Feasibility Study of Starch Industry

Foreword

The food processing sector, which is one of the largest in India, is key to achieving the nation's targeted growth rate. India is the world's second largest producer of food after China, and has the potential of becoming the No. 1.Currently, the food processing industry accounts for 32 per cent of India's food market.

With population growing steadily, the demand for food is increasing. With disposable incomes rising steadily, the food sector has been witnessing a marked change in consumption pattern.

It is estimated that 10 years from now, the sector will attract investment worth $33 billion and generate employment of 9 million man-days. West Bengal is slated to be the champion in developing this industry. Among many other processed food products, starch has been identified as one of the potential products of West Bengal's Food Processing Industry. This study attempts to document the techno-economic feasibility of setting up starch industry in West Bengal. It also scans and analyses all other aspects –financial, ecologicaland legislative – that are relevant to the starch industry in the State.

Starch is one of the most versatile by-products of agricultural produce and due to its wide application it has a huge global demand. Initially, after the first stage of processing, starch is used in the industries primarily as a binding or thickening agent. Starch finds great usage in Paper, FMCG, Pharmaceutical, and Textile Industry. Currently, the Indian starch industry produces starch at ~1800 crstonnes and about 65% of the total production comes from organized sector whereas remaining 35% from unorganized sector.

Starch can be made from several sources likemaize, wheat and potato. However, the report outlines the formation of Starch using maize only as the content of starch in the materials is high as compared to Wheat. The report lists the approvals needed to setup new units and also contains a financial analysis which includes key parameters like IRR and NPV.

It also highlights the market opportunity for Starch in both domestic and foreign markets and includes a list of B2B market opportunities.

This CIIreport focuses on feasibility of setting up starch industry in districtsin West Bengal and provides a roadmap for its execution. The report finds that this project, if implemented, will start to earn revenue from the first year itself. The manufacturing unit will have an IRR of 19% and payback period of seven years. To establish this capital and power intensive industry, man power of 120 labour will be required. Districts of North Bengal are the most ideal for establishing such a unit.

CONTENTS

Overview

Agriculture Sector in India:

Agriculture is an important sector of Indian economy. Although its share in Gross Domestic Product (GDP) has declined from over half during Independence to less than one-fifth currently, agriculture remains a dominant sector in terms of employment and livelihood.For more than half of India's workforce,agriculture is the principal occupation. It still contributes significantly to export earnings and is an important source of raw materials as well as of demand for many industries. However, agricultural output of India is below its potential. The sector currently contributes closer to 13% to the GDP of the economy. Agriculture sector saw a decline inits growth in 2012-13 as compared to the previous two years.

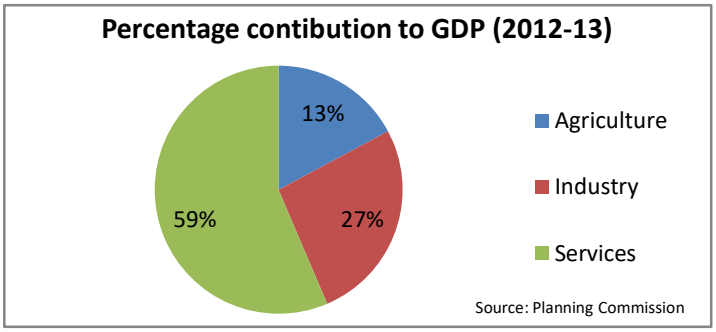


Figure I: Sector wise GDP Breakup

India ranks second in the world in the production of farm output.Crop yield per unit area of all crops has grown since 1950 due to the special emphasis placed on agriculture in the five-year plans.Steady improvement in irrigation methods, adoption of technology, application of modern agricultural practices and provision of agricultural credit & subsidies have also contributed to increase in productivity.

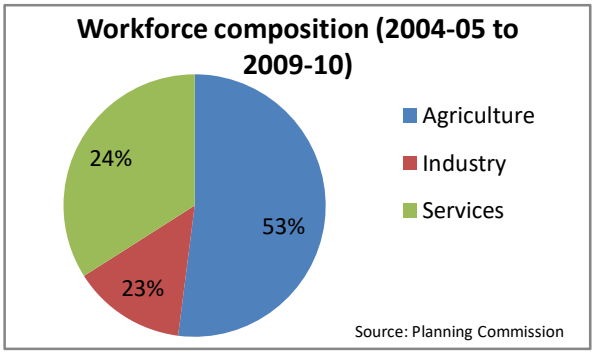


Figure II: Workforce Composition

States such as Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Andhra Pradesh, Bihar, West Bengal, Gujarat and Maharashtra are the major producers of agricultural output in the country.

India is the world's largest producer of milk, jute and pulses, and has the world's second largest cattle population.It is the world's second largest producer of rice, wheat, sugarcane, cotton and groundnuts. India is also the second largest producer of fruits and vegetables, accounting for 10.9% and 8.6% of the world fruit and vegetable production respectively.

India is not only one of the world's largest producers of agricultural products, but also one of the largest consumers of food products. Food and food products are the largest consumption category in India, with a market size of USD 181 billion in 2010 (Source: E and Y Report). Domestically, spending on food and food products account for nearly 21% of India'sGDP. Indian domestic food market is expected to growby 40% of its current market size by 2015 to USD 258 billion. Food processing industry in India is increasingly seen as a potential source for driving rural economy as it brings synergy between the consumer, industry and agriculture.

In an era of economic liberalization where the private (including co-operatives) and public sector play their rightful role in the development of the food processing sector, the government acts as a catalyst for bringing in greater investment.

The food processing sector in India is a highly fragmented industry, comprising of sub-segments like fruits and vegetables, milk and milk products, beer and alcoholic beverages, meat and poultry, marine products, grain processing, packaged or convenience food and packaged drinks.

Status of Agriculture in West Bengal

- Largest producer of rice in India
- Second largest producer of potatoes and litchis
- Presence of 6 Agro-Climatic Zones
- Leading producer of vegetables and fruits, fruits, meat (including poultry) in India
- Occupies 1st position in India in Inland Fisheries sector for more than a decade
- It has nearly 3% of the nation's cultivable land
- Agriculture contributes 24% of GSDP

West Bengal is among the richest states in agriculture in the country

Crop Situation in India

There are two principal crop seasons namely "Kharif"-with the sowing season beginning in April- June and harvesting during October-December; and the "Rabi"-which begins in October-December and ends in April-May.Rice, sugarcane, cotton, maize, bajra and jowar are Kharif crops whilewheat, gram, barley and mustard are Rabi crops.

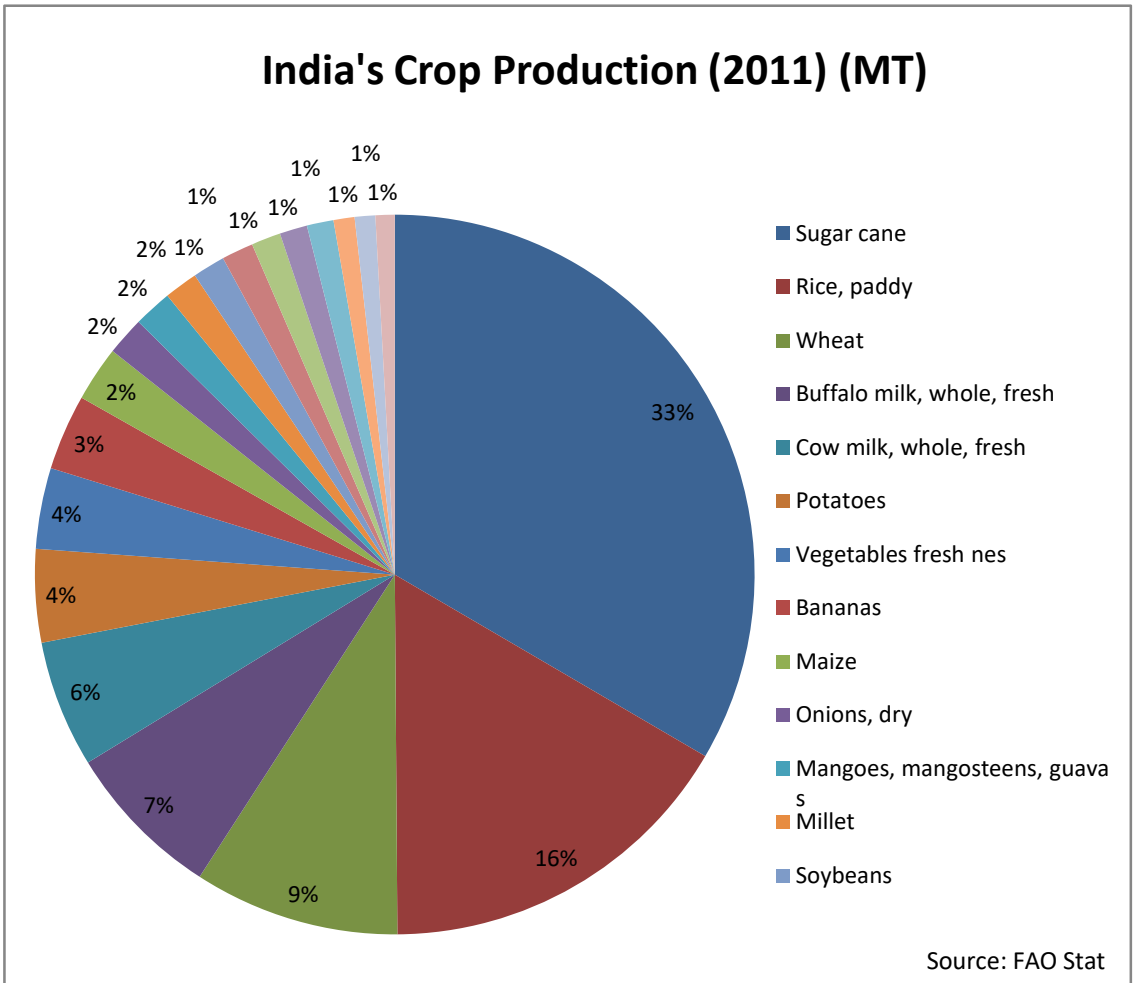


Figure III: Crop Situation and Production in India (2011)

Area and Production

The table below shows the area under cultivation of major crops in Hectare (Ha)

Year	Rice	Wheat	Potato	Maize
2009	41918300	27752400	1828300	8261600
2010	42862400	28457400	1835300	8553200
2011	44100000	29068600	1863200	7270000

Table 1: Area under cultivation of major cropsSource: FAO

Maize

Maize is third important cereal/crop after wheat and rice and has a great potential of processing due to its high nutritive value and commercial uses. Maize (also known as corn) is common name for a cereal grass widely grown for food and livestock fodder. Alongside wheat and rice, maize ranks as one of the world's chief grain crops and accounted for 2.5% of the total agricultural production in India (in MT) in 2011, according to FAO.

Maize producing states in India

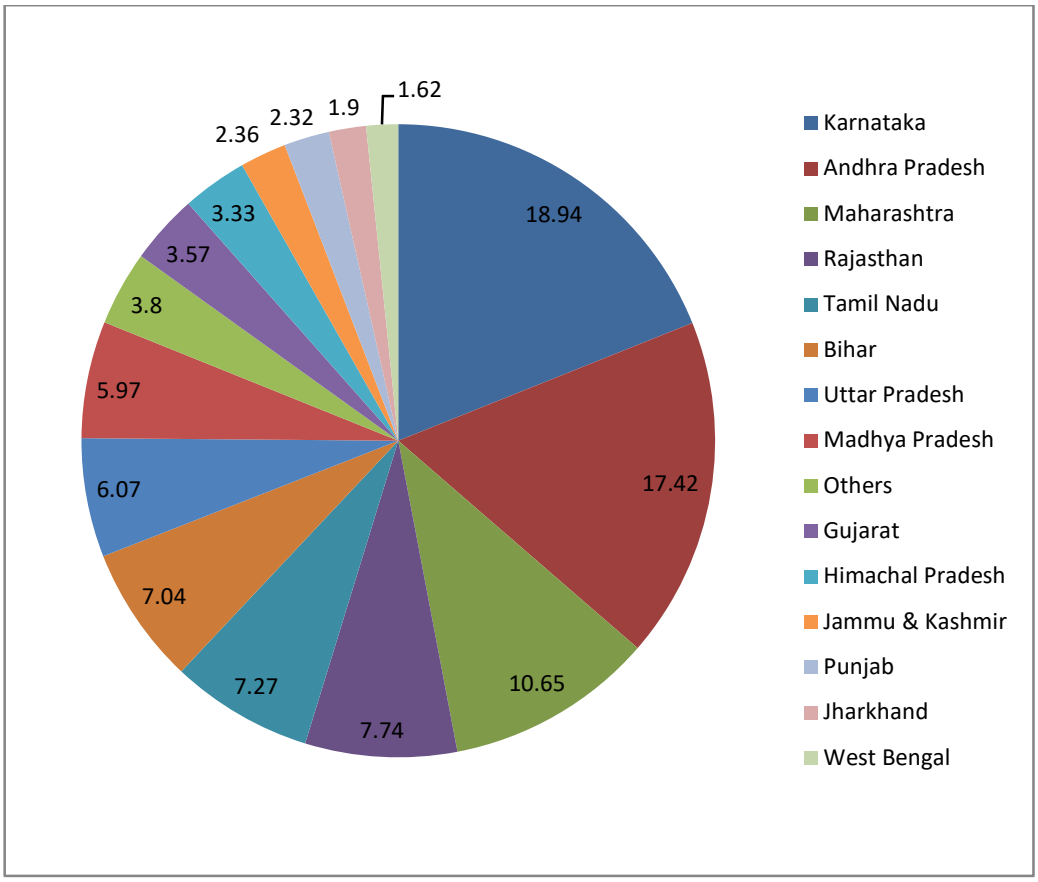


Figure IV: Maize Producing States in India

World Top Ten Maize Producers

Maize is one of the most important cereal crops in the world. The top ten maize producing countries are shown in the figure below.

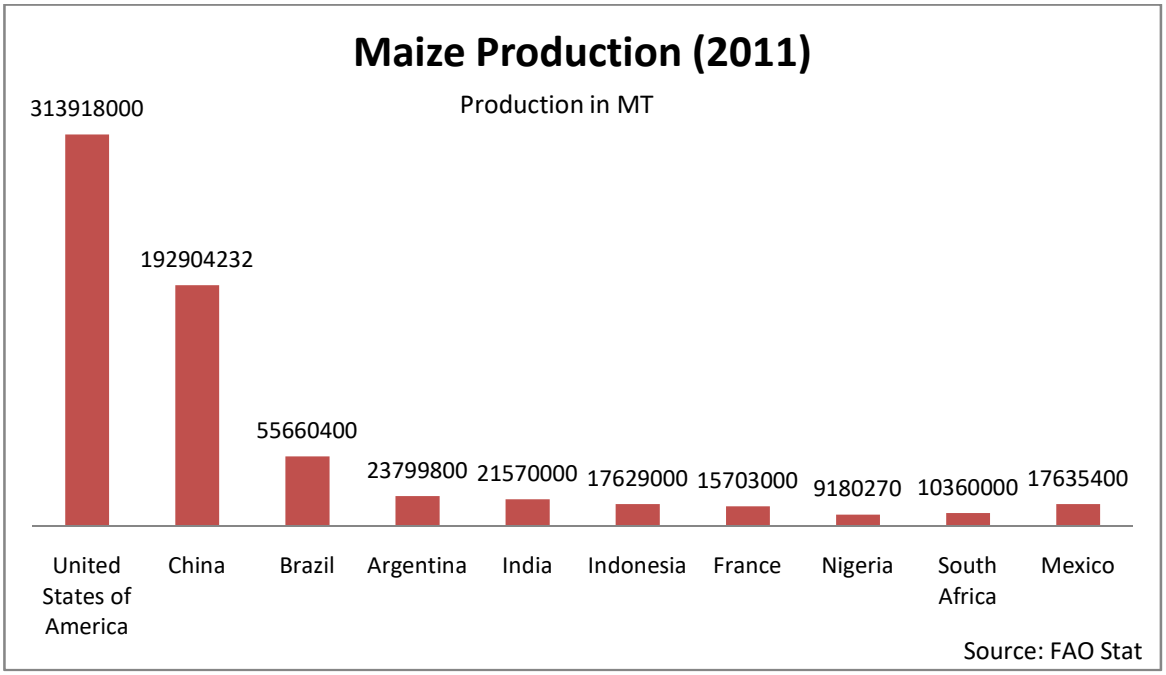


Figure V: World Top 10 Maize Producers

Study Objective

The future of Indian farmers dependslargely on the success of the food industry. Increasing pace of liberalization of the economy has reduced the protection that the food and agriculture sector once enjoyed in the country. This has created both opportunities and challenges.The food processing sector in India is clearly an attractive sector for investment and offers significant growth potential for investors.Ministry of Food Processing Industries (MFPI) has launched a new Centrally Sponsored Scheme (CSS) and National Mission on Food Processing (NMFP) during 12th Plan (2012-17) for implementation through States/UTs. The main objective of NMFP is decentralization of the implementation of Ministry's schemes, which will lead to substantial participation of State Governments / UTs.

The objective of the study is to analyse the feasibility of setting up starch industry in West Bengal. The purpose is to ascertain the techno-economic feasibility of setting up starch manufacturing units in the state. We have taken into consideration the production of starch only from Maize as it has veryhigh starch content. Also the materials are available in abundance in West Bengal (North Bengal), Bihar and Jharkhand.

On a broader perspective, Maize can be considered the most potential source of starch for setting up a processing unit in West Bengal.

The main reason for the preference of maize over potato in starch manufacturing is dueto the large difference in water content. While maize contains only about 12% water, potato has almost 78% water, rendering extraction of starch from potato less viable.

Bihar has recently introduced 3 crop cultivation of maize thereby ensuring availability of the raw material throughout the year. Since, the neighbouring states of Bihar and Jharkhand both boast a healthy cultivation of maize, the procurement of raw materials do not pose any threat. Districts of North Bengal and those adjacent to Bihar and Jharkhand with the exceptions of West Midnapur, Purulia and Bankura could be the potential locations for setting up starch processing units.

Economic Analysis

Export-Import Trend: Global and Domestic

Global Trade

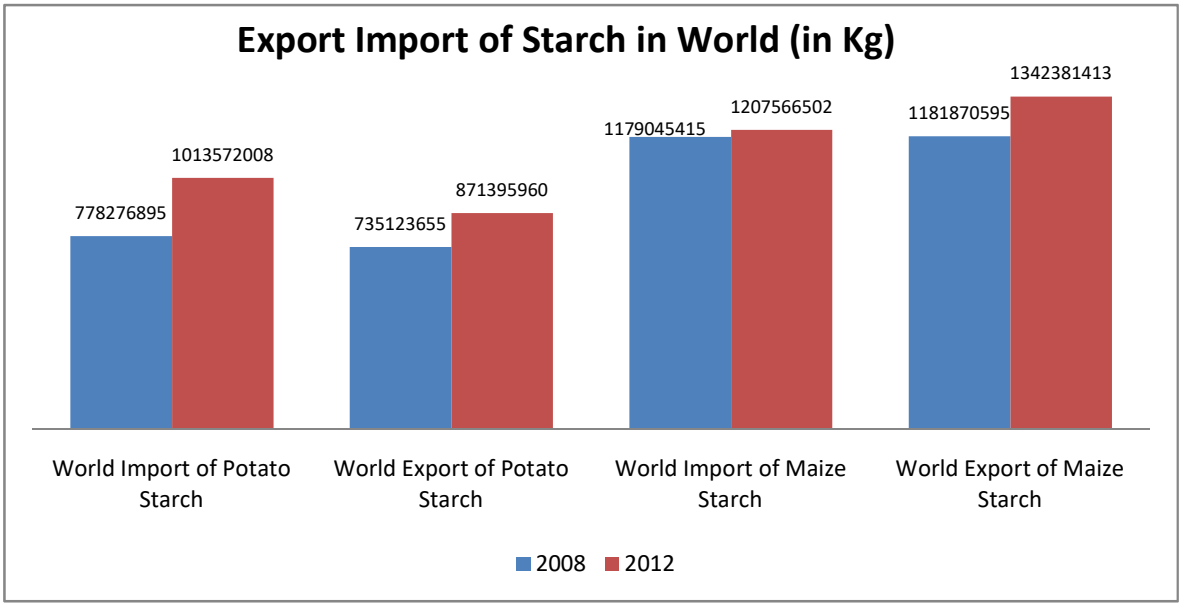


Figure VI: World Export Import of Potato/Maize Starch (in KG), *Source: WITS*

Domestic Trade

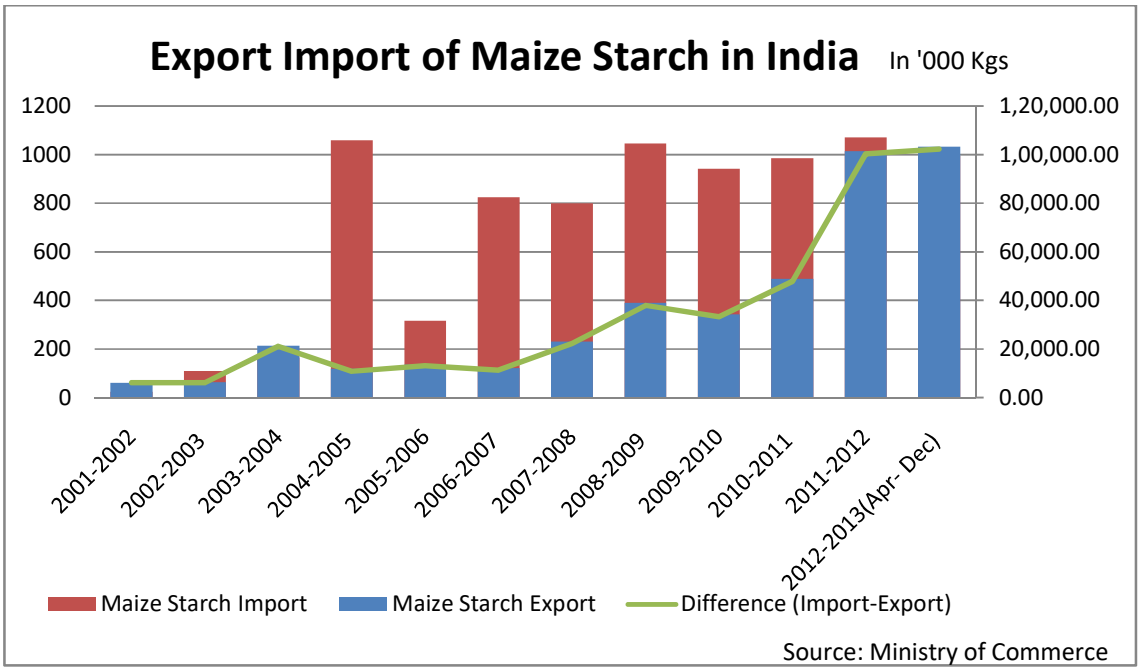


Figure VII: Export/Import of Maize Starch in India

Demand-Supply Gap

We see that India exports as well as imports Maize Starch. Import figures are very small compared to exports, thus depicting India's ability to meet the domestic demand. However, import of starchcan be prevented if the demand-supply gap can be met domestically. This will help the economy to improve its Current Account Deficit. Also this implies that there is availability of domestic market which is not fully served by domestic starch production.

Raw Material Availability

Maizeis the common and vital raw material needed for manufacturing starch which is further processed into glucose and a number of other valuable products. Of the total production of maize in India, around9% of the maize is used for the production of starch and 33% for human composition. The break-up is shown below.

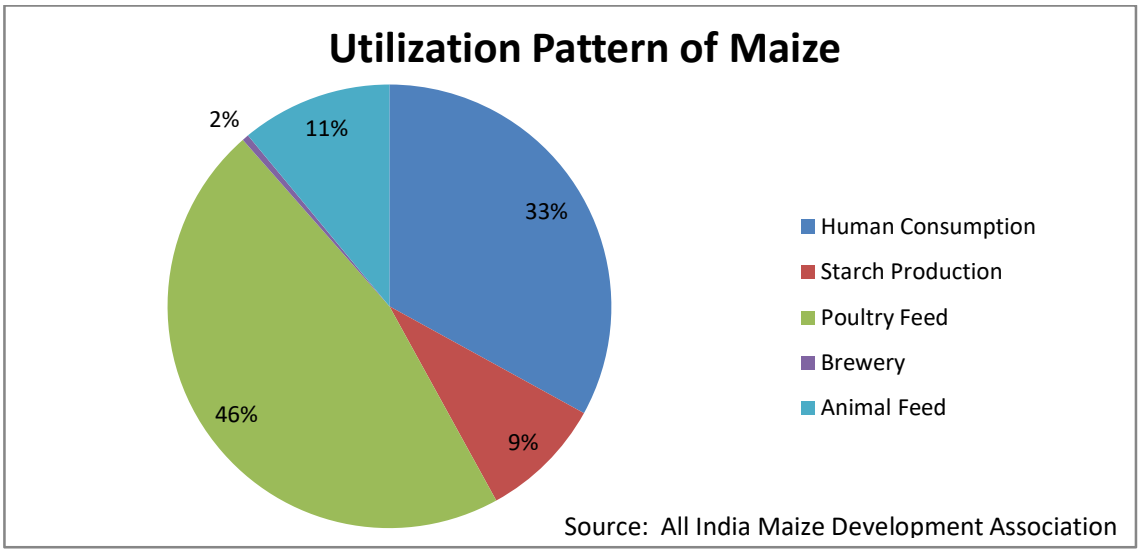


Figure VIII: Utilization Pattern off Maize

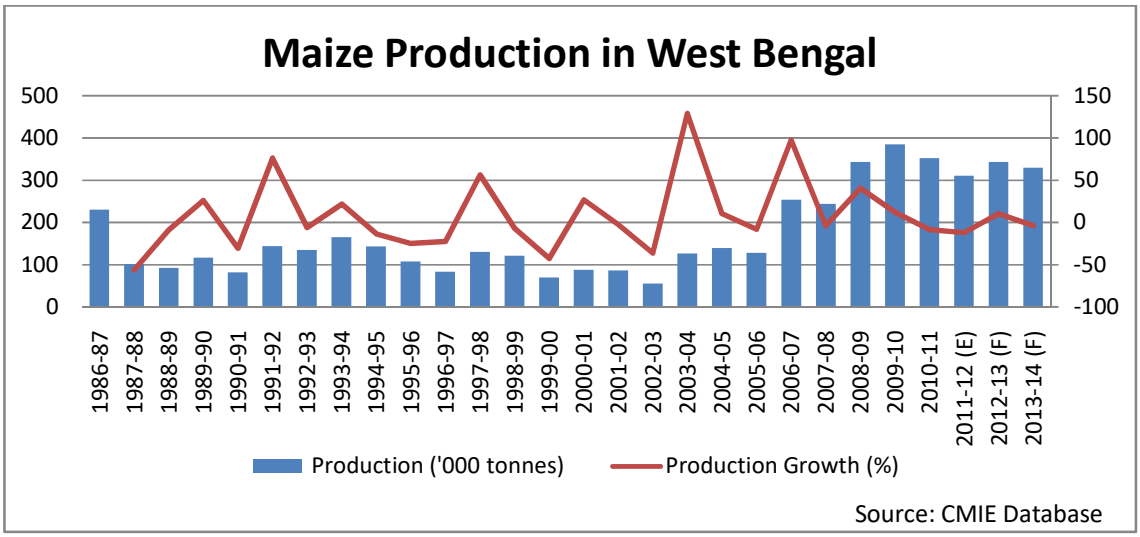


Figure IX: Production/Growth of Maize in WB

N.B: E=Estimated and F=Forecast

District-wise production : Maize (Source: CMIE Database)										
West Bengal : 2000-01 to 2010-11 : '000 tonnes										
	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Bankura	0.7	1	0.2	0.7	1.1	1.5	2.1	0.7	0.6	0.4
Barddhaman	0.1	0	0.1	0.4	0.3	0.5	0.8	0.9	1.1	0.9
Birbhum	0.9	0.5	0.4	0.3	0.2	0.2	0.4	0.6	0.7	0.8
Dakshin Dinajpur	0				0.3	0.2	4.1	1.5	1.1	2.3
Darjeeling	39.9	44.9	29.2	28	42	29.4	30.8	38.2	42.9	39.6
Haora		0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hugli	0			0	0	0.1	0.7	0.7	0.5	0.6
Jalpaiguri	5	2.2	3.1	18.2	20.6	22.5	23.1	25.4	29.1	23.7
Koch Bihar	0	0.1	0.1	0.5	11.2	22.6	35.2	57.6	48.8	62.6
Maldah	10.4	11.2	8.4	20.4	31.9	29.7	29.5	22.8	24.5	19.9
Murshidabad	1	0.1	0.2	6.3	8.8	23.9	34.4	19.5	17.9	18.1
Nadia	0.6	1.6	0.7	6.6	4.8	4.3	10.4	7.2	6.6	8.5
North 24 Parganas						0		0.2	0.3	0.8
Paschim Medinipur	3	1.6	0.3	1.6	1.5	2	1.8	1	2.2	2.9
Purba Medinipur		0								
Purulia	26.3	21.3	12.3	20.7	20.5	17.9	19.3	7	12.6	9.8
South 24 Parganas				1.2	0.7	0.5	0.5	0.6	0.6	0.4
Uttar Dinajpur	0.1	1.8	0.4	21.3	46.6	51.8	60.2	60.5	153.9	193.8

Table 2: District-wise Maize Production in WB Source: DSHB

From the above table, it is clear that the districts of north Bengal like Uttar Dinajpur, Koch Bihar, Darjeeling, Jalpaiguri, Malda and Murshidabad are the major corn growing districts.

Availability of Maize in theneighbouring States

Both Bihar and Jharkhand boast healthy cultivation of maize. As a result, supply of raw materials (maize) does not pose any threat. Districts of North Bengal and those adjacent to Bihar and Jharkhand with the exceptions of West Midnapur, Purulia and Bankura could be the potential locations for setting up of starch processing units.

Bihar has recently introduced 3 crop cultivation of maize thereby ensuring availability of the raw material throughout the year.

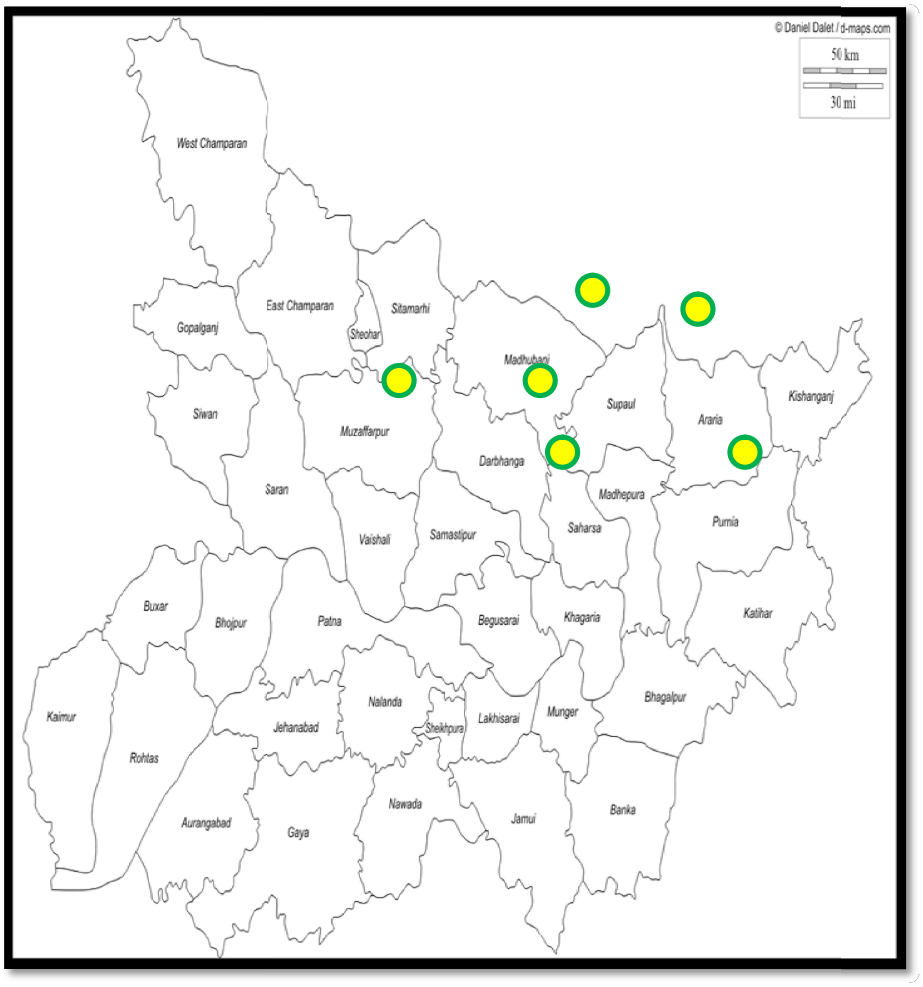


Figure x: Main Maize Growing Districts in Bihar

Bihar accounts for 7.3% of total Maize in India. It ranks 4th in terms of Production, Area coverage and Productivity.

Figure XI: Corn Tree

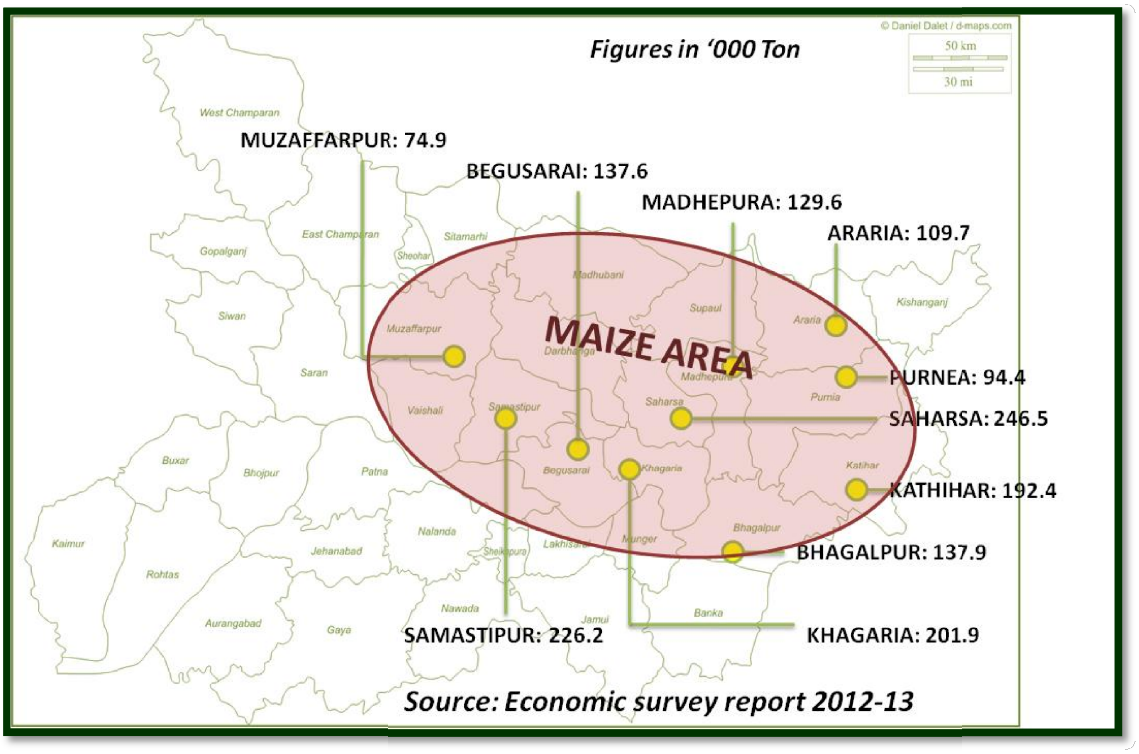


Figure XII: Maize cultivation zone in Bihar

Assistance under NMFP scheme

Assistance under the National Mission on Food Processing (NMFP), GOI Scheme for Technology Improvement / Establishment / Modernisation of Food Processing Industries during the tenure of the 12th plan is available to the extent of 25% of the cost of Plant and Machinery and technical Civil Works, subject to a maximum of Rs.50 lakhs in general areas (refer Appendix A).

Mapping of Supply Chain and Delivery Channel

The starch supply chain will consist of three main technical stages as shown:

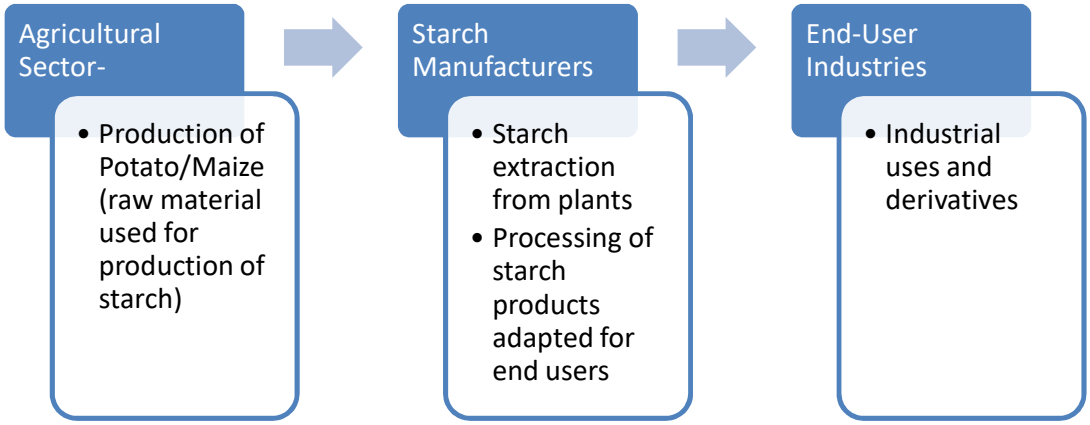


Figure X: Mapping of Supply Chain

- Starch supply chain is based on agricultural production of plants with high starch content. The type of raw materials processed varies depending upon their geographical location. In the past, potatoes were used for the production of starch.With gradual change in technology,maize is now more commonly processed into starch.
- Second stage is starch manufacturing, which consists of extracting starch and separating it from other molecules existing in the storage organ of the plants. Starch manufacturers extract native starch and also process it. Modified or hydrolysed starches are produced after processing the native starch. It is needless to say that the extraction of starch involves production of industrial residues (effluents) and several by-products or co-products such as cellulose and proteins, etc. These products can be high-value products like maize oil etc. which is used in numerous ways like cattle feed, energy source, etc.
- The final stage is undertaken by the end-user industries that process these starch products.Starch is used as a thickening material during the preparation of ketchup, noodles, etc. It has wide use in paper, jute, and textile industry.

Competition

Competitors

Today, the main commercial refined starch is corn-starch, tapioca, wheat and potato starch.A few of such manufacturers of starch are given below. For a comprehensive list, see Appendix B.

- **Gujarat**

  Anil Starch Products Ltd, Ahmedabad

  Maize Products Ltd, Ahmedabad

  Gujarat Ambuja Starch Products Ltd, Ahmedabad

  GulshanPolyols Ltd, Jhagadia Industrial Estate, Bharuch

- **Karnataka**

  Riddhi Siddhi Glucobiols Ltd, Gokak, Belgaum District

- **Maharashtra**

  Sahyadri Starch & Industries Ltd, MIDC, Miraj

  Universal Starch Products Ltd, Dhule

  Yaswant Glucose Ltd, Sangli

  Kissan Starch Ltd, Dhule

- **Madhya Pradesh**

  Rajaram Corn Products Ltd

  Tirupathi Starch Products Ltd, Indore

- **Tamil Nadu**

  Santhosh Maize & Industries Ltd, Salem

  Varalaxmi Starch Ltd, Salem

  Kamala Sugars Ltd, Coimbatore

- **Andhra Pradesh**

  Gayathri Starch Ltd, Hyderabad

  VensaBiotek Ltd, Samalkot

- **Punjab**

  Sukhjit Starch Products Ltd, Phagwara

- **Haryana**

  Bharat Starch Products Ltd, Haryana

Substitute

Arrowroot is a major substitute of Corn Starch.

Pure arrowroot, like other pure starches, is a light, white and odourlesspowder that can be used to prepare food. It is made with arrowroot tubers which contains about 23% starch. Arrowroot powder is primarily used to thicken foods and used as a healthier substitute for talc in cosmetics. It is very similar in appearance and consistency to cornstarch. Flour made from arrowroot starch is the perfect alternative to wheat flour when making baked goods. As such, it is still used today to make biscuits and cookies. Using arrowroot powder over other starches in cooking has additional advantages. Acidic ingredients have no affect on arrowroot, which makes it highly suitable for making perfectly clear jellies, glazes, and sauces made from fruits.Arrowroot also thickens foods at much lower temperatures than other starches without altering the food's colour or taste. It also holds up to freezing.

SWOT ANALYSIS

Strengths

- Corn production in the country has been growing steadily over the past five years. The anticipated production of maize during the period 2014-15 to 2017-18 will expand to 7 MT and above.
- Starch manufacturing from maize generates about 1 MT of by-products for every 2 MT of starch produced and these by-products are worth more per MT than maize itself making the starch manufacturing an economic venture.
- Availability of raw materials throughout the year following introduction of 3 crop cultivation in Bihar.
- Maize is becoming one of the cash crops for farmers, as a major part of it is usually sold for market. Further, there is no substitute for it particularly in rain fed condition and so farmers will continue to grow maize.
- Very few maize processing plants in West Bengal, and hence, shall not face any difficulty in marketing its products.
- Maize starch is a preferred product due to higher yield compared to its substitutes like potato starch and tapioca starch.
- The productivity of maize is high. It can still be raised. The higher is the productivity, the less is the cost of production.

Weaknesses

- Competition for maize procurement by the poultry feed industry would limit the raw material availability.

- No organised market/ single place for bulk procurement. Maize has to be procured from individual farmers or through middle men/traders. This may hamper regular availability or may cause price fluctuations.

Opportunities

- Demand for starch is high from varied users like food, pharmaceuticals, textiles, paper, packaging etc.

- Great export demand for corn gluten as a poultry feed in South East Asian countries.

- Substantial subsidies from the Govt. in investment in plant & machinery.

- Corn starch is identified as one of the ingredients for manufacture of biodegradable plastic. Demand for corn starch is expected to increase.

- Corn starch is a substrate (substance on which an enzyme acts) for manufacture of alcohol, which has been identified as an environment friendly fuel.

Threats

- Raw material availability may be adversely affected due to new entrants in West Bengal where raw materials availability is restricted and complemented by procurement from neighbouring states.

Technical Analysis

Starch

Diverse uses of starch make it a very versatile product. Maize or Corn Starch is a typical cereal starch with distinctly low protein and ash contents. Its carbohydrate content of high purity makes it usable in several industries.

Starch is found in nature in several ways. Maize contains about 66% of starch which can be separated by processes such as steeping, grinding, purifying and drying. The physico-chemical and functional properties of starch exhibit a wide variation with slight change in production parameters. One of the important properties of starch is viscosity of starch slurry. Normally, starch has near neutral pH. With increase in pH value, viscosity of starch tends to increase, allowing for multipleuses. This is commonly known as High Viscosity Starch and is used in the textile industry for sizing.

Maize Starch exhibits all the properties of native starch with some special features such as non-foaming & non-thinning characteristics of boiling solution. Hence maize starch has a marginal effect on the efficiency in weaving and paper industry. Where high viscosity starch is used, it imparts higher tensile strength to the fibre and thus, improves the sizing. The remarkable advantage over tapioca starch is short cooking time of less than an hour and uniform smoothness of paste. The foaming is also very less even at high pH.

Maize Starch

Maize is one of the important crops of India and has a greatprocessing potential due to its high nutritive value and commercial uses. Maize (also known as corn) is a common name for a cereal grass widely grown for food and livestock fodder. Maize ranks with wheat and rice as one of the world's chief grain crops. Starch is mostly produced from maize than any other crop.

The Composition of maize is shown in the next page.

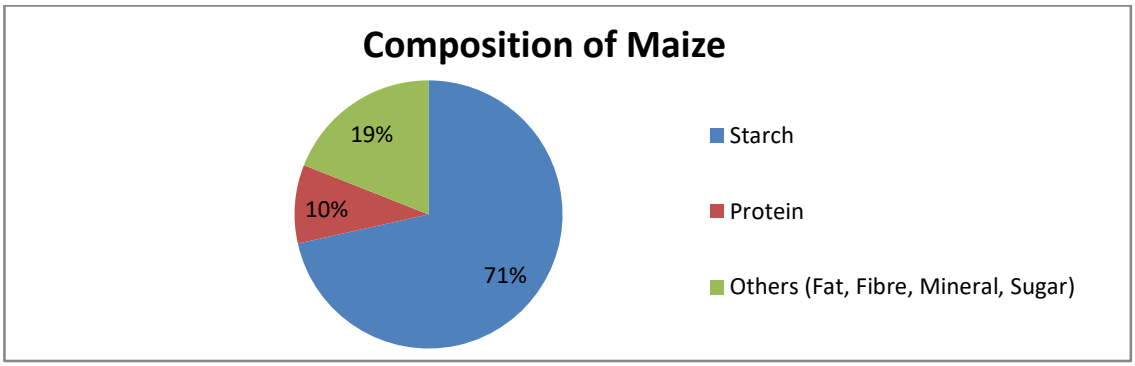


Figure XIV: Composition of Maize

Structural unit

Starch consists of two types of molecules, amylose (normally 20%-30%) and amylopectin(normally 70-80%).

Procedure

Maize starch is produced through a wet milling process. This involves grinding of softened corn and separation of germs (corn oil seeds), proteins (gluten), husk (fibres) and finally pure starch is derived.

Process of Manufacturing

There are five basic steps to accomplish the process of starch manufacturing.

- The corn is steeped for 30 to 48 hours, which ferments it slightly.
- Germ is then separated from the endosperm and those two components are grounded separately (still soaked).
- The starch is then removed from each by washing.
- The starch is separated from the corn steep liquor, the cereal germ, the fibres and the corn gluten mostly in hydro cyclones and centrifuges, and then dried.
- Residue from every stage is used in animal feed and to make corn oil.

The process of manufacturing is called wet milling. Finally, the starch may be modified for specific purposes. It is important to release the starch from the cell structure in particularwithout damaging the germ to obtain extracted corn starch with the minimum possible fat content. Thus, corn is first subjected to a 30 to 50-hour steeping process with the addition of sulphur dioxide before processing to make the corn grain amorphous in structure and achieve efficient separation of starch and gluten. In primary separation, this separation is effected by a highly efficient nozzle separator. After the starch phase has been washed with the aid of hydrocyclones, it is dewatered and dried or passed to a saccharification unit.

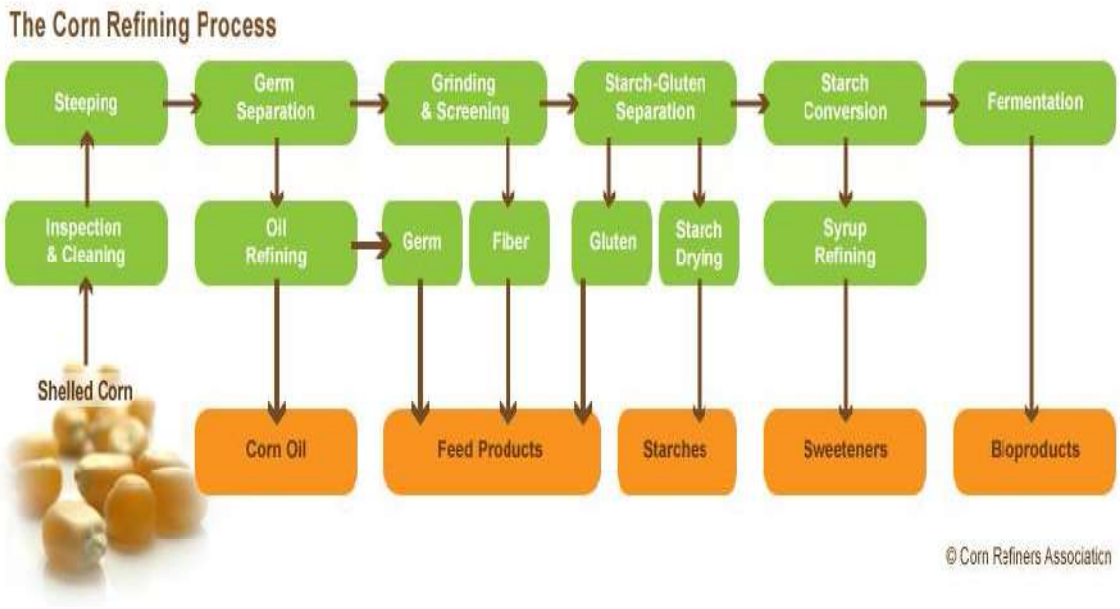


Figure XV: Process of Starch manufacturing from Maize

Manufacturing Process & Facilities

Starch can be manufactured by using Maize, Milo, Tapiocaand Potatoes. However India's climatic conditions and availability of raw material propels to manufacture starch using maize primarily.

Methods of Maize Processing

Maize is usually processed by two distinct processes, namely wet milling and dry milling. Drymilling produces grits, corn flour and minimum amount of corn meal. The technology hasbeen standardised by Central Food Technological Research Institute (CFTRI), Mysore. Dry milling units have a crushing capacity of 10 MT/day with aproject cost of a minimum of about Rs 30 lakhs. Such units can be set up anywhere depending uponthe availability of raw material, power and suitable land. The end products are consumed by the feed and snack food manufacturing industries.

Dry Milling

The maize kernels are screened, tempered with hot water/steam to loosen the germ andbran. Then it is de-germinated to remove the germ. The husk is separated by means ofaspirators. The de-germed maize is dried to a moisture content of 15-15.5 percent followed by sifting. It is then subjected to milling to produce grits, meal and flour. The germs separated isdried and passed through an expeller to produce the corn oil. The different products thatresult from dry milling are as under:

S. No.	Product	Share (%)
1	Grits	40
2	Coarse Meal	20
3	Germ	14
4	Fine Meal	10
5	Flour	5
6	Hominy Feed	10
7	Wastage	1

Table 3: Different Products from Dry Milling Source: IndiaStat

CFTRI has developed a mini mill for dry milling of maize. The grits is the main product of drymilling process;this is used as porridge by boiling domestically. The processing units usegrits for manufacture of products like ready-to-eat snacks (corn flakes), wall paper paste andmanufacture of glucose by direct hydrolysis. The process flow of dry milling is posited below:

Cleaning => Conditioning =>De-germinating => Drying & Cooling => Grading & Grinding =>

=>Sifting & Classifying => Purifying => Drying => Packaging

Wet Milling

Maize is generally processed to manufacture corn starch by wet milling method all over the world. The by-products of starch manufacture like corn oil, corn steep liquor, gluten etc are important value added products.

The grain is unloaded from the trucks directly in receiving area or stored in silos. The materials are fed to the cleaning section by a feed conveyor. The cleaning section is housed in 3 floors,where the material is screened for debris such as sand, stones and any other foreignparticles. The cleaned material is then sent to steeping section. It is received in a tank where itis washed with hot water first and subsequently steeped in water containing sulphur dioxide at 0.2 percent for 70 hrs at 52°C. Steeping softens the kernels and also removes somesoluble. Sulphur dioxide act as a preservative. The steep water produced in this process isthen concentrated and fortified with vitamins, minerals to produce corn steep liquor. It is thensubjected to primary and secondary grinding, wherein the germ and husk are separated.

Thede-germed maize is passed through a fibre washing section where the fibre (husk) isseparated by pressure washing. Now the mixture consists of gluten and starch. The gluten isseparated from starch by centrifugal separation. The starch slurry is then passed through a12 stage hydroclone washing system, wherein the starch is washed and concentratedsimultaneously. Starch slurry usually has a moisture content of 42 percent. The starch slurrythus obtained is diverted to various production lines for manufacture of liquid glucose andmodified starches such as dextrose, dextrose mono hydrate etc. The wet starch is then driedby hot air by passing through a drier. The dry starch has a moisture content of 11-12 percent.

The slurry containing gluten is passed through a rotary vacuum filter in which a portion of themoisture is removed followed by drying in a hot air drier. The dried gluten thus obtained hasa moisture content of 12 percent. The gluten is mainly used for poultry feed.

The average recovery of various products and co-products of maize during the wet milling are:

Starch - 60-62 %

Gluten - 8-9 %

Germ - 6-7 %

Husk - 22-24 %

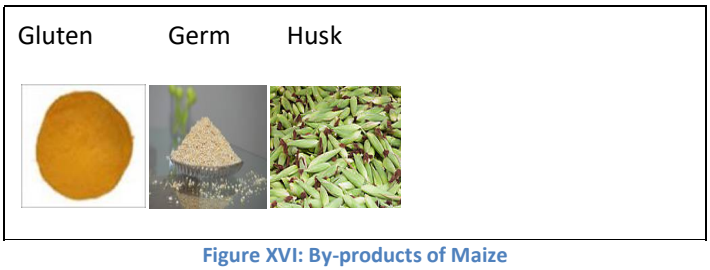


Figure XVI: By-products of Maize

The wet milling has developed into an industry that seeks optimum use and maximum value from each constituent of the maize kernel. In addition to starch and edible corn oil, the industry has become an important source of well-defined specialised ingredients used in feed formulation industry.

Technology

The technology used is indigenous except for starch-gluten separation and starch washing unit which is imported through companies like Alfa Laval. The entire plant can be fabricatedby the professional fabricators who are situated at Ahmedabad and few other parts of the country. There are a number of suppliers for setting up of the plant on turnkey basis.

A view of a maize wet milling unit is given in Fig. below:

Courtesy: The Kissan Sahakari Starch Mfg. Society Ltd. Dhule, Maharashtra

Starch is usually manufactured from maize by a process known as wet milling. The wet milling process is a complex process, which involves a series of operations, by which corn is separated into three parts- the outer hull or bran, the germ (the source of most of the corn oil) and the endosperm (the source of gluten and starch).

Detailed process of Maize Starch Extraction

- Germ Separation (De-germination)
- Fibre Washing
- Thickening
- Primary separation
- Gluten thickening
- Rotary vacuum filter
- Hydroclone system
- Drying

The critical operations which have a direct bearing on the quality of the final product are:

Raw material selection and cleaning - Good quality yellow dent corn without various impurities will increase the quality of the final product.

Steeping - Germination of maize and the microbial growth are controlled by steeping.

Hydroclone washing - The simultaneous washing and concentration of starch to the desiredmoisture and solid level increases the quality and marketability of the finished product.

The steps involved in the wet milling are presented below.

Corn Kernels

Receiving

The corn is transported to a unit in trucks in gunny bags and offloaded in receiving area or in silos. The receiving area should be designed in such a manner that there is enough space for smooth movement of expected number of vehicles. The grain is fed to the belt conveyor for taking the maize grains to cleaning section.

Cleaning

The grain contains various impurities like cobs, stones, metal parts, dust, other foreign matter etc. These unwanted materials are removed in cleaning section. The grain is passed over perforated metals sheets, air blowers, electromagnets to remove the impurities.

Cleaning Process in progress

Steeping

The grain is fed into large steep tanks with hot water at 52°C and steeped for 70 hrs. Generally, RCC steep tanks are used by the existing units in India. However, steep tanks can also be fabricated by stainless steel but it increases the capital cost. The RCC tanks should be designed in such a manner that it withstands the gravitational force as well as the weight of the material. Steeping mixture containing sulphur dioxide (SO_2) at 0.2 percent concentration in hot water is added in the steeping tanks to prevent germination and bacteria. The steeping process softens the maize kernels and loosens the bonds between germ, husk and endosperm making it suitable for the later processing steps. During the soaking process, nutrients are absorbed into water and this water subsequently evaporates to concentrate the nutrients to get corn steep liquor or condensed corn fermented extractives.

Soaking process in RCC Tanks

Grinding

The grinding process is completed in 2 stages. The grinders are made of stainless steel with adjustable RPM with or without pneumatic settings. There are a number of manufacturers of grinding machines in India. In the first stage, the steeped maize grains are grounded coarsely to loosen the husk and germ. The second stage of grinding, known as fine grinding, help in detaching the germ from the grain.

Grinding in progress

Germ Separation (De-germination)

The pasty mix obtained after fine grinding is pumped to water filled settling troughs- known as germ separators or de-germinators. It is a 3-stage process where the slurry containing soluble husk, gluten and starch are separated from germ. The lighter density rubbery germ float on the top and is skimmed off.

The germ is passed to germ drier which is finally sent to oil extraction unit. The germ contains 45 percent oil and the rest is crude fibre and moisture. The starch manufacturers generally prefer to sell germ rather than extract oil in oil extraction unit.

Germ Separators

Fibre Washing

The slurry of husk, starch and gluten is grounded for better recovery of starch. The fibre washing is a 6 stage process which is carried in DSM box. The husk is separated from the soluble starch and gluten slurry by a counter current flow system. The husk is sent to either drying section or used as animal feed in wet form. The husk is mainly carbohydrate and contains 8 percent protein.

Thickening

The slurry of starch and protein is passed through a centrifugal concentrator to get the concentrated slurry. This machine is also called milk stream thickener.

Primary separation

The thickened slurry is passed through a high speed centrifuge to separate the heavier starch from the lighter protein (Gluten).

GlutenSeparation

Gluten thickening

The protein slurry is passed through a centrifuge to get concentrated slurry of gluten. The gluten contains 65 percent protein and is a good source of protein for animals and is used in animal feed preparation.

Rotary vacuum filter

The thickened gluten slurry is further concentrated to get gluten cake with 40 percent solids through a rotary vacuum filter. The cake is further dried by hot air and / or sun to bring down the final moisture content to 12 percent.

Hydroclone system

The starch slurry received from the primary separation is passed through a multi stage hydroclone system which concentrates the starch slurry to 42 percent solid level. Alfa-Laval is the main company supplying this system in India for starch units.

Drying

The concentrated starch slurry is then dried by hot air application (175^0C) to reduce the moisture content to 11-12 percent. The main product of wet-milling of maize is starch. Besides, it produces four major co-products for the feed industry namely the steep water, husk (hulls or bran), germ and gluten.

These co-products represent about 25-30 percent of the processed maize. The starch is rawmaterial for various ancillary industries like dextrose monohydrate, dextrins, saccharin etc.For manufacture of further derivatives of starch, ancillary units need to be attached withstarch manufacturing units.

The wet milling has developed into an industry that seeks optimum use and maximum valuefrom each constituent of the maize kernel. In addition to starch and the various otherproducts, and edible corn oil, the industry has become an important source of well-definedspecialised ingredients used in feed formulation industry.

Effluent Treatment Plant

Effluent treatment plant is an essential component of a starch industry. It should be set up as per the norms of State Pollution Control Board. It has been made mandatory to set up an ETP in all starch manufacturing units.

Detailed process is shown by Flow Chart in AppendixC.

Plant and Machinery

Detailed Machinery required is described in Appendix D and the lists of suppliers are given in Appendix E.

CRITICAL FACTORS IN SETTING UP A MAIZEPROCESSING PLANT

Raw material

The viability of a maize processing plant depends upon the availability and uninterrupted supply ofraw material to the unit. On an average, a unit with a crushing capacity of 200 MT/ day will requireabout 60000 MT of maize per year (assuming 330 days of operation of the plant). Hence, theavailability of raw material is one of the important considerations in deciding the location of maizeprocessing unit.

Keeping in view the cropping pattern, consumption of maize by local populationand market surplus, it should not be a problem for aunit of above capacity to procure the raw material. The plant will be able toprocure major portion of its raw material requirement within a radius of 300 km. The yellow dent corn is most suitable for wet milling for manufacture of starch and other by-products.

Land

Land requirement of starch manufacturing unit is very high, as it requires large area to set upplant and machinery and effluent treatment plant. There should be enough land for disposalof treated waste water. A unit with crushing capacity of 200MT/day should have at least 8 to 10acres of land. However, if available at reasonable price, the unit may acquire excess land to meet future expansion requirements.

Water

The water requirement for the wet milling industry is relatively large with an average use of 4cum per MT of crushing per day. For a wet milling unit of 200 MT capacity, therefore, about 8lakh litres of water/day is required. The site where wet milling units are to be set up, should have agood source of water, preferably a perennial river, as the unit will also generate high amount ofsewage water, which require to be disposed of properly. In case water is to be sourcedfrom ground, the water table should be high and the areas should fall in white category ofunrestricted use.

Power

The average power requirement is about 170-250 units per day per MT of maize crushing.The milling unit requires uninterrupted power supply and hence a DG set is required asstand-by arrangement. The state is reported to be surplus in power and there shouldnot be any problem in respect of power supply. The power tariff in the state is also reasonable, which will help in viability of the unit.

Steam

Steam requirement is 1 ton / MT of maize crushing. The units manufacturing starch bywet milling in states like Maharashtra and Gujarat use coal for production of steam.However, alternative source of energy for boilers such as Biogasifiers coupled with Gas Generators could be an alternate choice.

Technology

Technology as already described before.

Manpower

Manpower requirement for a unit with crushing capacity of 200 MT/ day, running three shifts per day and operating for 330 days a year, is about 120.

SOCIAL AND ECONOMIC IMPACT OF THE PROJECT

Environmental Issues

The starch manufacture by wet milling process uses sulphur dioxide (SO_2) as preservativeduring the steeping process. The three main pollutants which are released into theatmosphere during the wet milling process are volatile organic compounds, sulphur dioxide(SO_2) and particulate matter. The SO_2 is released during the process of initial steepingand evaporation. The emission levels of these pollutants by maize processingindustries are usually quite low.

However, to mitigate the effect of hazardous pollutants, an Effluent Treatment Plant (ETP) has been mademandatory for maize processing industry by the Government of India. The treated water canbe utilised for agricultural purposes within the permitted BOD level of 30 PPM. Financialsupport in the form of capital subsidy is also available from the Union Ministry of Environment andForestsfor this purpose.

Economic Impact

Maize wet milling unit will have positive economic impact as it will utilise its by-productsto produce value added product. It will reduce the dependence on other states for import ofstarch and other maize products. Farmers in the state will be benefited because there will be aready market for their main seasonal crop. The units importing starch from other stateswill get their raw materials within the state at a lower rate.

Employment opportunities

The wet milling unit will create both direct and indirect employment opportunities. Themanpower requirement of the unit is given in Appendix G. The unit will createemployment opportunities for about 120 skilled and unskilled workers directly. The chain will go on increasing down the line in procurement and marketing.

The indirect employmentopportunities around the unit are estimated as under:

S.No.	Particulars		Labour requirement per day
1	Procurement and transport of raw material		30
2	Handling and transport of finishedgoods	30	
3	Marketing of finished goods		200
4	Business opportunities around theunit	20	
		Total	280

It is observed from the above Table that the indirect employment generation is fourtimes the direct employment opportunities.

Storage Facilities:

West Bengal lacks in the Cold Storage facility. The current capacity in the state is as given below:

Status of Cold Storage Capacity in West Bengal (As on 04.05.2012) (In ' 000 MT)			
State	**Cold Storage Requirement**	**Present Capacity**	**Gap**
West Bengal	10566	5682	4884
India	61130	24298	36832

Table 4: Cold Storage Capacity Source: IndiaStat

Output Analysis:

Maize Starch Final Composition	
% Moisture (Max)	14
% Ash (Max)	0.25
% Soluble (Max)	0.5
% Ether extract (Max)	0.25
Acidity (5 grams in 100 ml alcohol)	Not more than 1 ml. of 0.1 N NaOH
% Protein	0.5
Viscosity of 3% paste by ostawald Viscometer at 75°C.	38 to 42 seconds
pH of 10% suspension	4.5 to 7

Table 5: Output Analysis Source: IndiaStat

MARKET OPPORTUNITIES

STATUS OF MARKETING OF MAIZE PRODUCTS IN INDIA

Starch is the main product of a maize processing unit, which is consumed in various other industries like food, pharmaceutical, textile, paper, hotels and restaurants etc. The other products include Gluten, Germ, Fibre (husk) and Corn Steep Liquor. Gluten has greatdemand in animal feed industry because of its high protein content (70%).

Germ is expressed to extract germ oil which is used to manufacture edible oil containing low cholesterol. Fibre, i.e., the husk, is used by animal feed manufacturers. It has demand in wet form itself as animal feed. Corn Steep Liquor is one of the substrates for culture media for manufacturing of antibiotics and other microbial production systems.

In India Mumbai, Delhi, Ahmedabad and Kolkata are the major markets for processed maizeproducts. Other important markets include Bhopal, Hyderabad, Chandigarh, Lucknow,Bangalore etc. Most of the starch manufacturers of Gujarat, Maharashtra, Punjab, etc have their marketing offices in Mumbai. Hence, Ahmedabad and Mumbai are the major tradingcentres for corn starch in India.

Maize processors directly market their products to the consumers like pharmaceuticalindustries, hotels, textiles, paper industries, etc. and through traders as well. Most of themhave their marketing offices in metros and big cities for direct sale. They also sell throughtrading agencies as well.

Therefore, it is advisable for a maize processor to have processing facilities for starch and its derivatives like liquid glucose, dextrose monohydrate, etc. Also, different industries require different typesof starch and the processor should be able to meet their demand to compete in the market.

Starch and Gluten have good export potential as well. India exports these products to SriLanka, South East Asian countries, Bangladesh and South Africa.

Market Identification

The use of starch varied.When combined with resins starch produces a permanent finish. It is also used as a good filler and binder in tablets due to its superior binding capacity. Starch is a vital additive in most of the adhesives. In slurry, starch provides body to the food products and also helps in retaining the viscosity. Besides this, it isexcellent filler in cosmetics by virtue of its smoothness in dry form. It also comes handy in production of bakery products by participating in Maillard's reaction in presence of proteins to give the brown colour.

By virtue of its superior uniformity and stability of water solution, starch is preferred over any other material when it comes to sizing, finishing and printing. Starch not only offers an easy solution for filling the interstices of the weave but is also economically viable in use. Some of the major applications of starch and its prospective market are:

Textile Industry

Textile engineers find starch suitable for all types of clothes and yarns as it offers a wide titration of parameters such as viscosity, binding strength and compatibility with thermoplastic and thermosetting resins for a permanent finish and back filling. Also, starch has added advantage of being washed away easily from the fabric. Some of the textile players in India are Phoenix Mills, Vardhaman Textile, DCM, Ambika Cotton, Morarjee Textiles, Abhishek Industries, Oswal Spinning etc (Comprehensive List in Appendix F).

Pharmaceutical Industry

A pharmacist uses starch as a tablet binder in excipient. Also, it is used as a disintegrating agent in the dispersible tablets and in sustained release formulations. Some of the key players in India are Sun Pharma, Cipla, Merck, Dr. Reddy Labs, etc. (Comprehensive List in Appendix F)

Household (as an end product)

The ubiquitous nature of starch does not go unnoticed due to its presence in food products such as ketchups, ice-creams, cakes, biscuits, chocolates, wafers, dry-cell batteries, detergents, etc. Starch also finds use in adhesives and gums. The soft and silky feel of starch is used in talcum powder. Also starch is used for blasting sound in crackers.

Paper Industry

The use of starchin the paper industry is extensive, for it enhances bursting and tensile strength, elongation, fold endurance, pick resistance etc. It also improves printability of papers by inhibiting ink penetration and forming a hard firm surface. Some of the key players in India are Ballarpur Industries, Ruchira Papers, Emami Paper, ITC, JK Paper etc. (ComprehensiveList in Appendix F).

FMCG Industry

Starch is much in use in the FMCG industry. It is used as a thickening material in the preparation of products like ketchup, cereals, noodles, pasta, bread, jelly bean etc. Some of the key FMCG players India are Hindustan Unilever Ltd., Procter & Gamble, Colgate-Palmolive, Britannia, SABMiller, Marico, etc.

Due to high usage of starch in industries as an ingredient for the manufacturing of several products, a huge B2B market exists.Consumption of starch in global markets has been forecast to reach 133.5 million metric tons by 2018, driven primarily by the diversity and sheer number of end-use applications in both food and non-food industries.The food industry is the largest end-use sector. Having gained a strong foothold in the food industry, starch has now become an integral component for several day-to-day products such as medicines, cosmetics, toothpaste, building material, polish, paper and many more(ComprehensiveList in Appendix F).

The US is the world's largest supplier of starch, followed by China, where activity has increased manifold in recent years. Although developed markets such as the US and Europe have traditionally been the biggest consumers of starch, recent growthsof the global starch market has been particularly driven by developing markets in Asia-Pacific.

Sales and Marketing activities

Manufacturing companies require Industrial marketing mainly when it comes to B2B segment. This department is important and is necessary to allocate a separate sales and marketing department which will maintain direct relationship with clients. High quality products will not only cater to the local market, but overseas markets as well. Export will be one of the key areas of focus for business.

Exports Section

A separate export department will be designed to cater to the needs of the international clients and tap the international market.

Export Market

The international market would include but not limited to the following:

Maize Starch Largest Importers Worldwide (2012):

Reporter Name	Quantity (in Kg)	Share in World's Total Import (%)
Germany	157266973	27.1%
Malaysia	48365495	8.3%
Mexico	43293418	7.5%
Poland	39864339	6.9%
Belgium	36823110	6.3%

Table 6: Maize Starch Largest Importers (2012) Source: WITS World Bank

Product

The details of the product items and product lines which can be offered are as under:

Starches:

- Modified Starches
- Unmodified Starches

Sweeteners

- Liquid Glucose
- Speciality Glucose

By-Products

- Maize Gluten Meals
- Maize Steeping Liquor
- Maize Oil Cake

By-products

The by-products from maize industries find various applications:

- **Maize (Corn) Steep Liquor:** It contains amino acids, proteins and is used by antibiotics drug manufacturers. Also it is a large source of biogas, which is being used as fuel for driers, boilers, etc.
- **Maize Gum:** Corn Oil is produced by expelling oil from the germs. Corn Oil finds applications in food and other chemical industries. Maize oil cake obtained after expelling oil is used as cattle and poultry feeds.
- **Maize Gluten:** Maize Gluten contains high protein content and it is used as cattle and poultry feeds.
- **Maize Husk:** It contains starch, protein and fat as minor components and mainly consumed as cattle feed.

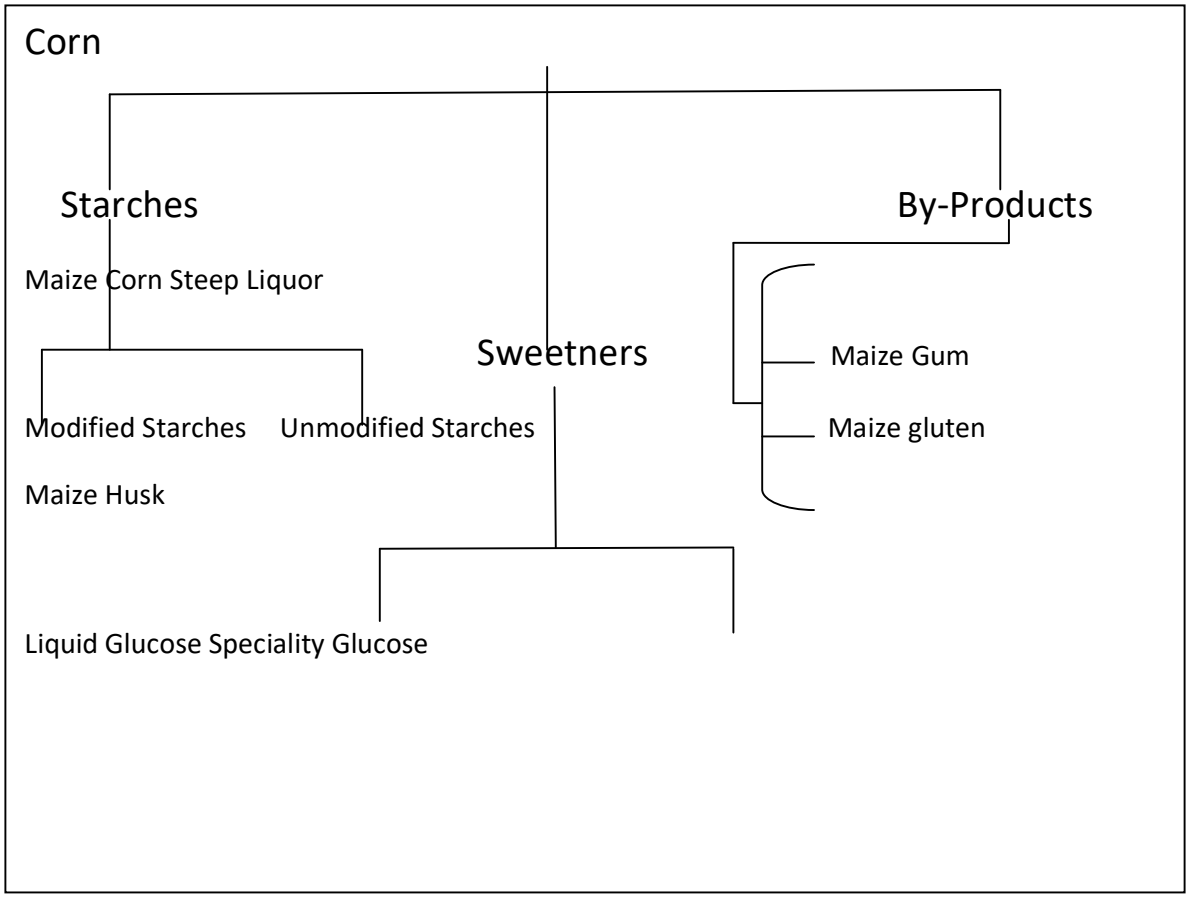


Figure XIIII: Products of Corn

Pricing

Since the industrial products vary in nature to a great extent there is no need of fixed price for the product. However, high charges can be levied provided the quality and standard are exceptionally good.

Suggested Organizational Chart

Departments:

In the proposed project following departments will comprise the structure:

1. Production
2. Engineering
3. Commercial
4. Quality Assurance
5. Accounts Department

Structure:

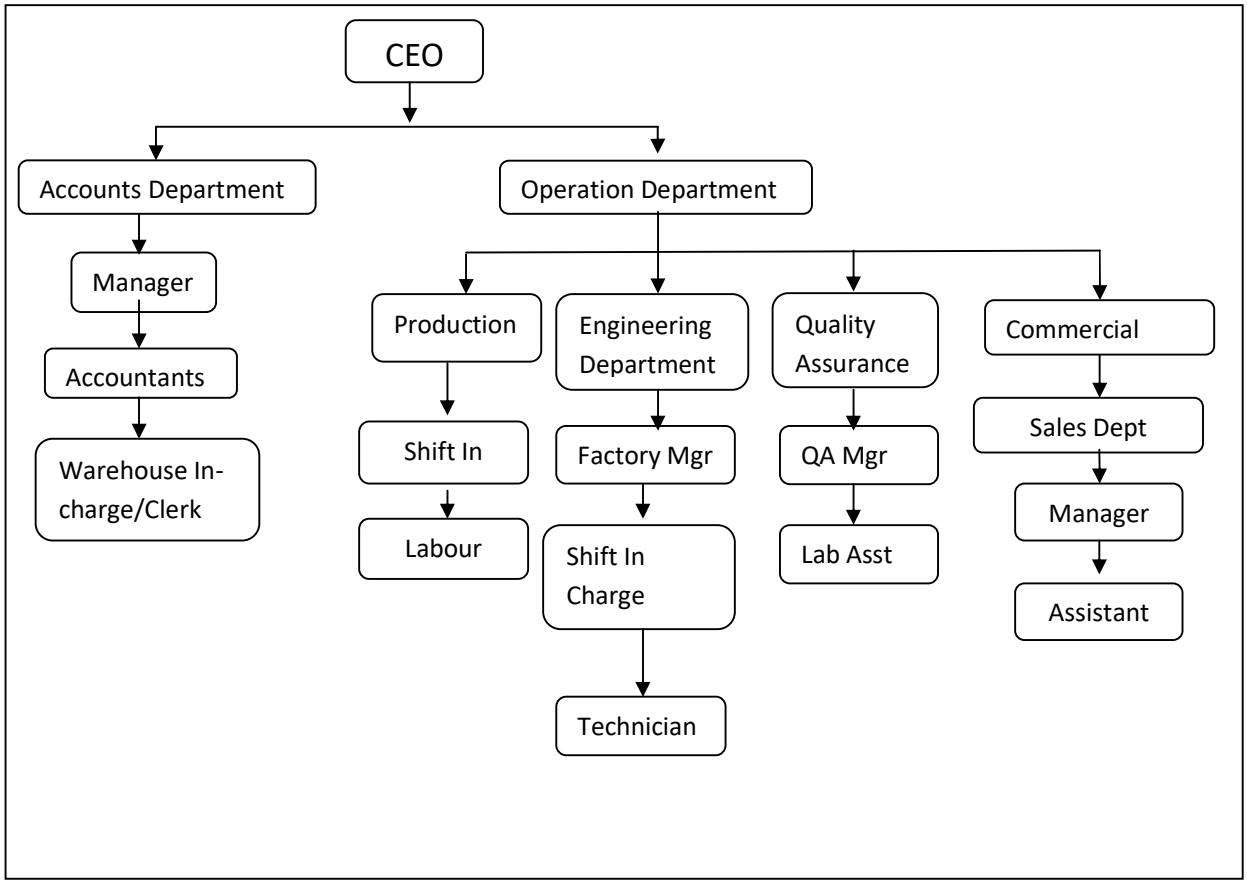


Figure XIIIIII: Organizational Analysis

Financial Analysis

Financial Evaluation

Profitability

According to the projected income statement, the project will start generating profit from the first year of operation. Important ratios such as profit to total sales, net profit to equity (return on equity) and net profit plus interest on total investment (return on total investment) show an increasing trend during the life-time of the project.

The income statement and the other indicators of profitability show that the project is viable

Break-even Analysis

The break-even point of the project including cost of finance when it starts to operate at full capacity is estimated by using income statement projection.

Break Even = Fixed Cost/ (Sales – Variable Cost)

Pay Back Period

The investment cost and income statement projection are used to project the pay-back period. The project's initial investment will be fully recovered within 7 years.

Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 19%.

Economic Benefits

The project can create employment for 120 persons. In addition to supply of the domestic needs, the project will generate Rs 2432 lacs in terms of tax revenue.

Details of Financial Projections given in Appendix - G.

Ecological Analysis

Environment concerns significantly determine the feasibility of any project. A life cycle assessment also known as LCA is a well-known method used to analyse the environmental impacts of a product/project. An LCA quantifies the potential environmental effects of a project over its entire life cycle, thus, taking into account the extraction of raw materials, the production of the materials and the product, the use and the end-of-life treatment.

The environmental profile of final products is divided into two:

- The contribution of agriculture
- The industrial processes for the production of final products

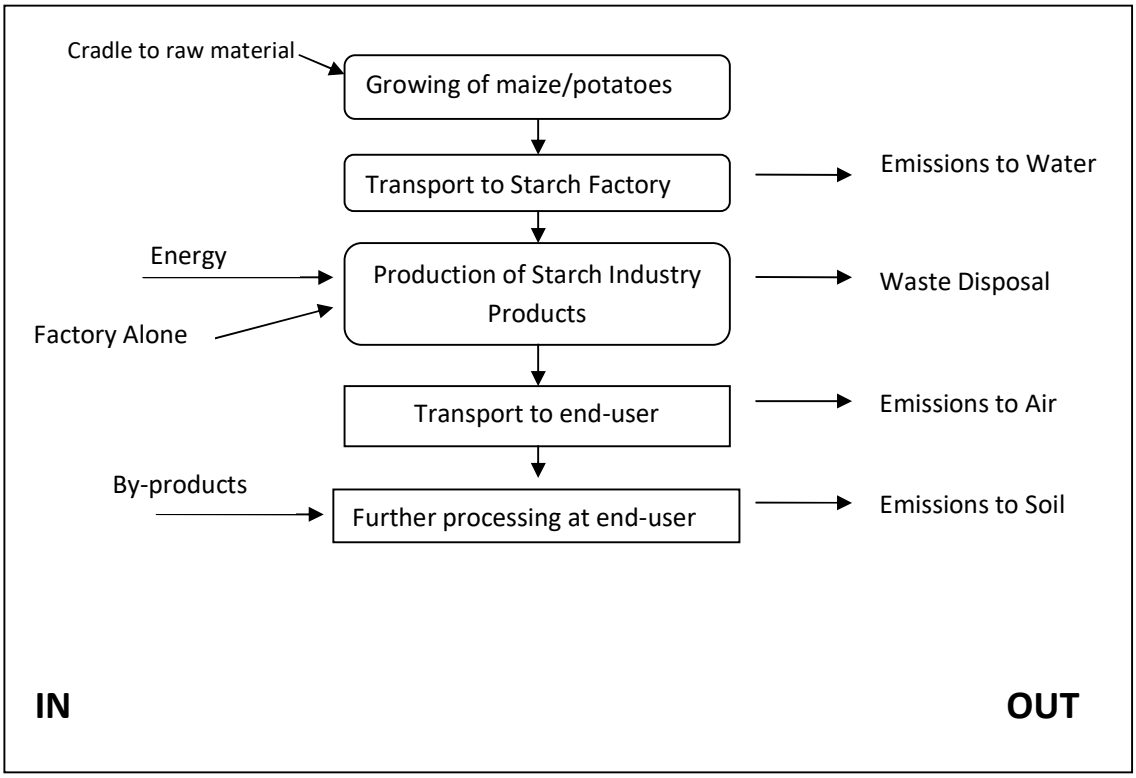


Figure IX: LCA analysis

The following life cycle stages (as detailed in the above figure) are included in the cradle to gate approach:

- ***Cradle-to-raw materials:*** Alsotermed upstream process for starch production, it includes the production of raw materials used (e.g. growing of maize, potatoes), the production of energy, the production of chemicals needed for starch production (caustic soda, hydrochloric acid etc.)
- ***Factory alone/gate-to-gate:*** This focuses on the companies producing all co-products and by-products.
- ***Transport step:*** Transport of raw materials from the field/storage to the starch plants is included here. Transportation from the factory (AAF member companies) to customers is excluded.

In order to implement the various pollution control measures, an Effluent Treatment Plant has to be set up for the purpose.

Legal and Administrative Analysis

Legal

Policy Initiatives

The food processing sector is critical to India's development, as it establishes a vital linkage and synergy between the two pillars of the economy—Industry and Agriculture. Liberalisation and opening up of the economy has thrown up new opportunities in the food-processing sector which has opened new vistas for growth. Several policy measures have been taken with regard to regulation and control, export and import, fiscal policy, exchange and interest rate control, taxation, etc. Food processing and agro industries have been accorded high priority by the government with a number of important relieves and incentives. Some of the important policy changes towards food processing industry are as follows:

Regulation and Control:

- Most of the processed food items have been exempted from the purview of licensing under the Industries Development and Regulation Act, 1951, except items reserved for small-scale sector and alcoholic beverages.
- As per extant policy Foreign Direct Investment up to 100% is permitted under the automatic route in the food infrastructure like Food Park, Cold Chain and Warehousing.
- No industrial license is required for almost all of the food and agro processing industries except for some items like beer, potable alcohol and wines, cane sugar, hydrogenated animal fats and oils etc. and items reserved for exclusive manufacture in the small scale sector. Items reserved for S.S.I. include pickles and chutneys, bread, confectionery, excluding chocolate, toffee and chewing-gum, rapeseed, mustard, sesame and groundnut oils (except solvent extracted), ground and processed spices other than spice oil and oleoresins, sweetened cashew nut products, tapioca sago and tapioca flour.
- Use of foreign brand names is now freely permitted by the government.
- MRTP (Monopolies and Restrictive Trade Practices Act) rules and FERA (Foreign Exchange Regulation Act) regulations have been relaxed and given more freedom to encourage investment and expansion by large Corporates.

- Most of the items can be freely imported and exported except for items in the negative lists for imports and exports. Capital goods are also freely importable, including second hand ones in the food-processing sector.

Tax Incentives

- Custom duty rates have been substantially reduced on food processing plant and equipments, as well as on raw materials and intermediate goods especially for export production.
- Corporate taxes have been reduced. There are tax incentives for new manufacturing units for certain number of years, except for industries like beer, wine, aerated water using flavouring concentrates, confectionery, chocolates etc.

Export promotion:

- Food processing industry is one of the growing areas identified for exports. Free Trade Zones (FTZ) and Export Processing Zones (EPZ) have been set up with all infrastructures. Also, setting up of 100% Export Oriented Units (EOU) is encouraged. They may import free of duty all types of goods, including capital goods.
- Capital goods, including spares up to 20% of the CIF value of the capital goods may be imported at a concessional rate of Customs duty subject to certain export obligations under the EPCG scheme, Export Promotion Capital Goods. Export linked duty free imports are also allowed.
- Units in EPZ/FTZ and 100% Export oriented units can retain 50% of foreign exchange receipts in foreign currency accounts.
- 50% of the production of EPZ/FTZ and 100% EOU units are saleable in domestic tariff area.

The government of West Bengal will provide incentives to units. These have been outlined in Appendix K

Food laws and Regulations

Types of food safety and quality standards that apply in most countries are elucidated as under:

Food Safety and Standards Act

Food Safety and Standards Act, 2006 passed by the Indian Parliamentoverrides all other food related laws. It specifically repeals eight laws:

- The Prevention of Food Adulteration Act, 1954
- The Fruit Products Order, 1955
- The Meat Food Products Order, 1973
- The Vegetable Oil Products (Control) Order, 1947
- The Edible Oils Packaging (Regulation) Order, 1998
- The Solvent Extracted Oil, De Oiled Meal, and Edible Flour (Control) Order, 1967

- The Milk and Milk Products Order, 1992
- Essential Commodities Act, 1955 relating to food

The Act establishes a new national regulatory body, the Food Safety and Standards Authority of India, to develop science based standards for food and to regulate and monitor the manufacture, processing, storage, distribution, sale and import of food so as to ensure the availability of safe and wholesome food fit for human consumption.

- Prevention of Food Adulteration Act (PFA) of 1954 and the PFA Rules of 1955 protects India against impure, unsafe and fraudulently labelled foods. It includes measures like food colour, preservatives, pesticide residues, packaging & labelling and regulation of sales.
- Standards for weights and measures are administered by the Ministry of Consumer Affairs, Food and Public Distribution under the Standards of Weights and Measures Act, 1976. All weights or measures must be recorded in metric units and certain commodities can only be packed in specified quantities (weight, measure or number).
- Essential Commodities Act, 1955 regulate the manufacture, commerce and distribution of essential commodities, including food.
- Consumer Protection Act, 1986provides for formation of District Forum/State/National Commission for settlement of disputes between the seller/service provider and the consumer.
- The Insecticide Act, 1968envisages safe use of insecticides so as to ensure that the leftover chemical residues do not pose any health hazard.
- Export (Quality Control and Inspection) Act, 1963aims at facilitating export trade through quality control and inspection before the products are sold to international buyers.
- Environment Protection Act, 1986incorporates rules for the manufacture, use, import and storage of hazardous microorganisms / substances / cells used as foodstuff.

Approvals Required

Phase I: Inception

Registration of Company

Authority: Registrar of Companies, West Bengal

Process: i. Apply for Name

ii. Drafting of MoA (Memorandum of Association) &AoA (Article of Association)

iii. Company Incorporation:

- Declaration of Compliance
- Situation of Registered Office
- Filing of particulars of Directors etc.
- Commencement of Business

Starting a Business

- Project Identification
- Preparation of Detailed Project Report
- Site Selection

Industrial License

Authority: Secretariat for Industrial Assistance, Department of Industrial Policy and Promotion

Industrial Entrepreneurs Memorandum

Department: Secretariat of Industrial Assistance, Department of Industrial Policy and Promotion

Phase II: Establishment

Purchase of Land

Direct acquisition under the Land Acquisition Act:Traditionally this has been the favoured mechanism for procuring land for industrial units. The legal framework for land acquisition permits for acquisition of large tracts of land though a unified process that vests the land free of encumbrances with the government. Subsequently such land can be transferred by way of long term lease to the industrial unit.

*Reallocation of unutilised land from existing project:*Industrial units that were historically allocated land on long term leases and have since stopped utilising the same due to closure of operations may have huge tracts of unutilised land which can be reutilised for facilitating new industry

Allocation of land in land banks, industrial areas and special investment regions etc.: Various State Governments have undertaken suo-moto land acquisition processes to create ready land banks for allocation to new industrial units.

*Purchase of private land:*Land may also be acquired directly by the Entrepreneur from the land owners through private purchase. Depending on the prevailing legal framework and administrative mechanism of a state, this process can be time consuming and fraught with risks and prone to irregularities.

Mutation of Land for Conversion

Authority: Revenue Inspector at Gram Panchayat level BLLRO at the Block or PanchayatSamitylevel

Clearance under Town and Country planning Act

Authority: a) Zilla Parishad b) Notified Area DevelopmentAuthority

Urban Land Ceiling Clearance

Authority**:** a) Sub-Divisional Officer b) DLLR

Feasibility Report of Power

Authority: West Bengal State Electricity Board

VAT Registration

Authority: Deputy Commissioner or Assistant Commissioner, Commercial Tax Office

Central Excise registration

Authority: Commissioner of Central Excise or Asst.Commissioner, BranchOffice, at the respective district

Service tax registration

Authority: Superintendent of Central Excise having jurisdiction

Fire License

Authority: a) Directorate of Fire Service

b) District Magistrate

c) Panchayat& Municipality

d) Collector, Fire License Section

Environmental Clearance:

Authority: Ministry of Environment & Forest, Government of India &West Bengal Environment Impact Assessment Authority

Pollution Control Board

Authority: Central and State Pollution Control Board

Phase III: Commencement

Trade License

Authority: Concerned Gram Panchayat or Local Municipality

Factory and Industrial Approval

Authority: Chief Inspector of Factories, Directorate of Factory, West Bengal

Activity:Apply for Registration & Licensing, Notice of Occupation

Project Summary

Setting up of a starch manufacturing unit in West Bengal is viable. The districts of North Bengal are most suitable for such a unit. According to West Bengal government's Industrial policy, the regions would fall under Zone D, and Scale 1 (below 100 lacs of investment).

Starch manufacturing is a capital intensive industry, and thus, setting up of a unit requires huge capital investment. Hence, the industry falls under large category of industry. Further power is a crucial factor. West Bengal, by virtue of being a power surplus state, is very well suited to harbour such an industry.Labour requirement is around 120.Raw material will be sourced from the districts of North Bengal and Bihar. The industrial unit will be eligible for incentives under NMFP as well as under state government's industrial policy (see Appendix K).

Maize starch production will be coupled with the generation of by-products (like gluten, germ and husk), that themselves have separate markets, and in turn raises the profitability of the business.As per our estimates, the project would start generating profit from the very first year itself and would have a pay back period and IRR of 7 years and 19% respectively.

The main markets of maize starch are paper, FMCG, textiles and pharmaceutical industries. Apart from catering to the domestic market, units can export to international markets like Germany, Malaysia, Mexico, Poland, Belgium and others.

Appendix A

Ministry of Food Processing Industries

Govt. of India

SNAP SHOT OF SCHEMES AND PATTERN OF ASSISTANCE UNDER NMFP (2013-17)

S. No.	Scheme	Grant-in-aid (2013-17)			
	NMFP	**General Areas**	**Difficult areas including Hilly areas like J&K, H.P., Uttarakhand & ITDP areas**	**NE States including Sikkim**	**Maximum limit of Grant-in-aid**
1	Technology Up-gradation/Establishment/Modernisation of FPIs (Cost of Plant & Machinery & Technical Civil Works)	25%	33.33%	50%	Max. Rs.50 lakhs (for general areas) Max. Rs.75 lakhs (for difficult areas) Max. Rs.100 lakhs (for NE States)
2	Cold Chain for Non-Horticulture products	35%	50%	50%	Max. Rs.5 crores Interest subvention @ 6% & 7%/per year subject to max of Rs.2/3 crores in general areas and difficult areas for 5/7 years, respectively.
3	Abattoir (Plant & Machinery, Technical Civil Works)	50%	75%	75%	Max. Rs.15 crores or interest subvention max of Rs.6 crores for 3 years for general areas and Rs.9 crores for 5 years in NE/ Difficult areas, respectively.
4	HRD				
	1. Infrastructure for running Degree/ Diploma course	---	---	---	Max. Rs. 100 lakhs
	2. EDP	---	---	---	Max. Rs. 3 lakhs
	3. FPTC				
	(a) Single Product Line				

	(i) Fixed Capital Cost	---	---	---	Max. Rs. 6 lakhs
	(ii) Revolving Seed Capital	---	---	---	Max. Rs. 3 lakhs
	(b) Multi Product Line				
	(i) Fixed Capital Cost	---	---	---	Max. Rs. 15 lakhs
	(ii) Revolving Seed Capital	---	---	---	Max. Rs. 5 lakhs
5	Promotional Activities				
	a. Organizing Seminar/Workshops	50%	50%	50%	Max. Rs. 4 lakhs
	b. Conducting Studies/Surveys	50%	50%	50%	Max. Rs. 4 lakhs
	c. Support to Exhibitions/Fairs	--	--	--	Quantum of assistance will depend on merits of the proposal
	d. Advertisement & Publicity	--	--	--	
6	Scheme for Creating Primary Processing Centers/ Collection Centers in Rural Areas	50%	75%	75%	Max Rs.2.50 crores (for general & difficult areas including NE States)
7	Modernisation of Meat Shops.	50%	75%	75%	Max Rs.5 lakhs (for general & difficult areas including NE States)
8	Reefer Vehicles	50%	50%	50%	Max Rs.50 lakhs (for general & difficult areas including NE States)
9	Old Food Parks	--	--	--	Left over liabilities to be met from NMFP funds

Appendix B

List of major starch manufacturing units in India

Maize Poducts, P.O. Kathwada,
Ahmedabad,
Gujarat - 382430

Saahil Organics, NR. Shailesh Park,
B/H L.D. Engg. Hostel Polytechnic,
Ahmedabad, Gujarat-380015

Anil Products, Anil Road,
Post BoxNo.10009, Ahmedabad
Gujarat - 380 025

Riddhi Siddhi Starch
Viramgaon, Ahmedabad,

Kashyap Sweetners
Vapi, Ahmedabad,
Gujarat

Ambuja Proteins Ltd
Heemat Nagar, Ahmedabad,
Gujarat

The Kissan Sahakari Starch Mfg. Soc. Ltd.
Mumbai-Agra Road, (Bladi-Nyahalod Fata),
Deopur, Dhule,
Maharashtra - 424005

Universal Starch Chemical Allied Ltd.
Jay Palace, Hawai Mahal,
Maharana Pratap Sinh Marg,
Dadanagar, Dodaicha,
Maharashtra – 425498,

Sahayadri Starch
Sangli, Maharashtra

Yaswant Starch
Sirola, Maharashtra

Tirupathi Starch
Indore, Madhya Pradesh

Rajaram Brothers
Mhow Neemuch Road, Mandsaur,
Madhya Pradesh - 458 001

Kashyap Sweetners
Ratlam, Madhya Pradesh

Riddhi Siddhi Starch
Gogak, Near Balgaon,
Karnataka

Devji AgroPvtLtd
Kolapur, Maharashtra

Sukhjeet Starchand Chemical Ltd
Sarai road, Phagwara,
Punjab-144001

Rajaram Maize Products
Komal Niwas, Kailash Nagar, Rajnandgaon
Chhattisgarh - 491 441

Santosh Starch Products Ltd
71, New cloth Market,
Ahmedabad-380007

Jaychandra Agro Industries Pvt. Ltd
Mhatre Pen Building, Bwing,
II floor, Senapati Bapat Marg,
Dadar (West), Mumbai-400028

DSQ Biotech
Origin Agro Starch,
Kadhur, Tamil Nadu

Basant Dada Patil Makka Prakariya Karkhana Ltd.
Sangli, Maharashtra

The Sukhjit Starch & Chemicals Ltd.
Sarai Road, Phagwara, Punjab India

Pratik Products
Gundawadi Police Gate, Canal Road, Rajkot, Gujarat India

Vighnaharta Cargo Services
Office No. - 001, Plot No. - 54A, Sector - 50 (Old), Seawood, Navi Mumbai, Maharashtra India

Mona Exim Inc.
Kandivali (west), Mumbai, Maharashtra India

Ram Kumar Raj Kumar
1726 / 205, Naya Bazar, Delhi India

Mk Agro Products
18, Sukhram Chambers, Opp. Narayan Nagar, Bapunagar, Ahmedabad, Gujarat India

Siddhi Vinayak Agro Industries Pvt. Ltd.
Anaj Bazar, Maharashtra India

Desai Marketing
307, Ram Chamber, Dhebar Road, RAJKOT, Gujarat India

Santosh Limited
135/1, Santoshnagar, Mangalapuram-636 202 , Rasipuram Tk., Namakkal Dist, Tamil Nadu India

Chittaranjan Chemicals Private Limited
A-13 304 Florida Estate Keshavnagar Mundhwa Pune Maharashtra India 411036

Honest Derivatives Pvt. Ltd.
Bodakdev, Ahmedabad, Gujarat India

Vedant Starch (p) Ltd.
Bedag Tal.-miraj Dist.-Sangli, Maharashtra India

Sadasat Corn Products Pvt. Ltd
Kurukshetra, Haryana India

H.M. Shah & Company
Address: 9 Telgali Siyaganj, INDORE, Madhya Pradesh India

Everest Starch Pvt. Ltd.
Address: Samrat Industrial Area, Road No.29, Plot No.23, Near S.t. Work Shop, Gondal Road, RAJKOT, Gujarat India

Kasyap Sweetners Limited
Address: Paragon Centre, I wing, PB Marg, Worli, Mumbai, Maharashtra India

Rajaram& Brothers
Address: Mhow Neemuch Road, Mandsaur, Madhya Pradesh India

Shri Herbs And Foods
Address: # 22 Anna Street, Near Park, Gobichettipalayam - 638452, Erode, Tamil Nadu India

Milestone Intl
Address: 1/259-2, Vaigai Main St, Sri Nagar, Iyer Bungalow, MADURAI, Tamil Nadu India

Gujarat Ambuja Exports Ltd
Address: Ambuja tower, Opp. Memnagar Fire Station, Post Navjivan, Navrangpura, Ahmedabad 380014, Gujarat - India

Santosh Starch Products
Address: 201, Karma Complex, Nr Mahalaxmi Cross Road, Ahmedabad, Gujarat India

Tantia Agrochemical Pvt Ltd
Address: 23, N.S.Road, 1st Floor, Room-8, Kolkata, West Bengal India

GujratAmbuja Export Ltd
Address: Navrangpura Opp Mem Nagar Fire Station, Ahmedabad, Gujarat India

Santish Maize & Ind. Ltd.
Address: Santosh Nagar, Mangalapuram, Tamil Nadu India

Indian Starch Mindustries
Address: 577, Sathy Road, Erode, Tamil Nadu India

Everest Starch India Pvt Ltd
Address: 23, Smrat Ind Area, Near S.t. Workshop Rajkot, Gujarat India

Angel Starch & Chemicals Pvt Ltd

Address: 1st Floor, H-19, Perilya Nagar, Erode, Tamil Nadu India

Riddhi Siddhi Gluco Biols Limited
Address: plot no.12, sector-9, IIE, Pantnagar, Rudrapur, Uttarakhand India

B.m. Savla & Co.
Address: 26/55 Birhana Road, 208001, India, Kanpur, Uttar Pradesh India

Amrut International
Address: 305, Himadri- 2 Complex, Near Old High Court, Income Tax, Ahmedabad, Gujarat India

Gujarat Ambuja Exports Limited
Address: S12nd Floor Ride Residency 488 3rd Stage Balm Layout Rare Nagar Bangalore 560098, Karnataka India

Vijayanagar Biotech Limited
Address: 404, Vijaya Appart, D.K.Road, Ameerpet, Hyderabad, Andhra Pradesh India

Rk Starch And Allied Indst
Address: 44 Robertson Road Fraser Town Bangalore, Karnataka India

English Indian Clays Ltd (starch Division: Bharat Starch Industries)
Address: N75, Connaught Circus, NEW DELHI India

Cobham Starch Chem. Pvt Ltd
Address: 287-c, Hsidc Industrial Estate Sector 59, Faridabad, Haryana India

Santosh Starch Products Ltd.
Address: 7b/37, Navjivan Society, Laminton Rd., Mumbai, Maharashtra India

Varalaxmi Starch Industries (p) Ltd
Address: Varalaxmi Towers, 127/1, Gandhi Road, Salem, Tamil Nadu India

Heera Indu Infrastructure Co. Ltd.
Address: Station Road Above Hotel Heera Palace, Nandurbar 425412, Maharashtra India

Pruthvi's Foods Pvt. Ltd.
Address: Paldi, Gujarat India

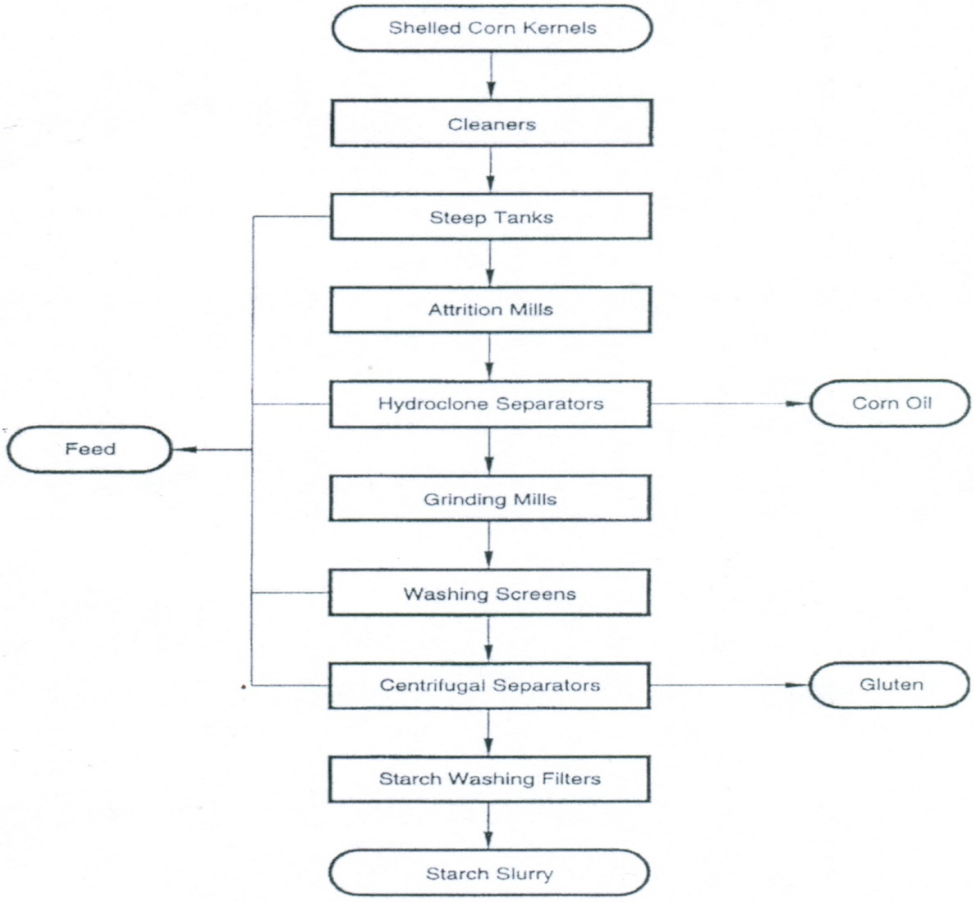
Amuja Exports Ltd
Address: Ambuja Exports Ltd, 37 Km from Hubli, Madli Cross, Village: Hulsoggi, Taluk: Shiggaon, Dist: Haveri, Karnataka India

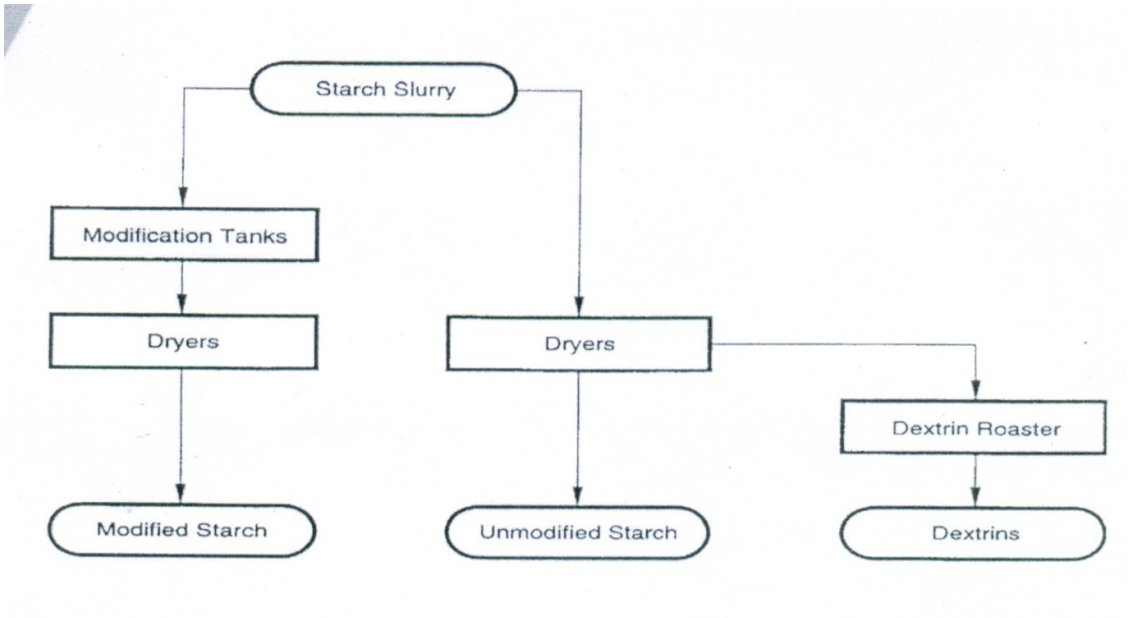
Neelkanth Traders
Address: 1025 Gali TeliyanTilak Bazar, Delhi India

Ahanda Food Colour Preparation
Address: 26-a, Industrial Focal Point, Amritsar, Punjab India

Appendix C

Process Flow Chart




Starch Slurry
Modification Tanks
Dryers
Dryers
Dextrin Roaster
Modified Starch
Unmodified Starch
Dextrins

Appendix D

Details of Machinery Required

Imported	
Bend Screen No. 1	Fine Mill
Mill Degerunator No. 1	Fine Bend Screen
Bend Screen for Germ	Auto Brush Strainer for Starch Separator
Feed Separator-No. 1	Starch Separator No. 1
Bend Screen No. 2	Starch Separator No. 2
Mill-No.2	Starch Separator No. 3
Feed Separator-No. 2	Middling Separator No. 1
Bend Screen No. 3	Middling Separator No. 2
Local	
Corn Feed Conveyor	Service tank for Starch separator
Shifter	Flotation System No. 2
Feed Conveyor for Scale Tank	Flotation System No. 3
Scale Tank	Flotation System No. 4
Screw Feeder	Gluten Settler
Screw Conveyor for Steep Tank	Dehydrator for Starch
Steep Tank	Dryer for Starch
Shute for Steeping Maize	Steam Boiler
Stand Catcher	Gyro Shifter
Service tank for No. 1 Mill	Backet Conveyor for packer
Receive tank for No. 1 Mill	Packing machine for product starch
Receive tank for starch milk and gluten liquid	Agitator for Tank
Germ Separator	Water and Water
Dehydrator for Germ	Switchboard
Germ Dryer	Platform for Steep Tank
Dehydrator for feed	Piping material for plant
Dryer for feed	SO_2 Plant Sulphur Furnace
Liquid	SO_2 Storage Tank
Air Compressor	Feed Plant and Packaging
Flotation System No. 1	Power Generator

Appendix E

LIST OF SUPPLIERS OF STARCH MACHINERY COMPANIES

Name of the Company	Address	Website
Excel Plants & Equipment Pvt Ltd, Pune	Gat No. 611, Moujekuruli, Chakan M.I.D.C., Tal-Khed, Pune-410501, Maharastra, India Phone: 08588815515	http://www.excelplants.com/
Ylemparto, New Delhi, New Delhi	25/34, AnandChamber, East Patel Nagar, New Delhi- 110008, Delhi, India Phone: 08586968511	http://www.yelmequipmentmachinery.com/
YSM Biotech International, Faridabad	B-96, Ground Floor, Part-2, Asoka Enclave, Sector-37, Faridabad-121003, Haryana, India Phone: 08376805990	http://www.ysmbiotech.com/
Biomate India Pvt Ltd, New Delhi	436, shahabad Daulatpur Near Sec- 17, Rohini, New Delhi-110042, Delhi	http://www.fermentor.co.in
Disha Engineering Works, Hyderabad	Phase-V, Plot No. 128, Doolapalli Road, Jeedimelta, IDA, Hyderabad-500018, Andhra Pradesh	http://www.indiamart.com/dishaengineeringworks/
PushtiPowertech Private Limited, Vadodara	104, Shivalay, Haribhakti Extension Colony, Old Parada Road, Vadodara- 390007, Gujrat, India Phone: 09953353528	http://www.indiamart.com/pushtipowertech/
Vijsun Engineers Pvt. Ltd, Pune	203, Legacy Apartments, Above Lifeline Hospital, D.P. Road, Aundh, Pune- 411007, Maharashtra, India Phone: 09953363802	http://www.indiamart.com/vijsunengineers/
Jay Sardar Strach & Gum Consultant, Rajkot	Survey no. 204, Plot no. 8-B.S.I.D.C. Road, Behind Suzlon Mosaic Tiles, Near Gulab Oil Mill, Veravalshapar, Rajkot-360002, Gujrat, India Phone: 08588874250	http://www.indiamart.com/jaysardar-starchgum-consultant/
Bio- Energy Engineering, Nagpur	No. 7-B, GHS L/O, Surendra Nagar, Nagpur-440015, Maharashtra, India Phone: 09953358993	http://www.indiamart.com/bioenergyengineering/
Real Ions Technologies, Pune	Sukhawani Classic, A-7, Near Potdar International School, Chinchwadgoan, Pune- 411033, Maharashtra, India Phone: +91-9175009953	http://www.indiamart.com/real-ions/

Universal Process Engineers Pvt. Ltd, Hyderabad	Plot No. A 28/1/10, I.D.A, Nacharam Hyderabad, Andhra Pradesh, Hyderabad- 500076, Andhra Pradesh, India Phone: +(91)-402-7172573	http://www.indiamart.com/universal-process-engineers/
Aeon India Corporation Private Limited, Pune	4th Floor, Trident, Near Bank of Maharashtra, Bavdhan, Pune-411021, Maharashtra, India Phone: +91-9881072237	http://www.indiamart.com/aeonindia/

Appendix F

Textile Industry

Phoenix Mills	Suryalakshmi Co	Yantra Natural	Nagreeka Export	Surat Textile
Vardhman Text	Jindal Cotex	Indo Count	Kallam Spinning	Malwa Cotton
Forbes Gokak	Super Sales	Ginni Filaments	Suryajyoti Spg	Gangotri Textile
Trident	R M Mohite Ind	Nahar Poly Film	Volant Tex	Alka India
Rajapalayam	SIL Invest	Lambodhara Text	VTX Industries	Ashima
Winsome Yarns	Shiva Texyarn	Amarjothi Spin	Oswal Spinning	Vertex Spinning
Ambika Cotton	Supreme Tex	Sambandam Spin	Patspin India	Sybly Ind
DCM	Morarjee Text	Spentex Ind	Prime Urban Dev	Salona Cotspin
Vardhman Poly	Nitin Spinners	PBM Polytex	Suryavanshi Spg	HP Cotton
Gloster	Maral Overseas	Super Spinning	Santaram Spinne	Vippy Spinpro
Tamil Jai Bharat	Faze Three Exp	Thambbi Modern	Pacific Cotspin	Pasari Spinning
Alchemist Corpo	Suryaamba Spin	Bafna Spinning	Sree Jaya Auto	Tavernier
Kakatiya Tex	ACIL Cotton Ind			

Pharmaceutical Industry

Ankur Drugs	Advik Labors	Abbott India	Aanjaneya Life	Lupin
Bacil Pharma	Alpa Laboratori	Ajanta Pharma	Aarey Drugs	Makers Labs
Biocon	Anuh Pharma	Albert David	Aarti Drugs	Mangalam Drugs
Cadila Health	Arvind Remedies	Alembic Pharma	ABL Biotech	Medicamen Bio
Cipla	Bafna Pharma	Anus Labs	Ahlcon Parent	Panchsheel Org
Divis Labs	Biofil Chem.	Astra Zeneca	Alembic	Parabolic Drugs
Dr Reddys Labs	Caplin Point La	Auro Labs	Ambalal Sarabha	Parenteral Drug
Fulford	Claris Life	Aurobindo Pharma	Amrutanjan Heal	Piramal Enter
Glaxo Smith Kline	DIL	Bharat Immuno	Astec Life	Ranbaxy Labs
Glenmark	Dishman Pharma	FDC	Bal Pharma	Samrat Pharma
Godavari Drugs	Elder Pharma	Fervent Synergi	Beryl Drugs	Sandu Pharma
Guj Terce Labs	Hester Bio	Fresenius Kabi	Brawn Pharma	Sanofi India
Guj Themis	Hikal	Gennex Labs	Brooks Labs	Sequent Scienti
Hiran Orgochem	Indoco Remedies	Gufic Bio	Celestial Labs	Sun Pharma
Ipca Labs	JB Chemicals	Ind-Swift	Coral Labs	Suven Life Scie
Kerala Ayur	Kabra Drugs	Ishita Drugs	Elder Healthcare	Torrent Pharma
Kilitch Drugs	Kappac Pharma	Jubilant Life	Granules India	Trimurthi Drugs
Krebs Biochem	Marksans Pharma	KDL Biotech	Ind-Swift Labs	TTK Healthcare
Lyka Labs	Merck	Kopran	Jagson Pharma	Wockhardt
Natural Capsule	Morepen Lab	Lincoln Pharma	Jenburkt Pharma	Zenith Health
Ortin Labs	Nectar Life	Natco Pharma	Pfizer	SMS Pharma
Pharmaids Pharma	Neuland Lab	Novartis India	Pharmasia	Surya Pharma

Protochem	Orchid Chemical	Vista Pharma	Piramal Life	Syncom Formula
Saamya Biotech	Panacea Biotec	Wanbury	Sanjivani Paren	Transchem
Sun Pharma Adv	Plethico Pharma	Wyeth	Smruthi Organic	Twilight Litaka
Syncom Health	Roopa Industries	Zyden Gentec	Strides Arcolab	Venus Remedies
Themis Medicare	RPG Life	Sterling Bio	Shilpa	Vikram Thermo
Unichem Labs	Sharon Bio Medi	Torrent Cables	Source Natural	Welcure Drugs
Wintac	Shasun Pharma	Vivimed Labs	Zenotech Labs	

Paper Industry

Ballarpur Ind	Ruchira Papers	Vapi Paper	Kay Power	Pudumjee Ind
Rainbow Papers	Sakthi Paper	Rama Pulp	Magnum Ventures	Shree Kr Paper
AP Paper Mills	NR Agarwal	Rama Paper Mill	Malu Paper	Star Paper
Tamil Newsprint	Kauntam Papers	Agio Paper	Yash Papers	Rama Newsprint
West Coast Paper	Shreyans Ind	Rohit Pulp	Servalakshmi	Emami Paper
JK Paper	Shree Ajit Pulp	Nath Pulp	Well Pack Paper	Special Papers
Seshasayee Paper	Aurangabad Paper	Cosboard Ind	Pudumjee Pulp	Sipaper
Sirpur Paper	Mysore Paper	Metroglobal	Soma Papers	

FMCG Industry

Hindustan Unilever Ltd.	Nirma	Godfrey Phillips	Modi Revlon
Colgate-Palmolive (India) Ltd.	Bovonto	Henkel Spic	Amul India
ITC Limited	Cavin Kare	Johnson & Johnson	Godrej Group
SABMiller, India	Grove limited	Parle Agro	Wital See Group
Britannia Industries Ltd.	Wipro	GCMMF (AMUL)	Procter & Gamble
Marico Industries Ltd.	Nestlé India	Reckitt Benckiser	
Tata Global Beverages	Gillette India Ltd.	Cadburys India	
Himalaya Herbal Healthcare	Jahana Electricals and Galaxy Graphics		

Appendix G

G.1Project Cost

FINANCIALS						
	1	**Cost of the Project**				
		Fixed Investments				
	i)	Land		400.00		
	ii)	Building		600.00		
	iii)	Plant & Machinery		1,305.69		
	iv)	Misc fixed assets (inclusive of electricals, transformer,substation etc)	30%	391.71		
	v)	Furniture & Fixture		10.22		
	vii)	Preliminary & Pre-operative		41.14		
	viii)	Margin for Working Capital		408.71		
		COST OF THE PROJECT		**3,157.47**		
		Means of Financing				
		Promoters Contribution	1/3rd	1,052.49		
		Borrowing from Bank / Financial Institution	2/3rd	2,104.98		
				3,157.47		
Details of Fixed Investments						
					Rs./Lacs	
Land		8 Acre x 40 lacs			320.00	
		Development			80.00	**400.00**
Building and Civil Structure						
		Steeping Tanks 4 No.s of 100 MT Capacity, shed				
		Silo Storage unit and office buildings				**600.00**
Plant &Machinery						
	i)	S.S.Course Grinder (36 inches dia, 7RPM 50-250 MT / day)	2 Nos. X Rs.6.825		13.65	

	ii)	Degerminator / Seperator (3 Stages)	3 Nos.X Rs.5.775		17.33	
	iii)	Fine Grinder (36 inces dia. 700 RPM 50-250MT / day)	1 no. X Rs.8.4		8.40	
	iv)	DSM Box for fibre washing (6 stage)	6 Nos. x Rs.3.15		18.90	
	v)	Centrifugal Separators (Separation of Protein and starch)	1 no. X Rs.94.5		94.50	
	vi)	Hydro Clone Starch Washing (12 Stage)	1 no. X Rs.94.5		94.50	
	vii)	Gluten Thickner	1 no. X Rs.94.5		94.50	
	viii)	Hydraulic Press for Gluten	2 no. X Rs.12.075		24.15	
	ix)	Gluten Drier	1 no. X Rs.18.375		18.38	
	x)	Starch Pulversier	1 no. X Rs.63		63.00	
	xi)	Germ Drier	1 no. X Rs.24.15		24.15	
	xii)	Boiler (Coal Fire) (8 Tonne Steam / Hr)	1 no. X Rs.52.5		52.50	
	xiii)	Effluent Treatment Plant	1 no. X Rs.315		315.00	
	xiv)	D.G.Set (500 KVA)	1 no. X Rs.31.5		31.50	
					870.46	
Erection & Commissioning 15%			50%		435.23	**1,305.69**
Furniture & Fixure LS					10.22	
						10.22
						2,315.91

G.2Statement of Fixed Assets & Depreciation (in Rs/ lakhs)

Statement of Fixed Assets & Depreciation									
Assets		**Land & Development**	**Factory Shed Building**	**Plant & Machinery**	**Furniture & Fixure**	**Misc. Equipments**	**Total**	**Total without Land**	**Insurance**
			15%	20%	15%	15%			2.00%
1st Year	Additions	400.00	600.00	1,305.69	10.22	391.71	2,707.62		
	Depreciation	-	90.00	261.14	1.53	58.76	411.43		
	W.D.V	400.00	510.00	1,044.55	8.69	332.95	2,296.19	1,896.19	37.92
2nd Year	Depreciation	-	76.50	208.91	1.30	49.94	336.65		
	W.D.V	400.00	433.50	835.64	7.39	283.01	1,959.54	1,559.54	31.19
3rd Year	Depreciation	-	65.03	167.13	1.11	42.45	275.72		
	W.D.V	400.00	368.47	668.51	6.28	240.56	1,683.82	1,283.82	25.68
4th year	Depreciation	-	55.27	133.70	0.94	36.08	225.99		
	W.D.V	400.00	313.20	534.81	5.34	204.48	1,457.83	1,057.83	21.16
5th year	Depreciation	-	46.98	106.96	0.80	30.67	185.41		
	W.D.V	400.00	266.22	427.85	4.54	173.81	1,272.42	872.42	17.45
6th year	Depreciation	-	39.93	85.57	0.68	26.07	152.25		
	W.D.V	400.00	226.29	342.28	3.86	147.74	1,120.17	720.17	14.40
7th year	Depreciation	-	33.94	68.46	0.58	22.16	125.14		
	W.D.V	400.00	192.35	273.82	3.28	125.58	995.03	595.03	11.90
8th year	Depreciation	-	28.85	54.76	0.49	18.84	102.94		
	W.D.V	400.00	163.50	219.06	2.79	106.74	892.09	492.09	9.84
9th year	Depreciation	-	24.53	43.81	0.42	16.01	84.77		
	W.D.V	400.00	138.97	175.25	2.37	90.73	807.32	407.32	8.15
10th year	Depreciation	-	20.85	35.05	0.36	13.61	69.87		
	W.D.V	400.00	118.12	140.20	2.01	77.12	737.45	337.45	6.75

G.3Assessment of Working Capital Requirement (in Rs/ lakhs)

	Days	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year
Raw Material Stock	45	466.03	543.70	621.37	699.04	699.04	699.04	699.04	699.04	699.04	699.04
Work-in-progress	4	69.79	79.12	89.08	99.16	98.71	98.31	98.01	97.76	97.57	97.39
Finished Goods	30	585.86	683.51	781.15	878.79	878.79	878.79	878.79	878.79	878.79	878.79
Debtors	30	585.86	683.51	781.15	878.79	878.79	878.79	878.79	878.79	878.79	878.79
		1,707.55	1,989.83	2,272.75	2,555.79	2,555.34	2,554.94	2,554.64	2,554.39	2,554.20	2,554.02
Less: Creditors	7	72.69	84.81	96.92	109.04	109.04	109.04	109.04	109.04	109.04	109.04
Working Capital GAP		1,634.86	1,905.02	2,175.83	2,446.75	2,446.30	2,445.90	2,445.60	2,445.35	2,445.16	2,444.98
Less : Margin Money for Working Capital	25 %	408.71	476.26	543.96	611.69	611.57	611.47	611.40	611.34	611.29	611.24
Bank Loan Permissible		**1,226.15**	**1,428.76**	**1,631.87**	**1,835.06**	**1,834.73**	**1,834.43**	**1,834.20**	**1,834.01**	**1,833.87**	**1,833.74**
Interest	13 %	159.40	185.74	212.14	238.56	238.51	238.48	238.45	238.42	238.40	238.39

G.4 Calculation of Term Loan & Interest

Calculation of Term Loan & Interest					
				Amount in lacs	
			Rate of		
			Interest	**13.00%**	
	1st	2nd	3rd	4th	5th
	Year	Year	Year	Year	Year
1st Quarter					
Opening Balance	2,104.98	2,104.98	1,578.73	1,052.49	526.24
Interest	67.47	67.47	50.61	33.74	16.87
Repayment	-	131.56	131.56	131.56	131.56
2nd Quarter					
Opening Balance	2,104.98	1,973.41	1,447.17	920.93	394.68
Interest	67.47	63.26	46.39	29.52	12.65
Repayment	-	131.56	131.56	131.56	131.56
3rd Quarter					
Opening Balance	2,104.98	1,841.85	1,315.61	789.37	263.12
Interest	67.47	59.04	42.17	25.30	8.43
Repayment	-	131.56	131.56	131.56	131.56
4th Quarter					
Opening Balance	2,104.98	1,710.29	1,184.05	657.80	131.56
Interest	67.47	54.82	37.95	21.09	4.22
Repayment	-	131.56	131.56	131.56	131.56
Annual Total					
Interest	269.88	244.59	177.12	109.65	42.17
Repayment	-	526.24	526.24	526.24	526.24
Closing Balance	2,104.98	1,578.73	1,052.49	526.24	0.00

G.5 Capacity Utilization (in MT)

	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year
Installed Capacity (MT)										
Maize (Raw Materials)	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00	60,000.00
Production										
Starch	39,000.00	39,000.00	39,000.00	39,000.00	39,000.00	39,000.00	39,000.00	39,000.00	39,000.00	39,000.00
Gluten (Pretein)	2,400.00	2,400.00	2,400.00	2,400.00	2,400.00	2,400.00	2,400.00	2,400.00	2,400.00	2,400.00
Germ	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
Husk	6,600.00	6,600.00	6,600.00	6,600.00	6,600.00	6,600.00	6,600.00	6,600.00	6,600.00	6,600.00
Total	**54,000.00**	**54,000.00**	**54,000.00**	**54,000.00**	**54,000.00**	**54,000.00**	**54,000.00**	**54,000.00**	**54,000.00**	**54,000.00**
Capacity Utilisation	60.00%	70.00%	80.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%
Products (MT)										
Maize (Raw Materials)	36,000.00	42,000.00	48,000.00	54,000.00	54,000.00	54,000.00	54,000.00	54,000.00	54,000.00	54,000.00
Production										
Starch	23,400.00	27,300.00	31,200.00	35,100.00	35,100.00	35,100.00	35,100.00	35,100.00	35,100.00	35,100.00
Gluten (Pretein)	1,440.00	1,680.00	1,920.00	2,160.00	2,160.00	2,160.00	2,160.00	2,160.00	2,160.00	2,160.00
Germ	3,600.00	4,200.00	4,800.00	5,400.00	5,400.00	5,400.00	5,400.00	5,400.00	5,400.00	5,400.00
Husk	3,960.00	4,620.00	5,280.00	5,940.00	5,940.00	5,940.00	5,940.00	5,940.00	5,940.00	5,940.00
Total	**32,400.00**	**37,800.00**	**43,200.00**	**48,600.00**	**48,600.00**	**48,600.00**	**48,600.00**	**48,600.00**	**48,600.00**	**48,600.00**

G.6Income & Expenditure Statement

(Units in Rs Lakhs)

	Price / Tonne	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year
Income											
Starch	22,000.00	5,148.00	6,006.00	6,864.00	7,722.00	7,722.00	7,722.00	7,722.00	7,722.00	7,722.00	7,722.00
Gluten (Protein)	36,000.00	316.80	369.60	422.40	475.20	475.20	475.20	475.20	475.20	475.20	475.20
Germ	26,000.00	792.00	924.00	1,056.00	1,188.00	1,188.00	1,188.00	1,188.00	1,188.00	1,188.00	1,188.00
Husk	5,000.00	871.20	1,016.40	1,161.60	1,306.80	1,306.80	1,306.80	1,306.80	1,306.80	1,306.80	1,306.80
Total		**7,128.00**	**8,316.00**	**9,504.00**	**10,692.00**	**10,692.00**	**10,692.00**	**10,692.00**	**10,692.00**	**10,692.00**	**10,692.00**
Expenditure											
Raw Materials	10,500.00	3,780.00	4,410.00	5,040.00	5,670.00	5,670.00	5,670.00	5,670.00	5,670.00	5,670.00	5,670.00
Procurement Expenses (on RM)	5.00%	189.00	220.50	252.00	283.50	283.50	283.50	283.50	283.50	283.50	283.50
Consumables (on RM)	5.00%	189.00	220.50	252.00	283.50	283.50	283.50	283.50	283.50	283.50	283.50
Power (on RM)	20.00%	756.00	882.00	1,008.00	1,134.00	1,134.00	1,134.00	1,134.00	1,134.00	1,134.00	1,134.00
Steam cost	17.00%	642.60	749.70	856.80	963.90	963.90	963.90	963.90	963.90	963.90	963.90
Wages		39.60	39.60	41.58	41.58	43.66	43.66	45.84	45.84	48.13	48.13
Insurance	2.00%	37.92	31.19	25.68	21.16	17.45	14.40	11.90	9.84	8.15	6.75
Repair & Maintenance		-	2.00	3.00	5.00	6.00	6.00	6.00	8.00	8.00	8.00
Depreciation on Fixed Asset		411.43	336.65	275.72	225.99	185.41	152.25	125.14	102.94	84.77	69.87
Preliminary & Pre-operative	10%	41.14	-	-	-	-	-	-	-	-	-
Contingency	5%	281.71	327.67	373.80	419.88	419.80	419.65	419.63	419.53	419.56	419.49
Total (A)		6,368.40	7,219.81	8,128.58	9,048.51	9,007.22	8,970.86	8,943.41	8,921.05	8,903.51	8,887.14
Adm. Expenses											
a) Salary		58.10	58.10	61.01	61.01	64.06	64.06	67.26	67.26	70.62	70.62
b) Printing & Stationery		12.00	12.00	12.60	12.60	13.23	13.23	13.89	13.89	14.58	14.58

c) TA & conveyance		24.00	24.00	25.20	25.20	26.46	26.46	27.78	27.78	29.17	29.17
d) Misc. Expenditure		40.00	40.00	42.00	42.00	44.10	44.10	46.31	46.31	48.63	48.63
Total (B)		134.10	134.10	140.81	140.81	147.85	147.85	155.24	155.24	163.00	163.00
Selling &Distribution	2.50%	178.20	207.90	237.60	267.30	267.30	267.30	267.30	267.30	267.30	267.30
Freight		9.68	9.68	10.16	10.16	10.67	10.67	11.20	11.20	11.76	11.76
Interest:											
Term Loan		269.88	244.59	177.12	109.65	42.17	-	-	-	-	-
Working Capital Loan		159.40	185.74	212.14	238.56	238.51	238.48	238.45	238.42	238.40	238.39
Total (C)		617.16	647.91	637.02	625.67	558.65	516.45	516.95	516.92	517.46	517.45
Total (A+B+C)		**7,119.66**	**8,001.82**	**8,906.41**	**9,814.99**	**9,713.72**	**9,635.16**	**9,615.60**	**9,593.21**	**9,583.97**	**9,567.59**
Profit before Tax		**8.34**	**314.18**	**597.59**	**877.01**	**978.28**	**1,056.84**	**1,076.40**	**1,098.79**	**1,108.03**	**1,124.41**
Less:- Provision for Taxation	30%	2.50	54.86	179.28	263.10	293.48	317.05	322.92	329.64	332.41	337.32
Profit after Tax		**5.84**	**259.31**	**418.31**	**613.91**	**684.80**	**739.79**	**753.48**	**769.15**	**775.62**	**787.09**
Cash Generation											
Net Profit		5.84	259.31	418.31	613.91	684.80	739.79	753.48	769.15	775.62	787.09
Add Depreciation		411.43	336.65	275.72	225.99	185.41	152.25	125.14	102.94	84.77	69.87
Net Cash Generation		417.27	595.96	694.03	839.90	870.21	892.04	878.62	872.09	860.39	856.96
DSCR		2.55	1.77	1.99	2.32	2.53	-	-	-	-	-
Term Loan Installment		-	526.24	526.24	526.24	526.24	-	-	-	-	-
Term Loan Interest		269.88	244.59	177.12	109.65	42.17	-	-	-	-	-

Sources And Application of Fund										
Particulars	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year
SOURCES:-										
Increase in Share Capital(Promoter's contribution)	1,052.49	-	-	-	-	-	-	-	-	-
Depreciation	411.43	336.65	275.72	225.99	185.41	152.25	125.14	102.94	84.77	69.87
Increase in Term Loan	2,104.98	-	-	-	-	-	-	-	-	-
Profit after Tax	5.84	259.31	418.31	613.91	684.80	739.79	753.48	769.15	775.62	787.09
Increase in CC from Bank	1,226.15	202.62	203.11	203.19	(0.33)	(0.30)	(0.23)	(0.19)	(0.14)	(0.13)
Increase in Current Liabilities	72.69	12.12	12.11	12.12	-	-	-	-	-	-
Subsidy obtainable from NMFP Scheme (GOI)	50.00	-	-	-	-	-	-	-	-	-
Total Generation	**4,923.57**	**810.70**	**909.25**	**1,055.21**	**869.88**	**891.74**	**878.39**	**871.90**	**860.25**	**856.83**
APPLICATIONS:-										
Increase in Fixed Assets	2,707.62	-	-	-	-	-	-	-	-	-
Increase in Current Assets	2,116.26	282.29	282.92	283.04	(0.45)	(0.40)	(0.30)	(0.25)	(0.19)	(0.18)
Repayment of Term Loan	-	526.24	526.24	526.24	526.24	-	-	-	-	-
Total Application	**4,823.87**	**808.53**	**809.16**	**809.28**	**525.79**	**(0.40)**	**(0.30)**	**(0.25)**	**(0.19)**	**(0.18)**
Surplus	**99.70**	**2.17**	**100.09**	**245.92**	**344.09**	**892.14**	**878.69**	**872.15**	**860.44**	**857.01**
Opening Cash & Bank Balance	-	99.70	101.87	201.96	447.88	791.97	1,684.11	2,562.80	3,434.95	4,295.39
Closing Cash & Bank Balance	99.70	101.87	201.96	447.88	791.97	1,684.11	2,562.80	3,434.95	4,295.39	5,152.40

G.7 Projected Balance Sheet

Description	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year	9th Year	10th Year
								(Units in Rs Lakhs)		
LIABILITIES										
Capital Account	1,052.49	1,052.49	1,052.49	1,052.49	1,052.49	1,052.49	1,052.49	1,052.49	1,052.49	1,052.49
Reserve & Surplus	5.84	265.16	683.47	1,297.37	1,982.17	2,721.97	3,475.44	4,244.59	5,020.22	5,807.31
Sub-total	1,058.33	1,317.65	1,735.96	2,349.86	3,034.66	3,774.46	4,527.93	5,297.08	6,072.71	6,859.80
Secured Loan										
Term Loan	2,104.98	1,578.73	1,052.49	526.24	0.00	-	-	-	-	-
Working Capital	1,226.15	1,428.76	1,631.87	1,835.06	1,834.73	1,834.43	1,834.20	1,834.01	1,833.87	1,833.74
Subsidy obtainable from NMFP Scheme (GOI)	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Sub Total	4,439.45	4,375.14	4,470.31	4,761.17	4,919.39	5,658.88	6,412.13	7,181.09	7,956.57	8,743.54
Current liabilities										
Creditors	72.69	84.81	96.92	109.04	109.04	109.04	109.04	109.04	109.04	109.04
TOTAL LIABILITIES	**4,512.14**	**4,459.95**	**4,567.23**	**4,870.21**	**5,028.43**	**5,767.92**	**6,521.17**	**7,290.13**	**8,065.61**	**8,852.58**
ASSETS										
Gross Block (Opening)	2,707.62	2,296.19	1,959.54	1,683.82	1,457.83	1,272.42	1,120.17	995.03	892.09	807.32
Less: Depreciation	411.43	336.65	275.72	225.99	185.41	152.25	125.14	102.94	84.77	69.87
Net Fixed Assets	2,296.19	1,959.54	1,683.82	1,457.83	1,272.42	1,120.17	995.03	892.09	807.32	737.45
Current Assets										
Raw Material Stock	466.03	543.70	621.37	699.04	699.04	699.04	699.04	699.04	699.04	699.04
Work in progress	69.79	79.12	89.08	99.16	98.71	98.31	98.01	97.76	97.57	97.39
Finished Goods	585.86	683.51	781.15	878.79	878.79	878.79	878.79	878.79	878.79	878.79

Debtors	585.86	683.51	781.15	878.79	878.79	878.79	878.79	878.79	878.79	878.79
Other Current Asset	408.71	408.71	408.71	408.71	408.71	408.71	408.71	408.71	408.71	408.71
Cash & Bank Balance	99.70	101.87	201.96	447.88	791.97	1,684.11	2,562.80	3,434.95	4,295.39	5,152.40
TOTAL ASSETS	**4,512.14**	**4,459.95**	**4,567.23**	**4,870.21**	**5,028.43**	**5,767.92**	**6,521.17**	**7,290.13**	**8,065.61**	**8,852.58**
Difference	-	-	-	-	-	-	-	-	-	-

G.8Internal Rate of Return

Year	Outflow/Inflows
0	(3157.47)
1	417.27
2	595.96
3	694.03
4	839.90
5	870.21
6	892.04
7	878.62
8	872.09
9	860.39
10	1,594.41
IRR	0.19

G.9Break Even

Description		2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2020-22	2020-23
		(Rs/lakhs)	(Rs/lakhs)	(Rs/lakhs)	(Rs/lakhs)	(Rs/lakhs)	(Rs/lakhs)	(Rs/lakhs)	(Rs/lakhs)	(Rs/lakhs)	(Rs/lakhs)
Capacity Utilisation		60%	70%	80%	90%	90%	90%	90%	90%	90%	90%
Expected Sales		7128.00	8316.00	9504.00	10692.00	10692.00	10692.00	10692.00	10692.00	10692.00	10692.00
Variable Expenses											
Raw Material		3780.00	4410.00	5040.00	5670.00	5670.00	5670.00	5670.00	5670.00	5670.00	5670.00
Procurement expenses		189.00	220.50	252.00	283.50	283.50	283.50	283.50	283.50	283.50	283.50
Power		756.00	882.00	1008.00	1134.00	1134.00	1134.00	1134.00	1134.00	1134.00	1134.00
Repair & Maintenance		0.00	2.00	3.00	5.00	6.00	6.00	6.00	8.00	8.00	8.00
Selling Expenses		178.20	207.90	237.60	267.30	267.30	267.30	267.30	267.30	267.30	267.30
Consumables		189.00	220.50	252.00	283.50	283.50	283.50	283.50	283.50	283.50	283.50
Other expenses		248.14	226.61	247.98	269.88	266.63	263.55	261.55	259.46	258.31	256.90
Sub-total		5340.34	6169.51	7040.58	7913.18	7910.93	7907.85	7905.85	7905.76	7904.61	7903.20
Contribution		1787.67	2146.50	2463.42	2778.82	2781.07	2784.15	2786.15	2786.24	2787.39	2788.80
Fixed Expenses											
Salaries & Wages		97.70	97.70	102.59	102.59	107.72	107.72	113.10	113.10	118.75	118.75
Administrative Overhead		76.00	76.00	79.80	79.80	83.79	83.79	87.98	87.98	92.38	92.38
Interest on Term Loan		269.88	244.59	177.12	109.65	42.17	0.00	0.00	0.00	0.00	0.00
Depreciation		411.43	336.65	275.72	225.99	185.41	152.25	125.14	102.94	84.77	69.87
Sub-total		855.01	754.94	635.23	518.03	419.09	343.76	326.22	304.02	295.90	281.00
Break-even as % of											
Capacity Utilisation		28.70%	24.62%	20.63%	16.78%	13.56%	11.11%	10.54%	9.82%	9.55%	9.07%
Cash Break-even		14.89%	13.64%	11.68%	9.46%	7.56%	6.19%	6.50%	6.50%	6.82%	6.81%

G.10 Man Power Requirement

	Type of manpower	No. Of Person
Managerial		
	Director	1
	Admn. Mangaer	1
	Plant Manager	3
	Procurement Manager	1
	Marketing Manager	1
Skilled Staff		
	Clerk	2
	Attendant	2
	Plant Operator / Electrcian	4
	Section-in-charge	10
	Store Keeper	3
	Boiler Operator	4
	Driver	4
	Security Guard	9
Unskilled / Casual		
	Labour	60
	Releiver	15
Total		120

G.11 Assumptions

1. Installed crushing capacity of Wet milling maize per day – 200 MT
   Installed capacity per year – 60,000 MT (Wet milling maize crushing)
   Output (in % MT)

Starch 60%	36,000 MT	
Germ 10%		6,000 MT
Gluten 5%		3,000 MT
Husk 15%		9,000 MT
		54,000 MT

   Plant will function 3 shifts per day of 8 hours per shift.
   Plant will work 330 days per year.

2. Capacity Utilization:

1st year	50%
2nd year	60%
3rd year	70%
4th year	80%
5th year	90%

   Capacity utilisation has been considered at 90% constant from 4th year onwards considering it as optimum capacity utilisation since 10% idle capacity is normal.

3. Assessment of Working Capital:

Stock of Raw Material (Maize)	-	45 days (average) at cost
Work-in-process	-	4 days cycle at cost
Finished Goods	-	30 days cost of sales
Debtors	-	30 days cost of sales

   Creditors for raw materials 7 days consumption (maize)
   [Maize being agricultural produce available seasonally, short period of credit envisaged]

4. Average rate of interest on both Term Loan and Working Capital Loan from Bank/Financial Institution has been taken @13% p.a.

5. Term Loan repayment is envisaged in 5 years with 1 year moratorium and balance payable in 4 years. Repayment of principal amount of loan starts from 1st quarter of second year.

6. Financial projection, have however, been spread over 10 years for better appreciation by the intending promoters.

7. Average DSCR during the Term Loan period works out to 2.23.

8. Rate of Depreciation on different Fixed Assets have been taken as:

Factory Shed & Building	15%
Plant & Machinery	20%
Furniture & Fixture	20%
Misc. Equipments	15%

9. Capital subsidy receivable under NMFP Scheme in North Bengal has been parked as a Capital Reserve.

10. Insurance cost has been taken @ 2% of the total cost of assets.

11. Margin money for Working Capital considered @25% on Working Capital gap.

Appendix H

List of Abbreviations Used

GDP	Gross Domestic Product	B2B	Business to Business
YoY	Year-on-Year	PH	Concentration of Hydrogen
PFA	Food and Agriculture Organization of United Nations	FTZ	Free Trade Zone
CMIE	Centre for Monitoring Indian Economy	EPZ	Export Processing Zone
CPRI	Central Potato Research Institute	EOU	Export Oriented Unit
WBPCB	West Bengal Pollution Control Board	MT	Million Tonnes
FMCG	Fast Moving Consumer Goods	CAD	Current Account Deficit
WITS	World Integrated Trade Solution	BCM	Billion Cubic Metres
MRTP	Monopolies and Restrictive Trade Practices Act	MTPA	Million Tonnes Per Annum
FERA	Foreign Exchange Regulation Act	PPM	Parts Per Million
PFA	Prevention of Food Adulteration Act	AoA	Article of Association
DMI	Directorate of Marketing and Inspection	SSI	Small Scale Industries
ISO	International Organization for Standardization		
HACCP	Hazard Analysis and Critical Control Point		
MoA	Memorandum of Association		
BLLRO	Block Land and Land Record Office		
DLLR	Department of Labour, Licensing and Regulation		

Appendix I

List of Figures/Charts used

List of Tables used

Appendix J

Glossary of Terms Used

- Steeping: It is soaking in liquid (usually water) of a solid so as to extract flavours or to soften it.
- Milling: It is the process of grinding grain or other materials in a mill.

Appendix K

Fiscal Incentives Given Under West Bengal Industrial Policy

As pointed out, the ideal location for establishing a starch manufacturing unit is in the districts of North Bengal, which fall in 'Zone D' as per West Bengal's industrial policy. Also, the amount of investment required for a unit is below Rs 100 cr, which makes it fall in 'Scale 1' of investment category. The main incentives that such a unit can reap are given below:

Industrial Promotion Assistance:

Industrial units in Zone D and falling in the scale 1 (investment between 10 Cr to 100 cr) will be granted Industrial Promotion Assistance (IPA). The total IPA for which an industrial unit would be eligible shall be equivalent to 90 percentage of the tax paid by the unit in the previous year. Value Added Tax (VAT) shall be considered for the entire eligible period. However, Central Sales Tax (CST) shall be considered for the first three years from the Commencement of Commercial Production. IPA would be admissible for eight years and upto75% of the Fixed Capital Investment by the industry, whichever is reached earlier.

Waiver of Electricity Duty:

A unit in Zone D will get 100% waiver of electricity duty for the first 5 years and 75% waiver for the next five years, with a ceiling of Rs 2.5 Lacs per year/ Rs 25 Cr for years.

Benefit for generating Employment:

Units will be reimbursed 100% contribution towards EPF/ ESI for 10 years.

Stamp Duty:

Units will be eligible for 75% stamp duty refund.

Anchor Unit Subsidy:

Anchor Unit subsidy worth Rs 100 lacs will be offered to the first two manufacturing units providing employment to at least 100 people and minimum investment amount of Rs 50 lacs.

Patent Registration:

The state will reimburse 50% of the expenditure incurred per patent, upto a limit of Rs 2 lacs.

Waiver of Land Conversion Fee:

Units will be able to benefit from 100% waiver of land conversion fee.