PROFILE ON PRODUCTION OF EDIBLE OIL

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ADDIS ABEBA INVESTMENT COMMISSION
A.A

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I. Executive Summary

This Project profiles is prepared to assess the viability of running an edible oil factory, in Addis Abeba city administration. Hence market, technical, organizational and financial study was made to investigate the viability of the envisaged project.

This project profile on edible oil factory has been developed to support the decision –making process based on a cost benefit analysis of the actual project viability. This profile includes marketing study, production and financial analysis, which are utilized to assist the decision-makers when determining if the business concept is viable. Ethiopia has a private sector driven edible oil factories. According to the latest data sourced from the ministry of Trade and industry here are some 405 registered oil extracting companies in Ethiopia. However, the majority of these factories do not have the latest technology to refine their crude oil processed from various types of oil seeds to the level required in terms of quality.

Ethiopia's demand for cooking oil has been growing at a rate of 6.8 % per annum. The national demand for edible oil is projected to reach over 1,395,685MT in 2020 up from 671,076 MT in 2015. Average National production from 2013 to 2017 was 167,797 MT making Ethiopia a net importer of edible oil to the tune of over one billion metric tons This gives ample investment opportunities in the edible oil industry.

The location of the plant will be decided on the basis of access to raw material infrastructure namely power water transport, telecom and easy access to international market. The most locally available raw materials for the factory are cotton seed, soya bean and imported crude oil.

The total investment capital including establishing the factory is Birr 1.425 billion. Out of the total investment capital, the owners will cover Birr 427.55 million (30 %) while the remaining balances amounting to Birr 997.60 million (70 %) will be secured from bank in the form of term loan.

The factory at full capacity operation can process 7,800 tons of cotton seed, 18,200 tons of soya bean and will import 49,280 tons of crude edible oil to produce 54,285,714liters of edible oil and 201,595 Quintals of oil cake per year based on 260 working days and their shifts of 24 hours per day. The Benefit-cost ratio and Net present value (NPV) have been calculated at 17% discount factor (D.F) for 10 years of the project activity. Accordingly, the project has NPV of 8.18 billion Birr at 17%D.F. and the benefit-cost ratio of 1.20 at 17% D.F.

Therefore, from the aforementioned overall market technical and financial analysis we can conclude that the edible oil factory business is a viable and worthwhile.

1. Background information

1.1. Introduction

The overall government policy framework in the agricultural sector emphasizes private sector participation and investments. This emphasis is highlighted in the comprehensive strategy growth and transformation program GTP to deal with major constraints to private sector development. Specifically, in the edible oil industry:

- The sub sector has been fully liberalized to create competition in production processing and marketing
- The taxation system is being harmonized so that oil millers operate on a level playing field, and
- Institutions that promote raw material production have been set up and are adequately financed

1.2. Product description

Edible or cooking oil is fat of plant, animal or microbial origin, which is liquid at room temperature and is suitable for food use. Some of the many different kinds of edible vegetable oils include: olive oil, palm oil, soybean oil, canola oil, pumpkin seed oil, corn oil, sunflower oil, safflower oil, peanut oil, grape seed oil, sesame oil and rice bran oil. Many other kinds of vegetable oils are also used for cooking. The generic term "vegetable oil" when used to label a cooking oil product refers to a blend of a variety of oils often based on palm, corn, soybean or sunflower oils.

1.3. Project location and description

1.3.1. Location of Addis Ababa

Addis Ababa is the seat of the Ethiopian federal government. It is located on the central highlands of Ethiopia in the middle of Oromia Region. The absolute location is around the intersection point of 901'48''N latitude and 38°44′24″E longitudes. This is very near to the geographical center of the country. It is, therefore, equidistant to the peripheral areas or is equally accessible to almost all parts of Ethiopia. Addis Ababa is located on a well-watered plateau surrounded by hills and mountains. The city is in the highlands on the edge of the Ethiopian rift valley or the eastern slopes of the Entoto Mountain ranges bordering the Great Rift Valley. The total area of Addis Ababa is about 540 km^2 of which 18.2 km^2 are rural. Addis Ababa's built-up urban area spans 474 km^2. It is also the largest city in the world located in a landlocked country.

1.3.2. Demography of Addis Ababa

According to the CSA (2013) population projection, Ethiopia's total population reaches about 105 million people in 2022. Of the total population 22.9% (24 million people) live in urban areas. Ethiopia's urban population is expected to triple by 2037 (World Bank, 2015). Addis Ababa hosts an estimated 3,859,638 people. Currently, Addis Ababa is experiencing an annual growth rate of 3.8% and is estimated to reach 4,696,629 inhabitants by 2032 (CSA, 2015).

1.3.3. Economic activity of Addis Ababa

The transformation of Addis Ababa has especially been rapid since 1991. According to the data from the city's Bureau of Finance and Economic Development (2006), per capital income of Addis Ababa has grown from USD 788.48 in 2010 to USD 1,359 in 2015. The city also achieved a decline

in the poverty index from a high of 29.6 in 2012 to 22.0 in 2014. Moreover, the current poverty headcount index for Addis Ababa is estimated at 18.9 while the poverty severity account for 5 and 1.8 index points respectively. Even though, the poverty status of Addis Ababa has an improvement over previous years, there is still much work to be done to curb both the incidence and severity of poverty.

The major contributor to the economic growth of the city is the implementation of publicly financed mega urban projects like condominium housing, the Light Rail Transit, the international airport and industrial zone development (The state of Addis Ababa, 2017). The existence of international large and medium-size enterprises in and around Addis Ababa have also significant role in creating huge opportunity for employment and technology transfer. Furthermore, there are strong demand for goods and services following the existence of many embassies and inter-governmental organizations like the African Union, the United Nations Economic Commission for Africa.

The manufacturing sector's contribution to Addis Ababa's GDP is high. Despite the fact that 86% of the industries in the city are micro and small scale (cottage and handicrafts, and small-scale), the majority of the country's large and medium scale industries are found in the city. Noticeable increases are also registered currently in other aspects of industrial growth.

The service sector is both the largest contributor to the city's economy and the largest employer. It contributes to 76.4% of the city's GDP while industry's share makes up (almost all) the rest. This sector is dominated by three major sub-sectors: Transport and communication; Real estate, Renting and Business services; and Trade, Hotel and Restaurants. According to the state of Ethiopian Cities 2015 report, the service sector has also been responsible for more than 50% of

the growth in the estimated annual growth of the city's GDP. Although 75% of employment in the city is also generated in the service sector, a large proportion of the employed work in low skill and low paying jobs as shop salespersons, petty and 'gullit' traders, sales workers in small shops, domestic helpers or doorkeepers and restaurant service workers.

Analysis of the economic structure of Addis Ababa reveals that the services sectors (63%) dominates with industry (36%) in second place indicating that these sectors account for almost all of the Addis Ababa's GDP (The State of Addis Ababa, 2017).

Addis Ababa has a great share in the economy of the country due to its attractiveness to businesses, companies, individuals and foreign direct investment. Overall primacy index of the city is 24.8 based on urban employment and unemployment survey (CSA 2015). According to the State of Addis Ababa 2017 report, the simultaneous high rates of economic growth and urbanization in Addis Ababa indicates a likely further rising dominance of the city in Ethiopia's economy as well as growing agglomeration of economic activities in and around the city.

1.4. Why is it beneficial to invest in Addis Ababa?

Addis Ababa is the largest and most economically significant city in the country. Ethiopia's urban population share is only 17 percent (as of 2012, World Bank 2015). The city is the only urban area in Ethiopia capable of delivering scale economies in terms of concentrated demand, specialization, diversity and depth of skills, innovation, and technology transfers. Thus, investors will be benefited in getting capable human power from the market.

The capital is the country's main industrial hub. The city dominates industrial capacity in almost all the braches of light manufacturing that Ethiopia prioritizes. As a result Addis Ababa completely

dominates production in various subsectors. This can be taken as the political and social stability of the city.

Overall, the city has a beautiful environment, favorable location, and strong industrial base. Its advantage as an economic powerhouse of the country and human resource center are the most attractive features for local and overseas investors.

Moreover, investors will be getting a comprehensive set of incentives for priority sectors. These include:

- Customs duty free privilege on capital goods and construction materials, and on spare parts whose value is not greater than 15% of the imported capital goods' total value.
- Investors have the right to redeem a refund of customs duty paid on inputs (raw materials and components) when buying capital goods or construction materials from local manufacturing industries.
- Income tax exemption of up to 6 years for manufacturing and agro-processing, and up to 9 years for agricultural investment.
- Additional 2-4 years income tax exemption for exporting investors located within industrial parks and 10-15 years exemption for industrial park developers.
- Loss Cary forward for half of the tax holiday period. Several export incentives, including Duty Draw-Back, Voucher, Bonded Factory, and Manufacturing Warehouse, and Export Credit Guarantee schemes.

1.4.1. The city benefit from the investment

The city will be benefited from investment. These are discussed below.

- Employment opportunity

  Investment is expected to provide direct and indirect employment. These range from unskilled causal workers, semi-skilled and skilled employees.

- Improving growth of the economy

  Through the use of locally available materials and exporting products, the investment contributes towards growth of the economy by contributing to the growth of domestic product. These eventually attract taxes including VAT which will be payable to the government hence increasing government revenue while the cost of local materials will be payable directly to the producers. In addition, domestic products save foreign exchange and exports also bring money to the country.

1.5. Production of Oilseeds in Ethiopia (Availability of raw materials)

Ethiopia is the sixth world producer of sesame seed and the fifth for linseed. In addition, Ethiopia is a relative important world producer of sunflower and castor beans.

Oil seed are the third important crop in acreage after cereals and pulses. Oilseeds are cultivated by 30% of the agricultural holdings on 7% of the total agricultural land. Figure below presents the distribution of the total production of oilseeds in Ethiopia which amounted to 967,759 tons in 2019/20.

Table 1 Production of major oil seeds and soya bean crops in 2019/20 in Ethiopia

Crops	Unit of measure	Quantity
Niger seed	Quintals	2,916,369
Sesame seed	Quintals	2,626,542
Ground nuts	Quintals	1,565,332
Sunflower	Quintals	95,708
Rapeseed	Quintals	420,462
Linseed	Quintals	796,949
Soya-bean	Quintals	1,256,232

Sources: - CSA

1.6. Oilseeds processing and refining

Ethiopia has a large number of local small scale processors. The estimated actual domestic production is 70,543 tons in 2017. This provides an opportunity to increase production for domestic consumption as substitution for imports. Ethiopia imparted 1.07 billion tones edible oil in the period in 2021 that means for the past year imports were 14 times that of domestic production. The increase of import suggests a potentially large domestic market with rising incomes main imports of edible oil are palm and soybean oil

Substitution of these oils by domestic production seems feasible encouraged by high domestic prices. Imports show large variations between years which can partly be explained by food aid of specific edible oils.

2. Marketing plan

2.1. Market analysis summary

The current drive and emphasis by the government on the diversification of the industrial base away from the other sector presents an opportunity for production industry to a valuable contribution towards achieving goal. Having undertaken a thorough and comprehensive research of the market we realized that there was a vast opportunity for domestic products. Aware of the fact operating in such a market is largely dependent on good networking, the promoter intends to establish networks and strategic relationships with various wholesalers and retailers to ensure a steady stream of orders. In so doing the owner intend to ensure that the products they produce are of extremely high quality and fully serve the customers purpose.

The global edible oil market is anticipated to witness a substantial growth owing to increasing popularity of unrefined, unprocessed, healthy, and organic oil. In the coming years, vegetable oils with low cholesterol, fat, and calories are likely to gain high response due to growing health awareness among people across the world. In addition, major improvement in retail network, increasing crop yields, oil production, and growing economies are some of the prominent factors supporting the growth of the global edible oil market.

The market for edible oil can be segmented on the basis of type, end-users, and geography. In terms of type, the market can be classified into palm oil, cotton seed oil, soya bean oil, olive oil, sunflower oil, specialty blended oil, and corn oil. Increasing consumption of fried foods has significantly increased the demand for edible oils. Based on end-users, the marker for edible oil can be divided into food processor, food service, and retail. Improving living standards, changing

dietary habits, and increasing consumer preference for healthy edible oil supporting the growth of the global edible oil market.

2.2. Supply

Supply of Refined Edible Oil in Ethiopia emanates from both domestic production and import from abroad. As per Food, Beverage & Pharmaceutical Development Institute, the supply of edible oil for consumption in Ethiopia can be seen from five perspectives.

i. Large and modern private refineries produce and supply for the consumption of middle and high income urban dwellers.

ii. Low and middle technology semi refinery or crude oil producer house industries in small towns produce and supply to low and middle income urban dwellers.

iii. Rural house industries produce crude oil by traditional system and supply to rural residents by low price.

iv. Since the difference between domestic productions supply and demand for edible oil is being wide from time to time, government takes the action of importing palm oil through selected importing companies and this supply takes the lion share.

v. Private traders also import edible oil by free market.

2.2.1. Domestic supply

The production of edible oil in Ethiopia is characterized by refined, semi -refined and crude edible oil. As per data obtained from Food, Beverage & Pharmaceutical Development Institute, there are less than ten refineries, few semi refinery and so many crude oil producers with different production capacity in Ethiopia. The potential areas for edible oil production in Ethiopia are Addis Ababa cluster, Burayou cluster, Adama cluster and Bahir-Dar cluster. On these sites government planned to organize producers and promote them to plant refineries by cooperation.

As per data obtained from CSA domestic production of edible oil per year from 2005 E.C to 2009 E.C is shown below in table 2

Table 2 Local supply of Edible oil in kg

	2005	2006	2007	2008	2009	Average
Local Edible oil	4,573,000	9,596,000	5,612,000	748,859,000	70,543,000	167,836,600

Sources: - CSA

2.2.2. Import

Import constitutes the major and lion's share part of country's edible oil supply. Currently, government of Ethiopia imports edible palm oil from Indonesia and Malaysia and supply to consumers (especially for low income society) at lower price to make them beneficiary in both price and accessibility wise. As can be seen on the following table 3 to table 5, imports of edible oil have been rapidly increasing over the last five years.

2.2.2.1. Imported edible palm oil

Table 3 imported edible palm oil from 2015 to 2019 in kg

	Gross Wt. (Kg)	Net Wt. (Kg)	CIF Value (ETB)	CIF Value (USD)	Total tax (ETB)	Total tax (USD)
2012	310,799,430	292,711,106	6,827,878,573	382,180,200	0	0
2013	357,425,204	336,900,057	6,677,872,203	355,204,079	0	0
2014	364,446,495	343,310,756	7,350,938,165	364,926,734	0	0
2015	471,032,351	442,018,747	8,711,141,485	419,167,620	0	0
2016	249,313,745	227,535,039	4,447,223,057	205,904,255	0	0
2017	475,553,935	451,548,052	10,421,519,888	430,340,790	405	17
2018	304,278,989	289,486,178	7,584,622,111	274,109,943	56,972,130	2,058,986
2019	1,121,720	1,033,236	27,010,446	924,699	0	0
2020	418,771,831	401,680,739	11,692,496,232	334,549,248	489,242,780	13,998,363
2021	663,732,878	656,112,248	28,530,162,550	643,731,104	290,282,787	6,549,702
	Average	382,481,795	10,252,318,301	379,004,297	92,944,234	2,511,896

2.2.2.2. Imported crude edible oil

Table 4 Imported crude edible oil from 2012 to 2021

	Gross Wt. (Kg)	Net Wt. (Kg)	CIF Value (ETB)	CIF Value (USD)	Total tax (ETB)	Total tax (USD)
2012	91,570	88,622	2,007,695	112,378	808,605	45,260
2013	24,519	23,176	428,991	22,819	174,332	9,273
2014	143,741	140,143	4,275,686	212,260	951,070	47,214
2015	723,415	711,034	15,075,139	725,394	3,908,492	188,071
2016	441,208	436,619	8,501,812	393,630	4,202,521	194,575
2017	2,674,069	2,655,810	65,377,604	2,699,669	29,376,290	1,213,049
2018	8,281,997	8,162,500	212,362,854	7,674,841	79,147,503	2,860,408
2019	0	0	0	0	0	0
2020	36,601,382	35,833,780	1,271,441,877	36,378,881	141,538,562	4,049,744
2021	61,560,990	57,615,023	3,491,236,295	78,773,382	4,258,027	96,075
	Average	11,740,745	563,411,995	14,110,361	29,373,934	967,074

2.2.2.3. Imported edible oil excluding palm oil and crude oil

	Gross Wt. (Kg)	Net Wt. (Kg)	CIF Value (ETB)	CIF Value (USD)	Total tax (ETB)	Total tax (USD)
2012	22,860,776	21,237,826	636,626,220	35,634,192	327,431,519	18,327,485
2013	22,887,332	20,837,085	546,355,881	29,061,328	307,687,945	16,366,293
2014	17,926,822	16,316,743	538,351,085	26,725,664	298,146,725	14,801,065
2015	38,436,388	35,649,292	1,107,371,774	53,285,140	687,614,748	33,087,034
2016	27,735,138	25,362,949	785,460,271	36,366,427	413,353,436	19,138,062
2017	70,776,715	66,775,698	2,246,400,083	92,761,670	897,758,751	37,071,580
2018	53,454,424	51,194,393	1,802,249,678	65,133,707	434,688,014	15,709,722
2019	0	0	0	0	0	0
2020	425,592,865	419,212,749	12,742,121,153	364,581,435	2,403,034,882	68,756,363
2021	388,631,734	363,753,461	17,880,126,547	403,432,458	783,736,239	17,683,579
	1,068,302,193	1,020,340,196	38,285,062,693	1,106,982,021	6,553,452,258	240,941,184

Table 5 Total supply of edible oil

Year	2017	2018	2019	2020	2021
Domestic production	167,836,600	167,836,600	167,836,600	167,836,600	167,836,600
Edible palm oil	451,548,052	289,486,178	1,033,236	401,680,739	656,112,248
Edible oil excluding palm oil	66,775,698	51,194,393	0	419,212,749	363,753,461
Imported crude edible oil	2,655,810	8,162,500	0	35,833,780	57,615,023
Total imported edible oil	520,979,560	348,843,071	1,033,236	856,727,268	1,077,480,732
Total supply of edible oil	688,816,160	516,679,671	168,869,836	1,024,563,868	1,245,317,332

Sources: - ERCA and CSA

The total existing supply of edible oil is the sum of domestic production and imported quantity.

Out of total supply domestic production share is only 13.5% in the year 2021G.C.

2.3. Supply projection

The future supply of refined edible oil is projected by assuming that supply trend observed in the past five years will continue in the near future. Accordingly, the following points are considered to forces supply.

- Domestic production of edible oil will grow by 2.5% (last five years' average is base data)
- Future import is forecasted by trend adjusted exponential smoothing method

Table 6 Projected edible oil supply in kg

Year	Projected domestic supply	Forecasted edible oil import	Total future supply forecast
2022	167,836,600	1,077,480,732	1,245,317,332
2023	172,032,515	1,153,825,050	1,325,857,565
2024	176,333,328	1,230,169,368	1,406,502,696
2025	180,741,661	1,306,513,685	1,487,255,346
2026	185,260,203	1,382,858,003	1,568,118,206
2027	189,891,708	1,459,202,321	1,649,094,029
2028	194,639,000	1,535,546,639	1,730,185,639
2029	199,504,975	1,611,890,957	1,811,395,932
2030	204,492,600	1,688,235,274	1,892,727,874
2031	209,604,915	1,764,579,592	1,974,184,507
2032	214,845,038	1,840,923,910	2,055,768,948

Sources: - Compiled by consultant

2.4. Demand

2.4.1. Domestic consumption

Edible oil is a consumable material and used to cook food and as raw material for food industries. Consumption demand of edible oil is the main and has lion share than food processing industrial demand. The major determinants of edible oil demand include Population dynamics, per capita income, improvement in living standard of the people and changing food habits of the peoples. These determinants have direct relationship with edible oil demand. It is fa ct that theEthiopia's Economic Growth registered in the past few years increased the disposable income of peoples which in turn have positive effect on their consumption habit and hence increa se the demand of edible oil in Ethiopia.

2.4.2. Apparent and per capital consumption

Total actual edible oil consumption in Ethiopia on year 2020 G.C. is 1.245 billion liters out of which almost 86.5% is imported edible oil. Following increased demand, limited domestic production and the country's heavy reliance on import, there is frequent supply shortages especially in urban areas. In addition, as consumers become increasingly diet conscious, they are looking for healthier alternatives to palm oil. Local consumers consider Niger seed and soybean oil to be healthier. (USDA Foreign Agricultural Service Report on Oil Seeds and Products, 2016). To determine the food demand of edible oil in Ethiopia, apparent consumption approach is appropriate model and it is applied in this study. Apparent consumption of edible oil is reckoned by [**Domestic production + Import**] since there is no export of edible oil. Import constitutes both Edible Palm Oil and edible oils of other oil seeds.

Table 7 Apparent and per capital consumption of edible oil

Year	Ethiopian population	Domestic production	Imported edible oil	PCC of domestic supply oil (kg)	PCC of imported edible oil	PCC OF Edible oil
	A	B	C	B/A	C/A	
2017	106,241,653	167,836,600	1,535,546,639	1.58	14.45	16.03
2018	108,897,695	167,836,600	1,611,890,957	1.54	14.80	16.34
2019	111,620,137	167,836,600	1,688,235,274	1.50	15.12	16.63
2020	114,410,640	167,836,600	1,764,579,592	1.47	15.42	16.89
2021	117,270,906	167,836,600	1,840,923,910	1.43	15.70	17.13
AVERAGE				1.5	15.10	16.60

The computed per capita consumption figures illustrate the actual consumption of edible oil in Ethiopia. The per capita consumption of edible oil calculated edible oil increased from 16.03 liter in the year 2017 to 17.13 liter in the year 2021 by 6.8% growth rate.

2.4.3. Demand projection

Assuming that the consumption pattern observed in the past will continue in the future, the demand for edible oil, is projected by per capita consumption growth rate (6.8%) registered in the past five years and taking per capita consumption of year 2021 as base year. Total population of year 2022 is 120,202,679 is taken as a base and projected by 2.5% growth rate.

Table 8 Projected Demand of Edible oil

Year	Total projected population	Projected PCC (kg)	Total Projected Demand (in liter)
2022	120,202,679	17	2,043,445,543
2023	123,207,746	18	2,217,739,428
2024	126,287,940	20	2,525,758,800
2025	129,445,138	21	2,718,347,898
2026	132,681,267	22	2,918,987,874
2027	135,998,298	24	3,263,959,152
2028	139,398,256	25	3,484,956,400
2029	142,883,212	27	3,857,846,724
2030	146,455,292	29	4,247,203,468
2031	150,116,675	31	4,653,616,925
2032	153,869,592	33	5,077,696,536

2.5. Demand supply gap

Despite of Ethiopia's favorable geographical condition and potential areas for oil seed production even for export, and existence of many firms engaged in edible oil production, it is fact that more than 86.5% demand for edible oil is being satisfied by imported edible oil as exhibited in the past five years. Domestic production fills the gap (only less than 15%) of demand and the firm performs under capacity since the competitive position of imported edible oil outshines the domestic production being competitive in price. Demand supply Gap analysis

Table 9 Demand supply Gap Analysis

Year	Total projected population	Projected supply	Total Projected Demand (in liter)	Supply demand GAP
2022	120,202,679	1,245,317,332	2,043,445,543	798,128,211
2023	123,207,746	1,325,857,565	2,217,739,428	891,881,863
2024	126,287,940	1,406,502,696	2,525,758,800	1,119,256,104
2025	129,445,138	1,487,255,346	2,718,347,898	1,231,092,552
2026	132,681,267	1,568,118,206	2,918,987,874	1,350,869,668
2027	135,998,298	1,649,094,029	3,263,959,152	1,614,865,123
2028	139,398,256	1,730,185,639	3,484,956,400	1,754,770,761
2029	142,883,212	1,811,395,932	3,857,846,724	2,046,450,792
2030	146,455,292	1,892,727,874	4,247,203,468	2,354,475,594
2031	150,116,675	1,974,184,507	4,653,616,925	2,679,432,418
2032	153,869,592	2,055,768,948	5,077,696,536	3,021,927,588

Sources: - Compiled by consultant

3. Technical study

3.1. Land, building and civil works

The required area (m^2) and construction cost for the production facilities essential for the successful operation of the processing plant is shown in Table 10. A total area ready for the processing plant is 10,000m^2 out of which 6,9300m^2 is will be covered by building while uncovered area of 3,100m^2 is left open for parking, storage of waste materials and future expansions. In order to estimate the land lease cost of the project profiles it is assumed that all the project will be located in different land level from level 1/1 to level 4/3, their current market lease price is from 39,073.31 birr per M^2 to 2,800.71 birr per M^2respectively. Therefore, for the profile a land lease rate of birr 3,885 per M^2 have been taken, which is between the ranges.

The cost of construction of building should be appropriate to the size and expected profitability of business, costs of building generally differs by the type of construction materials used, the type of foundation, wall height and location. The current building cost for simple storage and processing room is from 1,800.00 Birr per m^2 to 25,000 Birr per m^2. The total construction cost of buildings and civil works, at a rate of Birr 20,000 per m^2 is estimated at Birr 146.30 million. Therefore, the total cost of land lease and construction of buildings and civil works is estimated at Birr 163.775 million.

Table 10 Construction costs

S/No	Descriptions	Total area in M^2	Estimated construction cost per M^2	Total estimated cost (in Birr)
1	Raw materials store	2,500	20,000.00	50,000,000.00
1	Packing materials store	1,500	20,000.00	30,000,000.00
2	Processing(crushing) room	1,000	20,000.00	20,000,000.00
3	Office, Canteen and toilet room	200	20,000.00	4,000,000.00
4	Boiler Room	150	20,000.00	3,000,000.00
5	Crude oil storage silo	150	20,000.00	3,000,000.00
6	Mechanical workshop	100	20,000.00	2,000,000.00
7	Refined oil storage silo	150	20,000.00	3,000,000.00
8	Refinery unit	150	20,000.00	3,000,000.00
9	Final products store	1,000	20,000.00	20,000,000.00
10	Parking	1,500	5,000.00	7,500,000.00
11	Green area	1,600	500.00	800,000.00
	Grand Total	10,000		146,300,000.00

Table 11 Land lease period in Addis Abeba

Sector of development activity	Period of lease	Down payment
Education, health, culture and sports	90	10%
Industry (manufacturing)	70	10%
commerce	60	10%
For urban agriculture	15	10%
For others	60	10%

Sources: - city government of Addis Abeba land development and management bureau

Table 12 Land lease floor price in Addis Abeba

S/No	Land level	Current land lease floor price per M^2	Current lease price per M^2 (Market price)
1	1/1	2,213.25	39,073.31
2	1/2	2,165.47	36,825.73
3	1/3	1,900.19	34,578.15
4	¼	1,552.93	31,119.21
5	1/5	1,531.91	29,096.45
6	2/1	1327.39	27,073.71
7	2/2	1,221.18	25,050.96
8	2/3	1,191.17	23,028.21
9	2/4	1,074.39	21,005.46
10	2/5	1,027.84	18,982.71
11	3/1	994.71	16,959.96
12	3/2	960.21	14,937.21
13	3/3	927.84	12,914.46
14	¾	904.77	10,891.71
15	3/5	873.74	8,868.96
16	4/1	814.06	6,846.21
17	4/2	786.45	4,823.46
18	4/3	748.80	2,800.71

Sources: - city government of Addis Abeba land development and management bureau

3.2. Technology and Engineering

3.2.1. Technology

3.2.1.1. Production process

Oil is extracted from a number of fruits, nuts and seeds for use in cooking and soap making or as an ingredient in other foods, such as baked or fried goods. Oil is a valuable product with universal demand and the possible income from oil extraction is therefore often enough to justify the relatively high cost of setting up and running an oil milling and refining business.

Mechanical extraction is common in developing countries while solvent extraction is more widely used in developed countries and in countries which are large producers of oil seeds. The oil mill for the anticipated project is to employ mechanical extraction and batch refining. In order to get high quality edible oil, various processing techniques are used. The process of obtaining oil from seeds involves the separation of oil from oil-bearing material by mechanical means, chemical means, etc.

Edible oil technology can be grouped into two: mechanical pressing and solvent extraction. Sometimes the latter complements the former. For oil seeds 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 extraction.

Edible oil processing comprises the following activities.

3.4.1.1.1 Oilseed cleaning, milling, and expelling

The oil seeds received from the market will be sampled for quality parameters such as moisture content, foreign matter, oil content and robustness of the seeds. The accepted quality will then be cleaned. The clean beans will be taken to the hammer mill for millings. This will be done to prepare feed stock for extrusion cooking in the extruder. The extruder will cook the mill for milling. This will be done to prepare feed stock for extrusion cooking in the extruder. The extruder will cook the milled seed into a wet powder form. The wet powder mill will then be fed into the oil expeller. The expeller will squeeze the wet powder through a mechanical process to produce oil and cake as a by-product. This oil will be delivered into a storage tank and finally to the refinery unit while cake will be collected and packed for sale to livestock feed stock manufactures.

Using solvent extraction methods, the oil cake received from the mechanical expeller will be subjected to breaking into smaller particles using cake breaking machine. This will be conveyed by screw conveyor to an extractor machine which moves with the cake spread. As it moves n-hexane will be sprayed on top of it using a series of pumps. This technology utilizes the solubility of oil n-hexane. Oil dissolves in hexane and is collected and sent into hexane recovery system in which hexane vapors are removed, condensed back to liquid form and recycled. The oil obtained is cooled down and sent for storage. The above process recovers approximately 14.5% of oil from the cake, while the de-oiled cake (DOC) retains less than 0.5% oil. With this oil content the DOC provides excellent feed meal for animals.

3.4.1.1.2. Refinery

The refinery process entails the removal of color, odor, and fatty acids from the crude oil. This is done by addition of caustic soda to the crude oil to neutralize it. Therefore, it will be washed,

bleached and filtered. This will be done for the purpose of removal of impurities, which settle and will be discarded as sludge.

- Degumming

Crude oil contains a number of finely dispersed or dissolved constituents that can be hydrated or coagulated to form gums. The need for this procedure is dependent on the type of oil being processed and desired end product, and it may be combined with the neutralization process. When performed, hot water is added to the oil. The phosphatides are hydrated by the water, and the acid sludge is separated by settling or centrifuging. The gums are vacuum dried, cooled and stored for additional processing of commercial lecithin

- Neutralizing

Degummed oil usually contains between 0.5 and 5% free fatty acids and the purpose of neutralization is to reduce the FFA to below 0.05%. The most common system, alkali neutralization, achieves this reduction by heating the oil with an alkali solution, 0 usually caustic soda, and removing the resultant soap-stock. Either batch or continuous neutralization procedures can be used. The mixture of oil and caustic soda is heated, converting the FFA to water-soluble soaps, which are separated by gravity or centrifuge. Where gravity settling is used considerable expertise is required to minimize losses. In addition to FFA removal, neutralization also reduces some of the colouring compounds, and will remove any gums or phosphatides not removed by the degumming process. There are two other refining systems currently in use. Miscella refining consists of neutralizing the oil-solvent mixture obtained from the extraction plant with caustic soda, and separating the soap-stock by centrifuging. It is used primarily in the processing of

cottonseed, the oil of which must be refined very soon after extraction to avoid permanent setting of dark colors. Soap-stock from miscella refining is spread over the marc in the desolventizer-toaster to recover the hexane, and to increase the caloric value of the dried meal. Steam refining relies on the distillation of the fatty acids under vacuum with steam. In theory it is an attractive method since the FFA are removed from the oil without the addition of chemicals, thus avoiding the problems of effluent or residue disposal associated with alkali neutralization. Special precautions are needed at all stages of production, storage and transportation to safeguard edible oil quality. Steam is not appropriate for certain oils like cottonseed and soybean. Within the same plant, different systems are often applied to different types of oil.

- Bleaching

Market requirements demand that most oils be light-colored. The colour is improved (ie. lightened) by treating the neutralized oil with bleaching earth, or a mixture of bleaching earth and activated carbon which absorbs the colouring substances dissolved in the oil. The bleaching earth containing the colorings is filtered out of the oil, along with some neutral oil. Oil losses, labour requirements and steam consumption are higher in a batch system than in a continuous system. Capital costs are higher for continuous systems.

- Hydrogenation

Hydrogenation is the method used to change liquid edible oils into semi-solid form which allows their use for shortenings and margarines, increases the oil stability and reduces rancidity. It enables vegetable oils to be substituted for traditional solid cooking and baking fats like butter or lard. The process raises the melting point of the oil by transforming unsaturated fatty acids into saturated

forms through the addition of hydrogen. During hydrogenation, agitated oil is heated - in the presence of a catalyst (usually nickel) - in a vessel pressurized with hydrogen gas. The gaseous hydrogen reacts with the unsaturated fatty acids, saturates them to form stable oils and 'hardened' fats. The process can be controlled and stopped when the desired degree of saturation (measured as Iodine Value) is achieved. Hydrogenation can produce fats which are soft (but solid appearing) or fats that are hard and brittle at room temperature. Most oils and fats produced for edible purposes are partially hydrogenated. A necessary adjunct to a hydrogenation plant is a supply of hydrogen gas. This can either be purchased from outside sources or produced within the refinery by electrolysis.

- Deodorizing

After neutralization, bleaching, and winterizing, the oil usually still contains impurities giving it Odour and Flavour. Unless a 0 unique flavour is desirable (as in olive oil), these components are removed by steam stripping under vacuum. For effective deodorizations, the oil must be heated to a high temperature (160 to 275 degrees centigrade). At lower temperatures, the oil requires longer steaming periods, and a higher ratio of steam to oil. Methods using the higher temperatures are not suitable for all oils, and are generally used in continuous systems that hold the oil for a short time. Consumption of steam and cooling water is high with both batch and continuous systems, although continuous systems use one third or less steam than batch systems. Steam consumption will vary for continuous systems, but as a rough guide, a medium sized plant will need 150-250 kg of steam per ton of oil, and 70-100 times that of cooling water. Where cooling water is scarce, it is sometimes recovered by evaporation towers. The distillate is sometimes recovered as a source of Vitamin E (alpha tocopherol) and other chemicals. Oil losses in a continuous deodorization system

should be about 0.2%, and in a good batch plant, perhaps 0.3%. Deodorized oils are often stored under blankets of nitrogen to exclude oxygen and prevent darkening and deterioration of flavors.

- End Uses

After bleaching, refined oil is ready for packaging and distribution. The most important consideration when storing or packaging the oil is to provide protection against contamination from atmospheric adulterants, internal contamination by water, soaps or heavy metals, over-heating and exposure to oxygen. Usually oils are stored in completely closed iron tanks, although stainless steel or food-grade epoxy coating lined tanks are used when highest stability of the finished oil is required.

3.4.2. Environmental and social impact assessment of the project

Typically, any developmental projects also trigger a set of environmental and social impacts. These environmental and social due to development projects occur in different forms. An Environmental and Social Impact Assessment (ESIA) has to be carried out to study the potential environmental and social impacts due to the production edible oil. Potential environmental and social impacts due to the production of edible oil products on attributes like air quality, noise, water quality, soil, flora, socio-economic, etc. have to be assessed as part of the ESIA study. Appropriate mitigation measures to help minimize/avoid impacts from the development have to be recommended in the study. The measures include avoidance measures, mitigation measures and environmental enhancement measures. For the purpose of including environmental costs, the costs of wastewater treatment plant and solid waste incineration systems are included in the cost of machinery and equipment. Social responsibility cost estimated to be 1% of fixed investment costs.

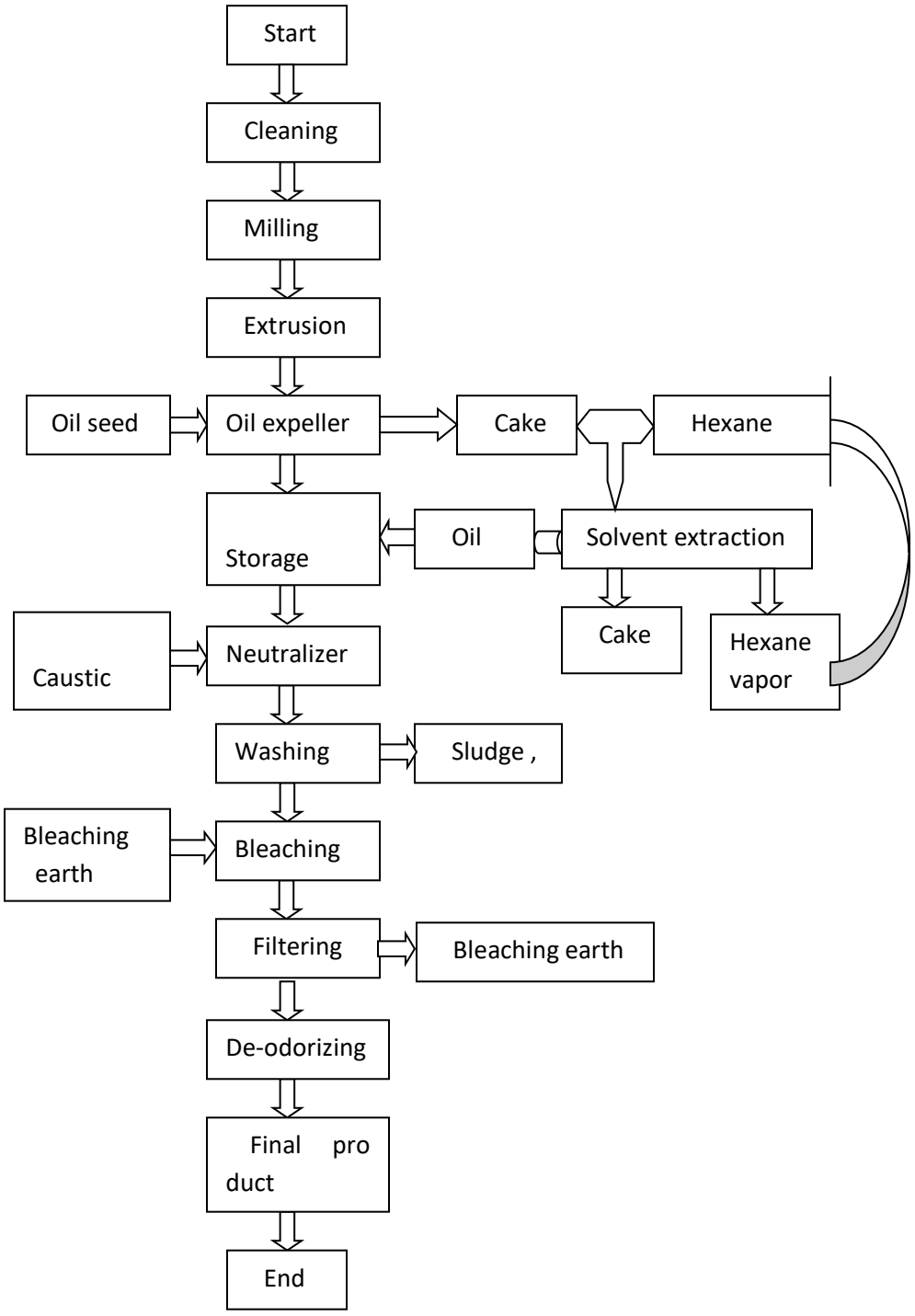

Figure 1 process flow diagram of edible oil factory

3.3.LISTS OF MACHINERY SUPPLIERS

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+91-99150-90111 (Whatsapp)

Shreeji Expeller Industries
11460/1,Street No.4,Partap Nagar
Industrial Area (B), Ludhiana - 141003, INDIA
Phone:+91 161 2535575
Skype ID: shreejiexpellerindustries
Website: www.shreejiexpeller.com

GOYUM GROUP
SINCE 1971
EXTRACTION REFINING RECYCLING
Phone:+91 9915043180/919915743183
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3.4. Capacity and Program

The production capacity of the factory is 200,000 liters of edible oil per day. The capacity can be increased by increasing the number of shifts and/or working hours per day.

However, for various reasons, it will start producing at 70 % of its capacity in the first year. It is estimated that the capacity will grow by 10 % every year. At the initial stage of the production period, the plant would require some time to penetrate into the market. Therefore, in the first, second, and third to tenth year of production, the capacity utilization rate will be 70%, 80%, 90%, and finally to 100% respectively. The following table shows the production program of the project.

Table 8: Production program (tones)

Description/ Year	unit	Full capacity	1	2	3	4	5-10
Capacity utilization		100%	70%	80%	90%	100%	100%
Own production of crude oil							
Soya bean crude oil	Ton	1,784	1,249	1,427	1,605	1,784	1,784
Cotton seed crude oil	Ton	936	655	749	843	936	936
Purchase of crude oil	Ton	49,280	34,496	39,424	44,352	49,280	49,280
Total crude oil available	Ton	52,000	36,400	41,600	46,800	52,000	52,000
Refining process loss, 5%	Ton	2,600	1,820	2,080	2,340	2,600	2,600
Net refined edible oil	Ton	49,400	34,580	39,520	44,460	49,400	49,400
Net refined oil (1liter = 910gm)	Lit	54,285,714	38,000,000	43,428,571	48,857,143	54,285,714	54,285,714

4. Organizational and Human resource study

The selection of structure of the envisaged project is made based on the existing structure of manufacturing plants operating in the country, the capacity, complexity and technology mix of the plant. Organizational structure principles such as specialization, coordination, and departmentalization are also considered for design of structure that best suits the envisaged project

Table 9: Manpower requirement and salary costs

Description	Number	Monthly salary	Annual salary, Birr
General manager	1	30,000.00	360,000.00
Administration and finance manager	1	25,000.00	300,000.00
Human resource manager	1	15,000.00	180,000.00
General service	1	10,000.00	120,000.00
Secretary	1	7,500.00	90,000.00
Commercial manager	1	20,000.00	240,000.00
Marketing and sales manager	1	17,000.00	204,000.00
Senior Accountant	1	15,000.00	180,000.00
Cost Accountant	2	15,000.00	360,000.00
Junior Accountant	3	10,000.00	360,000.00
Clerk	3	5,000.00	180,000.00
Purchaser	3	10,000.00	360,000.00
Sales man	5	10,000.00	600,000.00
Production and technical head	1	25,000.00	300,000.00
Senior Mechanic	6	12,000.00	864,000.00
Junior mechanic	9	7,5000.00	810,000.00
Senior Electrician	6	12,000.00	864,000.00
Junior Electrician	9	7,500.00	810,000.00
Operator	15	6,000.00	1,080,000.00
Ass. Operator	9	3,000.00	324,000.00
Senior Laboratory technician	3	12,000.00	432,000.00
Assistant laboratory technician	3	5,000.00	180,000.00
Boiler technician	3	10,000.00	360,000.00
Guard	8	2,000.00	192,000.00
Driver	7	5,000.00	420,000.00
Laborers	45	1,500.00	810,000.00
TOTAL	148		**10,980,000**

5. Financial Analysis

5.1. General

The financial analysis evaluation of edible oil factory, of the envisaged factory are mainly consisted of capital investment as well as operating and maintenance costs. The capital investment costs include fixed investment costs (initial fixed investment and replacement costs), working capital, while operating and maintenance costs comprise current expenses related to material inputs, labour, utility, repair and maintenance costs, spare parts, Overheads, Sales and distribution, interest and depreciation expenses.

The financial analysis and evaluation has been conducted taking assumptions:

1. It is assumed that about 70% of the total capital investment costs including the working capital requirement could be covered through Development bank of short and long-term credits. The remaining balance 30% will be covered by equity capital contribution of the project owner.
2. Even though the project might secure loans under different term and conditions as well as from different financial sources, for the purpose of calculation of debt service scheduling, the current Development bank of Ethiopia credit terms and conditions have been used. Consequently. It is assumed that the project will secure loan facility on the basis of 11.5% annual interest rate, for 10 years.
3. Even though the estimated project production life is more 10 years, the financial analysis has been undertaken for a period interval covering the first 10 years only, during which

time most of the capital assets are assumed to be deprecated, debts recovered and pay-back period accomplished

4. It is assumed that the project will be start up production activity at 70 % capacity. During years 2 & year 3 the projects is anticipated to gradually increase capacity utilization to reach 100% in year 4. Therefore, starting from year 4 the project will be operational at full capacity.

5. For the project under reference promotional, sales and distribution expenses have been estimated at 3% of the sales revenue.

5.2. Initial investment costs

Table 13 Fixed Capital investment costs

S/No	Fixed investment type	Unit of measurement	Quantity	Unit price	Total Amount	Remarks
1	Land	Square meter	10,000	3,885 birr/M^2	38,850,000.00	The period of land lease will be 70 years and 10% of the total lease amount will be paid in the first year
2	Buildings and civil works	Square meter	6,900	lump sum	146,300,000.00	
	Sub total				**185,150,000.00**	
3	Machineries	set	2	Lump sum	400,000,000.00	
4	Transformer	set	1	Lump sum	5,000,000.00	
5	Weighbridge	Set	1	Lump sum	4,000,000.00	
6	Truck and vehicles	Pcs	2	Lump sum	12,000,000.00	
7	Furniture and fixture	Pcs			500,000.00	
	SUB TOTAL				421,500,000.00	
	Fixed capital investment costs				606,650,000.00	
8	pre-operational expenses				2,000,000.00	
	Working capital				816,558,000.00	
	TOTAL INVESTMENT COSTS				1,425,160,000.00	

5.3. Working capital

Working capital is the financial means required for smooth operation and maintenance of a project mathematically, it is a difference between current assets and current liabilities. In the particular case of the project under consideration, the current assets comprise receivables, inventories (local and imported material inputs, spare parts, work in progress, and products ready for delivery) and cash in hand, while current liabilities comprise accounts payable to creditors.

5.4. Project Financing

Fixed capital investment costs and working capital requirements are assumed to be financed by equity capital of the owner and through loans of short and long-term credits.

As stated earlier even though the company obtains loans under different terms and condition as well as from different sources, for the purpose of calculation of debt service scheduling the current Development bank of Ethiopia credit terms and conditions have been used. Accordingly, it is assumed that the company will be able to obtain loan 70% of the total investment costs for construction of different buildings, for purchase of machineries, for purchase of truck and vehicles, for working capital and for purchase of office furniture and pre operation expense will be covered through bank loans that will have to be repaid back within 10 years, during which time interest will be paid on the loan. The remaining balance that of the total investment costs will be expected to be covered by equity contribution of the project promoter.

5.5. Operating and Maintenance Costs

It is deemed essential to make realistic forecasts of the plant costs, operating costs and the total production costs in order to establish the amount of working capital requirements and compute project benefits. The costs have been calculated as total costs and all cost elements required for computation have been estimated and scheduled in line with the envisaged capacity build-up program of the project. The total production costs are divided in to four major categories, namely direct costs, operating costs, financial costs and depreciation costs. The direct costs include material inputs, utility, labour cost, direct overheads as well as repair and maintenance expenses and spare part costs is (1.5% of fixed costs), while operating costs include factory costs (direct production costs), administrative over heads, and advertisement, Sales and distributions costs. For the project under reference promotional, sales and distribution expenses have been estimated at 3% of the sales revenue.

5.6. Production costs

As it is depicted in Table 19 major categories of the total production costs are assembled into the following cost elements.

5.6.1. Material inputs

In the project under study the basic material inputs are cotton seed, Soya bean seed, bleaching agent, caustic soda, packing materials etc. Therefore, the current prevailing local and international market prices have been used for estimation of material inputs costs.

At full capacity operation the material inputs costs are estimated at Birr 8.2 billion per annum.

Because of the specific nature of the given project 100 % of the material inputs are attributed to purchase of raw materials.

Table 14 Raw materials input plan in quantity

	Capacity utilization		70 %	80 %	90 %	100 %
	Period (in years)		Year 1	Year 2	Year 3	Year 4
S/No	Item description	U/m	Quantity	Quantity	Quantity	Quantity
1	Cotton seed (30 %)	Ton	5,460	6,240	7,020	7,800
2	Cotton seed husk	Ton	1,802	2,059	2,317	2,574
3	Cotton seed ready for pressing (98%)	Ton	3,658	4,181	4,703	5,226
4	Soya bean (70 %)	Ton	12,740	14,560	16,380	18,200
5	Sieve reject of soya bean (2%)	Ton	255	291	328	364
6	Soya bean ready for pressing (98%)	Ton	12,485	14,269	16,052	17,836
7	Crude oil(imported)	MT	36,400	41,600	46,800	52,000
8	Bleaching earth	kg	717,080	819,520	921,960	1,024,400
9	Caustic soda	Kg	537,810	614,640	691,470	768,300
	Packing materials					
10	Carton for 1 liter	pcs	791,667	904,762	1,017,857	1,130,953
11	Carton for 3 liter	pcs	791,667	904,762	1,017,857	1,130,953
12	Carton for 5 liter	pcs	950,000	1,085,714	1,221,429	1,357,143
13	Preform for 1 liter	pcs	9,500,000	10,857,143	12,214,286	13,571,429
14	Preform for 3 liter	pcs	3,166,667	3,619,048	4,071,429	4,523,810
15	Preform for 5 liter	pcs	3,800,000	4,342,857	4,885,714	5,428,572
16	Labeling for 1 liter	pcs	9,500,000	10,857,143	12,214,286	13,571,429
17	Labeling for 3 liter	pcs	3,166,667	3,619,048	4,071,429	4,523,810
18	Labeling for 5 liter	pcs	3,800,000	4,342,857	4,885,714	5,428,572
19	Plaster	Roll	63,334	72,381	81,429	90,477
20	P.P.Bag for soya bean sieve reject	pcs	5,100	5,820	6,560	7,280
21	P.P.Bag for soya bean cake	pcs	222,233	253,988	285,726	317,481
22	P.P.Bag for cotton seed cake	pcs	59,992	68,569	77,129	85,707
23	P.P.Bag for Cotton seed husk	pcs	36,040	41,180	46,340	51,480

Table 15 Raw materials input plan in Birr

	Capacity utilization			70 %	80 %	90 %	100%
	Period (in years)			Year 1	Year 2	Year 3	Year 4
S/No	Item description	**U/M**	**Unit price**	**In Birr**	**In Birr**	**In Birr**	**In Birr**
1	Cotton seed (30 %)	Ton	20,000	1,089,200,000	1,244,800,000	1,400,400,000	1,556,000,000
2	Soya bean (70 %)	Ton	45,000	573,300,000	655,200,000	737,100,000	819,000,000
3	Crude oil(imported)	liter	120	3,640,000,000	4,160,000,000	4,680,000,000	5,200,000,000
4	Bleaching earth	kg	90	64,537,200	73,756,800	82,976,400	92,196,000
5	Caustic soda	Kg	200	107,562,000	122,928,000	138,294,000	153,660,000
	Packing materials			-	-	-	0
6	Carton for 1 liter	pcs	25	19,791,678	22,619,060	25,446,443	28,273,825
7	Carton for 3 liter	pcs	27	21,375,012	24,428,585	27,482,158	30,535,731
8	Carton for 5 liter	pcs	30	28,500,003	32,571,432	36,642,861	40,714,290
9	Preform for 1 liter	pcs	7	66,500,002	76,000,002	85,500,003	95,000,003
10	Preform for 3 liter	pcs	15	47,500,005	54,285,720	61,071,435	67,857,150
11	Preform for 5 liter	pcs	20	76,000,008	86,857,152	97,714,296	108,571,440
12	Labeling for 1 liter	pcs	1.00	9,500,000	10,857,143	12,214,286	13,571,429
13	Labeling for 3 liter	pcs	1.00	3,166,667	3,619,048	4,071,429	4,523,810
14	Labeling for 5 liter	pcs	1.00	3,800,000	4,342,858	4,885,715	5,428,572
15	Plaster	Roll	80.00	5,066,712	5,790,528	6,514,344	7,238,160
16	P.P.Bag for soya bean cake	pcs	23.00	5,111,444	5,841,650	6,571,857	7,302,063
17	P.P.Bag for soya bean sieve reject	pcs	23.00	117,208	133,952	150,696	167,440
18	P.P.Bag for Cotton husk	pcs	23.00	1,379,883	1,577,009	1,774,135	1,971,261
19	P.P.Bag for Cotton seed cake	Pcs	23.00	828,828	947,232	1,065,636	1,184,040
	Grand Total			5,763,236,650	6,586,556,171	7,409,875,694	8,233,195,214

5.6.2. Utilities

In estimating costs of utility expenses for operation and maintenance of the project, Costs of fuel, oil and lubricant, electricity and water consumptions have been taken in to consideration, the rates of which have been estimated on the basis of the proposed capacity utilization program of the project and at the current official charging rates. At full capacity operation the project will have the following utility expense per annum which amounts to Birr 22.97 million.

Table 16: Utilities of the factory

Utility		Start-up			Full Capacity
Capacity utilization		70 %	80 %	90 %	100 %
Project year		1	2	3	4
Item description	Unit of measurement				
Fuel					
Gasoline for service vehicle	100km*300days*37irr/LIT*8km/Li	138,750	138,750	138,750	138,750
Gasoline for transport truck	(200km*300days*37Birr/LIT*5km/Li)* 4	1,776,000	1,776,000	1,776,000	1,776,000
Sub-Total		1,914,750	1,914,750	1,914,750	1,914,750
Change of oil and lubricant	10% of the fuel consumption	191,475	191,475	191,475	191,475
Sub-Total		2,106,225	2,106,225	2,106,225	2,106,225
Electricity	300days*24 hrs*950kwh* 0.69Birr/kwh	3,303,720	3,775,680	4,247,640	4,719,600
Sub- Total		3,303,720	3,775,680	4,247,640	4,719,600
Water	365days*50m^3/day*10Birr/m^3	127,750	146,000	164,250	182,500
Sub -Total		127,750	146,000	164,250	182,500
Crude Fuel for Boiler	1,500 liters/day*260 days*22birr/liter	10,920,000	12,480,000	14,040,000	15,600,000
	Sub total	16,457,695	18,507,905	20,558,115	22,608,325
Telecommunication					
Telephone	5 lines* 2,000Birr/month/line+18Birr/line/month	121,080	121,080	121,080	121,080
Mobile	5 lines*1,500 Birr/month/line	90,000.00	90,000.00	90,000.00	90,000.00
Fax	3 line*1,000Birr/month + 17 Birr/line/month	36,612	36,612	36,612	36,612
Internet	10,000 Birr/month	120,000	120,000	120,000	120,000
Sub-Total		**367,692**	**367,692**	**367,692**	**367,692**
TOTAL		16,825,387	18,875,597	20,925,807	22,976,017

5.6.3. Repair and maintenance

In the expenses under this title have been considered cost estimates required for annual repair and maintenance works including spare parts expenses. These costs include the annual repair expenses of structures and civil works as well as repair and maintenance expenses of machinery and equipment including accessory and general service facilities. The repair and maintenance costs have been assumed to 1.5% of the fixed assets costs.

5.6.4. Salaries and wages

The costs of salaries have been calculated in accordance with the manning list proposed under the "organization and Management" section of this study. In the estimation of salaries and wages, the official minimum wage has been taken in to account. At full capacity operation the costs of salaries and wages will amount to Birr 10.98 Million.

5.6.5. Over heads

In the expenses under this title have been included land and building taxes, buildings, vehicles as well as machinery and equipment insurance, vehicles annual inspection; postage, telephone and e. mail, stationery and office supplies; printing and copying; audit fee; cash indemnity etc. The overhead costs and divided in to direct overheads and administration overheads.

Table 16 Overhead costs

Direct Overhead		Year 1	Year 2	Year 3	Year 4
Annual land lease Payment		5,550,000	5,550,000	5,550,000	5,550,000
Insurance					
Building and Civil works	0.10%	146,300	146,300	146,300	146,300
Machinery and Equipment	0.20%	800,000	800,000	800,000	800,000
Motor vehicle and Truck	1%	120,000	120,000	120,000	120,000
Vehicles annual inspection and registration	10,000 Birr per annum per vehicle	50,000	50,000	50,000	50,000
Work cloth	Two times per annum per workers at 1,000 Birr	284,000	284,000	284,000	284,000
Cleaning and sanitation (factory)	An estimate of 100 Birr/day	365,000	365,000	365,000	365,000
Sub Total		7,315,300	7,315,300	7,315,300	7,315,300
Administration Overhead "000' Birr					
Audit fee	100,000 Birr per annum	100,000	100,000	100,000	100,000
Office cleaning and sanitation	2,000 Birr per month	24,000	24,000	24,000	24,000
Stationery and office supplies	2,000 Birr per month	24,000	24,000	24,000	24,000
Printing and Copy	2,000 Birr per month	24,000	24,000	24,000	24,000
Sub Total		**172,000**	**172,000**	**172,000**	**172,000**
GRAND TOTAL		7,487,300	7,487,300	7,487,300	7,487,300

5.6.6. Financial costs

As it has been outlined earlier under" project Financing" the current Development Bank of Ethiopia credit terms and conditions for newly establishing projects have been used to compute the financial costs, estimated to be incurred in connection with that working capital of the total investment costs assumed to be covered through loan financing. The amount of the loan capital to be obtained and the financial costs to be incurred thereof have been determined depending on the working capital requirements.

5.6.7. Depreciation

Depreciation charges should be taken in to account as part of the total production costs in order to calculate the total production costs, the net working capital and the gross or net-profit. For the given project under reference, the fixed assets and the pre-production capital expenditures have been depreciated and amortized respectively on "a straight line" depreciation method basis using the following rates of the original acquisition costs of the assets:

Table 17 Depreciation costs

Period			Start-up			
Capacity utilization			70 %	80 %	90 %	100 %
Project year			1	2	3	4
Item description	Original Value					
Structure and civil works	146,300,000.00	5% of original value	7,315,000	7,315,000	7,315,000	7,315,000
Machinery and equipment	400,000,000.00	15 % of original value	60,000,000	60,000,000	60,000,000	60,000,000
Transformer	5,000,000.00	15 % of original value	750,000	750,000	750,000	750,000
Motor vehicles and trucks	12,000,000.00	15 % of original value	1,800,000	1,800,000	1,800,000	1,800,000
Weighbridge	4,000,000.00	15 % of original value	600,000	600,000	600,000	600,000
Office equipment and furniture	500,000.00	20% of original value	100,000	100,000	100,000	100,000
Pre-operation expense	2,000,000.00	25% of original value	500,000	500,000	500,000	500,000
Total			71,065,000	71,065,000	71,065,000	71,065,000

The rationale uses for the estimation of the depreciation and the amortization rates is based on the expected service life of the assets and repayment capacity of the project under consideration. Based on the above charging rates and consideration of the above facts, the total annual depreciation cost at full capacity operation have been estimated at Birr 71.065 million.

5.7. Break – even point (BEP) analysis

A. Break-even point(BEP) Sales

To determine BEP Annual Sales, multiply annual sales found in income statement by the annual fixed cost, and divided by Annual sales less Annual variable cost.

BEP (sales) = $= \frac{\text{Annual sales x Annual fixed costs}}{\text{Annual sales} - \text{Annual variables costs}}$

Annual sales = 722,716,000.00 Birr

Unit selling price = 37.40 Birr/kg

BEP (sales) = $= \frac{\text{Annual sales x Annual fixed costs}}{\text{Annual sales} - \text{Annual variables costs}} = = \frac{7,635,047 \text{ x } 204,257}{7,635,047 - 5,789,162}$

BEP (Sales) = 844,858,588 Birr

B. BEP production

To determine BEP production volume, divided BEP sales by the unit selling price (USP)

BEP production = 844,858,588/185 = 4,566,803

C. BEP percentage $= \frac{\text{Annual fixed costs x 100\%}}{\text{Annual sales} - \text{Annual variables costs}}$

$= \frac{204,257 \text{ x } 100\%}{7,635,047 - 5,789,162}$

= 11%

5.7.1. Return on investment

Return on investment = Net profit /Total capital requirement
= 918,175,000/1,425,160,000
= 64%

The return on owners' investment (ROOI)
= Annual net profit /owners' investment
= 918,175,000/427,548,000
= 214%

5.8. Project costs

Project capital investment costs are the sum of fixed capital investment (fixed investment plus pre-production capital expenses) and net working capital at full capacity, with fixed capital constituting the resources required for constructions and civil works, importation and installation of production machinery(Edible oil factory machinery) and equipment and general service facilities, whereas, the working capital corresponding to the resources needed for operation of the project totally and partially.

Of the total outlay estimated for the investment capital 997 million Birr (70%) has been assumed to be obtained in the form of loan capital and the remaining 427.55 million Birr (30 %) is anticipated to be contributed in form of equity capital.

In the assumptions used to compute the working capital, basically care has been taken to cover costs of consumable materials inventory (material input, spare parts stock, work in progress and product ready for delivery), delivered products and cash in hand requirement.

5.9. Project benefits

For financial analysis and evaluation of the given project, the current raw materials price, and packing materials buying price and final packed Edible oil factory price at the project gate has been taken as a basis.

At full capacity operation the project is envisaged to have the following revenue components.

Table 18 Source of revenue in Birr"000"

	Capacity utilization			70%	80%	90%	100%
	Project year			1	2	3	4
	Product type	Unit of measure	Unit price				
1	Refined oil						
1.1.	Packed in 1 liter(25%)	Carton	2,220	1,757,500	2,008,571	2,259,643	2,510,714
1.2.	Packed 3 liter (25%)	Carton	2,220	1,757,500	2,008,571	2,259,643	2,510,714
1,3.	Packed in 5 liter (50%)	Carton	3,700	3,515,000	4,017,142	4,519,286	5,021,428
2	By product						
2.1.	Soya bean cake	Quintal	4,800	505,651	577,886	650,122	722,358
2.2	Cotton seed cake	Quintal	2,200	65,994	75,422	84,849	94,277
2.3.	Cotton seed husk	Quintal	1,500	27,027	30,888	34,749	38,610
2.4	Soya bean sieve reject	Quintal	2,500	6,375	7,275	8,200	9,100
	Total			7,635,047	8,725,755	9,816,492	10,907,201

Thus, according to the computation in Annex Table 21 and Annex Table 23, the net income and cash flow statements analysis revealed that at full capacity operation the project will generate a total income (gross profit) amounting to 10.90 billion Birr per annum. The corresponding Annex Table 21 of "Net Income Statement" shows a steady growth of gross profit starting from 1.4 billion Birr in year 1 reaching the peak of 2.2 billion Birr in year 10. In its 10 years of manufacturing activities, the project is expected to generate a total net profit of 13.2 billion Birr.

According to the current investment Law, machinery and equipment are anticipated to be imported duty- free. The liquidity position of the project is very strong. The corresponding Annex Table 23

of "Cash Flow Statement" shows the positive cumulative cash balance of Birr 12.7 billion and the project will not face any cash shortage throughout its production life.

The computation of the pay-back period as depicted in Annex table 28 indicates that the project will be able to reimburse itself from its net cash-income within 2 years after commencement of production activities, the period which is considered to be very good for the project of this nature. In Annex Table 29 of the Net present value (NPV) have been calculated at 17% discount factor (D.F) for 10 years of the project activity. Accordingly, the project has NPV of 8.12billion Birr at 17%D.F and benefit cost ratio is 1.2. These results are most appreciable, especially, when related to the external capital borrowing interest rate which ranges from 8.50% to 18.50 % for newly establishing projects. The project under study when implemented will have BEP at about 11% operation of the estimated full capacity. In addition to this, finally, summary of financial efficiency tests have been conducted in Annex table 24, Accordingly, all efficiency ratios indicated positive trends and consequently, it can be inferred that the project can operate in the frame work of free market mechanism on commercially and financially viable basis and is remunerative.

ANNEX

Table 19 Total annual production cost"000"

Capacity utilization	70 %	80 %	90 %	100 %	100 %					
Project Year	1	2	3	4	5	6	7	8	9	10
Cost category										
I. Material inputs	5,763,237	6,586,556	7,409,876	8,233,195	8,233,195	8,233,195	8,233,195	8,233,195	8,233,195	8,233,195
II. Labor	10,980	10,980	10,980	10,980	10,980	10,980	10,980	10,980	10,980	10,980
III. Utility	16,825	18,876	20,926	22,976	22,976	22,976	22,976	22,976	22,976	22,976
IV. Repair and Maintenance with spare (1.5% of fixed costs)	9,100	9,100	9,100	9,100	9,100	9,100	9,100	9,100	9,100	9,100
VI Direct overheads	7,315	7,315	7,315	7,315	7,315	7,315	7,315	7,315	7,315	7,315
A. Direct Production costs	5,807,457	6,632,827	7,458,197	8,283,566	8,283,566	8,283,566	8,283,566	8,283,566	8,283,566	8,283,566
VII. Administration over head	172	172	172	172	172	172	172	172	172	172
VIII. Marketing and Promotional expense 3% of sales revenue	229,051	261,773	294,495	327,216	327,216	327,216	327,216	327,216	327,216	327,216
B. Operating costs	6,036,680	6,894,772	7,752,864	8,610,954	8,610,954	8,610,954	8,610,954	8,610,954	8,610,954	8,610,954
Interest	114,725	108,028	100,561	92,234	82,950	72,599	61,057	48,188	33,838	17,939
Depreciation	71,065	71,065	71,065	71,065	70,565	70,465	49,436	7,315	7,315	7,315
C. Total production costs	6,222,470	7,073,865	7,924,490	8,774,253	8,764,469	8,754,018	8,721,447	8,666,457	8,652,107	8,636,208

Calculation of working capital requirements

I. Minimum requirement of current assets and liabilities
   A. Accounts receivable: 26 days at total production costs minus depreciation and interest
   B. Inventory
      1. Material inputs: 30days
      2. Spare parts : 90 days
      3. Work under process: one day at direct costs
      4. Product ready for delivery: 8 days at direct costs plus administration overheads
   C. Cash on hand : 90 days
   D. Accounts payable 26 days for material inputs and utilities

II. Working capital requirement

Table 20 Calculation of working capital

Cost category	Minimum Days of coverage	Coeff-icient of turnover	Project year									
			Start up			Full capacity						
			1	2	3	4	5	6	7	8	9	10
I. Current asset												
A. A/R	26	10	603,668	689,477	775,286	861,095	861,095	861,095	861,095	861,095	861,095	861,095
B. Inventory												
1. Material inputs	26	10	576,324	658,656	740,988	823,320	823,320	823,320	823,320	823,320	823,320	823,320
2. Spare parts	90	4	2,275	2,275	2,275	2,275	2,275	2,275	2,275	2,275	2,275	2,275
3. Work under process	1	260	22,336	25,511	28,685	31,860	31,860	31,860	31,860	31,860	31,860	31,860
4. Product ready for delivery	8	32.5	178,863	204,259	229,655	255,051	255,051	255,051	255,051	255,051	255,051	255,051
C. Cash on hand	90	4	11,098	11,611	12,123	12,636	12,636	12,636	12,636	12,636	12,636	12,636
D. Current assets			1,394,564	1,591,789	1,789,012	1,986,237	1,986,237	1,986,237	1,986,237	1,986,237	1,986,237	1,986,237
Current liabilities A. A/p	26	10	578,006	660,543	743,080	825,617	825,617	825,617	825,617	825,617	825,617	825,617
Working capital												
A. Net working capital			816,558	931,246	1,045,932	1,160,620	1,160,620	1,160,620	1,160,620	1,160,620	1,160,620	1,160,620
B. Increasing in working capital			816,558	114,688	114,686	114,688	0.0	0.0	0.0	0.0	0.0	0.0

Table 21 Projected Net income statement ("000)

Period	Start up			Full capacity						
Capacity utilization	70 %	80 %	90 %	100 %						
Project year	1	2	3	4	5	6	7	8	9	10
Item description										
Product sales revenue	7,635,047	8,725,755	9,816,492	10,907,201	10,907,201	10,907,201	10,907,201	10,907,201	10,907,201	10,907,201
Less total production costs	6,222,470	7,073,865	7,924,490	8,774,253	8,764,469	8,754,018	8,721,447	8,666,457	8,652,107	8,636,208
Gross profit	1,412,577	1,651,890	1,892,002	2,132,948	2,142,732	2,153,183	2,185,754	2,240,744	2,255,094	2,270,993
Tax	494,402	578,162	662,201	746,532	749,956	753,614	765,014	784,260	789,283	794,848
Net profit	918,175	1,073,729	1,229,801	1,386,416	1,392,776	1,399,569	1,420,740	1,456,484	1,465,811	1,476,145
Accumulated undistributed profit	918,175	1,991,904	3,221,704.85	4,608,121	6,000,897	7,400,466	8,821,206	10,277,690	11,743,501	13,219,646

ANNEX V

DEBT SERVICE SCHEDULE AND COMPUTATION

PAYMENT OF EQUAL ANNUAL INSTALLMENTS

Table 22 Debt services schedule and computation

Item description	Project year										
	1	2	3	4	5	6	7	8	9	10	
A. Investment and working capital											
1. Investment											
2. Increment working capital											
Total											
B. Loan receipts and balances											
1. Loan receipts	997,612	939,374	874,439	802,036	721,307	631,294	530,930	419,023	294,248	155,123	
2. Outstanding balance at end of year	997,612	939,374	874,439	802,036	721,307	631,294	530,930	419,023	294,248	155,123	
a. First year loan											
Total											
A. Debt service											
1. First year Loan											
a. Interest	114,725	108,028	100,561	92,234	82,950	72,599	61,057	48,188	33,838	17,939	
b. Repayment of principal	58,237	64,935	72,402	80,729	90,013	100,364	111,906	124,775	138,124	137,285	

ANNEX VI
CASH-FLOW STATEMENT
FOR
FINANCIAL PLANING

Table 23 Projected Cash flow statement

Period	Start up			Full capacity						
Capacity utilization	70%	80%	90%	100%						
Project year	1	2	3	4	5	6	7	8	9	10
Item description										
A. Cash - inflow	9,638,213	9,624,850	10,013,715	11,104,426	10,907,201	10,907,201	10,907,201	10,907,201	10,907,201	10,907,201
1. Financial resource (total)	2,003,166	899,095	197,223	197,225						
2. Sales revenue	7,635,047	8,725,755	9,816,492	10,907,201	10,907,201	10,907,201	10,907,201	10,907,201	10,907,201	10,907,201
B. Cash – outflow	8,707,210	8,544,992	8,785,251	9,727,674	9,533,873	9,537,531	9,548,931	9,568,177	9,572,199	9,561,026
1. Total assets schedule including replacement	2,003,214	197,225	197,223	197,225						
2. Operating costs	6,036,680	6,894,772	7,752,864	8,610,954	8,610,954	8,610,954	8,610,954	8,610,954	8,610,954	8,610,954
3. Debt service (total)										
a. Interest	114,725	108,028	100,561	92,234	82,950	72,599	61,057	48,188	33,838	17,939
b. Repayment	58,237	64,935	72,402	80,729	90,013	100,364	111,906	124,775	138,124	137,285
4. Tax	494,402	578,162	662,201	746,532	749,956	753,614	765,014	784,260	789,283	794,848
C. Surplus (Deficit)	931,003	1,079,858	1,228,464	1,376,752	1,373,328	1,369,670	1,358,270	1,339,024	1,335,002	1,346,175
D. Cumulative cash balance	931,003	2,010,861	3,239,325	4,616,077	5,989,405	7,359,075	8,717,345	10,056,369	11,391,371	12,737,546

ANNEX X

SUMMARY OF FINANCIAL EFFECIENCY TESTS

Table 24 Summary of financial efficiency tests

	Project year									
Project year	1	2	3	4	5	6	7	8	9	10
Capacity utilization	70%	80%	90%	100%						
Financial ratio in %										
1. Gross profit : Revenue	19%	19%	19%	20%	20%	20%	20%	21%	21%	21%
2. Net profit : Revenue	12%	12%	13%	13%	13%	13%	13%	13%	13%	14%
3. Net profit : initial investment	64%	70%	74%	78%	79%	79%	80%	82%	83%	83%
4. Net profit : Equity	215%	198%	187%	180%	181%	181%	184%	189%	190%	191%
5. Gross profit : Initial investment	99%	107%	114%	121%	121%	122%	124%	127%	127%	128%
6. Operating costs : Revenue	79%	79%	79%	79%	79%	79%	79%	79%	79%	79%

ANNEX XI

TOTAL INVESTMENT COSTS

Table 25 Total investment costs'000'

Period	Start up			Full capacity								
Project year	1	2	3	4	5	6	7	8	9	10	11	
Investment Category												
1. Fixed investment costs												
a. Initial fixed investment costs	606,650											
b. Replacement												
2. Pre-operational capital expenditure	2,000											
3. Working capital increase	816,558	114,688	114,686	114,688								
Total investment costs	1,425,208	114,688	114,686	114,688								

ANNEX XII

TOTAL ASSETS

Table 26 Total Assets'000'

Period	Start up			Full capacity							
Project year	1	2	3	4	5	6	7	8	9	10	11
Investment Category											
1. Fixed investment costs											
c. Initial fixed investment costs	606,650										
❖ Cost of land											
d. Replacement											
2. Pre-operational capital expenditure	2,000										
3. Current assets increase	1,394,564	197,225	197,223	197,225							
Total assets	2,003,214	197,225	197,223	197,225							

ANNEX XIII

SOURCES OF FINANCE

Table 27 Sources of finance'000'

Period	Start up			Full capacity							
Project year	1	2	3	4	5	6	7	8	9	10	Total
Sources of finance											
1. Equity capital	427,548	114,688	114,686	114,688							
2. Loan capital	997,612										
3. Current liabilities	578,006	82,537	82,537	82,537							
Total finance	2,003,166	197,227	197,223	197,225							

ANNEX XIV

Calculations of payback period

Table 28 Calculation of payback period'000'

Year	Amount Paid Back			Total investment	End of year
	Net Profit	Depreciation	Total		
1	918,175	71,065	989,240	1,425,160	-435,920
2	1,073,729	71,065	1,144,794	114,688	+405,814

ANNEX XVI

Calculations of Net present value at 17% D.F.

Table 29 Calculation of NPV at 17% D.F.

Project year	Gross Revenue	$1/(1+i)^n$ At 17%	Present value at 17%	Project costs			
				Total investment	Operating costs	Total	Present value at 17%
1	7,635,047	0.854701	6,525,682.31	1,425,160	6,036,680	7,461,840	6,377,642
2	8,725,755	0.730514	6,374,286.19	114,688	6,894,772	7,009,460	5,120,509
3	9,816,492	0.624371	6,129,132.93	114,686	7,752,864	7,867,550	4,912,270
4	10,907,201	0.53365	5,820,627.81	114,688	8,610,954	8,725,642	4,656,439
5	10,907,201	0.456111	4,974,894.36		8,610,954	8,610,954	3,927,551
6	10,907,201	0.389839	4,252,052.33		8,610,954	8,610,954	3,356,886
7	10,907,201	0.333195	3,634,224.84		8,610,954	8,610,954	2,869,127
8	10,907,201	0.284782	3,106,174.52		8,610,954	8,610,954	2,452,245
9	10,907,201	0.243404	2,654,856.35		8,610,954	8,610,954	2,095,941
10	10,907,201	0.208037	2,269,101.37		8,610,954	8,610,954	1,791,397
Total			45,741,033.00				37,560,005

A. Benefit- cost ratio at 17% D.F. = 1.2

B. NPV at 10% D.F. = 8,181,027,000 Birr