

Feasibility Study

Consumer Pack Fruit Juices



Agriculture Department
Government of Punjab

September 2018

Acronyms

| Acronym | Description |
|---------|---|
| CEO | Chief Executive Officer |
| CIP | Cleaning in Place |
| CMC | Carboxy Methyl Cellulose |
| CPEC | China Pakistan Economic Corridor |
| FAO | Food and Agriculture Organization |
| FCKJ | Frozen Concentrated Kinnow Juice |
| GDP | Gross Domestic Product |
| HS | Harmonized System |
| IMF | International Monetary Fund |
| IRR | Internal Rate of Return |
| ITC | International Trade Center |
| JNSD | Juice, Nectars and Still Drinks |
| LDPE | Low Density Polyethylene |
| NFC | Not from Concentrate |
| NPV | Net Present Value |
| PET | Polyethylene Terephthalate |
| PKR | Pakistan Rupee |
| RAD | Radiation Absorbed Dose |
| RO | Reverse Osmosis |
| RTD | Ready-to-Drink |
| SMEDA | Small and Medium Enterprise Development Authority |
| TBA | Tetra Brik Aseptic |
| TVC | Television Commercial |
| UAE | United Arab Emirates |
| UCM | Unit Contribution Margin |
| UK | United Kingdom |
| UN | United Nations |
| USA | United States of America |
| USD | United States Dollar |

Table of Contents

| | | |
|------------|--|-----------|
| 1.0 | EXECUTIVE SUMMARY | 1 |
| 1.1 | Project Summary Sheet..... | 5 |
| 2.0 | INTRODUCTION..... | 6 |
| 2.1 | Economic Context..... | 6 |
| 2.2 | Agriculture Sector Overview | 6 |
| 2.3 | Horticulture Sector of Punjab | 8 |
| 2.4 | Horticulture Value Added products | 11 |
| 2.4.1 | Ready-to-Drink Juices | 11 |
| 2.5 | Opportunity Rationale..... | 12 |
| 2.5.1 | Abundant Availability of Raw Material | 12 |
| 2.5.2 | Value Addition Potential..... | 12 |
| 2.5.3 | Large Growing Market | 13 |
| 2.5.4 | Opportunities in Export Market | 13 |
| 2.5.5 | Availability of Technical Knowhow | 13 |
| 2.5.6 | China-Pakistan Economic Corridor | 13 |
| 2.5.7 | Punjab Horticulture Sector Development | 13 |
| 3.0 | CONSUMER PACK FRUIT JUICES PRODUCTION | 15 |
| 3.1 | Main Processes..... | 15 |
| 3.2 | Plant Utilities | 15 |
| 3.3 | Process Flow Description | 15 |
| 3.3.1 | Raw Materials | 15 |
| 3.3.2 | Raw Materials Blending | 16 |
| 3.3.3 | Processing of Juice/Nectars/drinks | 17 |
| 3.3.4 | Tetra Pak Filling | 20 |
| 4.0 | FRUIT JUICE EXPORT MARKET ANALYSIS | 23 |
| 4.1 | Fruit Juices International Trade | 23 |
| 4.2 | Fruit Juice International Trade..... | 24 |
| 4.2.1 | Exports Products Distribution..... | 25 |
| 4.2.2 | Export Products Trends..... | 26 |
| 4.2.3 | Major Fruit Juices Exporting Countries..... | 27 |
| 5.0 | PAKISTAN’S TRADE IN FRUIT JUICES | 31 |
| 5.1 | Pakistan’s Fruit Juice Exports..... | 31 |
| 5.1.1 | Pakistan Fruit Juice Exports – Trading Partners..... | 33 |
| 5.1.2 | Export Price of Pakistan’s Fruit Juices | 36 |
| 5.2 | Pakistan’s Imports of Fruit Juices..... | 37 |

| | | |
|------------|---|-----------|
| 6.0 | LOCAL MARKET ANALYSIS | 39 |
| 6.1.1 | Local JNSD Market Size | 40 |
| 6.1.2 | Market Distribution by Juice Categories | 40 |
| 6.1.3 | Market Distribution by Flavors..... | 41 |
| 6.1.4 | Major Brands in Local Juice Market | 42 |
| 7.0 | THE PROPOSED BUSINESS..... | 47 |
| 7.1 | Purpose of the Business | 47 |
| 7.2 | Product Line..... | 47 |
| 7.3 | Suggested Location..... | 48 |
| 7.4 | Plant Capacity | 48 |
| 7.5 | Project Cost..... | 49 |
| 7.5.1 | Land and Building..... | 49 |
| 7.5.2 | Machinery & Packaging Paper | 51 |
| 7.5.3 | Laboratory Equipment | 54 |
| 7.5.4 | Office Equipment and Furniture | 55 |
| 7.5.5 | Vehicles..... | 55 |
| 7.5.6 | Pre-Operating Expenses..... | 56 |
| 7.5.7 | Working Capital..... | 57 |
| 7.6 | Operating Assumptions..... | 58 |
| 7.6.1 | Revenue Assumptions..... | 58 |
| 7.6.2 | Costs Assumptions..... | 63 |
| 7.6.3 | Chemicals and Lab Cost | 65 |
| 7.6.4 | Furnace Oil..... | 66 |
| 7.6.5 | Electricity Cost..... | 66 |
| 7.6.6 | Depreciation/Amortization | 66 |
| 7.6.7 | Human Resource Plan..... | 67 |
| 7.7 | Financial Feasibility Analysis..... | 69 |
| 7.7.1 | Key Financial Assumptions | 69 |
| 7.7.2 | Financial Feasibility..... | 69 |
| 7.7.3 | Profitability Ratios | 69 |
| 7.7.4 | Projected Income Statement | 70 |
| 7.7.5 | Projected Balance Sheet..... | 71 |
| 7.7.6 | Projected Cash Flow Statement | 72 |
| 7.7.7 | Financial Feasibility Results | 73 |
| 7.8 | Sensitivity Analysis | 74 |
| 7.8.1 | Project’s Sensitivity to Sales Price | 74 |
| 7.8.2 | Project’s Sensitivity to Fruit Juice Sale Price Growth..... | 74 |
| 7.8.3 | Project’s Sensitivity to Pulps/Concentrates Cost..... | 75 |
| 7.8.4 | Project’s Sensitivity to Tetra Pak Paper Cost | 76 |
| 7.8.5 | Project’s Sensitivity to Land Cost..... | 76 |
| 7.8.6 | Project’s Capacity to Absorb Debt | 77 |
| 8.0 | ANNEXES | 78 |
| 8.1 | Annex I – Glossary of Technical Terms | 78 |

| | | |
|-------|---|-----|
| 8.2 | Annex II – Comparison of Frozen and Aseptic Pulps/Concentrates | 81 |
| 8.3 | Annex III – Examples of Specialized Drinks | 83 |
| 8.4 | Annex IV – Details of Project Cost Calculations | 84 |
| 8.4.1 | Annex IV-A – Pre-Operating Cost Details | 84 |
| 8.4.2 | Annex IV-B – Working Capital Details..... | 85 |
| 8.5 | Annex V – Operating Revenues Details (Year 1)..... | 86 |
| 8.5.1 | Annex V-A - 1000 ml Packs Revenue Calculations | 86 |
| 8.5.2 | Annex V-B - 200 ml Packs Revenue Calculations | 86 |
| 8.5.3 | Annex V-C - 250 ml Packs Revenue Calculations | 87 |
| 8.5.4 | Annex V-D - Mango Nectar 1000 ml Revenues Projections..... | 88 |
| 8.5.5 | Annex V-E - Mango Nectar 200 ml Revenues Projections | 88 |
| 8.5.6 | Annex V-F - Mango Drink 250 ml Revenues Projections..... | 88 |
| 8.5.7 | Annex V-G - Revenues Summary | 89 |
| 8.6 | Annex VI – Raw Material Costs Details (Year 1) | 90 |
| 8.6.1 | Annex VI-A – Recipes of Different Juice Products..... | 90 |
| 8.6.2 | Annex VI-B - Juice Ingredients Costs | 91 |
| 8.6.3 | Annex VI-C - Packaging Costs..... | 95 |
| 8.6.4 | Annex VI-D - Raw Material Cost Projections of Selected Products | 97 |
| 8.7 | Annex VII – Other Operating Cost Details (Year 1) | 100 |
| 8.7.1 | Annex VII-A – Chemicals & Lab Cost Calculations..... | 100 |
| 8.7.2 | Annex VII-B – Furnace Oil Cost Calculations | 100 |
| 8.7.3 | Annex VII-C – Electricity Bill Calculations..... | 101 |
| 8.7.4 | Annex VII-D – Depreciation & Amortization Calculations | 102 |
| 8.8 | Annex VIII – Key Assumptions | 104 |

Table of Tables

| | |
|---|----|
| Table 1 – Fruit Juice Manufacturing Operations | 15 |
| Table 2 – Utilities Required for Fruit Juice Manufacturing..... | 15 |
| Table 3 – HS Codes of Fruit Juices..... | 23 |
| Table 4 – Global Export Growth Rates of Different Fruit Juice Products | 27 |
| Table 5 – Major Orange Juice Exporting Countries - 2016..... | 28 |
| Table 6 – Major Grapefruit Juice Exporting Countries - 2016..... | 29 |
| Table 7 – Major Apple Juice Exporting Countries - 2016..... | 29 |
| Table 8 – Major ‘Other juices’ Exporting Countries - 2016..... | 30 |
| Table 9 – Major Mixed Fruit Juice Exporting Countries - 2016..... | 30 |
| Table 10 – Average Unit Prices of ‘Mixed Fruit Juices’ Exported by Pakistan - 2016..... | 36 |
| Table 11 – Average Unit Prices of ‘Other Fruit Juices’ Exported by Pakistan - 2016..... | 37 |
| Table 12 – Project’s Proposed Product Line..... | 47 |
| Table 13 – Production Capacities of the Suggested Machines | 49 |
| Table 14 - Project Cost Details | 49 |
| Table 15 – Land Cost..... | 50 |
| Table 16 – Civil Construction Cost of Buildings..... | 50 |
| Table 17 – Civil Construction Cost in Open Spaces..... | 51 |
| Table 18 – Total Civil Construction Cost | 51 |
| Table 19 - Machinery & Equipment Cost..... | 53 |
| Table 20 – Tetra Pak Machines Capacities..... | 53 |
| Table 21 – Tetra Pak Machinery Cost | 53 |
| Table 22 – Processing Machinery Cost Details | 54 |
| Table 23 – Utility/Allied Machinery Cost Details | 54 |
| Table 24 – Laboratory Equipment Cost..... | 55 |
| Table 25 - Office Equipment and Furniture Cost | 55 |
| Table 26 – Vehicles Cost..... | 55 |
| Table 27 - Pre-Operating Costs..... | 56 |
| Table 28 - Working Capital Details | 57 |
| Table 29 – Capacity Utilization in Different Months | 59 |
| Table 30 - Capacity Utilization Schedule | 59 |
| Table 31 – Proposed Flavor Mix..... | 60 |
| Table 32 – Proposed Sale Prices of 1000 ml Packs | 61 |
| Table 33 – Proposed Sale Prices of 200 ml Packs | 61 |
| Table 34 – Proposed Sale Prices of 250 ml Packs | 62 |
| Table 35 – Project’s First Year Revenues Summary | 62 |
| Table 36 – 1000 ml First Year Revenues Summary | 62 |
| Table 37 – 200 ml First Year Revenues Summary | 63 |
| Table 38 – 250 ml First Year Revenues Summary | 63 |
| Table 39 – Pulps/Concentrates Costs (Year 1) | 64 |
| Table 40 – Juice Ingredients Costs (Year 1)..... | 64 |
| Table 41 – Raw Material Costs per Pack (Year 1)..... | 65 |
| Table 42 – Tetra Pak and Other Packaging Materials Costs (Year 1) | 65 |
| Table 43 – Packaging Costs per Pack (Year 1)..... | 65 |
| Table 44 – Electricity Load..... | 66 |
| Table 45 - Depreciation Rates..... | 67 |
| Table 46 - Human Resource Cost –Direct vs. Indirect | 67 |

| | |
|---|----|
| Table 47 –Project Staff Details | 68 |
| Table 48 - Financial Feasibility Results..... | 69 |
| Table 49 – Profitability Ratios..... | 69 |
| Table 50 – Concentrate Preservation Methods Comparison..... | 82 |

Table of Figures

| | |
|--|----|
| Figure 1 - Pakistan Agriculture Subsectors Distribution | 7 |
| Figure 2 - Punjab's Share in Cultivated Areas of Different Commodity Groups..... | 7 |
| Figure 3 - Punjab's Share in Production of Different Commodity Groups | 8 |
| Figure 4 - Punjab's Horticultural Production Distribution | 9 |
| Figure 5 - Punjab's Share in Fruit Production | 10 |
| Figure 6 - Punjab's Share in Vegetable Production..... | 10 |
| Figure 7 - Punjab's Share in Potato Production..... | 10 |
| Figure 8-Punjab's Share in Condiments Production | 10 |
| Figure 9 - Punjab's Horticultural Production Trend 2011-15..... | 10 |
| Figure 10 - Aseptic Bags for Fruit Pulp/Concentrates | 16 |
| Figure 11 - Juice Blending System | 17 |
| Figure 12 - De-Aerator..... | 18 |
| Figure 13 - Homogenizer | 19 |
| Figure 14 – Pasteurizer | 19 |
| Figure 15 - Tetra Pak Filling Machine..... | 20 |
| Figure 16 - Straw Applicator | 21 |
| Figure 17 – Process Flow Chart for Consumer Pack Fruit Juice Manufacturing | 22 |
| Figure 18 – Global Fruit Juice Exports Trend (Value) | 24 |
| Figure 19 – Global Fruit Juice Exports Trend (Quantity)..... | 24 |
| Figure 20 –Global Fruit Juice Exports – 2016 – Product Distribution (Value) | 25 |
| Figure 21 – Global Fruit Juice Exports – 2016 – Product Distribution (Quantity)..... | 26 |
| Figure 22 – Global Fruit Juice Exports - Product Category Trends (Value) | 26 |
| Figure 23 – Global Fruit Juice Exports - Product Category Trends (Quantity)..... | 27 |
| Figure 24 – Pakistan Fruit Juice Exports (Value) | 31 |
| Figure 25 –Fruit Juice Exports - Product Category Trends (Quantity)..... | 32 |
| Figure 26 –Pakistan Fruit Juice Exports - Product Categories | 32 |
| Figure 27 – Pakistan Fruit Juice Exports - Product Category Trends (Quantity) | 33 |
| Figure 28 – Pakistan ‘Other Fruit Juice Exports – Trading Partners Shares (Quantity)..... | 33 |
| Figure 29 – Pakistan ‘Other Fruit Juice Exports – Trading Partners Trends (Quantity)..... | 34 |
| Figure 30 – Pakistan ‘Mixture of Juices’ Exports – Trading Partners Shares (Quantity)..... | 35 |
| Figure 31 – Pakistan ‘Other Fruit Juice Exports – Trading Partners Trends (Quantity)..... | 35 |
| Figure 32 – Pakistan Fruit Juice Imports Trends – (Value and Quantity) | 37 |
| Figure 33 – Pakistan Fruit Juice Imports – Products Distribution (Quantity) | 38 |
| Figure 34 – Pakistan Fruit Juice Exports – Trading Partners (Quantity) | 38 |
| Figure 35 – Cold Beverage Market Product Classification | 39 |
| Figure 36 – Local Fruit Juice Market – Flavor-wise Distribution | 41 |
| Figure 37 - Nestlé’s Juice and Nectar Products | 42 |
| Figure 38 - Nestlé’s Still Drink Products..... | 43 |
| Figure 39 - Popular 200 ml Pure Juices and Nectars Products | 43 |
| Figure 40 - Popular 200 ml Juices Drinks Products..... | 43 |
| Figure 41 - Popular 250 ml Juices Drinks Products for Export Markets | 44 |
| Figure 42 - Shezan Pure Juice and Nectar Products | 44 |
| Figure 43 - Shezan Still Drinks Products..... | 44 |
| Figure 44 - CitroPak (Fruitien) Juice and Nectar Products..... | 45 |
| Figure 45 – Shakarganj Foods (Anytime) Juice and Nectar Products | 45 |
| Figure 46 – Shakarganj Foods Still Drinks Products..... | 45 |
| Figure 47 – Common Fruit Drinks Brands | 46 |

| | |
|---|----|
| Figure 48 – Proposed Capacity Plan during the Year | 59 |
| Figure 49 – Project’s Sensitivity to Juice Sales Price | 74 |
| Figure 50 – Project’s Sensitivity to Juice Sales Price Growth..... | 75 |
| Figure 51 – Project’s Sensitivity to Pulps/Concentrates Cost..... | 75 |
| Figure 52 – Project’s Sensitivity to Tetra Pak Cost..... | 76 |
| Figure 53 – Project’s Sensitivity to Increase in Land Price | 76 |
| Figure 54 – Project’s NPV and IRR Sensitivity to Debt Share..... | 77 |
| Figure 55 – Project’s Profit Margin’s Sensitivity to Debt Share | 77 |

Disclaimer

This document has been prepared with the objective to provide basic information about the subject business proposition. The content of the document has been derived from data and information collected from various reliable secondary and primary sources and is based on certain assumptions. While reasonable due diligence has been carried out during information collection and working out the presented calculations, the reader is strongly encouraged to carry out any further scrutiny and diligence to collect any other information that may be deemed necessary to take an informed decision. Professional advice from qualified technical expert/consultant should preferably be sought before taking any decision to act upon the information presented in the document. Department of Agriculture, Government of Punjab does not assume any liability for any financial or other loss in consequence of undertaking any activity on the basis of the information provided in the document.

1.0 EXECUTIVE SUMMARY

Agriculture sector holds a pivotal position in the economy of Pakistan. The sector contributes 18.9% to GDP, 42.3% to labor force and supplies raw materials to several value added sectors of the country. The sector offers host of attractive opportunities for private sector investment. Horticulture is an important subsector producing large volumes of wide variety of fruits, vegetables and condiments. Major share of national horticultural production is contributed by the province of Punjab. Lack of proper harvest and post-harvest practices is a major issue that leads to wasting significant share of horticultural production. Surplus fruit production can be converted into various high value added products like pulps, purees, concentrates, fruit juices/drinks, dehydrated fruits and vegetables, squashes, canned products, frozen fruits and vegetables, jam, jellies, syrups, etc. Value addition is an effective way to reduce post-harvest losses and increase the economic value of the produce for the farmers, traders and other stakeholders in the value chain.

Pure fruit juices, nectars and drinks are prepared from pulps, purees and concentrates which are obtained by processing fresh fruits. These raw materials are either stored aseptically or packed in food grade drums and stored at freezing temperatures. For producing fruit juices, these raw materials are reconstituted with water and other ingredients as per defined recipes and packed in consumer packing which may be Tetra Pak, glass bottle, PET bottle or metal can. Fruit juices are marketed in packs of different sizes; in line with the market demand.

The investment opportunity of consumer juice manufacturing unit derives its rationale from an abundant local availability of fruits, high value addition potential and large growing demand in local and international markets. The local juice market has expanded manifold over the past decade. In addition, Pakistani juice products are also exported to various destinations around the world. There is a high potential to further capitalize on this presence and increase the exports of these products. There is sufficient availability of trained technical and management human resource in the local market to run the business of fruit juice manufacturing. During recent years, CPEC has also emerged as a new window of opportunity which is creating new possibilities of trade between Pakistan and China.

Fruit pulps/concentrates are the key raw materials that are sourced from local and import markets and checked for the desired quality parameters of brix, acidity and microbiological parameters to ensure production of good quality juice products. Tetra Pak paper and other ingredients are also procured and checked for the desired quality parameters. Frozen pulps/concentrates are stored at freezing temperatures of -18C and aseptically filled products are stored at 10-15C.

For producing juice, the operations of syrup making, stabilizer preparation and juice blending are carried out. All the juice ingredients are mixed as per the defined recipe. The prepared juice batch is standardized and examined for brix, acidity, color and taste. The juice is preheated to around 60C and de-aeration is carried out. It is followed by homogenization and pasteurization at 90-97C. The hot juice is aseptically cooled to 30C for filling into Tetra Pak

packaging. Tetra Pak paper is sterilized by chemicals and the pack is filled with juice and sealed in the aseptic chamber without being exposed to external environment.

Fruit juices have a large export market. In 2016, total global trade of ready-to-drink juices was 8.83 million tons with a value of USD 7.89 billion. The export market, during the period from 2007 to 2016, grew by 80% in quantity term and 121% in value term. Orange juice was the biggest product in single juice category that accounted for 38% of the total traded quantity of fruit juices. Apple juice was the second largest product with 8.8% share of the total exported quantity. The other two large product categories were ‘mixture of juices’ and ‘other juices’ that respectively accounted for 21% and 18% shares of the total global trade of fruit juices. During the period from 2007 to 2016, the global exports of orange and apple juices respectively increased by 34% and 49%. The trade of ‘Mixture of juices’ and ‘other juices’ grew by 47% and 38% respectively.

Brazil is the largest exporter of orange juice in the world that held 38% share of the total market in 2016. It was followed by Belgium and Netherlands. Germany, Poland and Italy were the three largest exporters of apple juice. Saudi Arabia was the largest exporter in ‘Mixture of juices’ and ‘other juices categories. Pakistan is a small player in the international trade of fruit juices. In 2016, the country exported 4,663 tons of juice with a value of USD 5.7 million. Pakistan’s fruit juices exports include only two product categories. 70% exports fell under the category of ‘mixture of juices’ and 30% under the ‘other juices’ category. UK, Canada, Afghanistan and USA are the key importers of fruit juices from Pakistan. These are mainly the countries where a sizeable population of overseas Pakistanis resides. The local demand of fruit juices is mainly fulfilled by local manufacturing industry; however, there is a small share of imported juices as well. Pakistan imports fruit juices mainly from UAE, Turkey, Thailand and Malaysia. In 2016, Pakistan’s ready-to-drink juice imports were 4,647 tons with a value of USD 4.8 million.

Pakistan has a large local fruit juice market which has grown exponentially over the years to develop a diverse portfolio of ready-to-drink fruit juices, nectars and still drinks (JNSD). Increased health consciousness, rising disposable incomes of middle to high income families and increased penetration in newer market in peri-urban and rural areas have been the key drivers of this growth. The size of JNSD market in 2018 is estimated to be around 2.0 billion liters. During the past decade, the market has grown consistently at an average annual rate of around 15%. About two third of the total market is accounted by fruit drinks. The share of pure juices and nectars in the total Tetra Pak market is around 28%. Mango is the most popular flavor in the local market. Around 50% of the JNSD market is accounted by mango nectars and drinks. Nestle, Shezan, Popular, CitroPak and Shakarganj Foods are the large juice manufacturing companies in the local market. In addition, there are around hundred smaller enterprises that manufacture and sell fruit juices in the country under less popular brand names.

The purpose of the proposed business is to manufacture consumer pack fruit juices using local and imported pulps, purees and concentrates. Major share of production will be sold in the local market with the balance being exported. A diverse product line has been suggested that includes products in all the three categories of pure juice, nectars and drinks. The flavors

include orange, mango, apple, red grapes, peach, pineapple, guava, pomegranate, mango-orange and mixed fruit; marketed in 1000 ml, 200 ml and 250 ml packs. The proposed location for the project is Lahore. The manufacturing capacity of the unit has been based on three Tetra Pak machines of 1000 ml, 200 ml and 250 ml packs; with hourly filling capacities of 7,000, 7,500 and 7,500 packs respectively.

Total cost of the project has been estimated to be PKR 426.98 million. Capital cost constitutes 75.5% of the total project cost and the working capital the balance 24.5%. Total land requirement for the project is three acres. Total covered area of the buildings is estimated to be 25,700 sq. ft. that entails a civil construction cost of PKR 45.78 million. To reduce the project's cost, the use of reconditioned Tetra Pak machines and processing lines has been suggested. Total machinery cost has been estimated to be PKR 197.5 million; of which PKR 120 million is the cost of Tetra Pak machines, PKR 41.85 million is the cost of the processing machinery and the balance of utility/allied machinery and cold store. The project requires pre-operating expenses of PKR 36.31 million and a working capital of PKR 104.51 million. The project is assumed to be financed with 100% equity.

The project will be run at different operational capacities during different months of the year. During the four summer months from May to August, the plant will operate at full capacity. It will operate at 50% capacity for two months and at 40% for another two months. The operating capacity during the four winter months will only be 20%. Another adjustment will be with respect to the demand for 1000 ml packs which is lower than the demand for 200 ml and 250 ml packs. Based on the market estimates, it has been assumed that the production of 1000 ml packs will be maintained at 5% of the production of 200 ml packs. Effective capacity utilization for the first year of operations has been assumed to be 70% which will progressively increase to 95% in four years.

In line with market demand, 60% capacities of 1000 ml and 200 ml machines have been allocated to fruit drinks and 40% to nectars/pure juices. For 250 ml machine, all the available capacity has been allocated to fruit drinks. Flavor mix has been fixed in line with the current market demand. Within the fruit drinks category, biggest shares have been allocated to mango flavor. In 1000 ml and 200 ml sizes, 30% of the capacity has been allocated to mango, 20% to apple and 10% to mixed fruit flavors. In 250 ml size, the shares of mango, apple and mixed fruit drinks respectively are 50%, 30% and 20%. In nectars category, the highest 12% of the available capacity has been allocated for mango flavor.

The project assumes that 80% of the revenues will come from sales in local market and the balance from export market. The consumer sale prices have been assumed to be lower than the current market prices of comparable products. This has been done as part of the project's strategy to create consumer pull for the newer products. Higher margins have been offered to the distributors and retailers as an added incentive to push the product. Export prices have been kept 10% higher than the local prices. With these assumptions, the first-year revenues of the project were calculated to be PKR 793.52 million. The shares of 1000 ml, 200 ml and 250 ml packs in the total revenues were 10.4%, 45.8% and 43.8% respectively. The sale price growth rate has been assumed to be 6% in both local and export markets.

Pulps/concentrates are the most important ingredients of the juice; along with sugar, CMC, citric acid, malic acid, ascorbic acid, flavors and food colors. The costs of these ingredients vary with the recipes of different types of fruit juices in the project's product line. The first-year cost of these juice ingredients was calculated to be PKR 203 million which was 41.5% of the total direct cost. Tetra Pak paper was the other major cost which for the first year was calculated to be PKR 188.5 million accounting for 38.5% of the total direct cost. Other direct costs include the costs of chemicals, furnace oil, electricity and direct labor. Indirect costs include depreciation/amortization, marketing, administration, insurance, fixed electricity and indirect labor. Manpower requirement of the project was worked out as 126; that entails a cost PKR 55.7 million during the first year of operations.

The project is financially viable with a positive NPV of PKR 571.76 million, an IRR of 50.5% and payback period of 2.6 years. Gross profit and net profit margins for the first year of operations were calculated to be 38.3% and 15.7% respectively.

Project's sensitivity to different business parameters was also evaluated. The business proposition remains viable up to an average juice sale price drop of around 20%. Project's viability decreases by increasing the cost of pulps/concentrates and remains in the viable range even if the cost of these ingredients increase by two times. Project's viability decreases with increase in cost of Tetra Pak paper and remains viable up to a cost increase of 65%. Project's viability is found to be not very sensitive to land price and remains feasible even if land is acquired at a cost of 2.5 times more than the assumed rate. The project is found to have sufficient capacity to absorb debt cost and remains viable even if 80% of the project cost is financed through debt. Net profit margin falls by around 1.0% for every 20% increase of debt in the capital structure.

1.1 Project Summary Sheet

| Project's Concept | |
|---------------------|--|
| Objective | Manufacturing of Consumer Pack Fruit Juices |
| Product Line | Tetra Pak Juices |
| Operative Capacity | 1000 ml machine 7,500 packs per hour 200 ml machine 7,000 packs per hour 250 ml machine 7,000 packs per hour |
| Location | Lahore, Punjab |
| Target Market | Local and Export |
| Technology Employed | Tetra Pak Packaging |

| Project Cost (PKR Million) | |
|----------------------------|---------------|
| Total Project Cost | 426.98 |
| Capital Cost | 322.47 |
| Working Capital | 104.51 |

| Financing Plan (PKR Million) | | % Share |
|------------------------------|--|-------------|
| Equity | | 100% |

| First Year's Summary Income Statement (PKR Million) | | % of Revenues |
|---|---------------|---------------|
| Revenues | 793.52 | 100.0% |
| Cost of Sales | 489.60 | 61.7% |
| Gross Profit | 303.92 | 38.3% |
| Operating Costs | 112.29 | 14.2% |
| Earnings Before Interest and Tax | 191.63 | 24.1% |
| Tax | 67.07 | 8.5% |
| Net Income | 124.56 | 15.7% |

| Financial Feasibility | |
|-------------------------------|-------------|
| Internal Rate of Return (IRR) | 50.51% |
| Net Present Value (NPV) @ 18% | 571,761,615 |
| Payback Period (years) | 2.60 |

| Conclusion |
|---|
| 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 Economic Context

With a population of over 19 million people, Pakistan is the sixth most populous country and the 43rd largest economy in the world. In the current global economic scene, Pakistan is being viewed as the top emerging market economy in South Asia and 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 21st century. Economic growth of the country has been on a rise during recent years; being 4.56% in 2016, 5.37% in 2017 and 5.79 in 2018;¹ the highest growth realized during the past ten years. The economy has successfully maintained its growth momentum above 4.0% for four years in a row.

The IMF projects that the growth trend will be maintained at around 5.2% till the year 2020. The World Bank projects that Pakistan's economic growth will increase due to greater inflow of foreign investment from China-Pakistan Economic Corridor (CPEC). The government is fully committed to capitalize on this emerging growth trend and is making tireless efforts to implement all the necessary steps in the right direction to facilitate consistent flow of private sector investment. Strengthened macroeconomic outlook, improved law and order situation and facilitative government policies are acting as the key drivers to improve investment climate for foreign and local investors. Increased private sector investment is expected to expedite economic activity, generate new employment opportunities, strengthen associated sectors and contribute towards the overarching goal of reducing poverty and improving the economic wellbeing of the common man of Pakistan.

For private sector investment to flow, provision of information about feasible business opportunities is an important initial step. Investment promotion materials introduce the investors to potential business opportunities and provide basic information about the projects' capital and operational costs and technical and financial feasibility of the presented propositions. Agriculture, being the mainstay of Pakistan's economy, offers host of attractive opportunities which possess high potential of being converted into profitable businesses. The current document discusses the feasibility of one such business proposition.

2.2 Agriculture Sector Overview

Pakistan is an agriculture-based economy. Agriculture is the lifeline of Pakistan's economy accounting for 18.9% of the GDP, 42.3% of labor force and supplying raw material to several value added sectors.² Agriculture GDP is derived from four major subsectors. Livestock is the biggest contributor to GDP that accounted for 58.9% of the total value in 2017-18. Crops represented the second largest subsector accounting for 36.9%. It was followed by two smaller subsectors, Fishing and Forestry, each accounting for 2.1% of the total agriculture value added in 2017-18. The subsector distribution of agriculture GDP is shown in Figure 1.

¹ Economic Survey of Pakistan 2017-18

² Ibid

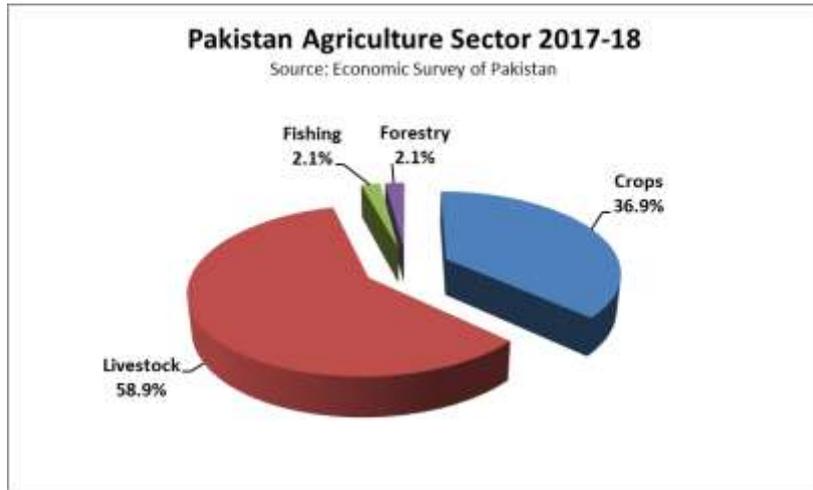


Figure 1 - Pakistan Agriculture Subsectors Distribution

The crops subsector is further divided into three categories. In 2017-18, 'Important Crops' category accounted for 64.0%, 'Other crops' category 29.3% and 'Cotton Ginning' 6.7% of the total value of crops. Horticultural crops, including fruits, vegetables and condiments are reported under 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 snapshot of Punjab's contribution in the productions of different agriculture commodity groups during the year 2015-16.

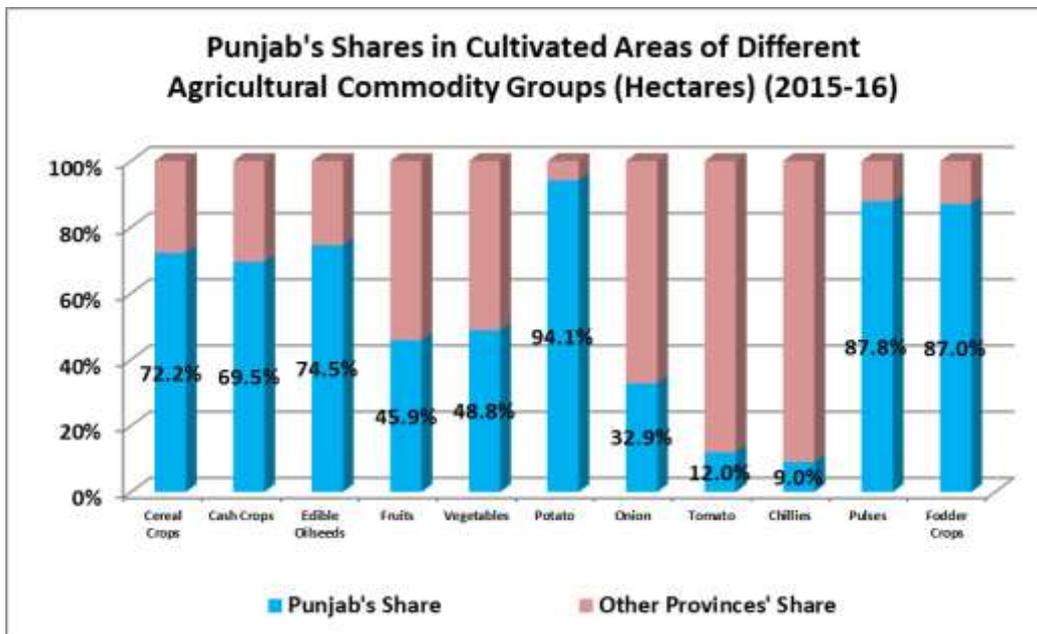


Figure 2 - Punjab's Share in Cultivated Areas of Different Commodity Groups

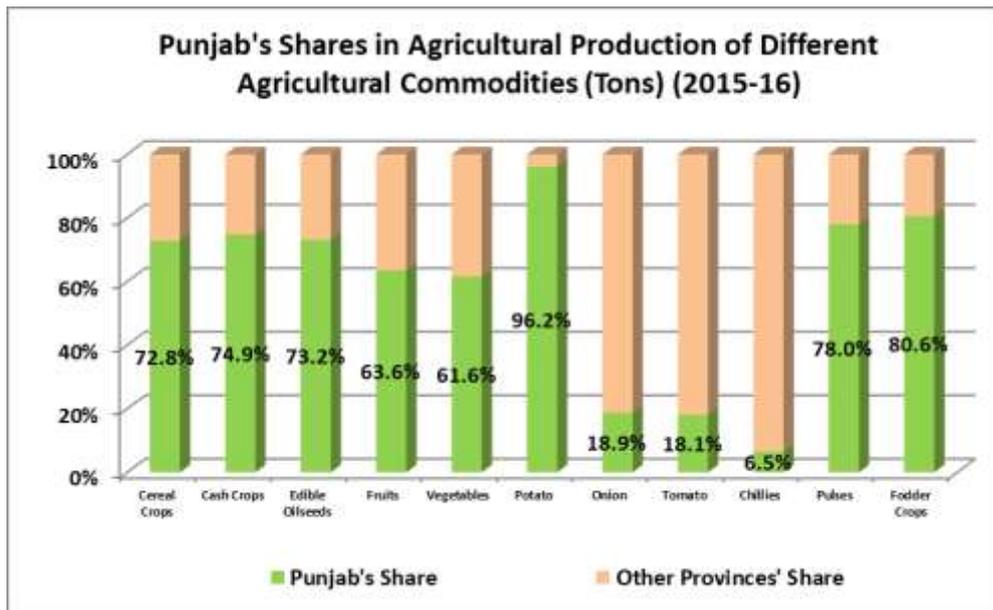


Figure 3 - Punjab's Share in Production of Different Commodity Groups

Punjab holds the largest shares in cultivated areas and productions of majority of the agricultural commodities. Cereal crops³ were cultivated on an area of 10.10 million hectares to produce 27.84 million tons. That translated into 72.2% share in cultivated area and 72.8% share in the overall national production of cereal crops. Similarly, the province held a leading position in cash crops⁴ as well where it produced 50.1 million tons; accounting for 74.9% of the national production. During the same year, Pakistan's total production of edible oilseeds⁵ was 317 thousand tons of which 73% was contributed by Punjab.

In horticultural production also, Punjab maintains a leading position. In 2015-16, total fruit cultivation in Pakistan was carried out on an area of 765 thousand acres to produce 6.6 million tons of fruit. Punjab held a share of 45.9% of the total cultivated area and 63.6% share of the total national fruit production. During the same year, the vegetable production (excluding potato) in Punjab was 1.96 million tons that accounted for 63.4% share of the total national production. Punjab held 94.1% and 96.2% shares respectively in potato's total national cultivated area and production. A similar situation also existed in pulses and fodder crops where Punjab's shares in total national production respectively were 78% and 80.6%.

In some horticultural commodities, Punjab is a smaller producer; such as onion, tomato and chillies; where in 2015-16, the province held 18.9%, 18.1% and 6.5% shares in the total national productions of these commodities respectively.

2.3 Horticulture Sector of Punjab

Pakistan's horticulture basket is diverse containing large variety of fruits, vegetables and condiments.⁶ Pakistan's total horticultural production in 2015-16 was 15.87 million tons from

³ Wheat, Rice, Maize, Jowar, Bajra and Barley

⁴ Cotton, Sugarcane, Tobacco, Jute, Sugar beet, Guar and Sunhemp

⁵ Rapeseed, Mustard, Canola, Sesame, Groundnut, Soybean, Sunflower and Safflower

⁶ Onion, garlic, coriander, chillies and turmeric

the total cultivated area of 1.47 million hectares. Fruits accounted for 41.4% and vegetables 45.9% of the total national horticultural production. The vegetables included potato as the largest product that claimed 55% of the total vegetables production. Condiments accounted for 12.8% of the total national horticultural production. Figure 4 shows the split between three main horticulture product categories.

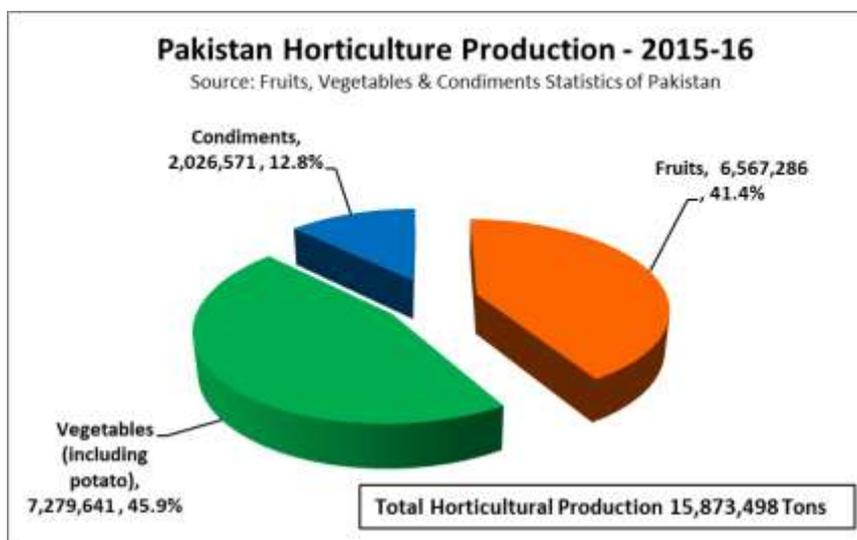


Figure 4 - Punjab's Horticultural Production Distribution

Punjab is the major contributor in most of the horticulture product categories. In 2015-16, Punjab's total horticultural production was 10.71 million tons which accounted for 67.5% of the total national production. 66.5% of the national fruit production was contributed by Punjab. Citrus and mango are the two main fruits of Punjab. The province's share in national vegetable production (excluding potatoes) was 66.5%.

Punjab enjoyed a monopolistic position in potato production by producing 3.81 million tons and claiming 95.9% share in the total national production in 2015-16. Condiments represent the only horticultural product category where Punjab is not the largest producer. In 2015-16, the province produced 0.43 million tons of condiments to contribute 21.3% to the national condiments basket.

Figures 5 to 8 show the share of Punjab in total national production of different horticultural products.

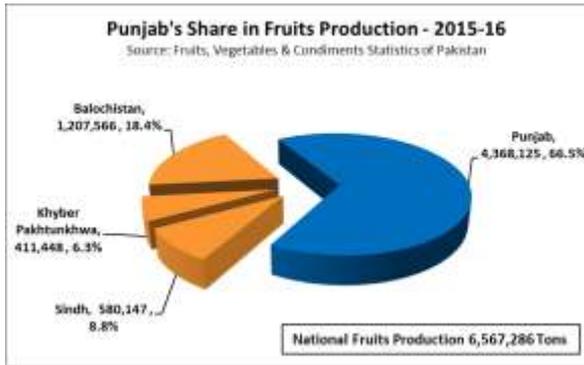


Figure 5 - Punjab's Share in Fruit Production

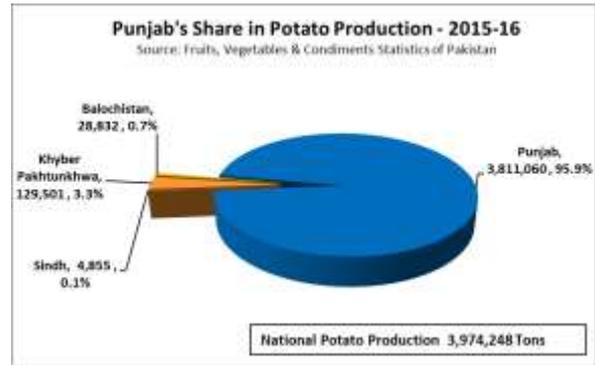


Figure 7 - Punjab's Share in Potato Production

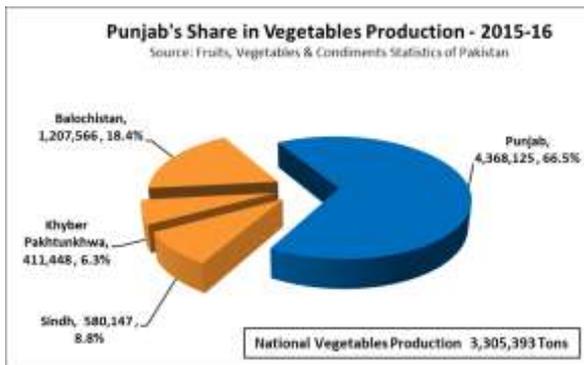


Figure 6 - Punjab's Share in Vegetable Production

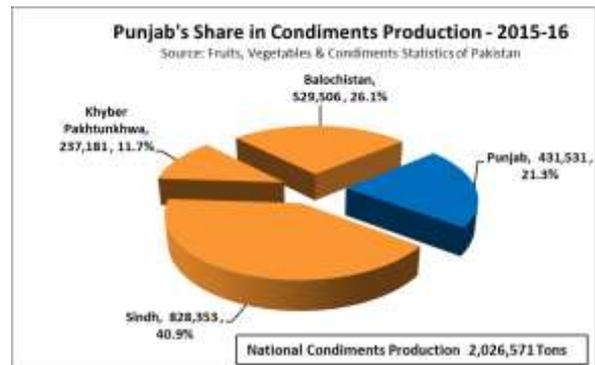


Figure 8 - Punjab's Share in Condiments Production

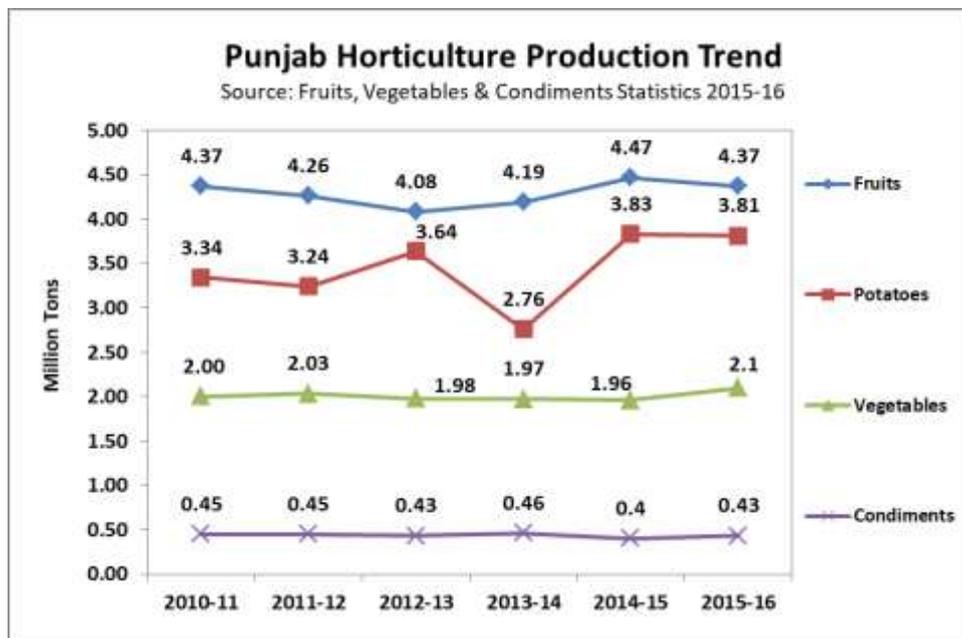


Figure 9 - Punjab's Horticultural Production Trend 2011-15

During the six year period from 2010-11 to 2015-16, the horticultural production of Punjab has been almost stable. There was no increase in fruit production; whereas potato production increased by 14%. There was an increase of 5% in vegetables production and decrease of 4.5% in condiments production during the six year period under review.

2.4 Horticulture Value Added products

Fruits, the marvelous gift of nature, besides having delicious taste and being source of readily available energy, are natural sources of vital nutrients like organic acids, minerals, vitamins and enzymes. These nutritional components are essential for proper functioning of the human body. Fruits are harvested in their respective production seasons and because of their perishable nature have to be consumed or processed within that limited time. To extend the shelf life, a very small percentage is stored for a limited period by the application of microorganism growth inhibiting chemicals and by controlling storage conditions including temperature, pressure, humidity and composition of surrounding gases. Fruits are preferred to be consumed fresh, however, the entire production cannot be consumed directly as such. The surplus produce is processed into value added products like dried fruit, fruit juices and drinks, squashes, canned fruit, frozen fruit, jam, jellies, *murabbas*⁷, etc. A predominant part of the value added products comprises of fruit juices and drinks.

Fruit juices derive their importance from their relishing taste and the associated health benefits. Fruit juices are produced from a large variety of fruits and have a high concentration of vitamins and minerals. Every fruit juice has its own defined market; however, some juices, remain more popular than the others. The most popular product in this regard, with the globally highest demand, is the orange juice. Orange juice holds a special importance by being a major source of vitamin C. In Pakistan, a variant of orange juice is the Kinnow juice; produced from Kinnow, the most commonly grown citrus fruit in the country. Unlike rest of the world, citrus is not the most popular juice in Pakistan. Instead, the local population likes mango juice more than any other juice which makes it the most commonly consumed juice in the local market. Other popular fruit juice flavors include apple, red grapes, peach, pineapple, guava, pomegranate and mixed fruits. Basic raw material for producing juices include fruit pulps purees and concentrates. Juices produced in Pakistan use local as well as imported raw materials.

During recent past, fruit juice has become very popular and an essential part of everyday diet of medium to high income families. Hundreds of thousands of tons of fresh fruits are processed all over the world to meet the growing demand of fruit juices; made from wide variety of fruits.

In Pakistan, only a small share of the surplus fruit production is preserved and converted into value added products. A significant share of horticulture production cannot be processed and thus gets wasted. Attracting more investment in horticulture value added sector can help reduce this economic loss. It will lead to improving the overall value of horticulture crops for the farmers, traders and consumers, generating new employment opportunities and increasing exports; thereby contributing towards the overall economic prosperity of the country.

2.4.1 Ready-to-Drink Juices

Pure fruit juices, nectars and drinks are prepared by the raw material obtained by processing fresh fruits. Processing of some fruits (such as orange, Kinnow, apple, etc.) produces the

⁷ sweet fruit preserve prepared with fruits, sugar, and spices

natural single strength juices (unaltered, non-concentrated, natural). These juices are in such huge volumes that their packaging, storage and transportation are hardly practicable. To overcome this difficulty and economize packaging, storage and transportation, volumes of juices are reduced by concentration process in which the major part of the naturally present water content is physically removed. The single strength juices are mostly boiled under vacuum conditions to evaporate a defined portion of the water content of fruit juices by using special equipment. This results in cutting transportation and storage costs, and improving the storage stability of the product. The products obtained in this way are known as juice concentrates which may be packed aseptically or alternatively packed in food grade drums and stored at freezing temperatures. The other raw material for producing juice is ‘pulp’ which is obtained by processing fruits like mango, peach, guava, etc. These pulps may also be stored aseptically or may be packed in food grade drums and stored at freezing temperatures.

These pulps, purees and concentrates are reconstituted with water and other ingredients, as per defined recipes, to produce different varieties of ready-to-drink juices; which are packed in consumer packs and marketed. The consumer packing may be Tetra Pak, glass bottle, PET bottle or metal can. Juices are marketed in packings of different sizes, in line with the market demand.

The document discusses the business feasibility of manufacturing consumer pack fruit juices using local and imported fruit pulps, purees and concentrates.

2.5 Opportunity Rationale

Establishing a fruit juice manufacturing unit to cater to the consumer demand in local and international markets is an attractive investment opportunity from multiple perspectives. Key factors are discussed below:

2.5.1 Abundant Availability of Raw Material

Pakistan is a large producer of variety of fruits. Punjab is the largest producer of Kinnow, mango and guava. Apple, peach and number of other fruits are produced in other parts of the country and are available for processing into value added juice products. Area under fruit orchards and the total fruit production have been increasing over the years. New orchards are being established at a steady rate that ensures a consistent supply of the fruit for consumption as fresh fruit and as raw material for manufacturing value added products like fruit juices. There are numerous pulps and concentrates manufacturing units in the country which ensure a consistent supply of raw material for producing juices.

2.5.2 Value Addition Potential

Major share of fruit production is consumed in fresh form. However, there is always a significant share of production which has a lower value as table fruit; mainly due to its smaller size and some appearance issues. This grade of fruit serves as the raw material for the processing industry to be converted into value added products. In case of absence of a processing sector, this grade of fruit would be wasted since there is practically no market for this to be consumed as table fruit. Value addition of horticulture products directly contributes

towards reducing the post-harvest losses to create added value for the farmers, traders, processors, consumers and the economy as a whole.

2.5.3 Large Growing Market

By being a populous country with sizeable middle-to-upper income class, Pakistan is a large market for fruit juices and drinks. The market has been growing at high rate during recent years. This is evident by a continuously increasing sale of fruit juices/drinks and growing product diversity in terms of flavors and packaging in the local market. Per capita fruit juice consumption in Pakistan has been on a rise during the past decade; when there has been a mushroom growth of fruit juice/drinks companies to meet the growing demand of the local market. Large growing market provides a strong rationale to invest in fruit juice manufacturing business.

2.5.4 Opportunities in Export Market

There is demand of fruit juices all over the world that has led to creating a large export market of these value added products. International trade statistics indicate that the global consumption of fruit has been on rise over the years. Pakistan has the opportunity to explore and identify niche markets in the world for its ready-to-drink fruit juices. The country's existing exports to neighboring countries is an indication of the potential in this regard. The existing market presence can be capitalized upon to further increase this market penetration by realizing new investments in the sector.

2.5.5 Availability of Technical Knowhow

Fruit juice processing is not new to Pakistan. In fact, the sector has a long history and can be classified as a mature, well developed industrial sector of the country. The sector is being managed by professional manpower, qualified by diverse experience and backed by the relevant formal education from leading agricultural universities of the country. There is thus an abundant supply of both technical and managerial human resource to run this delicate business of food processing. Any new investor venturing into this business is adequately covered with respect to getting access to quality human resource to manage this business.

2.5.6 China-Pakistan Economic Corridor

China-Pakistan Economic Corridor (CPEC) is creating a new window of opportunity whereby Pakistan can explore new markets for different types of products in the world. Fruit juices also represent an important product category in this regard. Chinese market offers attractive potential for imports of fruit juices. In addition to export opportunities for Pakistan, development of CPEC also offers opportunities to import Chinese machinery and equipment and raw materials to produce fruit juices. The local fruit juice manufacturers are already importing packing materials and machines from China and this trend is expected to increase in the coming years.

2.5.7 Punjab Horticulture Sector Development

Fruits are produced in large volumes in the province of Punjab. Value addition projects like fruit juices manufacturing are based on the raw material grown in Punjab. Investment in such

projects provides a boost to the local horticulture sector by creating a market for the farm produce which does not have a value otherwise. Such projects lead to reducing the post-harvest losses to increase the overall economic value of the produce for the sector stakeholders. The proposed project is aligned with the provincial government's strategy of shifting its focus from large cereal crops towards the non-traditional crops like fruits, vegetables, condiments, flowers, pulses and oilseeds.

3.0 CONSUMER PACK FRUIT JUICES PRODUCTION

3.1 Main Processes

Production of fruit juices from fruit pulps/purees/concentrates is carried out in multiple processing steps. The process can be divided into three major stages; shown in Table 1.

| No. | Process Stage | Operations |
|-----|-----------------------|---|
| 1. | Juice Blending | Syrup making, stabilizer preparation, blending with juice pulp concentrate, other additives and water |
| 2. | Juice Processing | Preheating, de-aeration, homogenization, pasteurization |
| 3. | Juice Packing/Storage | Tetra Pak filling, carton packaging, storage |

Table 1 – Fruit Juice Manufacturing Operations

Definitions of the key technical terms used in fruit juice manufacturing are provided in Annex I.

3.2 Plant Utilities

The main production processes require use of different types of utilities. Major utilities required in this regard are shown in Table 2.

| No. | Utility | Source |
|-----|----------------|---|
| 1. | Electricity | WAPDA; with backup generator |
| 2. | Process water | Tube well |
| 3. | Steam | Boiler (furnace oil fired); with water softening facility |
| 4. | Treated water | RO Plant |
| 5. | Instrument air | Air compressor |

Table 2 – Utilities Required for Fruit Juice Manufacturing

3.3 Process Flow Description

3.3.1 Raw Materials

Fruit pulps/concentrates constitute the most important ingredient of the fruit juice. The pulps/concentrates for juice/drinks production are available either in frozen form or in aseptically preserved bags. The frozen products have to be stored in freezing store to effectively preserve their quality. The aseptically packed pulps/concentrates are stored above freezing temperatures (10-15C). Both types of products are considered to be quality products. A comparison of frozen and aseptically preserved pulps/concentrates is provided in Annex II.

Other ingredients of the juice/drink include sugar, Carboxy Methyl Cellulose (CMC), citric acid, ascorbic acid, malic acid, different types of flavors, food colors, etc. These, along with pulps/concentrates, are needed to constitute different recipes of different flavors of juice. Along with the juice ingredients, the other important raw material is the Tetra Pak paper used

to pack the juice/drink products. Tetra Pak paper is sourced from reliable suppliers in the market.



Figure 10 - Aseptic Bags for Fruit Pulps/Concentrates

3.3.1.1 Raw Material Quality Assurance

The quality of the final product largely depends upon the quality of the pulps/concentrates used to prepare those juices. It is therefore very important to ensure that the raw materials meet the required quality standards. The raw materials may be procured either from local or from import sources. The raw materials are checked against the required quality standards by the quality assurance department. Brix is the most important parameter to be checked. Another very important parameter is the acidity content in the pulps/concentrates. These two attributes directly impact the quality of the final product. In addition, the incoming raw materials are also evaluated against microbiological standards. The pulps/concentrates not meeting the required quality standards are rejected.

Similarly, other juice ingredients are also checked against the required quality standards before using them in product formulations. Quality of Tetra Pak paper is also checked to ensure that it can preserve the quality of the juice during the expected shelf life.

3.3.2 Raw Materials Blending

The recipe of fruit juice includes many ingredients which are blended in the required proportions to prepare juices of different favors.

3.3.2.1 Syrup Making

Measured quantity of water is poured in the sugar dissolving steam-jacketed tank and heated up to 85-90C. 60-65% sugar syrup is prepared by adding measured quantity of sugar in the hot water and dissolving by operating the tank agitator. The sugar syrup thus produced, is filtered and transferred to the sugar syrup storage tank.

3.3.2.2 Stabilizer Preparation

Water is poured in stabilizer tank and heated by injecting steam in the jacket of the tank in an agitated state. One part (by weight) CMC (stabilizer) is dry mixed with three parts sugar and

added slowly into the tank filled with agitating hot water. It takes three to five minutes to completely dissolve the stabilizer–sugar dry mix.

3.3.2.3 Juice Blending

As per the established juice/nectar/drink recipe, all the ingredients are mixed in the blending tank by adopting the following sequence:

- Sugar syrup, as per recipe, is transferred from the syrup storage tank to the juice blending tank and agitation is started.
- Stabilizer from the stabilizer tank is transferred to juice blending tank where it is blended with the sugar syrup.



Figure 11 - Juice Blending System

- Pulp from the pulp tank is transferred to the juice blending tank to blend it with already added sugar syrup and stabilizer.
- Minor ingredients including flavor, colors, citric acid/malic acid and ascorbic acid are manually poured in the juice blending tank and agitated for two to three minutes.
- Finally, water is poured in the mixture of all the mentioned ingredients as per recipe.

3.3.2.4 Batch standardization

After blending all the recipe ingredients and water, sample of the blended juice/drink is taken and examined for brix, acidity, color and taste. If the juice/drink sample meets the required quality standards, the batch prepared is approved for further processing and filling/packaging. In case of any variation from the standards, corresponding adjustments are made to achieve the required standards.

3.3.3 Processing of Juice/Nectars/drinks

Product from the approved batch is supplied to the treatment line for further processing. Following machines are involved in the processing of the product before final filling/packaging.

- Balance tank
- Pasteurizer
- De-aerator

- Homogenizer
- Pumps for product transferring

3.3.3.1 Feeding to Balance Tank

The product is fed to balance tank which receives the product from the source (juice tank) and feed it to the pasteurizer. The balance tank, with the help of its float valve, keeps a balance between receiving of product and its delivery to pasteurizer.

3.3.3.2 Juice Pre-heating

The juice/drink is fed to the preheating section of the pasteurizer where it is heated around 60C before transferring to the de-aerator of the juice processing line. Preheating of the product leads to better de-aeration.

3.3.3.3 De-Aeration

De-aeration of the product is done in a vessel known as *de-aerator*. It is a vessel which works under vacuum conditions to expel the air trapped in the product during juice blending operation. In case air is not extracted from the product, oxygen of the air combined with juice, causes deteriorative oxidative changes leading to loss of flavor, color, taste and vitamin content of the product.



Figure 12 - De-Aerator

3.3.3.4 Homogenization

After *de-aeration*, the product is fed to *Homogenizer*. Function of a homogenizer is to break the particle size of the product and convert the blended mixture of various ingredients and water into a homogeneous mass. Homogenization leads to better viscosity, smooth texture and product stability against separation of the ingredients of the product during storage.



Figure 13 - Homogenizer

3.3.3.5 Pasteurization

The homogenized product is again fed to heating section of the pasteurizer for its heating/pasteurization. This is the most critical part of the processing operation and it inactivates/kills the deteriorating enzymes and juice spoilers as well as the disease causing microorganisms and preserves the juice. In this section of pasteurizer, juice is heated up to 90-97C and held for 30 seconds. The hot juice is aseptically cooled down to 30C before filling into Tetra Pak packaging.



Figure 14 – Pasteurizer

3.3.4 Tetra Pak Filling

3.3.4.1 Tetra Pak Paper Treatment

Tetra Pak machine automatically fills the juice in cartons in an aseptic environment. Paper is fed continuously from the rolls loaded on the machines. The paper is converted into package by the machine by cutting it and giving it the required shape. The package is sterilized in the aseptic chamber in three steps. It is first preheated, then treated with Hydrogen Peroxide and finally ventilated with hot sterile air to eliminate the traces of Hydrogen Peroxide from the paper before product filling.

3.3.4.2 Juice Filling

The pasteurized juice is continuously fed to the Tetra Pak machine. The sterilized Tetra Pak pack is automatically filled with the juice and sealed in the aseptic chamber so that it is not exposed to external environment.



Figure 15 - Tetra Pak Filling Machine

3.3.4.3 Straw Application

For juices of smaller sizes (200 ml, 250 ml, etc.) drinking straw is attached to the Pack using hot melt. Straw applicator machine is used for this purpose.



Figure 16 - Straw Applicator

3.3.4.4 Tray/Carton Packing

1000 ml Tetra Pak packs are packed in cartons with twelve packs per carton. The smaller sizes of 200 ml and 250 ml are stacked in trays and shrink wrapped. 24 packs of 200 ml and 27 packs of 250 ml are generally packed in one tray.

Process flow chart of consumer pack fruit juice manufacturing is shown in Figure 17.

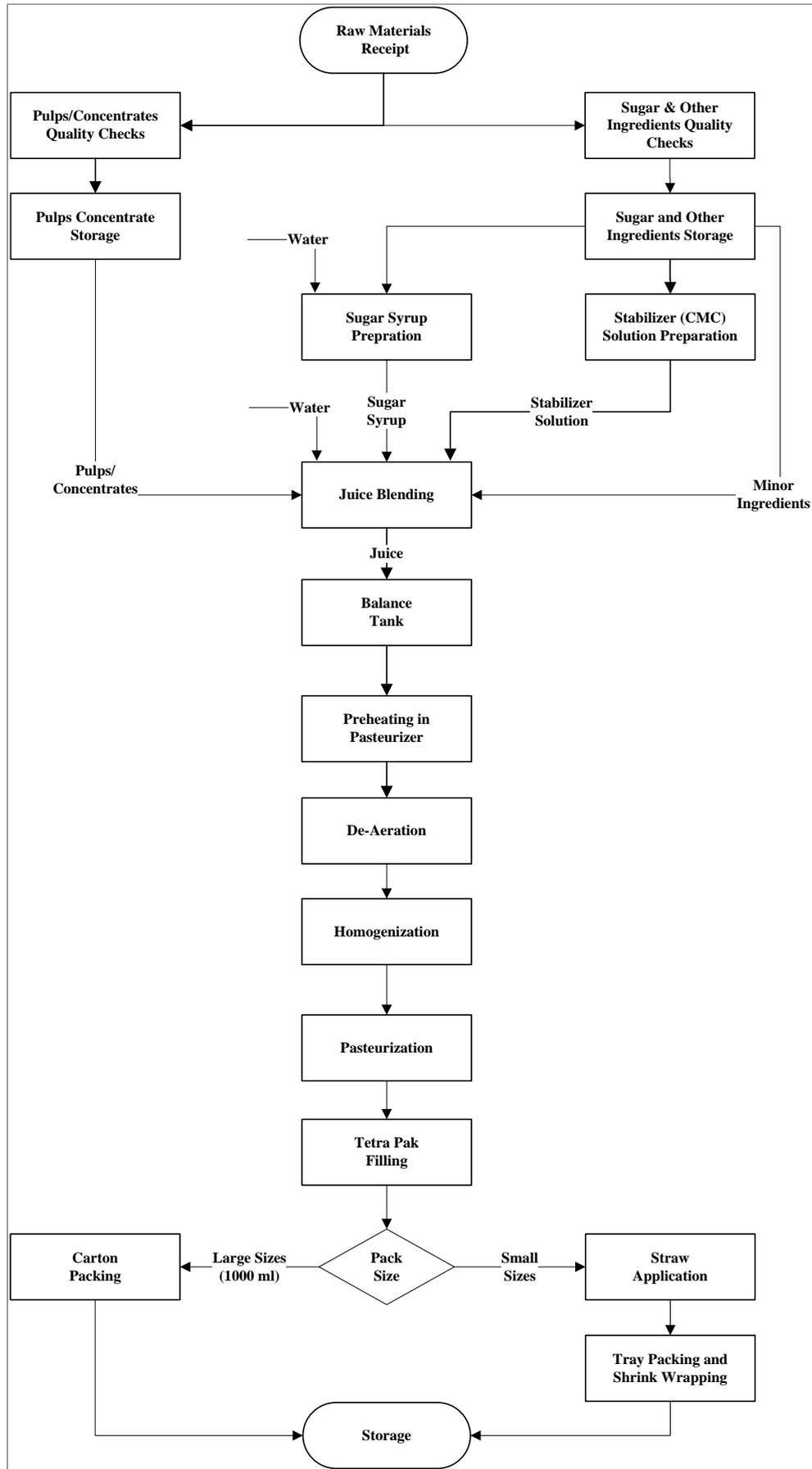


Figure 17 – Process Flow Chart for Consumer Pack Fruit Juice Manufacturing

4.0 FRUIT JUICE EXPORT MARKET ANALYSIS

The planet earth has different climatic and agro-ecological zones suitable for growing different types of fruits and vegetables in different parts of the world. All types of fruits and vegetables are not grown in all parts of the world. Demand for fruits and vegetables and their processed products in different parts of the world is thus met through trade between different countries/regions of the world. Consequently, the fruits, vegetables and their products constitute a significant share of the total international trade.

4.1 Fruit Juices International Trade

Fruits and vegetables juices represent a major category in international trade. The international trade of fruit juices is categorized under different HS codes. The codes are defined on the basis of the fruit and the composition/ingredients of the product. HS 2009 is the main category which reports the trade of fruit juices. The basic classification under this code is based on ‘Brix’ (the sugar percent) of the juices. The juices which are marketed as industrial products have a higher brix. The brix of ready-to-drink juices, in different types of packings, is usually lower than 15. The codes definitions do not provide information on the size or type of the packing. The relevant HS codes of the juices of lower brix are listed in Table 3.

| HS Code | Description |
|---------|--|
| 200912 | Juice; orange, not frozen, of a Brix value not exceeding 20, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200921 | Juice; grapefruit, of a Brix value not exceeding 20, unfermented, (not containing added spirit), whether or not containing added sugar or other sweetening matter |
| 200931 | Juice; of single citrus fruit (excluding orange or grapefruit), of a Brix value not exceeding 20, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200941 | Juice; pineapple, of a Brix value not exceeding 20, unfermented, (not containing added spirit), whether or not containing added sugar or other sweetening matter |
| 200961 | Juice; grape, of a Brix value not exceeding 30, unfermented, (not containing added spirit), whether or not containing added sugar or other sweetening matter |
| 200971 | Juice; apple, of a Brix value not exceeding 20, unfermented, (not containing added spirit), whether or not containing added sugar or other sweetening matter |
| 200981 | Juice; Cranberry juice, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200989 | Juice; of any single fruit or vegetable n.e.s. in heading no. 2009, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |
| 200990 | Juices; mixtures of fruits or vegetables, unfermented, not containing added spirit, whether or not containing added sugar or other sweetening matter |

Table 3 – HS Codes of Fruit Juices

In addition to HS 2009, trade of fruit juices is also sometimes reported under HS 2202. International traders prefer one code over the other to avail any possible advantage of getting some benefits by avoiding import duties, etc.

4.2 Fruit Juice International Trade

Fruit juices have a large export market. The global market of fruits and vegetables juices has been increasing over the past ten year period. In 2016, total global exports of fruit juices were 8.83 million tons with a value of USD 7.89 billion. The export increased from 4.91 million tons in 2007 to 8.83 million tons in 2016 which is an increase of 80%. The increase in value terms during this period was 121% when the exports increased from USD 3.57 billion in 2007 to USD 7.89 billion in 2016. Positive growth in the world export market is an indicator of the rising global demand of fruits juices. Increase in population and increasing per capita consumption of juices are the main drivers of this growth in demand. Export value and quantity trends are shown in Figure 18 and Figure 19.

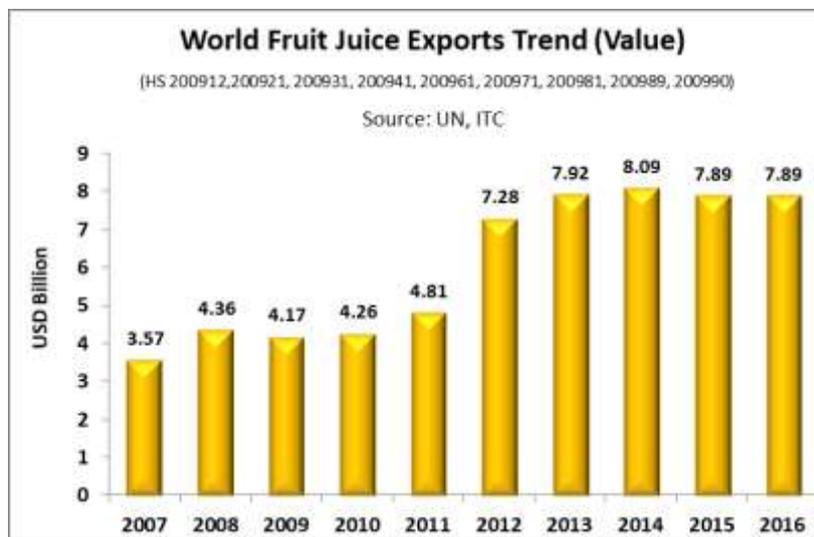


Figure 18 – Global Fruit Juice Exports Trend (Value)

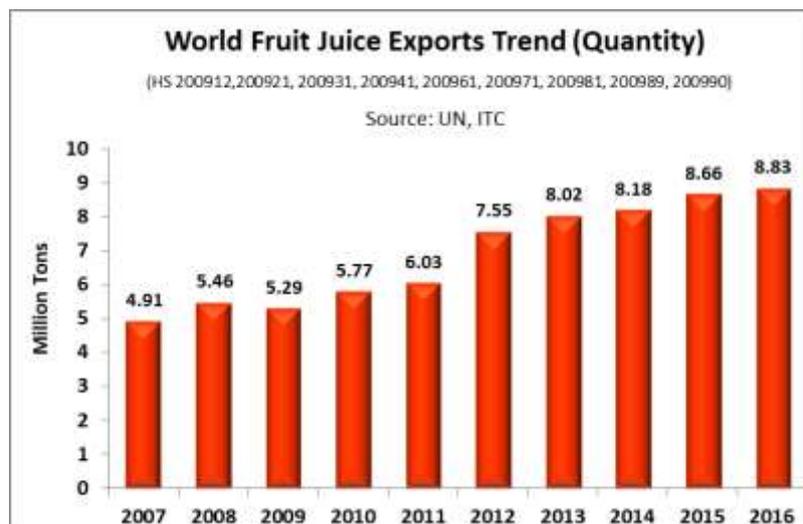


Figure 19 – Global Fruit Juice Exports Trend (Quantity)

Higher increase in value compared to that in quantity shows that the average export prices of fruit juices have increased during the period under review. However, during the period from 2014 to 2016, this trend was reverse when the export quantity followed an increasing trend whereas the export value decreased.

4.2.1 Exports Products Distribution

In 2016, the total international trade of fruit juices, categorized under the nine selected HS codes, was USD 7.89 billion against a total quantity trade of 8.83 million tons. In single fruit category, Orange juice is the most popular juice in the world and accounts for the highest share of the total global trade. In 2016, total world orange juice trade was 3.3 million tons that accounted for 38% share of the total trade of fruit juices. The value of this trade was USD 2.0 billion that translated into 25% share of the total export value market. A lower value share compared to that of export quantity share indicates that the average export price of orange juice is lower than those of other types of juices. Distribution of the total trade between nine product categories is shown in Figure 20 and Figure 21.

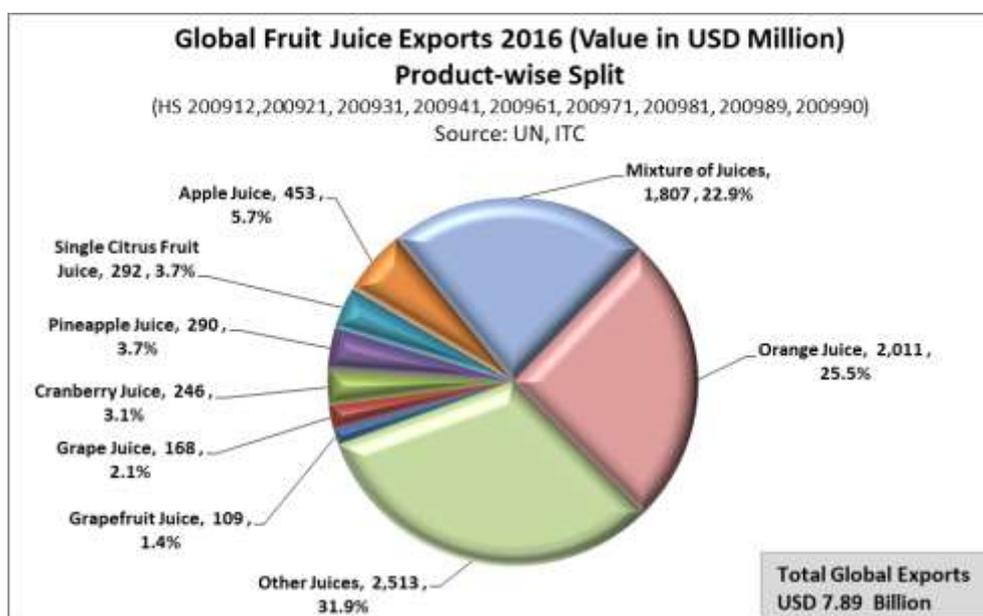


Figure 20 –Global Fruit Juice Exports – 2016 – Product Distribution (Value)

In single juice category, apple juice is the second largest juice in global trade of fruit juices. In 2016, total trade of apple juice was 777 thousand tons with a value of USD 453 million. Global market share of apple juice was 8.8% in quantity and 5.7% in value terms. ‘Other citrus fruits’ was the third largest that accounted for 3.7% of the total global trade value. Pineapple, Cranberry, Grapes and Grapefruit juices respectively were the fourth, fifth, sixth and seventh largest export single fruit juices in the international export market in 2016.

Overall, the two other large juice categories were the ‘mixture of juices’ and ‘other juices’. Together, these two categories accounted for 55% of the total trade value and 39% of the total trade quantity. A higher share in value terms indicates that the fruit juices traded under these categories were able to fetch higher unit prices compared to those of single fruit juices.

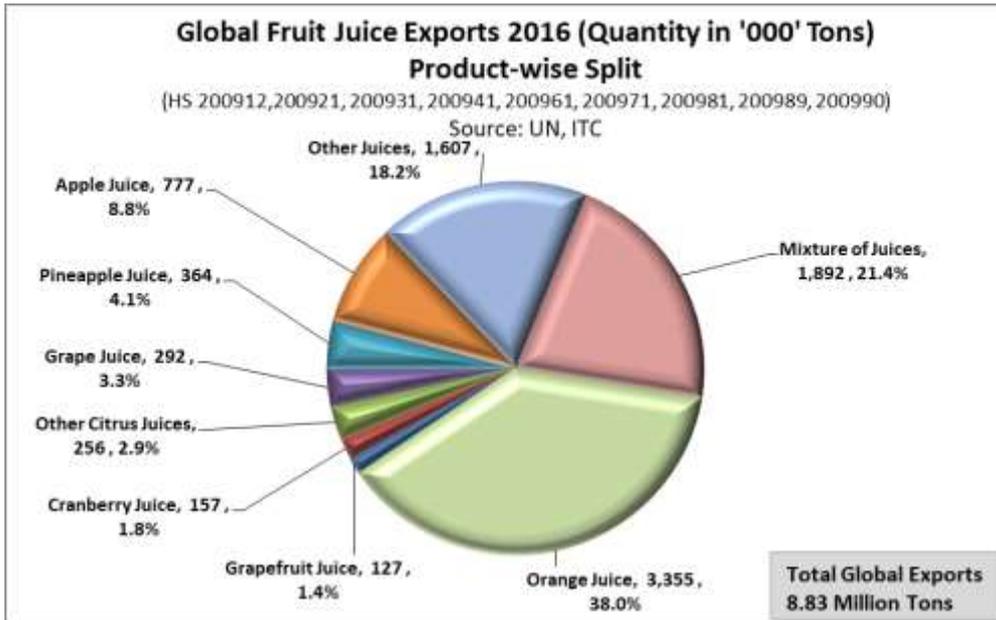


Figure 21 – Global Fruit Juice Exports – 2016 – Product Distribution (Quantity)

4.2.2 Export Products Trends

Orange juice exports grew from USD 1.4 billion in 2007 to USD 2.0 billion in 2016 which is an increase of 39%. During the same period, the orange juice export quantity increased from 2.5 million tons to 3.4 million tons which represents an increase of 34%. Pineapple juice was the other single fruit juice that experienced a high growth rate. The exports of pineapple juice increased from 159 thousand tons to 364 thousand tons representing an increase of 128%. Increase in value terms was 147%. Figure 22 and Figure 23 show the export value trends of different types of fruit juices.

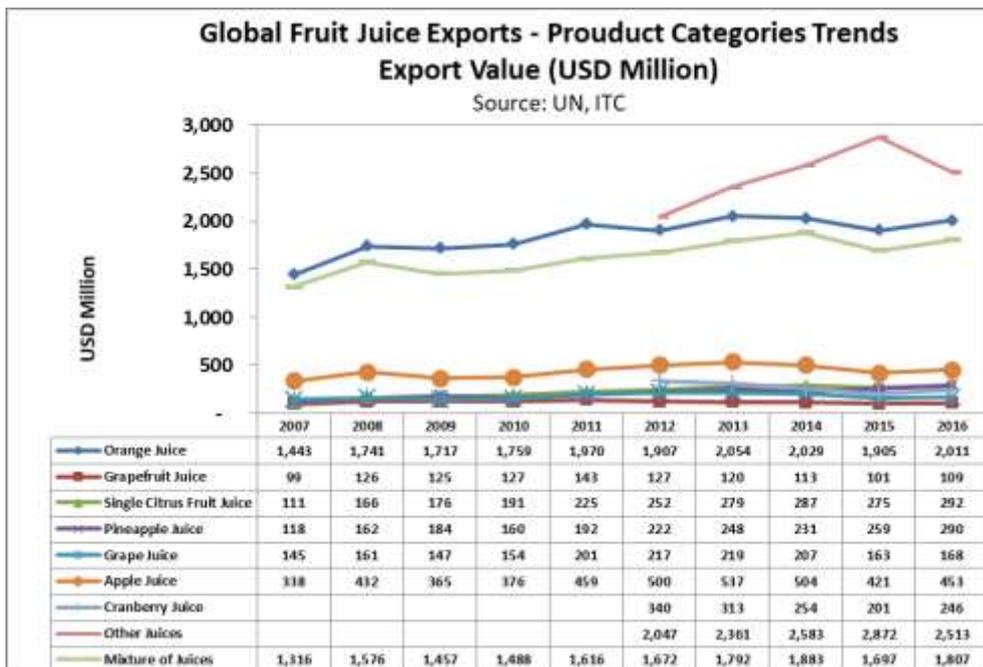


Figure 22 – Global Fruit Juice Exports - Product Category Trends (Value)

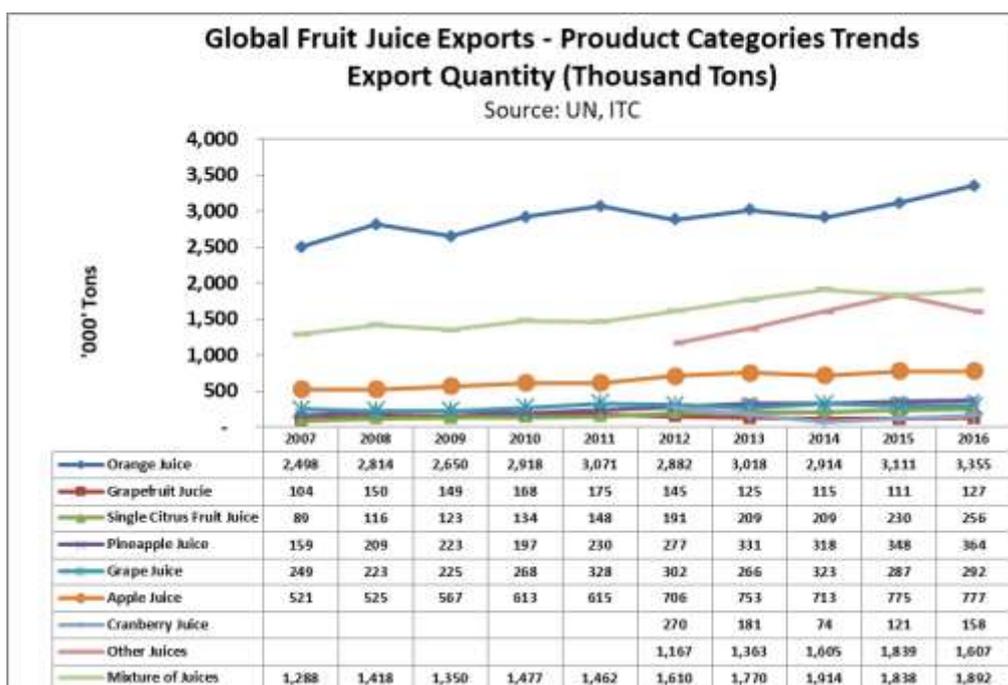


Figure 23 – Global Fruit Juice Exports - Product Category Trends (Quantity)

‘Mixed fruit juices’ was another large product category which exhibited high growth rates during the period from 2007 to 2016. Export quantity of mixed fruit juices increased by 47% and the value increased by 37%. Growth in export quantity and value for different fruit juice products during the period from 2007 to 2016 is shown in Table 4.

| Juice Product | Growth in Export Value (2007-2016) | Growth in Export Quantity (2007-2016) |
|---------------------------|------------------------------------|---------------------------------------|
| Orange Juice | 39.3% | 34.3% |
| Grapefruit Juice | 9.8% | 22.4% |
| Single Citrus Fruit Juice | 163.7% | 186.4% |
| Pineapple Juice | 146.7% | 128.4% |
| Grape Juice | 15.8% | 17.4% |
| Apple Juice | 34.3% | 49.2% |
| Cranberry Juice | -27.5% | -41.7% |
| Other Juices | 22.8% | 37.7% |
| Mixture of Juices | 37.3% | 46.9% |

Table 4 – Global Export Growth Rates of Different Fruit Juice Products

For Pakistani juice exporters, the category of ‘Other juices’ is important since mango juice, the main juice product of Pakistan, is included under this category. The ‘Other Juices’ category grew at 23% in value and 38% in quantity terms during the five year period from 2012 to 2016.

4.2.3 Major Fruit Juices Exporting Countries

Major exporting countries of ready-to-drink juices are the developed countries from European and North American continents. Top ten exporters of the different types of juice products in the year 2016 are shown in Table 5 to Table 9.

4.2.3.1 Orange Juice Exporters

Orange juice is the most popular fruit juice in the world. By being the largest producer of oranges, Brazil is also the largest producer of orange juice in the world. Brazil exported 1.43 million tons of ready-to-drink orange juice in 2016 capturing 37.9% share of the total global trade. Belgium and Netherlands respectively were the second and third largest exporters with 17% and 8.4% shares. These are followed by Germany and USA. The global orange juice export market is controlled by few large exporters. 76% of the total orange juice exports are contributed by only five top five exporters. The exports and global market shares of the top ten exporters are shown in Table 5.

| Exporting Country | Export Quantity (Tons) | Market Share |
|--------------------|------------------------|---------------|
| Brazil | 1,429,231 | 37.9% |
| Belgium | 640,877 | 17.0% |
| Netherlands | 318,440 | 8.4% |
| Germany | 283,132 | 7.5% |
| USA | 198,704 | 5.3% |
| Spain | 176,336 | 4.7% |
| Denmark | 36,897 | 1.0% |
| France | 32,714 | 0.9% |
| Mexico | 27,831 | 0.7% |
| Ireland | 24,764 | 0.7% |
| Others | 605,086 | 16.0% |
| Total World | 3,774,012 | 100.0% |

Table 5 – Major Orange Juice Exporting Countries - 2016

4.2.3.2 Grapefruit Juice Exporters

Total global exports of grapefruit juice in 2016 were 126,497 tons. USA was the largest exporter with exports of 21,095 tons; with 16.7% market share. Netherlands and Belgium respectively were the second and third largest exporters with 13.5% and 10.9% shares. South Africa was the only country among the top ten exporting countries which was not from European or American continents. The export market of grapefruit juice is more diversified compared to that of orange juice. The top ten exporters accounted for 60% of the total exports; compared to 84% for orange juice. The exports and global markets shares of the top ten exporting countries are shown in Table 6.

| Exporting Country | Export Quantity (Tons) | Market Share |
|-------------------|------------------------|--------------|
| USA | 21,095 | 16.7% |
| Netherlands | 17,079 | 13.5% |
| Belgium | 13,749 | 10.9% |
| Germany | 6,817 | 5.4% |
| France | 6,116 | 4.8% |

| | | |
|--------------------|----------------|---------------|
| Mexico | 5,489 | 4.3% |
| Denmark | 2,312 | 1.8% |
| Cyprus | 1,366 | 1.1% |
| Spain | 1,185 | 0.9% |
| South Africa | 523 | 0.4% |
| Others | 50,766 | 40.1% |
| Total World | 126,497 | 100.0% |

Table 6 – Major Grapefruit Juice Exporting Countries - 2016

4.2.3.3 Apple Juice Exporters

Apple juice market is dominated by exporters from European continent. USA is the only non-European country which is included as the seventh largest exporter in the list of top ten exporters. Total global apple juice exports in 2016 were 773,601 tons of which 38% was contributed by the largest exporter Germany. Poland, Italy and Austria were the second, third and fourth largest exporters; with 12.1%, 10% and 3.9% shares respectively. Apple juice market is not very diversified and top five exporters accounted for two third of the total global exports in 2016. The exports and the market shares of the top ten exporters are shown in Table 7.

| Exporting Country | Export Quantity (Tons) | Market Share |
|-------------------|------------------------|---------------|
| Germany | 294,926 | 38.1% |
| Poland | 93,312 | 12.1% |
| Italy | 77,438 | 10.0% |
| Austria | 29,908 | 3.9% |
| Belgium | 25,857 | 3.3% |
| USA | 23,695 | 3.1% |
| Netherlands | 22,867 | 3.0% |
| Hungary | 20,505 | 2.7% |
| France | 19,937 | 2.6% |
| Spain | 15,066 | 1.9% |
| Others | 150,090 | 19.4% |
| World | 773,601 | 100.0% |

Table 7 – Major Apple Juice Exporting Countries - 2016

4.2.3.4 'Other Juices' Exporters

'Other juices' export market is geographically more diversified compared to the markets of single fruit juices. Unlike single fruit juice categories, the top ten exporters list in 'Other juices' category includes countries from Asian continent also. In fact in 2016, the largest exporter of 'Other juices' was Thailand, an Asian country. With exports of 370,552 tons, Thailand claimed 23.1% share of the global exports. Saudi Arabia, another Asian country, was the second largest exporter with 4.8% market share. Brazil and Netherlands respectively were the third and fourth largest exporters. Fifth rank was claimed by China with exports of

64,639 tons and market share of 4.0%. Top ten exporters accounted for 55% of the total global exports. Exports and the market shares of the top ten exporters of ‘Other juices’ in 2016 are shown in Table 8.

| Exporting Country | Export Quantity (Tons) | Market Share |
|-------------------|------------------------|---------------|
| Thailand | 370,552 | 23.1% |
| Saudi Arabia | 76,391 | 4.8% |
| Brazil | 74,129 | 4.6% |
| Netherlands | 63,364 | 4.0% |
| China | 64,639 | 4.0% |
| Poland | 62,790 | 3.9% |
| USA | 59,872 | 3.7% |
| Germany | 43,722 | 2.7% |
| Turkey | 37,991 | 2.4% |
| Spain | 35,373 | 2.2% |
| Others | 715,285 | 44.6% |
| World | 1,604,108 | 100.0% |

Table 8 – Major ‘Other juices’ Exporting Countries - 2016

4.2.3.5 Mixed Fruit Juice Exporters

The exporters of mixed fruit juices include countries from all the continents. Saudi Arabia was the largest exporters with exports of 505,812 tons and market share of 27%. Netherlands and Germany, the two European countries were the second and third largest exporters with market shares of 9.8% and 8.6% respectively. South Africa and USA were the fourth and fifth largest exporters. Top five exporters accounted for 57% of the total global exports. Top ten exporters are shown in Table 9.

| Exporting Country | Export Quantity (Tons) | Market Share |
|-------------------|------------------------|---------------|
| Saudi Arabia | 505,812 | 27.1% |
| Netherlands | 182,794 | 9.8% |
| Germany | 161,473 | 8.6% |
| South Africa | 114,555 | 6.1% |
| USA | 98,642 | 5.3% |
| Spain | 98,173 | 5.3% |
| Thailand | 69,278 | 3.7% |
| Belgium | 62,217 | 3.3% |
| United Kingdom | 42,791 | 2.3% |
| Nepal | 43,150 | 2.3% |
| Others | 489,885 | 26.2% |
| World | 1,868,770 | 100.0% |

Table 9 – Major Mixed Fruit Juice Exporting Countries - 2016

5.0 PAKISTAN'S TRADE IN FRUIT JUICES

Pakistan is a large producer of diverse variety of fruits and vegetables. Large horticultural production provides a strong raw material base for the juice processing sector. Pakistan's fruits and vegetables processing sector dates back to past three decades. During this period, the sector has not only been successful in meeting the needs of the processed foods by the local population but has also established a visible presence in the international markets by exporting variety of value added products to different parts of the world. These include raw materials like pulps/concentrates as well as ready-to-drink fruit juices.

5.1 Pakistan's Fruit Juice Exports

Pakistan's fruit juice exports have not followed a consistent trend over the years. It can be inferred that Pakistani fruit juice exports are only dependent upon receiving individual orders from different parts of the world during different years. The industry is not recognized as a large and reliable supplier of fruit juices in the international markets. The last ten years Pakistani exports in Figure 24 and Figure 25 show this irregular trend.

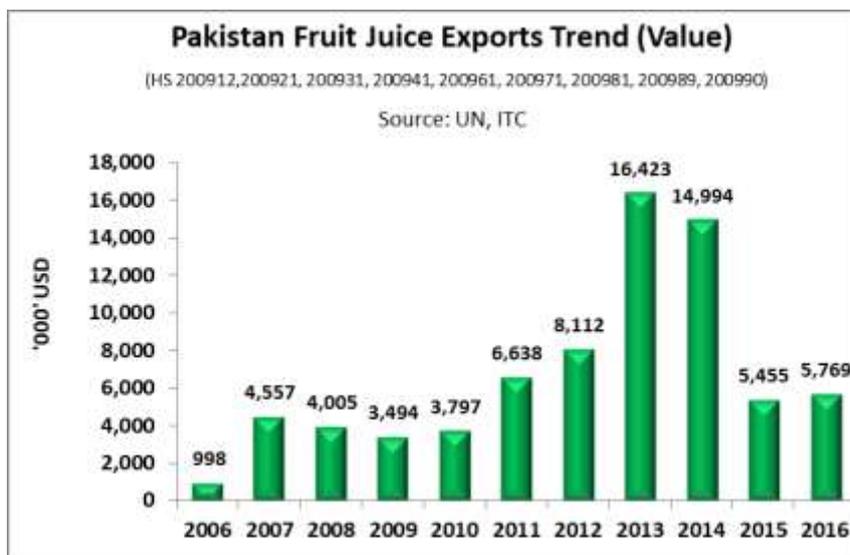


Figure 24 – Pakistan Fruit Juice Exports (Value)

The exports increased from 2006 to 2007, then followed a declining trend till 2009, and once again followed an increasing trend till 2012 to reach 9,356 tons in 2012. The year 2013 saw a sharp increase when the exports touched their highest to reach 19,031 tons against a value of USD 16.4 million which was partially maintained in 2015. However, in 2015, the exports once again experienced a drastic decrease when they fell to 5,993 tons.

Pakistan's total exports of ready-to-drink fruit juices in 2016 were 4,663 tons with a value of USD 5.77 million. These exports translate into a meager market share of 0.05% of the total quantity and 0.075 of the total value of global exports of fruit juices. Looking in the context of the country's large horticultural production, this export performance cannot be termed satisfactory. There is a huge potential to increase the exports of fruit juices from Pakistan to capture a respectable share of the international export market.

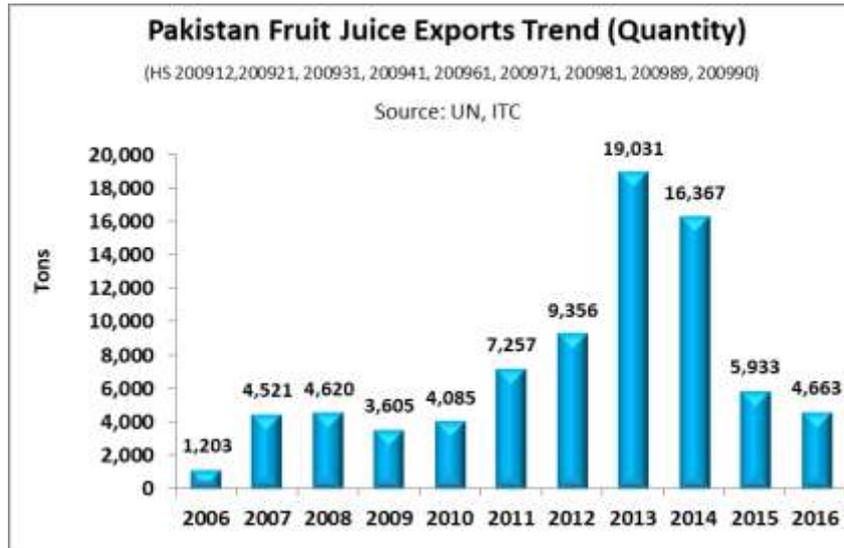


Figure 25 –Fruit Juice Exports - Product Category Trends (Quantity)

Product split of Pakistani exports show that around 70% of the total exports were of the mixture of juices (HS 2009.90). ‘Other juices’ (HS 2009.89) was the other product category where Pakistan managed to capture some export market. Exports in other product categories were negligible. The exports product split is shown in Figure 26.

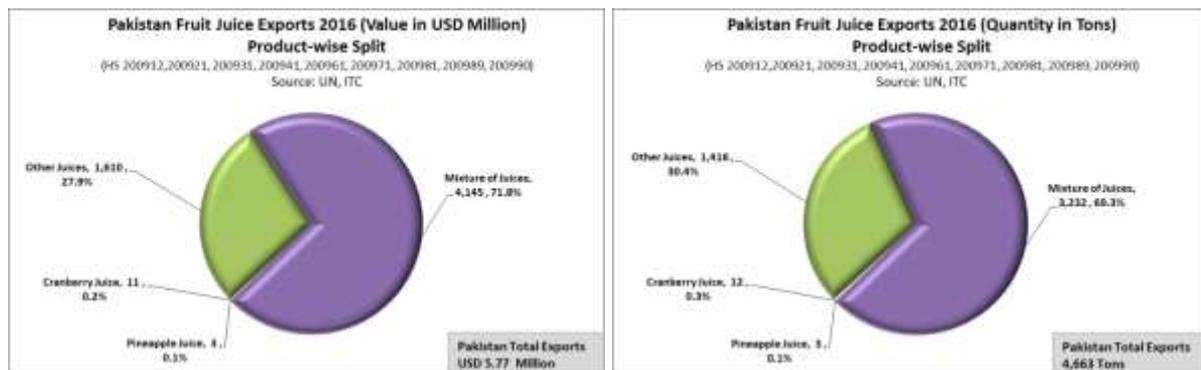


Figure 26 –Pakistan Fruit Juice Exports - Product Categories

It is surprising to note that in spite of being a large citrus producer, Pakistan does not have any exports in citrus juice categories. Pakistan is an important exporter of Frozen Concentrated Kinnow Juice (FCKJ) which is a raw material to produce ready-to-drink citrus juices. However, there is no presence of Pakistan in consumer pack orange juices.

Looking into Pakistan’s export trends of its two major categories, shown in Figure 27, it is seen that the exports of Mixed Fruit juices remained more stable during the ten year period from 2007 to 2016. However, in case of ‘Other juices’, there were sharp rises and falls during this period. Further insights can be obtained by looking into Pakistan’s trading partners in the two product categories.

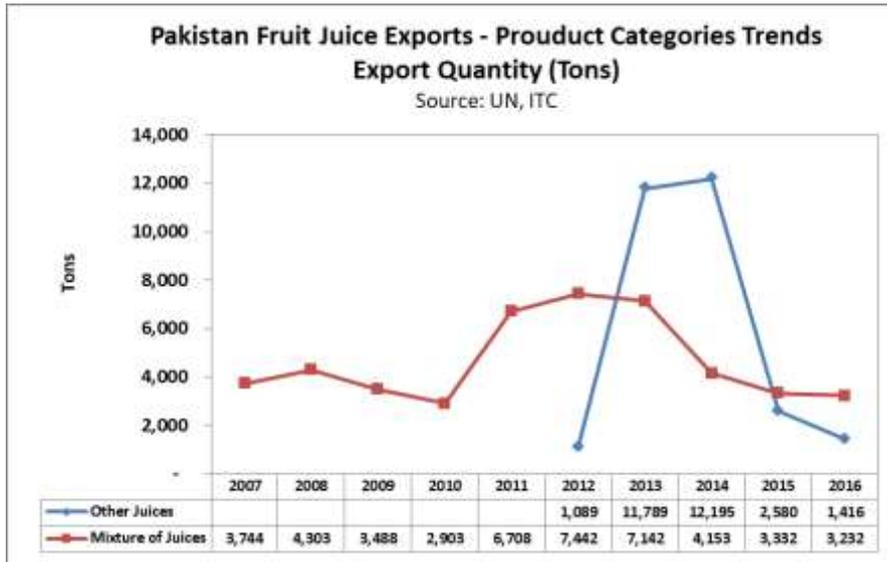


Figure 27 – Pakistan Fruit Juice Exports - Product Category Trends (Quantity)

5.1.1 Pakistan Fruit Juice Exports – Trading Partners

5.1.1.1 Pakistan’s Other Fruit Juices’ Exports

Pakistan exports ‘Other Fruit Juices’ products to large number of countries in the world. In 2016, a total of twenty two countries imported these products from Pakistan. Imports and the relative shares of the top ten trading partners in 2016 in this category are shown in Figure 28.

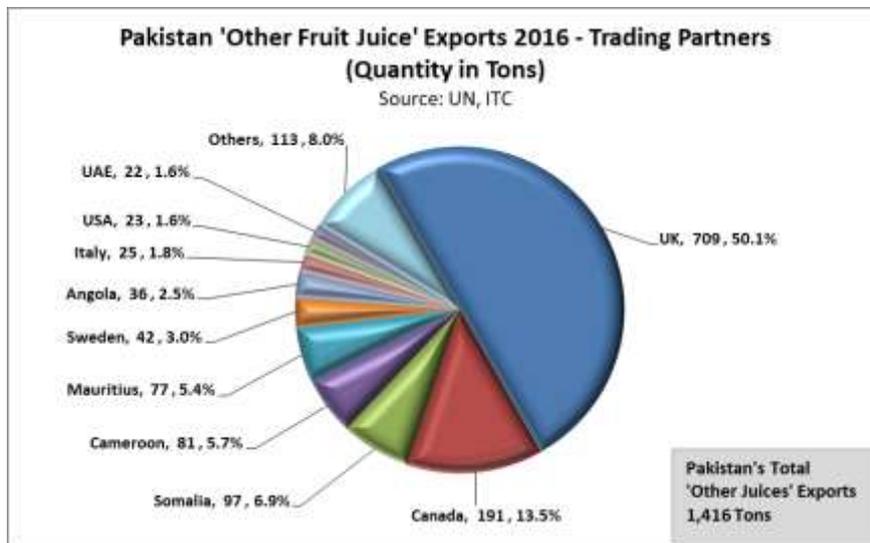


Figure 28 – Pakistan ‘Other Fruit Juice Exports – Trading Partners Shares (Quantity)

UK was the largest trading partner of Pakistan with imports of 709 tons that accounted for half of Pakistan’s total exports in this product category. Canada was the second largest partner that held 13.5% share of the total. Other trading partners included USA and UAE. It can be inferred that Pakistani juice products in this category are being imported by countries where a large number of overseas Pakistanis reside; UK and Canada being the two major examples in this regard. Along with these countries, other buyers of Pakistani juice products included African countries; Somalia, Cameroon and Angola respectively being the third,

fourth and seventh largest importers of ‘Other juices’ exported by Pakistan in 2016. Top ten importers accounted for 92% of the total exports of Pakistan in this category.

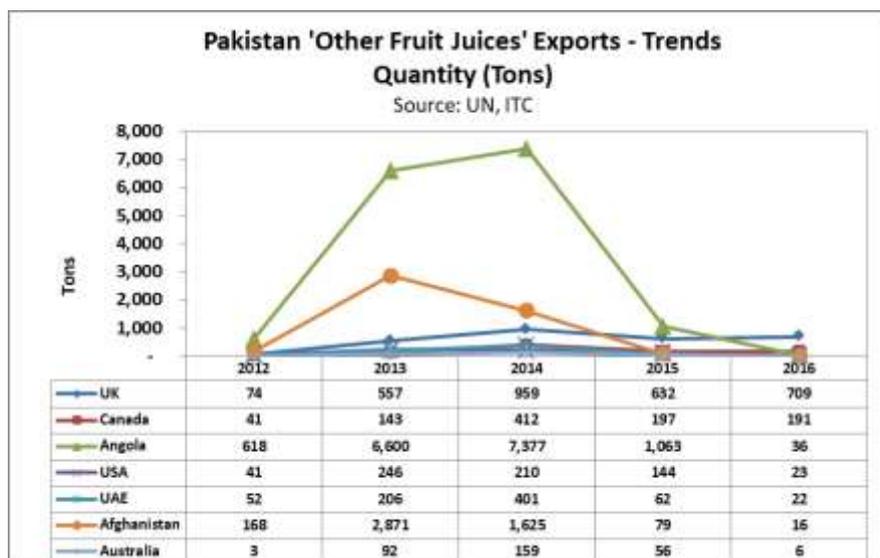


Figure 29 – Pakistan ‘Other Fruit Juice Exports – Trading Partners Trends (Quantity)

Pakistan’s past five year export trends to key trading partners in ‘Other Juices’ category are shown in Figure 29. It can be seen that the sudden increase in Pakistani exports in the year 2013 was due to increased exports to Angola and Afghanistan. Exports to Angola increased by more than ten times; from 618 tons in 2012 to 6,600 tons in 2013. There was a further increase to 7,377 tons in the year 2014. This rise however was not sustainable and the exports to Angola dropped to 1,063 tons in 2015 and to only 36 tons in 2016. Similarly, the exports to Afghanistan increased by seventeen times from 2012 to 2013. However, there was a decline phase in the next years and the exports decreased only to 16 tons in 2016. Such trends confirm the hypotheses that Pakistan’s fruit juice exports are dependent upon certain orders by some international customers that may exist in any one year and may not exist in some other years. Exports to major buyers like UK and Canada have been more sustainable and predictable.

5.1.1.2 Pakistan’s ‘Mixture of Fruit Juices’ Exports

Pakistan’s biggest category in its fruit juices exports is the ‘Mixture of Juices’. These juices are exported to large number of countries around the world. In 2016, there were twenty eight countries which imported these juices from Pakistan. Afghanistan was the largest importer which bought 761 tons of these products to claim 23.5% share in total exports. USA was the second largest buyer with 632 tons of imports and 19.6% share. Oman, Canada and Somalia were the third, fourth and fifth largest buyers with respective shares of 9.7%, 9.6% and 6.6%. Pakistani markets include its neighbors, countries with large number of overseas Pakistanis and smaller non-traditional markets like African countries. Distribution of Pakistan’s exports of ‘Mixture of Juices’ during the year 2016 is shown in Figure 30.

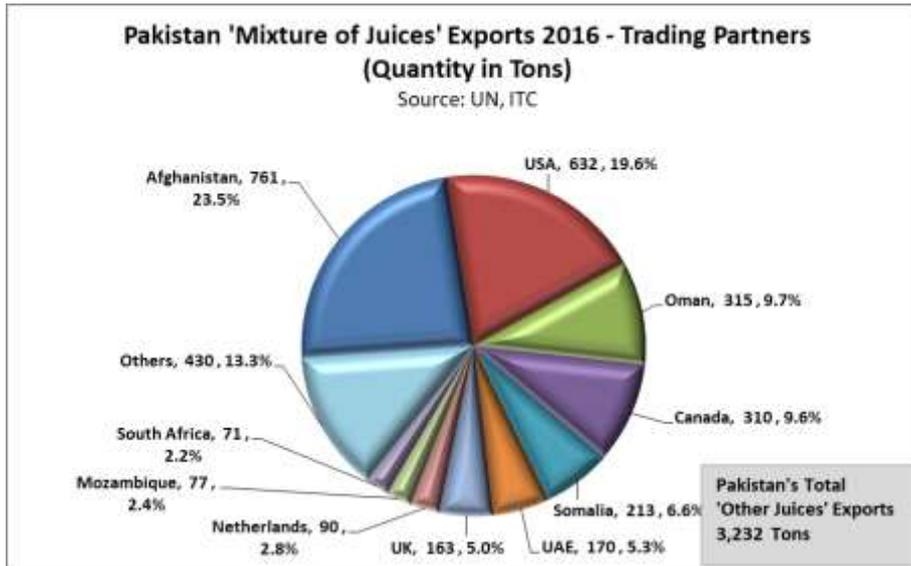


Figure 30 – Pakistan ‘Mixture of Juices’ Exports – Trading Partners Shares (Quantity)

Looking at the export trends to different trading partners, a sharp fluctuating pattern was seen in case of Afghanistan. Exports to Afghanistan increased sharply in 2011 by about three times. It was however followed by a sharp declining trend that started from 2013. A similar trend was seen in case of Angola in which case the exports increased by about nine times in 2013 and dropped in the next two years to around their previous average value. Export trends of the more consistent trading partners are shown in Figure 31.

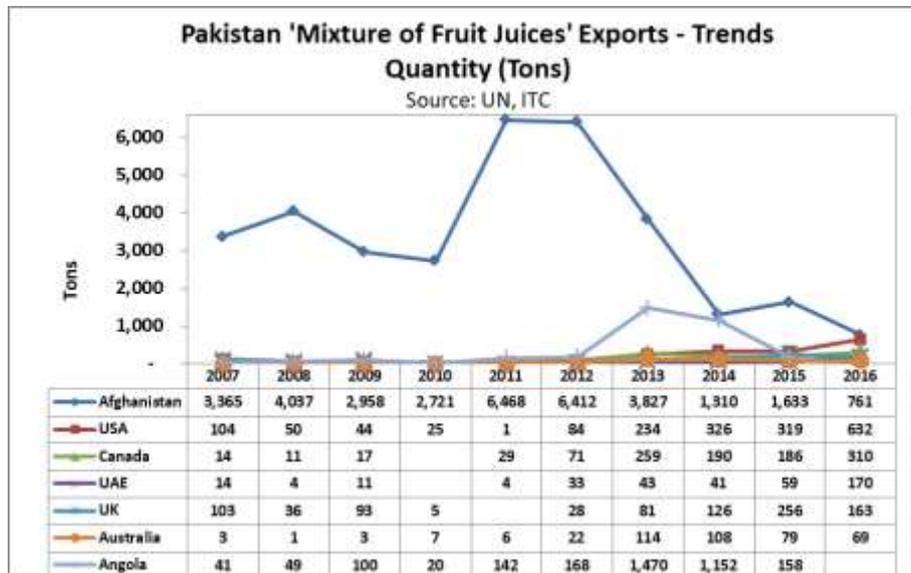


Figure 31 – Pakistan ‘Other Fruit Juice Exports – Trading Partners Trends (Quantity)

The exports to other countries were characterized by small ups and downs during the period under review. The trends indicate that Pakistani exports of ‘Mixture of Juices’ are highly dependent upon some individual orders received by the local suppliers from different parts of the world. There is lack of consistency and sustainability due to which no specific trend can be observed in this case.

5.1.2 Export Price of Pakistan’s Fruit Juices

Average unit prices of Mixed Fruit Juices exported by Pakistan in different markets are shown in Table 10. Average unit price of the entire exports in this category in 2016 was USD 1.28 per liter which in local currency is around PKR 140 (@PKR 110 per USD). It can be observed that the unit prices of the products sold in high-income countries are generally higher. For example, per liter prices of the products exported to USA, Oman, Canada, UK and Netherlands respectively are USD 1.3, 1.52, 1.34, 1.32 and 1.78 respectively. Whereas, the products exported to low-income countries generally fell in lower range. For example, the per liter prices realized in Somalia, Mozambique, Djibouti and Botswana respectively were USD 0.84, 0.99, 0.87 and 1.0. Afghanistan was seen as an anomaly where a higher than average price of USD 1.43 was realized, in spite of a weak and unstable economic situation in the country. Difference in prices is also an indicator of the types of products sold in different markets. The products sold at higher prices may be the fruit nectars whereas the one sold at lower prices may be fruit drinks.

| Importers | Export Quantity (Tons) | Export Value (000 USD) | Unit Price (USD/Liter) |
|----------------------|------------------------|------------------------|------------------------|
| World Average | 3,232 | 4,145 | 1.28 |
| Afghanistan | 761 | 1,090 | 1.43 |
| USA | 632 | 824 | 1.30 |
| Oman | 315 | 479 | 1.52 |
| Canada | 310 | 414 | 1.34 |
| Somalia | 213 | 179 | 0.84 |
| UAE | 170 | 184 | 1.08 |
| UK | 163 | 215 | 1.32 |
| Netherlands | 90 | 160 | 1.78 |
| Mozambique | 77 | 76 | 0.99 |
| South Africa | 71 | 69 | 0.97 |
| Australia | 69 | 82 | 1.19 |
| Djibouti | 68 | 59 | 0.87 |
| Mauritius | 59 | 57 | 0.97 |
| Hong Kong, China | 43 | 51 | 1.19 |
| New Zealand | 34 | 27 | 0.79 |
| Bahamas | 26 | 26 | 1.00 |
| Greece | 26 | 28 | 1.08 |
| Malaysia | 24 | 18 | 0.75 |
| Botswana | 21 | 20 | 0.95 |

Table 10 – Average Unit Prices of ‘Mixed Fruit Juices’ Exported by Pakistan - 2016

A similar trend can also be seen in the export prices of ‘Other Juices’ exported by Pakistan. Average prices of this product exported all over the world in 2016 was USD 1.14 per liter; which in local currency is around PKR 125 per liter (@ PKR 100 per USD). Export prices realized in different markets are shown in Table 11.

| Importers | Export Quantity (Tons) | Export Value (000 USD) | Unit Price (USD/Liter) |
|--------------|------------------------|------------------------|------------------------|
| World | 1416 | 1,610 | 1.14 |
| UK | 709 | 952 | 1.34 |
| Canada | 191 | 207 | 1.08 |
| Somalia | 97 | 84 | 0.87 |
| Cameroon | 81 | 61 | 0.75 |
| Mauritius | 77 | 59 | 0.77 |
| Sweden | 42 | 30 | 0.71 |
| Angola | 36 | 26 | 0.72 |
| Italy | 25 | 17 | 0.68 |
| USA | 23 | 28 | 1.22 |
| UAE | 22 | 16 | 0.73 |
| Norway | 22 | 18 | 0.82 |
| Belgium | 18 | 17 | 0.94 |
| Afghanistan | 16 | 21 | 1.31 |
| Singapore | 11 | 15 | 1.36 |
| Congo | 11 | 12 | 1.09 |
| Denmark | 9 | 13 | 1.44 |

Table 11 – Average Unit Prices of ‘Other Fruit Juices’ Exported by Pakistan - 2016

Per liter prices of fruit juice products exported by Pakistan in developed economies like UK, USA, Canada, USA, Singapore and Denmark were USD 1.34, 1.08, 1.22, 1.36 and 1.44 respectively. The prices realized in less developed countries fell in the lower range. For example, the per liter prices of these products in Somalia, Cameroon, Angola and Congo were USD 0.87, 0.75, 0.72 and 1.09 respectively. Some exceptions from this general rule were also observed including price of USD 1.31 for Afghanistan and USD 0.73 for UAE.

5.2 Pakistan’s Imports of Fruit Juices

Pakistan imports different types of ready-to-drink fruit juices. There is no specific trend of these imports. Last ten-year trend has been fluctuating and is shown in Figure 32.

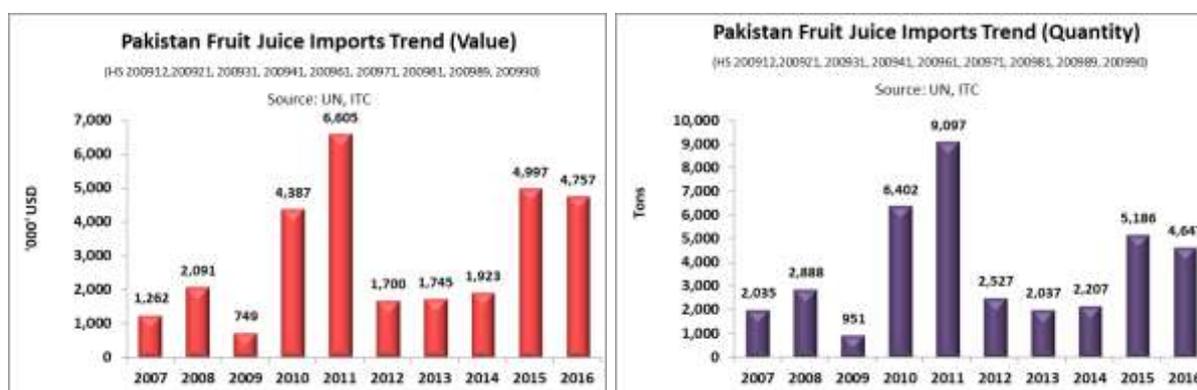


Figure 32 – Pakistan Fruit Juice Imports Trends – (Value and Quantity)

Imports increased from 2,035 tons in 2006 to touch their maximum of 9,097 tons in 2011 and dropped in the following years. In 2016, Pakistan’s total imports of fruit juices were 4,647 tons with a value of USD 4.76 million.

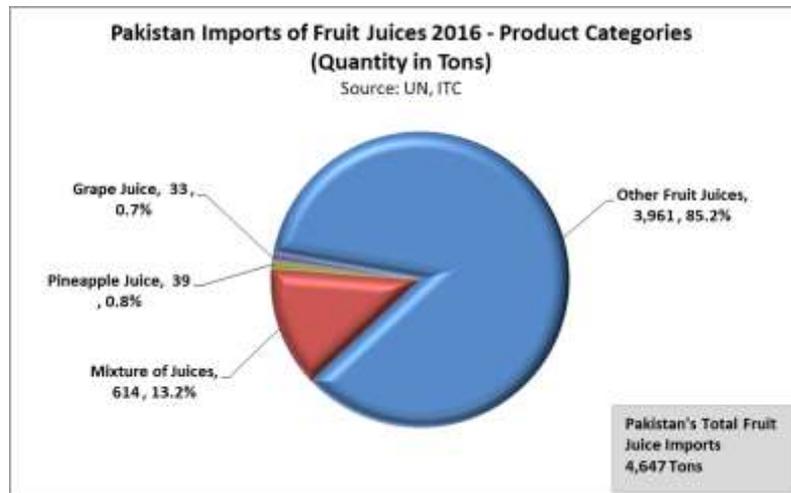


Figure 33 – Pakistan Fruit Juice Imports – Products Distribution (Quantity)

85% of the Pakistan’s fruit juices imports fell in the category of ‘Other Juices. In 2016, Pakistan imported 3,961 tons of ‘Other Juices’ for a value of USD 4.1 million. The other important product was ‘Mixture of Juices’ that accounted for 13% of the total quantity of juices imported by Pakistan. 614 tons of juice were imported against a value of USD 0.6 million. Pakistan’s import product distribution is shown in Figure 33.

Most of the countries supplying fruit juices to Pakistan are from the Asian continent. In the ‘Other Juices’ category, Pakistan met 39% of its import needs by importing 1,537 tons of juices from UAE. Turkey and Thailand respectively were the second and the third largest suppliers; claiming 24% and 13% shares of the Pakistan’s total imports of this product.

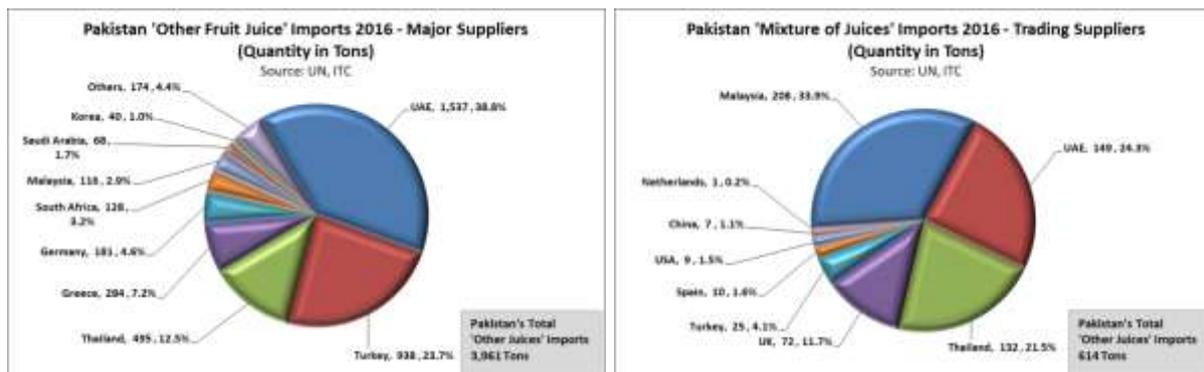


Figure 34 – Pakistan Fruit Juice Exports – Trading Partners (Quantity)

In the ‘Mixture of Juices’ category, UAE was the largest supplier that exported 149 tons of juice products to Pakistan in 2016 to claim one fourth share of the total imports of this product by Pakistan. Thailand and UK were the second and the third largest suppliers respectively accounting for 22% and 12% shares. Pakistan’s import product distribution of ‘Other Juices’ and ‘Mixture of Juices’ in 2016 is shown in Figure 34.

6.0 LOCAL MARKET ANALYSIS

Pakistan has a large fruit juice processing sector to cater to the needs of the large population of 210 million people. Fruit processing and juice manufacturing industry of Pakistan, over the past two decades, has grown exponentially and has managed to develop a diverse product portfolio of the ready-to-drink fruit juices and drinks; in line with the rising market demand. The growth has been fuelled by an increasing health consciousness among the urban population. There has been a shift in demand away from carbonated cola drinks and an increased customer focus on fruit based beverages. Increased quality awareness among consumers has also been a factor driving the companies towards better product development in diverse flavors. Other market driving factors have been the population growth, increased disposable incomes of middle to high income families and increased penetration in newer smaller markets in peri-urban and rural areas.

The market for fruit juices is a part of the cold beverage market which includes different product categories and sub-categories. Major product classification is shown in Figure 35.⁸

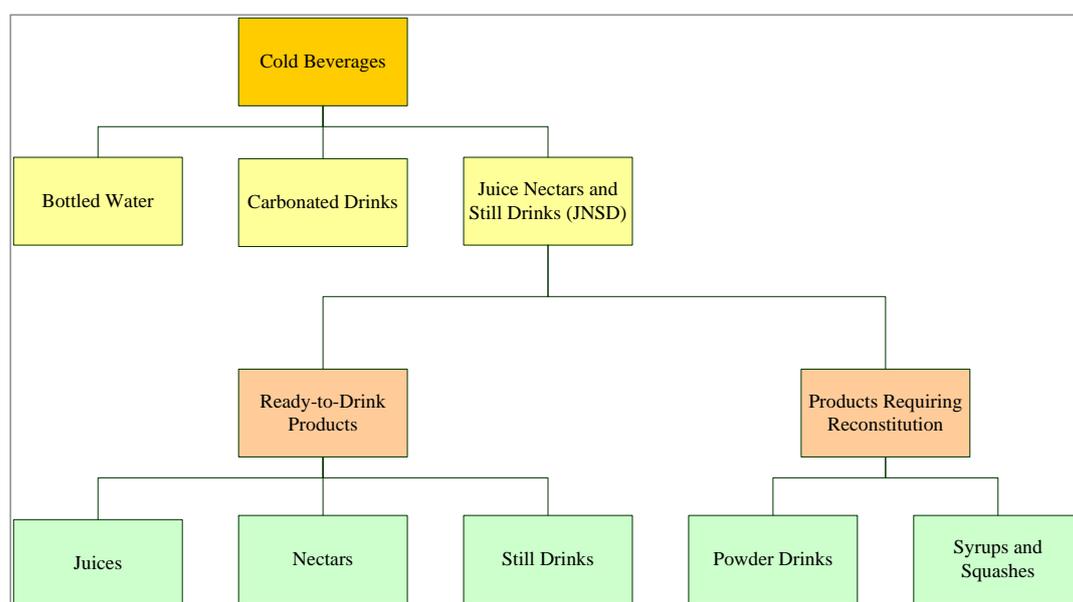


Figure 35 – Cold Beverage Market Product Classification

The scope of this document covers the Juice, Nectars and Still Drinks (JNSD) products. These three types of products are classified with respect to the percentage of fruit pulp in their recipes.

Pure Juice is the 100% juice with no addition of sugar or other artificial ingredients. 100% juice may be straight juice or obtained after reconstituting concentrates, pulps, purees with water and other natural ingredients.

Nectar is the processed juice product having 20-50% fruit content with added water, sugar and number of other ingredients.

⁸ Potential for Processing Afghanistan Pomegranates – A Study of Pakistani Market for Pomegranates, International Finance Corporation, 2009

Still Juice Drink is the processed juice drink with 8-10% fruit juice pulp, added water, sugar and other ingredients so that they closely mimic fruit juice.

During recent past, there was a trend in the juice industry to manufacture ‘flavored drinks’ also. These products were made only from sugar, artificial flavors, essences and other ingredients; without adding any fruit content in their recipes. All such products were being sold as fruit juice drinks. However, during recent past, Government of Punjab has placed a special emphasis to ensure stricter compliance to food regulations. As a result, the manufacturing of such low quality products has drastically reduced in the province. There has been a significant improvement in the quality of fruit juice drinks and most of the juice drinks currently being manufactured in Punjab contain at least 8% fruit pulp.

6.1.1 Local JNSD Market Size

Local JNSD market has grown at a high rate during the past decade. Increasing disposable incomes of middle to high income families have driven the market growth. Increasing health consciousness and aggressive marketing by the juice companies have also played a key role in developing this market. As per a previous report by Tetra Pak, in 2009, the total JNSD market in Pakistan was 461 million liters (Tetra Pak juices). The share of bottled juice in the total juice market was around 13%. This made the total market size as around 527 million liters. Market growth in 2009 was estimated to be 16% per annum.⁹ Using this growth rate, Pakistan’s JNSD market in 2018 can be estimated to be around 2 billion liters.

Using another source, a similar result is obtained. As per a newspaper article of September 2017, the total size of Pakistani beverage market was 44 billion liters.¹⁰ JNSD was quoted to hold 4% share of this market which makes the total market size as 1.76 billion liters. Using a growth rate of 16%, JNSD market size in 2018 would be around 2.0 billion liters.

As per industry sources, Tetra Pak’s total market in Pakistan in 2018 is around 14 billion packs. This includes all types of dairy and juice products; marketed in packs of all sizes (1000 ml, 500 ml, 250 ml and 200 ml). The share of juices in the total Tetra Pak market of Pakistan is around 6 billion packs. The market has been growing at a rate of about 15% per annum during the last six to seven years. Consistent growth at this healthy rate means that the market keeps doubling every five years. Such a huge growth offers huge opportunity for investors to earn decent profits by investing in this sector.

6.1.2 Market Distribution by Juice Categories

Fruit juice drinks is the largest category with production of around 4 billion packs. This translates into a share of 67% of the total fruit juice market of 6 billion packs. The sale of flavored drinks is estimated to be around 300 million packs (major share of these flavored drinks are being produced in provinces other than Punjab). The share of flavored drinks comes out to be around 5%. The balance 28% share of the total Tetra Pak juice market is

⁹ Potential for Processing Afghanistan Pomegranates – A Study of Pakistani Market for Pomegranates, International Finance Corporation, 2009

¹⁰ <https://aurora.dawn.com/news/1142372>

accounted by pure juices and nectars. The share of juice and nectars in the total fruit juice market of Pakistan has grown over the years. In spite of their smaller volumes, the pure juices and nectars remain as the major contributors to the company’s profitability since unit profit margin of these high value added products is higher than that of the fruit juice drinks.

Looking at the market distribution with respect to pack size, it was estimated that the share of 1000 ml juice packs in the total Tetra Pak market in Pakistan is around 10%. On this basis, the total volume of fruit juices sold in 1000 ml packs should be around 600 million liters. Using the basis of 220 ml as the basis (average of 200 ml and 250 ml), the volume of juice sold in smaller packs comes out to be 1,188 million liters. This makes the total JNSD market of Pakistan to be 1,788 million liters. This estimate is not very far from the previously estimated figure of 2.0 billion liters.

6.1.3 Market Distribution by Flavors

Fruit juices are made from different fruits in large variety of flavors. Globally, orange juice is the most popular fruit juice in the world accounting for around one third of the total fruit juice market; followed by apple, mixed fruit and grape.¹¹ The situation however is different in Pakistani market; with mango juice being the most popular fruit juice. As per the industry sources, around 50% share of the local fruit juice market is claimed by mango-based products. This dominance of mango flavor holds in both nectar and drinks categories. It is followed by apple flavor with an estimated market share of 25-30%. Apple is the second most popular flavor both in nectars and juice drinks categories. The balance 20-25% market is claimed by other flavors including red grapes, orange/kinnow, guava, peach, pineapple, pomegranate, lychee, strawberry, tamarind and mixed fruits. In nectars and juices category, red grape is the third most consumed flavor and orange/kinnow juice is the fourth.

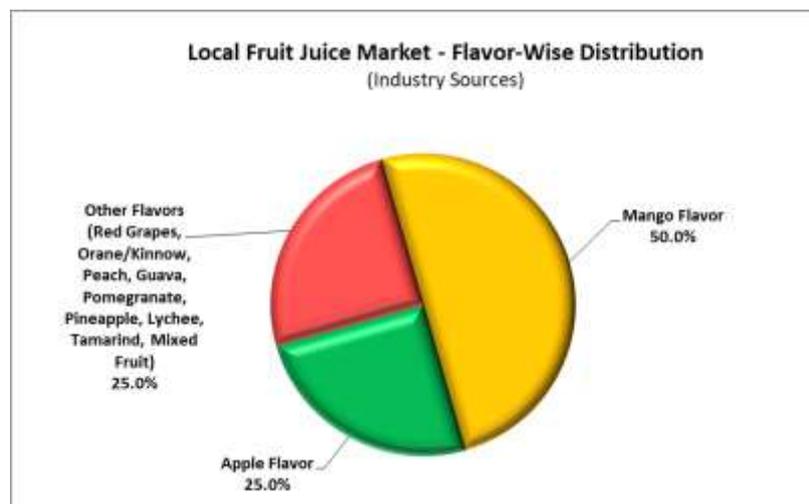


Figure 36 – Local Fruit Juice Market – Flavor-wise Distribution

Pakistani market is different from other markets since it offers two types of flavors in citrus-based juices; Orange and Kinnow. Orange juice is produced in smaller volumes and its recipe generally also includes the imported orange juice concentrate; along with the local Kinnow

¹¹ www.businesswire.com

juice concentrate. Kinnow is the main citrus-based juice that is sold in larger quantity in the local market compared to that of orange juice.

6.1.4 Major Brands in Local Juice Market

There are a large number of players in the local market that manufacture different JNSD products. However, the larger players, with popular brands, are not many. These popular brands are large well-established companies, marketing their products mostly in larger urban population centers. Along with these, there are a large number of smaller players which sell their products in the markets of smaller cities and towns. The brand names of such juice products are usually not well known and their products are characterized by lower quality and lower price. The consumers in smaller markets have lower awareness and concern about hygiene and quality and are not brand conscious.

As per the industry sources, there are around thirty to forty different companies manufacturing fruit juices in Pakistan. These companies have their own processing and filling facilities. Along with such companies, there is another category of juice manufacturers who do not have their own facilities but they use the facilities of other manufacturers to get their product packaged by paying service charges. Including such investors, the total number of juice manufacturers (brands) in the country comes to around hundred.

Introduction to major fruit juice/nectars/drinks manufacturers and their brands sold in the local market is provided in the following paragraphs:

6.1.4.1 Nestle Pakistan

Nestle Pakistan is the largest manufacturer of fruit-based beverage products in the local market. The company has products in all the three categories of fruit juices, nectars and still drinks. The pure juices and nectars are marketed under the brand name of 'Fruita Vitals' and the fruit drinks are marketed under the brand name of 'Nesfruta'. Products under the two categories are shown in Figure 37 and Figure 38.



Figure 37 - Nestlé's Juice and Nectar Products

As per industry estimates, Nestlé's sales of Tetra Pak juices in 2017 were around 1.5 billion packs which is 25% of the total Tetra Pak juices sold in the country. However, as per some other estimates, Nestle holds a higher market share which may be close to half of the total JNSD market of Pakistan. Major share of Tetra Pak sales is accounted for by the fruit drinks

category. As per the industry sources, around 80% of the total sales of Tetra Pak juices was accounted by fruit drinks; which is a low-priced product and thus falls within the affordability range of a larger segment of the local population.



Figure 38 - Nestlé's Still Drink Products

6.1.4.2 Popular Food Industries Ltd.

Popular Food Industries is a major fruit juice producer of Pakistan with a diversified product line in all product categories. The company has a strong presence in local market; mainly in the province of Sindh. It also exports its products to different African markets. The products are available in 1000 ml, 200 ml, 250 ml and 125 ml packs. As per the industry estimates, the company has annual sales of around 700 million packs of different juice products. Company's juice brands are shown in Figure 39, Figure 40 and Figure 41.



Figure 39 - Popular 200 ml Pure Juices and Nectars Products



Figure 40 - Popular 200 ml Juices Drinks Products



Figure 41 - Popular 250 ml Juices Drinks Products for Export Markets

6.1.4.3 Shezan International

Shezan International is another large player in fruit-based beverages in the local market. Just like Nestle Pakistan, Shezan has a strong presence in the local market in all the three product categories of juices, nectars and drinks. Pure juices and nectars are marketed under the brand name of ‘All Pure’ and drinks under the brand names of ‘Twist’. Some drinks are also marketed with the name of fruits; such as mango drink, apple drink, etc. Products under the juice & nectars and still drink categories are shown in Figure 42 and Figure 43.



Figure 42 - Shezan Pure Juice and Nectar Products

Shezan sells major share of its production in local market. The company also exports its fruit juice products into various markets.



Figure 43 - Shezan Still Drinks Products

6.1.4.4 CitroPak

CitroPak is a major fruit processor with a presence in consumer fruit juice products with the name ‘Fruiten’. Fruiten is a new brand that was launched only a few years ago and very quickly, it has been able to gain a respectable share of the local juice and nectars market. CitroPak has presence only in high value added product categories of pure juices and nectars. As per the industry estimates, the sale of Fruiten brand is around 300 million packs per annum. Product line of ‘Fruiten’ is shown in Figure 44.



Figure 44 - CitroPak (Fruiten) Juice and Nectar Products

6.1.4.5 Shakarganj Foods

Shakarganj Foods is also in the business of fruit processing and has a product line of consumer fruit-based beverages. The company markets its pure juices and nectars under the brand name ‘Anytime’ and the still drinks under the brand name ‘Refresh’. There is a separate product line with the name ‘Mango Tango’ under which mango drinks made from different varieties of mango have been launched. Juice products of Shakarganj Foods are shown in Figure 45 and Figure 46.



Figure 45 – Shakarganj Foods (Anytime) Juice and Nectar Products



Figure 46 – Shakarganj Foods Still Drinks Products

6.1.4.6 Fruit Drinks Manufacturers

In addition to these large players, there are numerous smaller companies which only operate in the lower market tier of fruit drinks. Some important brands in this category selling in Punjab markets are ‘Shezan’ and ‘Maza’. Maza is also a popular brand in the southern parts of Pakistan where Karachi is the largest market. Frooto and Maza are two other known brands of fruit drinks in that market. Slice is a fruit drink launched in the local market by PepsiCo. Recently, another large group has launched a new fruit drink brand with the name ‘Must’ in the local market. In addition to these known names, there are many small brands selling locally in smaller markets throughout the country. Figure 47 shows some more known brands of fruit drinks selling in the local market.



Figure 47 – Common Fruit Drinks Brands

6.1.4.7 Imported Juices

Major share of the local fruit juice market is captured by the locally manufactured brands. However, there is a presence of imported products as well. International brands like Malee, Rani, Tropicana, Minute Maid and many others are also available in the local market. These brands are generally sold at higher prices than the local brands. The availability of imported brands is usually limited to larger stores. The share of imported juices in the local market is less than 10%.

7.0 THE PROPOSED BUSINESS

7.1 Purpose of the Business

The purpose of the proposed business is to manufacture consumer pack fruit juices using local and imported pulps, purees and concentrates. Major share of production will be sold in the local market with the balance being exported. The project will directly add value to the agriculture sector of Punjab by increasing demand for high value added horticultural products obtained by processing the surplus farm produce which otherwise gets wasted. The project will thus contribute towards reducing post-harvest losses and increasing the economic value of produce for the sector stakeholders. Local farmers will benefit by getting a market for their lower grade fruits which do not have value as table fruit.

7.2 Product Line

The product line of the proposed business includes fruit juices of different flavors in three types of Tetra Pak consumer packings (1000 ml, 200 ml and 250 ml). The selected products include pure fruit juices, fruit nectars and fruit juice drinks. The proposed product line has been decided in line with the market demand and is shown in Table 12.

| Product Line | | |
|----------------------------|---------------------------|--------------------|
| 1000 ml Pack | 200 ml Pack | 250 ml Pack |
| Pure Juice | | |
| Orange Juice 1000 ml | Orange Juice 200 ml | - |
| Nectars | | |
| Mango Nectar 1000 ml | Mango Nectar 200 ml | - |
| Apple Nectar 1000 ml | Apple Nectar 200 ml | - |
| Red Grapes Nectar 1000 ml | Red Grapes Nectar 200 ml | - |
| Peach Nectar 1000 ml | Peach Nectar 200 ml | - |
| Pineapple Nectar 1000 ml | Pineapple Nectar 200 ml | - |
| Guava Nectar 1000 ml | Guava Nectar 200 ml | - |
| Pomegranate Nectar 1000 ml | Pomegranate Nectar 200 ml | - |
| Mixed Fruit Nectar 1000 ml | Mixed Fruit Nectar 200 ml | - |
| Fruit Juice Drinks | | |
| Mango Drink 1000 ml | Mango Drink 200 ml | Mango Drink 250 ml |
| Apple Drink 1000 ml | Apple Drink 200 ml | Apple Drink 250 ml |
| Mixed Fruit Drink 1000 ml | Mixed Fruit Drink 200 ml | Guava Drink 250 ml |

Table 12 – Project’s Proposed Product Line

The product line for this project has been based on the products which have an established market presence and demand. However, newer, more specialized juice products may also be added in the product line using the same machinery and equipment. The selling point of these newer products may be derived from some targeted health benefits, diverse tastes or any other attributes aimed at fulfilling some specialized consumer needs. Some examples of such products are provide in Annex III.

7.3 Suggested Location

The proposed project will manufacture consumer juice products that will be mainly sold in the retail markets in major cities and towns of Punjab. The project therefore should be established in or around the major urban centers of the province. In that context, Lahore appears to be the best location. Other suitable locations include Faisalabad, Rawalpindi, Multan or any other large city of Punjab. The location selection decision should also take into consideration the share of export sales in the company's total sales. With a high share of exports, it will more advisable to establish this facility closer to seaports. Multan becomes a preferred location in this context since it is closer to Karachi compared to Lahore, Faisalabad or Rawalpindi.

Another important factor in deciding on the location of the proposed facility is the raw material sourcing. The suggested business model does not include manufacturing of pulps, purees and concentrates and hence these raw materials will have to be sourced from the market. Most of the pulps/concentrates manufacturing facilities exist around Lahore, Sargodha and Multan. Establishing the proposed facility in the vicinity of these cities will make raw material sourcing easier; and will not only ensure consistency in supplies but will also reduce the raw materials transportation cost.

In addition to the above, the selected location should also be close to the main highways. It is important both from the perspective of receiving raw material supplies conveniently and for allowing easier transportation of the final product for export.

7.4 Plant Capacity

The capacity of fruit juice manufacturing plants is defined by the capacity of the filling (packing) machines. Three Tetra Pak machines have been suggested to be included in this project; one each of 1000 ml, 200 ml and 250 ml packing. Different models of Tetra Pak machines are available in the market. The investor can make his selection on the basis of market demand of the product and the technical attributes of the machine. Total capacity of the processing unit can be increased by increasing the number of filling machines. Corresponding additions will have to be made in the upstream processes to match the change in juice filling capacity.

The Tetra Pak machines selected for the purpose of this feasibility study have the capacities in the range 7,000-7,500 packs per hour. In a normal three-shift day, the plant is operational for around 20 hours. Remaining hours are used for shift change operations and for carrying out sterilization of the plant; known as Cleaning-in-Place (CIP). CIP is carried out once in every twenty four hours and juice processing and filling remains stopped during that time. With these factors, the filling capacities of the three machines selected for this project are shown in Table 13.

| Machine | Capacity (packs/hr) | Hrs/day | Pack/day | Days/year | Packs/year |
|---------|---------------------|---------|----------|-----------|------------|
| 1000 ml | 7,000 | 20 | 140,000 | 300 | 42,000,000 |
| 200 ml | 7,500 | 20 | 150,000 | 300 | 45,000,000 |

| | | | | | |
|--------|-------|----|---------|-----|------------|
| 250 ml | 7,500 | 20 | 150,000 | 300 | 45,000,000 |
|--------|-------|----|---------|-----|------------|

Table 13 – Production Capacities of the Suggested Machines

The capacities shown in the table are the maximum theoretical capacities. The production will be carried out in line with the market demand. Demand for fruit juices is seasonal; with juice consumption increasing in summer and decreasing in winter seasons. Thus the machines usually operate on full capacities during summer months and under capacity during winter months. However, this seasonality can be managed if the project has sales in export markets; especially in the markets where seasons are opposite to those in Pakistan. Decrease in winter sales in the local market can be compensated by increased sales in an export market where summer season prevails. Detailed production schedule has been discussed in the section on revenues.

7.5 Project Cost

The project has a total cost of PKR 426.98 million This includes capital investment of PKR 322.47 million and working capital of PKR 104.51 million. Working capital is 24.5% of the total project cost. Details of different cost components are shown in Table 14 and discussed in the following pages:

| Cost Item | Cost (PKR) | Percent |
|------------------------------|--------------------|---------------|
| Land | 24,000,000 | 5.6% |
| Building & Civil Works | 50,380,000 | 11.8% |
| Tetra Pak Machines | 120,000,000 | 28.1% |
| Processing Machinery | 41,850,000 | 9.8% |
| Utility/Allied Machinery | 25,150,000 | 5.9% |
| Cold Store Machinery | 10,500,000 | 2.5% |
| Laboratory Equipment | 868,600 | 0.2% |
| Office Equipment & Furniture | 4,510,000 | 1.1% |
| Vehicles | 8,900,000 | 2.1% |
| Pre-operating expenses | 36,309,000 | 8.5% |
| Capital Investment | 322,467,600 | 75.5% |
| | | |
| Working Capital | 104,511,684 | 24.5% |
| | | |
| Total Project Cost | 426,979,284 | 100.0% |

Table 14 - Project Cost Details

Detailed calculations of the project cost components are shown in Annex IV.

7.5.1 Land and Building

The project will have one location that will house both the head office and the manufacturing facility. Land and building requirements are discussed in the following paragraphs:

7.5.1.1 Land

Total land requirement for the proposed processing facility has been estimated to be three acres; of which around half an acre will be required for buildings. Two and half acres have been included as open areas to allow for easy movement of the vehicles bringing in raw materials and the vehicles transporting finished goods. Land cost will vary with the actual location. Incorporating the requirement of being close to main road, the land cost has been averaged out to be PKR 8 million per acre which for three acres, comes out to be PKR 24 million. Table 15 shows the details.

| | |
|-------------------------------|-------------------|
| Total Land requirement (Acre) | 3.0 |
| Land Cost (PKR per acre) | 8,000,000 |
| Total Land cost (PKR) | 24,000,000 |

Table 15 – Land Cost

In case there is the option of establishing the proposed unit in some industrial estate or special economic zone in Lahore or other cities, the land cost may be lower than the quoted figure that will reduce the capital cost to increase financial viability of the project. For reducing the capital cost, the option of establishing this project in a leased land may also be considered.

7.5.1.2 Civil Construction of Buildings

The buildings required in the proposed juice manufacturing unit plant include processing hall, utility machinery halls, workshops, cold store (for raw materials), spares and general items stores, finished goods store, office space, laboratory, canteen and residences. Total covered area of the proposed building has been estimated as 25,700 square feet. Space requirement and the associated civil construction costs are presented in Table 16.

| Building | Sq. ft | Construction Cost (Rs/sq.ft.) | Building & Civil Works Cost |
|-------------------------------------|---------------|-------------------------------|-----------------------------|
| Processing hall | 8,000 | 2,000 | 16,000,000 |
| Utilities Hall & Workshop | 1,200 | 1,800 | 2,160,000 |
| Sugar Store | 1,500 | 1,500 | 2,250,000 |
| Paper Store | 1,500 | 1,500 | 2,250,000 |
| Cold Store (for pulps/concentrates) | 2,000 | 1,500 | 3,000,000 |
| Office space | 1,200 | 2,500 | 3,000,000 |
| Laboratory | 400 | 2,500 | 1,000,000 |
| Spare parts & General Items Store | 900 | 1,800 | 1,620,000 |
| Finished Products Store | 7,000 | 1,500 | 10,500,000 |
| Toilets & Change Rooms | 400 | 2,000 | 800,000 |
| Canteen | 600 | 2,000 | 1,200,000 |
| Residence for Security Guards | 1,000 | 2,000 | 2,000,000 |
| Total Covered Buildings | 25,700 | | 45,780,000 |

Table 16 – Civil Construction Cost of Buildings

7.5.1.3 Civil Construction in Open Spaces

In addition to the enclosed buildings, civil construction will be done in open areas for the roads inside the factory premises for movement of vehicles, walking pavements, boundary wall, entry/exit gates and landscaping. Roads and pavements have been assumed to be constructed by Tuff Tiles. Asphalt roads have been avoided to reduce capital cost. Per unit construction cost of roads has been kept higher than that of per unit cost of pavements since roads have to sustain the heavy weight of loaded vehicles carrying fruit or finished goods. Civil construction costs in the open spaces of the processing facility are shown in Table 17.

| Construction | Requirement | Unit Construction Cost (PKR/unit) | Cost (PKR) |
|-----------------------|-------------|-----------------------------------|------------------|
| Inside roads (sq.ft.) | 12,000 | 125 | 1,500,000 |
| Pavements (sq. ft.) | 3,000 | 100 | 300,000 |
| Boundary wall (R.ft.) | 1,500 | 800 | 1,200,000 |
| Landscaping (sq. ft.) | 10,000 | 100 | 1,000,000 |
| Factory Gates (no.) | 2 | 300,000 | 600,000 |
| Total | | | 4,600,000 |

Table 17 – Civil Construction Cost in Open Spaces

| Civil Construction Cost Head | Cost (PKR) |
|--------------------------------------|-------------------|
| Buildings Construction Cost | 45,780,000 |
| Open Areas Construction Cost | 4,600,000 |
| Total Civil Construction Cost | 50,380,000 |

Table 18 – Total Civil Construction Cost

The total civil construction cost in the project is PKR 50.38 million. 91% of this cost is accounted by the cost of buildings and 9% by construction in the plant’s open areas.

7.5.2 Machinery & Packaging Paper

7.5.2.1 Tetra Pak Machines

The proposed project of consumer pack fruit juices has been based on reconditioned Tetra Pak machines. The option of using new Tetra Pak machines is also available. However, going for that option significantly increases the project’s capital cost. Generally, the cost of a new Tetra Pak machine is more than double of that of a similar reconditioned machine. Reconditioned machines are the ones which are replaced by the large juice manufacturers due to change in their business strategy. These old machines are reconditioned by changing the necessary parts and carrying out complete servicing and are made available in good condition. Any potential problem in a reconditioned machine is resolved by the suppliers before selling it to juice manufacturers. These machines are easily available in the local market and can be purchased as per the customer’s specific needs.

The operations and maintenance costs of the reconditioned machines are usually higher than those of the new machines. These older machines also lack some features that may be present

in the newer models. However, at the end of the day, these reconditioned machines possess a good capacity to deliver quality Tetra Pak juice products; comparable with the ones produced by the new machines.

Another consideration for the investor while purchasing old machine is the availability of spare parts. This is not an issue in the case of Tetra Pak machines since all types of spare parts are easily available in the local market. These parts may be sourced from Tetra Pak or from the agents of the Chinese suppliers in the local market. In case a spare part is not available locally, it may also be imported directly.

Another possible technology option is that of using Chinese Tetra Pak machines which are also available in the market. However, the option is usually not preferred by investors since the cost of a new Chinese machine is generally higher than that of a similar reconditioned Tetra Pak machine. Moreover, the engineering services are more readily available for Tetra Pak machines compared to those for the Chinese machines.

7.5.2.2 Packaging Paper

The Tetra Pak uses a special paper to pack food products. This paper is made up of multiple layers of Polyethylene, Kraft paper and Aluminum to make it waterproof, durable, antibacterial, and resistant to oxygen permeability. Tetra Pak is also the supplier of the paper used in its machines. Previously, the paper could only be made by Tetra Pak. However, there are now other manufacturers also who are manufacturing Tetra Pak paper. China is an important supplier of Tetra Pak paper. The Chinese manufacturers can supply paper in the printed form as per the requirements of the customers. There are agents in the local market who can fulfill the orders of Tetra Pak paper for the local juice/milk manufacturers. The quality of the Chinese paper is comparable with that of Tetra Pak while its cost is lower. As per industry estimates, the Chinese Tetra Pak paper is around 15-20% cheaper than the paper supplied by Tetra Pak. Since paper is a major component in the cost structure of packed juices, getting paper at lower cost becomes an important competitive advantage.

Chinese paper is suitable for small to medium investors in juice business. Large investors prefer to use Tetra Pak paper since they can afford it and they also want to avoid any possible quality risk by shifting away from Tetra Pak paper. Tetra Pak prefers to provide its engineering services to those companies which use its paper. The companies using Chinese paper are usually assigned lower priority by Tetra Pak. However, that does not become a constraint for the juice processors since Tetra Pak engineers are also available in open market who can provide good quality engineering services and support.

7.5.2.3 Processing Line

In addition to Tetra Pak machines, for processing lines as well, the option of reconditioned machinery and equipment of the imported origin has been considered. For more common needs like plant utilities, machinery and equipment of local origin has been suggested. The cost of Tetra Pak machines, processing machinery, utility/allied machinery and cold store are provided in Table 19.

| Machinery Category | Cost (PKR) | Share |
|--------------------------|--------------------|---------------|
| Tetra Pak Machines | 120,000,000 | 60.8% |
| Processing Machinery | 41,850,000 | 21.2% |
| Utility/Allied Machinery | 25,150,000 | 12.7% |
| Cold Store | 10,500,000 | 5.3% |
| Total | 197,500,000 | 100.0% |

Table 19 - Machinery & Equipment Cost

Total cost of machinery and equipment of the proposed Tetra Pak fruit juice production facility is PKR 197.5 million. 60.8% of this cost is accounted for by Tetra Pak machines, 21.2% by processing machinery, 12.7% by utility/allied machinery and 5.3% by cold store.

7.5.2.4 Details of Machinery & Equipment

The models of Tetra Pak machines have been selected looking at the market feedback and reputation of these models. The selected machines include TBA-8 for 1000 ml packs and TBA-19 (20-V) for 200 ml and 250 ml packs. These models are considered successful in the market and the reconditioned machines are easily available in the local market. The capacities of the suggested machines are shown in Table 20.

7.5.2.4.1 Tetra Pak Machines

| Sr. No | Name of the Machine | Model | Capacity (Packs/hr) | Capacity Pack//20 hr day |
|--------|---------------------------|-------------|---------------------|--------------------------|
| 1 | Tetra Pak Machine 1000 ml | TBA-8 | 7,000 | 140,000 |
| 2 | Tetra Pak Machine 200 ml | TBA-19 20-V | 7,500 | 150,000 |
| 3 | Tetra Pak Machine 250 ml | TBA-19 20-V | 7,500 | 150,000 |

Note: The machinery package includes the straw applicators and shrink wrapping machines with 200 ml and 250 ml machines

Table 20 – Tetra Pak Machines Capacities

The number of Tetra Pak filling machines and the costs of the selected machinery and equipment for manufacturing Tetra Pak fruit juices is shown in Table 21 to Table 23.

| Sr.No | Name of the Machine | No. | Unit Cost (PKR) | Total Cost (PKR) |
|-------|---------------------------|----------|-----------------|--------------------|
| 1 | Tetra Pak Machine 1000 ml | 1 | 70,000,000 | 70,000,000 |
| 2 | Tetra Pak Machine 200 ml | 1 | 25,000,000 | 25,000,000 |
| 3 | Tetra Pak Machine 250 ml | 1 | 25,000,000 | 25,000,000 |
| | Total | 3 | | 120,000,000 |

Table 21 – Tetra Pak Machinery Cost

7.5.2.4.2 Processing Machinery & Equipment

| Sr.No | Name of the Machine | No. | Unit Cost (PKR) | Total Cost (PKR) |
|-------|-------------------------------|-----|-----------------|------------------|
| 1 | Blending System | 1 | 1,850,000 | 1,850,000 |
| 2 | Juice Processing Line 1000 ml | 1 | 20,000,000 | 20,000,000 |

| | | | | |
|---|------------------------------|----------|------------|-------------------|
| 3 | Juice Processing Line 200 ml | 1 | 10,000,000 | 10,000,000 |
| 4 | Juice Processing Line 250 ml | 1 | 10,000,000 | 10,000,000 |
| | Total | 3 | | 41,850,000 |

Note: Juice Processing line consists of Pasteurizer, homogenizer, de-aerator, pumps, valves, etc.

Table 22 – Processing Machinery Cost Details

7.5.2.4.3 Utility/Allied Machinery and Equipment

| Sr.no | Name of the machine | No. | Unit Price (PKR) | Total Price (PKR) |
|-------|---|-----|------------------|-------------------|
| 1 | Air Compressor | 1 | 450,000 | 450,000 |
| 2 | Boiler (2 tons/Hr) | 1 | 6,500,000 | 6,500,000 |
| 3 | Cooling Tower | 1 | 800,000 | 800,000 |
| 4 | Water Reservoir and Delivery System | 1 | 1,000,000 | 1,000,000 |
| 5 | RO Plant | 1 | 1,200,000 | 1,200,000 |
| 6 | Generator (400 KVA) | 1 | 8,000,000 | 8,000,000 |
| 7 | Fork lifter 2.5 tons (battery operated) | 1 | 4,000,000 | 4,000,000 |
| 8 | Transformer (500 KVA) | 1 | 2,000,000 | 2,000,000 |
| 9 | Workshop Machinery | 1 | 1,000,000 | 1,000,000 |
| 10 | Fire Fighting Equipment | 1 | 200,000 | 200,000 |
| | Total | | | 25,150,000 |

Table 23 – Utility/Allied Machinery Cost Details

7.5.3 Laboratory Equipment

Quality assurance is a very important function of the proposed juice manufacturing unit. In fact, strict quality control is the key success factor to achieve sustainable operations and profitability of the unit. Implementing effective quality assurance requires maintaining a modern laboratory for conducting the required quality checks at raw material, in-process and finished goods stages. List of the required laboratory equipment is shown in Table 24.

| Sr. No. | Items description | Unit | Quantity | Cost (PKR) |
|---------|---------------------------------------|------|----------|------------|
| 1 | Weigh scale | No. | 1 | 3,500 |
| 2 | Lab centrifuge machine | No. | 1 | 138,000 |
| 3 | Magnetic stirrer | No. | 2 | 2,500 |
| 4 | pH meter | No. | 1 | 22,500 |
| 5 | Auto burette | No. | 2 | 88,000 |
| 6 | Distillation apparatus | No. | 1 | 9,800 |
| 7 | Abbe Refractometer | No. | 1 | 24,000 |
| 8 | Hand Refractometer (0-32) | No. | 2 | 7,600 |
| 9 | Hand Refractometer (20-80) or (32-80) | No. | 1 | 3,800 |
| 10 | Glass Thermometer | No. | 10 | 500 |
| 11 | Autoclave | No. | 1 | 30,000 |
| 12 | Microscope | No. | 1 | 200,000 |

| | | | | |
|----|----------------|-----|---|----------------|
| 13 | Incubator | No. | 2 | 200,000 |
| 14 | Hot Air Oven | No. | 1 | 100,000 |
| 15 | Colony Counter | No. | 1 | 12,000 |
| 16 | Stop Watch | No. | 1 | 1,400 |
| 17 | Water Bath | No. | 1 | 25,000 |
| | Total | | | 868,600 |

Table 24 – Laboratory Equipment Cost

Along with the above-mentioned capital items, laboratory operations also require consumable apparatus including glassware, stands, etc. The cost for this has been averaged out to be PKR 25,000 per annum.

7.5.4 Office Equipment and Furniture

Office equipment and furniture is required to carry out the routine administrative operations. It includes furniture, interior decoration, air conditioners and IT and communication equipment. Total cost of office equipment and furniture is PKR 4.5 million. Details are presented in Table 25.

| Item | No. | Unit Cost (PKR) | Total Cost (PKR) |
|-------------------|-----|-----------------|------------------|
| Office Furniture | 1 | 1,500,000 | 1,500,000 |
| Office Interior | 1 | 1,000,000 | 1,000,000 |
| Air Conditioners | 10 | 60,000 | 600,000 |
| Laptop Computers | 10 | 70,000 | 700,000 |
| Desktop Computers | 8 | 50,000 | 400,000 |
| Printers | 8 | 20,000 | 160,000 |
| Telephone sets | 50 | 3,000 | 150,000 |
| Total | | | 4,510,000 |

Table 25 - Office Equipment and Furniture Cost

7.5.5 Vehicles

Five vehicles have been proposed in the project cost; including loading vehicles and salon cars for the management. Total cost of vehicles was calculated as PKR 8.9 million. Details are provided in Table 26.

| Type | No. | Unit cost (PKR) | Total cost (PKR) |
|--------------|----------|-----------------|------------------|
| Small Truck | 1 | 2,500,000 | 2,500,000 |
| Salon car | 2 | 2,000,000 | 4,000,000 |
| Carry Van | 2 | 1,200,000 | 2,400,000 |
| Total | 5 | | 8,900,000 |

Table 26 – Vehicles Cost

7.5.6 Pre-Operating Expenses

Pre-operating expenses are the costs incurred before the start of the routine operations. These include the costs of utility connections, machinery installation, registrations/licenses, salaries of the personnel that have to be hired before the start of plant operations, necessary administrative expenses like travelling, office management, etc. Total pre-operating expenses for the proposed business were calculated to be PKR 33.31 million. Summary costs of different heads of pre-operating costs are provided in Table 27.

| Pre-Operating Costs | Cost (PKR) |
|------------------------------------|-------------------|
| Consultancies, Registrations, etc. | 4,019,000 |
| Utility Connections/Installations | 6,000,000 |
| Erection and Commissioning | 1,975,000 |
| Salaries | 3,330,000 |
| Admin. Expenses | 675,000 |
| Promotional cost | 20,310,000 |
| Total (PKR) | 36,309,000 |

Table 27 - Pre-Operating Costs

Brief description of the categories included under pre-operating costs is provided in the following paragraphs:

- Registration and licenses cost includes the costs paid to different government departments for registration of the business. Consultancies for the civil construction, at the rate of 5% of the total civil construction cost, are also included under this head. Associated operational expenses are also covered under this cost.
- Utility connections and installations include the cost of electrical connection and installation cost of water tube well.
- Erection and commissioning cost has been considered as 1% of the total machinery cost.
- The human resource cost includes the salaries of the persons who will have to be hired before the start of the operations. These include CEO, Plant Manager, Finance & Accounts Manager, Engineering Manager, Admin Officer, Procurement Officer, fitters/welders, driver, office boy, sweeper and security guards. It has been assumed that these persons will be hired three months before the start of plant operations.
- The admin expenses under the pre-operations costs include travelling and office expenses for three months.
- Marketing expenses is the largest head of Pre-operating costs. Since the project will be selling its juice products to retail consumers, it will require advertisement and promotion at the start of the project to create awareness and promote its brand. The marketing head includes the costs of outdoor marketing, TV Commercials (TVCs), cost of promotional materials and website development.

Detailed calculations of pre-operating costs are shown in Annex IV-A.

7.5.7 Working Capital

Initial working capital requirement has been worked out with the approach that marketing efforts will be required to penetrate the export markets. The biggest component of working capital includes the cost of fruits pulps and concentrates which have to be procured to ensure consistent production of juices as per the market demand. The raw material requirement for working capital calculations has been assumed for two months. Tetra Pak paper and other packaging materials constitute the other raw material cost. Two months basis has been used to calculate the cost of packaging materials for working capital calculations.

A similar approach has been adopted for other processing costs. Two month operating costs of chemicals and furnace oil have been included in the working capital. For utility and HR costs also, a time period of two months has been considered. An allocation of 2% of the machinery cost has been made for spare parts.¹² Upfront insurance payment has also been included in the working capital. Insurance cost has been calculated at 5% of machinery and 3% of vehicles cost. A higher insurance rate has been used since reconditioned Tetra Pak machines and processing lines have been used in the project. Initial working capital requirements have been calculated for 70% capacity utilization as per the assumed capacity utilization schedule. An initial cash balance of Rs 10 million has been included in the working capital. Table 28 shows the working capital details.

| Cost Head | Cost (PKR) |
|------------------------------|--------------------|
| Raw Materials | 33,852,131 |
| Tetra Pak Paper | 31,416,226 |
| Other Packaging | 5,341,084 |
| Electricity Bill | 2,378,116 |
| Furnace Oil | 4,098,646 |
| Chemicals | 48,149 |
| Salaries | 9,285,333 |
| Spares | 3,950,000 |
| Upfront Insurance Payment | 4,142,000 |
| Starting Cash Balance | 10,000,000 |
| Total Working Capital | 104,511,684 |

Table 28 - Working Capital Details

Details of the working capital calculations are presented in Annex IV-B.

¹² 1% cost of spares is usually considered sufficient. However, in this case, a factor of 2% has been used due to use of reconditioned machinery.

7.6 Operating Assumptions

7.6.1 Revenue Assumptions

7.6.1.1 Capacity Utilization

The project's revenue will be obtained by selling the manufactured fruit juices to the distributors who will sell the products to retailers. Thus, the sale price of company's juice will be obtained by subtracting the distributor and retailer margins from the consumer price. It has been assumed that 80% share of the total production will be sold in the local market. At 100% capacity, operating 300 days a year, the plant can produce 42 million packs of 1000 ml and 45 million packs each of 200 ml and 250 ml packs. However, the juice plants do not run at the same capacities round the year. Seasonality factor has to be incorporated to make the feasibility calculations realistic.

An important market parameter in estimating production is the difference in demand of the large and the small size packs. Since the volume of juice sold in a 200 ml pack is one fifth of that sold in 1000 ml pack, it means that for every 1000 ml pack, five 200 ml packs will be sold. For 250 ml packs, it will be four times. Moreover, the demand for smaller packs is higher than that of larger packs. The sale of smaller packs is usually impulsive whereas the sale of 1000 ml packs is more planned. Juice sold in smaller packs is usually consumed while being out of home (at shops, parks, roads, etc.) whereas the major share of juice sold in large packs is consumed in homes, hotels, etc. This difference in demand has to be incorporated while taking production decisions and calculating project's revenues. To accommodate this factor, the production of smaller packs (200 ml) has been considered as the basis and the production of 1000 ml packs has been linked to it. The production of larger packs has been assumed to be 5% of the production of 200 ml packs.

To incorporate the seasonality factor, it has been assumed that the plant will run at full capacity for four months of May, June, July and August. Operational capacity will be 50% at the two ends of these months, i.e. April and September. It will be 40% in the two months of March and October; whereas during the four winter months of November, December, January and February, the machines will operate at 20% of their theoretical capacities. Capacity utilization and number of operational days during different months of the year is shown in Figure 48 and Table 29.

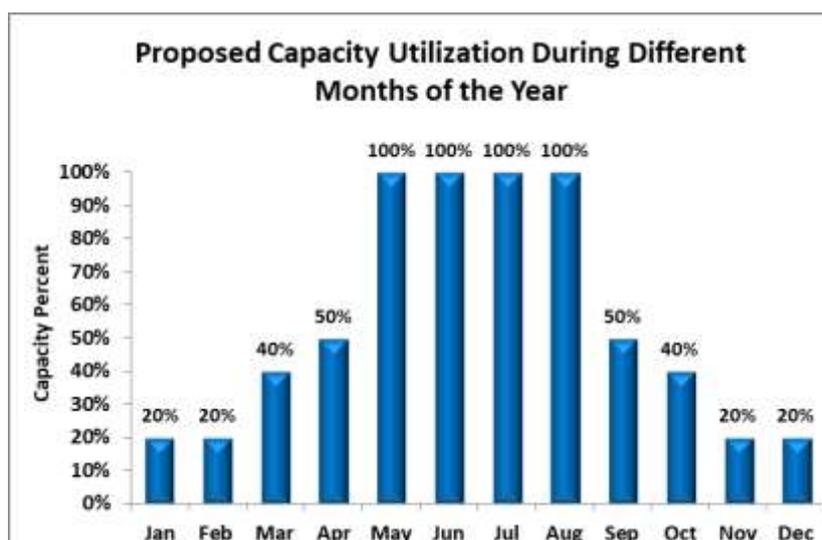


Figure 48 – Proposed Capacity Plan during the Year

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total |
|---------------------|-----|-----|------|------|------|------|------|------|------|------|-----|-----|-------|
| Percent Operational | 20% | 20% | 40% | 50% | 100% | 100% | 100% | 100% | 50% | 40% | 20% | 20% | 55% |
| Total No. of days | 31 | 28 | 31 | 30 | 31 | 30 | 31 | 31 | 30 | 31 | 30 | 31 | 365 |
| Days Operational | 6.2 | 5.6 | 12.4 | 15.0 | 31.0 | 30.0 | 31.0 | 31.0 | 15.0 | 12.4 | 6.0 | 6.2 | 200.8 |

Table 29 – Capacity Utilization in Different Months

However, the plant will not start running at full capacity from the first year. It is assumed that during the first year, the plant will attain 70% of the planned capacity utilization that will increase to 80% in the second year, 90% in the third year and 95% in the following years. A conservative approach has been adopted in assuming capacity utilization. Table 30 shows the proposed schedule.

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| 70% | 80% | 90% | 95% | 95% | 95% | 95% | 95% | 95% | 95% |

Table 30 - Capacity Utilization Schedule

7.6.1.2 Product Mix

Fruit drinks constitute a larger share of the total market compared to that of fruit nectars/pure juices. Therefore, 60% capacities of 1000 ml and 200 ml machines have been allocated to fruit drinks and 40% to nectars/pure juices. For 250 ml machine, all the available capacity has been used for fruit drinks since the nectars/pure drinks are not sold in this packing in the local market. The 250 ml pack comes with a consumer perception of lower price. With these assumptions, the share of fruits/nectars in the project’s total production comes out to be around 21% which is almost in line with the local market demand.

The total available machine capacity will be used for making different flavors. Flavor mix has been fixed in line with the current market demand for different products. Within the fruit drinks category, biggest shares have been allocated to mango flavor. In 1000 ml and 200 ml sizes, 30% of the capacity has been allocated to mango, 20% to apple and 10% to mixed fruit

flavors. In 250 ml size, the shares of mango, apple and mixed fruit flavors respectively are 50%, 30% and 20%. In nectars category, the highest 12% of the available capacity has been allocated for mango flavor. Product-mix with respect to juice flavors for the three machines is shown in Table 31.

| Product | 1000 ml | 200 ml | 250 ml |
|---------------------|----------------|---------------|---------------|
| Pure Juice | | | |
| Kinnow Juice | 4% | 4% | - |
| Nectars | | | |
| Mango Nectar | 12% | 12% | - |
| Apple Nectar | 8% | 8% | - |
| Red Grapes Nectar | 4% | 4% | - |
| Peach Nectar | 2% | 2% | - |
| Pineapple Nectar | 2% | 2% | - |
| Guava Nectar | 3% | 3% | - |
| Pomegranate Nectar | 1% | 1% | - |
| Mango-Orange Nectar | 4% | 4% | - |
| Juice Drinks | | | |
| Mango Drink | 30% | 30% | 50% |
| Apple Drink | 20% | 20% | 30% |
| Mixed Fruit Drink | 10% | 10% | 20% |
| Total | 100% | 100% | 100% |

Table 31 – Proposed Flavor Mix

7.6.1.3 Sale Prices

The study has been conducted with the assumption that manufactured fruit juices will be sold in both local and export markets. Product’s sale prices in the local market have been fixed looking at the current market prices of similar juices being sold in the market. Since the company will launch a new juice brand in the market, it will be important to set its prices lower than the prices of the existing brands to create a market pull for the new brand. At the same time, it will also be important to give incentives to distributors and retailers to make them push the new brand towards the consumers. This means offering higher margins to trade compared to the ones being offered by the established big players in the market. In line with this, the sale prices of the products have been fixed with the following assumptions.

- The consumer retail prices will be 10% lower than the prices of the similar products of the market leaders. For example, the retail price of 1000 ml pack of mango nectar by the market leader is PKR 150. In line with the assumption, the retail price of mango nectar launched by the new project will be PKR 135. As a marketing ‘pull’ strategy, these lower prices will be an attractive incentive for the consumers to ensure the trial of the newly launched juice products.
- The second assumption is that the project will offer 11% margin to retailer and 12% to the distributor as added incentive to sell the newly launched juice products. These margins are higher than the average margins offered by the leading fruit juice brands

in the local market. This will be a part of the marketing ‘push’ strategy to ensure the trial of the newly launched product.

- The final ex-factory prices obtained through these calculations are rounded off to the nearest decimal.

On the basis of the above assumptions, the juice prices for the consumer, retailer and the distributor for the selected juice products are shown in Table 32, Table 33 and Table 34.

| 1000 ml Prices (PKR/pack) | | | | | |
|----------------------------------|--------------------------------|--------------------------------|--------------------------------|-----------------------------------|-------------------------------------|
| | Existing Consumer Price | Proposed Consumer Price | Proposed Retailer Price | Proposed Distributor Price | Rounded Off Ex-Factory Price |
| Kinnow Juice 1000 ml | 150 | 135 | 120.2 | 105.7 | 106.0 |
| Mango Nectar 1000 ml | 150 | 135 | 120.2 | 105.7 | 106.0 |
| Apple Nectar 1000 ml | 150 | 135 | 120.2 | 105.7 | 106.0 |
| Red Grapes Nectar 1000 ml | 150 | 135 | 120.2 | 105.7 | 106.0 |
| Peach Nectar 1000 ml | 150 | 135 | 120.2 | 105.7 | 106.0 |
| Pineapple Nectar 1000 ml | 150 | 135 | 120.2 | 105.7 | 106.0 |
| Guava Nectar 1000 ml | 150 | 135 | 120.2 | 105.7 | 106.0 |
| Pomegranate Nectar 1000 ml | 200 | 180 | 160.2 | 141.0 | 141.0 |
| Mango-Orange Nectar 1000 ml | 150 | 135 | 120.2 | 105.7 | 106.0 |
| Mango Drink 1000 ml | 80 | 72 | 64.1 | 56.4 | 56.0 |
| Apple Drink 1000 ml | 80 | 72 | 64.1 | 56.4 | 56.0 |
| Mixed Fruit Drink 1000 ml | 80 | 72 | 64.1 | 56.4 | 56.0 |

Table 32 – Proposed Sale Prices of 1000 ml Packs

| 200 ml Prices (PKR/pack) | | | | | |
|---------------------------------|--------------------------------|--------------------------------|--------------------------------|-----------------------------------|-------------------------------------|
| | Existing Consumer Price | Proposed Consumer Price | Proposed Retailer Price | Proposed Distributor Price | Rounded Off Ex-Factory Price |
| Kinnow Juice 200 ml | 30 | 27 | 24.0 | 21.1 | 21.0 |
| Mango Nectar 200 ml | 30 | 27 | 24.0 | 21.1 | 21.0 |
| Apple Nectar 200 ml | 30 | 27 | 24.0 | 21.1 | 21.0 |
| Red Grapes Nectar 200 ml | 30 | 27 | 24.0 | 21.1 | 21.0 |
| Peach Nectar 200 ml | 30 | 27 | 24.0 | 21.1 | 21.0 |
| Pineapple Nectar 200 ml | 30 | 27 | 24.0 | 21.1 | 21.0 |
| Guava Nectar 200 ml | 30 | 27 | 24.0 | 21.1 | 21.0 |
| Pomegranate Nectar 200 ml | 40 | 36 | 32.0 | 28.2 | 28.0 |
| Mango-Orange Nectar 200 ml | 30 | 27 | 24.0 | 21.1 | 21.0 |
| Mango Drink 200 ml | 20 | 18 | 16.0 | 14.1 | 14.0 |
| Apple Drink 200 ml | 20 | 18 | 16.0 | 14.1 | 14.0 |
| Mixed Fruit Drink 200 ml | 20 | 18 | 16.0 | 14.1 | 14.0 |

Table 33 – Proposed Sale Prices of 200 ml Packs

| 250 ml Prices (PKR/pack) | | | | | |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|--------------------|
| | Existing | Proposed | Proposed | Proposed | Rounded Off |

| | Consumer Price | Consumer Price | Retailer Price | Distributor Price | Ex-Factory Price |
|--------------------|----------------|----------------|----------------|-------------------|------------------|
| Mango Drink 250 ml | 22 | 19.8 | 17.6 | 15.5 | 16.0 |
| Apple Drink 250 ml | 22 | 19.8 | 17.6 | 15.5 | 16.0 |
| Guava Drink 250 ml | 22 | 19.8 | 17.6 | 15.5 | 16.0 |

Table 34 – Proposed Sale Prices of 250 ml Packs

7.6.1.4 Export-Local Sale Distribution

The sales of different products have to be seen in terms of the available market. The prices of the juices in the export market have been assumed to be 10% higher than those in the local market. Product and flavor mix for the export market have been assumed to same as that for the local market.

7.6.1.5 Operating Revenues

Based on the above productions and sale prices, the project will generate revenues of PKR 793.52 million during first year of operations; while operating at 70% capacity utilization. Summary of revenue calculations are presented in Table 35 to Table 38

7.6.1.5.1 Revenues Summary (Pack-wise)

| Machine | Packs/Year | Revenues (PKR) | Share of Revenue |
|---------------|-------------------|--------------------|------------------|
| 1000 ml Packs | 1,059,451 | 82,590,630 | 10.4% |
| 200 ml Packs | 21,189,000 | 363,433,728 | 45.8% |
| 250 ml Packs | 21,189,000 | 347,499,600 | 43.8% |
| Total | 43,437,451 | 793,523,958 | 100.0% |

Table 35 – Project’s First Year Revenues Summary

7.6.1.5.2 1000 ml Revenue Details (Flavor-wise)

| Product | Packs/year | Revenues (PKR) | Share of Revenue |
|-----------------------------|------------------|-------------------|------------------|
| Kinnow Juice 1000 ml | 42,378 | 4,585,304 | 5.6% |
| Mango Nectar 1000 ml | 127,134 | 13,755,901 | 16.7% |
| Apple Nectar 1000 ml | 84,756 | 9,170,597 | 11.1% |
| Red Grapes Nectar 1000 ml | 42,378 | 4,585,304 | 5.6% |
| Peach Nectar 1000 ml | 21,189 | 2,292,652 | 2.8% |
| Pineapple Nectar 1000 ml | 21,189 | 2,292,652 | 2.8% |
| Guava Nectar 1000 ml | 31,784 | 3,439,031 | 4.2% |
| Pomegranate Nectar 1000 ml | 10,595 | 1,523,561 | 1.8% |
| Mango-Orange Nectar 1000 ml | 42,378 | 4,585,304 | 5.6% |
| Mango Drink 1000 ml | 317,835 | 18,180,162 | 22.0% |
| Apple Drink 1000 ml | 211,890 | 12,120,108 | 14.7% |
| Mixed Fruit Drink 1000 ml | 105,945 | 6,060,054 | 7.3% |
| Total | 1,059,451 | 82,590,630 | 100.0% |

Table 36 – 1000 ml First Year Revenues Summary

7.6.1.5.3 200 ml Revenue Details (Flavor-wise)

| Product | Packs/year | Revenues (PKR) | Share of Revenue |
|----------------------------|-------------------|--------------------|------------------|
| Kinnow Juice 200 ml | 847,560 | 18,137,784 | 5.0% |
| Mango Nectar 200 ml | 2,542,680 | 54,413,352 | 15.0% |
| Apple Nectar 200 ml | 1,695,120 | 36,275,568 | 10.0% |
| Red Grapes Nectar 200 ml | 847,560 | 18,137,784 | 5.0% |
| Peach Nectar 200 ml | 423,780 | 9,068,892 | 2.5% |
| Pineapple Nectar 200 ml | 423,780 | 9,068,892 | 2.5% |
| Guava Nectar 200 ml | 635,670 | 13,603,338 | 3.7% |
| Pomegranate Nectar 200 ml | 211,890 | 6,060,054 | 1.7% |
| Mango-Orange Nectar 200 ml | 847,560 | 18,137,784 | 5.0% |
| Mango Drink 200 ml | 6,356,700 | 90,265,140 | 24.8% |
| Apple Drink 200 ml | 4,237,800 | 60,176,760 | 16.6% |
| Mixed Fruit Drink 200 ml | 2,118,900 | 30,088,380 | 8.3% |
| Total | 21,189,000 | 363,433,728 | 100.0% |

Table 37 – 200 ml First Year Revenues Summary

7.6.1.5.4 250 ml Revenue Details (Flavor-wise)

| Product | Packs/year | Revenues (PKR) | Share of Revenue |
|--------------------------|-------------------|--------------------|------------------|
| Mango Drink 250 ml | 10,594,500 | 173,749,800 | 50.0% |
| Apple Drink 250 ml | 6,356,700 | 104,249,880 | 30.0% |
| Mixed Fruit Drink 250 ml | 4,237,800 | 69,499,920 | 20.0% |
| Total | 21,189,000 | 347,499,600 | 100.0% |

Table 38 – 250 ml First Year Revenues Summary

Detailed revenue calculations are presented in Annex V.

7.6.1.6 Sales Price Growth Rate

Annual sale price growth rate of fruit juices has been considered as 6% in both local and export markets.

7.6.2 Costs Assumptions

7.6.2.1 Pulps/Concentrates Costs

A large number of raw materials will be required to manufacture the diverse range of products included in the proposed product line. Pulps and concentrates are the most important ingredients of juice. Other ingredients include sugar, CMC, Citric acid, Malic Acid, Ascorbic Acid, Beta Carotene, Flavors and Food colors. Different ingredients are used in different types of juices in different ratios as per the defined recipes. Basic costs of different types of pulps/concentrates and other raw materials are shown in Table 39 and Table 40.

| Pulp/Concentrate | Cost (PKR/kg) |
|--------------------------|---------------|
| Kinnow Juice Concentrate | 300 |

| | |
|--------------------------|-----|
| Orange Juice Concentrate | 525 |
| Mango Pulp (Chaunsa) | 130 |
| Mango Pulp (Mix) | 80 |
| Apple Concentrate | 260 |
| Red Grapes Concentrate | 460 |
| Peach Pulp | 70 |
| Pineapple Concentrate | 400 |
| Guava Pulp | 70 |
| Pomegranate Concentrate | 550 |

Table 39 – Pulp/Concentrates Costs (Year 1)

| Ingredient | Cost (PKR/kg) |
|---------------------|---------------|
| Sugar | 65 |
| CMC | 700 |
| Citric Acid | 140 |
| Ascorbic Acid | 500 |
| Flavors | 800 |
| Beta Carotene | 15,000 |
| Orange Flavor/Aroma | 2,000 |
| Food Colors | 500 |
| Malic Acid | 180 |

Table 40 – Juice Ingredients Costs (Year 1)

Recipes of the selected juice products are provided in Annex VI-A; which provide the estimates of consumption of all the juice components per 1000 liters of juice. Per pack ingredients costs of the juice products for 1000 ml, 200 ml and 250 ml packs are shown in Table 41.

| Product | 1000 ml | 200 ml | 250 ml |
|---------------------|---------|--------|--------|
| Pure Juice | | | |
| Kinnow Juice | 59.72 | 11.94 | |
| Nectars | | | |
| Mango Nectar | 39.64 | 7.93 | |
| Apple Nectar | 24.54 | 4.91 | |
| Red Grapes Nectar | 45.69 | 9.14 | |
| Peach Nectar | 34.11 | 6.82 | |
| Pineapple Nectar | 38.60 | 7.72 | |
| Guava Nectar | 25.80 | 5.16 | |
| Pomegranate Nectar | 52.01 | 10.40 | |
| Mango-Orange Nectar | 49.53 | 9.91 | |
| Juice Drinks | | | |
| Mango Drink | 15.00 | 3.00 | 3.75 |

| | | | |
|-------------------|-------|------|------|
| Apple Drink | 12.64 | 2.53 | 3.16 |
| Mixed Fruit Drink | 14.52 | 2.90 | 3.63 |

Table 41 – Raw Material Costs per Pack (Year 1)

Ingredients costs of all the juice products are shown in Annex VI-B.

7.6.2.2 Tetra Pak Paper & Other Packaging Materials Cost

The basic costs of Tetra Pak paper and other packaging materials are shown in Table 42.

| Packaging Item | Cost (PKR) |
|--|------------|
| Tetra Pak Paper 1000 ml (PKR/pack) | 12.00 |
| Tetra Pak Paper 200 ml (PKR/pack) | 4.00 |
| Tetra Pak Paper 250 ml (PKR/pack) | 4.25 |
| Packaging Tray 1000 ml (12 packs) | 35.00 |
| Packaging Tray 200 ml (24 packs) | 7.00 |
| Packaging Tray 250 ml (27 packs) | 8.00 |
| Hot Melt for Straw (PKR/tray) | 0.91 |
| Shrink Wrap per tray (200 ml & 250 ml) | 3.70 |
| Straw (PKR/straw) | 0.22 |

Table 42 – Tetra Pak and Other Packaging Materials Costs (Year 1)

Costing of Tetra Pak paper and other packaging materials for 1000 ml, 200 ml and 250 ml packs is shown in Table 43.

| Cost (PKR/Pack) | 1000 ml | 200 ml | 250 ml |
|-------------------------|--------------|-------------|-------------|
| Tetra Pak Paper | 12.0 | 4.00 | 4.25 |
| Other Packaging | 2.92 | 0.70 | 0.69 |
| Total (PKR/Pack) | 14.92 | 4.70 | 4.94 |

Table 43 – Packaging Costs per Pack (Year 1)

Detailed breakup of packaging cost for three types of packs is shown in Annex VI-C.

7.6.2.3 Raw Material Cost Growth Rate

An average cost growth rate of 6% for local pulps and 8% for imported pulps/concentrates has been used for financial calculations. Tetra Pak paper has been assumed to grow at 8% per annum whereas the annual cost growth rate of other packaging materials has been assumed to be 6%. Raw material cost projections of mango nectar/drink are shown in Annex VI-D.

7.6.3 Chemicals and Lab Cost

Chemicals are required both for process and for laboratory tests. Major use of chemicals during the process is for CIP of the plant once in every twenty four hours. Caustic soda and Nitric acid are the two main chemicals required for this purpose. Average consumption of caustic soda has been estimated to be 10 kg per day for three machines. Total consumption during the first processing season (at 70% capacity utilization) will be 1,405 kg which translates into a total cost of PKR 112,420 at a rate of PKR 80 per kg. Average consumption

of nitric acid is 6 kg per day. Total consumption of this chemical during the first year will be 843 kg. At a rate of PKR 150 per kg, total cost of nitric acid comes out to be PKR 126,473. The other use of chemicals is for conducting tests in Quality Assurance Lab. An annual cost of PKR 50,000 has been assumed for those chemicals.

The other input for carrying out laboratory work is the consumable apparatus. It is assumed that all the apparatus will be consumed during a year and new apparatus will be procured each year. Thus the apparatus cost of PKR 25,000 has been included as the operating cost; growing at 8% per annum. Detailed chemicals and lab cost calculations are shown in Annex VII-A. On this basis, the total cost of chemicals and lab for the first year of plant’s operation at 70% capacity utilization was worked out to be PKR 0.31 million.

7.6.4 Furnace Oil

Steam is an important input in the manufacturing process of fruit juices. It is mainly used for pasteurization of the juice. The fuel used in the boiler to generate steam is furnace oil. Average furnace oil consumption for running three Tetra Pak machines is 2.5 tons per day. At 70% capacity utilization for the first year, total consumption of furnace oil comes will be 351 tons which translates into a cost of PKR 24.59 million at an average rate of PKR 70,000 per ton of furnace oil. Detailed calculations are provided in Annex VII-B.

7.6.5 Electricity Cost

Electricity cost has been calculated on the basis of overall electricity connection of 500 KVA as per the capacity utilization assumptions during each year. B3 industrial supply tariff has been applied to calculate the electricity bill. Total electricity load of the four sections of the plant and the number of kilowatt hours are provided in Table 44.

| Plant Section | Load (KW) | Hours/day | KWH/day |
|--------------------|------------|-----------|--------------|
| Tetra Pak Machines | 90 | 20 | 1,800 |
| Processing Section | 170 | 20 | 3,400 |
| Utility Section | 60 | 20 | 1,200 |
| Cold Store | 150 | 8 | 1,200 |
| Total | 380 | | 5,800 |

Table 44 – Electricity Load

Annual increase in electricity cost has been assumed to be 8%. Electricity bill calculations are attached as Annex VII-C.

7.6.6 Depreciation/Amortization

Straight line depreciation method has been applied to calculate the associated costs. Different rates applied to different types of assets are shown in Table 45.

| Asset | Depreciation Rate |
|------------------------|-------------------|
| Land | 0% |
| Building & Civil Works | 5% |

| | |
|------------------------------|-----|
| Tetra Pak Machinery | 10% |
| Processing Machinery | 10% |
| Utility Machinery | 10% |
| Cold Store Machinery | 10% |
| Laboratory Equipment | 10% |
| Office Equipment & Furniture | 20% |
| Vehicles | 20% |

Table 45 - Depreciation Rates

Depreciation and amortization calculations are shown in Annex VII-D.

7.6.7 Human Resource Plan

The project will require human resource in all important functions. Staff will be placed at the location of the processing facility. Overall management will be carried out by CEO who will manage the business operations through his procurement, production, quality assurance, marketing, administration, finance & accounts and engineering teams. Qualified operators will be engaged to operate the plant; whereas semiskilled labor will be engaged in processing and packaging activities. Total HR needs of the proposed business has been calculated to be 126 persons.

The project’s HR cost for the first year of operations is calculated to be PKR 55.7 million. Consolidated human resource cost and split between production and non-production staff is presented in Table 46.

| HR Cost | Cost - Year 1 (PKR) |
|---------------------------|---------------------|
| Production Staff Cost | 26,972,000 |
| Administration Staff Cost | 28,740,000 |
| Total | 55,712,000 |

Table 46 - Human Resource Cost –Direct vs. Indirect

7.6.7.1 Project Staff Cost Details

| Designation | No. | Salary (PKR/month) | Total (PKR/month) | No. of Months | Salary per annum (PKR) |
|----------------------------|-----|--------------------|-------------------|---------------|------------------------|
| CEO | 1 | 250,000 | 250,000 | 12 | 3,000,000 |
| Plant Manager | 1 | 200,000 | 200,000 | 12 | 2,400,000 |
| Admin & HR Manager | 1 | 150,000 | 150,000 | 12 | 1,800,000 |
| Finance & Accounts Manager | 1 | 150,000 | 150,000 | 12 | 1,800,000 |
| Marketing Manager | 1 | 150,000 | 150,000 | 12 | 1,800,000 |
| Engineering Manager | 1 | 150,000 | 150,000 | 12 | 1,800,000 |
| Quality Assurance Manager | 1 | 150,000 | 150,000 | 12 | 1,800,000 |
| Admin Officer | 2 | 70,000 | 140,000 | 12 | 1,680,000 |
| Accounts Officer | 3 | 50,000 | 150,000 | 12 | 1,800,000 |
| Marketing Officer | 5 | 70,000 | 350,000 | 12 | 4,200,000 |

| | | | | | |
|---------------------------|------------|--------|------------------|----|-------------------|
| Procurement Officer | 2 | 70,000 | 140,000 | 12 | 1,680,000 |
| Shift Incharge | 4 | 70,000 | 280,000 | 12 | 3,360,000 |
| TP Operator | 9 | 50,000 | 450,000 | 12 | 5,400,000 |
| TP Worker | 12 | 18,000 | 216,000 | 12 | 2,592,000 |
| Plant Operator | 6 | 40,000 | 240,000 | 12 | 2,880,000 |
| Plant Helpers | 6 | 15,000 | 90,000 | 12 | 1,080,000 |
| Quality Assurance Officer | 3 | 50,000 | 150,000 | 12 | 1,800,000 |
| Lab Assistant | 3 | 25,000 | 75,000 | 12 | 900,000 |
| Electrician | 3 | 25,000 | 75,000 | 12 | 900,000 |
| Electrician Helpers | 3 | 15,000 | 45,000 | 12 | 540,000 |
| Boiler Engineer | 1 | 70,000 | 70,000 | 12 | 840,000 |
| Boiler Operator | 3 | 35,000 | 105,000 | 12 | 1,260,000 |
| Cold Storage Incharge | 1 | 50,000 | 50,000 | 12 | 600,000 |
| Cold Store Operator | 3 | 25,000 | 75,000 | 12 | 900,000 |
| Fitter/Welder | 4 | 25,000 | 100,000 | 12 | 1,200,000 |
| Workshop Helpers | 4 | 15,000 | 60,000 | 12 | 720,000 |
| Storekeeper | 1 | 50,000 | 50,000 | 12 | 600,000 |
| Store Officer | 1 | 30,000 | 30,000 | 12 | 360,000 |
| Unskilled Worker | 20 | 14,000 | 280,000 | 8 | 2,240,000 |
| Security Guard | 10 | 15,000 | 150,000 | 12 | 1,800,000 |
| Driver | 3 | 20,000 | 60,000 | 12 | 720,000 |
| Office boy | 3 | 15,000 | 45,000 | 12 | 540,000 |
| Sweeper | 2 | 15,000 | 30,000 | 12 | 360,000 |
| Gardener | 2 | 15,000 | 30,000 | 12 | 360,000 |
| Total Staff | 126 | | 4,486,000 | | 55,712,000 |

Table 47 –Project Staff Details

7.7 Financial Feasibility Analysis

7.7.1 Key Financial Assumptions

| | |
|----------------------------|-----|
| No. of Projection Years | 10 |
| Discount Rate used for NPV | 18% |

7.7.2 Financial Feasibility

The project of fruit juice manufacturing is found to be financially feasible. Financial feasibility results are summarized in Table 48 and Table 49.

| Evaluating Factor | Value |
|------------------------|-------------|
| IRR | 50.51% |
| NPV (PKR) | 571,761,615 |
| Payback Period (years) | 2.60 |

Table 48 - Financial Feasibility Results

7.7.3 Profitability Ratios

| | Amount (PKR) | Percent |
|------------------------------------|--------------------|--------------|
| Sales | 793,523,958 | 100.0% |
| Cost of Sales | 489,602,306 | 61.7% |
| Gross Profit | 303,921,652 | 38.3% |
| Operating Costs | 112,289,935 | 14.2% |
| Earnings Before Interest and Taxes | 191,631,717 | 24.1% |
| | | |
| Net Profit | 124,560,616 | 15.7% |

Table 49 – Profitability Ratios

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 |
|---|--------------------|--------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Operating Revenues | | | | | | | | | | |
| 1000 ml Packs | 82,590,630 | 100,086,413 | 119,348,234 | 133,536,220 | 141,554,628 | 150,007,008 | 159,008,504 | 168,569,627 | 178,736,302 | 189,465,645 |
| 200 ml Packs | 363,433,728 | 440,154,859 | 524,950,816 | 586,695,864 | 622,152,629 | 660,145,717 | 699,657,148 | 742,044,229 | 787,312,711 | 833,760,210 |
| 250 ml Packs | 347,499,600 | 421,842,720 | 502,360,920 | 562,477,140 | 595,259,550 | 630,917,610 | 668,876,190 | 709,710,420 | 751,119,780 | 795,404,790 |
| Total Revenues | 793,523,958 | 962,083,992 | 1,146,659,969 | 1,282,709,224 | 1,358,966,806 | 1,441,070,334 | 1,527,541,841 | 1,620,324,275 | 1,717,168,793 | 1,818,630,645 |
| Direct Costs | | | | | | | | | | |
| Juice Ingredients | 203,112,787 | 244,739,183 | 292,704,575 | 328,476,547 | 349,235,766 | 371,324,753 | 394,830,032 | 419,843,857 | 446,464,600 | 474,797,161 |
| Tetra Pak Paper | 188,497,356 | 232,625,676 | 282,599,782 | 322,118,531 | 347,840,064 | 375,616,443 | 405,611,883 | 438,003,725 | 472,983,488 | 510,758,001 |
| Other Packaging | 32,046,502 | 40,628,818 | 48,449,869 | 54,210,023 | 57,462,624 | 60,910,382 | 64,565,005 | 68,438,905 | 72,545,239 | 76,897,954 |
| Chemicals & Lab | 313,893 | 375,862 | 445,737 | 502,891 | 543,122 | 586,572 | 633,498 | 684,178 | 738,912 | 798,025 |
| Direct Electricity | 11,302,894 | 13,951,001 | 16,950,466 | 19,323,531 | 20,869,414 | 22,538,967 | 24,342,084 | 26,289,451 | 28,392,607 | 30,664,016 |
| Furnace Oil | 24,591,875 | 30,353,400 | 36,879,381 | 42,042,494 | 45,405,894 | 49,038,365 | 52,961,435 | 57,198,349 | 61,774,217 | 66,716,155 |
| Payroll Production | 26,972,000 | 29,129,760 | 31,460,141 | 33,976,952 | 36,695,108 | 39,630,717 | 42,801,174 | 46,225,268 | 49,923,290 | 53,917,153 |
| Maintenance | 2,765,000 | 3,476,000 | 4,266,000 | 4,878,250 | 5,253,500 | 5,628,750 | 6,004,000 | 6,379,250 | 6,754,500 | 7,129,750 |
| Total Direct Cost | 489,602,306 | 595,279,699 | 713,755,950 | 805,529,220 | 863,305,493 | 925,274,949 | 991,749,111 | 1,063,062,984 | 1,139,576,853 | 1,221,678,213 |
| Gross Profit | 303,921,652 | 366,804,293 | 432,904,019 | 477,180,004 | 495,661,314 | 515,795,385 | 535,792,730 | 557,261,291 | 577,591,940 | 596,952,431 |
| Operating Costs | | | | | | | | | | |
| Payroll Admin | 28,740,000 | 31,039,200 | 33,522,336 | 36,204,123 | 39,100,453 | 42,228,489 | 45,606,768 | 49,255,309 | 53,195,734 | 57,451,393 |
| Fixed Electricity | 2,965,800 | 3,203,064 | 3,459,309 | 3,736,054 | 4,034,938 | 4,357,733 | 4,706,352 | 5,082,860 | 5,489,489 | 5,928,648 |
| Depreciation | 25,037,860 | 25,037,860 | 25,037,860 | 25,037,860 | 25,037,860 | 22,355,860 | 22,355,860 | 22,355,860 | 22,355,860 | 22,355,860 |
| Amortization | 7,261,800 | 7,261,800 | 7,261,800 | 7,261,800 | 7,261,800 | - | - | - | - | - |
| Marketing Cost | 36,680,000 | 38,842,640 | 29,672,029 | 26,645,410 | 21,174,264 | 22,444,719 | 23,791,403 | 25,218,887 | 26,732,020 | 28,335,941 |
| Office maintenance | 2,043,600 | 2,327,040 | 2,521,123 | 2,731,525 | 2,959,630 | 3,206,942 | 3,475,093 | 3,765,856 | 4,081,155 | 4,423,081 |
| Licensing/Regulatory Fee | 1,000,000 | 1,060,000 | 1,123,600 | 1,191,016 | 1,262,477 | 1,338,226 | 1,418,519 | 1,503,630 | 1,593,848 | 1,689,479 |
| Audit fee | 1,000,000 | 1,060,000 | 1,123,600 | 1,191,016 | 1,262,477 | 1,338,226 | 1,418,519 | 1,503,630 | 1,593,848 | 1,689,479 |
| Legal/Professional Fee | 1,000,000 | 1,060,000 | 1,123,600 | 1,191,016 | 1,262,477 | 1,338,226 | 1,418,519 | 1,503,630 | 1,593,848 | 1,689,479 |
| Insurance | 4,142,000 | 3,701,100 | 3,260,200 | 2,819,300 | 2,378,400 | 1,937,500 | 1,550,000 | 1,162,500 | 775,000 | 387,500 |
| Vehicle fuel & maintenance | 1,918,875 | 2,014,819 | 2,115,560 | 2,221,338 | 2,332,405 | 2,449,025 | 2,571,476 | 2,700,050 | 2,835,052 | 2,976,805 |
| Miscellaneous expenses | 500,000 | 530,000 | 561,800 | 595,508 | 631,238 | 669,113 | 709,260 | 751,815 | 796,924 | 844,739 |
| Total Operating Costs | 112,289,935 | 117,137,523 | 110,782,817 | 110,825,965 | 108,698,419 | 103,664,058 | 109,021,769 | 114,804,028 | 121,042,779 | 127,772,405 |
| Earnings before interest and taxes | 191,631,717 | 249,666,770 | 322,121,202 | 366,354,039 | 386,962,895 | 412,131,327 | 426,770,962 | 442,457,263 | 456,549,161 | 469,180,027 |
| Interest | - | - | - | - | - | - | - | - | - | - |
| Earnings before taxes | 191,631,717 | 249,666,770 | 322,121,202 | 366,354,039 | 386,962,895 | 412,131,327 | 426,770,962 | 442,457,263 | 456,549,161 | 469,180,027 |
| Tax | 67,071,101 | 87,383,369 | 112,742,421 | 128,223,914 | 135,437,013 | 144,245,964 | 149,369,837 | 154,860,042 | 159,792,206 | 164,213,009 |
| Net Income | 124,560,616 | 162,283,400 | 209,378,781 | 238,130,125 | 251,525,882 | 267,885,363 | 277,401,125 | 287,597,221 | 296,756,955 | 304,967,017 |
| Balance brought forward | - | 62,280,308 | 112,281,854 | 160,830,318 | 199,480,221 | 225,503,052 | 246,694,207 | 262,047,666 | 274,822,444 | 285,789,699 |
| Total profit available for appropriation | 124,560,616 | 224,563,708 | 321,660,636 | 398,960,443 | 451,006,101 | 493,388,414 | 524,095,332 | 549,644,887 | 571,579,398 | 590,756,717 |
| Dividend | 62,280,308 | 112,281,854 | 160,830,318 | 199,480,221 | 225,503,052 | 246,694,207 | 262,047,666 | 274,822,444 | 285,789,699 | 295,378,358 |
| Balance carried forward | 62,280,308 | 112,281,854 | 160,830,318 | 199,480,221 | 225,503,052 | 246,694,207 | 262,047,666 | 274,822,444 | 285,789,699 | 295,378,358 |

7.7.5 Projected Balance Sheet

| ASSETS | | | | | | | | | | | |
|----------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| Current Assets | | | | | | | | | | | |
| Cash | 10,000,000 | 134,938,519 | 206,313,780 | 275,619,774 | 338,706,072 | 393,529,697 | 433,192,429 | 466,979,529 | 497,877,542 | 527,087,662 | 555,005,673 |
| Raw material | 70,609,441 | | | | | | | | | | |
| Advance Processing Charges | 15,810,244 | | | | | | | | | | |
| Prepaid Insurance | 4,142,000 | 3,701,100 | 3,260,200 | 2,819,300 | 2,378,400 | 1,937,500 | 1,550,000 | 1,162,500 | 775,000 | 387,500 | - |
| Accounts Receivables | | 132,253,993 | 160,347,332 | 191,109,995 | 213,784,871 | 226,494,468 | 240,178,389 | 254,590,307 | 270,054,046 | 286,194,799 | 303,105,107 |
| Spare Parts inventory | 3,950,000 | 4,147,500 | 4,354,875 | 4,572,619 | 4,801,250 | 5,041,312 | 5,293,378 | 5,558,047 | 5,835,949 | 6,127,746 | 6,434,134 |
| Total Current Assets | 104,511,684 | 275,041,112 | 374,276,187 | 474,121,687 | 559,670,592 | 627,002,977 | 680,214,196 | 728,290,382 | 774,542,536 | 819,797,708 | 864,544,914 |
| Fixed Assets | | | | | | | | | | | |
| Land | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 |
| Building & Civil Works | 50,380,000 | 47,861,000 | 45,342,000 | 42,823,000 | 40,304,000 | 37,785,000 | 35,266,000 | 32,747,000 | 30,228,000 | 27,709,000 | 25,190,000 |
| Tetra Pak Machines | 120,000,000 | 108,000,000 | 96,000,000 | 84,000,000 | 72,000,000 | 60,000,000 | 48,000,000 | 36,000,000 | 24,000,000 | 12,000,000 | - |
| Processing Machinery | 41,850,000 | 37,665,000 | 33,480,000 | 29,295,000 | 25,110,000 | 20,925,000 | 16,740,000 | 12,555,000 | 8,370,000 | 4,185,000 | - |
| Utility Machinery | 25,150,000 | 22,635,000 | 20,120,000 | 17,605,000 | 15,090,000 | 12,575,000 | 10,060,000 | 7,545,000 | 5,030,000 | 2,515,000 | - |
| Cold Store Machinery | 10,500,000 | 9,450,000 | 8,400,000 | 7,350,000 | 6,300,000 | 5,250,000 | 4,200,000 | 3,150,000 | 2,100,000 | 1,050,000 | - |
| Laboratory Equipment | 868,600 | 781,740 | 694,880 | 608,020 | 521,160 | 434,300 | 347,440 | 260,580 | 173,720 | 86,860 | - |
| Office Equipment & Furniture | 4,510,000 | 3,608,000 | 2,706,000 | 1,804,000 | 902,000 | - | - | - | - | - | - |
| Vehicles | 8,900,000 | 7,120,000 | 5,340,000 | 3,560,000 | 1,780,000 | - | - | - | - | - | - |
| Net Fixed Assets | 286,158,600 | 261,120,740 | 236,082,880 | 211,045,020 | 186,007,160 | 160,969,300 | 138,613,440 | 116,257,580 | 93,901,720 | 71,545,860 | 49,190,000 |
| Other Assets | | | | | | | | | | | |
| Pre-operating Expenses | 36,309,000 | 29,047,200 | 21,785,400 | 14,523,600 | 7,261,800 | - | - | - | - | - | - |
| Contingencies | | | | | | | | | | | |
| Total Other Assets | 36,309,000 | 29,047,200 | 21,785,400 | 14,523,600 | 7,261,800 | - | - | - | - | - | - |
| TOTAL ASSETS | 426,979,284 | 565,209,052 | 632,144,467 | 699,690,307 | 752,939,552 | 787,972,277 | 818,827,636 | 844,547,962 | 868,444,256 | 891,343,568 | 913,734,914 |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| LIABILITIES | | | | | | | | | | | |
| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| Current Liabilities | | | | | | | | | | | |
| Accounts Payables | | 75,949,460 | 92,883,329 | 111,880,705 | 126,480,047 | 135,489,941 | 145,154,144 | 155,521,012 | 166,642,528 | 178,574,584 | 191,377,271 |
| Short term loan | | | | | | | | | | | |
| Other Current Liabilities | | | | | | | | | | | |
| Total Current Liabilities | - | 75,949,460 | 92,883,329 | 111,880,705 | 126,480,047 | 135,489,941 | 145,154,144 | 155,521,012 | 166,642,528 | 178,574,584 | 191,377,271 |
| Long Term Liabilities | | | | | | | | | | | |
| Lease payable | | | | | | | | | | | |
| Long term debt | - | - | - | - | - | - | - | - | - | - | - |
| Long term debt | - |
| Equity | | | | | | | | | | | |
| Paid up Capital | 426,979,284 | 426,979,284 | 426,979,284 | 426,979,284 | 426,979,284 | 426,979,284 | 426,979,284 | 426,979,284 | 426,979,284 | 426,979,284 | 426,979,284 |
| Retained Earnings | | 62,280,308 | 112,281,854 | 160,830,318 | 199,480,221 | 225,503,052 | 246,694,207 | 262,047,666 | 274,822,444 | 285,789,699 | 295,378,358 |
| Total Equity | 426,979,284 | 489,259,592 | 539,261,139 | 587,809,602 | 626,459,506 | 652,482,336 | 673,673,491 | 689,026,951 | 701,801,728 | 712,768,984 | 722,357,643 |
| TOTAL LIABILITIES | 426,979,284 | 565,209,052 | 632,144,467 | 699,690,307 | 752,939,552 | 787,972,277 | 818,827,636 | 844,547,962 | 868,444,256 | 891,343,568 | 913,734,914 |

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 |
|---|----------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Operating Activities | | | | | | | | | | | |
| Net Income | | 124,560,616 | 162,283,400 | 209,378,781 | 238,130,125 | 251,525,882 | 267,885,363 | 277,401,125 | 287,597,221 | 296,756,955 | 304,967,017 |
| Depreciation | | 25,037,860 | 25,037,860 | 25,037,860 | 25,037,860 | 25,037,860 | 22,355,860 | 22,355,860 | 22,355,860 | 22,355,860 | 22,355,860 |
| Amortization | | 7,261,800 | 7,261,800 | 7,261,800 | 7,261,800 | 7,261,800 | - | - | - | - | - |
| Change in raw material inventories | (70,609,441) | 70,609,441 | - | - | - | - | - | - | - | - | - |
| Change in advance processing charges | (15,810,244) | 15,810,244 | | | | | | | | | |
| Change in spares inventory | (3,950,000) | (197,500) | (207,375) | (217,744) | (228,631) | (240,062) | (252,066) | (264,669) | (277,902) | (291,797) | (306,387) |
| Change in advance insurance premium | (4,142,000) | 440,900 | 440,900 | 440,900 | 440,900 | 440,900 | 387,500 | 387,500 | 387,500 | 387,500 | 387,500 |
| Change in Accounts Receivables | | (132,253,993) | (28,093,339) | (30,762,663) | (22,674,876) | (12,709,597) | (13,683,921) | (14,411,918) | (15,463,739) | (16,140,753) | (16,910,309) |
| Change in Accounts Payables | | 75,949,460 | 16,933,869 | 18,997,377 | 14,599,341 | 9,009,895 | 9,664,203 | 10,366,867 | 11,121,517 | 11,932,056 | 12,802,687 |
| Cash from operations | (94,511,684) | 187,218,827 | 183,657,115 | 230,136,311 | 262,566,520 | 280,326,677 | 286,356,939 | 295,834,766 | 305,720,457 | 314,999,820 | 323,296,368 |
| Financing Activities | | | | | | | | | | | |
| Short term debt principle repayment | | | | | | | | | | | |
| Long term debt principle repayment | | - | - | - | - | - | - | - | - | - | - |
| Addition to short term debt | | | | | | | | | | | |
| Additions to long term debt | | - | | | | | | | | | |
| Issuance of shares | 426,979,284 | | | | | | | | | | |
| Net cash from financing activities | 426,979,284 | - |
| Investing Activities | | | | | | | | | | | |
| Capital Expenditure | (322,467,600) | | | | | | | | | | |
| Cash from investing activities | (322,467,600) | - |
| Net Cash | 10,000,000 | 187,218,827 | 183,657,115 | 230,136,311 | 262,566,520 | 280,326,677 | 286,356,939 | 295,834,766 | 305,720,457 | 314,999,820 | 323,296,368 |
| Cash balance brought forward | - | 10,000,000 | 134,938,519 | 206,313,780 | 275,619,774 | 338,706,072 | 393,529,697 | 433,192,429 | 466,979,529 | 497,877,542 | 527,087,662 |
| Cash investment in securities | | - | - | - | - | - | - | - | - | - | - |
| Cash available for appropriation | 10,000,000 | 197,218,827 | 318,595,634 | 436,450,092 | 538,186,293 | 619,032,749 | 679,886,636 | 729,027,195 | 772,699,985 | 812,877,362 | 850,384,031 |
| Dividend | - | 62,280,308 | 112,281,854 | 160,830,318 | 199,480,221 | 225,503,052 | 246,694,207 | 262,047,666 | 274,822,444 | 285,789,699 | 295,378,358 |
| Cash carried forward | 10,000,000 | 134,938,519 | 206,313,780 | 275,619,774 | 338,706,072 | 393,529,697 | 433,192,429 | 466,979,529 | 497,877,542 | 527,087,662 | 555,005,673 |

7.7.7 Financial Feasibility Results

| 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 | 187,218,827 | 183,657,115 | 230,136,311 | 262,566,520 | 280,326,677 | 286,356,939 | 295,834,766 | 305,720,457 | 314,999,820 | 323,296,368 |
| Total Investor Cash outflow (Rs) | (426,979,284) | | | | | | | | | | |
| Net Cash flows (Rs) | (426,979,284) | 187,218,827 | 183,657,115 | 230,136,311 | 262,566,520 | 280,326,677 | 286,356,939 | 295,834,766 | 305,720,457 | 314,999,820 | 323,296,368 |
| Accumulated Cash flows (Rs) | | (239,760,457) | (56,103,342) | 174,032,969 | 436,599,489 | 716,926,166 | 1,003,283,105 | 1,299,117,871 | 1,604,838,327 | 1,919,838,147 | 2,243,134,515 |
| Payback period (years) | | 1.00 | 1.00 | 0.60 | - | - | - | - | - | - | - |
| IRR | 50.51% | | | | | | | | | | |
| NPV (Rs) | 571,761,615 | | | | | | | | | | |
| Payback (years) | 2.60 | | | | | | | | | | |
| RATIO ANALYSIS | | | | | | | | | | | |
| | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| Gross Profit Margin | | 38.3% | 38.1% | 37.8% | 37.2% | 36.5% | 35.8% | 35.1% | 34.4% | 33.6% | 32.8% |
| Net Profit Margin | | 15.7% | 16.9% | 18.3% | 18.6% | 18.5% | 18.6% | 18.2% | 17.7% | 17.3% | 16.8% |
| Current Ratio | | 3.6 | 4.0 | 4.2 | 4.4 | 4.6 | 4.7 | 4.7 | 4.6 | 4.6 | 4.5 |
| Return on Equity (ROI) | | 25.5% | 30.1% | 35.6% | 38.0% | 38.5% | 39.8% | 40.3% | 41.0% | 41.6% | 42.2% |

7.8 Sensitivity Analysis

Sensitivity of project’s viability in terms of NPV and IRR 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 were assumed to be constant.

7.8.1 Project’s Sensitivity to Sales Price

Project’s financial calculations have already been based on fruit juices sale price lower than the prices of the comparable products already present in the market. However, the investor may still intend to further penetrate the market by fixing the prices even lower than that. Therefore a sensitivity analysis was carried out to know the impact of a possible low-price strategy on the project’s feasibility. The analysis assumes an equal percent decrease in the prices of all the products in both local and export markets. Corresponding decrease in NPV and IRR is shown in Figure 49.

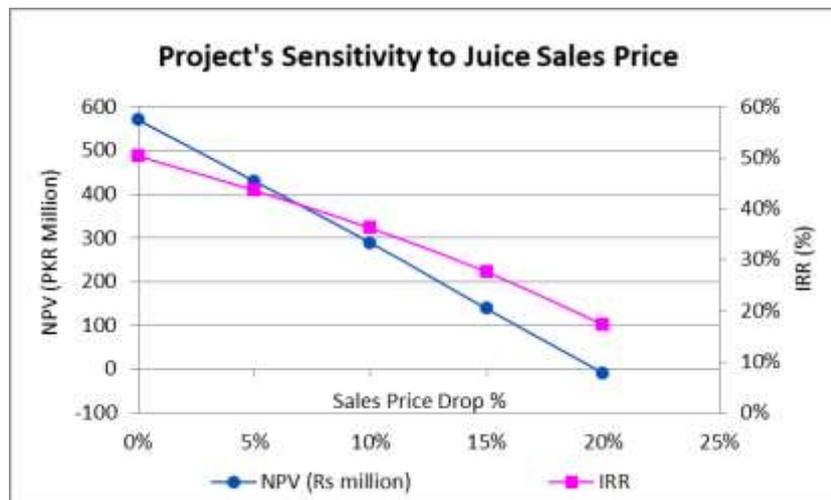


Figure 49 – Project’s Sensitivity to Juice Sales Price

The project remains in the feasible range as long as the sales price does not drop by around 20% from the assumed prices; which shows that the project has reasonable cushion to sustain any possible price war that the existing competitors may start once the new products are launched in the market.

7.8.2 Project’s Sensitivity to Fruit Juice Sale Price Growth

Along with the sale price, the project’s viability is also linked to annual increase in the sale price. The feasibility calculations have assumed juice sale price to grow at 6% per year for both local and export markets. NPV and IRR decrease by lowering the sales price growth rate; however the sensitivity was observed to be low. Result is shown in Figure 50 which indicates that the project becomes infeasible when the juice sale price growth rate is close to zero. At a growth rate of 1%, the NPV drops to PKR 94.6 million and IRR to 29.6%.

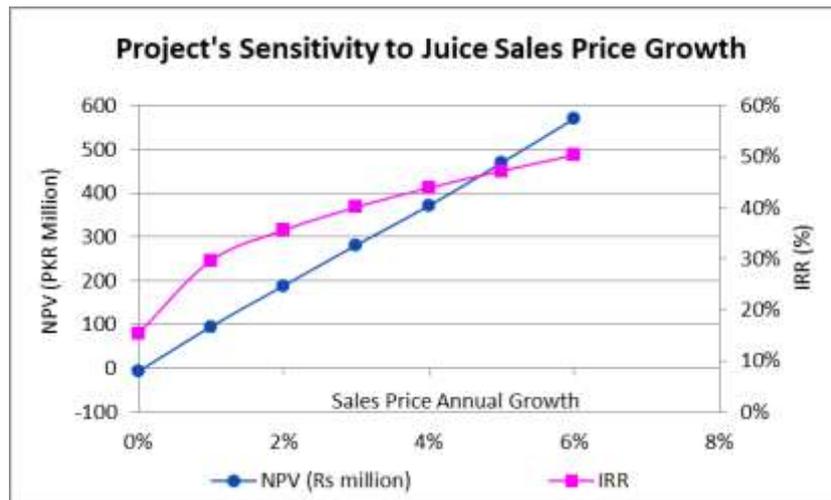


Figure 50 – Project’s Sensitivity to Juice Sales Price Growth

7.8.3 Project’s Sensitivity to Pulps/Concentrates Cost

Pulps/concentrates are the most important raw material and constitute the biggest direct cost. It is therefore important to see the impact of increase in the cost of pulps/concentrates on the project’s viability. It is also important in the context that many of the raw materials used by the project are imported; which means that their cost is directly affected by depreciation of Pak Rupee. The analysis has assumed that the costs of all the raw materials increase by the same percentage. Figure 51 shows the drop in NPV and IRR with increase in pulp/concentrates price.

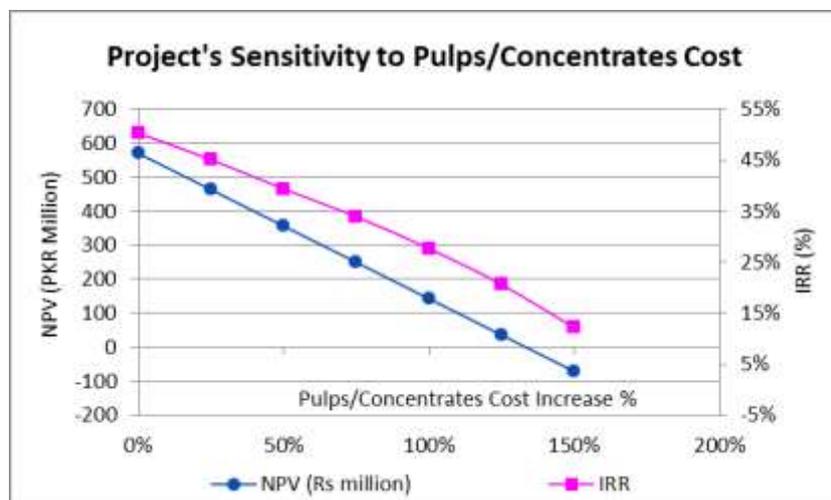


Figure 51 – Project’s Sensitivity to Pulps/Concentrates Cost

Project was found to possess high capacity to absorb the shocks due to any possible increase in the cost of pulps/concentrates. The project remains viable even if the raw material prices double. At a cost increase of 100% (two times) the NPV drops to PKR 142.7 million and IRR to 27.7%. The project becomes unviable when the costs of pulps/concentrates increase by more than 135%.

7.8.4 Project’s Sensitivity to Tetra Pak Paper Cost

After pulps/concentrates, the second biggest direct cost is that of Tetra Pak paper. It is therefore important to see the impact of increase in this cost on the project’s viability. It has been assumed that Tetra Pak paper cost increases by the same percentage for all the products. Figure 52 shows the drop in NPV and IRR with increase in the cost of Tetra Pak paper.

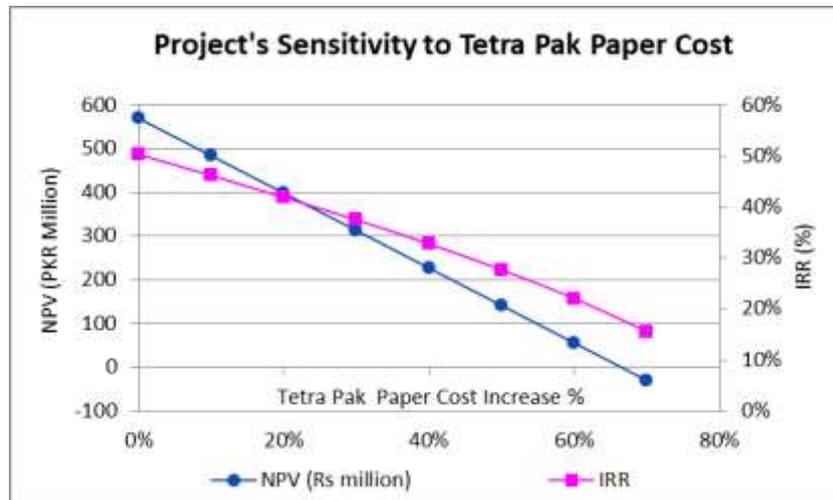


Figure 52 – Project’s Sensitivity to Tetra Pak Cost

The graph shows that the project is stable against the cost of Tetra Pak paper. NPV remains in the positive range even when the cost is increased by 50%. In such a situation, NPV drops to PKR 141.6 million and IRR to 27.7%. The project becomes unviable when the cost of Tetra Pak paper increases by around 65%.

7.8.5 Project’s Sensitivity to Land Cost

The project uses commercial rate of land in the selected location in Lahore. Average rate of PKR 8 million per acre has been used. There is the possibility that the investor may have to spend more on land depending upon its availability and specific location. In that context, the impact of land cost on project’s viability was analyzed. Figure 53 shows the results.

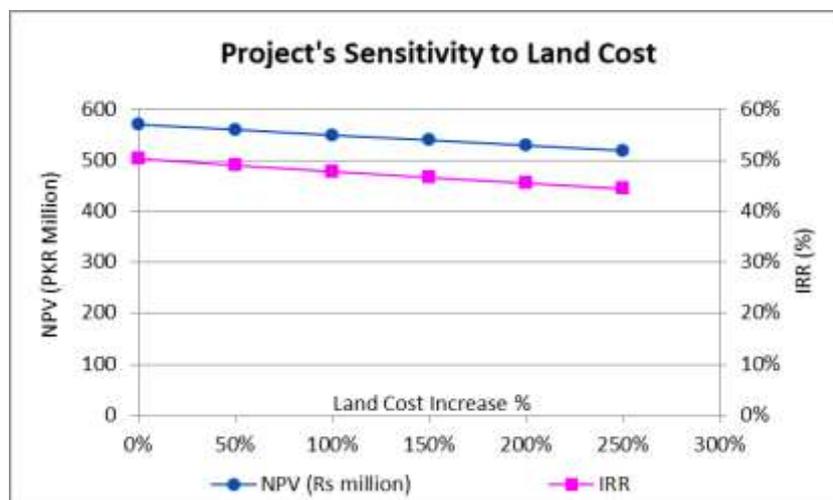


Figure 53 – Project’s Sensitivity to Increase in Land Price

The project is seen to be fairly safe with increase in land prices. NPV remains positive even if land is acquired at three times of the cost that has been used in project’s calculations. At a land cost of PKR 28 million per acre (3.5 time of the value used in calculations), the NPV still remains stable at PKR 519 million and the IRR is 44%.

7.8.6 Project’s Capacity to Absorb Debt

The project has been assumed to be fully equity-financed. 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 significant capacity to absorb debt. NPV remains positive even when even 80% of the capital cost is financed through debt at 15% p.a. for 10 years.

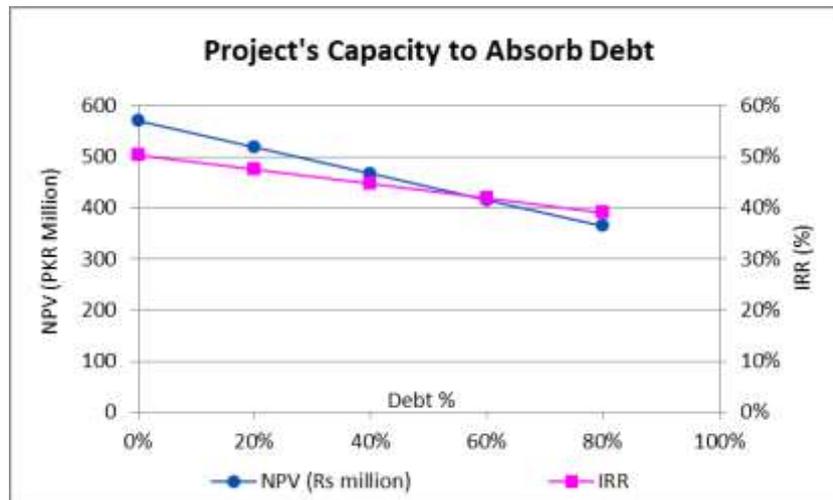


Figure 54 – Project’s NPV and IRR Sensitivity to Debt Share

Impact of debt on profitability ratio was also analyzed. Net profit margin was found to be falling by about 1% with every 10% increase of debt in capital structure. Thus the project has a good capacity to absorb debt cost. Figure 55 shows the result.

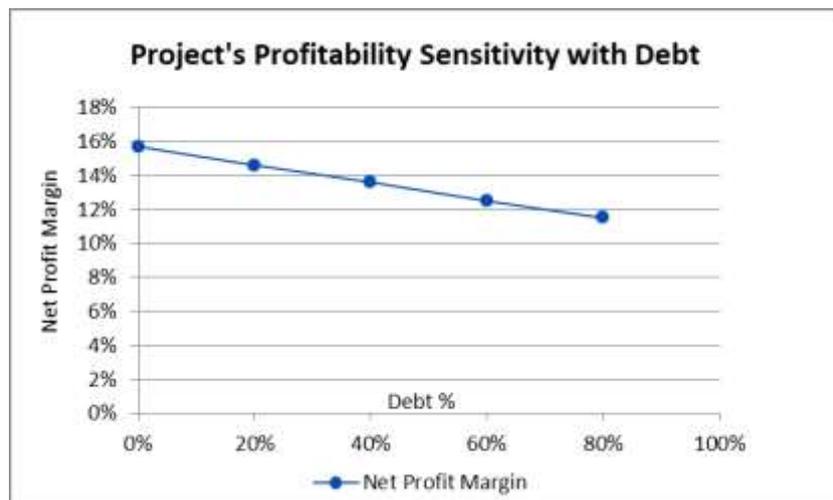


Figure 55 – Project’s Profit Margin’s Sensitivity to Debt Share

8.0 ANNEXES

8.1 Annex I – Glossary of Technical Terms

Fruit juice is defined as the “*fermentable but unfermented liquid obtained from mature fresh fruits*”. The liquid has nothing added or subtracted. Squeezed or extracted fresh juices can be consumed as such but for long term storage they are preserved by pasteurization or commercial sterilization and sealing hermetically in some sort of packaging.

Pulp or Puree

Some fruits/vegetable when extracted/squeezed yield thin juice such as orange juice. Other fruit/vegetable due to their specific composition; high pectin, starch fiber and sugar contents like mango or banana, on processing, yield viscous material termed as pulp or puree. “*Pulp or puree is fermentable but not fermented viscous refined fleshy portion of the fresh and mature fruit/vegetable having nothing added or subtracted*”.

Concentrate

Juices concentrates are produced by evaporating water from juices or pulps. The process is called concentration or evaporation or *Folding*. It is done to reduce the bulks facilitating transportation and storage. The extent of concentration or folding depends upon the initial soluble solids and viscosity. Higher the initial viscosity or soluble solids lesser it will be subjected to concentration or folding. Thin juice of oranges is concentrated 5 to 7 times to produce orange juice concentrate but pulp from grafted mango varieties having high sugar content and viscosity cannot be concentrated. Pulp from low sugar mango varieties is concentrated only two times.

Clear Juice

This transparent juice is obtained by removing all turbidity or haze causing insoluble and soluble contents of the natural fruit juice. After extraction and filtration, juice is treated with pectin-decomposing enzymes to remove the naturally present haze.

Concentrated fruit juice is the unfermented but fermentable product that has been produced by evaporating a definite amount of water from the liquid obtained from the edible part of sound, appropriately mature and fresh fruit or of fruit maintained in sound condition by suitable means.

Single Strength Juice is the unaltered pure fruit juice either extracted from fruit, or juice reconstituted from juice concentrate with the addition of water to reach the defined natural single strength brix level for that specific item.

Pure juices

These are 100% pure juices and may be of two types: juice from concentrate, and straight juices.

Reconstituted juice (juice from concentrate)

This juice is obtained from juice concentrate by the adding back water to bring it in its original form. This product has almost same analytical characteristics as juice obtained from fruit of same kind. Organoleptic characteristics of this product may slightly differ from the original juice as during concentration some changes, especially in aromatic components, may occur.

Straight Juice

Original juice obtained from fresh and mature fruit without addition or subtraction of anything. It may be fresh or pasteurized. It is the single strength juice.

Nectars

These are processed juice products having 20% to 50% fruit content with added sugar, water and other ingredients.

Juice drinks

These processed juice drinks contain around 10% fruit juice pulp, added sugar water and other ingredients.

Fruit flavored Still Drinks

These are non-alcoholic, non-carbonated beverages containing water, sugar, artificial colors & flavors, thickening agents and other ingredients.

Acidity means the percent, by weight, of total acidity (calculated as anhydrous citric acid) i.e. 2% acidity of some orange juice sample means that 100 gram of juice contains 2 gram anhydrous citric acid.

Brix is the percentage of total soluble solids by weight in some liquid foods and is generally termed as Brix degree. The Brix (degree brix) scale, which was developed by the sugar industry, relates the sucrose concentration of a pure sucrose solution to its density at 20C. Degree Brix for Kinnow/orange juice not only includes concentration of dissolved sugars but all soluble solids. Dissolved substances other than sugars will influence the result of °Brix measurements. Thus the level of acid, the second most abundant dissolved material, is often measured and a correction of measured brix value made. For single-strength Kinnow juice, the acid correction is very small and the term Brix is commonly used without correction to mean only the sugar content.

Brix is the Percent soluble solids (w/w)

Corrected Brix is the Percent sugar (w/w)

Brix/Acid ratio or **Ratio** means the ratio of the degrees Brix of the juice to the grams of anhydrous citric acid per 100 grams of the juice, i.e. *Ratio* or *brix Ratio* of a juice sample having 12 degree brix and 0.8 % acidity will be 15 (12/0.8). The **Ratio** indicates the balance between sugar (sweetness) and acid (sourness) in the juice. As the Kinnow ripens, the acidity decreases while the sugars increase. Therefore the brix acid ratio will also increase as the degree of ripeness increases.

Color is an important quality parameter of the orange/Kinnow juice. It is evaluated by comparing the color of the juice with the USDA Orange Juice Color Standards as points of reference. The USDA colors 1, 2, 3, 4, 5 and 6 represent processed orange/Kinnow juice points of reference corresponding to the color scores 40 points through 32 points, respectively. The six tubes with different standard orange color shades are used as reference.

8.2 Annex II – Comparison of Frozen and Aseptic Pulps/Concentrates

Preservation by Freezing

Freezing is one of the many preservation methods. When some food item is kept at extremely low temperature (freezing), the microorganisms cannot act to spoil it. Similarly, freezing significantly ceases those chemical and biochemical reactions which can spoil the food if kept at ordinary conditions. In freezing method of preservation, the product keeps its own individual form, texture, taste and nutritional value better than any other way of preservation. Freezing can be successfully employed for long-term preservation of many foods.

During freezing storage of high degree Brix pulps/concentrates, microbiological growth is very slow due to high sugar content causing high osmotic pressure. The pulps/concentrates stored at below zero degree Celsius are principally stable against microbiological growth. To minimize changes in quality during long storage, juice pulps/concentrates are kept at freezing temperature of below -18°C. The storage condition can extend the products life for more than two years.

Preservation by Aseptic Processing/Packaging

Pulps/concentrates can also be processed/packed aseptically and stored at 10-15°C. In this mode of preservation/packaging, fruit pulps/juice concentrates are thermally processed at high temperature, cooled, and filled in a pre-sterilized bag by using sterile filling equipment. Before thermal treatment (sterilization), air entrapped in the pulp during different processing steps is expelled by de-aeration operation. There are three key ingredients for good aseptic packaging:

- a. **Sterile product** (pulp or juice/concentrate) is processed at an ultra-high temperature (105-107°C). The product is heated and aseptically cooled before filling.
- b. **Sterilized bag:** The bags are gamma-irradiated with 3.5 m RAD for low acid foods and 1.5 m RAD for high acid foods. The hermetic spout, devoid of any leaks, applied after filling does not allow microorganisms to enter the bag.
- c. **Aseptic filler:** The purpose and function of the filler is to fill the aseptic product in a pre-sterilized bag. Filling is carried out in aseptic (sterile) zone of the machine.

The aseptic bags provide protection against contamination to the aseptically processed and packed products. The extent of oxygen penetration (resulting in color and flavor deterioration) varies with the materials used for bag manufacturing. Aluminum foil Bag (Alu Foil or Foil Bag) possesses high barrier properties against penetration of oxygen through their pores.

Comparison of Frozen and Aseptically Packed Pulps/Concentrates

Comparison of the two types of packaging is shown in Table 50.

| Criterion | Freezing | Aseptic Packaging |
|-----------|----------|-------------------|
|-----------|----------|-------------------|

| | | |
|-----------------------------|--|--|
| Storage Cost | Higher, due to higher energy consumption | Lower, due to lower energy consumption |
| Handling and Transportation | Higher handling and transportation cost | Easier handling and lower transportation cost |
| Overall Product Quality | Highest quality | Relatively lower quality |
| Product Life | Longer keeping quality product; can be stored for 3-4 years without any deteriorative changes during storage | Shorter/limited keeping quality; longer storage leads to deteriorative changes in the product. |

Table 50 – Concentrate Preservation Methods Comparison

8.3 Annex III – Examples of Specialized Drinks

- Vegetable drinks
- Vegetable-fruit mix drinks (e.g. orange & carrot)
- Functional drinks
- Flavored waters
- Coconut drinks
- Detox drinks (e.g. boosting energy, promoting weight loss)
- Diabetic drinks
- Protein drinks
- Tropical fruit drinks
- Noncarbonated cola drinks
- Local specialties (e.g. sugarcane juice)
- Smoothies
- Exotic fruits drinks
- Rooh Afza type drinks

8.4 Annex IV – Details of Project Cost Calculations

8.4.1 Annex IV-A – Pre-Operating Cost Details

| Personnel Cost | | | |
|----------------------------|--------------------|-----------|------------------|
| Position | Salary (PKR/month) | No. | Total |
| CEO | 250,000 | 1 | 250,000 |
| Plant Manager | 200,000 | 1 | 200,000 |
| Finance & Accounts Manager | 150,000 | 1 | 150,000 |
| Engineering Manager | 150,000 | 1 | 150,000 |
| Admin Officer | 70,000 | 1 | 70,000 |
| Procurement Officer | 70,000 | 1 | 70,000 |
| Fitter/Welder | 25,000 | 2 | 50,000 |
| Security Guard | 15,000 | 8 | 120,000 |
| Driver | 20,000 | 1 | 20,000 |
| Office boy | 15,000 | 1 | 15,000 |
| Sweeper | 15,000 | 1 | 15,000 |
| Total | | 19 | 1,110,000 |

| | |
|-----------------------|------------------|
| Per Month Salaries | 1,110,000 |
| No. of Months | 3 |
| Total Salaries | 3,330,000 |

| Project's Promotional Cost | No. | Unit Cost (PKR) | Total cost (PKR) |
|----------------------------|-------|-----------------|-------------------|
| Promotional Flyers | 2,000 | 30 | 60,000 |
| TVCs | | | 10,000,000 |
| Outdoor Advertisment | | | 10,000,000 |
| Website Development | 1 | 250,000 | 250,000 |
| Total | | | 20,310,000 |

| Admin Expenses | (PKR/month) |
|-------------------------|----------------|
| Travelling | 100,000 |
| Office expenses | 25,000 |
| Office rent | 100,000 |
| Total (Rs/month) | 225,000 |
| No. of months | 3 |
| Total (Rs/month) | 675,000 |

| Pre-Operating Costs | Cost (PKR) |
|------------------------------------|-------------------|
| Consultancies, Registrations, etc. | 4,019,000 |
| Utility Connections/Installations | 6,000,000 |
| Erection and Commissioning | 1,975,000 |
| Salaries | 3,330,000 |
| Admin. Expenses | 675,000 |
| Promotional cost | 20,310,000 |
| Total (PKR) | 36,309,000 |

| Consultancy/Registration Cost (Rs) | (PKR) |
|--|------------------|
| Company registration cost | 500,000 |
| Consultancy for project development | 1,000,000 |
| Consultancy for civil works (5% of cost) | 2,519,000 |
| Total consultancy cost | 4,019,000 |

| Erection and Commissioning | |
|---|------------------|
| Percent of Machinery | 1.0% |
| Machinery cost | 197,500,000 |
| Machinery erection cost (PKR) | 1,975,000 |
| Total Installation & Commissioning | 1,975,000 |

| Utility Connections | Amount (PKR) |
|------------------------------------|------------------|
| Electricity connection cost | 5,000,000 |
| Electricity transmission line cost | - |
| Gas connection cost | - |
| Water tube well | 1,000,000 |
| Total (PKR) | 6,000,000 |

8.4.2 Annex IV-B – Working Capital Details

| Raw Materials | Annual Cost (PKR) | Monthly Cost (PKR) | No. of Months | Amount (PKR) |
|----------------------|--------------------------|---------------------------|----------------------|---------------------|
| Raw Materials | 203,112,787 | 16,926,066 | 2 | 33,852,131 |
| Tetra Pak Paper | 188,497,356 | 15,708,113 | 2 | 31,416,226 |
| Other Packaging | 32,046,502 | 2,670,542 | 2 | 5,341,084 |
| Total | | | | 70,609,441 |

Other Costs

| | Annual Cost (PKR) | Monthly Cost (PKR) | No. of Months | Amount (PKR) |
|------------------|--------------------------|---------------------------|----------------------|---------------------|
| Electricity Bill | 14,268,694 | 1,189,058 | 2 | 2,378,116 |
| Furnace Oil Cost | 24,591,875 | 2,049,323 | 2 | 4,098,646 |
| Chemicals Cost | 288,893 | 24,074 | 2 | 48,149 |
| Total | | | | 6,524,910 |

| | Annual Cost (PKR) | Monthly Cost (PKR) | No. of Months | Amount (PKR) |
|----------------|--------------------------|---------------------------|----------------------|---------------------|
| HR Cost | 55,712,000 | 4,642,667 | 2 | 9,285,333 |

Spares **3,950,000**

2% of machinery

Upfront Insurance Payment **4,142,000**

Starting Cash **10,000,000**

Total Working Capital (PKR) **104,511,684**

8.5 Annex V – Operating Revenues Details (Year 1)

8.5.1 Annex V-A - 1000 ml Packs Revenue Calculations

| 1000 ml Packs | Kinnow Juice | Mango Nectar | Apple Nectar | Red Grapes Nectar | Peach Nectar | Pineapple Nectar | Guava Nectar | Pomegranate Nectar | Mango-Orange Nectar | Mango Drink | Apple Drink | Mixed Fruit Drink | Total 1000 ml |
|---|--------------|--------------|--------------|-------------------|--------------|------------------|--------------|--------------------|---------------------|-------------|-------------|-------------------|---------------|
| Production per year (Packs) | 42,378 | 127,134 | 84,756 | 42,378 | 21,189 | 21,189 | 31,784 | 10,595 | 42,378 | 317,835 | 211,890 | 105,945 | 1,059,451 |
| Sales in Local Market (packs) | 33,902 | 101,707 | 67,805 | 33,902 | 16,951 | 16,951 | 25,427 | 8,476 | 33,902 | 254,268 | 169,512 | 84,756 | 847,559 |
| Sale price in local market(PKR/pack) | 106 | 106 | 106 | 106 | 106 | 106 | 106 | 141 | 106 | 56 | 56 | 56 | |
| Revenues from Local Sales (PKR) | 3,593,612 | 10,780,942 | 7,187,330 | 3,593,612 | 1,796,806 | 1,796,806 | 2,695,262 | 1,195,116 | 3,593,612 | 14,239,008 | 9,492,672 | 4,746,336 | 64,711,114 |
| Sales in export market (packs) | 8,476 | 25,427 | 16,951 | 8,476 | 4,238 | 4,238 | 6,357 | 2,119 | 8,476 | 63,567 | 42,378 | 21,189 | 211,892 |
| Sale price in export market (PKR/pack) | 117 | 117 | 117 | 117 | 117 | 117 | 117 | 155 | 117 | 62 | 62 | 62 | |
| Revenues from Export Sales (PKR) | 991,692 | 2,974,959 | 1,983,267 | 991,692 | 495,846 | 495,846 | 743,769 | 328,445 | 991,692 | 3,941,154 | 2,627,436 | 1,313,718 | 17,879,516 |
| Revenues from 1000 ml (PKR) | 4,585,304 | 13,755,901 | 9,170,597 | 4,585,304 | 2,292,652 | 2,292,652 | 3,439,031 | 1,523,561 | 4,585,304 | 18,180,162 | 12,120,108 | 6,060,054 | 82,590,630 |

8.5.2 Annex V-B - 200 ml Packs Revenue Calculations

| 200 ml Packs | Kinnow Juice | Mango Nectar | Apple Nectar | Red Grapes Nectar | Peach Nectar | Pineapple Nectar | Guava Nectar | Pomegranate Nectar | Mango-Orange Nectar | Mango Drink | Apple Drink | Mixed Fruit Drink | Total 200 ml |
|---|--------------|--------------|--------------|-------------------|--------------|------------------|--------------|--------------------|---------------------|-------------|-------------|-------------------|--------------|
| Production per year (Packs) | 847,560 | 2,542,680 | 1,695,120 | 847,560 | 423,780 | 423,780 | 635,670 | 211,890 | 847,560 | 6,356,700 | 4,237,800 | 2,118,900 | 21,189,000 |
| Sales in Local Market (packs) | 678,048 | 2,034,144 | 1,356,096 | 678,048 | 339,024 | 339,024 | 508,536 | 169,512 | 678,048 | 5,085,360 | 3,390,240 | 1,695,120 | 16,951,200 |
| Sale price in local market(PKR/pack) | 21 | 21 | 21 | 21 | 21 | 21 | 21 | 28 | 21 | 14 | 14 | 14 | |
| Revenues from Local Sales (PKR) | 14,239,008 | 42,717,024 | 28,478,016 | 14,239,008 | 7,119,504 | 7,119,504 | 10,679,256 | 4,746,336 | 14,239,008 | 71,195,040 | 47,463,360 | 23,731,680 | 285,966,744 |
| Sales in export market (packs) | 169,512 | 508,536 | 339,024 | 169,512 | 84,756 | 84,756 | 127,134 | 42,378 | 169,512 | 1,271,340 | 847,560 | 423,780 | 4,237,800 |
| Sale price in export market (PKR/pack) | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 31 | 23 | 15 | 15 | 15 | |
| Revenues from Export Sales (PKR) | 3,898,776 | 11,696,328 | 7,797,552 | 3,898,776 | 1,949,388 | 1,949,388 | 2,924,082 | 1,313,718 | 3,898,776 | 19,070,100 | 12,713,400 | 6,356,700 | 77,466,984 |
| Revenues from 200 ml (PKR) | 18,137,784 | 54,413,352 | 36,275,568 | 18,137,784 | 9,068,892 | 9,068,892 | 13,603,338 | 6,060,054 | 18,137,784 | 90,265,140 | 60,176,760 | 30,088,380 | 363,433,728 |

8.5.3 Annex V-C - 250 ml Packs Revenue Calculations

| 250 ml Packs | | | | |
|---|--------------------|--------------------|--------------------------|---------------------|
| | Mango Drink | Apple Drink | Mixed Fruit Drink | Total 250 ml |
| Production per year (Packs) | 10,594,500 | 6,356,700 | 4,237,800 | 21,189,000 |
| Sales in Local Market (packs) | 8,475,600 | 5,085,360 | 3,390,240 | 16,951,200 |
| Sale price in local market (PKR/pack) | 16 | 16 | 16 | |
| Revenues from Local Sales (PKR) | 135,609,600 | 81,365,760 | 54,243,840 | 271,219,200 |
| Sales in export market (packs) | 2,118,900 | 1,271,340 | 847,560 | 4,237,800 |
| Sale price in export market (PKR/pack) | 18 | 18 | 18 | |
| Revenues from Export Sales (PKR) | 38,140,200 | 22,884,120 | 15,256,080 | 76,280,400 |
| Revenues from 250 ml (PKR) | 173,749,800 | 104,249,880 | 69,499,920 | 347,499,600 |

8.5.4 Annex V-D - Mango Nectar 1000 ml Revenues Projections

| Mango Nectar 1000 ml | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Production per year (Packs) | 127,134 | 145,296 | 163,458 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 |
| Sales in Local Market (packs) | 101,707 | 116,237 | 130,766 | 138,031 | 138,031 | 138,031 | 138,031 | 138,031 | 138,031 | 138,031 |
| Sale price in local market(PKR/pack) | 106.0 | 112.4 | 119.1 | 126.2 | 133.8 | 141.8 | 150.3 | 159.3 | 168.9 | 179.0 |
| Revenues from local sales (PKR) | 10,780,942 | 13,065,039 | 15,574,231 | 17,419,512 | 18,468,548 | 19,572,796 | 20,746,059 | 21,988,338 | 23,313,436 | 24,707,549 |
| Sales in export market (packs) | 25,427 | 29,059 | 32,692 | 34,508 | 34,508 | 34,508 | 34,508 | 34,508 | 34,508 | 34,508 |
| Sale price in export market (PKR/pack) | 117.0 | 124.0 | 131.4 | 139.3 | 147.7 | 156.6 | 166.0 | 176.0 | 186.6 | 197.8 |
| Revenues from export sales (PKR) | 2,974,959 | 3,603,316 | 4,295,729 | 4,806,964 | 5,096,832 | 5,403,953 | 5,728,328 | 6,073,408 | 6,439,193 | 6,825,682 |
| Revenues from Mango Nectar 1000 ml (PKR) | 13,755,901 | 16,668,355 | 19,869,959 | 22,226,477 | 23,565,379 | 24,976,749 | 26,474,387 | 28,061,746 | 29,752,629 | 31,533,231 |

8.5.5 Annex V-E - Mango Nectar 200 ml Revenues Projections

| Mango Nectar 200 ml | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|
| Production per year (Packs) | 2,542,680 | 2,905,920 | 3,269,160 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 |
| Sales in export market (packs) | 2,034,144 | 2,324,736 | 2,615,328 | 2,760,624 | 2,760,624 | 2,760,624 | 2,760,624 | 2,760,624 | 2,760,624 | 2,760,624 |
| Sale price in export market (PKR/pack) | 21.0 | 22.3 | 23.6 | 25.0 | 26.5 | 28.1 | 29.8 | 31.6 | 33.5 | 35.5 |
| Revenues from local sales (PKR) | 42,717,024 | 51,841,613 | 61,721,741 | 69,015,600 | 73,156,536 | 77,573,534 | 82,266,595 | 87,235,718 | 92,480,904 | 98,002,152 |
| Sales in export sales (packs) | 508,536 | 581,184 | 653,832 | 690,156 | 690,156 | 690,156 | 690,156 | 690,156 | 690,156 | 690,156 |
| Sale price in export price (PKR/pack) | 23.0 | 24.4 | 25.9 | 27.5 | 29.2 | 31.0 | 32.9 | 34.9 | 37.0 | 39.2 |
| Revenues from export sales (PKR) | 11,696,328 | 14,180,890 | 16,934,249 | 18,979,290 | 20,152,555 | 21,394,836 | 22,706,132 | 24,086,444 | 25,535,772 | 27,054,115 |
| Revenues from Mango Nectar 200 ml (PKR) | 54,413,352 | 66,022,502 | 78,655,990 | 87,994,890 | 93,309,091 | 98,968,370 | 104,972,728 | 111,322,163 | 118,016,676 | 125,056,267 |

8.5.6 Annex V-F - Mango Drink 250 ml Revenues Projections

| Mango Drink 250 ml | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Production per year (Packs) | 10,594,500 | 12,108,000 | 13,621,500 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 |
| Sales in Local Market (packs) | 8,475,600 | 9,686,400 | 10,897,200 | 11,502,600 | 11,502,600 | 11,502,600 | 11,502,600 | 11,502,600 | 11,502,600 | 11,502,600 |
| Sale price in local market(PKR/pack) | 16.0 | 17.0 | 18.0 | 19.1 | 20.2 | 21.4 | 22.7 | 24.1 | 25.5 | 27.0 |
| Revenues from local sales (PKR) | 135,609,600 | 164,668,800 | 196,149,600 | 219,699,660 | 232,352,520 | 246,155,640 | 261,109,020 | 277,212,660 | 293,316,300 | 310,570,200 |
| Sales in export market (packs) | 2,118,900 | 2,421,600 | 2,724,300 | 2,875,650 | 2,875,650 | 2,875,650 | 2,875,650 | 2,875,650 | 2,875,650 | 2,875,650 |
| Sale price in export market (PKR/pack) | 18.0 | 19.1 | 20.2 | 21.4 | 22.7 | 24.1 | 25.5 | 27.0 | 28.6 | 30.3 |
| Revenues from export sales (PKR) | 38,140,200 | 46,252,560 | 55,030,860 | 61,538,910 | 65,277,255 | 69,303,165 | 73,329,075 | 77,642,550 | 82,243,590 | 87,132,195 |
| Revenues from Mango Drink 250 ml (PKR) | 173,749,800 | 210,921,360 | 251,180,460 | 281,238,570 | 297,629,775 | 315,458,805 | 334,438,095 | 354,855,210 | 375,559,890 | 397,702,395 |

8.5.7 Annex V-G - Revenues Summary

| Revenues 1000 ml Packs | | | | | | | | | | |
|---|--------------------|--------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Product | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| Revenues from Kinnow Juice 1000 ml (PKR) | 4,585,304 | 5,556,114 | 6,623,316 | 7,408,830 | 7,855,131 | 8,325,588 | 8,824,801 | 9,353,921 | 9,917,549 | 10,511,083 |
| Revenues from Mango Nectar 1000 ml (PKR) | 13,755,901 | 16,668,355 | 19,869,959 | 22,226,477 | 23,565,379 | 24,976,749 | 26,474,387 | 28,061,746 | 29,752,629 | 31,533,231 |
| Revenues from Apple Nectar 1000 ml (PKR) | 9,170,597 | 11,112,240 | 13,247,503 | 14,818,254 | 15,709,926 | 16,649,945 | 17,648,205 | 18,705,441 | 19,831,633 | 21,018,402 |
| Revenues from Red Grapes Nectar 1000 ml (PKR) | 4,585,304 | 5,556,114 | 6,623,316 | 7,408,830 | 7,855,131 | 8,325,588 | 8,824,801 | 9,353,921 | 9,917,549 | 10,511,083 |
| Revenues from Peach Nectar 1000 ml (PKR) | 2,292,652 | 2,778,057 | 3,311,664 | 3,704,472 | 3,927,626 | 4,162,857 | 4,412,468 | 4,677,032 | 4,958,850 | 5,255,622 |
| Revenues from Pineapple Nectar 1000 ml (PKR) | 2,292,652 | 2,778,057 | 3,311,664 | 3,704,472 | 3,927,626 | 4,162,857 | 4,412,468 | 4,677,032 | 4,958,850 | 5,255,622 |
| Revenues from Guava Nectar 1000 ml (PKR) | 3,439,031 | 4,167,092 | 4,967,549 | 5,556,651 | 5,891,378 | 6,244,223 | 6,618,634 | 7,015,476 | 7,438,199 | 7,883,353 |
| Revenues from Pomegranate Nectar 1000 ml (PKR) | 1,523,561 | 1,845,992 | 2,201,854 | 2,463,533 | 2,611,627 | 2,768,348 | 2,934,270 | 3,110,257 | 3,296,597 | 3,494,439 |
| Revenues from Mango-Orange Nectar 1000 ml (PKR) | 4,585,304 | 5,556,114 | 6,623,316 | 7,408,830 | 7,855,131 | 8,325,588 | 8,824,801 | 9,353,921 | 9,917,549 | 10,511,083 |
| Revenues from Mango Drink 1000 ml (PKR) | 18,180,162 | 22,034,138 | 26,284,046 | 29,417,936 | 31,177,836 | 33,032,633 | 35,016,834 | 37,130,439 | 39,373,449 | 41,745,863 |
| Revenues from Apple Drink 1000 ml (PKR) | 12,120,108 | 14,689,426 | 17,522,698 | 19,611,933 | 20,785,198 | 22,021,728 | 23,344,527 | 24,753,595 | 26,248,933 | 27,830,541 |
| Revenues from Mixed Fruit Drink 1000 ml (PKR) | 6,060,054 | 7,344,713 | 8,761,349 | 9,806,003 | 10,392,638 | 11,010,905 | 11,672,307 | 12,376,844 | 13,124,516 | 13,915,323 |
| Total Revenues 1000 ml Packs (PKR) | 82,590,630 | 100,086,413 | 119,348,234 | 133,536,220 | 141,554,628 | 150,007,008 | 159,008,504 | 168,569,627 | 178,736,302 | 189,465,645 |
| Revenues 200 ml Packs | | | | | | | | | | |
| Product | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| Revenues from Kinnow Juice 200 ml (PKR) | 18,137,784 | 22,007,501 | 26,218,663 | 29,331,630 | 31,103,030 | 32,989,457 | 34,990,909 | 37,107,388 | 39,338,892 | 41,685,422 |
| Revenues from Mango Nectar 200 ml (PKR) | 54,413,352 | 66,022,502 | 78,655,990 | 87,994,890 | 93,309,091 | 98,968,370 | 104,972,728 | 111,322,163 | 118,016,676 | 125,056,267 |
| Revenues from Apple Nectar 200 ml (PKR) | 36,275,568 | 44,015,002 | 52,437,326 | 58,663,260 | 62,206,061 | 65,978,914 | 69,981,818 | 74,214,775 | 78,677,784 | 83,370,845 |
| Revenues from Red Grapes Nectar 200 ml (PKR) | 18,137,784 | 22,007,501 | 26,218,663 | 29,331,630 | 31,103,030 | 32,989,457 | 34,990,909 | 37,107,388 | 39,338,892 | 41,685,422 |
| Revenues from Peach Nectar 200 ml (PKR) | 9,068,892 | 11,003,750 | 13,109,332 | 14,665,815 | 15,551,515 | 16,494,728 | 17,495,455 | 18,553,694 | 19,669,446 | 20,842,711 |
| Revenues from Pineapple Nectar 200 ml (PKR) | 9,068,892 | 11,003,750 | 13,109,332 | 14,665,815 | 15,551,515 | 16,494,728 | 17,495,455 | 18,553,694 | 19,669,446 | 20,842,711 |
| Revenues from Guava Nectar 200 ml (PKR) | 13,603,338 | 16,505,626 | 19,663,997 | 21,998,723 | 23,327,273 | 24,742,093 | 26,243,182 | 27,830,541 | 29,504,169 | 31,264,067 |
| Revenues from Pomegranate Nectar 200 ml (PKR) | 6,060,054 | 7,347,134 | 8,766,797 | 9,811,718 | 10,398,350 | 11,019,491 | 11,692,393 | 12,394,052 | 13,130,218 | 13,923,897 |
| Revenues from Mango-Orange Nectar 200 ml (PKR) | 18,137,784 | 22,007,501 | 26,218,663 | 29,331,630 | 31,103,030 | 32,989,457 | 34,990,909 | 37,107,388 | 39,338,892 | 41,685,422 |
| Revenues from Mango Drink 200 ml (PKR) | 90,265,140 | 109,117,296 | 130,276,026 | 145,450,377 | 154,249,866 | 163,739,511 | 173,401,695 | 183,926,574 | 195,314,148 | 206,701,722 |
| Revenues from Apple Drink 200 ml (PKR) | 60,176,760 | 72,744,864 | 86,850,684 | 96,966,918 | 102,833,244 | 109,159,674 | 115,601,130 | 122,617,716 | 130,209,432 | 137,801,148 |
| Revenues from Mixed Fruit Drink 200 ml (PKR) | 30,088,380 | 36,372,432 | 43,425,342 | 48,483,459 | 51,416,622 | 54,579,837 | 57,800,565 | 61,308,858 | 65,104,716 | 68,900,574 |
| Total Revenues 200 ml Packs (PKR) | 363,433,728 | 440,154,859 | 524,950,816 | 586,695,864 | 622,152,629 | 660,145,717 | 699,657,148 | 742,044,229 | 787,312,711 | 833,760,210 |
| Revenues 250 ml Packs | | | | | | | | | | |
| Product | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| Revenues from Mango Drink 250 ml (PKR) | 173,749,800 | 210,921,360 | 251,180,460 | 281,238,570 | 297,629,775 | 315,458,805 | 334,438,095 | 354,855,210 | 375,559,890 | 397,702,395 |
| Revenues from Aple Drink 250 ml (PKR) | 104,249,880 | 126,552,816 | 150,708,276 | 168,743,142 | 178,577,865 | 189,275,283 | 200,662,857 | 212,913,126 | 225,335,934 | 238,621,437 |
| Revenues from Guava Drink 250 ml (PKR) | 69,499,920 | 84,368,544 | 100,472,184 | 112,495,428 | 119,051,910 | 126,183,522 | 133,775,238 | 141,942,084 | 150,223,956 | 159,080,958 |
| Total Revenues 250 ml Packs (PKR) | 347,499,600 | 421,842,720 | 502,360,920 | 562,477,140 | 595,259,550 | 630,917,610 | 668,876,190 | 709,710,420 | 751,119,780 | 795,404,790 |
| Total Revenues (PKR) | 793,523,958 | 962,083,992 | 1,146,659,969 | 1,282,709,224 | 1,358,966,806 | 1,441,070,334 | 1,527,541,841 | 1,620,324,275 | 1,717,168,793 | 1,818,630,645 |

8.6 Annex VI – Raw Material Costs Details (Year 1)

8.6.1 Annex VI-A – Recipes of Different Juice Products

| Juice Product | Ingredients Required for 1000 Liters of Final Juice Product (kg) | | | | | | | | | | |
|---------------------|--|------------------|------|------------|----------|--------------------|------------------|--------------------|--------------|------------|-----------------|
| | Pulp (kg) | Concentrate (kg) | Pulp | Sugar (kg) | CMC (kg) | Ascorbic Acid (kg) | Citric Acid (kg) | Beta Carotene (kg) | Flavors (kg) | Color (kg) | Malic Acid (kg) |
| Kinnow Juice | | 195 | | | | 0.2 | | | 1.4 | | |
| Mango Nectar | 250 | | | 92 | 0.275 | 0.2 | 0.2 | 0.04 | 0.3 | | |
| Apple Nectar | | 70 | | 75 | 0.5 | 0.15 | | | 0.9 | 0.1 | 1.5 |
| Red Grapes Nectar | | 80 | | 120 | 0.25 | | | | 0.65 | 0.06 | 2 |
| Peach Nectar | 400 | | | 85 | 0.2 | 0.15 | 1.5 | | 0.2 | | |
| Pineapple Nectar | | 78 | | 100 | 0.3 | 0.15 | 1.5 | | 0.5 | | |
| Guava Nectar | 250 | | | 120 | 0.12 | 0.25 | 1.5 | | 0.1 | | |
| Pomegranate Nectar | | 80 | | 110 | 0.5 | 0.125 | 1.5 | | 0.3 | | |
| Mango-Orange Nectar | 300 | 17 | | 70 | 0.2 | 0.15 | 1.5 | | 0.5 | 0.1 | |
| Mango Drink | 80 | | | 120 | 0.3 | 0.2 | 0.3 | | 0.5 | | |
| Apple Drink | | 14 | | 120 | | 0.2 | | | 0.6 | 0.1 | 2 |
| Mixed Fruit Drink | 40 | 4 | 20 | 120 | 0.3 | 0.2 | 1.5 | | 0.5 | | |
| Guava Drink | 80 | | | 120 | 0.2 | 0.2 | 1.5 | | 0.5 | | |

8.6.2 Annex VI-B - Juice Ingredients Costs

| Kinnow Juice | | | |
|--|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| FCKJ | 195 | 300 | 58,500 |
| Ascorbic Acid | 0.2 | 500 | 100 |
| Flavor | 1.4 | 800 | 1,120 |
| Total Ingredients Cost 1000 Liter | | | 59,720 |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost per Pack (PKR) | 59.72 | 11.94 | - |
| No. of packs (Year 1) | 42,378 | 847,560 | - |
| Total Ingredient Cost of Kinnow Juice | | | - |

| Mango Nectar | | | |
|--|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| Mango Pulp | 250 | 130 | 32,500 |
| Sugar | 92 | 65 | 5,980 |
| CMC | 0.275 | 700 | 193 |
| Ascorbic Acid | 0.2 | 500 | 100 |
| Citric Acid | 0.2 | 140 | 28 |
| Beta Carotene | 0.04 | 15,000 | 600 |
| Flavor | 0.3 | 800 | 240 |
| Total Ingredients Cost 1000 Liter | | | 39,641 |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost per Pack (PKR) | 39.64 | 7.93 | - |
| No. of packs (Year 1) | 127,134 | 2,542,680 | - |
| Total Ingredient Cost of Mango Nectar | | | - |

| Apple Nectar | | | |
|--|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| Apple Concentrate | 70 | 260 | 18,200 |
| Sugar | 75 | 65 | 4,875 |
| CMC | 0.5 | 700 | 350 |
| Food Color | 0.1 | 500 | 50 |
| Ascorbic Acid | 0.15 | 500 | 75 |
| Malic Acid | 1.5 | 180 | 270 |
| Flavor | 0.9 | 800 | 720 |
| Total Ingredients Cost 1000 Liter | | | 24,540 |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost per Pack (PKR) | 24.54 | 4.91 | 6.14 |
| No. of packs | 84,756 | 1,695,120 | - |
| Total Ingredient Cost of Apple Nectar | | | - |

| Red Grapes Nectar | | | |
|---|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| Red Grapes Concentrate | 80 | 460 | 36,800 |
| Sugar | 120 | 65 | 7,800 |
| CMC | 0.25 | 700 | 175 |
| Food Color | 0.06 | 500 | 30 |
| Malic Acid | 2 | 180 | 360 |
| Flavor | 0.65 | 800 | 520 |
| Total Ingredients Cost 1000 Liter | | | 45,685 |
| | | | |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost of 1000ml Pack (PKR) | 45.69 | 9.14 | - |
| No. of packs (Year 1) | 42,378 | 847,560 | - |
| Total Ingredient Cost of Red Grapes Nectar | 1,936,039 | 7,744,156 | - |

| Peach Nectar | | | |
|--|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| Peach Pulp | 400 | 70 | 28,000 |
| Sugar | 85 | 65 | 5,525 |
| CMC | 0.2 | 700 | 140 |
| Citric Acid | 1.5 | 140 | 210 |
| Ascorbic Acid | 0.15 | 500 | 75 |
| Flavor | 0.2 | 800 | 160 |
| Total Ingredients Cost 1000 Liter | | | 34,110 |
| | | | |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost of 1000ml Pack (PKR) | 34.11 | 6.82 | - |
| No. of packs (Year 1) | 21,189 | 423,780 | - |
| Total Ingredient Cost of Peach Nectar | 722,757 | 2,891,027 | - |

| Pineapple Nectar | | | |
|--|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| Pineapple Concentrate | 78 | 400 | 31,200 |
| Sugar | 100 | 65 | 6,500 |
| CMC | 0.3 | 700 | 210 |
| Citric Acid | 1.5 | 140 | 210 |
| Ascorbic Acid | 0.15 | 500 | 75 |
| Flavor | 0.5 | 800 | 400 |
| Total Ingredients Cost 1000 Liter | | | 38,595 |
| | | | |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost of 1000ml Pack (PKR) | 38.60 | 7.72 | - |
| No. of packs (Year 1) | 21,189 | 423,780 | - |
| Total Ingredient Cost of Pineapple Nectar | 817,789 | 3,271,158 | - |

| Guava Nectar | | | |
|--|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| Guava Pulp | 250 | 70 | 17,500.0 |
| Sugar | 120 | 65 | 7,800.0 |
| CMC | 0.12 | 700 | 84.0 |
| Citric Acid | 1.5 | 140 | 210.0 |
| Ascorbic Acid | 0.25 | 500 | 125.0 |
| Flavor | 0.1 | 800 | 80.0 |
| Total Ingredients Cost 1000 Liter | | | 25,799 |
| | | | |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost of 1000ml Pack (PKR) | 25.80 | 5.16 | - |
| No. of packs (Year 1) | 31,784 | 635,670 | - |
| Total Ingredient Cost of Guava Nectar | 819,995 | 3,279,930 | - |

| Pomegranate Nectar | | | |
|--|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| Pomegranate Concentrate | 80 | 550 | 44,000.0 |
| Sugar | 110 | 65 | 7,150.0 |
| CMC | 0.5 | 700 | 350.0 |
| Citric Acid | 1.5 | 140 | 210.0 |
| Ascorbic Acid | 0.125 | 500 | 62.5 |
| Flavor | 0.3 | 800 | 240.0 |
| Total Ingredients Cost 1000 Liter | | | 52,013 |
| | | | |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost of 1000ml Pack (PKR) | 52.01 | 10.40 | - |
| No. of packs (Year 1) | 10,595 | 211,890 | - |
| Total Ingredient Cost of Pomegranate Nectar | 551,072 | 2,204,186 | - |

| Mango-Orange Nectar | | | |
|---|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| Mango Pulp | 300 | 130 | 39,000.0 |
| Kinnow Concentrate | 17 | 300 | 5,100.0 |
| Sugar | 70 | 65 | 4,550.0 |
| CMC | 0.2 | 700 | 140.0 |
| Citric Acid | 1.5 | 140 | 210.0 |
| Ascorbic Acid | 0.15 | 500 | 75.0 |
| Flavor | 0.5 | 800 | 400.0 |
| Food Color | 0.1 | 500 | 50.0 |
| Total Ingredients Cost 1000 Liter | | | 49,525 |
| | | | |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost of 1000ml Pack (PKR) | 49.53 | 9.91 | - |
| No. of packs (Year 1) | 42,378 | 847,560 | - |
| Total Ingredient Cost of Mango-Orange Nectar | 2,098,770 | 8,395,082 | - |

| Mango Drink | | | |
|---|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| Mango Pulp (Mix) | 80 | 80 | 6,400.0 |
| Sugar | 120 | 65 | 7,800.0 |
| CMC | 0.3 | 700 | 210.0 |
| Citric Acid | 0.3 | 140 | 42.0 |
| Ascorbic Acid | 0.2 | 500 | 100.0 |
| Flavor | 0.5 | 800 | 400.0 |
| Food Color | 0.1 | 500 | 50.0 |
| Total Ingredients Cost 1000 Liter | | | 15,002 |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost of 1000ml Pack (PKR) | 15.00 | 3.00 | 3.75 |
| No. of packs (Year 1) | 317,835 | 6,356,700 | 10,594,500 |
| Total Ingredient Cost of Mango Drink | | | 39,734,672 |

| Apple Drink | | | |
|---|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| Apple Concentrate | 14 | 260 | 3,640.0 |
| Sugar | 120 | 65 | 7,800.0 |
| CMC | 0.3 | 700 | 210.0 |
| Malic Acid | 2 | 180 | 360.0 |
| Ascorbic Acid | 0.2 | 500 | 100.0 |
| Flavor | 0.6 | 800 | 480.0 |
| Food Color | 0.1 | 500 | 50.0 |
| Total Ingredients Cost 1000 Liter | | | 12,640 |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost of 1000ml Pack (PKR) | 12.64 | 2.53 | 3.16 |
| No. of packs (Year 1) | 211,890 | 4,237,800 | 6,356,700 |
| Total Ingredient Cost of Apple Drink | | | 20,087,172 |

| Mixed Fruit Drink | | | |
|---|-------------------------|----------------------|-------------------|
| 1000 Liter Basis | Consumption (kg) | Cost (PKR/kg) | Cost (PKR) |
| Mango Pulp | 40 | 80 | 3,200.0 |
| Guava Pulp | 20 | 70 | 1,400.0 |
| Kinnow Concentrate | 4 | 300 | 1,200.0 |
| Sugar | 120 | 65 | 7,800.0 |
| CMC | 0.3 | 700 | 210.0 |
| Citric Acid | 1.5 | 140 | 210.0 |
| Ascorbic Acid | 0.2 | 500 | 100.0 |
| Flavor | 0.5 | 800 | 400.0 |
| Total Ingredients Cost 1000 Liter | | | 14,520 |
| | 1000 ml | 200 ml | 250 ml |
| Ingredient Cost of 1000ml Pack (PKR) | 14.52 | 2.90 | 3.63 |
| No. of packs (Year 1) | 105,945 | 2,118,900 | 4,237,800 |
| Total Ingredient Cost of Mixed Fruit Drink | | | 15,383,214 |

8.6.3 Annex VI-C - Packaging Costs

8.6.3.1 1000 ml Pack Cost

| | |
|--|--------------|
| Packaging Cost 1000 ml Pack | |
| Tetra Pak Paper | |
| Cost per 1000 ml pack (PKR) (A) | 12.0 |
| Other Packaging | |
| Packaging Tray | |
| Packs per tray | 12 |
| Packaging Tray Cost (PKR) | 35.0 |
| Packaging Tray Cost per Pack (PKR) (B) | 2.92 |
| | |
| Total Packaging Cost per 1000 ml Pack (PKR) (A+B) | 14.92 |

8.6.3.2 200 ml Pack Cost

| | |
|---|-------------|
| Packaging Cost 200 ml | |
| Tetra Pak Paper | |
| Cost per 200 ml pack (PKR) (A) | 4.00 |
| Other Packaging | |
| Packaging Tray | |
| Packs per packaging tray | 24 |
| Packaging Tray Cost (PKR) | 7.0 |
| Packaging Tray Cost per Pack (PKR) (B) | 0.29 |
| | |
| Hot Melt | |
| Hot Melt Cost per tray | 0.91 |
| Hot Melt Cost per Pack (PKR) (C) | 0.04 |
| | |
| Shrink Wrap | |
| Shrink Wrap Cost per Tray | 3.70 |
| Shrink Wrap Cost per Pack (PKR) (D) | 0.15 |
| | |
| Straw | |
| Straw Cost per Pack (PKR) (E) | 0.22 |
| | |
| Other Packaging Cost per Pack (PKR) (F=B+C+D+E) | 0.70 |
| | |
| Total Packaging Cost per 200 ml Pack (PKR) (A+F) | 4.70 |

8.6.3.3 250 ml Pack Cost

| | |
|---|-------------|
| Packaging Cost 250 ml | |
| Tetra Pak Paper | |
| Cost per 250 ml pack (PKR) (A) | 4.25 |
| Other Packaging | |
| Packaging Tray | |
| Packs per packaging tray | 27 |
| Packaging Tray Cost (PKR) | 8.0 |
| Packaging Tray Cost per Pack (PKR) (B) | 0.30 |
| Hot Melt | |
| Hot Melt Cost per tray | 0.91 |
| Hot Melt Cost per Pack (PKR) (C) | 0.03 |
| Shrink Wrap | |
| Shrink Wrap Cost per Tray | 3.70 |
| Shrink Wrap Cost per Pack (PKR) (D) | 0.14 |
| Straw | |
| Straw Cost per Pack (PKR) (E) | 0.22 |
| Other Packaging Cost per Pack (PKR) (F=B+C+D+E) | 0.69 |
| Total Packaging Cost per 250 ml Pack (PKR) (A+F) | 4.94 |

8.6.4 Annex VI-D - Raw Material Cost Projections of Selected Products

8.6.4.1 Raw Material Cost Projections of Mango Nectar 1000 ml

| Mango Nectar 1000 ml | | | | | | | | | | |
|--|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Ingredients Cost | | | | | | | | | | |
| 1000 Liter Basis | Consumption (kg) | | | | | | | | | |
| Mango Pulp | | | | | | | | | | |
| Sugar | | | | | | | | | | |
| CMC | 0.275 | | | | | | | | | |
| Ascorbic Acid | 0.2 | | | | | | | | | |
| Citric Acid | 0.2 | | | | | | | | | |
| Beta Carotene | 0.04 | | | | | | | | | |
| Flavor | 0.3 | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| Mango Pulp Cost (PKR) | 32,500 | 34,450 | 36,517 | 38,708 | 41,031 | 43,492 | 46,102 | 48,868 | 51,800 | 54,908 |
| Sugar Cost (PKR) | 5,980 | 6,339 | 6,719 | 7,122 | 7,550 | 8,003 | 8,483 | 8,992 | 9,531 | 10,103 |
| CMC Cost (PKR) | 193 | 204 | 216 | 229 | 243 | 258 | 273 | 289 | 307 | 325 |
| Ascorbic Acid Cost (PKR) | 100 | 106 | 112 | 119 | 126 | 134 | 142 | 150 | 159 | 169 |
| Citric Acid Cost (PKR) | 28 | 30 | 31 | 33 | 35 | 37 | 40 | 42 | 45 | 47 |
| Beta Carotene Cost (PKR) | 600 | 636 | 674 | 715 | 757 | 803 | 851 | 902 | 956 | 1,014 |
| Flavor Cost (PKR) | 240 | 254 | 270 | 286 | 303 | 321 | 340 | 361 | 383 | 405 |
| Total Ingredients Cost 1000 Liter | 39,641 | 42,019 | 44,540 | 47,212 | 50,045 | 53,048 | 56,231 | 59,605 | 63,181 | 66,972 |
| Ingredient Cost of 1000ml Pack (PKR) | 39.6 | 42.0 | 44.5 | 47.2 | 50.0 | 53.0 | 56.2 | 59.6 | 63.2 | 67.0 |
| No. of packs | 127,134 | 145,296 | 163,458 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 |
| Total Ingredient Cost of Mango Nectar 1000 ml | 5,039,655 | 6,105,182 | 7,280,430 | 8,145,992 | 8,634,752 | 9,152,837 | 9,702,007 | 10,284,128 | 10,901,175 | 11,555,246 |
| Packaging Cost | | | | | | | | | | |
| Tetra Pak Paper | | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| No. of Packs | 127,134 | 145,296 | 163,458 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 |
| Cost per pack (PKR) | 12.0 | 13.0 | 14.0 | 15.1 | 16.3 | 17.6 | 19.0 | 20.6 | 22.2 | 24.0 |
| Tetra Pak Paper Cost (PKR) | 1,525,608 | 1,883,036 | 2,287,889 | 2,608,193 | 2,816,849 | 3,042,197 | 3,285,573 | 3,548,418 | 3,832,292 | 4,138,875 |
| Other Packaging | | | | | | | | | | |
| Packaging Tray | | | | | | | | | | |
| Packs per tray | 12 | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| No. of Packs | 127,134 | 145,296 | 163,458 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 | 172,539 |
| No. of Trays | 10,595 | 12,108 | 13,622 | 14,378 | 14,378 | 14,378 | 14,378 | 14,378 | 14,378 | 14,378 |
| Cost Per tray (PKR/tray) | 35.0 | 37.1 | 39.3 | 41.7 | 44.2 | 46.8 | 49.6 | 52.6 | 55.8 | 59.1 |
| Total Other Packaging Cost (PKR) | 370,808 | 449,207 | 535,679 | 599,365 | 635,327 | 673,447 | 713,854 | 756,685 | 802,086 | 850,211 |
| Total Packaging Cost of Mango Nectar 1000 ml (PKR) | 1,896,416 | 2,332,243 | 2,823,568 | 3,207,559 | 3,452,176 | 3,715,644 | 3,999,426 | 4,305,103 | 4,634,378 | 4,989,086 |
| Total Raw Material Cost of Mango Nectar 1000 ml (PKR) | 6,936,071 | 8,437,425 | 10,103,998 | 11,353,551 | 12,086,928 | 12,868,481 | 13,701,433 | 14,589,231 | 15,535,553 | 16,544,332 |

8.6.4.2 Raw Material Cost Projections of Mango Nectar 200 ml

| Mango Nectar 200 ml | | | | | | | | | | |
|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Ingredients Cost | | | | | | | | | | |
| 1000 Liter Basis | Consumption (kg) | | | | | | | | | |
| Mango Pulp | 250 | | | | | | | | | |
| Sugar | 92 | | | | | | | | | |
| CMC | 0.275 | | | | | | | | | |
| Ascorbic Acid | 0.2 | | | | | | | | | |
| Citric Acid | 0.2 | | | | | | | | | |
| Beta Carotene | 0.04 | | | | | | | | | |
| Flavor | 0.3 | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| Mango Pulp Cost (PKR) | 32,500 | 34,450 | 36,517 | 38,708 | 41,031 | 43,492 | 46,102 | 48,868 | 51,800 | 54,908 |
| Sugar Cost (PKR) | 5,980 | 6,339 | 6,719 | 7,122 | 7,550 | 8,003 | 8,483 | 8,992 | 9,531 | 10,103 |
| CMC Cost (PKR) | 193 | 204 | 216 | 229 | 243 | 258 | 273 | 289 | 307 | 325 |
| Ascorbic Acid Cost (PKR) | 100 | 106 | 112 | 119 | 126 | 134 | 142 | 150 | 159 | 169 |
| Citric Acid Cost (PKR) | 28 | 30 | 31 | 33 | 35 | 37 | 40 | 42 | 45 | 47 |
| Beta Carotene Cost (PKR) | 600 | 636 | 674 | 715 | 757 | 803 | 851 | 902 | 956 | 1,014 |
| Flavor Cost (PKR) | 240 | 254 | 270 | 286 | 303 | 321 | 340 | 361 | 383 | 405 |
| Total Ingredients Cost 1000 Liter | 39,641 | 42,019 | 44,540 | 47,212 | 50,045 | 53,048 | 56,231 | 59,605 | 63,181 | 66,972 |
| Ingredient Cost of 200 ml Pack (PKR) | 7.9 | 8.4 | 8.9 | 9.4 | 10.0 | 10.6 | 11.2 | 11.9 | 12.6 | 13.4 |
| No. of packs | 2,542,680.0 | 2,905,920.0 | 3,269,160.0 | 3,450,780.0 |
| Total Ingredient Cost of Mango Nectar 200 ml | 20,158,621 | 24,420,730 | 29,121,720 | 32,583,969 | 34,539,007 | 36,611,348 | 38,808,029 | 41,136,510 | 43,604,701 | 46,220,983 |
| Packaging Cost | | | | | | | | | | |
| Tetra Pak Paper | | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| No. of Packs | 2,542,680 | 2,905,920 | 3,269,160 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 |
| Cost per pack (PKR) | 4.00 | 4.32 | 4.67 | 5.04 | 5.44 | 5.88 | 6.35 | 6.86 | 7.40 | 8.00 |
| Tetra Pak Paper Cost (PKR) | 10,170,720 | 12,553,574 | 15,252,593 | 17,387,956 | 18,778,992 | 20,281,312 | 21,903,817 | 23,656,122 | 25,548,612 | 27,592,501 |
| Other Packaging | | | | | | | | | | |
| Packaging Tray | | | | | | | | | | |
| Packs per tray | 24 | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| No. of Packs | 2,542,680 | 2,905,920 | 3,269,160 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 | 3,450,780 |
| No. of Trays | 105,945 | 121,080 | 136,215 | 143,783 | 143,783 | 143,783 | 143,783 | 143,783 | 143,783 | 143,783 |
| Cost Per tray (PKR/tray) | 7.0 | 7.4 | 7.9 | 8.3 | 8.8 | 9.4 | 9.9 | 10.5 | 11.2 | 11.8 |
| Total Packaging Tray Cost (PKR) | 741,615 | 898,414 | 1,071,358 | 1,198,731 | 1,270,655 | 1,346,894 | 1,427,708 | 1,513,370 | 1,604,172 | 1,700,423 |
| Hot Melt Cost per tray | 0.91 | 0.97 | 1.03 | 1.09 | 1.15 | 1.22 | 1.30 | 1.37 | 1.46 | 1.54 |
| Total Hot Melt Cost | 96,728 | 117,179 | 139,736 | 156,349 | 165,730 | 175,673 | 186,214 | 197,387 | 209,230 | 221,784 |
| Shrink Wrap Cost per Tray | 3.70 | 3.92 | 4.16 | 4.41 | 4.67 | 4.95 | 5.25 | 5.56 | 5.90 | 6.25 |
| Total Shrink Wrap Cost | 391,997 | 474,876 | 566,289 | 633,615 | 671,632 | 711,930 | 754,645 | 799,924 | 847,920 | 898,795 |
| Straw Cost per Tray | 5.28 | 5.5968 | 5.932608 | 6.28856448 | 6.665878349 | 7.06583105 | 7.489780913 | 7.939167767 | 8.415517834 | 8.920448904 |
| Total Straw Cost | 559,390 | 677,661 | 808,110 | 904,186 | 958,437 | 1,015,943 | 1,076,899 | 1,141,513 | 1,210,004 | 1,282,604 |
| Total Other Packaging Cost (PKR) | 1,789,729 | 2,168,129 | 2,585,493 | 2,892,880 | 3,066,453 | 3,250,440 | 3,445,466 | 3,652,194 | 3,871,326 | 4,103,605 |
| Total Packaging Cost of 200 ml Mango Nectar (PKR) | 10,912,335 | 13,451,988 | 16,323,951 | 18,586,687 | 20,049,647 | 21,628,206 | 23,331,524 | 25,169,492 | 27,152,784 | 29,292,923 |
| Total Raw Material Cost of Mango Nectar 200 ml (PKR) | 31,070,956 | 37,872,718 | 45,445,671 | 51,170,656 | 54,588,654 | 58,239,554 | 62,139,553 | 66,306,003 | 70,757,485 | 75,513,906 |

8.6.4.3 Raw Material Cost Projections of Mango Drink 250 ml

| Mango Drink 250 ml | | | | | | | | | | |
|--|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Ingredients Cost | | | | | | | | | | |
| 1000 Liter Basis | Consumption (kg) | | | | | | | | | |
| Mango Pulp | | | | | | | | | | |
| Sugar | | | | | | | | | | |
| CMC | | | | | | | | | | |
| Citric Acid | | | | | | | | | | |
| Ascorbic Acid | | | | | | | | | | |
| Flavor | | | | | | | | | | |
| Food Color | | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| Mango Pulp | 6,400 | 6,784 | 7,191 | 7,623 | 8,080 | 8,565 | 9,079 | 9,623 | 10,201 | 10,813 |
| Sugar | 7,800 | 8,268 | 8,764 | 9,290 | 9,847 | 10,438 | 11,064 | 11,728 | 12,432 | 13,178 |
| CMC | 210 | 223 | 236 | 250 | 265 | 281 | 298 | 316 | 335 | 355 |
| Citric Acid | 42 | 45 | 47 | 50 | 53 | 56 | 60 | 63 | 67 | 71 |
| Ascorbic Acid | 100 | 106 | 112 | 119 | 126 | 134 | 142 | 150 | 159 | 169 |
| Flavor | 400 | 424 | 449 | 476 | 505 | 535 | 567 | 601 | 638 | 676 |
| Food Color | 50 | 53 | 56 | 60 | 63 | 67 | 71 | 75 | 80 | 84 |
| Total Ingredients Cost 1000 Liter | 15,002 | 15,902 | 16,856 | 17,868 | 18,940 | 20,076 | 21,281 | 22,557 | 23,911 | 25,346 |
| Ingredient Cost of 250ml Pack (PKR) | 3.8 | 4.0 | 4.2 | 4.5 | 4.7 | 5.0 | 5.3 | 5.6 | 6.0 | 6.3 |
| No. of packs | 10,594,500.0 | 12,108,000.0 | 13,621,500.0 | 14,378,250.0 | 14,378,250.0 | 14,378,250.0 | 14,378,250.0 | 14,378,250.0 | 14,378,250.0 | 14,378,250.0 |
| Total Ingredient Cost of Mango Drink 250 ml | 39,734,672 | 48,135,717 | 57,401,843 | 64,226,284 | 68,079,861 | 72,164,653 | 76,494,532 | 81,084,204 | 85,949,256 | 91,106,212 |
| Packaging Cost | | | | | | | | | | |
| Tetra Pak Paper | | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| No. of Packs | 10,594,500 | 12,108,000 | 13,621,500 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 |
| Cost per pack (PKR) | 4.3 | 4.6 | 5.0 | 5.4 | 5.8 | 6.2 | 6.7 | 7.3 | 7.9 | 8.5 |
| Tetra Pak Paper Cost (PKR) | 45,026,625 | 55,575,720 | 67,524,500 | 76,977,930 | 83,136,164 | 89,787,057 | 96,970,022 | 104,727,624 | 113,105,834 | 122,154,300 |
| Other Packaging | | | | | | | | | | |
| Packaging Tray | | | | | | | | | | |
| Packs per tray | 27 | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
| No. of Packs | 10,594,500 | 12,108,000 | 13,621,500 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 | 14,378,250 |
| No. of Trays | 392,389 | 448,444 | 504,500 | 532,528 | 532,528 | 532,528 | 532,528 | 532,528 | 532,528 | 532,528 |
| Cost Per tray (PKR/tray) | 8.0 | 8.5 | 9.0 | 9.5 | 10.1 | 10.7 | 11.3 | 12.0 | 12.8 | 13.5 |
| Total Packaging Tray Cost (PKR) | 3,139,111 | 3,802,809 | 4,534,850 | 5,073,993 | 5,378,432 | 5,701,138 | 6,043,207 | 6,405,799 | 6,790,147 | 7,197,556 |
| Hot Melt Cost per tray | 0.91 | 0.97 | 1.03 | 1.09 | 1.15 | 1.22 | 1.30 | 1.37 | 1.46 | 1.54 |
| Total Hot Melt Cost | 358,251 | 433,996 | 517,540 | 579,069 | 613,814 | 650,642 | 689,681 | 731,062 | 774,926 | 821,421 |
| Shrink Wrap Cost per Tray | 3.70 | 3.92 | 4.16 | 4.41 | 4.67 | 4.95 | 5.25 | 5.56 | 5.90 | 6.25 |
| Total Shrink Wrap Cost | 1,451,839 | 1,758,799 | 2,097,368 | 2,346,722 | 2,487,525 | 2,636,776 | 2,794,983 | 2,962,682 | 3,140,443 | 3,328,870 |
| Straw Cost per Tray | 5.28 | 5.5968 | 5.932608 | 6.28856448 | 6.665878349 | 7.06583105 | 7.489780913 | 7.939167767 | 8.415517834 | 8.920448904 |
| Total Straw Cost | 2,071,813 | 2,509,854 | 2,993,001 | 3,348,835 | 3,549,765 | 3,762,751 | 3,988,516 | 4,227,827 | 4,481,497 | 4,750,387 |
| Total Other Packaging Cost (PKR) | 7,021,014 | 8,505,457 | 10,142,758 | 11,348,619 | 12,029,536 | 12,751,309 | 13,516,387 | 14,327,370 | 15,187,013 | 16,098,233 |
| Total Packaging Cost of Mango Drink 250 ml (PKR) | 52,047,639 | 64,081,177 | 77,667,258 | 88,326,549 | 95,165,701 | 102,538,366 | 110,486,409 | 119,054,994 | 128,292,846 | 138,252,533 |
| Total Raw Material Cost of Mango Drink 250 ml (PKR) | 91,782,312 | 112,216,895 | 135,069,101 | 152,552,833 | 163,245,562 | 174,703,019 | 186,980,941 | 200,139,198 | 214,242,102 | 229,358,745 |

8.7 Annex VII – Other Operating Cost Details (Year 1)

8.7.1 Annex VII-A – Chemicals & Lab Cost Calculations

Caustic Soda (CIP)

Unit consumption (kg/day)

10

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| No. of days production | 140.5 | 160.6 | 180.7 | 190.7 | 190.7 | 190.7 | 190.7 | 190.7 | 190.7 | 190.7 |
| Total Consumption (kg) | 1,405 | 1,606 | 1,807 | 1,907 | 1,907 | 1,907 | 1,907 | 1,907 | 1,907 | 1,907 |
| Unit Cost (PKR/kg) | 80 | 86.4 | 93.3 | 100.8 | 108.8 | 117.5 | 126.9 | 137.1 | 148.1 | 159.9 |
| Total Cost of Caustic Soda (PKR) | 112,420 | 138,758 | 168,591 | 192,194 | 207,570 | 224,175 | 242,109 | 261,478 | 282,396 | 304,988 |

Nitric Acid (CIP)

Unit consumption (kg/day)

6

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| No. of days production | 140.5 | 160.6 | 180.7 | 190.7 | 190.7 | 190.7 | 190.7 | 190.7 | 190.7 | 190.7 |
| Total Consumption (kg) | 843 | 964 | 1,084 | 1,144 | 1,144 | 1,144 | 1,144 | 1,144 | 1,144 | 1,144 |
| Unit Cost (PKR/kg) | 150 | 162.0 | 175.0 | 189.0 | 204.1 | 220.4 | 238.0 | 257.1 | 277.6 | 299.9 |
| Total Cost of Nitric Acid (PKR) | 126,473 | 156,103 | 189,665 | 216,219 | 233,516 | 252,197 | 272,373 | 294,163 | 317,696 | 343,112 |

Laboratory Chemicals cost

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Lab Chemicals cost per year (PKR) @ 100% | 50,000 | 54,000 | 58,320 | 62,986 | 68,024 | 73,466 | 79,344 | 85,691 | 92,547 | 99,950 |
| Total Chemicals Cost (PKR) | 288,893 | 348,862 | 416,577 | 471,398 | 509,110 | 549,839 | 593,826 | 641,332 | 692,639 | 748,050 |

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|-------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| Lab Consumable Apparatus Cost (PKR) | 25,000 | 27,000 | 29,160 | 31,493 | 34,012 | 36,733 | 39,672 | 42,846 | 46,273 | 49,975 |

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Total Chemicals & Lab Cost (PKR) | 313,893 | 375,862 | 445,737 | 502,891 | 543,122 | 586,572 | 633,498 | 684,178 | 738,912 | 798,025 |

8.7.2 Annex VII-B – Furnace Oil Cost Calculations

Furnace Oil

Furnace oil consumption (kg/day)

2,500

Furnace oil rate (PKR/kg)

70

| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| No. of days production | 140.5 | 160.6 | 180.7 | 190.7 | 190.7 | 190.7 | 190.7 | 190.7 | 190.7 | 190.7 |
| Furnace oil consumption (kg) | 351,313 | 401,500 | 451,688 | 476,781 | 476,781 | 476,781 | 476,781 | 476,781 | 476,781 | 476,781 |
| Furnace oil rate (PKR/kg) | 70 | 75.6 | 81.6 | 88.2 | 95.2 | 102.9 | 111.1 | 120.0 | 129.6 | 139.9 |
| Furnace oil cost (PKR) | 24,591,875 | 30,353,400 | 36,879,381 | 42,042,494 | 45,405,894 | 49,038,365 | 52,961,435 | 57,198,349 | 61,774,217 | 66,716,155 |

8.7.3 Annex VII-C – Electricity Bill Calculations

| | | | | | | | | | | | | | | | | | | | | |
|---|-------------------|-------------------|-------------------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--|--|--|--|--|--|--|--|--|--|
| Plant Load (KVA) | 500 | | | | | | | | | | | | | | | | | | | |
| Electricity Calculation | | | | | | | | | | | | | | | | | | | | |
| Load Calculation per day | kw | Hours/day | KWH/day | No. of days per ye | KWH/year | | | | | | | | | | | | | | | |
| Tetra Pak Machines | 90 | 20 | 1,800 | 200.75 | 361,350 | | | | | | | | | | | | | | | |
| Processing Machinery | 170 | 20 | 3,400 | 200.75 | 682,550 | | | | | | | | | | | | | | | |
| Utility/Allied Machinery | 60 | 20 | 1,200 | 200.75 | 240,900 | | | | | | | | | | | | | | | |
| Cold Store | 150 | 8 | 1,200 | 200.75 | 240,900 | | | | | | | | | | | | | | | |
| Total kwh per day | 380 | | 5,800 | | 1,525,700 | | | | | | | | | | | | | | | |
| Variable Production Electricity Cost | | | | | | | | | | | | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | | | | | | | | | | |
| Variable Cost (Rs/kwh) | 10.58 | 11.43 | 12.34 | 13.33 | 14.40 | 15.55 | 16.79 | 18.14 | 19.59 | 21.16 | | | | | | | | | | |
| Variable Production Electricity Cost (PKR) | 11,302,894 | 13,951,001 | 16,950,466 | 19,323,531 | 20,869,414 | 22,538,967 | 24,342,084 | 26,289,451 | 28,392,607 | 30,664,016 | | | | | | | | | | |
| Variable Administrative Electricity Cost | | | | | | | | | | | | | | | | | | | | |
| Fixed Electricity Cost | | | | | | | | | | | | | | | | | | | | |
| | Kw | Hours/day | KWH/day | No. of days per ye | KWH per year | | | | | | | | | | | | | | | |
| Administrative Load | 30 | 12 | 360 | 180 | 64,800 | | | | | | | | | | | | | | | |
| Variable Administrative Electricity Cost (PKR) | | | | | | | | | | | | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | | | | | | | | | | |
| Variable Cost (Rs/kwh) | 10.58 | 11.43 | 12.34 | 13.33 | 14.40 | 15.55 | 16.79 | 18.14 | 19.59 | 21.16 | | | | | | | | | | |
| Variable Administrative Electricity Cost (PKR) | 685,800 | 740,664 | 799,917 | 863,910 | 933,023 | 1,007,665 | 1,088,278 | 1,175,341 | 1,269,368 | 1,370,917 | | | | | | | | | | |
| Fixed Charges on the Bill | | | | | | | | | | | | | | | | | | | | |
| | Per month | Per year | | | | | | | | | | | | | | | | | | |
| Fixed charges (Rs/kwm) | 380 | 2,280,000 | | | | | | | | | | | | | | | | | | |
| Total fixed charges | 380 | 2,280,000 | | | | | | | | | | | | | | | | | | |
| Fixed cost of Electricity (PKR) | | | | | | | | | | | | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | | | | | | | | | | |
| | 2,280,000 | 2,462,400 | 2,659,392 | 2,872,143 | 3,101,915 | 3,350,068 | 3,618,073 | 3,907,519 | 4,220,121 | 4,557,731 | | | | | | | | | | |
| Direct Electricity Cost (PKR) | | | | | | | | | | | | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | | | | | | | | | | |
| | 11,302,894 | 13,951,001 | 16,950,466 | 19,323,531 | 20,869,414 | 22,538,967 | 24,342,084 | 26,289,451 | 28,392,607 | 30,664,016 | | | | | | | | | | |
| Administrative Electricity Cost (PKR) | | | | | | | | | | | | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | | | | | | | | | | |
| | 2,965,800 | 3,203,064 | 3,459,309 | 3,736,054 | 4,034,938 | 4,357,733 | 4,706,352 | 5,082,860 | 5,489,489 | 5,928,648 | | | | | | | | | | |
| Total Electricity Cost (PKR) | | | | | | | | | | | | | | | | | | | | |
| | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | | | | | | | | | | |
| | 14,268,694 | 17,154,065 | 20,409,775 | 23,059,585 | 24,904,352 | 26,896,700 | 29,048,436 | 31,372,311 | 33,882,096 | 36,592,663 | | | | | | | | | | |

8.7.4 Annex VII-D – Depreciation & Amortization Calculations

8.7.4.1 Depreciation Calculations

| | | 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 |
| Land | 0% | 24,000,000 | - | - | - | - | - | - | - | - | - | - |
| Building & Civil Works | 5% | 50,380,000 | 2,519,000 | 2,519,000 | 2,519,000 | 2,519,000 | 2,519,000 | 2,519,000 | 2,519,000 | 2,519,000 | 2,519,000 | 2,519,000 |
| Tetra Pak Machines | 10% | 120,000,000 | 12,000,000 | 12,000,000 | 12,000,000 | 12,000,000 | 12,000,000 | 12,000,000 | 12,000,000 | 12,000,000 | 12,000,000 | 12,000,000 |
| Processing Machinery | 10% | 41,850,000 | 4,185,000 | 4,185,000 | 4,185,000 | 4,185,000 | 4,185,000 | 4,185,000 | 4,185,000 | 4,185,000 | 4,185,000 | 4,185,000 |
| Utility/Allied Machinery | 10% | 25,150,000 | 2,515,000 | 2,515,000 | 2,515,000 | 2,515,000 | 2,515,000 | 2,515,000 | 2,515,000 | 2,515,000 | 2,515,000 | 2,515,000 |
| Cold Store Machinery | 10% | 10,500,000 | 1,050,000 | 1,050,000 | 1,050,000 | 1,050,000 | 1,050,000 | 1,050,000 | 1,050,000 | 1,050,000 | 1,050,000 | 1,050,000 |
| Laboratory Equipment | 10% | 868,600 | 86,860 | 86,860 | 86,860 | 86,860 | 86,860 | 86,860 | 86,860 | 86,860 | 86,860 | 86,860 |
| Office Equipment & Furniture | 20% | 4,510,000 | 902,000 | 902,000 | 902,000 | 902,000 | 902,000 | - | - | - | - | - |
| Vehicles | 20% | 8,900,000 | 1,780,000 | 1,780,000 | 1,780,000 | 1,780,000 | 1,780,000 | - | - | - | - | - |
| Total | | 286,158,600 | 25,037,860 | 25,037,860 | 25,037,860 | 25,037,860 | 25,037,860 | 22,355,860 | 22,355,860 | 22,355,860 | 22,355,860 | 22,355,860 |

Year End Value

| | | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|------------------------------|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|-------------------|-------------------|
| Land | | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 | 24,000,000 |
| Building & Civil Works | | 50,380,000 | 47,861,000 | 45,342,000 | 42,823,000 | 40,304,000 | 37,785,000 | 35,266,000 | 32,747,000 | 30,228,000 | 27,709,000 | 25,190,000 |
| Tetra Pak Machines | | 120,000,000 | 108,000,000 | 96,000,000 | 84,000,000 | 72,000,000 | 60,000,000 | 48,000,000 | 36,000,000 | 24,000,000 | 12,000,000 | - |
| Processing Machinery | | 41,850,000 | 37,665,000 | 33,480,000 | 29,295,000 | 25,110,000 | 20,925,000 | 16,740,000 | 12,555,000 | 8,370,000 | 4,185,000 | - |
| Utility/Allied Machinery | | 25,150,000 | 22,635,000 | 20,120,000 | 17,605,000 | 15,090,000 | 12,575,000 | 10,060,000 | 7,545,000 | 5,030,000 | 2,515,000 | - |
| Cold Store Machinery | | 10,500,000 | 9,450,000 | 8,400,000 | 7,350,000 | 6,300,000 | 5,250,000 | 4,200,000 | 3,150,000 | 2,100,000 | 1,050,000 | - |
| Laboratory Equipment | | 868,600 | 781,740 | 694,880 | 608,020 | 521,160 | 434,300 | 347,440 | 260,580 | 173,720 | 86,860 | - |
| Office Equipment & Furniture | | 4,510,000 | 3,608,000 | 2,706,000 | 1,804,000 | 902,000 | - | - | - | - | - | - |
| Vehicles | | 8,900,000 | 7,120,000 | 5,340,000 | 3,560,000 | 1,780,000 | - | - | - | - | - | - |
| Total | | 286,158,600 | 261,120,740 | 236,082,880 | 211,045,020 | 186,007,160 | 160,969,300 | 138,613,440 | 116,257,580 | 93,901,720 | 71,545,860 | 49,190,000 |

8.7.4.2 Amortization Calculations

| | 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% | 36,309,000 | 7,261,800 | 7,261,800 | 7,261,800 | 7,261,800 | 7,261,800 | - | - | - | - | - |
| Accumulated Amortization cost | | | 7,261,800 | 14,523,600 | 21,785,400 | 29,047,200 | 36,309,000 | 36,309,000 | 36,309,000 | 36,309,000 | 36,309,000 | 36,309,000 |
| Year end value | | 36,309,000 | 29,047,200 | 21,785,400 | 14,523,600 | 7,261,800 | - | - | - | - | - | - |

8.7.4.3 Insurance Cost Calculations

Book Value

| | Rate | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|----------------------------|------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-----------|---------|
| Total Machinery Book Value | | 77,500,000 | 69,750,000 | 62,000,000 | 54,250,000 | 46,500,000 | 38,750,000 | 31,000,000 | 23,250,000 | 15,500,000 | 7,750,000 | - |
| Vehicles | | 8,900,000 | 7,120,000 | 5,340,000 | 3,560,000 | 1,780,000 | - | - | - | - | - | - |

Insurance Cost

| | Rate | Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 |
|---------------------------------|------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|----------------|----------------|----------|
| Equipment & machinery insurance | 5% | 3,875,000 | 3,487,500 | 3,100,000 | 2,712,500 | 2,325,000 | 1,937,500 | 1,550,000 | 1,162,500 | 775,000 | 387,500 | - |
| Office vehicles insurance | 3% | 267,000 | 213,600 | 160,200 | 106,800 | 53,400 | - | - | - | - | - | - |
| Total Insurance | | 4,142,000 | 3,701,100 | 3,260,200 | 2,819,300 | 2,378,400 | 1,937,500 | 1,550,000 | 1,162,500 | 775,000 | 387,500 | - |

8.8 Annex VIII – Key Assumptions

Revenue Assumptions

| | |
|---|--------------|
| Share of local Sales | 80.0% |
| Consumer Price Discount (from market leaders) | 10.0% |
| Retailer margin | 11.0% |
| Distributor margin | 12.0% |
| Export price higher by local price | 10.0% |

Input Costs Assumptions

| | |
|---|--------|
| Caustic Soda (PKR/kg) | 80 |
| Nitric Acid (PKR/kg) | 150 |
| Lab Chemicals & Consumables Cost (PKR/year) | 50,000 |
| Diesel cost (PKR/liter) | 107 |
| Petrol cost (PKR/liter) | 95 |
| Furnace oil rate (PKR/kg) | 70 |
| Machine maintenance (% of machine cost) | 2% |
| Consultancy charges (% of building) | 5% |

Sales Price Growth Rates

| | |
|---------------------|-------------|
| Local market sales | 6.0% |
| Export market sales | 6.0% |

Raw Materials Cost Growth Rates

| Raw Material | Cost Growth Rate per Annum |
|--|----------------------------|
| Juice Ingredients | |
| Kinnow Juice Concentrate, Mango Pulp (Chaunsa), Mango Pulp (Mix), Peach Pulp, Guava Pulp | 6% |
| Orange juice concentrate, Apple juice concentrate, Red Grapes juice concentrate, Pineapple juice concentrate Pomegranate juice concentrate | 8% |
| Sugar, CMC, Ascorbic Acid, Citric Acid, Malic Acid, Beta Carotene, Flavors, Food Colors | 6% |
| Juice Packaging | |
| Tetra Pak Paper 1000 ml, 200 ml, 250 ml | 8% |
| Packaging Trays 1000 ml, 200 ml, 250 ml | 6% |
| Hot Melt for Straw | 6% |
| Straw | 6% |
| Shrink Wrap 200 ml, 250 ml | 6% |

Inputs Costs Growth Rates

| | |
|---|-------|
| Electricity Cost growth | 8% |
| Chemicals cost growth rate | 8% |
| Lab consumable apparatus growth rate | 8% |
| Furnace oil cost growth rate | 8% |
| Fuel & vehicle maintenance cost growth rate | 5% |
| Payroll growth rate | 8% |
| Machine maintenance increase per year | 0.20% |
| Travel cost growth rate | 8% |

Financial Assumptions

| | |
|---------------------------|-----|
| Cost of capital (for NPV) | 18% |
| Tax Rate | 35% |

Marketing Costs Assumptions

| | |
|--|------------|
| Advertising brochure cost (PKR) | 30 |
| Growth in flyer cost | 6% |
| Billboard Cost (PKR) | 1,000,000 |
| Growth in Billboard Cost | 6% |
| TVCs Budget (Rs/year) | 10,000,000 |
| Growth in TVCs cost | 6% |
| Cost per mail letter (PKR) | 20 |
| Growth in mail cost | 6% |
| Cost per foreign marketing trip | 500,000 |
| Growth rate of travel cost | 10% |
| Newspaper advertisement cost (PKR) | 300,000 |
| Newspaper advertisement cost growth | 6% |
| Website development cost (PKR) | 250,000 |
| Website maintenance cost per year (PKR) | 100,000 |
| Growth in website maintenance cost | 6% |
| Internet advertisement cost per year (PKR) | 12,000 |
| Internet advertisement cost growth rate | 6% |
| Cost of trade fair (PKR) | 1,000,000 |
| Growth in trade fair cost | 6% |

Administrative Costs Assumptions

| | |
|---------------------------------|--------|
| Stationery cost per month (PKR) | 25,000 |
| Stationery cost growth rate | 8% |
| Mail cost per month (PKR) | 10,000 |
| Mail Cost growth rate | 8% |
| Telephone bill per month (PKR) | 25,000 |
| Telephone bill growth rate | 8% |
| Internet cost per month (PKR) | 25,000 |

| | |
|-------------------------------------|--------|
| Internet cost growth rate | 8% |
| Refreshment cost per month (PKR) | 30,000 |
| Refreshment cost growth rate | 10% |
| Average travel cost per visit (PKR) | 20,000 |

Legal/Regulatory Costs Assumptions

| | |
|---|-----------|
| Regulatory fee (PKR/annum) | 1,000,000 |
| Growth rate of regulatory fee per annum | 6% |
| Audit fee (PKR/annum) | 1,000,000 |
| Growth rate of audit fee per annum | 6% |
| Legal/Professional fee (PKR/annum) | 1,000,000 |
| Growth rate of legal fee per annum | 6% |
| Insurance rate (machinery) | 5% |
| Insurance rate (vehicles) | 3% |
| Miscellaneous expenses (PKR/annum) | 500,000 |
| Growth rate of miscellaneous expenses | 6% |

Debt Cost Assumptions

| | |
|-------------------------|-----|
| Interest Rate per annum | 15% |
| Debt Tenure (years) | 10 |