

## **5. PROFILE ON GROUNDNUT OIL**

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## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of groundnut oil with a capacity of 500 tonnes per annum. The plant will also produce 500 tonnes of expeller cake per annum that can be used for animal feed as by product.

The basic raw material required is dried groundnut, which is found locally.

The present demand for the proposed product is estimated at 1,972 tonnes per annum. The demand is expected to reach at 5,084 tonnes by the year 2022.

The plant will create employment opportunities for 32 persons.

The total investment requirement is estimated at Birr 10.57 million, out of which Birr 3 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 17.01% and a net present value (NPV) of Birr 8.60 million, discounted at 8.5%.

The plant will have a backward linkage effect with the agricultural sector. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.

## **II. PRODUCT DESCRIPTION AND APPLICATION**

Ground nut kernel contains 50-55% of oil. The oil obtained from the kernel is yellow to greenish yellow in colour with chief constituents of glycerides of oleic and linoleic acids with lesser amounts of the glycerides of palmitic, stearic, arachidic, behenic, and lignoceric acid. The oil is used as a substitute for olive oil and other edible oils, soaps, salad and cooking oil, mayonnaise and margarine. The meal is an important component of feeds for poultry and cattle.

### III. MARKET STUDY AND PLANT CAPACITY

#### A. MARKET STUDY

##### 1. Past Supply and Present Demand

Groundnut oil is used for cooking food. The Country's requirement of groundnut oil is met through import and domestic production. However, the market is quite dominated by imports. In 2000-2006 the highest share that could be achieved by domestic manufacturers was 26% in year 2003, while the average for the same period was around 11%. Despite availability of raw materials like groundnut, linseed, niggerseed, sesame, rapeseed, cotton seed in the country, packed edible oil of foreign sources are flooding the market (see Table 3.1).

**Table 3.1**  
**SUPPLY OF EDIBLE OIL (TONNES )**

<b>Year</b>	<b>Domestic</b>	<b>Import</b>	<b>Total</b>
2000	6,579	70,789	77,368
2001	6,637	24,785	31,422
2002	8,329	34,196	42,525
2003	7,999	22,283	30,276
2004	8,027	121,812	129,839
2005	6,931	82,014	88,945
2006	4,882	69,473	74,355
Average	7,054	60,764	67,818

*Source :- Customs Authority for import.*

*CSA, Statistical Abstract for domestic production.*

Table 3.1 reveals that domestic production of edible oil was fluctuating around a mean figure of 7054 tonnes. On the other hand import of edible oil has shown a substantial increase during the

recent three years, i.e., between year 2004 and 2006. The import level which was in the range of 22,283 tonnes and 34,196 tonnes during the year 2001- 2003 has increased to 121,812 tonnes, 82,2014 tonnes and 69,473 tonnes during 2004 , 2005 and 2006 , respectively.

Total apparent consumption (local and imported) during the past seven years ranged from 30,276 tonnes (2003) to 129,839 tonnes (2004). The mean apparent consumption in those years was 67,818 tonnes and this amount is considered to represent current effective demand for the year 2006. Moreover, in order to estimate the present ( 2008) demand it is assumed that demand for the product grows at a rate of 4% which is equivalent to the growth of population. Accordingly, taking the year 2006 apparent consumption as a base and applying a growth rate of 4% the current unsatisfied demand which excludes local production is estimated at 65,722 tonnes.

The data obtained for domestic production is in aggregate which does not show by type of the oil seeds. On the other hand, the import statistics reveals that of the total quantity of edible oil imported to the country about 70% is soya bean and palm oil and about 18% linseed and vegetable oils. The remaining 12% is the share of ground nut, sunflower, sesame and the like. Hence, only 3% of the total unsatisfied demand is assumed to be the current unsatisfied demand for ground nut oil. Accordingly, current unsatisfied demand for ground nut oil is calculated at 1,972 tonnes.

## **2. Projected Demand**

The demand for ground nut oil or edible oil is dependent on population and income. As a product targeted to a segment of the market ground nut oil will be more dependent on income. Thus the demand for ground nut oil is projected based on 7% annual growth rate attained in gross domestic product (GDP) in 2000-2006 The projected demand for ground nut oil is presented in Table 3.2.

**Table 3.2****PROJECTED UNSATISFIED DEMAND FOR GROUNDNUT OIL (TONNES)**

<b>Year</b>	<b>Projected Demand</b>
2009	2,110
2010	2,257
2011	2,415
2012	2,584
2013	2,765
2014	2,959
2015	3,166
2016	3,388
2017	3,625
2018	3,879
2019	4,150
2020	4,441

**3. Pricing and Distribution**

The price for one liter locally manufactured edible oil in Addis Ababa is Birr 13, while imported brands are sold at Birr 15. Taking into account mark-ups by distributors and retailers the factory gate price recommended for the new project is Birr 11/litre.

Edible oil distribution is becoming easy due to the use of tight and attractive packaging materials. The envisaged project can appoint agents in the major market areas of the country.

## B. PLNAT CAPACITY AND PRODUCTION PROGRAMME

### 1. Plant Capacity

Based on the market study the annual processing capacity of the envisaged plant is 500 tonnes (546,488 lt.) of edible oil assuming that the plant covers 20% of the market share of year 2012(Two years construction period and three years full capacity attainment period), based on 300 working days and a single shift of 8 hours per day.

### 2. Production Programme

At the initial stage of the production period, the plant would require some years to penetrate into the market and develop production skill. Therefore, in the first, second and third year of production, the capacity utilization rate will be 70%, 85% and 95%, respectively. In the fourth year and thereafter, full capacity (100%) production shall be attained. Table 3.3 shows the production programme of the project.

**Table 3.3**  
**PRODUCTION PROGRAMME (TONNES)**

Sr. No.	Product	Production year			
		1	2	3	4-10
1.	Edible oil	350	425	475	500
2.	Expeller Cake*	350	425	475	500
3.	Capacity Utilization (%)	70	85	95	100

*\*The plant generates income by the sale of the expeller cake for animal feed. By taking the price of Birr 1000 per ton of expeller cake, the envisaged plant gets Birr 1,000,000 annually.*

#### IV. MATERIALS AND INPUTS

##### A. RAW AND AUXILIARY MATERIALS

The principal raw material required for the production of groundnut oil is groundnut seed, which are produced locally in different regions such as Oromia, Benishangul, SNNPRS, etc. The seed gives 44.5-50% oil, 50-55% meal. All the other raw materials are also found locally. The raw material, refining chemicals and packing materials requirement of the envisaged plant is indicated in Table 4.1. The total annual cost of raw and auxiliary materials is estimated to be Birr 10,059,620.

**Table 4.1**  
**RAW AND AUXILIARY MATERIALS REQUIREMENT AND COST**  
**(AT FULL CAPACITY)**

Sr. No.	Raw & Auxiliary Materials	Unit of Meas.	Qty.	Cost ('000 Birr)		
				FC	LC	Total
1.	Shelled ground nut	Tonnes	1250	-	10,000	10,000
2.	Caustic Soda	Kg	2380	-	19.04	19.04
3.	Bleaching earth	Tones	11.09	-	22.18	22.18
5.	**Barrel (200 lt.)	Pcs.	92	-	18.4	18.4
<b>Grand Total</b>					<b>10,059.62</b>	<b>10,059.62</b>

*\*\* The drum number is calculated by assuming that the drum is recyclable and 10% loss annually.*

##### B. UTILITIES

The major utilities of the envisaged project are electricity, furnace oil and water. The annual consumption and cost of utilities is indicated in Table 4.2. The total annual cost of utilities is estimated at Birr 573,400.



**Table 4.2**  
**UTILITIES REQUIREMENT AND COST**

<b>Sr. No.</b>	<b>Utility</b>	<b>Unit of Measure</b>	<b>Qty.</b>	<b>Unit price</b>	<b>Cost ( in Birr)</b>
1.	Electricity	kWh	250,000	0.4736	118,400
2.	Furnace oil	lt.	50,000	5.84	292,500
3.	Water	m <sup>3</sup>	50,000	3.25	162,500
	<b>Total</b>				<b>573,400</b>

## V. TECHNOLOGY AND ENGINEERING

### A. TECHNOLOGY

#### 1. Production Process

Edible oil technology can be grouped into two: mechanical pressing and solvent extraction. Sometimes the latter compliments the former. For oilseeds with high oil content such as ground nut, first mechanical pressing will be applied and over 85% of the oil will be extracted. The remaining oil in the expeller cake will then be extracted with solvent. For some other oilseed with low oil content, solvent extraction is generally considered as the best alternative. However, the initial investment cost of solvent extraction is much higher than mechanical pressing. In addition, solvent extraction is more appropriate for large scale processing than small scale edible oil plants. Therefore, in this study the mechanical pressing technology has been selected.

Ground nut oil production process, based on mechanical pressing technology, can be grouped into three stages: seed preparation, pressing and crude oil refining.

The seed requires undergoing a thorough cleaning process to remove sand, stalk, plant debris and any other foreign matters by rotary or table sieve. Usually, the screening process is

assisted by air aspiration unit. After cleaning, the seeds have to be prepared for efficient oil recovery by pressing. The stages involved are size reduction of the seeds by breaking them and then conditioning the seeds by adjusting their moisture content and temperature, while keeping the seeds hot (say 90-95°C) for a period of 30-60 minute. Then the prepared seed shall be conveyed to the screw pressing machine where it is pressed by the action of worm and outer shell. The crude oil so obtained from the pressing will be first clarified in a settling tank and then shall be pumped through the filter press.

The filtered crude ground nut oil will be pumped to the refinery where it shall pass through three stages of refining: neutralization, bleaching and deodorization.

To reduce the level of free fatty acid (FFA) in the oil, caustic soda will be mixed with the crude oil. The neutralized oil may have trace of soap which is a by-product of the neutralization process. Therefore, the oil will be washed with water. It will then be pumped to the bleacher in which it will be mixed with bleaching earth to improve the color of oil by the process called adsorption. The bleached oil, after being filtered, will be pumped to the deodorizer to avoid substances which are responsible for the odor of edible oil. In some very small plant the three stages of refining crude oil shall be executed in a single vessel. The plant requires a containment vessel for the collection and treatment of wastes to be generated in the process.

## **2. Source of Technology**

The machinery and equipment can be obtained from the following company.

Nova Engineering

P.O.chittilapilly, Trichur- 680551, kerala, India

Telephone: 00-91-487-2306170, 2306435

Fax: 91-487-2308890, cell: 9447481890, 9895077644

E-mail: [novaengg@rediffmail.com](mailto:novaengg@rediffmail.com)

Web site: [www.novaind.net](http://www.novaind.net)

**B. ENGINEERING****1. Machinery and Equipment**

The list of machinery and equipment of the project is indicated in Table 5.1. The total cost of machinery and equipment is estimated at Birr 3 million, out of which Birr 2.55 million is required in foreign currency.

**Table 5.1**  
**LIST OF MACHINERY AND EQUIPMENT**

Sr. No.	Description	Qty.	Cost(Birr)		
			LC	FC	TC
1.	Seed cleaning unit	1	67,500	382,500	450,000
2.	Dust blower	1	12,600	71,400	84,000
3.	Cyclones	1	11,700	66,300	78,000
4.	Hammer Mill	1	6,300	35,700	42,000
5.	Screw conveyor	3	15,750	89,250	105,000
6.	Bucket elevator	2	19,800	112,200	132,000
7.	Roller crusher	1	27,000	153,000	180,000
8.	Screw press	1	90,000	510,000	600,000
9.	Filter press	1	19,350	109,650	129,000
10.	Holding tank	3	15,750	89,250	105,000
11.	Pumps	5	13,500	76,500	90,000
12.	Neutralizer	1	20,250	114,750	135,000
13.	Bleacher	1	14,850	84,150	99,000
14.	Vacuum pump	1	9,900	56,100	66,000
15.	Condenser	1	11,250	63,750	75,000
16.	Deodorizer	1	22,500	127,500	150,000
17.	Water treatment	Set	4,500	25,500	30,000
18.	Boiler	Set	67,500	382,500	450,000
	<b>Total</b>		<b>450,000</b>	<b>2,550,000</b>	<b>3,000,000</b>

## **2. Land, Building and Civil works**

The total land requirement of the project is about 2,000m<sup>2</sup>, out of which the built-up area is 1000m<sup>2</sup>. Out of the total built up area, 500m<sup>2</sup> will be covered by production facility, 350m<sup>2</sup> for store and 150 m<sup>2</sup> for office building. Therefore, the cost of building is estimated at Birr 2,300,000 million assuming construction cost rate of Birr 2,300 per square meter.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 272/2002) in principle, urban land permit by lease is on auction or negotiation basis, however, the time and condition of applying the proclamation shall be determined by the concerned regional or city government depending on the level of development.

The legislation has also set the maximum on lease period and the payment of lease prices. The lease period ranges from 99 years for education, cultural research health, sport, NGO , religious and residential area to 80 years for industry and 70 years for trade while the lease payment period ranges from 10 years to 60 years based on the towns grade and type of investment.

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%.The lease price is payable after the grace period annually. For those that pay the entire amount of the lease will receive 0.5% discount from the total lease value and those that pay in installments will be charged interest based on the prevailing interest rate of banks. Moreover, based on the type of investment, two to seven years grace period shall also be provided.

However, the Federal Legislation on the Lease Holding of Urban Land apart from setting the maximum has conferred on regional and city governments the power to issue regulations on the exact terms based on the development level of each region.

In Addis Ababa the City's Land Administration and Development Authority is directly responsible in dealing with matters concerning land. However, regarding the manufacturing sector, industrial zone preparation is one of the strategic intervention measures adopted by the

City Administration for the promotion of the sector and all manufacturing projects are assumed to be located in the developed industrial zones.

Regarding land allocation of industrial zones if the land requirement of the project is below 5000 m<sup>2</sup> the land lease request is evaluated and decided upon by the Industrial Zone Development and Coordination Committee of the City's Investment Authority. However, if the land request is above 5,000 m<sup>2</sup> the request is evaluated by the City's Investment Authority and passed with recommendation to the Land Development and Administration Authority for decision, while the lease price is the same for both cases.

The land lease price in the industrial zones varies from one place to the other. For example, a land was allocated with a lease price of Birr 284 /m<sup>2</sup> in Akakai-Kalti and Birr 341/ m<sup>2</sup> in Lebu and recently the city's Investment Agency has proposed a lease price of Birr 346 per m<sup>2</sup> for all industrial zones.

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all manufacturing projects will be located in the industrial zones. Therefore, for this profile since it is a manufacturing project a land lease rate of Birr 346 per m<sup>2</sup> is adopted.

On the other hand, some of the investment incentives arranged by the Addis Ababa City Administration on lease payment for industrial projects are granting longer grace period and extending the lease payment period. The criteria are creation of job opportunity, foreign exchange saving, investment capital and land utilization tendency etc. Accordingly, Table 5.2 shows incentives for lease payment.

**Table 5.2**

**INCENTIVES FOR LEASE PAYMENT OF INDUSTRIAL PROJECTS**

<b>Scored point</b>	<b>Grace period</b>	<b>Payment Completion Period</b>	<b>Down Payment</b>
Above 75%	5 Years	30 Years	10%
From 50 - 75%	5 Years	28 Years	10%
From 25 - 49%	4 Years	25 Years	10%

For the purpose of this project profile the average i.e. five years grace period, 28 years payment completion period and 10% down payment is used. The period of lease for industry is 60 years.

Accordingly, the total lease cost, for a period of 60 years with cost of Birr 346 per m<sup>2</sup>, is estimated at Birr 41.52 million of which 10% or Birr 4,152,000 will be paid in advance. The remaining Birr 37.37 million will be paid in equal installments with in 28 years i.e. Birr 1,334,571 annually.

## VI. MANPOWER AND TRAINING REQUIREMENT

### A. MANPOWER REQUIREMENT

The envisaged project requires 32 work forces. The list of manpower for the envisaged project is indicated in Table 6.1. The annual cost of labour including fringe benefits is estimated at Birr 330,750.

**Table 6.1**  
**MANPOWER REQUIREMENT AND ANNUAL LABOUR COST**

Sr. No.	Description	Req. No.	Monthly Salary (Birr)	Annual Salary (Birr)
1.	General Manager	1	4,000	48,000
2.	Secretary	1	900	10,800
3.	Purchaser	1	2,000	24,000
4.	Production and technic head	1	3,500	42,000
5.	Personnel	1	2,000	24,000
6.	Sales man	1	2,000	24,000
6.	Accountant	1	2,000	24,000
7.	Cashier	1	500	6,000
8.	Chemist	1	1,500	18,000
9.	Electrician	1	900	10,800
10.	Mechanic	1	900	10,800
11.	Production supervisor	1	1,500	18,000
12.	Operators	6	5,400	64,800
13.	Laborers	8	2,800	33,600
14.	Store keeper	1	500	6,000
15.	Driver	2	1,000	12,000
16.	Guards	3	1,050	12,600
	<b>Sub-Total</b>	<b>32</b>		<b>264,600</b>
	Benefits (20% BS)			66,150
	<b>Grand Total</b>	<b>32</b>		<b>330,750</b>

## **B. TRAINING REQUIREMENT**

Technical staffs, for example, the production supervisor, chemist, maintenance personnel and operators shall be trained for about one month by the experts of machinery supplier during plant erection and commissioning. The total cost of training is estimated to be Birr 50,000.

## **VII. FINANCIAL ANALYSIS**

The financial analysis of the ground nut oil project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity 70 % loan
Tax holidays	3 years
Bank interest	8.5%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30 days
Work in progress	1 days
Finished products	10 days
Cash in hand	5 days
Accounts payable	30 days
Repair and maintenance	5% of machinery cost

### **A. TOTAL INITIAL INVESTMENT COST**

The total investment cost of the project including working capital is estimated at Birr 10.57 million, of which 24 per cent will be required in foreign currency.

The major breakdown of the total initial investment cost is shown in Table 7.1.

**Table 7.1****INITIAL INVESTMENT COST ( '000 Birr)**

<b>Sr. No.</b>	<b>Cost Items</b>	<b>Local Cost</b>	<b>Foreign Cost</b>	<b>Total Cost</b>
1	Land lease value	4,152.00	-	4,152.00
2	Building and Civil Work	2,300.00	-	2,300.00
3	Plant Machinery and Equipment	450	2550	3,000.00
4	Office Furniture and Equipment	100	-	100.00
5	Vehicle	250	-	250.00
6	Pre-production Expenditure*	442.27	-	442.27
7	Working Capital	329.91	-	329.91
	<b>Total Investment cost</b>	<b>8,024.18</b>	<b>2,550.00</b>	<b>10,574.18</b>

\* *N.B Pre-production expenditure includes interest during construction ( 292.27 thousand , training (Birr50 thousand ) and Birr 100 thousand costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

**B. PRODUCTION COST**

The annual production cost at full operation capacity is estimated at Birr 12.09 million see Table 7.2). The raw material cost accounts for 83.20 per cent of the production cost. The other major components of the production cost are cost of utility , depreciation and financial cost which account for 4.74 %, 4.40 and 3.68 % respectively. The remaining 3.98 % is the share of repair and maintenance, direct labour and other administration cost.



**Table 7.2**  
**ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

Items	Cost	%
Raw Material and Inputs	10,059.62	83.20
Utilities	573.40	4.74
Maintenance and repair	150.00	1.24
Labour direct	158.76	1.31
Labour overheads	66.15	0.55
Administration Costs	105.84	0.88
Land lease cost	-	-
<b>Total Operating Costs</b>	<b>11,113.77</b>	<b>91.92</b>
Depreciation	532.5	4.40
Cost of Finance	444.6	3.68
<b>Total Production Cost</b>	<b>12,090.83</b>	<b>100</b>

## C. FINANCIAL EVALUATION

### 1. Profitability

Based on the projected profit and loss statement, the project will generate a profit through out its operation life. Annual net profit after tax will grow from Birr 2.3 million to Birr 3.5 million during the life of the project. Moreover, at the end of the project life the accumulated cash flow amounts to Birr 33.69 million.

### 2. Ratios

In financial analysis financial ratios and efficiency ratios are used as an index or yardstick for evaluating the financial position of a firm. It is also an indicator for the strength and weakness of the firm or a project. Using the year-end balance sheet figures and other relevant data, the most important ratios such as return on sales which is computed by dividing net income by

revenue, return on assets ( operating income divided by assets), return on equity ( net profit divided by equity) and return on total investment ( net profit plus interest divided by total investment) has been carried out over the period of the project life and all the results are found to be satisfactory.

### 3. Break-even Analysis

The break-even analysis establishes a relationship between operation costs and revenues. It indicates the level at which costs and revenue are in equilibrium. To this end, the break-even point of the project including cost of finance when it starts to operate at full capacity ( year 3) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 25 \%$$

### 4. Payback Period

The pay back period, also called pay – off period is defined as the period required to recover the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project's initial investment will be fully recovered within 7 years.

### 5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money in a bank account. Accordingly, the IRR of this project is computed to be 17.01 % indicating the viability of the project.

## **6. Net Present Value**

Net present value (NPV) is defined as the total present (discounted) value of a time series of cash flows. NPV aggregates cash flows that occur during different periods of time during the life of a project into a common measuring unit i.e. present value. It is a standard method for using the time value of money to appraise long-term projects. NPV is an indicator of how much value an investment or project adds to the capital invested. In principle a project is accepted if the NPV is non-negative.

Accordingly, the net present value of the project at 8.5% discount rate is found to be Birr 8.60 million which is acceptable.

### **D. ECONOMIC BENEFITS**

The project can create employment for 32 persons. In addition to supply of the domestic needs, the project will generate Birr 2.33 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.