PROJECT PROFILE ON MEAT PROCESSING AND PRESERVING

MEAT PROCESSING

NOVEMBER 14, 2022

ADDIS ABEBA CITY ADMINISTRATION INVESTMENT COMMISSION

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I. Executive summary

This project profile is prepared to assess the viability of running meat processing 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 meat processing 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. According to the latest data sourced from Ethiopian investment commission (EIC) there are more about 44 companies registered to involve in production of processed meat and related products..

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 17.68million kg of canned meat, 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 1.09billion. Out of the total investment capital, the owners will cover Birr 327.50million (30 %) while the remaining balances amounting to Birr 764.15million (70 %) will be secured from bank in the form of term loan.

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 447 million in the first year to Birr 654 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 6.26 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 3.69 billion Birr at 17%D.F. and the benefit-cost ratio of 1.09 at 17% D.F.

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

1. Background information

1.1. Introduction

Ethiopia has one of the largest livestock populations in Africa and the tenth in the world. The country had 59.5 million heads of cattle, 30.70 million heads of sheep, 30.20 million heads of goats, 56.53 millions of poultry and 1.21 million heads of a camel. Cattle in Ethiopia provide draught power, income for farming communities, means of savings and investment. It is central to the Ethiopian economy contributing about 45% to the agricultural GDP, supporting the livelihoods of 70 % of the population, 18.7% to the national GDP and 16–19% to the total foreign exchange earning of the country. Meat is the most valuable livestock product and for many people serves as their first-choice source of animal protein which provides all the essential amino acids and various micronutrients in proper proportion to the human beings. Meat defined as all animal tissues suitable as food for human consumption. This includes all processed or manufactured products prepared from animal tissues. Meat production and consumption is an important in the Ethiopian economy. The annual contribution of cattle meat production in Ethiopia is accounts for over 70% of the total red meat production and over 50% of the total meat output in Sub Saharan Africa. The Country's export performance reached its peak in 2016/17 by exporting 19,779.20 tons of meat. In the same period under review, the meat export (chilled shoats, beef carcass and offal) value has picked up from 1.7 million USD to 92.65 million USD. Among these shoat carcass account 80.35 million dollar (86.72%), beef carcass 6.23 (6.72%) and offal 6.07 (6.55%).

1.2. Product description

Processed meat is considered to be any meat which has been modified in order to either improve its taste or to extend its shelf life. Methods of meat processing include salting, curing, fermentation , smoking, and/or the addition of chemical preservatives. Processed meat is usually composed of pork or beef, but also poultry, while it can also contain offal or meat by-products such as blood. Processed meat products include bacon, ham, sausages, salami, corned beef, jerky, hot dog, lunch meat, canned meat and meat-based sauces. Meat processing includes all the processes that change fresh meat with the exception of simple mechanical processes such as cutting, grinding or mixing.

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 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. Meat Production Trends in Ethiopia

Meat production offers opportunity to serve a vast export market as well as Ethiopia's domestic market. The total meat production increase from 578,240 tons in 2004 to 749,430tons in year 2014 and decreased to 596,765 tons in year 2017. Despite the fact that Ethiopia is the tenth largest livestock population in the world, the production of meat is still low and contributed to about 0.2 percent of the world total meat production, of which most is sheep and goat meat. This ranked Ethiopia the 55th largest meat producing country in the world. The reasons behind low production of meat in Ethiopia are due to low off-take rates, most animals slaughtered and exported live were not produced in commercially oriented manner and sell only in need of cash or when animals get too old after serving for draft purpose and inability to fulfill minimum standard required in the international market for processed meat. The trend of meat production in Ethiopia shows it was rising moderately, of course with some fluctuations from 2004 to 2017.

1.5. Domestic Meat Consumption in Ethiopia

The domestic meat demand is believed to increase with increasing population, urbanization, and income in general and particularly for beef due to preference for eating meat. Meat consumption is often an indicator of economic status of a country or an individual. People with a higher social or economic status demand a greater amount of high-quality meat products. The per capita consumption of meat in developed countries is much higher than in developing countries. Countries whose population consumes the least amount of meat are located in Africa and Asia. Developed countries consumed a consistent level of 77 kg of meat per capita annually, while developing countries struggled to maintain a diet with only 25 kg of meat per capita annually. With the fast growth of Ethiopian economy and population, the domestic demand for meat is increasing; however, the country is one of the lowest per capita of meat consumption in the world which is 8 kg, of which about 5.3 kg comes from beef. This is due to low per capita incomes, non-commercial oriented animal

husbandry practices, high domestic meat prices and the fasting days over 200 days per year by the Orthodox Christians.

1.6. Status of meat processing industry in Ethiopia

Meat processing industry is on the rise in Ethiopia even though the sector is still much less than it should be given the resource potential. Currently there are about 15 export slaughter houses (including 8 under establishment) with installed capacity of 140,702 tons/year while they utilized 23%of their installed capacity and more than 29 abattoirs (with installed capacity 588,123 cattle/year and 317,785 goat/year) serving the local market. Notwithstanding, illegal or informal killing of animals is highly practiced for domestic consumption at the backyard of practically all households especially for shoats whereas for cattle killing at village level to share among a group of neighbors or close families is common which is called" Kircha". Municipal level domestic abattoirs are growing time to time with the growth of urbanization whereas modern slaughter houses are mainly established for exporting purpose

1.7. 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.

1.7.1. 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.

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 processed Meat

2.2.1. Local meat Supply

In Ethiopia there are large scales, medium and household level meat slaughter house. The design capacity and current utilizing capacity is mentioned in table 1.

Table 1Installed capacity and utilized capacity of Slaughter house in Ethiopia

S/No	Slaughter House	Quantity	Total installed capacity	Currently utilized capacity	Current status
1.	Slaughter house for export market	15	140,702 tons	31,687 tons	For export
2.	Slaughter house for local market	29	588,123 cattle 317,785 goat	223,639 tons	Average cattle weight is 350kg and average goat weight is 28kg
	For local market			223,639 tons/year	

2.1.2. Import

The supply of meat has been met both through import and domestic production. Although there is no apparent trend in the growth of import processed meat has continuously been appearing in the import statistics.

Table 2 Volume of imported processed meat from 2012 to 2021 in kg

Year	Net weight (in Kg)	CIF value in (ETB)	CIF value in USD	Total TAX in ETB	Total value in ETB	Unit price per Kg
2012	23,550	23,019	4,474,642	250,461	3,010,368	168,501
2013	13,693	13,562	3,297,673	175,407	2,222,705	118,228
2014	70,819	68,302	6,971,171	346,074	1,603,664	79,612
2015	156,298	134,265	8,694,265	418,356	5,706,053	274,567
2016	48,788	42,093	1,559,541	72,206	993,346	45,991
2017	47,260	45,529	2,662,536	109,945	1,427,669	58,953
2018	17,434	16,454	639,316	-	405,182	20,877
2019	-	-	-	-	-	-
2020	139,106	119,911	7,640,960	-	1,363,544	-
2021	181,872	151,100	16,191,912	-	4,950,736	-

Source: Ethiopia customs Authority

As it has been shown in table 3 import of processed meat which was 23,019 kg at the beginning of the period (2012) has increased to 151,100kg by the end of, 2021. A closer observation at the data set reveals that imported processed meat over the study period has shown varying patterns. Based on the data obtained from Ethiopia customs Authority, the annual average volume of imported processed meat is 61,424 kg from 2012 through 2021.

2.1.2.1. Forecasted future import of meat

Table 3 Future forecast of import of processed meat by trend adjusted exponential smoothing method

Year	Actual	Single exponential smoothing
2012	23,019	
2013	13,562	
2014	68,302	
2015	134,265	
2016	42,093	
2017	45,529	
2018	16,454	
2019	0.00	
2020	119,911	
2021	151,100	
2022		151,100
2023		163,908
2024		176,716
2025		189,524
2026		202,332
2027		215,141
2028		227,949
2029		240,757
2030		253,565
2031		266,373
2032		279,181

Sources :- Compiled by consultant

2.1.2.2. Meat Demand Projection

2.1.2.2.1. Local consumption

The demand for meat can be influenced by a number of factors. The size of population and its growth rate, disposable income prices and culture are few among many variables. With the fast growth of Ethiopian economy and population, the domestic demand for meat is increasing; however, the country is one of the lowest per capita of meat consumption in the world which is 8 kg, of which about 5.3 kg comes from beef. This is due to low per capita incomes, non-commercial oriented animal husbandry practices, high domestic meat prices and the fasting days over 200 days per year by the Orthodox Christians Nevertheless, for the purpose of this study, attempts have been made to forecast the likely future demand for meat on the basis of the following assumptions:

i. Local supply of meat assumed to be increased by 2.5% every year
ii. Ethiopia population is estimated to be 120,202,679 in 2022
iii. Annual growth of population is taken to be 2.5%
iv. According to International Journal of Food Science and Agriculture, 2019 consumption of per capital is 8kg/year.

Table 4 Projected Demand for meat in Ethiopia

Year	Population	Demand based on Per capital consumption , 8kg/year
2022	120,202,679	961,621,432
2023	123,207,746	985,661,968
2024	126,287,940	1,010,303,520
2025	129,445,138	1,035,561,104
2026	132,681,267	1,061,450,136
2027	135,998,298	1,087,986,384
2028	139,398,256	1,115,186,048
2029	142,883,212	1,143,065,696
2030	146,455,292	1,171,642,336
2031	150,116,675	1,200,933,400
2032	153,869,592	1,230,956,736

As it is indicated above the demand for meat in 2022 is 961,621,432kg. This volume will increase to 1,230,956,736 kg in the year 2032.

2.1.2.2.2. Export market

Table 5 Volume of Exported meat from 2012 to 2021 in kg

Year	Gross weight (in Kg)	NET weight (KG)	CIF value in in ETB
2012	**816,350**	**777,953**	**38,814,320**
2013	5,757	5,503	567,550
2014	2,057	1,866	205,892
2015	21,944	21,196	1,976,760
2016	82,439	80,077	4,448,568
2017	12,611	12,351	1,047,695
2018	7,365	7,265	728,020
2019	38	38	1,163
2020	44,673	42,397	1,541,318
2021	40,410	39,877	7,839,907

Source: Ethiopia customs Authority

2.1.2.2.3. Forecasted future export of meat

Table 6 Future forecast of export of processed meat by trend adjusted exponential smoothing method

Year	Actual	Single exponential smoothing
2012	**777,953**	
2013	5,503	
2014	1,866	
2015	21,196	
2016	80,077	
2017	12,351	
2018	7,265	
2019	38	
2020	42,397	
2021	39,877	
2022		34,337
2023		34,337
2024		34,337
2025		34,337
2026		34,337
2027		34,337
2028		34,337
2029		34,337
2030		34,337
2031		34,337
2032		34,337

Sources: - Compiled by consultant

2.1.2.3. Demand-Supply Gap Analysis

When we see the historical supply volume of meat in Ethiopia there is no apparent trend in the growth. Hence, it is found difficult to objectively forecast the future supply volume. Single exponential smoothing method was used, for import forecasting purposes. A 2.5% growth rate, equivalent to population growth of our country, is also assumed for local supply increase, for new as well as expansion projects for domestic suppliers of the existing slaughters' house.

Table 7 Demand supply gap Analysis

Year	Domestic production in (in kg)	Import in (in kg)	Total supply in (kg)	Demand (kg)		Excess demand(kg)
				Local demand	Export market	
2022	223,639 ,000	151,100	223,790,100	961,621,432	34,337	737,865,669
2023	229,230,000	163,908	229,393,908	985,661,968	34,337	756,302,397
2024	234,961,000	176,716	235,137,716	1,010,303,520	34,337	775,200,141
2025	240,835,000	189,524	241,024,524	1,035,561,104	34,337	794,570,917
2026	246,856,000	202,332	247,058,332	1,061,450,136	34,337	814,426,141
2027	253,027,000	215,141	253,242,141	1,087,986,384	34,337	834,778,580
2028	259,353,000	227,949	259,580,949	1,115,186,048	34,337	855,639,436
2029	265,836,000	240,757	266,076,757	1,143,065,696	34,337	877,023,276
2030	272,482,000	253,565	272,735,565	1,171,642,336	34,337	898,941,108
2031	279,294,000	266,373	279,560,373	1,200,933,400	34,337	921,407,364
2032	286,277,000	279,181	286,556,181	1,230,956,736	34,337	944,434,892

As shown in the above table, 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 meat 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 meat for the year 2032 estimated at 944,434,892 kg.

3. Technology and engineering

3.1. Technology

3.1.1. Meat production and preserving process

The meat processing involves the slaughter of animals and fowl, processing of the carcasses into cured, canned, and other meat products, and the rendering of inedible and discarded remains into useful by-products such as lards and oils. Meat is exposed to a series of wide range of processes viz. curing or preserving processes such as salting, wet pickling, drying, cooking and canning, sausage manufacture, ham curing. All these processing techniques are aimed at inhibiting the microbial spoilage and increasing the shelf life of the meat. Major principles involved in meat processing are use of heat, low temperature, smoking, modified atmosphere packaging and ionizing radiations. The methods of preservation are mainly grouped in three categories i.e. control by temperature, by moisture and by lethal agents (bactericidal, fungicidal etc.).

Freezing is an excellent process for preserving the quality of meat for long periods. Freezing is often used to preserve meats during shipment over long distances or for holding until long times of storage. Its effectiveness depends on ice crystal formation and rate of lowering of temperature. When the temperature of storage is below - $18C^2$, changes occur at a very slow rate in the muscle of warm blooded animals. Quality of frozen meat depends on various factors such as rate of freezing, packaging etc. When muscle tissue is frozen rapidly, small both intra and extra cellular ice crystals are formed which cause little damage to the meat structure. While large ice crystals are formed in slow rate of freezing causing compactness of muscle fiber. The process of denaturation can be accelerated with a resulting decrease in water holding capacity of tissue. Loss of water holding capacity of the muscle along with mechanical damage to cells by ice crystals is responsible in large parts of thaw exudates. To protect quality loss due to changes in protein, anti-freezing compounds

or cryoprotectants i.e. polydextrose, polyphosphate are added to meat formulations. Rapid freezing can be obtained by using air blast freezers either on batch or continuous basis which employs -20 to -40C[2] cold air. Large size meat cuts are vacuum packaged to prevent lipid oxidation and discoloration due to formation of metmyoglobin. Retail meat is packed in low permeability films with better mechanical strength.

3.1.2. Process flow chart of Cattle meat processing unit

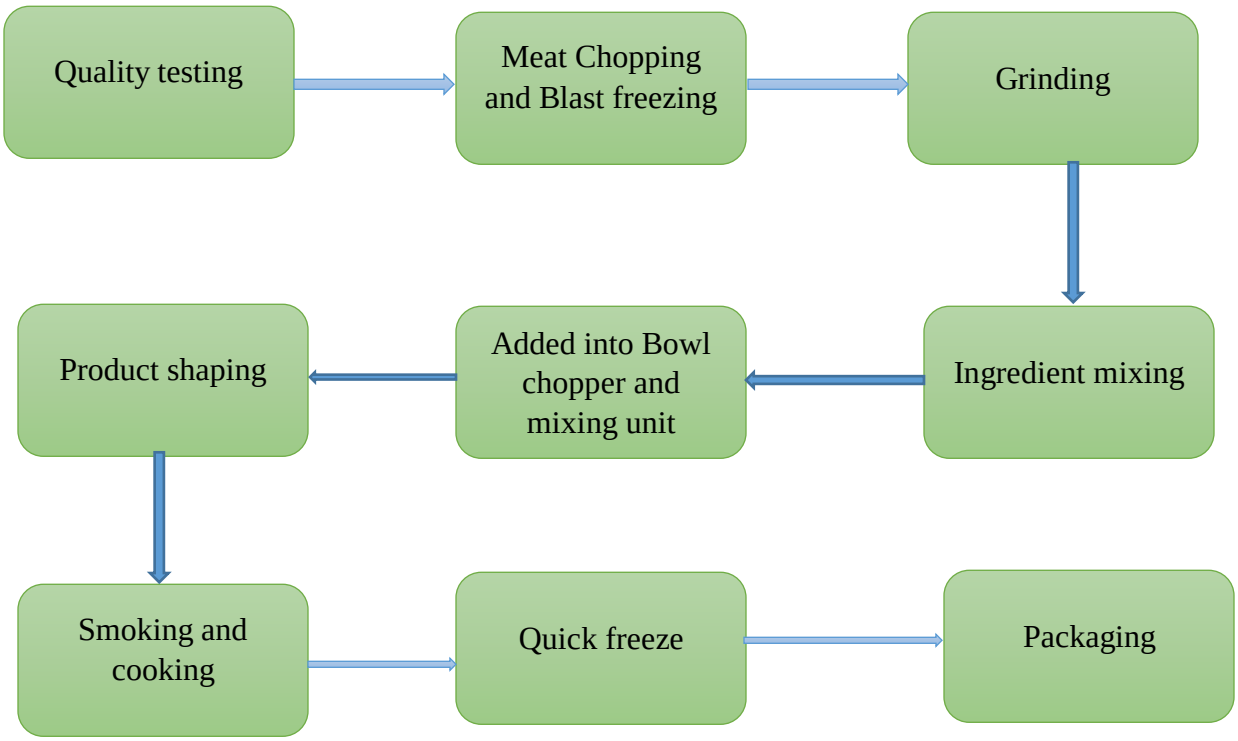

Figure 1 process flow chart for cattle meat processing unit

3.1.3. 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 processed meat. Potential environmental and social impacts due to the production of meat based 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.

3.1.4. Production Capacity and Production Program

3.1.4.1. Plant capacity

The annual production capacity of the plant in full capacity is 500 heads of cattle per day, their weight is 400kg each. The production capacity is based on projected demand and realistic market share that could be captured. The production commences three shift and 260 working days a year.

3.1.4.2. Production program

The annual production program for the year 1 to year 4 is indicated in Table 8 below. The plant initially produces 70 % of its annual rated capacity bound to initial operating problems such as machine set up and marketing. The production capacity will increase by 10 % and attain its full capacity by the third year of its commencement.

Table 8 Production programme

Product	Production programme			
Year	1	2	3	4
Capacity	70%	80%	90%	100%
Canned meat in Kg	12,376,000	14,144,000	15,912,000	17,680,000

Table 9 Approximate cut out weight for cattle

Component	% of cut out weight
Carcass	34
Bones	16
Organs	16
Skin and attached fat	6
Blood	3
Fatty tissues	4
Horns, hooves, feet and skull	5
Abdominal and intestinal contents	16

3.2. Engineering

3.2.1. Land, buildings 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 Table10. A total area ready for the processing plant is 50,000m^2 out of which 24,900m^2 is to be covered by building while uncovered area of 25,100m^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 10,000 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 402.80 million. Therefore, the total cost of land lease and construction of buildings and civil works is estimated at Birr 597 million.

The proposed plant layout comprises the following buildings and structures.

Table 10 Building costs

S/No	Descriptions	Total area M^2	Estimated cost per square meter (in Birr)	Total estimated cost (in Birr)
1	Open area meat processing facility	5,000	20,000	100,000,000.00
2	Covered area meat processing plant	4,000	20,000	80,000,000.00
3	Raw material storage	2,000	20,000	40,000,000.00
4	Cold storage area	1,500	20,000	30,000,000.00
6	Main product store	1,500	20,000	30,000,000.00
7	packing materials store	3,000	20,000	60,000,000.00
8	Office and toilet	500	20,000	10,000,000.00
9	Canteen	300	20,000	6,000,000.00
10	Guard house	100	20,000	2,000,000.00
11	parking	3,000	3,333,33	10,000,000.00
12	Green area	4,000	5,000	20,000,000.00
13	For expansion	30,100	0.00	4,800,000.00
14	Fence	1,200M	1,200*2*2,000	4,800,000.00
	TOTAL	50,000		**402,800,000.00**

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

3.2.2. Machinery and equipment

Table 13 Lists of meat processing machineries

S/No	Machines	Quantity
1	Automatic meat processing line including bowl chopper, mixing unit, vacuum filler, formic shape, smoke house and fryer	1
2	Cold storage	1
3	Packaging line	1
4	Refrigerated vehicle	2
5	Generators and solar system	2
6	Tube well for water supply	1
7	Miscellaneous	1

3.2.3. List meat processing machinery suppliers

Hermann Wiegand GmbH

Am Anger 27
36169 Rasdorf, Germany

Tel.: +49 (0)6651 9600-0

Fax.: +49 (0)6651 9600-16

SCHRÖDER Maschinenbau GmbH & Co. KG

Esch 11
33824 Werther, Germany

Tel.: +49 5203 9700 0

Fax.: +49 5203 9700 79

4. Organizational structure for meat processing unit

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

Table 14 Annual manpower costs

s/no	Description	Number of persons	Salary in birr	
			monthly	annually
1	General manager	1	45,000.00	540,000.00
2	executive secretary	1	15,000.00	180,000.00
3	legal advisor	1	20,000.00	240,000.00
4	Planning and project development	1	20,000.00	240,000.00
5	Manager- admin. and finance	1	25,000.00	300,000.00
6	assistance manager- finance	1	22,000.00	264,000.00
7	accountant	1	15,000.00	180,000.00
8	accounting clerk	1	10,500.00	126,000.00
9	cashier	1	10,000.00	120,000.00
10	personnel and general service	1	15,000.00	180,000.00
11	guards	5	4,500.00	270,000.00
12	messenger and cleaner	1	7,500.00	90,000.00
13	driver ii	4	10,000.00	480,000.00
14	Veterinary doctor	1	24,000.00	288,000.00
15	chief quality controller	3	22,000.00	792,000.00
16	Food technologist	1	20,000.00	240,000.00
17	Meat packers/processors	3	24,000.00	864,000.00
18	Sanitation expert	3	17,500.00	630,000.00
19	senior mechanics	3	15,000.00	540,000.00

20	senior electrician	3	15,000.00	540,000.00
21	store keeper	1	10,000.00	120,000.00
22	manager- commercial	1	20,000.00	240,000.00
23	purchaser	1	10,000.00	120,000.00
24	sales- manager	1	25,000.00	300,000.00
	TOTAL	41		7,884,000.00

5. Financial Analysis

5.1. General

The financial analysis evaluation of the project, under consideration has been carried out for meat processing cost estimates 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) and 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 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

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.
6. Maintenance and spare parts costs are 1.5% of the fixed investment costs.

5.2. Initial Fixed investment costs

Table 15 Initial Fixed investment costs

S/No	Fixed investment type	Unit of measurement	Quantity	Unit price	Total Amount	Remarks
1	Land	Square meter	50,000	3,885 birr/M^2	194,250,000.00	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	5,100	lump sum	402,800,000.00	
	Sub total				**597,050,000.00**	
3	Machineries	set	2	Lump sum	120,000,000.00	
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	12,000,000.00	
7	Furniture and fixture	Pcs			500,000.00	
	SUB TOTAL				138,500,000.00	
	Fixed capital investment costs				735,550,000.00	
8	pre-operational expenses				2,000,000.00	
	Working capital				354,099,000.00	
	TOTAL INVESTMENT COSTS				1,091,649,000.00	

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 and 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 21 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 are cattle (Oxen, bulls, and cows), labelled cans and salt. 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 10.05 billion per annum.

Table 16 Raw materials input plan in Birr'000'

	Period				Start-up			Full Capacity
	Capacity utilization				70%	80%	90%	100%
	Project year				1	2	3	4
	Materials input for meat processing	Description	Quantity at full Capacity	Unit price				
1	Cattle	Average weight 400kg	500 cattle/day	75,000	6,825,000	7,800,000	8,775,000	9,750,000
2	Can	1000gm, holding capacity	68, 000pcs/day	15	185,640	212,160	238,680	265,200
3	Salt	Food grade salt	378kg/day	13	895	1,023	1,150	1,278
4	Carton	For packing	5,667 pcs /day	22	22,691	25,932	29,174	32,415
5	Plaster	One roll for 40 cartons	142 roll/ day	75	1,938	2,215	2,492	2,769
	Total				7,036,164	8,041,330	9,046,496	10,051,662

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 8.88 million.

Table 17 Utilities of the factory'000"Birr

Utility"000"Birr		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	50km*260days*37Birr/LIT*8km/Li	29.575	33.80	38.025	42.250
Gasoline for transport truck	(200km*300days*37Birr/LIT*5km/Li)*3	655.20	748.80	842.40	936.00
Sub-Total		684.775	782.6	880.425	978.25
Change of oil and lubricant	10% of the fuel consumption	68.48	78.26	88.04	97.83
Sub-Total		753.25	860.86	968.47	1,076.08
Electricity	260days*24 hrs*650kwh* 0.4736Birr/kwh	2,839	3,245	3,650	4,056
Sub- Total		2,839	3,245	3,650	4,056
Water	365days*1,000m^3/day*10 Birr/m^3	2,555	2,920	3,285	3,650
Sub -Total		2,555	2,920	3,285	3,650
Telecommunication					
Telephone	5 lines* 500Birr/month/line+18Birr/line/month	31.08	31.08	31.08	31.08
Mobile	5 lines*500 Birr/month/line	30.00	30.00	30.00	30.00
Fax	2line*500Birr/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		**6,250.73**	**7,129.34**	**8,006.95**	**8,885.56**

5.5.3. 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 and spare parts costs have been assumed to be 1.5% of the total fixed costs.

5.5.4. 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 7.884Million.

5.5.5. 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 18 Overhead costs

Direct Overhead"000"Birr		Year 1	Year 2	Year 3	Year 4
Annual land lease Payment		27,750	27,750	27,750	27,750
Insurance					
Building and Civil works	0.10%	402.80	402.80	402.80	402.80
Machinery and Equipment	0.20%	240.00	240.00	240.00	240.00
Motor vehicle and Truck	1%	120.00	120.00	120.00	120.00
Vehicles annual inspection and registration	15,000 Birr per annum per vehicle	45.00	45.00	45.00	45.00
Work cloth	Two times per annum per workers at 800 Birr	65.60	65.60	65.60	65.60
Cleaning and sanitation	An estimate of 300 Birr/day	78.00	78.00	78.00	78.00
Sub Total		28,701.40	28,701.40	28,701.40	28,701.40
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		**28,809.40**	**28,809.40**	**28,809.40**	**28,809.40**

5.5.6. 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 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.

5.5.7. 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:

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 41.44 million.

Table 19 Depreciation in Birr"000"

Period			Start-up			
Capacity utilization			70 %	80 %	90 %	100 %
Project year			1	2	3	4
Item description	Original Value					
Structure and civil works	402,800,000.00	5% of original value	20,140	20,140	20,140	20,140
Machinery and equipment	120,000,000.00	15 % of original value	18,000	18,000	18,000	18,000
Transformer	2,000,000.00	15 % of original value	300	300	300	300
Motor vehicles and trucks	12,000,000.00	15 % of original value	1,800	1,800	1,800	1,800
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			41,440	41,440	41,440	41,440

5.6. Break Even point and ROI

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.

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

Annual sales = 8,153,600.00 Birr

Unit selling price = 600 Birr/kg

$$\text{BEP (sales)} = = \frac{\text{Annual sales x Annual fixed costs}}{\text{Annual sales} - \text{Annual variables costs}} = = \frac{8{,}153{,}600 \text{ x } 165{,}510}{8{,}153{,}600 - 7{,}345{,}143}$$

BEP (Sales) = 1,669,232,000 Birr

A. BEP production

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

BEP production = 1,669,232,0002/600 = 2,782,053

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

$$= \frac{165{,}510\text{x } 100\%}{8{,}153{,}600 - 7{,}345{,}14}$$

= 20.47%

5.6.1. Return on investment

Return on investment = Net profit /Total capital requirement

= 41%

The return on owners' investment (ROOI)

= Annual net profit /owners' investment

= 137%

5.7. 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 and equipment and general service facilities, whereas, the working capital corresponding to the resources needed for operation of the project totally and partially.

As it has been revealed in Annex Table 21 the total annual operating costs excluding depreciation and interest are estimated to range from 7.3billion Birr in year 1 to 10.45 billion Birr in year 4 and then after remain constant for the rest of the project life.

The total annual production costs including depreciation and interest increase from 7.46billion Birr in year 1 to 10.566 billion Birr in year 4 then starts declining until it reaches 10.48 billion Birr in year 10.

In according to Annex Table 22 requirement for the total working capital has been found to range from 354 Million Birr to in year 1 to 483 Million Birr in year 4 and then and then after remain constant for the rest of the project life.

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.

5.8. Project benefits

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

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

Table 20 Source of revenue in Birr"000"

	Period			Start-up			Full Capacity	
	Capacity utilization			70%	80%	90%	100%	100%
	Project year			1	2	3	4	5
	Product type		Unit price					
1	Canned meat		600/kg	7,425,600	8,486,400	9,547,200	10,608,000	10,608,000
2	By product like blood, fatty tissue, skin, organs and etc.	40% of total weight of the cattle will be sold as by products	50birr/kg	728,000	832,000	936,000	1,040,000	1,040,000
	TOTAL			8,153,600	9,318,400	10,483,200	11,648,000	11,648,000

Thus, according to the computation in Annex Table 23 and Annex Table 25, 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 11.64 billion Birr per annum. The corresponding Annex Table 23 of "Net Income Statement" shows a steady growth of gross profit starting from 692 million Birr in year 1 reaching the peak of 1.1billion Birr in year 10. In its 10 years of manufacturing activities,

the project is expected to generate a total net profit of 6.68 billion Birr and contribute 3.6billion 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 25 of "Cash Flow Statement" shows the positive cumulative cash balance of Birr 6.2 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 30 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 31 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 3.69billion Birr at 17%D.F. and the benefit-cost ratio of 1.09at 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.

The project under study when implemented will have BEP at about 20.47% operation of the estimated full capacity. In addition to this, finally, summary of financial efficiency tests have been conducted in Annex table 29, 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

ANNEX II

CALCULATION OF ANNUAL PRODUCTION COSTS

Table 21 Annual total production costs"000"

Period	Start-up			Full capacity						
Capacity utilization	70 %	80 %	90 %	100 %	100 %					
Project Year	1	2	3	4	5	6	7	8	9	10
Cost category										
I. Material inputs	7,036,164	8,041,330	9,046,496	10,051,662	10,051,662	10,051,662	10,051,662	10,051,662	10,051,662	10,051,662
II. Labor	7,884	7,884	7,884	7,884	7,884	7,884	7,884	7,884	7,884	7,884
III. Utility	6,251	7,129	8,007	8,886	8,886	8,886	8,886	8,886	8,886	8,886
IV. Repair and Maintenance and spare parts (0.5 % of fixed costs)	8,120	8,120	8,120	8,120	8,120	8,120	8,120	8,120	8,120	8,120
VI Direct overheads	28,701	28,701	28,701	28,701	28,701	28,701	28,701	28,701	28,701	28,701
A. Direct Production costs	7,087,120	8,093,164	9,099,208	10,105,253	10,105,253	10,105,253	10,105,253	10,105,253	10,105,253	10,105,253
VII. Administration over head	108	108	108	108	108	108	108	108	108	108
VIII. Marketing and Promotional expense 3 % of sales revenue	244,608	279,552	314,496	349,440	349,440	349,440	349,440	349,440	349,440	349,440
B. Operating costs	7,331,836	8,372,824	9,413,812	10,454,801	10,454,801	10,454,801	10,454,801	10,454,801	10,454,801	10,454,801
Interest	87,377	82,747	77,028	70,650	63,539	55,610	46,769	36,911	25,919	13,664
Depreciation	41,440	41,440	41,440	41,440	40,940	40,840	34,009	20,140	20,140	20,140
C. Total production costs	7,460,653	8,497,011	9,532,280	10,566,891	10,559,280	10,551,251	10,535,579	10,511,852	10,500,860	10,488,605

ANNEX IV
CALCULATION OF WORKING CAPITAL REQUIREMENTS

I. Minimum requirement of current assets and liabilities
   A. Accounts receivable: 30 days at total production costs minus depreciation and interest
   B. Inventory
      1. Material inputs: 30days
      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 : 90 days
   D. Accounts payable 52 days for material inputs and utilities

ii. Working capital requirement

Table 22 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	733,184	837,282	941,381	1,045,480	1,045,480	1,045,480	1,045,480	1,045,480	1,045,480	1,045,480
B. Inventory												
1. Material inputs	26	10	703,616	804,133	904,650	1,005,166	1,005,166	1,005,166	1,005,166	1,005,166	1,005,166	1,005,166
2. Spare parts	90	4	2,030	2,030	2,030	2,030	2,030	2,030	2,030	2,030	2,030	2,030
3. Work under process	2	130	54,516	62,255	69,994	77,733	77,733	77,733	77,733	77,733	77,733	77,733
4. Product ready for delivery	8	32.5	218,173	249,128	280,084	311,039	311,039	311,039	311,039	311,039	311,039	311,039
C. Cash on hand	90	4	51,064	51,942	52,820	53,699	53,699	53,699	53,699	53,699	53,699	53,699
D. Current assets			1,762,583	2,006,770	2,250,959	2,495,147	2,495,147	2,495,147	2,495,147	2,495,147	2,495,147	2,495,147
II. Current liabilities												
A. A/p	52	5	1,408,484	1,609,692	1,810,900	2,012,110	2,012,110	2,012,110	2,012,110	2,012,110	2,012,110	2,012,110
III. Working capital												
A. Net working capital			354,099	397,078	440,059	483,037	483,037	483,037	483,037	483,037	483,037	483,037
B. Increasing in working capital			354,099	42,979	42,981	42,978	0.0	0.0	0.0	0.0	0.0	0.0

ANNEX VI

PROJECTED NET INCOME STATMENT

Table 23 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	8,153,600	9,318,400	10,483,200	11,648,000	11,648,000	11,648,000	11,648,000	11,648,000	11,648,000	11,648,000
Less total production costs	7,460,653	8,497,011	9,532,280	10,566,891	10,559,280	10,551,251	10,535,579	10,511,852	10,500,860	10,488,605
Gross profit	692,947	821,389	950,920	1,081,109	1,088,720	1,096,749	1,112,421	1,136,148	1,147,140	1,159,395
Tax	242,531	287,486	332,822	378,388	381,052	383,862	389,347	397,652	401,499	405,788
Net profit	450,416	533,903	618,098	702,721	707,668	712,887	723,074	738,496	745,641	753,607
Accumulated undistributed profit	450,416	984,318	1,602,416.40	2,305,137	3,012,805	3,725,692	4,448,766	5,187,262	5,932,903	6,686,510

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

Table 24 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	764,154	719,545	669,805	614,347	552,510	483,561	406,684	320,965	225,389	118,822
2. Outstanding balance at end of year	764,154	719,545	669,805	614,347	552,510	483,561	406,684	320,965	225,389	118,822
a. First year loan										
Total										
A. Debt service										
1. First year Loan										
a. Interest	87,377	82,747	77,028	70,650	63,539	55,610	46,769	36,911	25,919	13,664
b. Repayment of principal	44,609	49,739	55,459	61,837	68,948	76,877	85,718	95,576	106,567	118,822

ANNEX VIII
CASH-FLOW STATEMENT
FOR
FINANCIAL PLANING

Table 25 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	10,653,733	9,562,587	10,727,389	11,892,188	11,648,000	11,648,000	11,648,000	11,648,000	11,648,000	11,648,000
1. Financial resource (total)	2,500,133	244,187	244,189	244,188						
2. Sales revenue	8,153,600	9,318,400	10,483,200	11,648,000	11,648,000	11,648,000	11,648,000	11,648,000	11,648,000	11,648,000
B. Cash – outflow	10,206,486	9,036,983	10,123,310	11,209,864	10,968,340	10,971,150	10,976,635	10,984,940	10,988,786	10,993,075
1. Total assets schedule including replacement	2,500,133	244,187	244,189	244,188						
2. Operating costs	7,331,836	8,372,824	9,413,812	10,454,801	10,454,801	10,454,801	10,454,801	10,454,801	10,454,801	10,454,801
3. Debt service (total)										
a. Interest	87,377	82,747	77,028	70,650	63,539	55,610	46,769	36,911	25,919	13,664
b. Repayment	44,609	49,739	55,459	61,837	68,948	76,877	85,718	95,576	106,567	118,822
4. Tax	242,531	287,486	332,822	378,388	381,052	383,862	389,347	397,652	401,499	405,788
C. Surplus (Deficit)	447,247	525,604	604,079	682,324	679,660	676,850	671,365	663,060	659,214	654,925
D. Cumulative cash balance	447,247	972,851	1,576,930	2,259,254	2,938,914	3,615,764	4,287,129	4,950,189	5,609,403	6,264,328

ANNEX XII
TOTAL INVESTMENT COSTS

Table 26 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	735,550											
b. Replacement												
2. Pre-operational capital expenditure	2,000											
3. Working capital increase	354,099	42,979	42,981	42,978								
Total investment costs	1,09,649	42,979	42,981	42,978								

ANNEX XIII
TOTAL ASSETS

Table 27 Total Assets

Period	Start up			Full capacity								
Project year	1	2	3	4	5	6	7	8	9	10	11	12
Investment Category												
1. Fixed investment costs												
c. Initial fixed investment costs	735,550											
❖ Cost of land												
d. Replacement												
2. Pre-operational capital expenditure	2,000											
3. Current assets increase	1,762,583	244,187	244,189	244,188								
Total assets	2,500,133	244,187	244,189	244,188								

ANNEX XIV
SOURCES OF FINANCE

Table 28 Sources of finance

Period	Start up			Full capacity							
Project year	1	2	3	4	5	6	7	8	9	10	Total
Sources of finance											
1. Equity capital	327,495	42,979	42,981	42,978							
2. Loan capital	764,154										
3. Current liabilities	1,408,484	201,208	201,208	201,210							
Total finance	2,500,133	244,187	244,189	244,188							

ANNEX XI
SUMMARY OF FINANCIAL EFFECIENCY TESTS

Table 29 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	8%	9%	9%	9%	9%	9%	10%	10%	10%	10%
2. Net profit : Revenue	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%
3. Net profit : initial investment	41%	47%	52%	58%	58%	58%	59%	61%	61%	62%
4. Net profit : Equity	138%	144%	149%	154%	155%	156%	158%	162%	163%	165%
5. Gross profit : Initial investment	63%	72%	81%	89%	89%	90%	91%	93%	94%	95%
6. Operating costs : Revenue	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%

ANNEX XV

CALCULATIONS OF PAYBACK PERIOD

Table 30 Calculation of payback period"000"

Year	Amount Paid Back			Total investment	End of year
	Net Profit	Depreciation	Total		
1	450,416	41,440	491,856	1,091,649	-599,793
2	533,903	41,440	575,343	42,979	-67,429
3	618,098	41,440	659,538	42,981	+549,128

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

Table 31 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	8,153,600	0.854701	6,968,890	1,091,649	7,331,836	8,423,485	7,199,561
2	9,318,400	0.730514	6,807,222	42,979	8,372,824	8,415,803	6,147,862
3	10,483,200	0.624371	6,545,406	42,981	9,413,812	9,456,793	5,904,547
4	11,648,000	0.53365	6,215,955	42,978	10,454,801	10,497,779	5,602,140
5	11,648,000	0.456111	5,312,781		10,454,801	10,454,801	4,768,550
6	11,648,000	0.389839	4,540,845		10,454,801	10,454,801	4,075,689
7	11,648,000	0.333195	3,881,055		10,454,801	10,454,801	3,483,487
8	11,648,000	0.284782	3,317,141		10,454,801	10,454,801	2,977,339
9	11,648,000	0.243404	2,835,170		10,454,801	10,454,801	2,544,740
10	11,648,000	0.208037	2,423,215		10,454,801	10,454,801	2,174,985
Total			48,847,679				44,878,901

A. Benefit- cost ratio At 17% D.F. = 1.09
B. NPV At 17% D.F. = 3,968,778,000 Birr