

1 POTATO FROZEN FRENCH FRIES

1.1 Introduction

Indian fast food sector is growing at 25-30 % annually due to rapid growth of fast food chain both Indian and international. Presently, the core food service Indian market is 3600 crores and the share of quick service restaurants' is Rs. 2500 crores. Out of the total snacks, potato based products like French fries, wedges, products using potato flakes and other Indian snacks have about 30 % share in fast food industry, approximately 75 crores in value terms.

French fries are among the highest saleable potato products. This is the most abundant processed potato and can be found in many varieties such as lattice cut, wedges, curly, batter dipped, seasoned, or straight –cut including French Fries on menu is one of the easiest ways to increase sales and profits for the companies

1.2 Objective

The primary objective of the model report is to facilitate the entrepreneurs in understanding the importance of setting up unit of Potato French Fries, technology and financial parameters of various components for preparation and submission of project proposal to bank for sanction of long term loan. This model report will serve as guidance to the entrepreneurs on starting up such a new project and basic technical knowledge for setting up such a facility.

1.3 Raw Material Availability

The main requirement for manufacturing of potato French fries are the potatoes. In MP the production of potatoes was 7.14 lakh MT (2004-05). It is grown on an area of around 47602 ha.

1.4 Market Opportunities

The market of processed potato products is growing at the rate of 15 to 20% per annum. The estimates of trade sources and sector studies indicate a market share of about 30% of potato based products in total 2400 crores snack food market.

The main potato based products are French fries, wedges, cutlets, chips etc. Besides, dehydrated potato products like flakes, granules and powder are also used in larger quantities in preparation of many products as the substitute of fresh potatoes in products like Bhujia, Tikki, thickener, fabricated chips, patties and in preparation of premixes used for other products. Out of above mentioned products, this section of report will discuss the domestic and international markets for French fries, wedges and potato flakes, as these are the high

value products with high growth rate and high demand in domestic and international market among all.

1.4.1 International market

Total World trade of potato fries is estimated at 2.5 Million MT for 2000/01 Netherlands, Canada, and USA are the major players contributing more than 90% of the trade.

During the past 10 years. The quantity and value of frozen fry exports have consistently increased. The major French fries and frozen food importing countries are East Asian countries, where the number of quick service restaurant has expanded significantly. In the year 2000-2001, East Asian countries accounted for over 80% of fry exports. Japan accounted highest imports of fry shipments followed by china, Hong Kong, Mexico and Taiwan and Republic of Korea.

1.4.2 Domestic market

The frozen French fries market in India is in a nascent stage but is growing at the rate of about 25% per year. The percent organized market for frozen French – fries in India is estimated at over 3500 tons/ annum, mostly contributed by imported French fries. The estimated domestic production of French fries is about 500 MT. There are also some Quick service food chains, and individual large restaurants making French fries for captive consumption. Wimpy is reportedly making 70 MT per year. A number of restaurants make fries using fresh potatoes. These restaurants are apparently making own French fries due to irregular supplies and high prices of imported fries. With affordable price and regular supplies, which a domestic producer will be in a position to organize, the volume will certainly increase as its market is growing tremendously due to increasing number of QSR Bars Pubs etc. The major end users of French fries are-

- **Quick service restaurants**

These are main buyer of French fries. Out of the total imported French fries, major quantity is sold through McDonald chain. The overall share of this segment is estimated around 60% the growth rate in these QSR is about 20-25%

- **Restaurants and eateries**

Apart from QSR's other restaurants and eateries also have French fries on the menu and are also served as an accompaniment to other snacks. The share of this segment is estimated at 10% at present but has the highest growth potential because of sheer size of restaurants and eating joints in the country.

▪ **Bars/ pubs**

Significant quantities are used in bar and pubs with the drinks. This is also growing at appreciable rate of 15%. With relaxation in the licencing policy for bare and pubs in most of the states and increasing consumption of beer, the sale in this segment would increase at a fast rate.

▪ **Flight Caterers / Luxury Trains**

Caterers, both flight and railways, are the another segment among the user of French fries, growing at the rate of 10%.

▪ **Retail sales**

Frozen French Fries are also sold in retail outlets, like frozen vegetables and meat products from the refrigerated outlets. The present share of this is 5%. With changing retail formats, shopping malls and super markets becoming popular giving better visibility to such products then by increasing sale.

Presently, the 90% need of domestic market is catered by imported frozen fries and remaining is manufactured in country by the companies like Tarai, Al Kabeer, Safal etc. In the year 1999, the imports were approximately 400 tons, which has grown to an estimated level of over 3000 tons in the year 2002. This shows a rapid upward trend in the consumption of French-Fries in India, which is getting boost with the expansin of fast food chains.

The main companies from which French fries, required for domestic market, is being imported are:

Lamb Weston : 1000 MT/Annum
 Aviko : 250 MT/Annum
 McCain : 1200 MT/Annum
 McDonalds : 500 MT/Annum (Direct from McCain)

In the country, the institutional sales of fries accounts for more than 90% of the market, as French fries is an important product on the menu of quick service outlets. 85% of French fries sold are consumed within the premises, while 15% are sold in packed form. The trend, however, is changing towards packed products for consumption at home. The prices for bulk consumers are much lower than the retail prices, due to lower packaging and distribution costs for bulk sales. The retail prices of imported fries are about 25-50% higher than the domestic product. The prices are given the table below:

Table 1 Selling prices of frozen French Fries

Company	Retail Price (Rs./Kg)	Bulk (Rs/Kg)
McCain/ Lambweston /Aviko	120	75-80
Tarai	90-100 (MRP is 120)	55-60
Safal	50	N.A.

Although some of the units like Al Kabeer, Tarai, Safal etc. and some regional players are also there manufacturing fries in the country but most of them are not as per the acceptable international standards, as the units are using indigenous technology and there is a clear difference in the product from the imported one. There is a gap between technology used and available. One unit establishment in Coimbatore, named Golden fries has also been set up with imported plant but has not come in production yet due to unavailability of quality raw material.

Apart from imported Frozen French fries which are generally used by the top and fast food chains, there is substantial and growing market for fresh French fries which are made in the eating joints from fresh potatoes.

The usage of this product is because of high price of imported frozen French fries and non-availability particularly in small towns where distribution network does not exist. Further, some of their users do not have regular pattern of sale and are hesitant to keep stocks. According to a quick estimate the consumption of this type of French fries is 12,000 MT. This market can easily be tapped by domestic producers with appropriate pricing and distribution network.

Fresh French Fries are also made in middle income group households quite frequently although it is difficult to estimate the size of this market. A part of this market can also be captured by appropriate marketing strategies in view of increasing trend of using ready to cook food products.

Potato wedges is the spicy variants of French fries, introduced only 4 year back in the country. Present market of wedges in the country is about 500 MT. In India the major consumer of wedges is McDonalds, having market of 400 MT /Annum, Pizza Hut has recently added this in its menu. Other fast food chains have also introduced this product as substantial growth is expected in this segment. Presently, Vista Foods, dedicated supplier to McCain, is the only manufacturer of Wedges in the country.

Wedges, being spicy in taste, offer great potential in terms of consumer acceptance as they are according to the Indian palate. The growth rate of this product in the country is about 25% per annum, whereas the scope is much higher, as there are possibilities of various types of

coatings and seasonings application to this product to make it more acceptable to consumers and choose from similar wide range of snacks already available in the Indian market like, Pakoras, Samosas containing potato as main ingredient. Wedges could be low cost substitute of imported French fries in the country, as it costs lower than fries. Its low prices can also help in penetration in middle and lower income groups and in smaller towns too.

French fries and wedges are the marketing oriented products, require more concentrated marketing and promotional efforts, whereas most of the units manufacturing in the country are multi-product units where efforts distributed over whole product range. Therefore, any exclusive units, with integrated operation could capture this highly growing domestic market easily.

Gulf countries can be an attractive market destination for India as the imports of frozen vegetables are very high, in which frozen French fries / wedges have a significant share. Presently, USA and European countries fulfill their market need. Assure quality of products can make India competitive for these markets due to the lower freight charges. Countries like Sri Lanka, Bangladesh & Nepal could have good market for India as they consume French fries in significant quantities.

French fries / wedges are growing at the rate of 25% in the country and it is likely to increase in coming years. The reason of this fast rate of growth is:

- Fast growth of international fast food chain (25-30%) not only in metro but in other large towns.
- Growth of Indian / regional chains like Nirula's in Delhi, Dairy dan in Gujarat etc.
- Growing preference for Western snacks due to changing life style. French fries / wedges are likely to cut into Indian snacks like Samosa, Tikki, Pakoras etc.
- Change in retail formats super market, shopping malls etc also stimulate the retail sales, as products are attractively displayed in visi-coolers/ deep freezers.
- Demographic changes like, increasing income, small family, more working women etc. results into more eating out and purchase of ready to cook products.
- French fries are also a complement item to many food products in restaurants, Bars and Pubs; this trend is growing and will contribute to its overall demand in near future.
- A significant proportion of fresh French fries is also expected to get converted to frozen French fries.

1.5 Project description

1.5.1 Support Infrastructure

The major support infrastructure required for establishment of potato processing facility is establishment of small collection centers in each of the district along with transport vehicles in the season. It is also suggested that the company should go for contract farming of potato to produce specifically processable varieties.

1.6 Critical Success Factors

- Availability of raw material
- Attack of diseases like early blight/late blight
- Modern storage facilities and use of modern technology as sprout inhibitors very important to ensure year round availability
- Through aggressive marketing and pricing strategy, bulk market would need to be created.

1.7 Processing facilities

The processing facilities are being recommended on the basis of:

- Market potential (Domestic as well as exports)
- Minimum economic size of processing unit
- Optimum utilization of various processing lines and raw material

Keeping in view, international trade of processing potato products and domestic demand it is suggested that initially facilities for processing potato flakes and frozen French Fries be set up. Potato flakes can be marketed in domestic market as well as exported nearby countries whereas frozen French Fries would be for domestic market. However, possibility of export of gulf countries can also be explored. In order to minimize wastage of potatoes provision for manufacturing wedges should also be there. Wedges being spiced product are likely to become popular in Indian market. This would increase utilization of French fries lines.

1.8 Process Description for French Fries

- **De-stoning, washing and peel removal**

The line is assumed to be fed with raw material (fruits and vegetables) in bulk boxes, which are emptied direct in feed hopper. The bulk boxes are tipped in the dosing hopper, which brings the product into the line. The line has an elevator behind the dosing hopper.

- De-stoning takes place in a flume de-stoner with a stone catching trap. In the trap is an upward water flow to prevent potatoes from trapping. The flume de-stoner ends with a de-watering sieve or a drum washer.
- In the cyclone de-stoner the product comes in spiral water movement, stones and heavy particles will sink against the current in to the stone collecting chamber. The potatoes are floating over the drum washer.

From the drum washer, the product is collected in a screw conveyor to bring the product to the peeler.

Peeling is done through steam peeler, in this method the peel loses are less than with abrasive peeling. In steam peeling method, potatoes are brought under pressure by means of steam and by means of steam heat; the outer layer of the product is heated above atmospheric boiling temperature. Then the pressure is released rapidly, so the potato cell moisture starts boiling and rubs the cell wall. The skin will hang loose around the tuber. In the dry brush machine this loose skin is brushed away. The dry removal gives relative dry peel waste, which is directly usable as cattle feed.

To clean the last starch dirt from potatoes, an after washer is used followed by an inspection belt for manual inspection belt for manual inspection.

- **Cutting sorting and blanching**

The product is collected in a dosing screw with an increased receiving hopper. This hopper has a buffer for at least 10 minutes to cope with fluctuations in the feed or even with small cleaning breaks or coffee breaks of the inspectors.

The product is brought to the in-feed of the hydro cutting system. For cutting high quality product the demand to the product is that the product should be square and straight. This can only be achieved by using a hydro cutting system. In hydro cutting system knives to cut square or rectangular product or wedges can be placed.

A pre-heater can be placed to soften the structure of the potato and give the advantage that during cutting less cells will be damaged and less product breakage and oil take-up. In hydro cutting system the flexible hose will be adapted to the size of the potatoes to be cut. This leads to improved length specifications.

Behind the cutter the thin side-pieces (silvers) and the too short pieces (nubbins) are removed from the product flow by means of a roller silver remover and a vibratory nubbin

grader. The sequence of these two machines depends mostly on the combination with the cutting equipment.

Over the silver remover a spray bar for fresh water is mounted to remove free starch from the product, which has come free by cutting through the potato cells. The last check of the product is done manually or through optical sorters.

An inclined belt elevator brings the product to the blancher. The most common actual blanching process is to blanch short in hot water, followed by long time in less hot water. The first blancher has a retention time up to 2 minutes, the water temperature control is able to maintain the water temperature on approx. 90°C.

The product moves directly over to the second blancher, which is calculated for a retention time of 40 minutes and is commonly set on a temperature of approx. 70°C. The second blancher is one with pump discharge system to bring the product up to the chemical dip flume. The type of blancher is adapted to the amount of product passing that blancher.

▪ **Drying**

The high quality demands equal colour of the stick and prevention of after cooking darkening. To achieve this product should be dipped for 45-60 seconds in hot (80°C) solution.

The product is de-watered as much as possible and divided over the width of the dryer belt. The dryer has to remove a certain amount of the water from the product to improve crispiness of the stick and shorter frying times.

The drying takes place on a two-belt system with as well as hot upward airflow as a downward airflow alternating. By a tipping over from one belt to the other belt the equal; drying is achieved. The maximal weight removal is 20%.

Nevertheless, the product needs time to equilibrate (10 minutes) its internal moisture prior to frying.

▪ **Frying**

The product of the dryer is collected on a collecting belt or converging in-feed vibrator to bring the product directly into the fryer. The fryer is a pan filled with oil, on the bottom a wire link conveyor is present to transport the product. The oil is injected in the bottom over the width of fryer.

The fryer assembly includes an oil circulation system with belt filter for the course of dirt remover, a thermal oil heat exchanger and a circulation pump. To complete the system a

prime oil day tank is included. The frying tank is set on 45-90 seconds, in oil of 180 °C the moisture content of the end product is fixed on 64%. The fat take up will be approx. 5-6%

Directly behind the fryer a de-fatting vibrator is placed to remove as much as possible surface fat from the product.

▪ **Cooling and freezing**

The product is taken over from the de-fatting vibrator by the ambient air – cooling tunnel. The belt is moving through a cabinet where outside air is taken in by means of fans and blown through the product and discharged again. This achieves a relatively easy temperature drop from 90°C incoming product temperature till 5°C above ambient air temperature for the outgoing product. The belt of the ambient cooling tunnel is designed in such a way that the product is directly dropped over to the freezer belt. This drop over point corresponds with the solidification point of the fat. So, if product has stick together, the relatively weak bonds are easily broken apart. The retention time in the ambient air-cooling tunnel is approximately 4 minutes.

In the freezer the product is individually quick-frozen. This means that a high capacity cold airflow is blowing upward through the product, fluidizing the product bed. The first belt part brings the product on the general solidification point of water (-1°C). The second belt of the freezer has a thicker layer of product and the product layer is cooled down further till -18°C in average a retention time in a freezer is approximately 9 minutes.

1.8.1 Raw Material Specifications

Raw material	: Potato – 2.880 kg/ hr
Average specific gravity	: 1.08
Potato solids	: 20.00%
Reducing Sugar	: 0.25% (acceptable upto 0.38%)
Recovery	: 0.960 kg/hr of French fries

1.9 Availability of know how and compliances

CFTRI, Mysore has successfully developed the technical know-how. Compliance under the PFA Act is mandatory.

1.10 Capacity of Plant

The rated capacity of the Frozen French fries is 1920 MT per annum.

1.11 Project component and cost

Major components of the project and their costs are as described in the table hereunder

Particulars	Unit	Qty	Cost/unit	Total
LAND & BUILDING				179.18
Land	SqM	3,100	625.00	19.38
Land Development				
Land Area		3,100	1,500.00	46.50
Building				
Production Block				
Raw Material Hall	SqM	200	5,000.00	10.00
Production Hall	SqM	300	5,000.00	15.00
Laboratory	SqM	40	5,000.00	2.00
Hygiene/Ultra hygiene area	SqM	50	5,000.00	2.50
Storage Block				
Finished Product	SqM	100	5,000.00	5.00
Cold Storage	SqM	1,200	5,000.00	60.00
UTILITY AREA & ADMIN BLOCK	SqM			
Utility area required for boiler, coal or fuel store etc.	SqM	40	5,000.00	2.00
Administrative block	SqM	100	6,500.00	6.50
Contingencies		10%		10.30
PLANT & MACHINERY				588.46
Automatic French Fry Production Line Model FRL	LS	1	509.49	509.49
Installation Costs	LS	5%		25.47
Contingencies		10%		53.50
MISCELLANEOUS FIXED ASSETS				51.15
Furniture and Fixture	LS	1	500,000	5.00
Computers & Other Electrical Items	No	6	50,000	3.00
Cars	No	1	500,000	5.00
Reefer Trucks	No	2	1,300,000	26.00
Weih Bridge	No	1	250,000	2.50
Others	LS	1	500,000	5.00
Contingencies		10%		4.65
PRE-OPERATIVE EXPENSES				59.86
Establishment		1	2,994,000	29.94
Professional Charges		1	200,000	2.00
Interest During Construction		1	1,151,700	11.52
Security Deposits		1	1,640,000	16.40
TOTAL				878.64

The cost of various components of Frozen French Fries unit will depend on the location/city of the project. Component wise investment justification for the unit is stated below -

1.12 Plant and Machinery

Major component of plant and machinery in the unit would be Automatic French Fry Production Line Model FRL. The total plant and machinery will cost around Rs. 588.46 lakhs.

1.13 Building

The main building will have a Raw material hall, Production hall, Laboratory and Hygiene/Ultra hygiene area, storage block etc. The construction of these will cost around Rs. 113.30 lakhs.

1.14 Miscellaneous Assets

The miscellaneous assets of Rs. 51.15 Lakhs will take care of all the other requirements.

1.15 Preliminary & Pre-operative Expenses

A provision of Rs 59.86 lakhs would take care of pre-production expenses like establishment, professional charges, security deposits etc.

1.16 Working Capital Assessment

(RS IN LACS)

ITEMS	Year 1	Year 3	Year 5
PROCUREMENT	23.04	51.84	51.84
PACKING MATERIAL	5.76	12.96	12.96
SUNDRY DEBTORS	142.08	319.68	319.68
TOTAL	170.88	384.48	384.48
MARGIN	42.72	96.12	96.12
MPBF	128.16	288.36	288.36
INTEREST ON WC	15.38	34.60	34.60

1.17 Means of Finance

EQUITY CAPITAL			44.57%	410.68
CENTRAL SUBSIDY	25%	50.00	5.43%	50.00
TERM LOAN				
FINANANCIAL INSTITUTIONS		10.00%	50.00%	460.68
-Payable half yearly Installments	14	2.90		
TOTAL			100%	921.36

1.18 Cash flow statement

PARTICULARS	Year 1	Year 3	Year 5	Year 7
SOURCES OF FUNDS				
EQUITY CAPITAL	-	-	-	-
SUBSIDY				
NET PROFIT	34.19	256.00	251.57	250.82
(INTEREST ADDED BACK)				
DEPRECIATION	69.32	69.32	69.32	69.32
PRELIMINARY EXP.W/O	8.55	8.55	8.55	8.55
INCREASE IN TERM LOAN	-	-	-	-
INCREASE IN BANK BORROWINGS-WC	128.16	80.10	-	-
TOTAL	240.22	413.97	329.45	328.69

1.19 Projected balance sheet

PARTICULARS	Year 1	Year 3	Year 5	Year 7
LIABILITIES				
EQUITY CAPITAL	410.68	410.68	410.68	410.68
RESERVES & SURPLUS	22.74	286.84	673.69	1,085.58
TERM LOAN	427.78	296.18	164.58	32.98

BANK BORROWINGS-WC	128.16	288.36	288.36	288.36
TOTAL	989.37	1,282.06	1,537.32	1,817.60

1.20 Projected profit and loss account

Particulars	Year 1	Year 3	Year 5	Year 7
INCOME	710.40	1,598.40	1,598.40	1,598.40
EXPENDITURE	598.34	1,264.53	1,268.95	1,269.71
VARIABLE	454.88	994.29	990.17	986.04
FIXED	143.46	270.24	278.79	283.67
GROSS PROFIT	112.06	333.87	329.45	328.69
PROFIT BEFORE TAX	(27.26)	186.84	195.58	207.99
RETAINED PROFIT	(27.26)	186.84	195.58	207.99

1.21 Key Indicators

NET PRESENT VALUE at current Inflation (Rs. in lakhs)	1,291.75
INTERNAL RATE OF RETURN %	25.01
AVERAGE DSCR	2.36
BREAK EVEN POINT %	66.04
PAY BACK PERIOD (YEARS)	4.52

1.22 Man Power Requirement

PARTICULARS	NOs.
ADMINISTRATIVE STAFF	
MANAGER-ADMN & OPRN	1
MANAGER-ACCOUNTS & MARKETING	2
EXECUTIVES	4
PRODUCTION	
ASTT MGR-QUALITY	1
SHIFT SUPERVISOR	3
REF. ENGINEER/SUPERVISOR	1
MAINTENANCE SUPERVISOR	1
WORKERS	
SKILLED WORKERS	5
UNSKILLED WORKERS	5
TOTAL	23

1.23 Assumptions

Project & Financing	
Contingencies on Building	10%
Contingencies on Equipment	10%
Term Loan	50%
Rate of Interest on Term Loan	10%
Subsidy Considered	Subject to ceiling 25%
Expected time of Installation	Months 10
Moratorium	Months 6

CAPACITY			
Rated Capacity Per Annum	80% of Installed capacity	TPA	4800
Number of Operational Days	DAYS		300
Working Hours Per day	Hrs		20
CAPACITY UTILIZATION			
Year I			40%
Year II			60%
Year III			90%
SALES PRICE			
Bulk			60%
Retail			40%
OTHER EXPENSE			
Commission			10%
Marketing Expenses			2.5%
POWER			
Connected Load for Cold Storage	HP		320
Connected Load for Processing	HP		90
DEPRICIATION AS PER COMPANY'S ACT			
BUILDING			3.34%
PLANT & MACHINERY			10.34%
MISC. FIXED ASSETS			7.07%
LAND & SITE DEVELOPMENT			1.63%
MAINTENANCE			
BUILDING			1.00%
PLANT & MACHINERY			3.00%
MISC. FIXED ASSETS			2.00%
LAND & SITE DEVELOPMENT			1.00%

1.24 Sources of technology

Technology of the project related material handling equipment is available with indigenous companies and could be set up at competitive prices. Major suppliers are understated –

Kriemko (UK) Ltd.
 Tasveld 7
 P.O. Box 5
 3417 ZG Montfoort
 The Netherlands
 Tel:+ 31 (0) 348-479400
 Fax:- +31 (0) 348-471307
 E- mail : kriemko@kriemko.com Internet:
www.kiremko.com.

Mr. C.P. Zijderveld
 Sale Manager
 H &H Engineering (adivision of BN
 Netherlands)
 Woerden
 The Netherlands
 E- mail: PZijderveld@BMA-NL.com

Refrigeration equipments

Mr. A.K. Vashist
 Manager 9tech. Services)
 Frick India Limited
 809, Suryakiram, 19 K.G. Marg, P.O. Box-18
 New Delhi 110001
 Tel -23322381 / 384 /391 23738693 / 694
 Fax: 91-11-23322396
 E- mail: Delhi@frick.co.in
 Internet: www.frickweb.com

Lioyd Insulations (India) Limited
 Punj Premises, Kalkaji Industrial Area,
 New Delhi- 110019
 Tel- 26430746 / 26430747/ 26440156
 Fax: 26478601 /26467259
 E- mail : lloyd@del2.vsnl.net.in
 Internet : www.lloydindia.com

The actual cost of projects may deviate on change of any of the assumptions.