.4 Project's Capacity to Absorb Debt

The project has been assumed to be financed solely with equity. Addition of debt in the project's capital structure directly affects the NPV due to added cost of interest payments and additional cash outflows for principle repayments. Figure 54 shows that the project has a significant capacity to absorb debt. NPV remains positive even for an 80% share of debt (15% p.a. for 10 years).

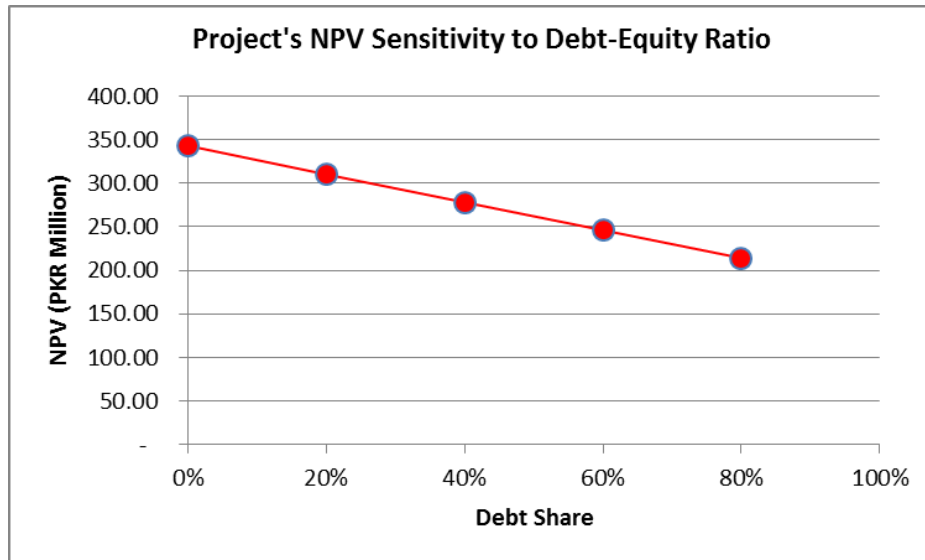


Figure 54 – Project's NPV Capacity to Absorb Debt

Impact of debt on profitability ratio was also analyzed. Net profit margin was found to be falling by about 1.2% with every 10% increase of debt in capital structure. Thus the project has a good capacity to absorb debt cost. Figure 55 shows the results.

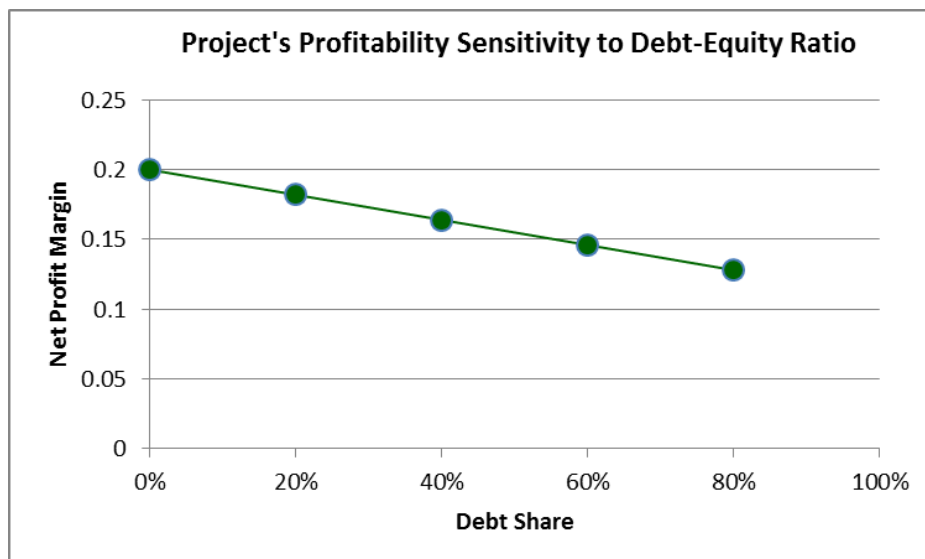
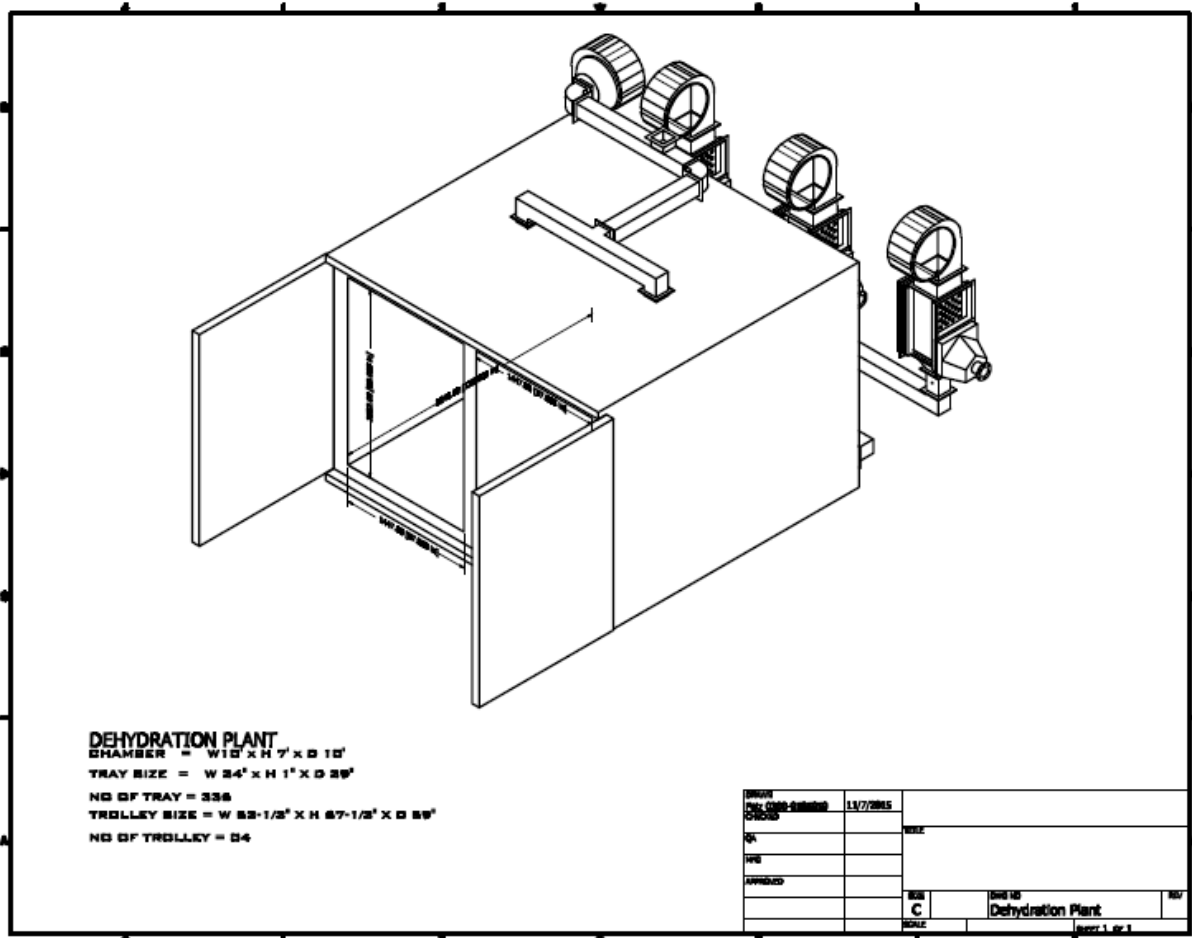


Figure 55 – Project's Profit Margin's Sensitivity to Debt ShareAnnexes

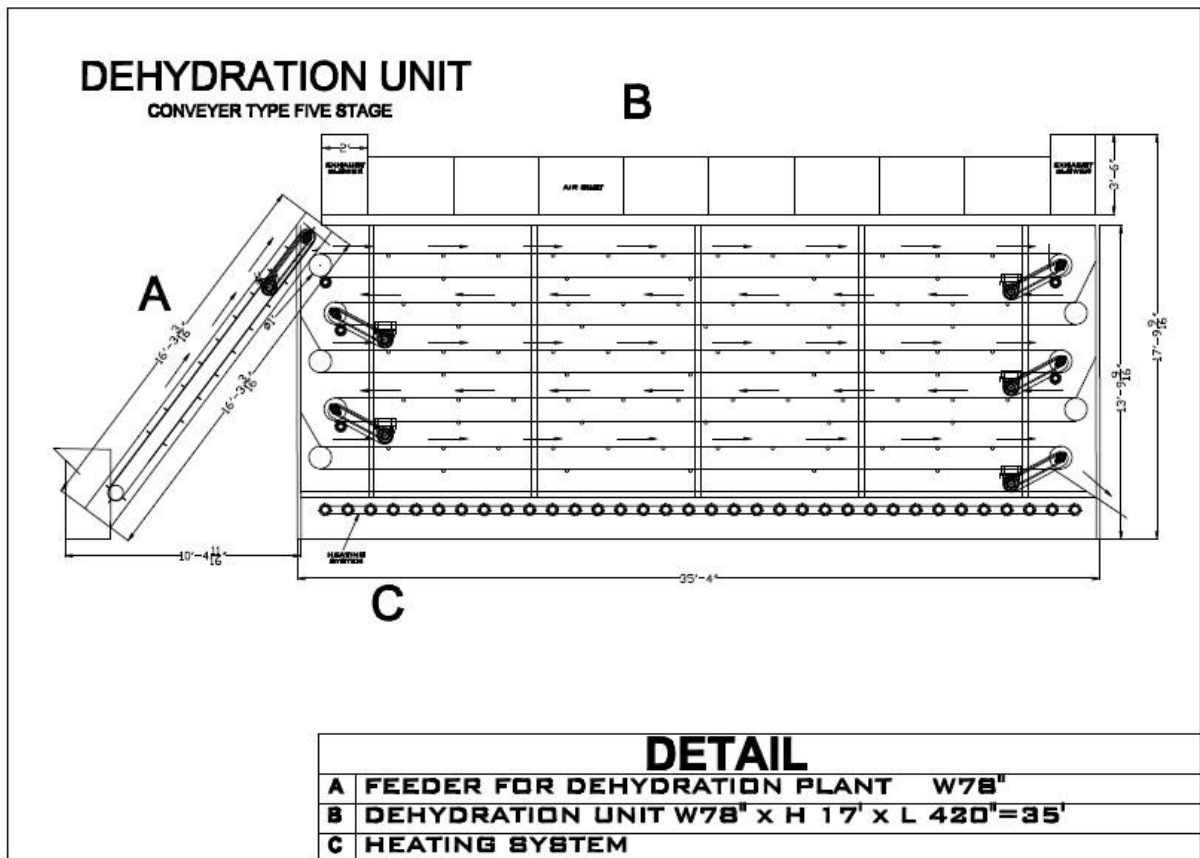
## 8.0 ANNEXES

### 8.1 Annex I - Technical Specifications of Dehydrator

#### 8.1.1 Annex I-A – Dehydration Plant Chamber



8.1.2 Annex I-B – Multistage Dehydration Unit



## 8.2 Annex II - Details of Feasibility Calculations

### 8.2.1 Annex II-A - Revenue Calculations

Revenues	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Dried Mango										
Volume produced (kg)	294,000	392,000	490,000	490,000	490,000	490,000	490,000	490,000	490,000	490,000
Selling price (Rs/kg)	700	770	847	932	1,025	1,127	1,240	1,364	1,501	1,651
Revenues from Mango	205,800,000	301,840,000	415,030,000	456,533,000	502,186,300	552,404,930	607,645,423	668,409,965	735,250,962	808,776,058
Dried Apple										
Volume produced (kg)	168,000	224,000	280,000	280,000	280,000	280,000	280,000	280,000	280,000	280,000
Selling price (Rs/kg)	500	550	605	666	732	805	886	974	1,072	1,179
Revenues from Mango	84,000,000	123,200,000	169,400,000	186,340,000	204,974,000	225,471,400	248,018,540	272,820,394	300,102,433	330,112,677
Dried Peas										
Volume produced (kg)	162,000	216,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000
Selling price (Rs/kg)	300	330	363	399	439	483	531	585	643	707
Revenues from Mango	48,600,000	71,280,000	98,010,000	107,811,000	118,592,100	130,451,310	143,496,441	157,846,085	173,630,694	190,993,763
Dried Onion										
Volume produced (kg)	162,000	216,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000
Selling price (Rs/kg)	280	308	339	373	410	451	496	546	600	660
Revenues from Mango	45,360,000	66,528,000	91,476,000	100,623,600	110,685,960	121,754,556	133,930,012	147,323,013	162,055,314	178,260,845
Dried Garlic										
Volume produced (kg)	204,000	272,000	340,000	340,000	340,000	340,000	340,000	340,000	340,000	340,000
Selling price (Rs/kg)	320	352	387	426	469	515	567	624	686	755
Revenues from Mango	65,280,000	95,744,000	131,648,000	144,812,800	159,294,080	175,223,488	192,745,837	212,020,420	233,222,463	256,544,709
<b>TOTAL</b>										
<b>Total Product Volume produced (kg)</b>	990,000	1,320,000	1,650,000	1,650,000	1,650,000	1,650,000	1,650,000	1,650,000	1,650,000	1,650,000
<b>Total Revenues (PKR)</b>	449,040,000	658,592,000	905,564,000	996,120,400	1,095,732,440	1,205,305,684	1,325,836,252	1,458,419,878	1,604,261,865	1,764,688,052

### 8.2.2 Annex II-B - Fruits/Vegetables Cost Calculations

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<b>Dried Mango</b>										
Volume produced (kg)	294,000	392,000	490,000	490,000	490,000	490,000	490,000	490,000	490,000	490,000
Fruit Required for processing	1,960,000	2,613,333	3,266,667	3,266,667	3,266,667	3,266,667	3,266,667	3,266,667	3,266,667	3,266,667
Fruit Cost (Rs/kg)	43.2	47.5	52.3	57.5	63.2	69.6	76.5	84.2	92.6	101.8
Mango cost (Rs)	84,643,253	124,143,438	170,697,228	187,766,950	206,543,645	227,198,010	249,917,811	274,909,592	302,400,551	332,640,606
<b>Dried Apple</b>										
Volume produced (kg)	168,000	224,000	280,000	280,000	280,000	280,000	280,000	280,000	280,000	280,000
Fruit Required for processing	1,200,000	1,600,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
Fruit Cost (Rs/kg)	41.9	46.0	50.7	55.7	61.3	67.4	74.2	81.6	89.7	98.7
Apple cost (Rs)	50,232,000	73,673,600	101,301,200	111,431,320	122,574,452	134,831,897	148,315,087	163,146,596	179,461,255	197,407,381
<b>Dried Peas</b>										
Volume produced (kg)	162,000	216,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000
Fruit Required for processing	1,157,143	1,542,857	1,928,571	1,928,571	1,928,571	1,928,571	1,928,571	1,928,571	1,928,571	1,928,571
Fruit Cost (Rs/kg)	27.1	29.8	32.8	36.1	39.7	43.7	48.0	52.8	58.1	63.9
Peas cost (Rs)	31,375,350	46,017,180	63,273,623	69,600,985	76,561,083	84,217,192	92,638,911	101,902,802	112,093,082	123,302,390
<b>Dried Onion</b>										
Volume produced (kg)	162,000	216,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000
Fruit Required for processing	1,472,727	1,963,636	2,454,545	2,454,545	2,454,545	2,454,545	2,454,545	2,454,545	2,454,545	2,454,545
Fruit Cost (Rs/kg)	17.5	19.2	21.2	23.3	25.6	28.2	31.0	34.1	37.5	41.2
Onion cost	25,762,418	37,784,880	51,954,210	57,149,631	62,864,594	69,151,054	76,066,159	83,672,775	92,040,052	101,244,057
<b>Dried Garlic</b>										
Volume produced (kg)	204,000	272,000	340,000	340,000	340,000	340,000	340,000	340,000	340,000	340,000
Fruit Required for processing	728,571	971,429	1,214,286	1,214,286	1,214,286	1,214,286	1,214,286	1,214,286	1,214,286	1,214,286
Fruit Cost (Rs/kg)	83.7	92.0	101.2	111.3	122.5	134.7	148.2	163.0	179.3	197.2
Garlic cost	60,945,000	89,386,000	122,905,750	135,196,325	148,715,958	163,587,553	179,946,309	197,940,939	217,735,033	239,508,537
<b>Total Fruit Cost (PKR)</b>	<b>252,958,022</b>	<b>371,005,098</b>	<b>510,132,010</b>	<b>561,145,211</b>	<b>617,259,732</b>	<b>678,985,705</b>	<b>746,884,276</b>	<b>821,572,704</b>	<b>903,729,974</b>	<b>994,102,971</b>

### 8.2.3 Annex II-C - Electricity Supply Tariff

B Industrial Supply Tariff								
Sr. No.	Tariff Category/Particulars	Fixed Charges Rs/KW/M	Variable Charges (Rs/KWh)		GOP Tarrif Rtionalization			
					Government Subsidy		Surcharge	
					Fixed Charges Rs/Kw/M	Variable Charges Rs/Kw/M	Variable Charges Rs/Kw/M	
B1 (a)	Up to 25 kw (at 400/230 volts)	-	12		-	-	-	2.5
B2(a)	exceeding 25-500 Kw (at 400	400	11.5		-	-	-	2.5
	Time of Use		Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
B1 (b)	Up to 25 kw	-	15	9.5	-	-	3	3
B2 (b)	exceeding 25-500 Kw (at 400	400	15	9.5	-	-	3	2.99
B3	For All Loads up to 5000 KW(at 11,33 KV)	380	15	9.5	-	-	3	3.1
B4	For All Loads (at 66,132 KV & above)	360	15	9.5	-	-	3	3.1
For B1 consumers there shall be fixed minimum charge of Rs. 350 per month.								
For B2 consumers there shall be fixed minimum charge of Rs. 2,000 per month.								
For B3 consumers there shall be fixed minimum charge of Rs. 50,000 per month.								
For B4 consumers there shall be fixed minimum charge of Rs. 500,000 per month.								

PEAK / OFF PEAK TIMINGS		
Season	Peak Timing	Off-Peak Timing
Dec to Feb	5 PM to 9 PM	Remaining 20 hours
Mar to	6 PM to 10 PM	-do-
Jun to	7 PM to 11 PM	-do-
Sep to	6 PM to 10 PM	-do-



### 8.2.4 Annex II-D - Depreciation Schedule

		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	Rate	Opening Balance	Depreciation	Depreciation	Depreciation	Depreciation	Depreciation	Depreciation	Depreciation	Depreciation	Depreciation	Depreciation
Land	0%	17,500,000	-	-	-	-	-	-	-	-	-	-
Multistage Dehydrator	10%	27,000,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000	2,700,000
Building & Civil Works	5%	40,625,000	2,031,250	2,031,250	2,031,250	2,031,250	2,031,250	2,031,250	2,031,250	2,031,250	2,031,250	2,031,250
Preparation/Finishing/Allied Ma	10%	25,660,250	2,566,025	2,566,025	2,566,025	2,566,025	2,566,025	2,566,025	2,566,025	2,566,025	2,566,025	2,566,025
Office Equipment	20%	4,145,000	829,000	829,000	829,000	829,000	829,000	-	-	-	-	-
Vehicles	20%	2,000,000	400,000	400,000	400,000	400,000	400,000	-	-	-	-	-
<b>Total</b>		<b>116,930,250</b>	<b>8,526,275</b>	<b>8,526,275</b>	<b>8,526,275</b>	<b>8,526,275</b>	<b>8,526,275</b>	<b>7,297,275</b>	<b>7,297,275</b>	<b>7,297,275</b>	<b>7,297,275</b>	<b>7,297,275</b>
<b>Year End Value</b>												
		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Land		17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000	17,500,000
Multistage Dehydrator		27,000,000	24,300,000	21,600,000	18,900,000	16,200,000	13,500,000	10,800,000	8,100,000	5,400,000	2,700,000	-
Building & Civil Works		40,625,000	38,593,750	36,562,500	34,531,250	32,500,000	30,468,750	28,437,500	26,406,250	24,375,000	22,343,750	20,312,500
Preparation/Finishing/Allied Machinery		25,660,250	23,094,225	20,528,200	17,962,175	15,396,150	12,830,125	10,264,100	7,698,075	5,132,050	2,566,025	-
Office Equipment		4,145,000	3,316,000	2,487,000	1,658,000	829,000	-	-	-	-	-	-
Vehicles		2,000,000	1,600,000	1,200,000	800,000	400,000	-	-	-	-	-	-
<b>Total</b>		<b>116,930,250</b>	<b>108,403,975</b>	<b>99,877,700</b>	<b>91,351,425</b>	<b>82,825,150</b>	<b>74,298,875</b>	<b>67,001,600</b>	<b>59,704,325</b>	<b>52,407,050</b>	<b>45,109,775</b>	<b>37,812,500</b>
<b>AMORTIZATION SCHEDULE</b>												
	Rate	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Pre-operating Expenses	20%	9,261,250	1,852,250	1,852,250	1,852,250	1,852,250	1,852,250	-	-	-	-	-
Accumulated Amortization cost			1,852,250	3,704,500	5,556,750	7,409,000	9,261,250	9,261,250	9,261,250	9,261,250	9,261,250	9,261,250
Year end value		9,261,250	7,409,000	5,556,750	3,704,500	1,852,250	-	-	-	-	-	-

## 8.2.5 Annex II-E - Key Assumptions Summary

### 8.2.5.1 Working Capital Assumptions

	No. of Months
Accounts Receivables	6
Accounts Payables	
Vegetables	3
Packing Material	3
Electricity bill	1

Table 34 – Working Capital Assumptions

### 8.2.5.2 Operating Assumptions

Sale price growth rate per year	10%
Vegetable cost growth rate per year	10%
Electricity Cost growth	10%
LPG cost growth rate	10%
Chemicals cost growth rate	10%
Packing material growth rate	10%
Payroll growth rate	8%
Machine maintenance (% of machine cost)	1%
Machine maintenance increase per year	0.10%
Diesel cost (PKR/liter)	80

Table 35 – Operating Assumptions

### 8.2.5.3 Financial Assumptions

Cost of capital (for discounting)	20%
Amortization rate	10%
Depreciation rate	10%
Tax Rate	35%

Table 36 – Financial Assumptions