Feasibility Study Report

Fruit & Vegetable Canning Unit

Agriculture Department
Government of Punjab

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Disclaimer

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Abstract:

The Government of Punjab is following an integrated and enterprising approach to bring about a paradigm shift in agriculture development in the province with a focus to increase the profitability of the farmers. Agriculture offers a high potential in other non-traditional sectors as well; such as horticulture, oilseeds, floriculture, etc. In the same context, the Government plan to identify gaps as well as areas of potential development and enhancement in the agriculture sector.

This feasibility study is a part of series of studies conducted for identified projects in the province of Punjab. The information used for the preparation of this report has been gathered from various reliable sources including economic and statistical surveys carried out by the government of Pakistan. Competitor's data and industry averages have been used as a basis for the preparation of preliminary financial projections.

The canning facility for locally grown fruit and vegetables has a strong growth potential in the local as well as International market. The report covers assessment of market demand, suggest technological options, conduct financial analysis and analyze the regulatory environment. It also provides potential technical strengths and constraints that may be encountered by the investor(s) in undertaking the identified project.

Acronyms

ADU	Agriculture Delivery Unit
AJK	Azad Jammu Kashmir
CPEC	China Pakistan Economic Corridor
EU	European Union
GB	Gilgit Baltistan
GDP	Gross Domestic Product
F&V	Fruits and Vegetables
FOREX	Foreign Exchange
HACCP	Hazard Analysis and Critical Control Point
HR	Human Resource
IT	Information Technology
IQF	Individual Quick Freezing
IRR	Internal Rate of return
KIBOR	Karachi Inter Bank Offer Rate
KP	Khyber Pakhtunkhwa
LTD	Limited
MFF	Mitchell's Fruit Farms
NGO	Non-Governmental Organization
NPV	Net present Value
PKR	Pakistani Rupee
PVT	Private
ROI	Return on Investment
SECP	Securities and Exchange Commission of Pakistan
USD	United States Dollar
US$	United States Dollar

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Executive Summary

Agriculture plays an important role in the economy of Pakistan and there is a dire need to minimize wastages and introduce value addition in order to bear the real benefit of the Agriculture produce. The Punjab province plays a pivotal role in the economy of Pakistan by contributing almost 60 percent to total agricultural production of the country. This contribution can further be enhanced by identifying the factors that affect agricultural production in the province. The Agriculture Department of the province is initiating steps to explore the real potential of agriculture sector in the province. The Agriculture Delivery Unit (ADU) is taking the lead by not only executing different projects but also assessing the prospects of several business ideas by conducting feasibility studies for these ideas.

The Punjab province is producing a huge quantity of fruit and vegetables that are supplied all over the country as well as gradually increasing its export market. The major products being Mango and Orange in fruit while all vegetables including tomatoes, peas, carrots, brinjals, gourds, raddish, etc. The seasonality of fruit and vegetable is a natural phenomenon and efforts are made on International level to reduce its impact. Canning is considered as a major method to preserve the perishable produce. This feasibility study on canning of fruits and vegetables mainly covers peas, carrots, peach, plum, olives, and mushrooms while other products include Mango, Pear, Cocktail (mixed fruit) and ready-to-eat food. The Punjab province is hub of the production and making it convenient to supply raw material to the canning facility located at Lahore or Faisalabad. The major can manufacturing units are also located in Faisalabad and Lahore.

The domestic market of Pakistan has shown positive growth with an increasing demand that is fed through imported products mainly from Thailand, Philippines, Australia, China and Malaysia. International market needs are mainly fulfilled by China followed by European countries and US. An opportunity lies to tap the International market keeping in view the massive production of fruit and vegetables in Pakistan accompanied by a small but growing domestic market.

The canning unit is proposed to be established at the city of Lahore or Faisalabad in Punjab province that has an advantage of being the hub of production as well as interconnected with the main highways of the country. The motorways and expressways not only link these cities with major ports of the country but also to the CPEC route that is going to open up new regions for exports from Pakistan. The processing capacity of the unit has been proposed to be 1 tons per hour with a usage of 16 hours operations per day. The total production is assumed to be 1,000 cartons of canned food per day in two different sizes i.e. 850 gms and 3 Kgs.

The canning unit is going to use locally grown Peas, Carrots, Olives, Mango, Pears, and Mustard in Punjab, while, Peach will be supplied from Khyber Pakhtunkhwa (KP) and Apricot from Gilgit Baltistan (GB). The Mushrooms will be sourced partly from KP and Punjab with the expectation that production in Punjab would rise if a certain demand exists. The supply chain of products that are deficit in Punjab is in place for supply to the main markets of Lahore and Faisalabad.

Total cost of the project has been estimated to be PKR 120.039 million. Capital cost constitutes 83% of the total project cost and the working capital the balance 17%. Total land requirement for the project has been worked out to be 2 acres with construction of building over an area of 6 kanals (6 kanals out of the total land of 16 kanals). The covered area of the building is estimated to be 29,000 sq. ft. with a construction cost of PKR 21.93 million. The machinery proposed for the unit is a mix of imported and local machinery that would not only reduce the capital investment but also benefit in troubleshooting and maintenance. The cost of machinery and equipment is estimated at PKR 42.61 million. The project is assumed to be financed with 100% equity.

The production and financial calculations for the project are conducted with a pessimistic approach that has an in-built room for improvement through enhancing production and sale revenue. The plant has the ability to be operative for a full year as it will be processing different fruits and vegetables depending upon their availability and prices. The prices for fruit and vegetables are assumed on the basis of market that may be reduced in case of direct sourcing especially in the case of olives and mushrooms. The project shows positive returns based on the risk-averse figures with revenues in the first year at PKR 233.8 million with an average increase of 3% per annum.

The project is found to be financially viable with a positive NPV of PKR 55.99 million and an IRR of 26%. Payback period of the project is found to be 3 years. Project's sensitivity to different business parameters was evaluated and identified to resist change in variables like increase in purchase price of raw material, drop in sale price, increase in costs such as salaries, utilities, machinery, land and marketing. The Project Summary sheet given below provides a summary of financial and technical information of the project.

Project's Summary Sheet	
Objective	Establishing a Canning unit for Fruit & Vegetables
Product Line	Canned Peas, Carrots, Olives, Mushrooms, Peach, Apricots, etc. in sizes of 850 gms and 3 Kgs.
Operative Capacity	1 Ton/hr
Location	Faisalabad or Lahore
Target Market	Export and local

Project Cost (PKR Million)	
Total Project Cost	120.039
Capital Cost	99.35
Working Capital	20.69

Financing Plan (PKR Million)		*% Share*
Equity	120.039	100%

Financial Feasibility	
Internal Rate of Return (IRR)	26%
Net Present Value (NPV) @ 15%	**55,933,872**
Payback Period (years)	3

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

1 Project Background and Rationale

1.1 Introduction

Agriculture plays an important role in the economy of Pakistan that has a population of 207[1] million that is the 5th largest in the world. Pakistan is a developing country having the potential to be among the world's large economies in the 21st century. The World Bank projects that by 2018, Pakistan's economic growth will increase to 5.4%[2] due to greater inflow of foreign investment from China-Pakistan Economic Corridor (CPEC). The present government is fully committed to capitalize on the emerging growth trend and is working hard to ensure implementation of all the necessary steps in the right direction to increase the flow of private sector investment.

Agriculture is the lifeline of Pakistan's economy accounting for 19.5[3] percent of the gross domestic product, employing 42.3[4] percent of the labour force and providing raw material for several value-added sectors. It thus plays a central role in national development, food security and poverty reduction. The rapid growth of Pakistan's urban areas indicate that demand for high-value perishable products such as fruits, vegetables, dairy, and meat is rising. Government is focusing to increase the yield for rural growers through major infrastructure investments including reliable transport networks and other building blocks for modern supply chains. The country has the world's largest contiguous irrigation system. The country is among the world's top ten producers of wheat, cotton, sugarcane, mango, dates and oranges (kinnow).

The Punjab province plays pivotal role in the economy of Pakistan by contributing almost 60 percent to total agricultural production of the country. This contribution can further be enhanced by identifying the factors that affect agricultural production in the province. The Agriculture Department of the province is initiating steps to explore the real potential of agriculture sector in the province. The Agriculture Delivery Unit (ADU) is taking the lead by not only executing different projects but also assessing the prospects of several business ideas by conducting feasibility studies for these ideas.

The Punjab province is producing a huge quantity of fruit and vegetables that are supplied all over the country as well gradually increasing its export market. The major products being Mango and Orange in fruit while all vegetables including tomatoes, peas, carrots, brinjals, gourds, raddish, etc. The seasonality of fruit and vegetable is a natural phenomenon and

[1] Pakistan Census report 2017
[2] Pakistan Development Update 2016 by the World Bank Group
[3] Pakistan Economic Survey 2016-17
[4] Pakistan Economic Survey 2016-17

efforts are made on International level to reduce its impact. Canning is considered as a major method to preserve the perishable produce.

This fruit and vegetables for the proposed canning unit are selected based on criteria: higher local production in Punjab and adjoining areas; price fluctuation (float) during a calendar year; and established local or International market. This resulted in selection of peas, carrots, peach, apricots, olives, and mushrooms for canning. The market of some high volume fruit i.e. Mango and Citrus is not well established but the proposed canning unit is capable of canning all fruit in case the market is feasible in future years. The major producing districts for peas are Sahiwal and Faisalabad; carrots are produced in Lahore, Bahawalpur, Multan, Faisalabad, and Gujranwala; Peach is produced in Rawalpindi but main supply is dependent on KP (Charsadda, Swat, Peshawar and Malakand); Apricots are produced in Gilgit Baltistan; Olives are produced in Attock, Chakwal, Rawalpindi, and Jehlum; Mushrooms are grown in Faisalabad, Multan and Rawalpindi.

1.2 International Trade

The fruit and vegetable canning industry is estimated to have a worth of US$ 46 billion having a 1.2% annual growth rate according to IBIS World (US Research firm). The trade in the last year was around US$ 14 billion with China being the largest exporter and US the biggest market. It is a low growth industry from a global perspective but an opportunity lies in capturing share in the market by providing good quality product and developing strong brands. The imports and exports of canned/preserved food are also growing at a similar rate, whereas, the figures for imports and exports for canned fruit and vegetables are shown in Table 1 and Table 2 below. The leading country to import canned vegetables in terms of dollar value is USA followed by Germany, Japan and France. The top ten importing countries comprises of 62.44% of the total imports where imports by USA were US$ 3.733 billion that are equal to 20.38% of the total imports of the world.

The overall market of USA is much larger than evident from the import/export figure as it has a huge domestic trade. Japan is considered to have strict custom rules for food items where China may face challenges in future. There is an opportunity for products from Pakistan in the EU markets and Gulf countries especially to benefit out of the negative perception of food products of China. One of Pakistan’s target markets of UAE is importing canned fruit & vegetables worth US$ 159 million in year 2017. The imports to USA have shown an increase of 15% compared to last year while China has shown an increase of 25%.

Table 1: Top Ten Importing Countries of Canned Fruit & Vegetables in 2017[5] (USD)

S. No.	Country	Amount in USD	%age of total
1	United States of America	3,733,701,000	20.38%
2	Germany	1,610,146,000	8.79%
3	Japan	1,096,583,000	5.99%
4	France	1,088,725,000	5.94%
5	Canada	981,534,000	5.36%
6	Netherlands	804,084,000	4.39%
7	United Kingdom	730,291,000	3.99%
8	China	590,615,000	3.22%
9	Korea, Republic of	418,821,000	2.29%
10	Spain	383,296,000	2.09%
	Total for 10 countries	**11,437,796,000**	**62.44%**
	Total (all countries)	**18,317,871,000**	**100.00%**

The list of top ten countries in terms of dollar value to export canned fruit and vegetables is given in Table 2 that is topped by China followed by USA and Netherlands. The top ten countries are exporting 65.56% of the total exports of the world for canned fruit and vegetables. The total exports being US$ 19 billion in 2017, China contributes 21% of it with an increase of 29% compared to exports in 2016.

Table 2: Top Ten Exporting Countries of Canned Fruit & Vegetables in 2017[6] (USD)

S.No.	Country	Amount in USD	%age of total
1	China	3,970,630,000	20.89%
2	United States of America	1,752,443,000	9.22%
3	Netherlands	1,164,231,000	6.12%
4	Germany	1,023,377,000	5.38%
5	Thailand	1,019,724,000	5.36%
6	Turkey	916,932,000	4.82%
7	Spain	713,968,000	3.76%
8	Mexico	696,135,000	3.66%
9	Canada	627,066,000	3.30%
10	Argentina	577,544,000	3.04%
	Total for 10 countries	**12,462,050,000**	**65.56%**
	Total (all countries)	**19,008,347,000**	**100.00%**

[5] International Trade Center (ITC), Trade Map
[6] ibid

1.3 Assessment of Vegetables production in Pakistan

Vegetables constitute an integral component of the cropping pattern but have a limited the area under vegetables due to the increasing pressure on food and cash crops that has ended up to around 3% of the total cropped area. Vegetables fit well in most farming systems due to shorter maturity period. Vegetable crops are very important due to their higher yield potential, higher return and high nutritional value and suitability for small land holding farmers. In view of population increase, land degradation and water scarcity, there is a need to substantially increase vegetable production in the years to come and to attain self-sufficiency as well as to increase the exportable surplus.

More than 35 kinds of vegetables are grown in the different areas of Pakistan with availability of same or different varieties all over the year in the market. During summer and spring season, tomato, chilies, brinjal, potato, cucumber, gourds and okra are abundantly available. The winter season is the most important for growing a wide variety of vegetables including, cauliflower, peas, cabbage, lettuce, spinach, onion, potato, carrot, radish, and turnip. The production data for major vegetables is shown in Table 5 below for the year 2015-16[7].

Table 3: Production Data for Vegetables in Pakistan / Punjab (2015-16)

	Production in Tonnes (Pakistan)			Production in Tonnes (Punjab)	
Product	**Kharif**	**Rabi**	**Total Production**	**Tonnes**	**% age**
Potatoes		3,974,248	3,974,248	3,811,060	95.89
Peas		145,404	145,404	112,267	77.21
Okra	118,986		118,986	67,058	56.36
Tomatoes	142,462	444,649	587,111	106,229	18.09
Cauliflower/Broccoli		216,473	216,473	147,165	67.98
Cucumber	54,288		54,288	44,919	82.74
Carrot		229,097	229,097	150,613	65.74
Bitter Gourd	64,975		64,975	45,432	69.92
Onions		1,736,361	1,736,361	328,171	18.90

The above data is a clear depiction that the main share of production in vegetables is in Punjab with a few exceptions. The production of potatoes, peas, okra, cucumber, and carrot is mainly from the fertile land of Punjab. This production may be further enhanced

[7] Source: Statistics of Pakistan 2015-16

as wide yield gaps exist over the country as well as internationally. If the production of vegetables in different districts is analyzed, it would further support the idea of having the canning facility at Lahore or Faisalabad. The production figures for peas and carrots are given below. The carrot production of top 10 districts is 70% of the total production in the province and 50% of the production is in Lahore and Faisalabad Divisions of Punjab.

Table 4: Top Ten Carrot producing districts of Punjab (2016-17)

District	Quantity (Tonnes)	%age of total
Sheikhupura	23,320	15.11%
Bahawalnagar	14,644	9.49%
Kasur	14,052	9.10%
Nankana sahib	11,262	7.29%
Khanewal	10,045	6.51%
Okara	9,484	6.14%
R Y Khan	6,925	4.49%
Lahore	6,569	4.26%
Faisalabad	5,739	3.72%
Vehari	5,176	3.35%
Total for 10 districts	**107,216**	**69.45%**
Total production of Punjab	**154,382**	**100.00%**

The Sahiwal and Chiniot districts tops in production of peas, whereas, the top ten districts makes up almost 90% of the production in the whole province. On divisional basis 40% of production is in Sahiwal while 38% of the production is in Faisalabad and Lahore divisions.

Table 5: Top Ten Pea producing districts of Punjab (2016-17)

District	Quantity (Tonnes)	%age of total
Sahiwal	2657	30.43%
Chiniot	2004	22.95%
TT Singh	628	7.19%
Khanewal	584	6.69%
Okara	470	5.38%
Pakpattan	440	5.04%
Sheikhupura	336	3.85%
Muzaffargarh	226	2.59%
Jhang	215	2.46%
Rajanpur	208	2.38%
Total for 10 districts	**7,768**	**88.96%**
Total production of Punjab	**8,732**	**100.00%**

Vegetables being a seasonal product keep on variation in supply demand situation. If we analyze the import and export data of vegetables, given in Table 6, it shows that the same product may be exported to Afghanistan as well as imported back to Pakistan in the same

year. Presently, Pakistan is mainly exporting fresh vegetables to Afghanistan, Malaysia, Russian Federation, Bahrain, UAE, Saudi Arabia and Sri Lanka. The main destinations for imports are Afghanistan and India.

Table 6: Imports and Export Data for Fresh Vegetables (2015-16) in Kgs[8]

Product	Export	Main countries	Import	Main countries	Surplus/(Deficit)
Potatoes	402,434,478	Sri Lanka, Afghanistan, Malaysia, UAE	233,840	Afghanistan	402,200,638
Peas	195,010		599,045,437	Australia, Ethiopia, India, Russia	(598,850,427)
Tomatoes	25,546,908	Afghanistan	233,245,713	Afghanistan	(207,698,805)
Cauliflower			2,702		(2,702)
Cucumber			1,362,296	Afghanistan	(1,362,296)
Carrot	102,171	UAE	49,689	Afghanistan	52,482
Bitter Gourd	5,500	UAE			5,500
Onions	33,592,836	Bangladesh, Malaysia, UAE	109,843,166	Afghanistan	(76,250,330)

The vegetable production requires improvement in order to get a benefit out of its high returns. Some immediate steps may be taken to develop varieties having International demand, import substitution, better quality seeds, improved irrigation system, integrated pest management, and establishing processing facilities. The above table identify that two of the highly deficient products are ideal for canning i.e. peas and tomatoes. The deficiency may be addressed through higher production and better preservation during production season that would also keep prices at a reasonable level to motivate farmers to increase production.

1.4 Assessment of Fruit production in Pakistan

Pakistan is rich in fruit production the main fruits being: Orange, Mango, Apple, Apricot, Banana, Cherry, Dates, Guava, Peach, Apricot, Litchi, Olive, mulberry, Plums, Pear, Pomegranate, Strawberry, and a lot of dry fruits including Almonds, Pistachios and Walnuts. Pakistan is the sixth largest producer of Kinnow (mandarin) and oranges in the world, with 2.1 million tons. According to an estimate approx. 95 percent of the total Kinnow produced all over the world is grown in Pakistan. Winter in the plains of Punjab

[8] ibid

province provides an excellent atmosphere for this fruit and the resulting fruit is sweet and has a very distinct taste.

Pakistan produces over 150 varieties of mango. Mango is the fruit par excellence of Subcontinent. Pakistan is an important mango growing country in the world. The soil and climatic conditions of Pakistan are highly suitable for mango cultivation. Mango enjoys second position after citrus in Pakistan. The major production of Mango is also in Punjab followed by Sindh. The mango from Pakistan is well known for its taste and quality abroad. The source for Peach and Plum is Khyber Pakhtunkhwa (KP) province while for Apples is Baluchistan, KP and South Waziristan. Apricots are mainly produced in Gilgit Baltistan with a high rate of wastage due to lack of processing facilities. Grapes, Olives and Strawberry production have shown promising growth mainly in the province of Punjab in the past decade that has a good potential. The production data for major fruit (mainly in Fresh form) is shown in Table 7 below for the year 2015-16[9].

Table 7: Production Data for Fresh Fruit in Pakistan /Punjab (2015-16)

Product	Pakistan (Tonnes)	Punjab (Tonnes)	% age	Main source
Mango	1,336,473	1,227,951	91.88	Punjab
Citrus	2,344,086	2,276,077	97.10	Punjab
Banana	134,634	1,393	1.03	Sindh
Peach	70,750	202	0.29	KP
Plum	54,634	27	0.05	KP
Apricot	172,933	43	0.02	GB
Apple	620,481	380	0.06	Baluchistan

As in vegetables, the production of fruit is also seasonal that faces the usual issue of surplus production in season and non-availability in off-seasons. In the seasons, there is high wastage due to lack of proper post-harvest management techniques and non-availability of appropriate processing facilities. Pakistan mainly exports Mango and Oranges (Kinnow) to Gulf countries as well as UK, US, Russia and China. A snapshot of data on imports and exports of fruit is given in Table 8 below:

[9] ibid

Table 8: Imports and Exports Data for Fresh Fruits (2015-16) in Kgs[10]

Product	Export	Main countries	Import	Main countries
Mango	64,111,550	Gulf countries, Canada, UK	24,665	Thailand
Citrus	372,160,422	Gulf countries, Indonesia, Afghanistan, Russia	735,755	China
Banana	-	-	-	-
Peach	7,501	china, KSA	1,088	Australia
Plum	124,334	KSA, US, UK, Canada, UAE	304,838	Afghanistan
Apricot	351,916	Germany, US	623,027	Afghanistan
Apple	375,536	UAE	73,216,930	Afghanistan

In addition to the conventional fruits mentioned above olive is a developing fruit with high potential of growth. Under a five-year plan initiated in 2015, the agriculture department of Pakistan's Punjab province is providing two million olive saplings free of charge to farmers in the Potohar region. The aim of the 'Olive Valley Project'[11] is to develop the region as an olive-growing region and promote domestic olive oil production. The potohar region of Punjab province has been identified as suitable for olive production because of its favorable climate and ideal topography. The proposed planting area covers an area of 15,100 acres, where 2,038,500 olive saplings will eventually be planted under the five-year project running until 2020. The project has already completed plantation of a million olive plants, half of which have started bearing fruit.

1.5 Production scenario of other products

This feasibility study is also considering other products than fruits and vegetables due to its similarity in processing such as mushrooms and ready-to-eat food. Mushrooms are basically fungi but are a very viable product due to the facts that its production is convenient dependent upon a suitable climate and it has an established market in Pakistan as well as internationally. There are no reliable figures of Mushroom production but it's capability of abundant growth or as it is called mushroom growth in a small space shall result in production based on demand of the produce. The mostly used substrate (medium) for cultivation of mushroom is wheat, paddy, barley, sugarcane and maize empty millet heads and corn cobs, cotton waste, manure etc. As Pakistan is an agricultural country, therefore a huge quantity of the crop waste is easily available at low cost, which could be converted into edible mushrooms by using separately or in combination.

[10] ibid
[11] Barani Agriculture Research Institute Chakwal

The main producer of canned mushroom is China to Pakistan as well as to other countries but facing challenges due to reputational issues in production and processing methods applied. Pakistan export mushrooms to Gulf countries and it was successful in exporting 201,000 Kgs of mushroom in 2016 but at the same time imports large quantity of canned mushrooms from China and Thailand.

1.6 Imports and Exports of Pakistan

In the trade of canned fruit and vegetables, Pakistan made imports valuing US$ 21.9 million where the top five countries add up of 85% of the total imports of the country. The major import is made from Thailand that makes up 35% of the total imports. Thailand is followed by Philippines, Australia and China.

Table 9: Top Five Countries - Imports of Pakistan for Canned F&V in 2017[12] (USD)

S. No.	Country	Amount in USD	%age of total
1	Thailand	7,693,000	35.06%
2	Philippines	5,255,000	23.95%
3	Australia	2,494,000	11.36%
4	China	2,179,000	9.93%
5	South Africa	976,000	4.45%
	Total for 5 countries	**18,597,000**	**84.74%**
	Total (all countries)	**21,945,000**	**100.00%**

The exports of Pakistan are also showing an increasing trend with a value of US$ 12 million in 2017. The top destination is UAE followed by Saudi Arabia and Afghanistan. These countries have an appetite for Pakistani products and strongly recommended to establish strong brands for canned F&V in gulf countries. It is promising to know that exports to UK and US are also at a rise but further improvement require aggressive marketing and branding.

Table 10: Top Five Countries - Exports of Pakistan for Canned F&V in 2017[13] (USD)

S.No.	Country	Amount in USD	%age of total
1	United Arab Emirates	2,288,000	18.80%
2	Saudi Arabia	1,758,000	14.45%
3	Afghanistan	1,481,000	12.17%
4	United Kingdom	1,351,000	11.10%
5	United States of America	1,329,000	10.92%
	Total for 5 countries	**8,207,000**	**67.44%**
	Total (all countries)	**12,169,000**	**100.00%**

[12] ibid
[13] ibid

1.7 Fruit & Vegetable Processing Industry

Fruit & Vegetable processing is basically preparation of fruit and vegetable for human consumption. As discussed above, fruit and vegetables are a rich source of healthy diet but at the same time seasonal. The seasonal aspect of these products makes it naturally available at a specific time of the year. In this case, the product has to be sourced from a different location that may cost high or preserved to be used conveniently. The demand for processed fruits & vegetables is projected to be on the rise, owing to factors such as increase in disposable incomes, the growing middle-class population, the introduction of technologically advanced products, and benefits such as long shelf life offered by processed fruits & vegetables. This scenario required increased production, reduced pre and post-harvest losses, and preservation in order to meet the growing demand.

There are different methods for preservation that include dehydration, thermal processes (e.g. canning), chemical preservation (e.g. fermentation, pickling), irradiation, and freezing. Globally, all these methods are used historically depending upon the volume of product, technological advancement, research and awareness. It is assumed that the current fruit and vegetable industry is growing and so is the canning industry. The fruit and vegetable canning industry is estimated to have a worth of US$ 46 billion having a 1.2% annual growth rate according to IBIS World (US Research firm). The exports in the last year were around US$ 14 billion with China being the largest exporter and US the biggest market.

In Pakistan the fruit and vegetable processing industry especially for canned products has grown at a very slow pace with a few market players dominating the market namely: Mitchells, Shezan, Sundip Ahmed, and some tomato processing units. The true potential of this industry is yet to be explored. The reason may not be price, quality or regulation but the reason is lack of branding and focus. These companies are having full-fledged canning equipment and used in some of its products.

Figure 1: Can Retorting Equipment commissioned in 2008 by Mitchell's Fruit Farms

The major companies tried to focus on market niches with low turnover but having a competitive advantage. The market players, mentioned above, are having a diversified product line with focus mainly on other products: Mitchell's Fruit Farms major products are jams, jellies, squashes, and ketchup; Shezan is juices, jams and jellies; the major products of Sundip and Ahmed are also jams, juices, and ketchups. All these companies are having canning facility and developed market niches in different parts of the world e.g. Ready to eat canned products of Saag and Haleem are popular in Gulf countries. On overall terms, Pakistan is an importer of canned fruit and vegetables products mainly from China, Malaysia, and Thailand though some export are made to Gulf countries, US and UK.

Figure 2: Canned products by Shezan Foods

1.8 Opportunity Analysis

The opportunity analysis for entering the business of canned fruit and vegetables is based on the following factors: production capability; market demand; competitive analysis and profit margin. The production capability is adequate and the suggested locations for the canning facility are in close to the production centers or major fruit and vegetable markets of the region. The selected raw materials (fruits, vegetables, and others) are available in abundance and the items that are not produced in Punjab have an established supply chain from KP in case of Peach and GB in the case of apricots. The other fruit that may be processed such as Mango and Pear are produced in Punjab; mango being the biggest product among fruit produced in Punjab that had a production of 1.4 million tonnes in the last year. The production, in particular for vegetables, mushrooms, and olives may be further enhanced as supply is not the limitation factor and it requires demand management. An increased production of mushroom in areas nearby the canning facility would result in lowered cost of production. The production of olives is also picking up as the Government of Punjab plan to plant more than two million olive trees up to 2020, almost half of which have been planted.

The production centers of Punjab or the well-established supply chain for deficit fruit and vegetable is strength of the province though production volumes have a reasonable room for improvement. It is observed that the percentage of post and pre harvest losses are higher than international standards as well as the yield per acre is less than international standards. This provides a further opportunity by improving pre-harvest and post-harvest management of the fruits and vegetables. The production of fruit and vegetables has

shown growth over the past ten years[14] that is as the result of increase in area under cultivation as well as improvement in yield (production per acre of land).

The demand for fruit and vegetables exists in the domestic as well as international market. Pakistan is exporting fresh fruit and vegetables to other countries but its share in processed food products is very low. As mentioned earlier the main players of food industry that are Mitchell's Fruit Farms (MFF), Shezan, Sundip, and Ahmed have focus on juices, squashes, jams, and jellies. They produce canned food and supply it to the local market as well as export it to gulf countries and European Union. In export market, these companies have relied more on the niche of ready to cook/eat Pakistani food such as mustard (saag), haleem, nihari, etc. The figures below are showing the product line of canned food by Mitchell's Fruit Farms and Ahmed foods where a variety of products are displayed.

Figure 3: Canned products by Mitchell's Fruit Farms

The competition in domestic market is mainly from low priced canned food from China and the local producers including MFF, Shezan, Ahmed, etc. In the International market, the product may be divided into three main categories as high price high quality product, medium range products, and low price low quality products. The category of high price high quality is dominated by companies like Del Monte, Heinz, CHB, Kraft, etc. The low

[14] Agriculture Marketing Information Service

price and low quality category has many brands from China, India, Thailand, Malaysia, Iran, etc. The better brands of this category are positioned and perceived as to be in the medium range. The marketing strategy for export is to place the brand in medium category where a perception of better quality is developed providing an opportunity to charge price slightly higher than the low priced brands. As it is already mentioned that China controls the export market despite of a reputation of below average production and processing standards provides an opportunity to capture some market share based on better quality products.

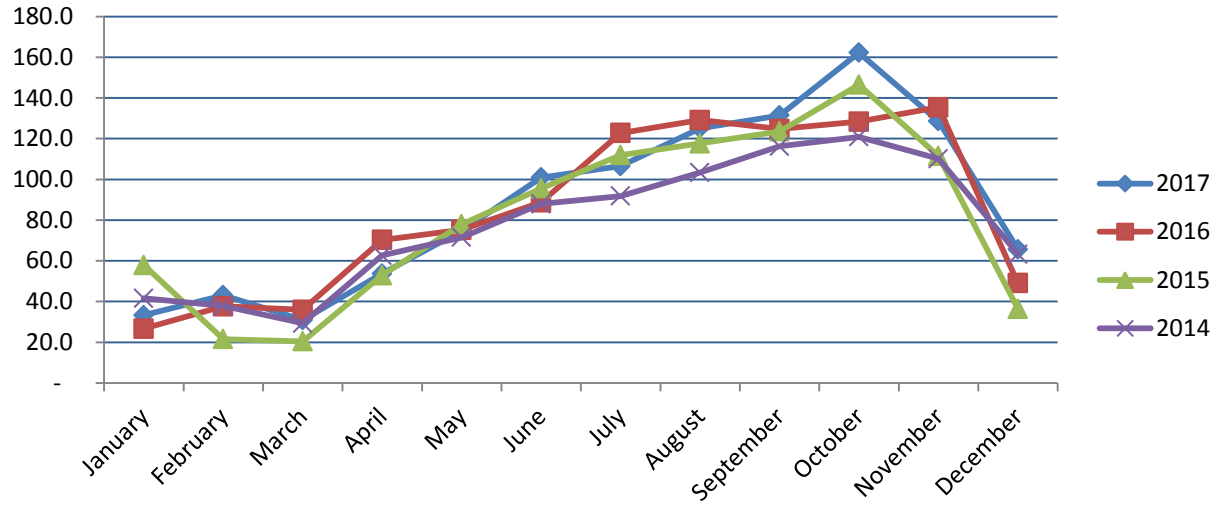
Figure 4: International brands of canned Fruit & Vegetables

The competition from substitute products is mainly from fresh products and from frozen fruit and vegetables. The canned products has an advantage over fresh products as the latter is not available all over the year and in case it is available then the prices are higher and may also have quality issues. The market of frozen products is growing but canned products have an advantage as it is expensive to keep it in frozen form during transportation and storage.

The profit margin in the processing industry is based on price float i.e. the positive difference between maximum and minimum prices over one calendar year. A positive float is the major decision making factor for investing in processing. The annual data over the past 5 years has shown that prices of peas fluctuates between PKR 26/Kg to PKR 162/Kg that is a float of 6.23[15]. In the same manner price of carrot fluctuates between PKR 11/Kg to PKR 47/Kg that is a float of 3.2 despite of full year availability; fruit usually operate up to a float of 2.5 within the season with no availability in off seasons. The high production and high price float provides an opportunity to invest in processing industry. The price fluctuation favouring profitability of the proposed canning unit is further shown through the pricing trend of peas and carrots at the main F&V market of Lahore for the past three years from 2015 to 2017 in Figure 5 below.

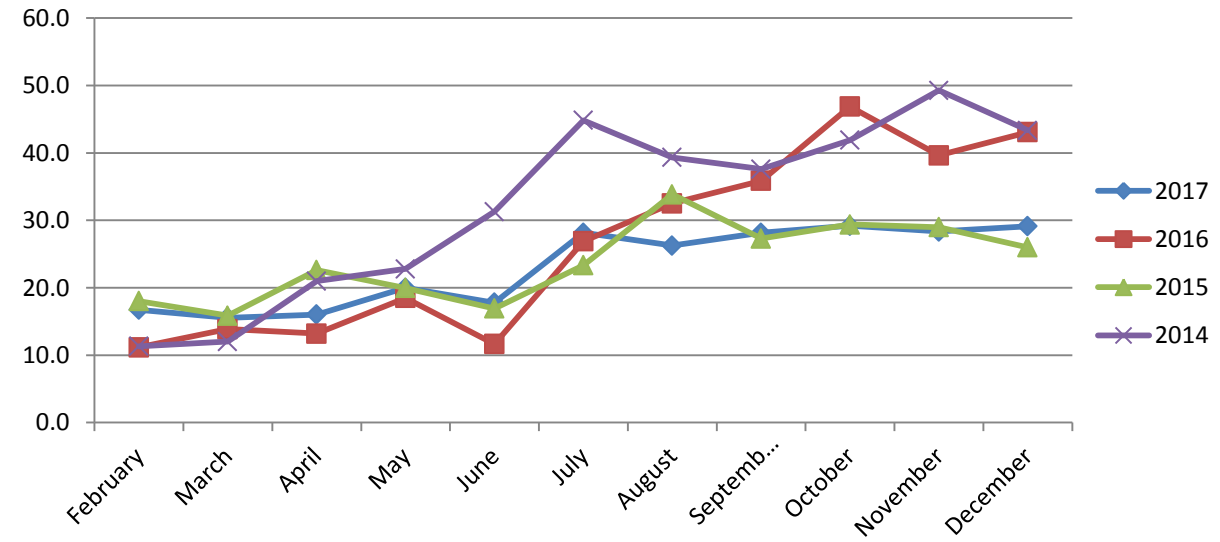
[15] Float is calculated as the multiple of minimum price equaling the maximum price. In this case 26 x 6.23 = 162 where 26 is the minimum price, 162 is the maximum price and 6.23 is the float

Figure 5: Monthly trend of pricing[16] for Peas (Lahore)



It shows a clear price difference for the seasonal months that are from December to May in 2017 where the average price is PKR 45/Kg and it rises to an average of PKR 126/Kg in the remaining six months of the year. In case of carrots (Figure 6), the price difference ranges around PKR 17/Kg in the seasonal months from January to May while it rises to an average price of PKR 33/Kg in the months of June to November. The purchasing time these products are the months with lower prices to get an advantage of higher prices in off-season.

Figure 6: Monthly trend of pricing[17] for Carrots (Lahore)



[16] Agriculture Marketing Information Service (www.amis.pk)
[17] ibid

2. Canning of Fruit & Vegetables - Process and End Products

The fruit and vegetables, in most cases, are not available throughout the year due to its harvesting, although there is abundant supply of the horticulture produce available in the harvesting season, these are not available at the other times of the year. After harvesting, fruits and vegetables quickly deteriorate when kept under ordinary conditions. Their life is extended for some weeks by improving and modifying the storage conditions like cold store. To preserve fruits and vegetable for longer period i.e., for 1-2 years, different techniques including, drying, freezing and canning can be adopted. Some of the methods extend the shelf life for few weeks, while others can give a shelf life of two years or more. To make the fruits/vegetable available for round the year, different methods of preservation have to be applied.

The basic objective of fruit and vegetables canning is to convert the perishable horticulture produce into a stable form that can be stored and shipped to distant markets during all the months of the year. It is processed and preserved in the production season and made available during the off season months of the year. The processing also changes the vegetables into new or more usable forms making foods more convenient to prepare. Technically, objective of canning process is to destroy all pathogenic and spoiling microorganisms in the product and preserve them by preventing their recontamination by microorganisms. Heat is the most common mode used to destroy microorganisms where removal of oxygen by exhausting helps prevent the growth of oxygen requiring microorganisms.

The canning process dates back to the late 18th century in France when the Emperor Napoleon Bonaparte, concerned about keeping his armies fed, offered a cash prize to the one who could develop a reliable method of food preservation. Canning is the method of preserving food from spoilage by storing it in containers that are sealed completely air tight and sterilized by heat. The process was invented after prolonged research by Nicolas Appert of France in 1809, in response to the call by his government. Appert's method consisted of tightly sealing food inside a bottle or jar, heating it to a certain temperature, and maintaining the heat for a certain period, after which the container was kept sealed until use. Later on it was discovered that the food does not spoil on canning as the heat killed the microorganisms

in the food, and the sealing kept other microorganisms from entering the jar. The first commercial canning factory was established in England in 1813.

The canning industry grew as more and more of the world was explored, and as supplying food to armies took on greater importance though the basic principles of canning have not changed dramatically since the initial discovery by Nicholas Appert. The key to canning food is to provide sufficient to destroy microorganisms and pack it in airtight sealed containers and then heated. The amount of time and preparation depends upon the type of food and its characteristics such as food's acidity, density and ability to transfer heat. The process usually provides a shelf life of more than two years unless the can is not damaged.

The canning process was developed to preserve food safely and for long periods of time. Once a food is packed into a can, the can is heated to a temperature which kills all known microorganisms. In addition, most processed foods are closely monitored, using a system called Hazard Analysis and Critical Control Point, or HACCP. A HACCP system identifies areas of potential contamination within the food process and builds check points to ensure that the highest possible safety standards are maintained at all times. Modern processors maintain close watch on the heating process, ensuring that the canned food that reaches the market is the safest possible product for the consumer. All food that is harvested or processed can be found in a can. In fact, for decades, many foods were only available in cans but now other options of frozen food are also available.

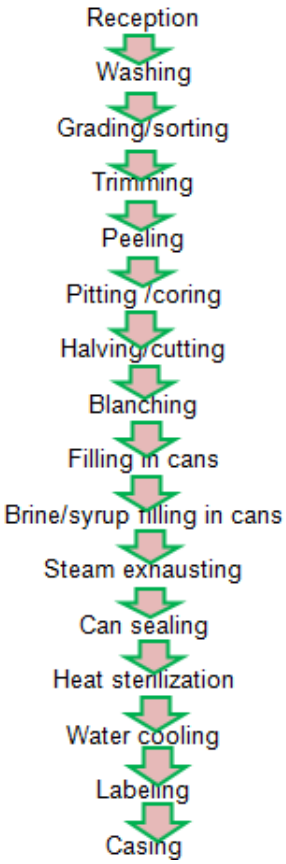
2.1 Canning of Fruit & Vegetable

In a typical commercial canning operation of fruits and vegetables, there are basic process steps that are similar for both types of products. However, there is a great diversity among all plants and even those plants processing the same commodity. The differences include the inclusion of certain operations for some fruits or vegetables, the sequence of the process steps used in the operations, and the cooking or blanching steps. A typical commercial canning operation may employ the following general processes: washing, sorting/grading, preparation, container filling, exhausting, container sealing, heat sterilization, cooling, labeling/casing, and storage for shipment as shown in Figure 8. On receipt, the raw material is checked for maturity and degree of ripeness. The raw material has to be passed through

acceptance criteria on firmness, free from blemishes and diseases free prior to acceptance. Once received and accepted, the material must be prepared and canned with minimum delay or stored at around 10 degree C.

One of the major differences in the sequence of operations between fruit and vegetable canning is the blanching operation. Most of the fruits are not blanched prior to can filling whereas many of the vegetables undergo this step. Canned vegetables generally require more severe processing than do fruits because the vegetables have much lower acidity and contain more heat-resistant soil organisms. Many vegetables also require more cooking than fruits to develop their most desirable flavor and texture. The methods used in the cooking step vary widely among facilities. With many fruits, preliminary treatment steps (e. g., peeling, coring, halving, pitting) occur prior to any heating or cooking step but with vegetables, these treatment steps often occur after the vegetable has been blanched. For both fruits and vegetables, peeling is done either by a mechanical peeler, steam peeling, or lye peeling. The choice depends upon the type of fruit or vegetable or the choice of the company.

Figure 7: General process flow for canning



2.2 Selection of Fruit & Vegetable

The fresh fruits and vegetables passes through an initial inspection stage where only the material with sound condition are selected for canning. This selection is done through visual inspection as they are sorted on belt or roller conveyors. The fruit and vegetables are also washed by immersing in agitating water and rinsing by water sprays prior to the inspection or during the inspection. Some of the fruits/vegetables need to be washed by using brushing machine. The raw produce may need to be sorted for size and maturity. Sorting for size is accomplished by passing the raw produce through a series of moving screens with different mesh sizes or over differently spaced rollers. Separation into groups according to degree of ripeness or perfection of shape is mostly done by hand; trimming is also done by hand.

2.3 Peeling

Most of the fruits and vegetables possess an inedible outer covering or skin which has to be peeled-off before consuming or processing the produce. Besides hand peeling, it can be done by various techniques including abrasive peeling, steam peeling and lye peeling.

In abrasive peeling, the fruits/vegetables to be peeled are mechanically rubbed against the abrasive surface of the machine. Mechanical peeling is mainly used for peeling fruits, such as apples, pears, pineapples, oranges, and other citrus fruits. Some vegetables can also be peeled by mechanical peeling, such as carrots, potatoes, and sweet potatoes. The most common mechanical peeling method uses either cutting tools (knife peeling) or an abrasive peeler.

In steam peeling, the raw produce is treated with steam to loosen the skin, which is then removed by mechanical means. Steam peeling is the application of high-pressure steam at around 1500 kPa in a pressure vessel to peel fruits and vegetables.

Lye peeling is done by passing the material through hot solution of Caustic soda (NaOH). The degree of peeling can be adjusted by varying the strength and temperature of solution and the residence time. The temperature of lye solution is maintained at 90-100 °C. The contact time varies from 1-5 minutes in 2%-5% caustic soda solution. The loosened skin is removed by water jets which also removes the traces of caustic soda.

2.4 Slicing/Dicing

The raw produce then passes through the stage slicing and dicing, in most of the cases as per requirement. Some fruit e.g. Apples and Pear requires coring prior to slicing where the seeds and supporting parts are removed. In the same manner some fruit e.g. peaches, nectarines, olives, dates, and mangoes has a pit that needs to be removed before you process it. The coring and pitting is achieved manually as well as mechanically, whereas slicing/dicing is done by machines.

2.5 Blanching

Blanching (dipping materials in boiling water or treated with steam for a short time) is a must for most of the vegetables to be canned. One of the major differences in the sequence of operations between fruit and vegetable canning is the blanching operation. Most of the fruits are not blanched prior to can filling, whereas many of the vegetables undergo this step. Blanching destroys most of the enzymes responsible for the breakdown of food i.e., loss of flavor, color and texture of the product.

Blanching or scalding of vegetables in hot water or steam is useful for attaining the following purposes:

1. Removal of gases from vegetable tissue.
2. Removal of surface infection.
3. Removal of excess starch (in case of dried peas).
4. Cleaning of vegetables.
5. Improvement of color.
6. Improvement of texture.
7. Making the vegetables easier to cut or shape.

One important factor of blanching is the continued introduction of fresh water.

2.6 Filling of cans

The prepared fruits/vegetables to be canned, after peeling, coring, and blanching, are conveyed by automatic runways, through washers, to the point of filling. Before being filled, the cans are cleaned by hot water, steam, or air blast. The raw produce can be filled in the cans manually or by automatic filler. After filling the material, hot brine or syrup is poured (leaving essential head space) into the cans by liquid filling machine.

2.7 Exhausting

Objective of exhausting containers is to remove air so that the pressure inside the container following heat treatment and cooling will be lesser than atmospheric pressure. Air /gases entrapped in the material tissue are driven out during this treatment and vapors rising from hot liquid of the can expel air from the head space. The cans filled with prepared fruit/vegetables and brine/syrup before closing are moved in hot water for some minutes. When can is sealed and cooled, the vapors occupying the head space are condensed causing vacuum in the sealed can. The reduced internal pressure (vacuum) helps to keep the can ends drawn in, reduces strain on the containers during processing, and minimizes the level of oxygen remaining in the headspace. Shelf life of the canned material is always better when the oxygen and gases have been driven out before sealing. The can closed at a low temperature will develop a much higher internal pressure than which contains a reasonable level of vacuum. A long exhaust is not always essential, but a can center temperature of at least 160°F. Should be obtained, and since vegetables are not affected by a sudden rise in temperature before sealing, the steam exhauster can be used with advantage.

2.8 Seaming

After exhausting, the filled tin cans are sealed with lids. For sealing, a double seam is created by interlocking the curl of the lid and flange of the can. Some of the seaming machines are equipped to create vacuum in the headspace either mechanically or by steam-flow before lids are sealed.

2.9 Sterilization

After filling and sealing the tin can, the product inside is yet to be preserved. The fruit/vegetables packed in the tin can need further processing to sterilize the product to inactivate all the pathogenic (if any) and spoiling organism present in the packed food. During processing, microorganisms that can cause spoilage are destroyed by heat. For this purpose,

the sealed cans are heat processed in industrial scale pressure cooker known as retort. The temperature and processing time vary with the nature of the product and the size of the container. The high acid food (pH <4.6) can be sterilized by boiling water or with steam at atmospheric pressure, while low acid food (pH> 4.6) has to be sterilized by pressurized steam. After completion of heat treatment the cans are immediately cooled by water and labeled. The fruit and vegetables processed by using canning are safe for around two years.

After heat sterilization, containers are quickly cooled to prevent overcooking. Containers may be quick cooled by adding water to the cooker under air pressure or by conveying the containers from the cooker to a rotary cooler equipped with a cold-water spray. After the heat sterilization, cooling, and drying operations, the containers are labeled before casing.

2.10 Peach Canning

The fruit is sorted on a sorting conveyer to select peaches of uniform size and symmetrical shape with good golden color and a close tender. To remove dust and dirt, the fruit is washed in the washing tank by water agitated by pressurized air. The loosened dust is finally washed out by water jets while fruit is passing on the roller conveyer.

Figure 8: Locally produced Peach from KP

Peeling

Peaches are peeled by lye peeling method. The fruit passes through 1.5- 2% caustic soda solution at 95-100 C for 30-90 seconds followed by through washing, and dipping in the solution of 2-3% citric acid to neutralize residues' of caustic soda.

Grades of canned peaches

Peach halves are visually inspected to remove any damaged or blemished fruit pieces, and then graded. Fancy grade: The largest and most perfect halves. Fruits of smaller and less perfect halves are graded in the diminishing order as Choice grade, Standard grade, Second grade and Pie grade.

Filling

Peach are diced (cut in pieces/halves) and carefully filled in the cans in such a way as to prevent air being entrapped in the hollow left by the pit. Drain weight (weight of fruit/vegetable in a can without syrup or brine) in No 2 ½ cans is 18-21 ounces or 510 gm-596 gm.

Syrup filling

Cans are automatically filled with syrup by a vacuum *syruping* machine. After placing the peach halves, hot syrup of 45 brix at 180 °F -190°F is filled in the cans. *Fancy* grade peaches should test 26 brix, *Choice* at least 21° brix, *Standard* at least 17 brix and *Second* at least 11 brix. Most of the Choice grade peaches are at 21-22° brix.

Exhausting

Exhausting is done by passing the filled cans through a steam filled exhaust box for 5-7 minutes at 200-205 F.

Closing of cans

The fruit filled cans after syrup filling and exhausting go to the double seaming machine which automatically place the lids on the cans and seals them. Seam testing is done every 30-60 minute to ensure that faulty seaming does not occure.

Processing

Peaches packed in 402x411 cans (No 2 ½ cans) are heat treated for 20-25 minutes at a temperature of 212°F in still retorts.

After sterilization the canned peaches are cooled in water to 100-110 F at which drying will take place satisfactory and can rusting will not occur.

Inputs

Peaches are canned in two sizes; 850-gm can and 3-kg can. The cans are packed in card board carton/ box which can hold 12 cans of 850 gms or 4 cans of 3-kg. This table shows quantities of the material (empty cans, fruit and sugar) used and electricity & fuel consumed

to produce one carton (twelve 850-gm cans of peaches). The table also shows the inputs required to produce the other carton holding four cans of 3 Kgs each.

The inputs to produce one carton of twelve 850-gm cans of peaches include: 10 kg peach fruit, 2.2 kg sugar and 12 empty cans. The inputs also include 0.2 kg caustic soda to peel off the peach skin. Electricity and fuel consumed to produce one carton are also mentioned. The table also indicates that in one day (one 8-hr shift) 525 cartons can be produced. This number will help calculate the HR cost incurred to produce one carton of canned peaches.

Similarly, inputs to produce the other carton (four cans of 3-Kg each) are also given. To produce this carton of four 3-kg cans of peaches, the inputs are comprised of: 4 empty cans, 12 kg peach fruit, 2.65 kg sugar, 0.24 kg caustic soda for peeling, 0.270 furnace oil and 0.82 KWH electricity. In one shift 500 cartons will be produce.

Table 11: Inputs for Peach Canning

	1 Carton of twelve 850-gm cans		**1 Carton of four 3-kg cans**	
Items	Qty	Unit Price	Qty	Unit price
Peach fruit	10 kg		12 kg	
Sugar	2.2 kg		2.65 g	
Empty cans	12	PKR 50/can	4	PKR 115/can
Electricity	0.7 KWH		0.82 KWH	
Fuel (furnace oil)	0.225		0.270	
Caustic soda For peeling	0.2 kg		0.24 kg	
Per shift production of 850-gm capacity can or 3-kg capacity can	525 cartons		500 cartons	

2.11 Apricot Canning

Apricots for canning are harvested at fully mature stage and at optimum ripening level i.e., firm textured (not spongy) and of optimum attractive color. The apricots are washed, halved (instead of slicing/dicing) and pitted but are not peeled usually. Some apricots are also processed as whole fruit after lye peeling. Average diameters of fancy, choice and standard

grades are usually 56, 54 and 50 thirty-second of an inch respectively. The graded fruit is conveyed to mechanical filler. The filled cans are fed to the vacuum syruping machine for syrup filling. Syrups of 55°, 40° and 25° brix are used for Fancy, Choice and standard grades.

Exhausting and double seaming of the cans

Some imprisoned gases of the fruit can cause pin hole in the cans if the gases are not released from the fruit. The apricot filled cans are exhausted in the exhaust box for 10 minutes at 180 °F.

Sterilization

After exhausting and double seaming**,** the apricots are heat processed at 212 F° for sufficiently long for the center temperatur of the product to reach 195 °F. Most canned apricots are heat processed at 212 °F for 17-19 minutes in the retorts using 401x 411 tin cans. The heat processed cans are water cooled at 105 F°.

Inputs

As for Peaches, the canning facility will produce Apricot in two sizes; 850-gm can and 3-kg can. The cans are packed in card board carton/ box which can can hold 12 cans of 850 gms or 4 cans of 3-kg. The quantities of the material (empty cans, fruit and sugar) used and electricity & fuel consumed to produce one carton, that include twelve 850-gm cans or four 3 Kg cans, are given in the Table below.

Table 12: Inputs for Apricot Canning

	1 Carton of twelve 850-gm cans		**1 Carton of four 3-kg cans**	
Items	Qty	Unit Price	Qty	Unit price
Apricot fruit	9.5 kg		11.5kg	
Sugar	2.5 kg		3 kg	
Empty cans	12	PKR 50/can	4	PKR 115/can
Electricity	0.7 KWH		0.84 KWH	
Fuel (Furnace oil)	0.24 Kg		0.290 KG	
Per shift production of 850-gm capacity can or 3-kg capacity can	525 cartons		500 cartons	

2.12 Canning of Carrots

Fresh and deep red color carrots of medium size are preferred for canning. The first step in preparation is to wash the carrot and remove all clinging soil by using a brushing machine.

Peeling

Peeling of carrots can be carried out by various methods including abrasive peeling, lye peeling and steam peeling. In lye peeling, carrots are passed through 5% caustic solution at 70 C for 2-3 minutes. Strength of the lye solution is maintained by frequent testing of the solution and addition of small quantities of caustic soda. Hydro meter testing method is fast, however, for precise testing of the caustic strength, titration method is adopted. To maintain the required level, caustic soda is added in small quantities according to the amount of vegetables passed through the machine. This operation is done in blanching tank manufactured in stain less steel.

For abrasive peeling, before peeling, carrots are blanched in the blanching tank at boiling temperature. The blanched carrots are fed into the abrasive peeling machine. During peeling operation, continuous water showering washes away all the peeled material in the form of sludge. Showering at the final stage completely cleans the carrots. Abrasive peelers are of various capacities with 5-7 minutes peeling time for each batch. After washing and peeling, carrots are passed over a grading machine to separate them on the basis of different sizes. The machine used for this work is 'diverging rope type' on which alternate cables travel at different speed. This action turns the carrot to the most suitable position for grading of ½" diameter or larger

Trimming

Trimming and removal of leafy top portion and defects is carried out on preparation belts. The carrots are delivered to the table at each side of the belt and the operators cut off the top, remove eyes or wire-worm holes etc., and place all clean carrots on the belt.

Slicing

Mostly, ¼ inch thick slices are produced by the slicing machine if carrots are to be canned in slice form. The sliced carrots need to be thoroughly washed; otherwise, light 'grainy' material going into the can would jeopardize the appearance of the product.

The slicing machines receive the carrots in a hopper from which they are cut into slices, and pushed forward on to a cubing block. This block consists of a series is pressed by a top plate, and the cube is thus formed.

The sliced carrots which are made soft and flexible by the heat in the peeling treatment are easily filled. Slices are not forced into the can as this will break others and present a poor appearance when the can is opened. If the slices are too thick, it will be impossible to obtain the weight, and it is much better to cut under ¼" than over.

Brine filling

After the cans of whole or sliced/diced carrots are filled, they pass to the brine filling machine where 1-2 salt solution is filled. The salt solution has nothing to do with preservation but is added to improve the taste.

Exhausting

Carrots when filled into the can are cold. By adding hot brine this will require an exhaust of about 6 minutes at 190°F. The center of the can should not be less than 180°F, when sealed.

Processing

After sealing, the carrot slices packed in 401 x411 cans are processed in the retort at 240 C for 32 minutes, whereas small whole carrots are processed for 35 minutes at 240 C.

Inputs

As for Peaches, the canning facility will produce Carrots in two sizes; 850-gm can and 3-kg can. The cans are packed in card board carton/ box which can can hold 12 cans of 850 gms or 4 cans of 3-kg. The quantities of the material (empty cans, vegetable and salt) used and electricity & fuel consumed to produce one carton, that include twelve 850-gm cans or four 3 Kg cans, are given in the Table below.

Table 13: Inputs for Carrot Canning

	1 Carton of twelve 850-gm cans		1 Carton of four 3-kg cans	
Items	Qty	Unit Price	Qty	Unit price
Carrot	12 kg		14.4 kg	
Salt	0.275		0.325	
Empty cans	12	PKR 50/can	4	PKR 115/can
Electricity	0.680 KWH		0.815 KWH	
Fuel	0.225 kg		0.270 Kg	
Per shift production of 850-gm capacity can or 3-kg capacity can	525 cartons		500 cartons	

2.13 Peas caning

After shelling, grading of green peas for quality is sharp and clear. First-class tender peas would float in a salt solution having a specific gravity of 1.075, while the poorer, hard peas would sink. The lightest weight peas are the finest, being even in quality, succulent, and tender. The heaviest peas are the poorest, being uneven in quality, hard, overripe, and of bad color. The middle-weight peas are good, but harder than the first grade, of darker color, and not so uniform.

Figure 9: Canned Peas

Fresh and dried peas, both are used for the production of canned pea production. The former is produced mostly from peas harvested at an early stage of maturity. These peas, called vining peas, are extremely perishable and are processed in the cannery within a few hours after harvesting. This helps retain their original sensory properties. Canned peas are mostly manufactured using dry peas that have been allowed to mature fully in the field before harvesting. The dried peas can be held for longer time before canning. The dry peas stable against any deteriorative change are available throughout the year for uninterrupted peas canning operation and canned peas supply. The manufacturing process for canned peas is similar to that used for fresh peas; however, there is a pre-soaking operation used to rehydrate the dry peas prior to blanching. Dry peas can be rehydrated by soaking in water for 10-15 hours in stainless steel tanks or tanks constructed from a suitable plastic material.

Soak time is adjusted depending on the moisture content of dry peas. During the soaking period, the peas swell and absorb enough water which is 95 - 110 % of the dry pea weight. The water temperature is ideally less than 68 °F (20 °C). Since wet peas are an excellent medium for microbial growth, warm weather often makes it necessary to change the water once or twice to prevent souring of the peas. The peas increase in volume as they absorb water and it is important that they continue to be covered with water during soaking.

Blanching

Blanching is an important step of peas canning process during which the peas pass through hot water at 190 °F-200 °F for 4-6 minutes. This operation accomplishes:

a. Washing and cleaning of the peas
b. Destruction of enzymes that can cause deterioration of the peas
c. Reduction of microbial load on the peas
d. Reduces starch content of the peas

The blancher typically comprises a large stainless steel vessel partially filled with hot water. Peas contained behind a perforated screen enter at one end of the vessel and running the

length of the vessel, reach the other end after the desired blanching time. The duration for blanching operation is adjustable.

Brine preparation and filling

Immediately after blanching the peas are filled in the cans. To improve taste and flavor of the canned peas, instead of just salt solution, liquor composed of water, salt and sugar is used in peas canning. The lowest amounts dissolved in water would be 2 pounds of salt and 2 pounds of sugar to 100 gallons of water (0.24% salt + 0.24% sugar). The maximum quantities used are 40 pounds of sugar and 16 pounds of salt per 100 gallons (5% salt and 2% sugar), while the average seems to be about 10 pounds of salt and 10 of sugar per 100 gallons of water (1.20% each salt and sugar). Brine is prepared by dissolving the required ingredients in water in a stainless steel, steam-jacketed kettle. The brine once prepared should not be held for longer time and be filled in cans within an hour. Otherwise color degradation will result.

Exhausting

After filling with peas and brine, the cans are exhausted. The filled cans before sealing are passed through hot water filled exhaust box. During which vapors rising from the can replace air of the head space. Exclusion of oxygen improves keeping quality of the canned peas and the internal pressure of the can is reduced when the can is closed at a high temperature. The closing temperature should be around 170°F.

Processing

The microorganisms which are found upon and associated with the peas cannot be killed at boiling temperature unless it is continued for such a length of time as to damage the peas. The spores of these microorganisms are supposed to resist any temperature below -240° F for twenty minutes. The duration of the process should be considered as the length of the time during which cans are submitted to a cooking temperature, and not the length of time they are in the retort. If a retort be filled it will take a few minutes for the steam or water to come to a fairly stationary temperature, when steam is used, it takes three to five minutes to bring up the temperature up to the required degree.

The rule, however, is to accept 240° F as the proper temperature and to vary the time from twenty-five to forty minutes. Duration of time depends upon texture the peas. Tender peas; from thirty-five to forty minutes, whereas old hard peas may take 45 minutes at 245 F. Sterilization is accomplished by a certain degree of heat applied for given time. Raising or prolonging the temperature beyond that necessary sterilization does do more in preventing spoilage, but does break down the peas to a greater or less degree and injures their appearance in the can. The peas, therefore, should be cooled at once to a fairly low temperature in order to get the best results.

The time given to processing should be sufficient only to sterilize, and the processor should use judgment in every case, giving the shortest time which will be safe and cause the least injury to the product. The better grade of peas will suffer less injury from long or high process than the poorer grades.

Cooling

Once sterilization is complete, to prevent undue product over cooking, the processed cans are rapidly cooled by introducing water into the retort. The cooling water is disinfected by the addition of chlorine gas or another suitable chlorine compound. Cooling water is of good microbiological quality is very important. Temperature of the processed cans is brought down to 104 to 122 °F (40 to 50 °C). The temperature should be cool enough to inhibit the growth of any surviving thermophilic organisms but warm enough for the cans to dry.

Inputs

As for Peaches, the canning facility will produces peas in two sizes; 850-gm can and 3-kg can. The cans are packed in card board carton/ box which can can hold 12 cans of 850 gms or 4 cans of 3-kg. The quantities of the material (empty cans, vegetable, sugar and salt) used and electricity & fuel consumed to produce one carton, that include twelve 850-gm cans or four 3 Kg cans, are given in the Table below.

Table 14: Inputs for Peas Canning

	1 Carton of twelve 850-gm cans		1 Carton of four 3-kg cans	
Items	**Qty**	**Unit Price**	**Qty**	**Unit price**
Green peas (pods)	15 kg		18 kg	
Salt	0.050 kg		0.06 kg	
Sugar	0.050		0.06 kg	
Empty cans	12	PKR 50/can	4	PKR 115/can
Electricity	0.68 KWH		0.816 KWH	
Fuel	0.225 Kg		0.270 Kg	
Per shift production of 850-gm capacity can or 3-kg capacity can	525 cases		500 cases	

2.14 Olive Canning

Olives are harvested at different stages of ripeness. For canning, *Button* olives of, mature green-ripe to purple turning color olives are used. The green-ripe olives are harvested when they are even colored, from yellow-green to a straw color. As the olives ripen further, their color turns from yellow-green to purple. These turning color olives are still firm and their flesh lacks dark pigment or is partially pigmented close to the skin. Only freshly harvested, un-bruised olives are selected for processing.

Olives picked off the tree contain a very bitter compound called O*leuropein*. Harvested olives need to be “cured” to remove the bitterness in order to make them palatable. Olives are mostly cured by lye or dry salt treatments. During these curing processes the water-soluble *Oleuropein* compound is leached out of the olive flesh. For olive canning, lye treatment is the most commonly adopted and suitable for olive curing process.

Among five commercially important olive varieties i.e., *Manzanillo, Mission, Evillano, Ascolano, and Barouni,* Manzanillo is ideal for lye-cured olives, while the Mission variety is excellent for dry salt cured ripe olives.

Olives can be rapidly cured by placing them in a lye (sodium hydroxide) solution. The lye breaks the chemical bond between Oleuropein (bitter compound) and sugars in the olives. After curing is complete, all the traces of lye are removed with a series of cold water rinses. The rinsing process also removes the bitterness, leaving a neutral, somewhat "buttery" flavored olive that can accept flavors from vinegar and herbs (if desired) in the brine. There is no fermentation step in this method. Lye-cured olives have a firm texture and a smooth, mild taste.

Green to green-purple color olives are selected. After removing debris, the fruit is rinsed with cold water. The washed olives are dipped in 1.3-1.5% caustic soda solution termed as "lye". After 8 hours, the lye solution is drained and again dipped in the fresh lye solution for next 8 hours. This treatment is repeated twice a day for three days. After initial treatment of three days, olives are again dipped in the fresh lye solution for 8 hours, once a day, for next three days. The lye cured olives are washed by dipping in cold water for 36-48 hrs. The washing water is drained after every 4 hours and fresh water is filled. Excessive exposure of olives during lye curing or washing can lead to development of undesired dark color. Natural phenolic compounds in the olives react with oxygen to create the black color. The cured lye free olives are then stored in weak brine for 2-3 days, initially in 3, then in 6, and finally in 10 salometer brine (2.5 % salt).

Can filling

In canning of olives No. 300 tin cans are used. Well cured olives are filled in the cans leaving 1 inch head space. 2-2.5 % salt solution at 70 C is poured in the olive filled cans. The filled cans are exhausted at 93-96 C for 5 minutes. (199- 205 F) and sealed at 77 C with double seam.

Figure 10: Can Filling machinery

Processing

The olives filled in No 300 can are processed at 116 C for 60 minutes. . The lye-cured non-fermented olives are low-acid foods. Such food, if under processed, can lead to growth of bacterium Clostridium *botulinum*. Botulism is a food poisoning that can be fatal. It is caused by eating the poison produced by the bacterium Clostridium *botulinum*, which can grow in low-acid foods (>pH 4.6), if the required processing (thermal treatment with required temperature and time) is not given.

Inputs:

As for Peaches, the canning facility will produce olives in two sizes; 850-gm can and 3-kg can. The cans are packed in card board carton/ box which can can hold 12 cans of 850 gms or 4 cans of 3-kg. The quantities of the material (empty cans, vegetable, caustic soda and salt) used and electricity & fuel consumed to produce one carton, that include twelve 850-gm cans or four 3 Kg cans, are given in the Table below.

Table 15: Inputs for Olive Canning

	1 Carton of twelve 850-gm cans		1 Carton of four 3-kg cans	
Items	**Qty**	**Unit Price**	**Qty**	**Unit price**
Olives	7.7 Kg		9.25 Kg	
Salt	0.09 Kg		0.105 kg	
Empty cans	12 Nos	PKR 50/ Can	4 Nos	PKR 115/can
Electricity	0.7 KWH		0.816 KWH	
Fuel	0.225 Kg		0.270 Kg	
Caustic soda for olive curing	0.1 kg		0.1 Kg	PKR 80/kg
Per shift production of 850-gm capacity can or 3-kg capacity can	525 cartons		500 cartons	

2.15 Mushrooms Canning

Among all the verities of mushrooms, Button mushroom (aka champignons de Paris.) is considered as the most suitable variety for canning. Mushrooms contain about 90% water, 10 % good quality protein, minerals, vitamins, fiber but low in calories.

Figure 11: Button Mushrooms

Process description

(i) Trimming and removing of stem ends and any discolored parts.

(ii) Soaking in cold water for 10 minutes to loosen any dirt.

(iii) Thorough washing of the mushrooms.

(iv) Blanching of mushrooms in boiling water for 5 minutes. This is done to inactivate the enzyme peroxidases, minimize surface microbial load and improve filling of material leading to better drain weight.

(v) Packing in 850-ml tin cans (2 ½ No can), leaving 3 cm (1 inch) headspace.

(vi) After filling can with mushrooms, water at 80-90 is added leaving 1 inch head space

(vii) The filled cans of mushrooms are exhausted at 80-85 C for 5 minutes

(viii) Closing by lid seaming.

(ix) Processing in retort at 245 F for 45 minutes. Inadequate processing of mushrooms may lead to development of deadly botulism toxin.

Inputs

As for Peaches, the canning facility will produce mushrooms in two sizes; 850-gm can and 3-kg can. The cans are packed in card board carton/ box which can can hold 12 cans of 850 gms or 4 cans of 3-kg. The quantities of the material (empty cans, mushrooms and salt) used and electricity & fuel consumed to produce one carton, that include twelve 850-gm cans or four 3 Kg cans, are given in the Table below.

Table 16: Inputs for Mushroom canning

	1 Carton of twelve 850-gm cans		**1 Carton of four 3-kg cans**	
Items	**Qty**	**Unit Price**	**Qty**	**Unit price**
Button musrooms	9 kg		10.6	
Salt	0.18		0.21 kg	
Empty cans	12	PKR 50/can	4	PKR115/can
Electricity	0.500 KWH		0.580 KWH	
Fuel	0.225		0.270	
Per shift production of 850-gm capacity can or 3-kg capacity can	525 cases		500 cases	

3. The Proposed Business

3.1 Purpose of the Business

The proposed business is to establish a fruit and vegetable canning unit in Punjab province to process the abundant supply of fruit and vegetable from the province or adjoining areas. The major products proposed to be canned include peas, carrots, mushrooms, olives, peach, and apricots. It may also be used to can other fruit & vegetables as well as ready-to-eat food may also be canned, in case the market demand exist as the proposed machinery and equipment are flexible to accommodate different varieties of fruit and vegetable.

3.2 Proposed Legal Status and certifications

The legal structure is proposed to be a Private Limited Company registered with the Securities and Exchange Commission of Pakistan (SECP). SECP requires the company to submit a complete audited record of financial statements and complete all requirements related to board composition, meetings and appointment of legal advisor, chief executive officer and directors. The company will also be having Hazard Analysis and Critical Control Point (HACCP) certification that would result in quality control, standardization, safety, and meet export requirements.

3.3 Raw Material Availability

As assessed in Chapter 1 of this study, the raw material is available in Punjab province. In the case where production source is not in Punjab the raw material will be conveniently sourced from Khyber Pakhtunkhwa (KP) and Gilgit Baltistan (GB). In the potential products: Peach is to be sourced from Swat, Charsadda, Peshawar, Mardan, and Malakand of Khyber Pakhtunkhwa (KP); Apricot is to be supplied from Gilgit Baltistan (GB) as it is produced in abundance in different parts of the region; in addition to this some portion of mushrooms and carrots may be supplied from Khyber Pakhtunkhwa. The supply chain for these products already exists and the fruit and vegetable markets in Punjab receive regular supply of Peach, Apricot, Carrots, and Mushrooms, etc. from KP and GB.

Figure 12: Pictures of local F&V markets

3.4 Location

The proposed location for the Canning Unit is Faisalabad and Lahore. The locations have their own strengths and weaknesses where the final decision shall be made by the investor. In case of Faisalabad, the area is hub of vegetable production and linked to the Motorway making it convenient for products from other areas to be supplied to the plant. Lahore, being center of trading activity and the main fruit and vegetable market of the region, make it convenient for supply of raw material as well as marketing. In addition to fruit and vegetables, the biggest can manufacturing units are also located in Faisalabad and Lahore[18].

3.5 Project Cost

The project has a total cost of PKR 120.039 million This includes capital investment of PKR 99.35 million and working capital of PKR 19.80 million. Details of different cost components are shown in Chapter 4.

3.6 Product Mix

The product mix for the unit is proposed keeping the market demand and costing. The most appropriate product is Peas which is proposed to have a production of 33% followed by Peach with 24% of the production. The product mix is flexible to be altered by the sponsors depending upon market demand and availability of product. As explained above, the facility is capable of canning ready-to-eat food so it may be provided a share in product mix depending upon market demand. It shall be noted that cooked mustard leaves (sarson saag in urdu) has a positive market response in gulf countries and Europe mainly exported by Mitchells' Food

[18] Pakistan Aluminum Beverage Cans Limited (PABC) Faisalabad and Hussain Can Co. Lahore

company from Pakistan. Technically, the proposed products are suitable to be used at this facility with addition of prescribed solutions.

Table 17: Product Mix

Product	Carton of can size	Total	%age each product line	%age each product
Peach	850 gm	22,050	16	
	3 Kg	11,000	8	24
Apricot	850 gm	8,925	7	
	3 Kg	2,500	2	8
Carrot	850 gm	6,300	5	
	3 Kg	5,000	4	8
Peas	850 gm	27,300	20	
	3 Kg	18,000	13	33
Olive	850 gm	11,025	8	
	3 Kg	3,000	2	10
Mushroom	850 gm	15,225	11	
	3 Kg	3,500	3	14
Other	**850 gm**	2,625	2	2
Total		**136,450**	**100**	**100**

The proposed product mix is based on existing market demand, production, and profitability that are going to be altered or adjusted by the company due to the same reasons. The production of most of the produce has the capacity to be increased if market demand is available and profitable for the company.

In product mix, canning of peas is higher due to the fact that it has an established market locally as well as internationally. The production is high in seasons giving an opportunity to procure the product at reasonable price providing a positive float to improve the overall profitability. Peach production in KP provides a good source for the facility that may process a mix of A and B category of Peach. The markets are Punjab are usually supplied A category of the Peach so it will provide an opportunity to source product at a better price. KP has the highest mushroom production but it has a growth potential in Punjab to facilitate the canning unit. The choices for other products also include pears, mango, mixed fruit, etc.

3.7 Target Markets

The assessment of canning industry explained in Chapter 1 of this study shows that China is rapidly growing as a supplier in the International market. The markets of United Arab Emirates (UAE), Saudi Arabia and other Gulf countries are receptive to Pakistani products as well small niches exist in these countries that may be further explored through branding. The

US and UK are major markets for the product that shall also be targetted. It must be noted that the domestic market is also dominated by Chinese products that has helped in developing local demand of canned products but people usually prefer local produce compared to chinese products if properly packaged and made available at a similar price.

3.8 Market Competition

The local as well as International market is dominated by Chinese produce. The national players i.e. Mitchells Fruits, Shezan, Nestle, etc. are mainly focusing their market niche' that in the case of Mitchells is squashes, Shezan is Tomato Ketchup and juices, while Nestle is having a large product line but in reference to fruit and vegetables have a focus on juices. Mitchells, Shezan and Ahmed initiated canned food production and supply to market at different stages but never remained the main focus. Furthermore, these companies were not able to capture an impressive market share as compared to imported products from China and Thailand.

Figure 13: Products of Ahmed Foods

The biggest reason for Chinese dominance is low price that is making it difficult for even big international brands like Del Monte and CHB to compete with it. The product from China is facing challenge due to quality concerns, regulatory restrictions and reputation issues that has affected demand. This affect is minor because of the non-availability of other alternatives in the market within the same price range. India has recently tried to capture market share

due to the same factors. This seems to be right time to aggressively enter the EU market with quality produce in order to capture market share.

As explained in Chapter 1, the competition in domestic market is mainly from low priced canned food from China and the local producers including MFF, Shezan, Ahmed, etc. In the International market, the product may be divided into three main categories as high price high quality product, medium range products, and low price low quality products. The category of high price high quality is dominated by companies like Del Monte, Heinz, CHB, Kraft, etc. The low price and low quality category has many brands from China, India, Thailand, Malaysia, Iran, etc. The better brands of this category are positioned and perceived as to be in the medium range. The marketing strategy for export is to place the brand in medium category where a perception of better quality is developed providing an opportunity to charge price slightly higher than the low priced brands. As it is already mentioned that China controls the export market despite of a reputation of below average production and processing standards provides an opportunity to capture some market share based on better quality products.

3.9 Alternatives to Canned Food

Another major source of competition is alternatives to the product. The biggest alternative is fresh fruit and vegetables that is very difficult to be targeted especially in the domestic market but at the same time the factor of seasonality is in favour of canned food. In seasons, the produce may be exported to markets with low or no production of fresh produce or it's demand drops drastically. In addition to fresh food, the Individual Quick Freeze (IQF) products are gaining acceptability. Canned food has the advantage that it can be transported and stored at ambient temperature conditions, whereas IQF product has to be transported and stored in frozen form. It requires an end-to-end cool chain otherwise it may lose its nutrients, freshness and rather turn unhealthy.

3.10 Strengths & Opportunities

The key strengths and underlying opportunities of the proposed business may be summed up as below:

- Abundant supply of high quality fruit & vegetables
- Fertile land available to meet growing demand of products

- In seasons, the raw material is available at low prices resulting in a higher price float
- The unit is designed in a way to cater for different product mix
- The proposed location is linked with highways and close to major markets of the country
- The proposed location is in Punjab province that is hub of agriculture produce
- Local competition is not fierce providing an opportunity to capture market share
- Security situation in the country has improved in the past couple of years resulting in higher production and attraction for investors
- The machinery is partly local made reducing cost of project and maintenance cost

3.11 Threats & Weaknesses

In comparison to the strengths and weaknesses highlighted above, the business also faces different threats and weaknesses that have to be taken care of. The major threats and weaknesses are listed as under:

- The local demand is low and limited to high income areas
- Post-harvest and Pre-harvest management losses results in low quality of raw material and increased cost of production
- Political and economic instability increase risk of doing business
- Non availability of skilled resources
- Short storage life of products
- Lack of modern technology and automation

4. Project Requirements

4.1 Land & Building

Total land requirement for the proposed processing facility has been estimated to be 2 acres that is 16 kanals. Of the total land requirement, the requirement of land for buildings is only around 6 kanals. The remaining 10 kanals will be left as open areas to allow for easy movement of the vehicles bringing in raw material and the vehicles transporting finished goods. Land cost for this project has been estimated at the prevailing commercial rates at areas suitable for establishing the unit in Faisalabad and Lahore. The 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 6.0 million per acre. Total cost for 2 acres of the required land for the proposed facility is estimated at PKR 12.0 million. A sensitivity analysis for higher price of land up to PKR 15 million per acre has been conducted with minor impact on project's profitability.

Table 18: Land requirement and cost

Total Land requirement (Acre)	2.0
Land Cost (PKR per acre)	6,000,000
Total Land cost (PKR)	12,000,000

The detailed working of civil construction and cost of building are given in the Table below:

Table 19: Construction Cost

Description	Covered area (sq.ft)	Construction cost (PKR/sq.ft)	Construction Cost (PKR)
Office	1,000	1,400	1,400,000
Processing hall	5,000	1,400	7,000,000
Hall /workshop	1,000	1,400	1,400,000
Spare parts and general items store	2,500	1,400	3,500,000
Canteen	1,000	1,250	1,250,000
Laboratory	300	1,800	540,000
Toilets	500	1,250	625,000
Residence guards	1,000	1,250	1,250,000
Unloading shed	1,700	1,000	1,700,000
Parking shed	1,500	1,000	1,500,000
Inside roads (sq.ft.)	4,000	100	400,000
Pavements (sq. ft.)	1,000	80	80,000
Boundary wall (R.ft.)	600	800	480,000
Landscaping (sq. ft)	8,000	50	400,000
Factory Gates (no.)	2	200,000	400,000
Total			**21,925,000**

4.2 Machinery & Equipment

The machinery and equipment required for the canning unit is proposed to be a mix of local and imported machinery. The processing machinery is more sophisticated and is not available from local suppliers so imported machinery is proposed. The other machinery that can be sourced locally is proposed to be manufactured locally. This would help the project in two ways: reduce project cost and improve troubleshooting.

Figure 14: Seaming machine

Figure 15: Retorting machine

It has been observed that production facilities with low quality processing machinery may save capital cost but it ends up being more expensive because of higher cost of maintenance and increased wastage. Therefore, it is recommended to make no compromise in processing machinery and it shall be of good quality with complete literature on troubleshooting, repair and maintenance. At the same time local companies are capable of manufacturing good quality machines that are recommended to be used. In the machines recommended for the canning unit Pocket filler, Shower filler, Change-over parts and Peas Sheller are recommended to be imported while the rest may be procured from a reputable local manufacturing company. The total cost of machinery and equipment is PKR 42.6 million.

Table 20: Detail of Machinery and Equipment

S.No.	Name of machine	Cost in local currency
1	Pocket filler (Imported)	12,818,107
2	Shower filler (Imported)	7,458,525
3	Change-over parts (Imported)	6,121,350
4	Peas Sheller (Imported)	550,000
5	Can seaming machine	280,000
6	Retort	6,500,000
7	Blancher	1,100,000
8	Exhaust box	700,000
9	Belt conveyer for sorting	450,000
10	Roller conveyer	800,000
11	Fruit washer	600,000
12	Brush washer	900,000
13	Lye peeling trough	500,000
14	Carrot peeling machine	280,000
15	Carrot slicing machine	200,000
16	Steam jacketed tank	550,000
17	Boiler 1-ton	1,200,000
18	Water treatment plant	350,000
19	Set of knives and hand choppers	2,000
20	Can vacuum tester	2,500
21	Equipment (general)	500,000
22	Generator (50KW)	750,000
	Total	**42,612,482**

4.3 Human Resource

The project will hire the best available human resource headed by a Chief Executive Officer. He will be managing 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 semi-skilled labor will be engaged in fruit preparation and packaging activities. Total HR needs of the proposed business has been calculated to be 47 persons all located at the factory. The sponsors may plan to have a separate office but it is proposed to have all the staff at the unit. This would reduce costs as well as improve coordination and result in efficiency. Staff salary is one of the major expenditure of the company that comes out to be PKR 19 million each year with an annual increase of 5%. The full detail and salaries of the HR is given in the Table below:

Table 21: Human resource requirement and salaries

Designation	No.	Salary (PKR/month)	Total (PKR/month)	Salary per annum (PKR)
CEO	1	200,000	200,000	2,400,000
Admin & HR Manager	1	50,000	50,000	600,000
Finance & Accounts Manager	1	50,000	50,000	600,000
Admin & HR Officer	1	40,000	40,000	480,000
Accounts Officer	1	40,000	40,000	480,000
Marketing Manager	1	50,000	50,000	600,000
Marketing Officer	2	50,000	100,000	1,200,000
Procurement Officer	1	50,000	50,000	600,000
Plant Manager	1	125,000	125,000	1,500,000
Assistant manager/shift in charge. Production	3	50,000	150,000	1,800,000
Lab assistant	3	25,000	75,000	900,000
Foreman	1	50,000	50,000	600,000
Plant Operator	3	20,000	60,000	720,000
Quality Assurance Manager	1	45,000	45,000	540,000
Electricians	1	25,000	25,000	300,000
Store Keeper	1	35,000	35,000	420,000
Fitter/Welder	2	20,000	40,000	480,000
Boiler Operator	2	30,000	60,000	720,000
Skilled workers	8	20,000	160,000	1,920,000
Office boy	2	15,000	30,000	360,000
Security Guard	4	15,000	60,000	720,000
Driver	2	20,000	40,000	480,000
Sweeper	2	15,000	30,000	360,000
Gardener	2	15,000	30,000	360,000
Total Staff	**47**		**1,595,000**	**19,140,000**

5. Financials

5.1 Project Cost

The project has a total cost of PKR 120.039 million This includes capital investment of PKR 99.347 million and working capital of PKR 20.69 million. Working capital is 16.8% of the total project cost. Details of different cost components are shown in the Table below and discussed in the following sections:

Table 22: Project Cost

Cost Item	Cost (PKR)	Percent
Land	12,000,000	10%
Building & Civil Works	21,925,000	18%
Machinery & Equipment	42,612,482	36%
Furniture & Fixtures	2,560,000	2%
Vehicles	7,050,000	6%
Pre-operating expenses	13,200,000	11%
Capital Investment	99,347,482	83%
Working Capital	20,692,153	17%
Total Project Cost	120,039,634	100%

5.2 Capital Cost

The Capital cost mainly comprises of expenses related to Machinery and Building. The cost of construction has been estimated at the prevailing market rates for good quality construction. The details of machinery and construction cost are provided in Chapter 4. The detail of vehicles is given below with a total cost of PKR 7 million:

Table 23: Vehicles

Type of Vehicle	No.	Unit cost (PKR)	Total cost (PKR)
Small Truck	1	2,500,000	2,500,000
Car	1	2,000,000	2,000,000
Carry Van	1	1,200,000	1,200,000
Tractor & Trolley	1	1,200,000	1,200,000
Motorcycles	2	75,000	150,000
Total	**6**		**7,050,000**

5.3 Expenses and Revenues estimation

The expenses and revenue estimation for a period of 10 years is calculated in the attached financial statements. The source of revenue is filled cans that are sold in cartons. The cans are of two sizes of 850 gms and 3 Kgs. The selection of two can sizes is made after market research where these sizes are the most popular among the retail as well as restaurant segment. The smaller size of 850 gms is on top of the list for retail customers, whereas, 3 Kgs cans are ideal for restaurant segment.

The major cost components to produce one carton of cans are calculated that include cost of fruit/vegetable, sugar, empty cans, electricity, fuel, and caustic soda. A can of 850 gms usually contain fruit in the range of 7.7 Kgs to 14 Kgs depending upon ratio of wastage for raw and processed fruit/vegetable. The highest wastage is for peas so a carton requires 15 Kgs of product to be filled, whereas, the lowest wastage is for olives so it takes 7.7 Kgs to fill a carton of cans with 850 gms. A can of 3 Kgs usually contain fruit/veg in the range of 9.25 Kgs for olives and 18 Kgs for peas.

The fruit/vegetable prices are estimated based on market trends for the past three years. The prices of mushrooms and olives are the highest due to relatively low level of production. The prices may reduce as a result of corporate buying by the canning unit especially in the case of mushrooms that has low dependence on season, land, and other requirements compared to other fruits and vegetables. As shown in the cost break-down below the production of mushroom cans are the most expensive that is mainly due to high price of raw food.

The cost break-down for production of a carton of cans is given in Table below that incorprate all items adding to cost of production where the main item is cost of empty cans and cost of fruit or vegetable. This is followed by cost of empty carton, sugar, fuel, electricity, salt, caustic soda, etc. The cost of empty cans is expected to be reduced in next couple of years after increase in locally produced cans.

Table 24: Cost break-down for a filled carton of product

S.No.	Product	Carton of can size	Fruit (PKR)	Sugar (PKR)	Salt (PKR)	Empty cans (PKR)	Electricity (PKR)	Fuel (Ltr)	Caustic soda (Kg)	Empty Carton (PKR)	Cost /Carton (PKR)
1	Peach	850 gm	350	114.40	-	600	8	17	16	75	1,180
2	Peach	3 Kg	420	137.80	-	460	9	20	19	85	1,151
3	Apricot	850 gm	333	130.00	-	600	8	18	0	75	1,163
4	Apricot	3 Kg	403	156.00	-	460	9	22	0	85	1,134
5	Carrot	850 gm	168	-	8.25	600	7	17	0	75	876
6	Carrot	3 Kg	202	-	9.75	460	9	20	0	85	786
7	Peas	850 gm	525	2.60	1.50	600	7	17	0	75	1,228
8	Peas	3 Kg	630	3.12	1.80	460	9	20	0	85	1,209
9	Olive	850 gm	732	-	2.70	600	8	17	8	75	1,442
10	Olive	3 Kg	879	-	3.15	460	9	20	8	85	1,464
11	Mushroom	850 gm	855	-	5.40	600	6	17	0	75	1,558
12	Mushroom	3 Kg	1007	-	6.30	460	6	20	0	85	1,585
13	Others	850 gm	596	45.33	3.24	660	8	19	4	75	1,231

The revenue estimation is based on pricing of the product that is given for the same sizes as below that may be varied based on market supply and demand situation. These prices are proposed after a market survey for similar items available in the local and international markets but the proposed prices are fixed at a lower side to provide a competitive advantage and room for price adjustment in light of market demand. In local markets price survey was mainly conducted in the cities of Lahore, Islamabad, Faisalabad and Karachi. The international prices for Dubai, Sharjah and London in addition to online sources were evaluated. The selling price in international market provides an advantage in the shape of higher price and foreign exchange but keeping a pessimistic approach it is considered to only offset the transportation and marketing cost.

The proposed prices are given in the Table below that where the sale price for a can of 850 gms of carrots is PKR 90, peas is PKR 125, peach is PKR 138, apricot is PKR 136, olives is PKR 205, mushrooms is PKR is 148. These prices are close to market rates of cans sizes of

425 – 475 gms in the local market. In comparison, the wholesale market price of a can of 850 gms of Mushrooms is available for PKR 250 against the proposed price of PKR 156; a can of peas is available for PKR 165 against the proposed price of PKR 133; a can of Peach is available for PKR 190 against the proposed price of PKR 157. The market prices are wholesale rate for imported products from China as it is the lowest price compared to local products or products imported from other imports.

Table 25: Revenue – Sale price of cartons and cans

S.No.	Product	Carton of can size	Cost /Carton (PKR)	Selling price (PKR)/Carton	Selling price (PKR)/Can
1	Peach	850 gm	1,180	1,888	157
2	Peach	3 Kg	1,151	1,727	432
3	Apricot	850 gm	1,163	1,570	131
4	Apricot	3 Kg	1,134	1,475	369
5	Carrot	850 gm	876	1,051	88
6	Carrot	3 Kg	786	943	236
7	Peas	850 gm	1,228	1,597	133
8	Peas	3 Kg	1,209	1,572	393
9	Olive	850 gm	1,442	2,379	198
10	Olive	3 Kg	1,464	2,343	586
11	Mushroom	850 gm	1,558	1,869	156
12	Mushroom	3 Kg	1,585	1,902	475
13	Others	850 gm	1,231	1,478	185

It is assumed that production will be in line with demand resulting in sale of 90% of the product with a normal lag of 30 days in accounts receivables. The canning unit is planned to produce 136,450 cartons of different products and sizes in a year. The total revenue estimate is PKR 233.804 million for the first year with gradual increase over the years in normal conditions. The business may get a boost if economical supply of mushrooms is sourced being one of the expensive raw materials and availability of empty cans at a better price. The annual revenue estimates based on the above given cost of production and prices are shown in the Table below:

Table 26: Revenue estimation

S.No.	Product	Carton of can size	Annual production (No)	Cost of production (PKR)	Sales Revenue (PKR)
1	Peach	850 gm	22,050	24,364,699	36,547,048
2	Peach	3 Kg	11,000	11,728,970	17,007,007
3	Apricot	850 gm	8,925	9,712,185	14,568,278
4	Apricot	3 Kg	2,500	2,623,725	3,804,401
5	Carrot	850 gm	6,300	5,043,812	6,809,146
6	Carrot	3 Kg	5,000	3,502,825	4,553,673
7	Peas	850 gm	27,300	31,489,322	40,936,118
8	Peas	3 Kg	18,000	20,234,628	26,305,016
9	Olive	850 gm	11,025	15,068,694	27,123,650
10	Olive	3 Kg	3,000	4,137,378	7,447,280
11	Mushroom	850 gm	15,225	22,575,249	27,090,299
12	Mushroom	3 Kg	3,500	5,249,755	6,037,218
13	Other	850 gm	2,625	3,022,318	3,626,782
	Total		**136,450**	**158,753,560**	**221,855,915**

As shown in the table above the maximum revenue generating product is peas followed by peach while in case of profitability peach is slightly more profitable than peas.

5.4 Project Returns & Profitability

The financial projections for the project are made in a robust manner with a pessimistic approach that would conveniently result in taking care of risks in the business. The projected financial statements (attached as Annexures I to III) for the canning unit are prepared for a time period of 10 years and attached to further authenticate the findings and provide confidence to the investors:

- Projected Income Statement
- Projected Balance Sheet
- Projected Cash Flow

These results depicts that the initiative is highly favourable with a Payback period of 3 years. This means that the initial investment of the sponsors would be returned through project's profitability within almost 3 years.

The Net Present Value (NPV) for the project is positive with a value of PKR 55.993 Million and Internal Rate of Return (IRR) is 26%. A basic assumption for the project related to finance is that the facility will not obtain loan from any financial institution. The results are shown in the Table below:

Table 27: Feasibility results

IRR	**26.00%**
NPV (PKR)	**55,993,872**
Payback Period (years)	**3**

The profitability comparison for year 1 and year 10 is provided in the Table below. In the first year, the cost of sales stands at 72% of the total sales for the year and the net profit is 7% of the total sales. The high level of cost of sales provides an opportunity to improve returns if raw material is procured at lower rates through different means. In year 10, the profitability shows an improved picture where cost of sales is 66% of the annual sales and net profit is 12% of the sales.

Table 28: Profitability Ratios

	Year 1 Amount (PKR)	%age of Annual sales	Year 10 Amount (PKR)	%age of Annual sales
Sales	221,855,915	100%	289,471,649	100%
Cost of Sales	158,753,560	72%	189,725,199	66%
Gross Profit	37,947,937	17%	67,477,039	23%
Operating Profit	23,879,721	11%	52,768,722	18%
Net Profit	15,521,819	7%	34,299,669	12%

5.5 Sensitivity Analysis

Sensitivity of project's viability in terms of NPV and IRR was analyzed with respect to changes in the following revenue and cost components:

a. Project's sensitivity to increase in land price:

The land price may fluctuate depending upon the location and market trend so the project returns were calculated at different prices of land. The sensitivity analysis was done in the price range of PKR 6 million per acre to PKR 15 million per acre that has shown minor impact on profitability of the proposed canning unit as shown in the table below:

Table 29: Sensitivity analysis for price of land

Land Price per acre (PKR)	NPV (PKR)	IRR
6,000,000	55,993,872	26.0%
7,500,000	53,315,074	25.3%
9,000,000	50,636,277	24.6%
10,500,000	47,957,479	23.9%
12,000,000	45,278,681	23.3%
13,500,000	42,599,884	22.6%
15,000,000	39,921,086	22.0%

b. Project's sensitivity to increase in purchase price of fruit and vegetables (raw material):

The prices for fruit and vegetable are assumed based on pricing trend for the past three years and prices are expected to increase as assumed but as it is an important variable so sensitivity anaysis was conducted. It was found that the project remains viable even if the prices of fruit and vegetables increase by 16.25%. The results are shown in the table below.

Table 30: Sensitivity analysis to f&v prices

Percentage Increase in fruit/vegetable prices	NPV (PKR)	IRR
0.00%	55,993,872	25.99%
2.50%	47,366,316	24.34%
5.00%	38,738,760	22.68%
7.50%	30,111,205	21.01%
10.00%	21,483,649	19.31%
12.50%	12,856,093	17.60%
15.00%	4,228,537	15.86%
17.50%	(4,399,018)	14.10%

c. Project's sensitivity to decrease in sale price of end product

The selling price is technically linked to cost price but a sensitivity analysis was conducted for project returns in case selling price of products reduces. It was found that the project remains feasible in case of 5% drop in selling price. This drop in selling price is despite of the fact that the purchase price of all raw material and other expenses remains unchanged. The table below show the project results in case of a drop of 2.5%, 5% and 7.5% in the selling price of the end product.

Table 31: Sensitivity Analysis for Selling price

Percentage decrease in selling price of cans	NPV (PKR)	IRR
0.00%	55,993,872	25.99%
2.50%	29,022,854	20.83%
5.00%	2,051,836	15.42%
7.50%	(24,919,182)	9.64%

Annexures:

Annex I: Projected Income Statement *(All figures in Pak Rupees)*

		YEAR- 1	YEAR- 2	YEAR- 3	YEAR- 4	YEAR- 5	YEAR- 6	YEAR- 7	YEAR- 8	YEAR- 9	YEAR- 10
SALES											
	Fruit & Vegetable Cans	233,804,051	240,818,173	248,042,718	255,483,999	263,148,519	271,042,975	279,174,264	287,549,492	296,175,977	305,061,256
		233,804,051	**240,818,173**	**248,042,718**	**255,483,999**	**263,148,519**	**271,042,975**	**279,174,264**	**287,549,492**	**296,175,977**	**305,061,256**
COST OF SALES											
	Fruit & Vegetable Cans	169,430,435	172,819,043	176,275,424	179,800,933	183,396,951	187,064,890	190,806,188	194,622,312	198,514,758	202,485,053
		169,430,435	172,819,043	176,275,424	179,800,933	183,396,951	187,064,890	190,806,188	194,622,312	198,514,758	202,485,053
Payroll		19,140,000	20,097,000	21,101,850	22,156,943	23,264,790	24,428,029	25,649,431	26,931,902	28,278,497	29,692,422
Machine Maintenance		395,620	403,532	411,603	419,835	428,232	436,796	445,532	454,443	463,532	472,802
Depreciation		5,618,799	4,987,969	4,440,589	3,963,913	3,547,364	3,182,141	2,860,895	2,577,469	2,326,688	2,104,186
		25,154,418	**25,488,501**	**25,954,042**	**26,540,691**	**27,240,385**	**28,046,966**	**28,955,858**	**29,963,814**	**31,068,717**	**32,269,410**
GROSS PROFIT		**39,219,198**	**42,510,628**	**45,813,251**	**49,142,376**	**52,511,182**	**55,931,118**	**59,412,218**	**62,963,366**	**66,592,501**	**70,306,792**
OPERATING EXPENSES											
	Printing, stationary & postage	10,000	10,500	11,025	11,576	12,155	12,763	13,401	14,071	14,775	15,513
	Selling and Marketing Cost	5,845,101	6,020,454	6,201,068	6,387,100	6,578,713	6,776,074	6,979,357	7,188,737	7,404,399	7,626,531
	Telephone, postage and Fax	30,000	31,500	33,075	34,729	36,465	38,288	40,203	42,213	44,324	46,540
	General Repair & Maintenance	4,676,081	4,909,885	5,155,379	5,413,148	5,683,806	5,967,996	6,266,396	6,579,716	6,908,701	7,254,136
	Depreciation	1,404,700	1,246,992	1,110,147	990,978	886,841	795,535	715,224	644,367	581,672	526,046
	Amortization of Preliminary Expenses	2,640,000	2,640,000	2,640,000	2,640,000	2,640,000					
TOTAL OPERATING EXPENSES		**14,605,882**	**14,859,332**	**15,150,695**	**15,477,532**	**15,837,980**	**13590657**	**14014580**	**14469104**	**14953871**	**15468767**
OPERATING PROFIT		**24,613,316**	**27,651,297**	**30,662,557**	**33,664,844**	**36,673,203**	**42,340,461**	**45,397,638**	**48,494,262**	**51,638,630**	**54,838,025**
FINANCIAL EXPENSES											
	Financial Charges on Long term loan										
TOTAL FINANCIAL EXPENSES		-	-	-		-	-	-	-		-
PROFIT BEFORE TAX		**24,613,316**	**27,651,297**	**30,662,557**	**33,664,844**	**36,673,203**	**42,340,461**	**45,397,638**	**48,494,262**	**51,638,630**	**54,838,025**
	Taxation	8,614,661	9,677,954	10,731,895	11,782,696	12,835,621	14,819,161	15,889,173	16,972,992	18,073,520	19,193,309
PROFIT AFTER TAX		**15,998,655**	**17,973,343**	**19,930,662**	**21,882,149**	**23,837,582**	**27,521,300**	**29,508,465**	**31,521,270**	**33,565,109**	**35,644,716**

Annex II: Projected Balance sheet *(All figures in Pak Rupees)*

	YEAR - 1	YEAR - 2	YEAR - 3	YEAR - 4	YEAR - 5	YEAR - 6	YEAR - 7	YEAR - 8	YEAR - 9	YEAR - 10
ASSETS										
Current Assets										
Cash & Bank Balance	25,977,809	52,084,418	67,978,886	84,231,910	100,924,963	119,827,948	138,454,559	157,725,388	177,698,838	198,429,870
Raw materials stock	8,460,663	8,629,877	8,802,474	8,978,524	9,158,094	9,341,256	9,528,081	9,718,643	9,913,016	10,111,276
W.I.P	1,120,903	1,143,321	1,166,188	1,189,511	1,213,302	1,237,568	1,262,319	1,287,565	1,313,317	1,339,583
Finished goods stock	5,430,463	5,539,072	5,649,853	5,762,850	5,878,107	5,995,670	6,115,583	6,237,895	6,362,653	6,489,906
Receivables	19,483,671	20,068,181	20,670,226	21,290,333	21,929,043	22,586,915	23,264,522	23,962,458	24,681,331	25,421,771
TOTAL CURRENT ASSETS	**60,473,509**	**87,464,869**	**104,267,628**	**121,453,129**	**139,103,510**	**158,989,356**	**178,625,065**	**198,931,949**	**219,969,155**	**241,792,406**
Fixed Assets										
At Cost less: Acc. Depreciation	79,123,984	72,889,023	67,338,286	62,383,395	57,949,190	53,971,514	50,395,395	47,173,559	44,265,198	41,634,966
Intangible Assets										
Pre-operational Expenses	10,560,000	60,000	40,000	20,000	-	-	-	-	-	
TOTAL ASSETS	**150,157,493**	**160,413,892**	**171,645,914**	**183,856,524**	**197,052,700**	**212,960,870**	**229,020,460**	**246,105,508**	**264,234,353**	**283,427,372**
LIABILITIES AND EQUITY										
Current Liabilities										
Current maturity of long term loan	-	-	-	-	-	-	-	-	-	
Accounts Payable	14,119,203	14,401,587	14,689,619	14,983,411	15,283,079	15,588,741	15,900,516	16,218,526	16,542,897	16,873,754
TOTAL CURRENT LIABILITIES	**14,119,203**	**14,401,587**	**14,689,619**	**14,983,411**	**15,283,079**	**15,588,741**	**15,900,516**	**16,218,526**	**16,542,897**	**16,873,754**
Non current Liabilities										
Long term Loan	-	-	-	-	-	-	-	-	-	
EQUITY										
Paid up Capital	120,039,634	120,039,634	120,039,634	120,039,634	120,039,634	120,039,634	120,039,634	120,039,634	120,039,634	120,039,634
Retained Earnings	15,998,655	25,972,670	36,916,661	48,833,479	61,729,986	77,332,495	93,080,310	109,847,348	127,651,822	146,513,983
Total Equity	**136,038,290**	**146,012,305**	**156,956,295**	**168,873,113**	**181,769,620**	**197,372,129**	**213,119,944**	**229,886,982**	**247,691,456**	**266,553,618**
TOTAL LIABILITIES & EQUITY	**150,157,493**	**160,413,892**	**171,645,914**	**183,856,524**	**197,052,700**	**212,960,870**	**229,020,460**	**246,105,508**	**264,234,353**	**283,427,372**

Annex III: Projected Cash flow Statement *(All figures in Pak Rupees)*

	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 Profit		**24,613,316**	**27,651,297**	**30,662,557**	**33,664,844**	**36,673,203**	**42,340,461**	**45,397,638**	**48,494,262**	**51,638,630**	**54,838,025**
Add:											
Depreciation		7,023,498	6,234,961	5,550,737	4,954,891	4,434,205	3,977,676	3,576,118	3,221,836	2,908,361	2,630,232
Amortization (Pre-operational Expenses)		2,640,000	2,640,000	2,640,000	2,640,000	2,640,000	-	-	-		
Interest charge		-	-	-	-	-	-	-		-	
Net profit before working capital changes		**34,276,814**	**36,526,257**	**38,853,293**	**41,259,736**	**43,747,408**	**46,318,137**	**48,973,757**	**51,716,098**	**54,546,991**	**57,468,257**
Working Capital changes											
Raw materials stock		(8,460,663)	(169,213)	(172,598)	(176,049)	(179,570)	(183,162)	(186,825)	(190,562)	(194,373)	(198,260)
W.I.P		(1,120,903)	(22,418)	(22,866)	(23,324)	(23,790)	(24,266)	(24,751)	(25,246)	(25,751)	(26,266)
Finished goods stock		(5,430,463)	(108,609)	(110,781)	(112,997)	(115,257)	(117,562)	(119,913)	(122,312)	(124,758)	(127,253)
Accounts payable		14,119,203	282,384	288,032	293,792	299,668	305,662	311,775	318,010	324,371	330,858
Accounts receivable		(19,483,671)	(584,510)	(602,045)	(620,107)	(638,710)	(657,871)	(677,607)	(697,936)	(718,874)	(740,440)
Working capital changes		**(20,376,497)**	**(602,367)**	**(620,259)**	**(638,685)**	**(657,659)**	**(677,200)**	**(697,322)**	**(718,045)**	**(739,385)**	**(761,362)**
Tax		(8,614,661)	(9,677,954)	(10,731,895)	(11,782,696)	(12,835,621)	(14,819,161)	(15,889,173)	(16,972,992)	(18,073,520)	(19,193,309)
Cash provided by/ used in operations		**5,285,656**	**26,245,937**	**27,501,139**	**28,838,355**	**30,254,127**	**30,821,776**	**32,387,261**	**34,025,062**	**35,734,085**	**37,513,587**
FINANCING ACTIVITIES											
Long term loan		-	-	-	-	-	-	-		-	
Owner equity	120,039,634	-	-	-	-	-	-	-		-	
Dividend paid		-	(7,999,328)	(8,986,671)	(9,965,331)	(10,941,074)	(11,918,791)	(13,760,650)	(14,754,232)	(15,760,635)	(16,782,555)
Cash provided by/ used in Financing activities	**120,039,634**	-	**(7,999,328)**	**(8,986,671)**	**(9,965,331)**	**(10,941,074)**	**(11,918,791)**	**(13,760,650)**	**(14,754,232)**	**(15,760,635)**	**(16,782,555)**
INVESTING ACTIVITIES											
Capital Expenditure	(99,347,482)	-	-	-	-	-	-	-		-	
Cash provided by/ used in Investing activities	**(99,347,482)**	-	-	-	-	-		-		-	
Net Cash Flow	**20,692,153**	**5,285,656**	**18,246,609**	**18,514,468**	**18,873,025**	**19,313,053**	**18,902,985**	**18,626,611**	**19,270,829**	**19,973,450**	**20,731,032**
Cash balance B/ F		20,692,153	25,977,809	44,224,418	62,738,886	81,611,911	100,924,963	119,827,948	138,454,559	157,725,388	177,698,838
Cash balance C/ F	**20,692,153**	**25,977,809**	**44,224,418**	**62,738,886**	**81,611,911**	**100,924,963**	**119,827,948**	**138,454,559**	**157,725,388**	**177,698,838**	**198,429,870**