



PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION



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ADDIS ABEBA CITY ADMINISTRATION INVESTMENT COMMISSION
A.A

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

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I. Executive summary

This project profile is prepared to assess the viability of running Essential oil manufacturing 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 Essential oil manufacturing 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 only one private Essential oil manufacturing factory. According to the latest data sourced from Ethiopian investment commission (EIC) there are more about 53 companies registered to involve in production of essential oil and related products. The status of these companies is: 38% on pre-implementation, 14% on implementation and 49% on operation stages.

The location of the plant will be decided on the basis of access to raw materials, infrastructure namely power, water, transport and telecom to easy access to international market.

The factory at full capacity operation can produce 15 million liters, per year based on 260 working days and their shifts of 24 hours per day.

The total investment capital including establishing the factory is Birr 348.77 million. Out of the total investment capital, the owners will cover Birr 104.63million (30 %) while the remaining balances amounting to Birr 244.14million (70 %) will be secured from bank in the form of term loan.

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As indicated in the financial study, the cash flow projection of the project shows surplus from the first year on. The net cash flows of the project range from Birr 113 million in the first year to Birr 164.5 million at the end of the 10th year of operation. At the end of the 10th year of operation period the cumulative cash balance reaches Birr 1.58 billion. 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 9.22 billion Birr at 17%D.F. and the benefit-cost ratio of 2.87 at 17% D.F.

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

1. BACKGROUND INFORMATION

1.1 Introduction

This document was undertaken to show Essential oil production investment profile in Addis Ababa. In compiling the report, information from Addis Ababa investment commission, Addis Ababa trade and industry development, Ethiopian custom commission and published sources have been augmented.

Presently, in spite of high demand and its crucial importance, essential oils are in short supply and also significant amounts are imported from abroad. This causes freight transportation costs from the supplier to the Djibouti Port to the users to be high and in some cases inefficient and unreliable.

The provision of adequate essential oil is fundamental importance to Ethiopia's present and future demand. In Ethiopia, the demand for essential oil is expected to increase considerably in the next few decades as a result of increased population growth, urbanization and increasing income levels. Thus, identifying potential of essential oil production is crucial in a country like Ethiopia.

1.2 Product Description and Application

Essential oils are concentrated volatile aromatic compounds produced by plants - the easily evaporated essences that give plants their wonderful scents. Each of these complex precious liquids is extracted from a particular species of plant life. Each plant species originates in certain regions of the world, with particular environmental conditions and neighboring fauna and flora.

Essential oils are frequently referred to as the "life force" of plants. Unlike fatty oils, these "essential" oils are volatile, highly concentrated, substances extracted from flowers, leaves, stems, roots, seeds, bark, resin or fruit rinds. The amount of essential oils found in these plants can be anywhere from

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0.01 percent to 10 percent of the total. That's why tons of plant materials are required for just a few hundred pounds of oil. These oils have potent antimicrobial factors, having wide range of therapeutic constituents. These oils are often used for their flavor and their therapeutic or odoriferous properties, in a wide selection of products such as foods, medicines, and cosmetics. Beware of imitations. Essential oils cannot be substituted with synthetics. Only pure oils contain a full spectrum of compounds that cheap imitations simply cannot duplicate.

Essential oils are extracted from oil 'sacs' in flowers, leaves, stems, roots, seeds, wood and bark. They differ significantly from the well-known vegetable, nut and seed oils which are made up of various fatty acids (essential oils are not). Essential oils are used by the plants in somewhat the same way they are by humans - they fight infection, contain hormone-like compounds, initiate cellular regeneration, and work as chemical defense against fungal, viral, and animal foes. Despite their foliar origins however, essential oils have a similar structure to some compounds found in blood and tissues, allowing them to be compatible with our own physiology.

1.3 Project Location and Justification

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 9°01'48"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 km²

of which 18.2 km² are rural. Addis Ababa's built-up urban area spans 474 km². 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

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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

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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 branches 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.

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- 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 Carry 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 casual 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.

2. Marketing study

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.

2.2 The Supply of Essential Oil

2.2.1 Local Supply

The demand for essential oil in Ethiopia is met through domestic production and import. According to the information obtained from Ethiopian Investment Commission, 52 companies received investment license for the production of essential oil and related works. Of these companies, 27 are in operation, 5 are in implementation and 20 are in the pre-implementation phase. As per the report of Ethiopian Agricultural Research Institute, in 2020 the country produced around 3 million tons of essential oil mainly from Eucalyptus, Lemongrass and Rosemary. In the same report the market was projected to grow at 9% in the coming five years. Thus, in estimating the current (2022) domestic supply, increase by 9% was considered. Accordingly, the present (Year 2022) local supply for essential oil is estimated at 3,564,300 tons. Moreover, the average increase of local supply from 2023 to 2033 is estimated to increase by 2.5%.

2.2.2 Import

As shown in table 1, import of essential oil has been growing from year to year with minor fluctuations. The yearly average level of import which was about 57,838 kg during the period 2012-2018 has increased to a yearly average of 81,123 kg during the period 2020 - 2021. The annual average import growth rate (CAGR) of the last 10 years was 5.55%.

In terms of value, the country was on the average spending 12,725,398 Birr during the period 2012-2018. The expenditure for importing essential oil has increased to annual average of Birr 54,824,636 during the period 2020-2021. The huge increase for the demand of essential oil is believed to be due to the people awareness for the use of essential oil.

In estimating the current effective demand for essential oil, it is considered as reasonable to assume that the present demand for the essential oil would be the average of the imported quantity of the recent two years i.e. year 2020 and 2021 (81,123 kg) and the domestic production (3,564,300 tons). Accordingly, the present (year 2022) effective demand for essential oil is estimated at 3,564,384 tons.

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Table 1: Import of essential oil from 2012 to 2021

Year	Quantity (Kg)	Value (Birr)
2012	52,783	14,310,154
2013	52,940	11,905,217
2014	90,751	20,345,076
2015	49,072	9,879,017
2016	56,550	11,540,764
2017	83,154	16,115,953
2018	19,617	4,981,608
2019	-	-
2020	71,613	22,132,598
2021	90,632	32,692,038

Sources: Ethiopian Revenue and customs Authority, compiled by consultant

2.3 Demand Projection

The future demand for essential oil depends mainly on the growth of expansion of the industrial sector that makes use of essential oil and people awareness on the importance of essential oil. During the past ten years, the annual average growth of import has been more than 5.55 % per annum. As per the data of the Ethiopian Investment commission there are a number of project companies which are licensed for domestic production of essential oil. When the projects become operational the demand for the product will undoubtedly increase significantly. By considering the import past trend, which was 5.55 % annual growth rate and future prospects of the industrial sector, demand for essential oil is assumed conservatively to grow by 10% per annum.

The total demand projection and the supply gap worked based on the above assumptions are presented in table 2.

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Table 2: Projected demand supply gap analysis for essential oil from 2023 to 2032

Year	Total Essential oil demand (tons)	Projected local supply (tons)	Unsatisfied demand (tons)
2023	3,920,822	3,653,408	267,415
2024	4,312,905	3,744,743	568,162
2025	4,744,195	3,838,361	905,834
2026	5,218,615	3,934,320	1,284,295
2027	5,740,476	4,032,678	1,707,798
2028	6,314,524	4,133,495	2,181,029
2029	6,945,976	4,236,833	2,709,143
2030	7,640,574	4,342,753	3,297,821
2031	8,404,631	4,451,322	3,953,309
2032	9,245,094	4,562,605	4,682,489

The demand projection, executed in table 2 reveals that the demand for essential oil will grow from 3,920,822 tons in the year 2023 to 5,740,476 tons and 9,245,094 tons by the year 2027 and year 2032, respectively.

As shown in table 2, the project will have unsatisfied demand for the coming 10 years' period. The projected demand will continue to be positive until 2032. It can be clearly noted that there is a huge gap between supply and demand figures, which can really be taken as the apparent demand-supply gap for essential oil in Ethiopia. This is really the actual unsatisfied demand as imports have to be substituted that also helps in saving the foreign currency outflow from the country. The unsatisfied demand for essential oil for the year 2032 estimated at 4,682,489 tons.

3. Production Technology and engineering

3.1 Technology

There are various technologies for production of essential oil. The following section describes both the conventional and modern methods for the essential oil production.

Cold Expression

Expression or cold pressing is the oldest extraction method and is used almost exclusively for the production of citrus essential oils. This method refers to any physical process during which the essential oil glands in the peel and cuticles are broken in order for the oil to be released. This process results in the production of a watery emulsion, which is subsequently centrifuged to separate out the essential oil (Bousbia et al., 2009).

Solvent Extraction

Solvent extraction can be used to extract essential oils that are thermally labile (e.g., from blossom). During this method, the plant material is placed into a solvent bath which dissolves it. After the extraction the liquid mixture that contains the essential oil (along with other compounds) goes through a filtration process and a subsequent distillation. Solvents that are commonly used for extraction are alcohol, hexane, ethanol, petroleum ether, and methanol. The main advantage of extraction over distillation is that a lower temperature is used during the process, therefore reducing the risk of chemical changes due to high temperatures, which are used during distillation. The essential oil produced will contain a small quantity of solvent as a residue and therefore its use for food applications is not possible. However, if the solvent used is alcohol, it is safe for consumption and considered “food grade”. This method is commonly used by the perfume industry.

The “Enfleurage” Method

Enfleurage is another conventional extraction method that dates back to antiquity. It has been used mainly for the extraction of essential oils from flowers (e.g., jasmine). During this method a purified odorless cold fat is spread on the plant material (e.g., flowers). The odors are given off by the flowers and are consequently dissolved in the fat. New flowers replace the old ones and the process is repeated for very long periods until saturation of the fat is reached. Afterwards the fat is collected and extracted with alcohol. By today’s standards it is a time-consuming, labor-intensive, and costly method. It does not appear to have any applications for essential oils used in food industry and it is virtually obsolete nowadays.

Distillation

The most commonly used extraction method is the steam distillation or water distillation method (Figure 1). This extraction process can last between 1 and 10 h. The amount of oil produced depends on length of distillation time, temperature, pressure, and type of plant material. During distillation, plant materials are exposed to boiling water or steam in order to release the essential oil within them through evaporation. As the steam and essential oil vapors are being condensed, they are collected and separated in a vessel usually called the “Florentine flask” (Dugo and Di Giacomo, 2002). Even though extraction of an essential oil by distillation appears to be a straightforward process, it has many drawbacks. Because the essential oils are exposed to boiling water for long time periods, the formation of artifacts is a possible issue due to the high temperature or the acidity of water. This can lead to differences in the composition of the volatile oils being extracted. During distillation the hydrolysis of esters to alcohols and acids can take place which may cause serious implications in the case of oils with high quantities of esters. Moreover, some essential oils require rectification. This

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process involves the re-distillation of the oil so as to eliminate undesirable impurities (e.g., waxes) as well constituents that can impart an unacceptable odor.

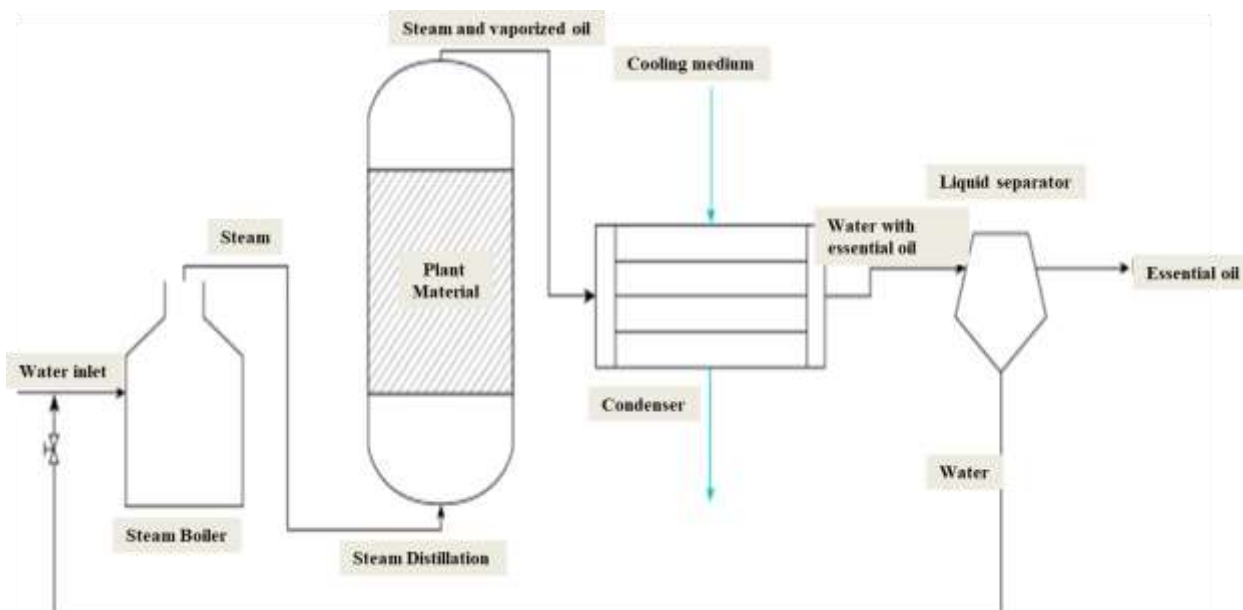


Figure 1: Typical industrial steam distillation unit for extraction of essential oils

Extraction with Supercritical Gases

In general, conventional extraction methods such as steam distillation and solvent extraction have been traditionally used; however, these methods have disadvantages such as low yield, loss of volatile compounds, long extraction times, and toxic solvent residues (Khajeh et al., 2005). This has led to the development of alternative extraction techniques that can overcome these problems. An alternative for these conventional methods is supercritical fluid extraction (SFE) which has been introduced and studied in depth. SFE can be performed in batch, semi batch, and continuous modes. In general, the solid material is put in a vessel in which the supercritical fluid is added under a specific flow rate until the appropriate extraction conditions are reached (Figure 2). Benefits of Supercritical Fluid Extraction are:

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- It is usually performed at low temperatures, making it a very suitable method for thermally sensitive compounds.
- The solvation power (i.e., interaction of a solute with the solvent) of the fluid in use can be controlled by changing pressure and/or temperature, thus leading to very high selectivity. However, high pressure should be avoided because it can lead to extraction of undesired high molecular weight compounds (e.g., simultaneous extraction of waxes during essential oil isolation).
- Supercritical fluids, because of their lower viscosity and higher diffusivity, can enter porous solid materials more effectively compared with liquid solvents resulting in faster mass transfer and rapid extraction compared with solvent extraction methods.
- It is a more environmental friendly method since it uses nontoxic fluids such as CO₂ or in some cases uses significantly less quantities of organic solvent of just a few millilitres.
- It can be scaled according to application from analytical up to large industrial scale.

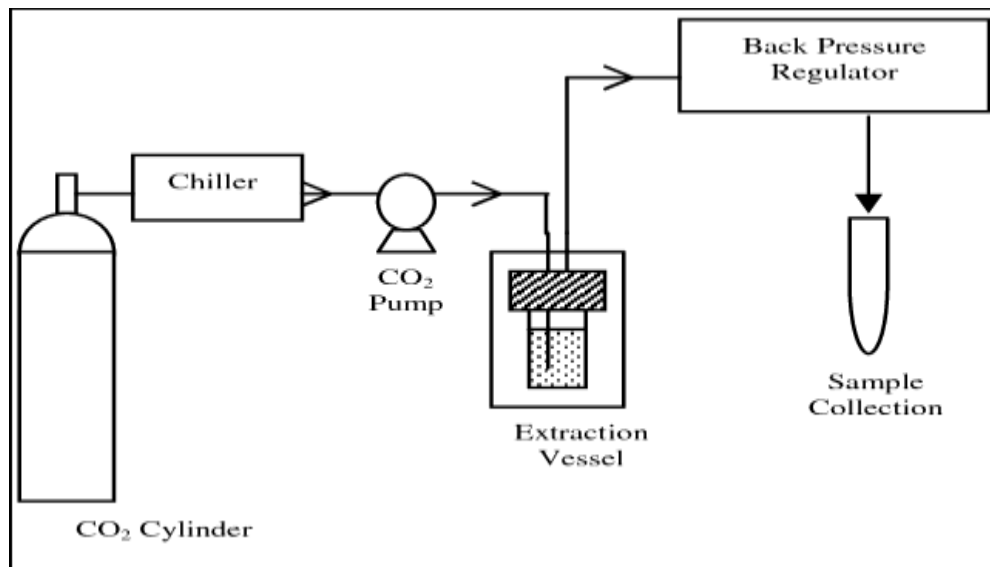


Figure 2: Flow diagram of supercritical fluid extraction system

3.1.1 Environmental and Social Impact Assessment

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 of essential oil. Potential environmental and social impacts due to the production of essential oil 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. Social responsibility cost estimated to be 1% of fixed investment costs.

3.1.2 Plant capacity

In determining the plant capacity of the essential oil production plant, the future demands of the product and the economies of scale of the available technologies were taken into consideration. According to the data obtained from the market study, the demand for essential oil raises from 267,415 tons to 4,682,489 tons from years 2023 to 2032.

Hence, based on the demand gap and the minimum economic of scale for essential oil production, a plant with a capacity of 15,000,000 liters of essential oil per annum is proposed.

3.1.3 Production program

It is assumed that the essential oil plant will start at 70% in the first year and will grow by 10% each year considering the market penetration traits and consumer perception for local products. The production program of the envisaged plant is given in table 3.

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Table 3: Essential oil production program

Year of Production	1st Year	2nd Year	3rd Year	4th-10th Year
Capacity utilization (%)	70	80	90	100
Essential Oil (liter)	10,500,000	12,000,000	13,500,000	15,000,000

3.1.4 Materials and inputs

Availability and Source of Raw Materials

The principal raw material for the production of essential oil is plant species since essential oil industry is an agro based industry. Accordingly, the envisaged plant will use Eucalyptus Globulus tree as the main raw material. This is available in large quantity in and around Addis Ababa. However, this profile is developed based on the consideration that the envisaged plant will use eucalyptus tree which would be specially grown by the firm for this purpose. Thus, the tree shall be planted in and around Addis Ababa.

The total annual cost of raw material is estimated at Birr 975million which is locally available. The annual requirement of this raw material is shown in table 4.

Table 4: Annual raw, auxiliary materials requirement and cost

S/No.	Description	Unit	Quantity at full capacity	Unit cost	Total cost (Birr)
1	Eucalyptus leave and branches	Tons	1,500,000	500	750,000,000.00
3	Packing material,	Pcs	15,000,000	15	225,000,000.00
	Total				975,000,000.00

3.2 Engineering

3.2.1 Land, buildings and civil works

The required area (m²) and construction cost for the production facilities essential for the successful operation of the processing plant is shown in Table 5. A total area ready for the processing plant is 10,000 m² out of which 5,170 m² is to be covered by building while uncovered area of 4,830m² is left 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 M² to 2,800.71 birr per M² respectively. Therefore, for the profile a land lease rate of birr 3,885 per M² 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 10,000.00 Birr per m² to 25,000.00 Birr per m². The total construction cost of buildings and civil works, at a rate of Birr 20,000 per m² is estimated at Birr 103.10 million. Therefore, the total cost of land lease and construction of buildings and civil works is estimated at Birr 141.95 million.

The proposed plant layout comprises the following buildings and structures.

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Table 5 Building costs

S/No	Descriptions	Total area in M ²	Estimated cost per square meter (in Birr)	Total estimated cost (in Birr)
1	Raw materials receiving and store	1,500	20,000.00	30,000,000.00
2	Production room	150	20,000.00	3,000,000.00
3	Ingredients store	500	20,000.00	10,000,000.00
4	Filling and packing room	500	20,000.00	10,000,000.00
5	Packing materials store	500	20,000.00	10,000,000.00
6	Final products store	500	20,000.00	10,000,000.00
7	Finished products delivery veranda	100	20,000.00	2,000,000.00
8	Boiler room	100	20,000.00	2,000,000.00
9	workshop	120	20,000.00	2,400,000.00
10	Generator room	20	20,000.00	400,000.00
11	Power station room	20	20,000.00	400,000.00
12	Administration office 5,360=13,400,000	300	20,000.00	6,000,000.00
13	Production and technical office	200	20,000.00	4,000,000.00
14	Toilet and shower for female	40	20,000.00	800,000.00
15	Room for cloth changing for female	40	20,000.00	800,000.00
16	Toilet and shower for male	40	20,000.00	800,000.00
17	Room for cloth changing for male	40	20,000.00	800,000.00
18	parking	500	5,000.00	2,500,000.00
19	Fence	1,200 M*2	3,000.00	7,200,000.00
	TOTAL	5,170 M²		103,100,000.00

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Table 6 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 7 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

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

3.2.2 Machinery and equipment

One of the core machines in essential oil production plant is the De-ionizing Machine, Steam Generator, and Distillation Unit. The total cost of machinery and equipment is estimated at about Birr 17,300,760.00, which is required in foreign currency. Lists of required machinery and equipment are shown in table 8.

Table 8: Lists of required machinery and equipment

S/N	Description	Quantity	Unit Cost of Equipment(Birr)	Total Cost of the Equipment(Birr)
1	De-ionizing Machine	1	12,500,000.00	12,500,000.00
2	Steam Generator	2	2,700,000.00	5,400,000.00
3	Distillation Unit (Still, Condenser, and Florentine flask)	1	7,200,760.00	10,200,760.00
4	Solvent extraction machine	1	50,000,000.00	50,000,000.00
4	Laboratory Equipment	set	2,200,000.00	5,200,000.00
Total				83,300,760.00

3.2.3. Lists of machinery suppliers

ALIBABA

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4. Organizational structure

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

4.1 Manpower Requirement and Estimated Annual manpower costs

Description	Number	Monthly salary	Annual salary, Birr
plant manager	1	30,000.00	360,000.00
Administration and finance manager	1	15,000.00	180,000.00
Human resource manager	1	7,500.00	90,000.00
Secretary	1	5,000.00	60,000.00
Marketing and sales officer	1	10,000.00	120,000.00
Sales manager	1	15,000.00	180,000.00
Accountant	1	10,000.00	120,000.00
Production unit leader	1	15,000.00	180,000.00
Senior Mechanic	3	10,000.00	360,000.00
Senior Electrician	3	10,000.00	360,000.00
Purchaser	1	10,000.00	120,000.00
Operator	6	4,000.00	288,000.00
Ass. Operator	6	3,000.00	216,000.00
Store keeper	2	5,000.00	120,000.00
Quality manager	1	15,000.00	180,000.00
Microbiologist	1	10,000.00	120,000.00
Sugar dissolving team	1	6,000.00	72,000.00
Boiler technician	1	3,000.00	36,000.00
Guard	4	1,400.00	67,200.00
Driver	1	3,000.00	36,000.00
Cleaners	2	2,500.00	60,000.00
TOTAL	40		3,325,200.00

5. Financial Analysis

5.1 General

The financial analysis evaluation of essential oil manufacturing project is 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) and working capital, while operating and maintenance costs comprise current expenses related to material inputs, manpower cost, 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 loans 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.
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

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most of the capital assets are assumed to be depreciated, 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.
6. Maintenance and spare parts costs are 1.5% of the fixed investment costs.
7. Furniture and fixture costs assumed to be 500,000.00

5.2 Initial Fixed investment costs

Table 9 Initial Fixed investment costs

S/No	Fixed investment type	Unit of measurement	Quantity	Unit price	Total Amount	Remarks
1	Land	Square meter	10,000	555 birr/year	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	5,170	lump sum	103,100,000.00	
	Sub total				141,950,000.00	
3	Machineries	set	2	Lump sum	83,300,760.00	
4	Transformer	set	1	Lump sum	2,000,000.00	
5	Weighbridge	Set	1	Lump sum	4,000,000.00	
6	Truck and vehicles	Pcs	2	Lump sum	6,000,000.00	
7	Furniture and fixture	Pcs			500,000.00	
	SUB TOTAL				95,800,760.00	
	Fixed capital investment costs				237,750,760.00	
8	pre-operational expenses				2,000,000.00	
	Working capital				109,024,000.00	
	TOTAL INVESTMENT COSTS				348,774,760.00	

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. See Annex table 14 detail annual working capital calculation.

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.

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. The remaining balance that of the total investment costs will be expected to be covered by equity contribution of the project promoter.

5.5 Production costs

As it is depicted in Annex Table 13 major categories of the total production costs are assembled into the following cost elements.

5.5.1 Material inputs

In the project under study the basic material inputs (see in table 4) are Eucalyptus leave and branches and, 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 975 million per annum.

5.5.2 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 6.089 million.

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Table 10 Utilities of the factory'000''Birr

Utility''000''Birr		Start-up			Full Capacity
		70 %	80 %	90 %	100 %
Project year		1	2	3	4
Item description	Unit of measurement				
Fuel					
Gasoline for service vehicle	100km*260days*32Birr/LIT*8km/Li	104	104	104	104
Gasoline for transport truck	(200km*300days*32Birr/LIT*5km/Li)*3	1,152	1,152	1,152	1,152
Sub-Total		1,256	1,256	1,256	1,256
Change of oil and lubricant	10% of the fuel consumption	126	126	126	126
Sub-Total		1,382	1,382	1,382	1,382
Electricity	260days*24 hrs*650kwh* 1.00Birr/kwh	2,839	3,245	3,650	4,056
Sub- Total		2,839	3,245	3,650	4,056
Water	365days*100m ³ /day*15 Birr/m ³	384	438	493	548
Sub -Total		384	438	493	548
Telecommunication					
Telephone	5 lines* 1,500Birr/month/line+18Birr/line/month	31.08	31.08	31.08	31.08
Mobile	5 lines*1,500 Birr/month/line	30.00	30.00	30.00	30.00
Fax	2line*1,000Birr/month + 17 Birr/line/month	12.40	12.40	12.40	12.40
Internet	2,500 Birr/month	30.00	30.00	30.00	30.00
Sub-Total		103.48	103.48	103.48	103.48
TOTAL		<u>4,708.48</u>	<u>5,168.48</u>	<u>5,628.48</u>	<u>6,089.48</u>

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5.5.3 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 11 Overhead costs

Direct Overhead”000”Birr		Year 1	Year 2	Year 3	Year 4
Annual land lease Payment		5,550	5,550	5,550	5,550
Insurance					
Building and Civil works	0.10%	113.10	113.10	113.10	113.10
Machinery and Equipment	0.20%	94.50	94.50	94.50	94.50
Motor vehicle and Truck	1%	60	60	60	60
Vehicles annual inspection and registration	25,000 Birr per annum per vehicle	50.00	50.00	50.00	50.00
Work cloth	Two times per annum per workers at 1,000 Birr	140	140	140	140
Cleaning and sanitation	An estimate of 300 Birr/day	78.00	78.00	78.00	78.00
Sub Total		6,085.60	6,085.60	6,085.60	6,085.60
Administration Overhead “000’ Birr					
Audit fee	40,000 Birr per annum	40.00	40.00	40.00	40.00
Office cleaning and sanitation	2,000 Birr per month	24.00	24.00	24.00	24.00
Stationery and office supplies	2,000 Birr per month	20.00	20.00	20.00	20.00
Printing and Copy	2,000 Birr per month	24.00	24.00	24.00	24.00
Sub Total		108.00	108.00	108.00	108.00
GRAND TOTAL		6,193.60	6,193.60	6,193.60	6,193.60

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5.5.4 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 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 amount of fixed investment cost and pre-production expenses.

5.5.5 Depreciation

Table 12 Depreciation in Birr"000"

Period			Start-up			
			70 %	80 %	90 %	100 %
Capacity utilization			70 %	80 %	90 %	100 %
Project year			1	2	3	4
Item description	Original Value					
Structure and civil works	103,100,000.00	5% of original value	5,155	5,155	5,155	5,155
Machinery and equipment	83,300,760.00	15 % of original value	12,495	12,495	12,495	12,495
Transformer	2,000,000.00	15 % of original value	300	300	300	300
Motor vehicles and trucks	6,000,000.00	15% of original value	900	900	900	900
Weighbridge	4,000,000.00	15 % of original value	600	600	600	600
Office equipment and furniture	500,000.00	20 % of original value	100	100	100	100
Pre-production expenses	2,000,000.00	25% of original value	500	500	500	500
Total			20,050	20,050	20,050	20,050

5.6 Break Even point and ROI

5.6.1 Break Even point (BEP)

Three kinds of break-even point

- A. BEP Sales Revenue(BR)
- B. BEP production (Volume)
- C. BEP Percentage (%)

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.

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

Annual sales = 2,362,500Birr

Unit selling price = 225 Birr/PCS

$$\text{BEP (sales)} = \frac{\text{Annual sales} \times \text{Annual fixed costs}}{\text{Annual sales} - \text{Annual variables costs}} = \frac{2,362,500,000 \times 51,559,000}{2,362,500,000 - 761,650,000}$$

BEP (Sales) = 76,089,663 Birr

B. BEP production

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

BEP production = $76,089,663 / 225 = 338,176$

$$\begin{aligned} \text{c. BEP percentage} &= \frac{\text{Annual fixed costs} \times 100\%}{\text{Annual sales} - \text{Annual variables costs}} \\ &= \frac{51,559,000 \times 100\%}{2,362,500,000 - 761,650,000} \\ &= 3.2\% \end{aligned}$$

5.6.2 Return on investment

Return on investment = Net profit /Total capital requirement

$$= 1,003,083,000/348,774,760$$

$$= 287\%$$

The return on owners' investment (ROOI)

= Annual net profit /owners' investment

$$= 1,003,083,000/104,632,428$$

$$= 958\%$$

5.7 Project benefits

For financial analysis and evaluation of the given project, the current raw price, and packing materials buying price and final packed processed veterinary drug price at the project gate has been taken as a basis. Consequently, based on the recent market survey, price has been indicated in table 13.

As it has been stated earlier the project is envisaged to reach full capacity operation four years after commencement of production activities which are assumed to begin with 70% of the estimated total capacity.

Thus, according to the computation in Annex Table 16 and Annex Table 18, the net income and cash flow statements analysis revealed that at full capacity operation the project will generate a total income (gross revenue) amounting to 3.37 billion Birr per annum. The Net Income Statement shows a steady growth of gross profit starting from 1.0billion Birr in year 1 reaching the peak of 1.4billion Birr in year 10. In its 10 years of manufacturing activities, the project is expected to generate a total

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

net profit of 13.70 billion Birr and contribute 7.38 billion Birr to the government treasury in form of 35% income tax.

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 18 of “Cash Flow Statement” shows the positive cumulative cash balance of Birr 14.10 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 23 indicates that the project will be able to reimburse itself from its net cash-income within one year after commencement of production activities, the period which is considered to be very good for the project of this nature.

In Annex Table 24 of 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 9.22 Billion Birr at 17% D.F. and the benefit-cost ratio of 2.87 at 17% D.F. These results are most appreciable, especially, when related to the external capital borrowing interest rate which ranges from 8.50% to 18.5 % for newly establishing projects.

Break-even point (BEP) have been undertaken the project under study when implemented will have BEP at about 3.2% operation of the estimated full capacity

In addition to this, finally, summary of financial efficiency tests have been conducted in Annex table 22, 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.

ANNEXES

NNEX I

CALCULATION OF ANNUAL PRODUCTION COSTS

Table 13 Annual total production costs”000”

Period	Start-up			Full capacity						
	70 %	80 %	90 %	100 %	100 %					
Project Year	1	2	3	4	5	6	7	8	9	10
Cost category										
I. Material inputs including packing materials	682,500	780,000	877,500	975,000	975,000	975,000	975,000	975,000	975,000	975,000
II. Labor	3,325	3,325	3,325	3,325	3,325	3,325	3,325	3,325	3,325	3,325
III. Utility	4,709	5,169	5,629	6,090	6,090	6,090	6,090	6,090	6,090	6,090
IV. Repair and Maintenance and spare parts (1.5 % of fixed costs)	3,566	3,566	3,566	3,566	3,566	3,566	3,566	3,566	3,566	3,566
VI Direct overheads	6,086	6,086	6,086	6,086	6,086	6,086	6,086	6,086	6,086	6,086
A. Direct Production costs	700,186	798,146	896,106	994,067	994,067	994,067	994,067	994,067	994,067	994,067
VII. Administration over head	108	108	108	108	108	108	108	108	108	108
VIII. Marketing and Promotional expense 3 % of sales revenue	70,875	81,000	91,125	101,250	101,250	101,250	101,250	101,250	101,250	101,250
B. Operating costs	771,169	879,254	987,339	1,095,425	1,095,425	1,095,425	1,095,425	1,095,425	1,095,425	1,095,425
Interest	28,076	26,437	24,610	22,572	20,300	17,767	14,942	11,793	8,281	4,366
Depreciation	20,050	20,050	20,050	20,050	19,550	19,450	14,690	5,155	5,155	5,155
C. Total production costs	819,295	925,741	1,031,999	1,138,047	1,135,275	1,132,642	1,125,057	1,112,373	1,108,861	1,104,946

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

ANNEX II 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: 26 days
 - 2. Spare parts : 90 days
 - 3. Work under process: two days at direct costs
 - 4. Product ready for delivery: 8 days at direct costs plus administration overheads
- C. Cash on hand : 360 days
- D. Accounts payable 26 days for material inputs and utilities

ii. Working capital requirement

Table 14 Calculation of working capital

Cost category	Minimum Days of coverage	Coeff-icent 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	77,117	87,925	98,734	109,543	109,543	109,543	109,543	109,543	109,543	109,543
B. Inventory												
1. Material inputs	26	10	68,250	78,000	87,750	97,500	97,500	97,500	97,500	97,500	97,500	97,500
2. Spare parts	90	4	892	892	892	892	892	892	892	892	892	892
3. Work under process	2	130	5,386	6,140	6,893	7,647	7,647	7,647	7,647	7,647	7,647	7,647
4. Product ready for delivery	8	32.5	21,652	24,666	27,680	30,695	30,695	30,695	30,695	30,695	30,695	30,695
C. Cash on hand	90	4	4,449	4,564	4,679	4,794	4,794	4,794	4,794	4,794	4,794	4,794
D. Current assets			177,745	202,186	226,628	251,069	251,069	251,069	251,069	251,069	251,069	251,069
II. Current liabilities												
A. A/p	26	10	68,721	78,517	88,313	98,109	98,109	98,109	98,109	98,109	98,109	98,109
III. Working capital												
A. Net working capital			109,024	123,669	138,315	152,960	152,960	152,960	152,960	152,960	152,960	152,960
B. Increasing in working capital			109,024	14,645	14,645	14,645	0	0	0	0	0	0

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

ANNEX III

PROJECTED SALES REVENUE

Table 15 projected sales revenue '000'

Period		U/m	Quantity at full capacity	Unit price	Start up			Full capacity						
					70 %	80 %	90 %	100 %						
Item description	Product mix													
Project year					1	2	3	4	5	6	7	8	9	10
Essential oil	Will be packed in 1 liter bottle	liter	15,000,000	225	2,362,500	2,700,000	3,037,500	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000
GRAND TOTAL					2,362,500	2,700,000	3,037,500	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

ANNEX VI

PROJECTED NET INCOME STATEMENT

Table 16 Projected Net income statement "000"

Period	Start up			Full capacity						
	70 %	80 %	90 %	100 %						
Project year	1	2	3	4	5	6	7	8	9	10
Item description										
Product sales revenue	2,362,500	2,700,000	3,037,500	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000
Less total production costs	819,295	925,741	1,031,999	1,138,047	1,135,275	1,132,642	1,125,057	1,112,373	1,108,861	1,104,946
Gross profit	1,543,205	1,774,259	2,005,501	2,236,953	2,239,725	2,242,358	2,249,943	2,262,627	2,266,139	2,270,054
Tax	540,122	620,991	701,925	782,934	783,904	784,825	787,480	791,919	793,149	794,519
Net profit	1,003,083	1,153,268	1,303,576	1,454,019	1,455,821	1,457,533	1,462,463	1,470,708	1,472,990	1,475,535
Accumulated undistributed profit	1,003,083	2,156,352	3,459,927	4,913,947	6,369,768	7,827,301	9,289,764	10,760,471	12,233,462	13,708,997

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

ANNEX VII DEBT SERVICE SCHEDULE AND COMPUTATION PAYMENT OF EQUAL ANNUAL INSTALLMENTS

Table 17 Debt services schedule and computation '000'

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	244,142	229,890	213,958	196,279	176,523	154,495	129,932	102,546	72,010	57,962
2. Outstanding balance at end of year										
a. First year loan	244,142	229,890	213,958	196,279	176,523	154,495	129,932	102,546	72,010	57,962
Total										
A. Debt service										
1. First year Loan										
a. Interest	28,076	26,437	24,610	22,572	20,300	17,767	14,942	11,793	8,281	4,366
b. Repayment of principal	14,252	15,892	17,718	19,755	22,028	24,561	27,386	30,535	34,047	33,597

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

ANNEX VIII CASH-FLOW STATEMENT FOR FINANCIAL PLANING

Table 18 Projected Cash flow statement

Period	Start up				Full capacity						
	70%	80%	90%	100%							
Capacity utilization											
Project year	1	2	3	4	5	6	7	8	9	10	
Item description											
A. Cash - inflow	2,779,995	2,724,441	3,061,941	3,399,441	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	
1. Financial resource (total)	417,495	24,441	24,441	24,441							
2. Sales revenue	2,362,500	2,700,000	3,037,500	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	3,375,000	
B. Cash – outflow	1,353,619	1,542,574	1,731,592	1,920,686	1,921,657	1,922,578	1,925,233	1,929,672	1,930,902	1,927,907	
1. Total assets schedule including replacement	417,496	24,441	24,442	24,441							
2. Operating costs	771,169	879,254	987,339	1,095,425	1,095,425	1,095,425	1,095,425	1,095,425	1,095,425	1,095,425	
3. Debt service (total)											
a. Interest	28,076	26,437	24,610	22,572	20,300	17,767	14,942	11,793	8,281	4,366	
b. Repayment	14,252	15,892	17,718	19,755	22,028	24,561	27,386	30,535	34,047	33,597	
4. Tax	540,122	620,991	701,925	782,934	783,904	784,825	787,480	791,919	793,149	794,519	
C. Surplus (Deficit)	1,426,376	1,181,867	1,330,349	1,478,755	1,453,343	1,452,422	1,449,767	1,445,328	1,444,098	1,447,093	
D. Cumulative cash balance	1,426,376	2,608,243	3,938,592	5,417,347	6,870,690	8,323,112	9,772,879	11,218,207	12,662,305	14,109,398	

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

ANNEX XII TOTAL INVESTMENT COSTS

Table 19 Total investment costs”000”

Period	Start up			Full capacity								
	1	2	3	4	5	6	7	8	9	10		11
Project year												
Investment Category												
1. Fixed investment costs												
a. Initial fixed investment costs	237,751											
b. Replacement												
2. Pre-operational capital expenditure	2,000											
3. Working capital increase	109,024	14,645	14,645	14,645								
Total investment costs	348,775	14,645	14,645	14,645								

ANNEX XIII TOTAL ASSETS

Table 20 Total Assets

Period	Start up			Full capacity								
	1	2	3	4	5	6	7	8	9	10		11
Project year												
Investment Category												
1. Fixed investment costs												
c. Initial fixed investment costs	237,751											
❖ Cost of land												
d. Replacement												
2. Pre-operational capital expenditure	2,000											
3. Current assets increase	177,745	24,441	24,442	24,441								
Total assets	417,496	24,441	24,442	24,441								

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

ANNEX XIV SOURCES OF FINANCE

Table 21 Sources of finance

Period	Start up			Full capacity							
	1	2	3	4	5	6	7	8	9	10	Total
Project year											
Sources of finance											
1. Equity capital	104,632	14,645	14,645	14,645							
2. Loan capital	244,142										
3. Current liabilities	68,721	9,796	9,796	9,796							
Total finance	417,495	24,441	24,441	24,441							

ANNEX XI SUMMARY OF FINANCIAL EFFECIENCY TESTS

Table 22 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 %										
Gross profit : Revenue	65%	66%	66%	66%	66%	66%	67%	67%	67%	67%
Net profit : Revenue	42%	43%	43%	43%	43%	43%	43%	44%	44%	44%
Net profit : initial investment	288%	317%	345%	370%	371%	371%	372%	375%	375%	376%
Net profit : Equity	959%	283%	309%	333%	333%	334%	335%	337%	337%	338%
Gross profit : Initial investment	442%	488%	530%	570%	570%	571%	573%	576%	577%	578%
Operating costs : Revenue	33%	33%	33%	32%	32%	32%	32%	32%	32%	32%

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

ANNEX XV CALCULATIONS OF PAYBACK PERIOD

Table 23 Calculation of payback period”000”

Year	Amount Paid Back			Total investment	End of year
	Net Profit	Depreciation	Total		
1	1,003,083	20,050	1,023,133	348,774	+674,359

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION

ANNEX XVI CALCULATIONS OF NET PRESENT VALUE AT 17% D.F.

Table 24 Calculation of NPV at 17% D.F.”000”

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	2,362,500	0.854701	2,019,231	348,774	771,169	1,119,943	957,216
2	2,700,000	0.730514	1,972,388	14,645	879,254	893,899	653,006
3	3,037,500	0.624371	1,896,527	14,645	987,339	1,001,984	625,610
4	3,375,000	0.53365	1,801,069	14,645	1,095,425	1,110,070	592,389
5	3,375,000	0.456111	1,539,375		1,095,425	1,095,425	499,635
6	3,375,000	0.389839	1,315,707		1,095,425	1,095,425	427,039
7	3,375,000	0.333195	1,124,533		1,095,425	1,095,425	364,990
8	3,375,000	0.284782	961,139		1,095,425	1,095,425	311,957
9	3,375,000	0.243404	821,489		1,095,425	1,095,425	266,631
10	3,375,000	0.208037	702,125		1,095,425	1,095,425	227,889
Total			14,153,582				4,926,363

A. Benefit- cost ratio at 17% D = 2.87

B. NPV at 17% D.F. = 9,227,219

PROJECT PROFILE ON ESSENTIAL OIL PRODUCTION
