Pre-Feasibility Study

Potato Powder and Flakes Manufacturing Unit

March 2017

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1 DISCLAIMER

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

2 EXECUTIVE SUMMARY

Potato Powder and Flakes Manufacturing Unit is proposed to be located keeping in view the easy availability of the raw material (fresh Potatoes). As per current agricultural practices, Okara is the largest producer of Potatoes not only in Punjab but in Pakistan, hence the proposed unit may be installed near district Okara in Punjab.

The proposed unit will produce dehydrated potato flakes and potato powder. Dehydrated potato flakes are used in retail mashed potato products, as ingredients in snacks, and even as food aid. Potato powder, another dehydrated product, is used by the food industry to bind meat mixtures and thicken gravies and soups.

The proposed unit has the capacity to produce either Potato Powder (1.52 tons/hour) or Potato Flakes (2 tons/hour) on the same line with slightly different process. The unit will produce 1,642 tons of Potato Powder (30% of production) and 5,040 tons of Potato Flakes (70% of production) per annum based on 150 working days (24 hours a day). However, the capacity utilization during the first year of operations is assumed to be 75% i.e. 1,231 tons of Potato Powder and 3,780 tons of Potato Flakes. The proposed Potato Powder and Flakes manufacturing business comprises a total investment of 870.11 million rupees with fixed investment of PKR 828.33 million and working capital of PKR 41.78 million. The Net Present Value (NPV) of the project is PKR 53.43 million with an Internal Rate of Return (IRR) of 21% and a payback period of 4.85 years.

The project will provide employment opportunities to 45 people. Apart from this, additional labor will be hired on daily wages during the peak production season. Higher return on investment and a steady growth of business is expected with the entrepreneur having some prior experience or education in the related field of business.

3 INTRODUCTION

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

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

4 PURPOSE OF THE DOCUMENT

The purpose of this document is to facilitate investment in **Potato Powder and Flakes Manufacturing Unit** by providing the potential investors a general understanding of the business and supporting them to make informed investment decisions.

The need to come up with pre-feasibility reports for undocumented or minimally documented sectors attains greater imminence as the research that precedes

such reports reveal certain thumb rules; best practices developed by existing enterprises by trial and error, and certain industrial norms that become a guiding source regarding various aspects of business setup and its successful management.

Apart from carefully studying the whole document, one must consider critical aspects provided later on, which forms the basis of any investment decision.

5 BRIEF DESCRIPTION OF PROJECT & PRODUCT

Potatoes are not only used as a vegetable for consumption at home but also at restaurants. Global consumption of potato as a food item has seen a shift from fresh potatoes to value-added products. It is estimated that a little less than 50 percent of potatoes grown worldwide are consumed fresh. The remaining are processed into potato food products and food ingredients like animal feed, processed into starch for industry, and re-used as seed for growing next season's potato crop.

5.1 Project Description

The market of Potato Powder and Flakes is increasing at a rate of 4.52% each year. In 2015, Italy, United Kingdom and France imported 134 million dollar's Potato Powder and Flakes out of 616 million dollar trade in the same year. However, if we consider China and Pakistan's potato exports in meeting world's demand, it is only 1,276 tons of Potato Powder and Flakes i.e. 0.25% of the world's demand. On the other hand, these two countries are importing Potato Powder and Flakes for domestic consumption. In 2015, China imported 16,816 tons of Potato Powder and Flakes worth 22 million dollars, and Pakistan imported 2,764 tons of Potato Powder and Flakes worth 3.78 million dollars in the same year[1].

Pakistan has abundance of unprocessed potatoes, especially in Punjab province. However, many companies in Pakistan and China are importing potato flakes and powder to meet their demand due of lack of potato processing units. The proposed unit having capacity to produce 5,472 tons of Potato Powder or 7,200 tons of Potato Flakes a year based on 150 processing days, can meet the local demand and enter into global market for export[2].

[1] Source: Trademap (Product: HS 1105 Flour, meal, powder, flakes, granules and pellets of potatoes)

[2] In Punjab Potatoes are harvested during January to May, so the unit will be operational during these months.

5.2 Product Description

Dehydrated potato flakes are used in retail mashed potato products, as ingredients in snacks, and even as an aid for other food products. Potato powder, another dehydrated product, is used by the food industry to bind meat mixtures and thicken gravies and soups.

Potato Powder is a dehydrated vegetable made from the whole potato which absorbs large amount of water. The manufacture of potato powder is based on the efficient dehydration of peeled cooked potatoes on single drum dryer. The thin dried sheet of potato solids is then ground to the desired fineness. As a dehydrated vegetable, Potato Powder can be used in a wide variety of industries including: food production, beverage, agriculture/animal feed, and various other industries. It can be used as:

- Nutritional supplement in food production
- Bread improver in baking
- Breading for fried foods; frozen fried chicken and seafood products
- Thickening agent; used in soup mixes sauces and baby foods
- Base material for many snack foods including potato-chip like fried products
- Ingredient formula in making pharmaceutical and cosmetic products
- Nutritional supplement in Agriculture/Animal Feed

Potato Flakes function like fresh potatoes and could be used as a substitute of a potato. Potato Flakes are hence used in confectionery and processing industries to make potato snacks, potato chips, mashed potato and potato pie to name just a few.

Potato flakes are most often used as an ingredient in snacks or bakery food items. However, there are many other uses. A few examples of this are as follows:

- As a replacement for corn-starch or wheat flour, dehydrated potato flour, flakes and granules add volume to soups, stews, sauces, and broths.
- The starch in dehydrated potato products makes them perfect for use as a binding agent in meat, fish or vegetable patties, sausages and cakes.
- Because of their subtle earthy flavour, dehydrated potato products are popular in baked goods such as breads, cakes, muffins, etc. Moreover, they retain water better than substitute flours, increasing the shelf life of bakery goods.

- Formed products like Burgers, Patties etc can be conveniently made from potato flakes.

- Long shelf snacks like extruded products, fabricated chips are made from potato flakes.

- Apart from the above uses, variety of food items can be made by using dehydrated potato products. Potato flakes can be used for various traditional delicacies.

- It is very convenient and cost saving for restaurants and bakeries to use potato dehydrated products to make mashed potatoes and other products. They save labour hours and help in quickly making and delivering end products.

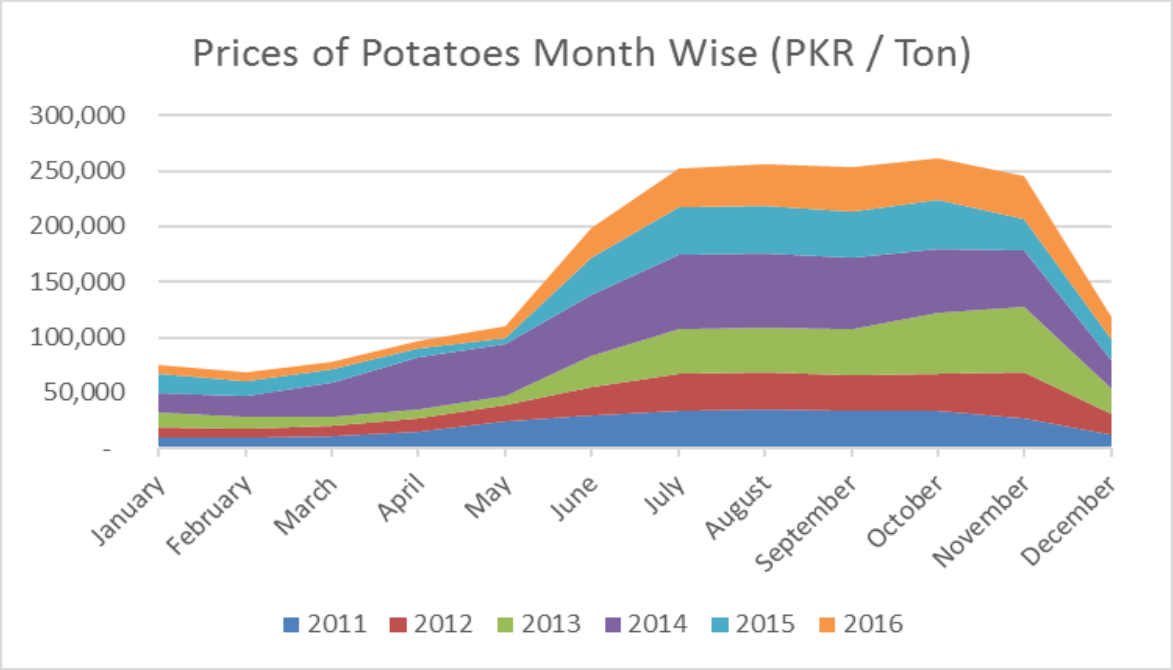
Potato dehydrated products are lightweight, easy to transport and require less storage space. “Lady Rosetta, Chipsona, Hermes and Pamela” have proven to be successful varieties as raw material and meet global requirements. It should be noted that these varieties are available and grown in Pakistan. Dry matter levels higher than 20% are ideal for processing flakes and powder and produce increased recovery rates and lower overall production cost. Maximum shelf-life of properly dehydrated and packed products is around 18-24 months.

The by-products of this process i.e. peel and cutting losses can be sold to cattle farmers or compost producers to generate additional revenue and off-set the input cost of raw material.

5.3 Installed And Operational Capacities

The proposed Potato Powder and Flakes Unit will have a maximum capacity of producing 1,642 tons of Potato Powder and 5,040 tons of Potato Flakes annually. As the Potatoes are a seasonal commodity, therefore, Plant will be operational for 5 months (January ~ May). One of the reasons to operate this plant in these months is low prices of the Potatoes due to its harvesting season in Punjab. Following graph shows the historical data of the potato price throughout the year[3].

[3] Source: Agriculture Marketing Information Service, Directorate of Agriculture (Economics & Marketing) Punjab, Lahore (Okara Prices)



Capacity utilization during first year of operations is assumed to be 75% with an annual growth rate of 5% up to maximum level of 100% capacity utilization in 6th year of operation. This production capacity is estimated to be economically viable and justifies the capital as well as operational costs of the project.

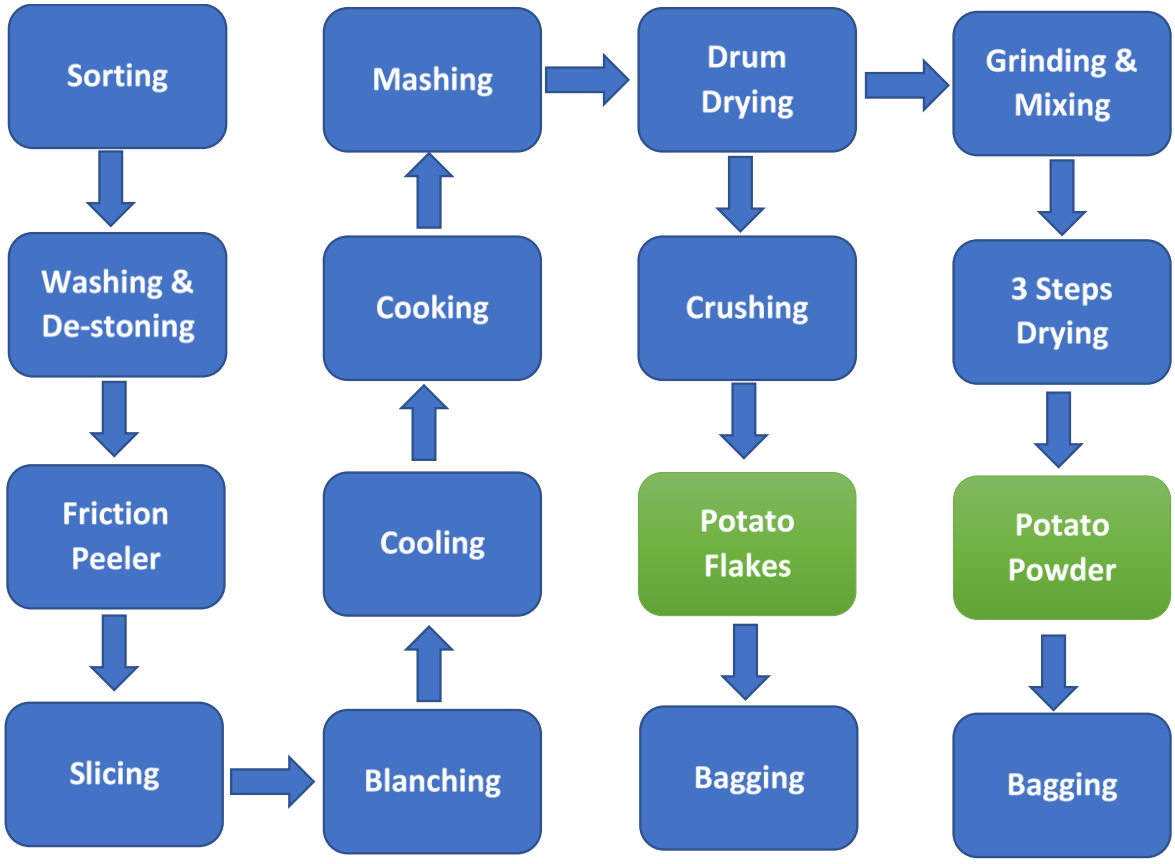
Details of operational and installed capacity according to product mix are provided in the table below:

Table 1: Installed and Operational Capacities

Description	Percentage Production	Operational Hours During Season/day	Installed Capacity (Tons/Hour)	Installed Production Capacity (Tons)	Operational Capacity 75% - in tons Year 1
Potato Powder	30%	24	1.52	1,642	1,231
Potato Flakes	70%	24	2.00	5,040	3,780
Total Potatoes Processing (Jan ~ May) 150 Days	**100%**	**24**		**6,682**	**5,011**

6 PRODUCTION PROCESS FLOW

Production Process of Potato Powder and Flakes is given below in detail;



I. WASHING & DESTONING

The process starts from intake of raw potatoes. The raw potatoes come via a belt conveyor into the rod de-soiler of the washing plant. The potatoes then arrive into the cyclone-destoner, where an upward stream makes the potatoes float, while heavy parts such as stones and clods sink. A special stone conveyor seizes these separated heavy parts, lifts them out of the water and drops them in a container.

A flume transports the product with circulation water in a washing machine with two compartments.

1. Separation of circulation water
2. Washing

In the first compartment, the potatoes are separated from circulation water. The potatoes then enter the washing compartment, where a bar-type drum immersing 10 to 15 cm into a water bath with its special internal components thoroughly moves and rubs the potatoes so that even loam comes off easily. The potatoes are then sprayed with water. The washed potatoes are transferred into a hopper for intermediate storage.

II. FRICTION PEELING

Friction peeler is a dedicated machine to remove the skin of potato, potatoes move up and down in the barrel, which produces relative movement of friction, so as to achieve friction peeled effect. A screw conveyor serves to reclaim the product, evens it and feeds it into the dry de-skinner. In the front part of the skinner, thorough and suitable surfaced rolls remove the loose potato skin. A pump discharges the mushy skin, which is used as high quality animal feed.

A screw conveyor serves to deliver the potatoes through the machine, the speed of which (and consequently the retention time) is variable. A downstream washing machine washes skin residues and dissolved potato cells off the potato surface. From the washer, the peeled and washed potatoes get onto an inspection belt conveyor, where they are sorted by hand and, if necessary, trimmed. Rejected potatoes get into separate containers and are also used as animal feed.

III. SLICING, BLANCHING & COOLING

An inspection belt conveyor transfers and feeds the peeled potatoes through a distributor into the slicing machines. Here the potatoes are cut into slices to allow easy transfer of heat during the pre-cooking process. The thickness of the cut can be adjusted according to the requirements.

Then the potatoes are pre-cooked in a warm water bath. The pre-cooker is of a steam injection screw type. This is called blanching and it is carried out in order to achieve the following:

1. Helping in gentle gelatinization of the starch (**Starch gelatinization** is a process of breaking down the intermolecular bonds of **starch** molecules in the presence of water and heat, allowing the hydrogen bonding sites (the hydroxyl hydrogen and oxygen) to engage more water. This irreversibly dissolves the **starch** granule in water), without impairing the cell membranes as a result of the large volume.
2. Changing the intercellular cementing substance in such a way that the cells separate more easily after cooking.
3. Preventing the enzymatic discoloration of the product.

A lifting wheel separates the potatoes from the pre-cooking water and feeds them through a flume into a screw-type cooler, where they are cooled in a water bath.

The result of this is the retro-gradation of the starch gelatinized in the pre-cooking stage. Retro-gradation in turn reduces the amylose solubility. Starch retro-gradation is desirable for starchy food products in terms of textural and nutritional properties.

IV. COOKING

The product is discharged from the wet hopper via a water lock and transferred hydraulically. A vibrating screen separates the potato slices from the conveying water, which flows back through an equalization tank into the hopper. A balance provided in the downstream belt conveyor measures the mass flow rate, which is set by varying the speed of the product feeder. Via a final lock, the belt conveyor feeds the product into a screw type cooker, where it is cooked at atmospheric pressure in steam or vapor.

The cooker used is a screw type unit, injecting steam just above the machine bottom and the screw shaft to provide a uniform temperature in the product and consequently homogeneous cooking. Efficient removal of condensate makes sure that the water content of the cooked product only increases just slightly. The optimum cooking time must be determined empirically and will have been reached when the cell-cementing substances have been weakened to such a degree that the cells separate with no major destruction of their membranes.

V. MASHING & DRYING (The process line for Potato Powder will be different from this step onwards)

From the screw type cooker the cooked potatoes drop down directly into the mashing screw conveyor, which gently pushes them through a perforated

template for mashing. Additives are added and mixed with the mash in a downstream screw conveyor, which feeds it to the drying plant.

A single drum drier is employed to dry the mash. The unit comprises an internal steam heated drying drum, six non-heated surface treated applicator rolls and the necessary bearings. A common chain drives all the applicator rolls. A frequency converter allows the speed, and consequently, the drying time to be varied.

The drying temperature is kept constant indirectly by controlling the pressure inside the drum. In the applicator roll contact zones, potato cells are transferred to the drying drum to which they stick to form a layer, increasing in thickness from one applicator roll to the next. This layer dries completely as the drum rotates and eventually comes off by itself or with the aid of a scraper. The fact that the layer is in intimate contact with the heated surface for the whole process results in a very short drying time, which is a major factor influencing the quality of the dried end product.

Furthermore, the single drum drier acts as a separator. Any non-cooked potato fragments and impurities are not transferred to the drum, but remain in the rotating layer on the applicator rolls. This layer is separated at specific intervals and transferred to the next applicator roll. On the lowermost or last applicator roll, the material is rich in unacceptable waste, which a screw conveyor feeds into a waste container. A fan removes the vapor produced by the drier through a hood and the roof into the open air.

V.1.0 PULVERIZING / CRUSHING

The pulverizing unit roughly breaks the dried product layer to such a degree that is it suited for pneumatic conveyance. The design of the injector is such that the air stream does not enter in wet and heavy parts, but lets them drop through, into a waste container.

A fluidized-bed breaker gently breaks the material to the required flake size, at a very low percentage of fines and free starch. Under the breaker are two collecting tanks, which are selected alternately. These tanks receive the production of 3 to 4 hours, allowing product samples to be examined during that time.

V.1.1 PACKAGING & STORAGE

The finished product is fed from the breaker to the silo. Where the product is consumed, or subjected to further processing, within 6 weeks from production as a maximum, initiation may be dispensed with, in case PE-lined multiple Kraft paper bags are used for packing. Flakes can be stored at room temperature in dry conditions.

FOR POTATO POWDER:

V.2.0 GRINDING/MIXING

After mashing and drying. The grinder unit will crush the dried potato layers into powder form and also the feeder system will add dried potato material (add-back) from granules which will process the cell bondage and provides for homogenization of both materials. Necessary additives are also fed into the mixer during the mixing process.

V.2.1 THREE STEP DRYING

1. Drying (Air-Lift Dryer)

The drying air is heated by a steam heat exchanger with high pressure steam to obtain the necessary drying temperature. The mixed product enters the drier at right angles to the air flow. Subsequent deceleration and multiple diversion of the product stream leads to frequent high relative movements between the particles and the hot air, resulting in optimum utilization of energy and an optimum drying efficiency. Centrifugal-force cyclones separate the dried product and discharge the exhaust air into the open.

2. Drying (Fluidized-Bed Dryer / Cooler)

The separated product from the cyclones is conveyed to the second dryer. In the unit fluidized product bed develops above a distributor plate. This is a perforated plate which produces an even inclined air stream. This makes the fluidized bed move almost in a linear way, and the thickness of the bed determines the specific residence time of the product. The fluidized-bed unit consists of two zones:

2.1 Drying zone

An appropriate part of the in going air is heated by a steam heater and then is blown by a fan into the drying zone.

2.2 Cooling zone

Another fan feeds cooling air into the cooling zone. The temperature of cooling air is the same as outside temperature.

3. Final Dryer (3rd Drying)

The drying-and cooling air is blown by separate fans through a perforated plate into the drying and cooling zone. The fluidized product bed develops above the perforated plate. An appropriate part of the in going air is heated by a steam heater. The temperature of cooling air is the same as outside temperature.

V.2.2 BAGGING

The product is bagged into PE-lined multi-layer paper bags. Package weight: 25 kg bagging, bag closing and palletizing are manual processes.

7 CRITICAL FACTORS

Following principles need to be pursued for the best productivity of Potato Powder and Flakes:

- Prices of Potatoes are volatile, so due care and diligence should be taken while procuring fresh potatoes. An experienced procurement officer having good knowledge and understanding of potatoes quality and price fluctuation should be permanently hired for the facility.
- Higher recovery ratio of flakes and flour is from fresh potatoes while stored potatoes give lower recovery ratio.
- Potatoes with high solid contents and low sugar are best to produce dehydrated products. These types of potatoes are widely available in Pakistan.
- Quality raw (potato) material and adaptive research & development is necessary for the project.
- Storage management and quality improvement is needed.
- Policy intervention and government support is required.
- Enhance the skill of the contract farmers and the process relevant staff and management should be ensured.
- Capacity building of the farmers, company staff and the management are lacking as this is a newly ventured sector, infusion of technical services & appropriate know-how are always a catalyst for the better performance.
- Run project on 3 shifts in peak season of potatoes harvesting as the raw material will be available at cheap price and the quality of Potato powder and flakes will be of high standards, while, it will save cost of storage.

8 GLOBAL MARKET OF POTATO POWDER AND FLAKES[4]

Demand for Potato Powder and Flakes is increasing. Biggest importing and exporting countries of Potato Powder and Flakes are given in tables below;

Table 2: Top Importing Countries

Rank	Top Importing Countries	2011	2012	2013	2014	2015
						Import Quantity in Tons
1	Italy	33,581	32,886	34,238	33,999	44,116
2	United Kingdom	42,634	42,269	56,764	37,685	39,671
3	France	17,568	19,852	24,385	26,086	29,721
4	Malaysia	11,458	12,254	12,798	21,636	29,284
5	United States of America	29,100	53,537	32,288	32,167	28,288
	Other Countries	274,685	291,528	383,179	385,075	334,383
						Import Value US $ thousand
1	Italy	47,641	41,113	45,402	46,617	46,603
2	United Kingdom	58,654	56,359	77,203	54,498	48,978
3	France	32,185	32,759	42,843	45,118	38,879
4	United States of America	42,259	72,887	44,975	42,525	37,376
5	Malaysia	15,576	18,324	19,418	30,158	36,133
	Other Countries	381,988	412,498	440,184	485,148	408,240

China and Pakistan have respectively imported 3.33% and 0.55% of the World's Potato Powder and Flakes trade in 2015. Detail of top exporting countries to China and Pakistan are given in table below:

Table 3: China and Pakistan Import Trade Partners (Tons)

Rank	Top Importing Countries by China	2011	2012	2013	2014	2015
						Import Quantity in Tons
1	United States of America	6,197	3,585	4,338	5,343	5,928
2	Netherlands	1,848	2,574	3,644	6,705	5,350
3	Germany	389	108	532	1,007	2,180
4	Poland	-	-	-	-	1,518
5	Belgium	468	1,180	693	1,061	1,176
	Other Countries	1,576	758	974	768	664
						Import Value US $ thousand

[4] Source: Trademap (Product: 1105 Flour, meal, powder, flakes, granules and pellets of potatoes)

1	United States of America	10,889	6,390	8,322	9,639	10,276
2	Netherlands	2,328	2,995	4,716	8,968	5,721
3	Germany	449	126	604	1,215	2,334
4	Poland	-	-	-	-	1,675
5	Belgium	608	1,695	1,113	1,826	1,522
	Other Countries	1,488	1,226	1,109	966	735
Top Importing Countries by Pakistan				**Import Quantity in Tons**		
1	Netherlands	437	969	1,710	2,249	2,199
2	Germany	991	867	331	380	456
3	Denmark	307	176	51	86	86
4	Europe Other. Nes	-	-	-	-	23
5	Bangladesh	-	5	15	-	-
	Other Countries	2	-	279	50	-
						Import Value US $ thousand
1	Netherlands	515	1,189	2,315	2,984	2,995
2	Germany	1,248	1,029	457	546	622
3	Denmark	370	221	70	140	121
4	Europe Other. Nes	-	-	-	-	32
5	Japan	-	1	3	2	1
	Other Countries	2	5	455	69	1

Germany, Netherland and USA are the main exporters of Potato Powder and Flakes, these three countries are exporting 70% of the world's total. Details are given in table below;

Table 4: Top Exporting Countries (Export Quantity in Tons)

Rank	Top Exporting Countries	2011	2012	2013	2014	2015
						Export Quantity in Tons
1	Germany	87,552	102,889	102,912	114,262	137,145
2	Netherlands	101,764	111,413	116,469	119,468	118,874
3	United States of America	70,253	74,435	74,877	90,565	110,132
4	Belgium	44,714	53,213	43,969	49,071	54,180
5	Poland	9,037	15,855	16,308	16,061	19,865
	Other Countries	112,427	99,643	124,210	121,722	84,175
						Export Value US $ thousand
1	Germany	122,122	139,530	142,096	171,373	163,970
2	Netherlands	135,011	133,247	148,407	155,072	133,275

3	United States of America	92,750	101,279	102,836	117,088	131,311
4	Belgium	71,596	71,765	65,400	71,253	62,043
5	Poland	14,428	19,447	22,437	22,486	21,009
	Other Countries	134,896	127,851	116,977	139,696	106,031

9 GEOGRAPHICAL POTENTIAL FOR INVESTMENT

The unit can be installed anywhere in Pakistan where the raw material (fresh potatoes) is easily accessible. As per current agricultural practices, Okara is the largest producer of Potatoes not only in Punjab Province but Pakistan. In 2014-15, Okara district produced 1.4 million tons of Potatoes which is 37% of the production of Punjab and 34% of the Pakistan's total Potato Production.[5] Total production of Potatoes in Pakistan during 2014-15 was 4.16 million tons out of which Punjab province is producing 97% of the potatoes production[6].

Table 5: Area Production and Average Yield of Potatoes in the Punjab

Year	Area (000 Acres)	Production (000 Tones)
2010-11	365.86	3,339.94
2011-12	429.19	3,235.32
2012-13	401.70	3,639.07
2013-14	367.32	2,743.27
2014-15	393.99	3,839.26

Keeping in view the above statistics and availability of raw material (fresh potatoes), the proposed unit will be installed near district Okara in Punjab. Potato Powder and Flakes imports may be reduced by installation of this processing unit as there is no state of the art processing unit currently existing, hence there is much potential available.

10 POTENTIAL TARGET CUSTOMERS / MARKETS

As stated above China and Pakistan are importing large quantities of Potato Powder and Flakes and it is estimated that in next 10 years these two countries will be importing 941,000[7] tons of Potato Powder and Flakes. This kind of unit and the ones similar will help reduce the import of such products and make Pakistan

[5] Agriculture Department Punjab
[6] Ministry of National Food Security & Research, Government of Pakistan
[7] Forecasted as per data available on the trademap, by taking average of last 5 years import trend of China and Pakistan.

capable of exporting Potato Powder and Flakes to the world.

The targeted customers for these products are food, bakery, agriculture / animal feed, and various other industries. The main export markets for Pakistani processed Potatoes are Middle East, Far East, China, Malaysia, and neighbouring countries. Apart from this, local demand will also be met by this unit.

11 PROJECT COST SUMMARY

11.1 Project Economics

All the figures in this financial model have been calculated for estimated production of 5,011 tons in the year one. The capacity utilization during year one is worked out at 75% with 5% increase in subsequent years up to the maximum capacity utilization of 100%.

The following table shows internal rate of return, payback period and net present value of the proposed unit.

Table 6: Project Economics

Description	Details
Internal Rate of Return (IRR)	21%
Payback Period (Years)	4.85
Net Present Value (@20%)	PKR 53,427,020

11.2 Project Financing

The project will be financed through 100% Owner's equity.

11.3 Project Cost

Following fixed and working capital requirements have been identified for operations of the proposed business.

Table 7: Project Cost

Description	Amount in PKR.
Land	36,000,000
Building/Infrastructure	163,637,585
Machinery & equipment	611,306,407
Furniture & fixtures	1,921,700

Office vehicles	2,632,875
Office equipment	1,893,100
Pre-operating costs	10,234,000
Training costs	700,000
Total Capital Costs	**828,325,667**
Working Capital	
Equipment spare part inventory	334,080
Raw material inventory	39,947,568
Cash	1,500,000
Total Working Capital	**41,781,648**
Total Investment	**870,107,314**

11.4 Space Requirement

Approximately 3 acres of land would be required for establishment of proposed unit, it is recommended that required land should be procured in the industrial estates of identified city / area. The cost of land is estimated at the rate of PKR 12 million per acre; hence total cost of required land is PKR 36 million.

The infrastructural requirements of the project mainly comprise the construction of Management Building, Sorting, Processing Hall, Store and other facilities. The cost of construction of building for the proposed unit is provided in the table below:

Table 8: Building / Infrastructure Requiremnt

Description	Area (Sq.ft.)	Unit Cost (Rs.)	Total Cost (Rs.)
Management Office	3,000	2,500	7,500,000
Processing Area	61,334	2,000	122,668,000
Laboratory	1,000	2,500	2,500,000
Meeting Room	600	3,500	2,100,000
Shed	3,000	800	2,400,000
Dining/Mess Hall	1,000	1,800	1,800,000
Toilets	600	400	240,000
Change Room	400	1,000	400,000
Guard Room	120	1,800	216,000
Pavement / Driveway	15,000	200	3,000,000
Open Grounds	10,000	50	500,000
Raw Material Store	10,000	1,500	15,000,000
External Development			3,000,000
Boundry Wall (Run. Feet)	1,446	1,600	2,313,585
Total Infrastructure			**163,637,585**

11.5 Machinery & Equipment Requirement

Plant, machinery and equipment for the proposed project are stated below;

Table 9: Machinery & Equipment

Sr. No	Description	Quantity	Unit Cost (PKR)	Total Cost (PKR)
1	**Steam Peeling System**			
1.1	Hoist	1	1,376,676	1,376,676
1.2	De-stoner	1	1,449,144	1,449,144
1.3	Washer	1	2,898,180	2,898,180
1.4	Hoist	1	1,594,080	1,594,080
1.5	Automatic Feeder	1	1,992,600	1,992,600
1.6	Peeling and Tank	1	12,136,500	12,136,500
1.7	Hoist	1	887,544	887,544
1.8	Brush Peeling	1	7,970,292	7,970,292
1.9	Sorting Platform	1	1,557,792	1,557,792
2	**Pretreatment**			
2.1	Hoist	1	941,868	941,868
2.2	Slicer	1	1,594,080	1,594,080
2.3	Rinser	1	2,717,172	2,717,172
2.4	Blancher	1	7,245,720	7,245,720
2.5	Cooler	1	5,796,576	5,796,576
2.6	Hoist	1	1,358,532	1,358,532
2.7	Cooker	1	7,245,720	7,245,720
2.8	Mud Machine	1	833,220	833,220
3	**Flakes Drum Dryer**			
3.1	Additive Tank	1	815,184	815,184
3.2	Tanks for Mud	1	633,960	633,960
3.3	Pump	2	470,988	941,976
3.4	Drum Dryer	2	30,214,512	60,429,024
3.5	Hood and Fan	2	1,358,586	2,717,172
3.6	Leveling Conveyor	2	1,449,144	2,898,288
3.7	Spent mud Conveyors	2	1,086,804	2,173,608
3.8	The Drive System	2	3,985,146	7,970,292
3.9	Grinder	1	2,318,652	2,318,652
4	**Pulverizer System**			
4.1	Suction fan, Pulverizer and	1	5,416,200	5,416,200

	Duster			
4.2	Semi-Automatic Package System	1	2,318,652	2,318,652
5	**Drying and Packaging System (for Potato Powder)**			
5.1	Grinder	1	2,318,652	2,318,652
5.2	Air Dryer	1	14,462,604	14,462,604
5.3	Grading Screen	1	1,377,432	1,377,432
5.4	Material Feeding System	1	2,457,432	2,457,432
5.5	Storage Bin	1	375,624	375,624
5.6	Cryogenic Dryer	1	6,746,112	6,746,112
5.7	Conveyor Belt	1	438,264	438,264
5.8	Cooling Mechanism	1	3,005,208	3,005,208
5.9	Packing Mechanism	1	2,457,432	2,457,432
6	Control System	1	25,125,336	25,125,336
7	Wires	1	12,618,936	12,618,936
8	Pipe and valves	1	6,501,600	6,501,600
9	Platform	1	4,334,364	4,334,364
Total (Ex-Shanghai Port)				**230,447,700**
Freight for Karachi				108,000
Machinery & Equipment Cost CNF Karachi[8]				**230,555,700**
Custom Duty (FoB)			5.0%	11,522,385
Sales Tax (FoB)			17.0%	39,176,109
Additional Sales Tax (FoB)			3.0%	6,913,431
Clearance and Transportation Charges			0.5%	25,125,336
Cost of Imported Plant				**289,320,404**
Supervision in Commissioning & Installing				1,252,800
Total Imported Machinery Cost[9]				**290,573,204**
Boiler		1	3,000,000	3,000,000
Generator 450 KW		1	8,000,000	8,000,000
Machinery & Equipment Cost for 1 Lines				**301,573,204**
Machinery & Equipment Cost for 2 Lines				**603,146,407**
Misc. Equipment (Water Pump, Reverse Osmosis plant, etc.)		1	3,500,000	3,500,000
Fork Lifter 2 ton		1	1,800,000	1,800,000

[8] The plant cost is taken from Chines Machinery Supplier, however local machinery suppliers may be contacted for low cost machinery or some of its components.
[9] The cost of Plant and Machinery may be reduced as Government of Pakistan has announced the tax holidays for foreign investors under special economic zones.

Laboratory Equipment - Microbiological and Analytical Lab	1	2,500,000	2,500,000
Weighing Scale	3	120,000	360,000
Total Machinery & Equipment Cost			**611,306,407**

11.6 Furniture & Fixtures Requirement

Details of the furniture and fixture required for the project are given below;

Table 10: Furniture & Fixture Requirement

Description	Quantity	Unit Cost (PKR)	Total Cost (PKR)
CEO Office Furniture	1	200,000	200,000
Managers Tables along with side tables	3	30,000	90,000
Manager / Officers Chairs	3	8,000	24,000
Visitor Chairs	6	8,000	48,000
Officers Tables along with Chairs	16	20,000	320,000
File Racks	10	15,000	150,000
Sofa Set	5	15,000	75,000
Split Air-conditioner 1.5 Ton	12	70,000	840,000
Misc. & Contingency		10%	174,700
Total Furniture & Fixtures			**1,921,700**

11.7 Office Equipment Requirement

Following office equipment will be required for Potato Powder and Flakes Manufacturing Unit;

Table 11: Office Equipment Requirement

Description	Quantity	Unit Cost (PKR)	Total Cost (PKR)
Laptop	4	100,000	400,000
Computers with LCD	11	60,000	660,000
Printer	3	20,000	60,000
Scanner	2	15,000	30,000
Networking Equipment & Accessories	1	150,000	150,000
Mini Telephone Exchange	1	100,000	100,000
Telephone Sets	10	1,500	15,000
Fax Machine	2	20,000	40,000

Photo Copy Machine	1	100,000	100,000
Water Dispenser	4	16,500	66,000
Refrigerator	1	50,000	50,000
Electric Water Cooler	2	25,000	50,000
Misc. & Contingency		10%	172,100
Total Office Equipment			**1,893,100**

11.8 Office Vehicle Requirement

Following office vehicles are required for Potato Powder and Flakes Manufacturing Unit;

Table 12: Office Vehicle Requirement

Description	Quantity	Unit Cost (PKR)	Total Cost (PKR)
1300 CC Car (For CEO)	1	1,650,000	1,650,000
800 CC Carry	1	900,000	900,000
Registration fee		3.25%	82,875
Total Office Vehicles cost			**2,632,875**

11.9 Human Resource Requirement

To run operations of Potato Powder and Flakes Manufacturing Unit smoothly, details of human resources required along with number of employees and monthly salary are recommended as under;

Table 13: Human Resource Requirement

Description	No. of Employees	Salary Per Month (PKR)
CEO	1	125,000
Manager Marketing	1	75,000
Assistant Manager – Marketing	2	35,000
Plant Manger	1	70,000
Assistant Plant Manager	1	40,000
Plant Operator	6	22,000
Manager Finance & Admin	1	60,000
Accounts officer	1	20,000
Assistant to Admin & HR	1	20,000
Boiler Engineer	1	50,000

Boiler Operator	3	20,000
Procurement Officer	1	50,000
Asst. Procurement Officer	1	30,000
Quality Control Officer / Food Technologist	1	35,000
Assistant to Quality Assurance Officer	1	15,000
Mechanical Foreman	1	30,000
Electrical In-charge	1	30,000
Mechanic	2	18,000
Electrician	2	18,000
Shift Supervisors	3	20,000
Store Keeper	1	20,000
Office Coordinator	1	15,000
Driver	2	15,000
Lifter Operator	1	15,000
Office Boy	2	14,000
Guard	4	18,000
Sweeper	2	14,000
Total	**45**	

Seasonal labor will be hired on daily wages. In year 1 the seasonal labor cost will be around PKR 6.26 million with 10% incremental effect each year.

11.10 Utilities and other costs

An essential cost to be borne by the project is the cost of electricity, gas and fuel for generator. The utility expenses are estimated to be around PKR 4.61 million per month[10]. Furthermore, promotional expenses are essential for marketing of this unit, and are estimated as 1% of revenue each year.

11.11 Revenue Generation

Based on the assumed capacity utilization for processing of Potatoes (Powder and Flakes), sales revenue during the first year of operations is estimated as under:

[10] The Plant load is 355.40 KW/H for each line and other load for management offices are estimated at 71.6 KW/H.

Table 14: Revenue Generation – Year 1

Description	Potato Powder	Potato Flakes	Total
Percentage Production	30%	70%	**100%**
Production (75% Capacity)	1,231	3,780	**5,011**
Sales Price Per Ton (PKR)	170,100	143,100	
Total Revenue (PKR)*	**209,427,120**	**540,918,000**	**750,345,120**

* Difference in Revenue may be due to rounding off.

11.12 Raw Material Requirement

Fresh potatoes are the main raw material for the proposed business, which will be procured either directly from the farms or from distributors of local vegetable market. Following table provides the details of seasonal requirements of fresh potatoes as a raw material:

Table 15: Raw Material Requirement – Year 1

Description	Requirement for Producing 1 kg Powder/Flake	Requirement for Year-1 (Tons)	Cost Per Ton (PKR)	Total Cost (PKR)*
Potatoes (Fresh) for Potato Powder	7.5	9,234	14,330	132,322,204
Freight in for Potato Powder		9,234	1,000	9,234,000
Potatoes (Fresh) for Potato Flakes	5.7	21,546	14,330	308,751,810
Freight in for Potato Flakes		21,546	1,000	21,546,000
Other Material (Monoglyceride, Glycerol mono-Palmitate, antioxidants, sodium salts, SO2,etc.)		5,011	1,500	7,516,800
Total Raw Material Cost				**479,370,814**

* Difference in Cost may be due to rounding off.

12 USEFUL WEB LINKS

Small & Medium Enterprises Development Authority (SMEDA)	www.smeda.org.pk
Government of Pakistan	www.pakistan.gov.pk
Ministry of Industries & Production	www.moip.gov.pk
Ministry of Education, Training & Standards in Higher Education	http://moptt.gov.pk
Government of Punjab	www.punjab.gov.pk
Government of Sindh	www.sindh.gov.pk
Government of Khyber Pakhtunkhwa	www.khyberpakhtunkhwa.gov.pk
Government of Balochistan	www.balochistan.gov.pk
Government of Gilgit Baltistan	www.gilgitbaltistan.gov.pk
Government of Azad Jamu Kashmir	www.ajk.gov.pk
Trade Development Authority of Pakistan (TDAP)	www.tdap.gov.pk
Security Commission of Pakistan (SECP)	www.secp.gov.pk
Federation of Pakistan Chambers of Commerce and Industry (FPCCI)	www.fpcci.com.pk
State Bank of Pakistan (SBP)	www.sbp.org.pk
Punjab Small Industries Corporation	www.psic.gop.pk
Sindh Small Industries Corporation	www.ssic.gos.pk
Punjab Vocational Training Council (PVTC)	www.pvtc.gop.pk
Technical Education and Vocational Training Authority (TEVTA)	www.tevta.org
Punjab Industrial Estates (PIE)	www.pie.com.pk
Faisalabad Industrial Estate Development and Management Company (FIEDMC)	www.fiedmc.com.pk
Pakistan Horticulture Development Export Company (PHDEC)	ww.phdec.org
Ministry of National Food Security and Research (MNFSR)	www.mnsfr.gov.pk
Pakistan Agriculture Research Council (PARC)	www.parc.gov.pk
National Agriculture Research Council (NARC)	www.narc.gov.pk
Agriculture University of Faisalabad (UAF)	www.uaf.edu.pk
Agriculture Marketing Information Service	www.amis.pk

Ayub Agricultural Research Institute (AARI), Faisalabad	www.aari.punjab.gov.pk

13 ANNEXURES

13.1 Income Statement

Calculations **SMEDA**

Income Statement **Amount in PKR**

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue	750,345,120	880,404,941	1,028,973,275	1,198,451,226	1,391,535,034	1,611,251,092	1,772,376,202	1,949,613,822	2,144,575,204	2,359,032,724
Cost of sales										
Fresh Potatoes Cost including Freight in	471,854,014	553,642,043	647,069,138	753,645,231	875,065,852	1,013,234,145	1,114,557,559	1,226,013,315	1,348,614,646	1,483,476,111
Other Material (Monoglyceride, sodium salts, SO2, etc.)	7,516,800	8,819,712	10,308,038	12,005,833	13,940,106	16,141,175	17,755,293	19,530,822	21,483,904	23,632,295
Operation costs 1 (direct labor)	7,968,000	8,764,800	9,641,280	10,605,408	11,665,949	12,832,544	14,115,798	15,527,378	17,080,116	18,788,127
Operating costs 2 (machinery maintenance)	1,002,240	1,175,962	1,374,405	1,600,778	1,858,681	2,152,157	2,367,372	2,604,110	2,864,521	3,150,973
Direct electricity including Generator and Boiler expense	53,030,397	62,222,332	72,722,351	84,700,150	98,346,285	113,874,646	125,262,111	137,788,322	151,567,154	166,723,869
Packing Cost	4,008,960	4,703,846	5,497,620	6,403,111	7,434,723	8,608,627	9,469,490	10,416,439	11,458,082	12,603,891
Daily Wages	6,264,000	7,349,760	8,590,032	10,004,861	11,616,755	13,450,980	14,796,077	16,275,685	17,903,254	19,693,579
Total cost of sales	551,644,411	646,678,456	755,202,865	878,965,372	1,019,928,351	1,180,294,273	1,298,323,700	1,428,156,070	1,570,971,677	1,728,068,845
Gross Profit	198,700,709	233,726,485	273,770,410	319,485,854	371,606,683	430,956,820	474,052,502	521,457,752	573,603,527	630,963,880
General administration & selling expenses										
Administration expense	7,056,000	7,761,600	8,537,760	9,391,536	10,330,690	11,363,759	12,500,134	13,750,148	15,125,163	16,637,679
Administration benefits expense	1,764,000	1,940,400	2,134,440	2,347,884	2,582,672	2,840,940	3,125,034	3,437,537	3,781,291	4,159,420
Electricity expense	2,318,400	2,550,240	2,805,264	3,085,790	3,394,369	3,733,806	4,107,187	4,517,906	4,969,696	5,466,666
Water expense	480,000	528,000	580,800	638,880	702,768	773,045	850,349	935,384	1,028,923	1,131,815
Travelling expense	1,764,000	1,940,400	2,134,440	2,347,884	2,582,672	2,840,940	3,125,034	3,437,537	3,781,291	4,159,420
Communications expense (phone, fax, mail, internet, etc.)	1,411,200	1,552,320	1,707,552	1,878,307	2,066,138	2,272,752	2,500,027	2,750,030	3,025,033	3,327,536
Office vehicles running expense	1,053,150	1,158,465	1,274,312	1,401,743	1,541,917	1,696,109	1,865,719	2,052,291	2,257,521	2,483,273
Office expenses (stationary, entertainment, janitorial services, etc.)	705,600	776,160	853,776	939,154	1,033,069	1,136,376	1,250,013	1,375,015	1,512,516	1,663,768
Promotional expense	7,503,451	8,804,049	10,289,733	11,984,512	13,915,350	16,112,511	17,723,762	19,496,138	21,445,752	23,590,327
Professional fees (legal, audit, consultants, etc.)	3,751,726	4,402,025	5,144,866	5,992,256	6,957,675	8,056,255	8,861,881	9,748,069	10,722,876	11,795,164
Depreciation expense	70,409,885	70,409,885	70,409,885	70,409,885	70,409,885	70,835,970	70,835,970	70,835,970	70,835,970	70,835,970
Amortization of pre-operating costs	2,046,800	2,046,800	2,046,800	2,046,800	2,046,800	-	-	-	-	-
Amortization of legal, licensing, and training costs	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000
Subtotal	100,334,212	103,940,344	107,989,628	112,534,631	117,634,006	121,732,462	126,815,111	132,406,025	138,556,030	145,321,036
Operating Income	98,366,497	129,786,141	165,780,782	206,951,223	253,972,677	309,224,358	347,237,391	389,051,727	435,047,497	485,642,843
Gain / (loss) on sale of office equipment	-	-	-	-	757,240	-	-	-	-	
Gain / (loss) on sale of office vehicles	-	-	-	-	1,053,150	-	-	-	-	
Earnings Before Interest & Taxes	98,366,497	129,786,141	165,780,782	206,951,223	255,783,067	309,224,358	347,237,391	389,051,727	435,047,497	485,642,843
Subtotal	-	-	-	-	-	-	-	-	-	-
Earnings Before Tax	98,366,497	129,786,141	165,780,782	206,951,223	255,783,067	309,224,358	347,237,391	389,051,727	435,047,497	485,642,843
Tax	34,428,274	45,425,149	58,023,274	72,432,928	89,524,073	108,228,525	121,533,087	136,168,104	152,266,624	169,974,995
NET PROFIT/(LOSS) AFTER TAX	**63,938,223**	**84,360,992**	**107,757,508**	**134,518,295**	**166,258,994**	**200,995,833**	**225,704,304**	**252,883,622**	**282,780,873**	**315,667,848**

13.2 Balance Sheet

Calculations **SMEDA**

Balance Sheet **Amount in PKR**

	Year 0	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	1,500,000	110,817,207	242,861,769	346,467,588	418,888,305	481,383,634	530,481,498	568,677,915	602,154,022	628,055,131	976,163,742
Accounts receivable		61,672,202	67,017,126	78,467,598	91,537,993	106,437,792	123,402,170	139,053,176	152,958,494	168,254,344	185,079,778
Equipment spare part inventory	334,080	411,587	505,094	617,700	753,079	915,586	1,057,502	1,221,415	1,410,734	1,629,398	-
Raw material inventory	39,947,568	51,558,994	66,285,532	84,923,464	108,466,135	138,151,604	167,163,441	202,267,763	244,743,994	296,140,232	-
Total Current Assets	41,781,648	224,459,990	376,669,521	510,476,350	619,645,513	726,888,615	822,104,610	911,220,269	1,001,267,243	1,094,079,104	1,161,243,520
Fixed assets											
Land	36,000,000	36,000,000	36,000,000	36,000,000	36,000,000	36,000,000	36,000,000	36,000,000	36,000,000	36,000,000	36,000,000
Building/Infrastructure	163,637,585	155,455,705	147,273,826	139,091,947	130,910,068	122,728,188	114,546,309	106,364,430	98,182,551	90,000,672	81,818,792
Machinery & equipment	611,306,407	550,175,766	489,045,126	427,914,485	366,783,844	305,653,204	244,522,563	183,391,922	122,261,281	61,130,641	-
Furniture & fixtures	1,921,700	1,729,530	1,537,360	1,345,190	1,153,020	960,850	768,680	576,510	384,340	192,170	-
Office vehicles	2,632,875	2,106,300	1,579,725	1,053,150	526,575	4,240,272	3,392,217	2,544,163	1,696,109	848,054	-
Office equipment	1,893,100	1,514,480	1,135,860	757,240	378,620	2,416,129	1,932,903	1,449,677	966,451	483,226	-
Total Fixed Assets	817,391,667	746,981,782	676,571,897	606,162,012	535,752,127	471,998,642	401,162,672	330,326,702	259,490,732	188,654,762	117,818,792
Intangible assets											
Pre-operation costs	10,234,000	8,187,200	6,140,400	4,093,600	2,046,800	-	-	-	-	-	-
Legal, licensing, & training costs	700,000	630,000	560,000	490,000	420,000	350,000	280,000	210,000	140,000	70,000	-
Total Intangible Assets	10,934,000	8,817,200	6,700,400	4,583,600	2,466,800	350,000	280,000	210,000	140,000	70,000	-
TOTAL ASSETS	**870,107,314**	**980,258,971**	**1,059,941,818**	**1,121,221,962**	**1,157,864,440**	**1,199,237,257**	**1,223,547,282**	**1,241,756,971**	**1,260,897,976**	**1,282,803,866**	**1,279,062,312**
Liabilities & Shareholders' Equity											
Current liabilities											
Accounts payable		43,754,271	51,816,028	61,174,746	72,038,717	84,651,931	98,609,459	109,986,526	122,819,423	137,320,496	124,130,908
Total Current Liabilities	-	43,754,271	51,816,028	61,174,746	72,038,717	84,651,931	98,609,459	109,986,526	122,819,423	137,320,496	124,130,908
Other liabilities											
Deferred tax		34,428,274	79,853,423	106,978,621	106,978,621	106,978,621	85,582,897	64,187,173	42,791,448	21,395,724	0
Total Long Term Liabilities	-	34,428,274	79,853,423	106,978,621	106,978,621	106,978,621	85,582,897	64,187,173	42,791,448	21,395,724	0
Shareholders' equity											
Paid-up capital	870,107,314	870,107,314	870,107,314	870,107,314	870,107,314	870,107,314	870,107,314	870,107,314	870,107,314	870,107,314	870,107,314
Retained earnings		31,969,112	58,165,052	82,961,280	108,739,787	137,499,390	169,247,612	197,475,958	225,179,790	253,980,331	284,824,090
Total Equity	870,107,314	902,076,426	928,272,366	953,068,594	978,847,102	1,007,606,705	1,039,354,926	1,067,583,272	1,095,287,105	1,124,087,646	1,154,931,404
TOTAL CAPITAL AND LIABILITIES	**870,107,314**	**980,258,971**	**1,059,941,818**	**1,121,221,962**	**1,157,864,440**	**1,199,237,257**	**1,223,547,282**	**1,241,756,971**	**1,260,897,976**	**1,282,803,866**	**1,279,062,312**

13.3 Cash Flow Statement

Calculations **SMEDA**

Cash Flow Statement **Amount in PKR**

	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		63,938,223	84,360,992	107,757,508	134,518,295	166,258,994	200,995,833	225,704,304	252,883,622	282,780,873	315,667,848
Add: depreciation expense		70,409,885	70,409,885	70,409,885	70,409,885	70,409,885	70,835,970	70,835,970	70,835,970	70,835,970	70,835,970
amortization of pre-operating costs		2,046,800	2,046,800	2,046,800	2,046,800	2,046,800	-	-	-	-	-
amortization of training costs		70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000
Deferred income tax		34,428,274	45,425,149	27,125,198	-	-	(21,395,724)	(21,395,724)	(21,395,724)	(21,395,724)	(21,395,724)
Accounts receivable		(61,672,202)	(5,344,924)	(11,450,472)	(13,070,395)	(14,899,798)	(16,964,378)	(15,651,007)	(13,905,318)	(15,295,849)	(16,825,434)
Equipment inventory	(334,080)	(77,507)	(93,507)	(112,606)	(135,379)	(162,507)	(141,916)	(163,913)	(189,319)	(218,664)	1,629,398
Raw material inventory	(39,947,568)	(11,611,426)	(14,726,538)	(18,637,932)	(23,542,671)	(29,685,469)	(29,011,837)	(35,104,323)	(42,476,230)	(51,396,239)	296,140,232
Accounts payable		43,754,271	8,061,757	9,358,718	10,863,971	12,613,214	13,957,528	11,377,067	12,832,896	14,501,073	(13,189,588)
Cash provided by operations	(40,281,648)	141,286,319	190,209,614	186,567,099	181,160,505	206,651,119	218,345,476	235,672,375	258,655,897	279,881,440	632,932,701
Financing activities											
Issuance of shares	870,107,314	-	-	-	-	-	-	-	-	-	-
Purchase of (treasury) shares											
Cash provided by / (used for) financing activities	870,107,314	-	-	-	-	-	-	-	-	-	-
Investing activities											
Capital expenditure	(828,325,667)	-	-	-	-	(6,656,400)	-	-	-	-	-
Acquisitions											
Cash (used for) / provided by investing activities	(828,325,667)	-	-	-	-	(6,656,400)	-	-	-	-	-
NET CASH	**1,500,000**	**141,286,319**	**190,209,614**	**186,567,099**	**181,160,505**	**199,994,719**	**218,345,476**	**235,672,375**	**258,655,897**	**279,881,440**	**632,932,701**

14 KEY ASSUMPTIONS

14.1 Operating Cost Assumptions

Description	Details
Administration Benefit Expenses	25% of admin. expense
Traveling Expenses	25% of admin. expense
Communication Expenses	20% of admin. expense
Office expenses (stationaey, entertainment, janitorial services, etc.)	10% of admin. expense
Promotional expense	1% of revenue
Office Vehicle Running Expenses	40% of the Vehicle Cost
Professional fee (Legal, Audit, etc.)	0.5% of revenue
Operating costs growth rate	10%
Depreciation on Building and Infrastructure	5%
Depreciation on Machinery & Equipment	10%
Depreciation on Furniture and Fixture	10%
Depreciation on Office Equipment	20%
Depreciation on Office Vehicle	20%

14.2 Production Cost Assumptions

Description	Details
Cost of Potatoes per Ton [11]	PKR 14,330
Packing Cost Per Ton[12]	PKR 800
Other Material (Monoglyceride, Glycerol mono-Palmitate, antioxidants, sodium salts, SO2,etc.) Cost used in Per Ton Potato Powder/Flakes	PKR 1,500
Production Cost Growth Rate	10%

14.3 Revenue Assumptions

Description	Details
Potato Powder Sales Price Per Ton	170,100
Potato Flakes Sales Price Per Ton	143,100
Growth is Sales Price	10%

[11] Took average of last 5 years of Okara district for 5 months (January ~ May)
[12] Inner Liner LDP Bag with Outer PP Bag (Food Grade) will be used as Packing

Days Operational / Year	150
Hours Operational Per Day	24
Production Capacity in First Year	75%
Percentage Increase in Production Capacity every Year	5%
Maximum Production Capacity	100%

15 SENSITIVITY ANALYSIS

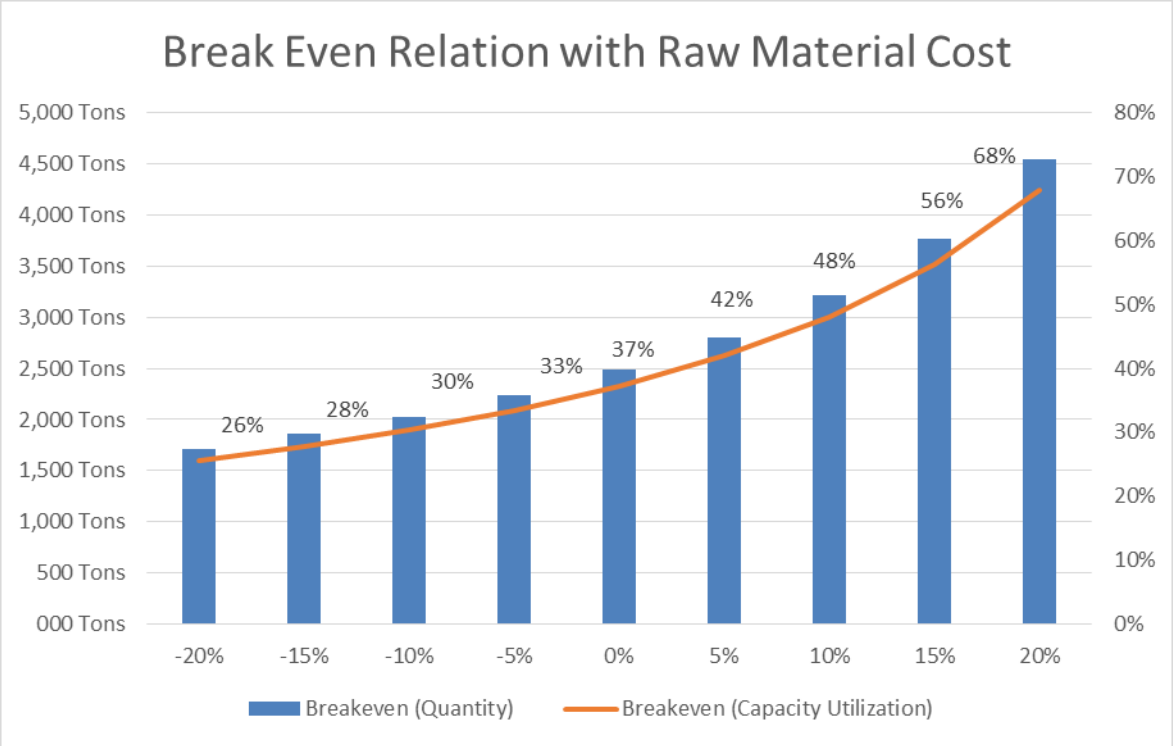
Sensitivity analysis determines how much the output is expected to change due to change in a variable. It refers to an analysis of how each of the input variables in a capital budgeting decision (such as discount rate, cash flows growth rate, tax rate, raw material cost, sale price, etc.) affect the net present value, IRR, payback, breakeven or any other output. In other words, sensitivity analysis finds out how sensitive an output is to any change in an input while keeping other inputs constant.

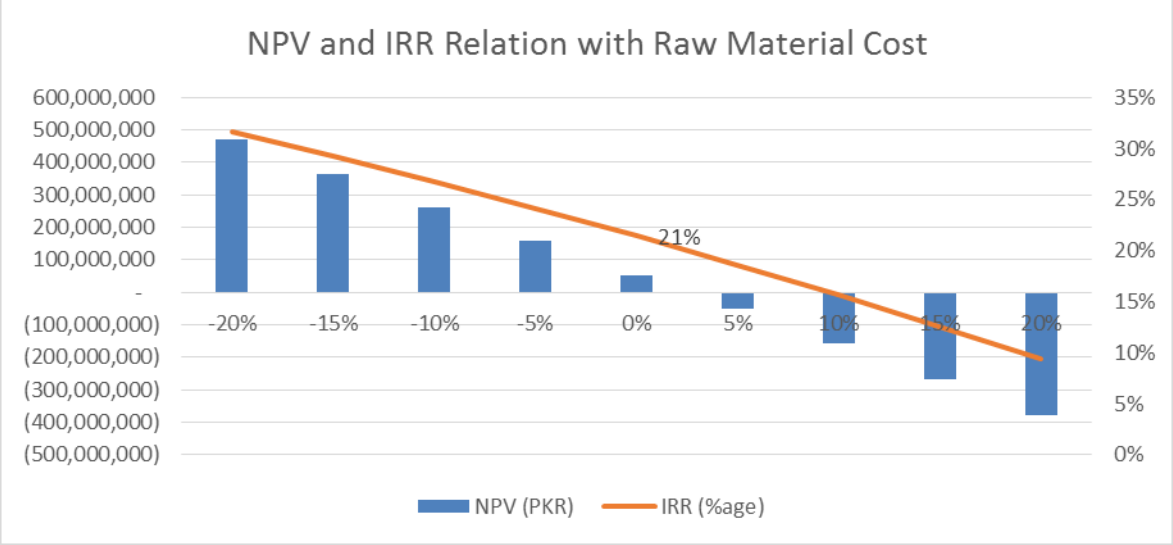
For the sake of this Pre-feasibility study, sensitivity analysis for change in raw material cost and sale price is tested in the following sections, to see the projected outcomes so that appropriate decisions or actions could be taken before investing in this project.

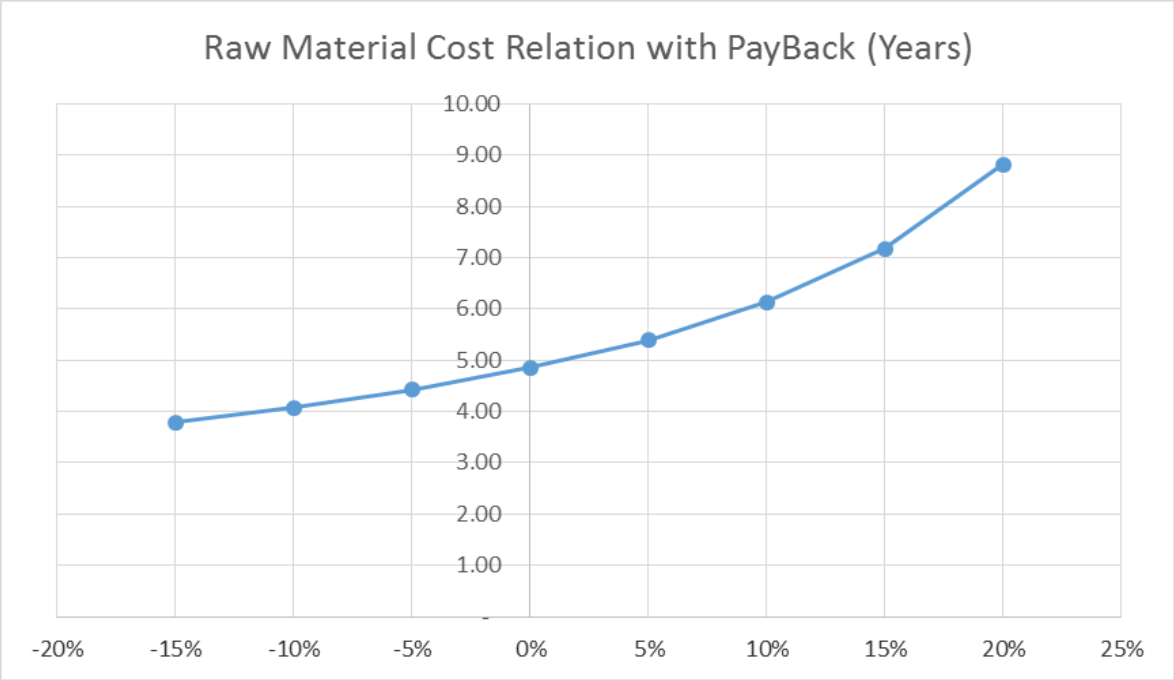
15.1 Raw Material Cost Sensitivity Analysis

The following sensitivity analysis is done with the assumption that all other factors will be constant except Raw Material Cost (Fresh Potatoes). The results are given in the table below;

Changes in Cost	Raw Material (Potato) Price (Rs. / Ton)	Breakeven (Quantity)	Breakeven (Capacity Utilization)	NPV (PKR)	IRR (%age)	Pay Back (Years)
-20%	11,464	1,715 Tons	26%	469,009,065	32%	3.52
-15%	12,180	1,859 Tons	28%	365,898,427	29%	3.78
-10%	12,897	2,030 Tons	30%	262,787,788	27%	4.08
-5%	13,613	2,236 Tons	33%	158,479,269	24%	4.42
0%	14,330	2,489 Tons	37%	53,427,020	21%	4.85
5%	15,046	2,805 Tons	42%	(51,625,229)	19%	5.39
10%	15,763	3,214 Tons	48%	(158,975,224)	16%	6.13
15%	16,479	3,763 Tons	56%	(267,931,209)	13%	7.17
20%	17,196	4,537 Tons	68%	(380,363,662)	9%	8.82


Break Even Relation with Raw Material Cost
5,000 Tons
4,500 Tons
4,000 Tons
3,500 Tons
3,000 Tons
2,500 Tons
2,000 Tons
1,500 Tons
1,000 Tons
500 Tons
000 Tons
80%
70%
60%
50%
40%
30%
20%
10%
0%
26%
28%
30%
33%
37%
42%
48%
56%
68%
-20%
-15%
-10%
-5%
0%
5%
10%
15%
20%
Breakeven (Quantity)
Breakeven (Capacity Utilization)


NPV and IRR Relation with Raw Material Cost
600,000,000
500,000,000
400,000,000
300,000,000
200,000,000
100,000,000
-
(100,000,000)
(200,000,000)
(300,000,000)
(400,000,000)
(500,000,000)
35%
30%
25%
20%
15%
10%
5%
0%
21%
-20%
-15%
-10%
-5%
0%
5%
10%
15%
20%
NPV (PKR)
IRR (%age)



The above table and graphs show that if the raw material (Fresh Potatoes) cost decreses by 5% upto 20%, on avaerage, project IRR, NPV and Payback will improve by 10%, 82% and 8% respectively. On the other hand if the raw material cost increases by the same rate, there will be a decrease in IRR by 19% and NPV will be negative, whereas Payback will reach to 8.82 years. If the raw material cost increases by 20% from its current cost, the project needs to produce and sell 4,537 tons of Potato Powder and Flakes in order to achieve its breakeven, otherwise, there is a chance that cash flows would be negative for next 5 years which means that project has to arrange additional funds in shape of equity or debt financing.

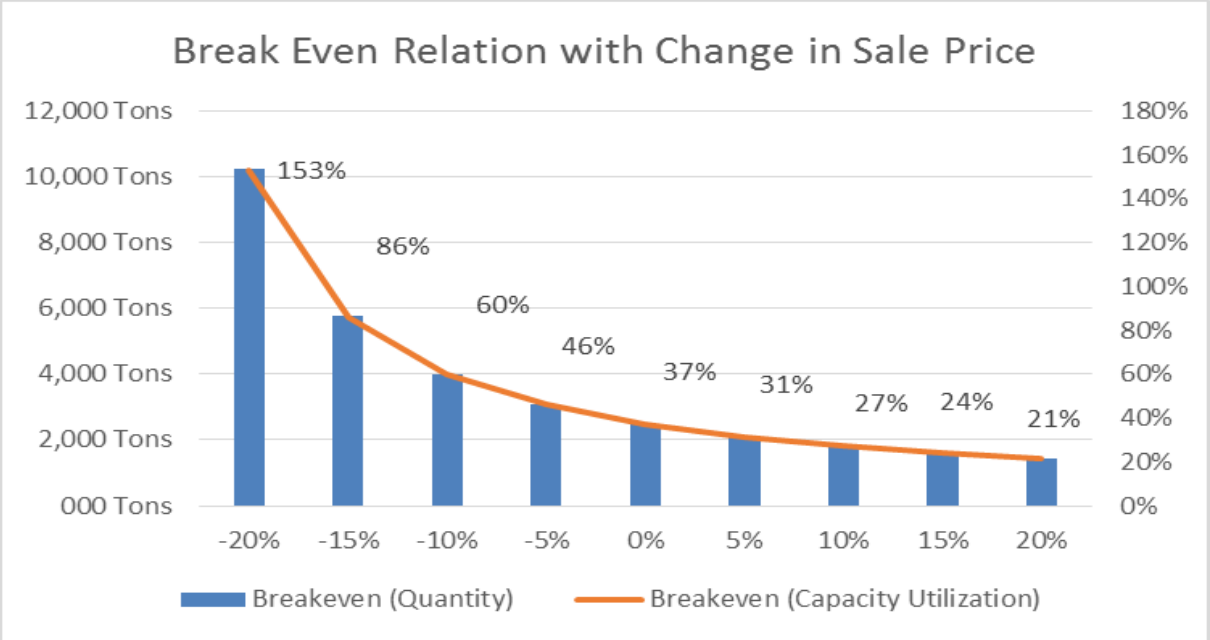
Hence, it is better to procure the raw material on cheaper prices in order to achieve sustainable profitibility from the project.

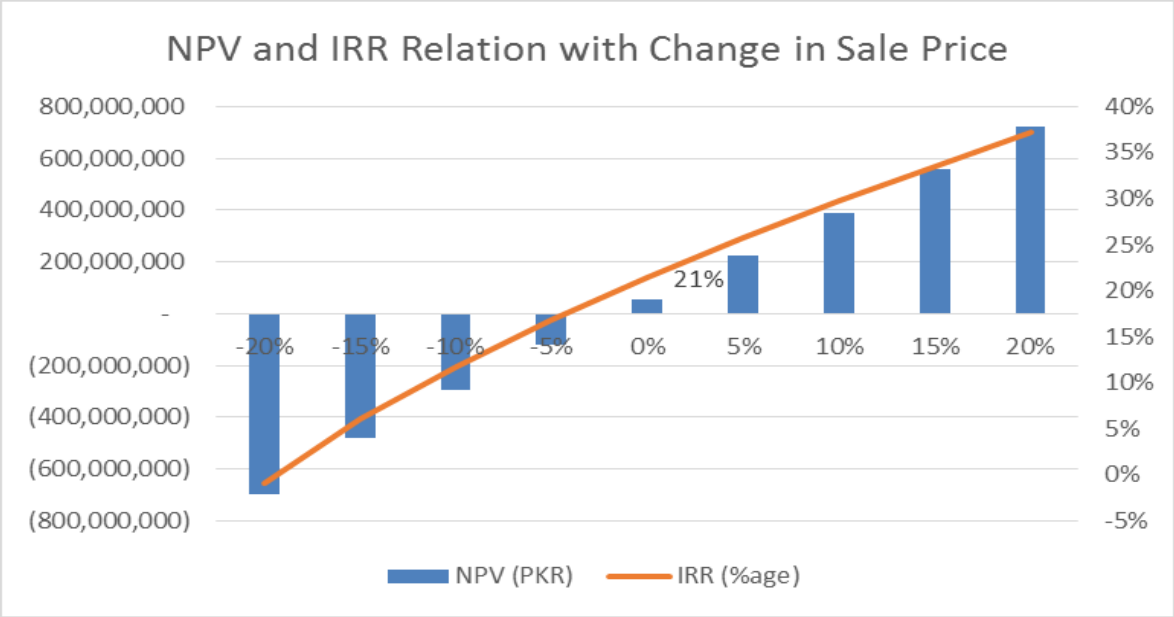
15.2 Sales Price Sensitivity Analysis

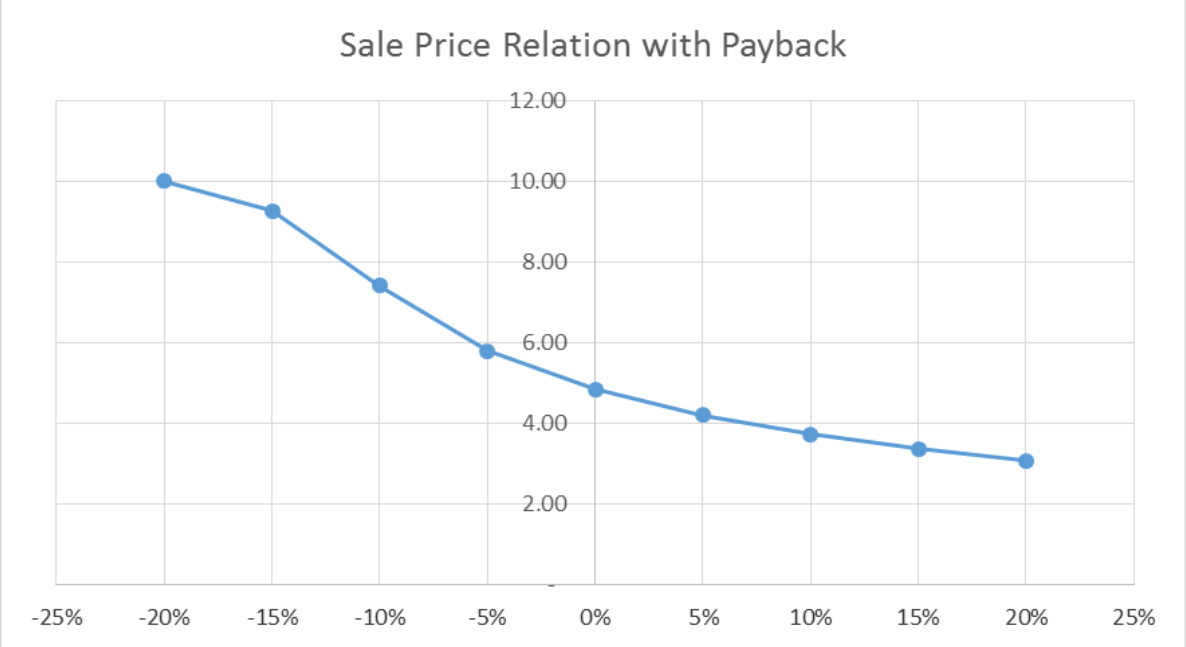
The sensitivity analysis is done with the assumption that all other things will be the same except Sale Price of the product. The results are given in table below;

Changes in Price	Sale Price (Rs./Ton)*	Breakeven (Quantity)	Breakeven (Capacity Utilization)	NPV (PKR)	IRR (%age)	Pay Back (Years)
-20%	119,787	10,218 Tons	153%	(695,619,758)	-1%	10.00
-15%	127,274	5,752 Tons	86%	(481,889,625)	6%	9.27
-10%	134,760	4,003 Tons	60%	(294,975,703)	12%	7.41
-5%	142,247	3,069 Tons	46%	(118,091,517)	17%	5.80
0%	149,734	2,489 Tons	37%	53,427,020	21%	4.85
5%	157,220	2,093 Tons	31%	223,389,739	26%	4.21
10%	164,707	1,806 Tons	27%	390,212,966	30%	3.74
15%	172,194	1,588 Tons	24%	557,036,194	34%	3.37
20%	179,680	1,417 Tons	21%	723,859,422	37%	3.08

* Average price of Potato Powder and Potato Flakes.







The above table and graphs show that if the sale price of the Potato Powder and Flakes decreses to 5%, the project NPV will be negative and payback will also be high. Therfore, it is better to ensure the quality of Potato Powder and Flakes in order to be competitive in the market, hence enabling to keep the sale price constant. On the other hand, if the sale price is increased, it will be good for the project. Under the ideal circumstances, if the price increases by 20%, IRR will be 37% and the project will return its whole investment in just 3.08 years.