

**79. PROFILE ON THE PRODUCTION OF INNER
TUBES AND TIRE**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of inner tubes and tire with a capacity of 220,000 pieces (equivalent of 30,000 tons) of tires and 220,000 pieces (equivalent of 1,000 tons) of inner tubes per annum. A tire is a ring-shaped covering that fits around a wheel rim to protect it and enable better vehicle performance by providing a flexible cushion that absorbs shock while keeping the wheel in close contact with the ground and inner tubes are flexible, airtight hollow rings, usually made of rubber, which is inserted into the casing of a pneumatic tire for holding compressed air.

The demand for inner tubes and tires in Ethiopia is met through both domestic production and import. The present (2012) demand for tire and inner tubes is estimated at 803,682 pieces and 570,791 pieces respectively. The demand for tire and inner tubes is projected to reach 1,180,872 pieces and 838,679 pieces by the year 2017 and 1,735,088 pieces and 1,232,295 pieces by the year 2022, respectively.

The principal raw materials required are synthetic rubber, carbon black, cord and accelerator which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 480.49 million. From the total investment cost, the highest share (Birr 341.74 million or 71.12%) is accounted by fixed investment cost followed by initial working capital (Birr 97.66 million or 20.33%) and pre operation cost (Birr 41.07 million or 8.55%). From the total investment cost Birr 258.02 million or 53.70% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 18.14% and a net present value (NPV) of Birr 195.39 million discounted at 10%.

The project can create employment for 226 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also generate income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

A tire is a ring-shaped covering that fits around a wheel rim to protect it and enable better vehicle performance by providing a flexible cushion that absorbs shock while keeping the wheel in close contact with the ground. The fundamental materials of modern tires are synthetic rubber, natural rubber, fabric and wire, along with other compound chemicals. They consist of a tread and a body. The tread provides traction while the body ensures support. Before rubber was invented, the first versions of tires were simply bands of metal that fitted around wooden wheels to prevent wear and tear. Today, the vast majority of tires is pneumatic inflatable structures, comprising a doughnut-shaped body of cords and wires encased in rubber and generally filled with compressed air to form an inflatable cushion. Pneumatic tires are used on many types of vehicles, such as cars, bicycles, motorcycles, trucks, earthmovers, and aircraft.

Inner tubes are flexible, airtight hollow rings, usually made of rubber, which is inserted into the casing of a pneumatic tire for holding compressed air.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The demand for vehicle tires and tubes in Ethiopia is met through both domestic production and imports. The only tire manufacturing plant in the country is Matador-Addis, which used to be known as Addis Tire S.C before the joint venture arrangement with Slovak Matador in April 2004. On the other hand the country also imports a substantial amount of different types of vehicle tires from various countries. Accordingly, data on local production and imports of rubber tires and tubes is shown in Table 3.1.

As can be seen from Table 3.1, the total supply for both tire and inner tubes fluctuates from year to year with out a visible trend. The total supply of tire during the period under consideration ranges from 1.31 million pieces in 2008 to 250,882 pieces in 2009. Similarly, the total supply of inner tubes ranges from 1.02 million pieces in 2008 to 82,678 pieces in 2009.

TABLE 3.1
LOCAL PRODUCTION AND IMPORT OF TIRES AND INNER TUBES (PCS)

Year	Supply of Rubber Tire			Supply of Rubber Tube		
	Local Production	Import	Total	Local Production	Import	Total
2002	118,776	487,416	606,192	77,997	341,410	419,407
2003	208,592	770,685	979,277	78624	299,397	378,021
2004	197,540	709,769	907,309	64550	388,909	453,459
2005	191,309	695,641	886,950	90,817	518,112	608,929
2006	181,725	742,988	924,713	87,927	643,836	731,763
2007	235,134	575,988	811,122	11,073	676,042	687,115
2008	316,337	1,001,463	1,317,800	121,121	904,684	1,025,805
2009	210,374	40,508	250,882	73,374 ¹	9,304	82,678
2010	72,939	929,682	1,002,621	73,374	790,316	863,690
2011	199,883 ²	677,681	877,564	73,374	204,519	277,893

Source: - 1. CSA, Report of Survey of the Manufacturing and Electricity Industries, Annual Issues.
2. Ethiopian Revenue & Customs Authority, External Trade Statistics.

On average during the period 2002-2011, local production accounts for only 23% and 14% of the total supply which indicates the capacity limitation of the sole local producer to meet the demand and the availability of market opportunity for new entrants. Given the foregoing nature of the supply data for the products under, it would be prudent to consider the average of the last five years total supply or apparent consumption as representative of the present demand. Accordingly, the present (2012) demand for tires and inner tubes is estimated at 803,682 pieces and 570,791 pieces, respectively.

¹ Local production data for 2009, 2010 and 2011 is available. Hence the average production during the previous three years (2006-2008) is assumed to approximate the level of local production in 2008, 2010 and 2011.

² Local production data for year 2011 is not available. Hence the average the average production during the previous three years (2008-2010) is assumed to approximate the level of local production in 2011

2. Demand Projection

The future demand for tuber tires and tubes depends on the growth of the fleet size of vehicles in the country. Moreover, the rapid growth of the middle class in the country, the development and expansion of road network coverage, the increase of freight and passenger transport companies, and the growth of mechanized agriculture and industrialization of the country will create a growing market for all kinds of tires: passenger car tires, off-the- road tires, industrial tires, agricultural tires, truck, bus and trailer tires as well as motorcycle and bicycle tires.

The total number of inspected and registered vehicles in the country in 2000 was only 96,504. This number has grown to 199,414 in 2010. During the period 2000--2010 the number of operational vehicles has registered an average annual growth rate of 8.04%, accordingly, the future demand for tires and inner tubes is assumed to annually increase at the rate of 8% (see Table 3.2).

Table 3.2
FORECASTED DEMAND (PIECES)

Year	Projected Demand		Existing Capacity		Demand Supply Gap	
	Tire	Inner tubes	Tire	Inner tubes	Tire	Inner tubes
2013	867,976	616,454	500,000	150,000	367,976	466,454
2014	937,414	665,771	500,000	150,000	437,414	515,771
2015	1,012,407	719,032	500,000	150,000	512,407	569,032
2016	1,093,400	776,555	500,000	150,000	593,400	626,555
2017	1,180,872	838,679	500,000	150,000	680,872	688,679
2018	1,275,342	905,774	500,000	150,000	775,342	755,774
2019	1,377,369	978,236	500,000	150,000	877,369	828,236
2020	1,487,558	1,056,495	500,000	150,000	987,558	906,495
2021	1,606,563	1,141,014	500,000	150,000	1,106,563	991,014
2022	1,735,088	1,232,295	500,000	150,000	1,235,088	1,082,295
2023	1,873,895	1,330,879	500,000	150,000	1,373,895	1,180,879
2024	2,023,807	1,437,349	500,000	150,000	1,523,807	1,287,349
2025	2,185,711	1,552,337	500,000	150,000	1,685,711	1,402,337

3. Pricing and Distribution

The price of tires and inner tubes varies according to size and origin. For the purpose of financial analyses based on current market price for the products an average factory -get price of Birr 2,000 for a tire including inner tubes is adopted.

B. PLANT CAPACITY & PRODUCTION PROGRAM

1. Plant Capacity

The production capacity of the envisaged plant is estimated to be 220,000 pieces(equivalent of 30,000 tons) of tiers and 220,000 pieces (equivalent of 1000 tons) of inner tubes based on 300 working days per annum and three shifts per day.

2. Production Program

Table 4.1 indicates the production program of the project. At the initial stage of production, the project may require some years to penetrate the market. Therefore, in the first and second year of production the capacity utilization rate will be 65% and 85%, respectively. In the third year and onwards, full capacity production shall be attained.

Table 4.1

PRODUCTION PROGRAM

Product	Production Year		
	1	2	3 rd and above
Tire s (pcs)	143,000	187,000	220,000
Inner Tubes (pcs)	143,000	187,000	220,000
Capacity Utilization Rate (%)	65	85	100

IV. MATERIALS AND INPUTS

A. RAW & AUXILIARY MATERIALS

The major raw & auxiliary materials for the production of tires and inner tubes are natural and synthetic rubber, carbon black, cord and accelerator. The process aid materials process oil, softener/peptizers and others. Annual requirements of both raw and process aid materials are given in Table 4.2.

Table 4.2

RAW AND AUXILIARY MATERIAL REQUIREMENT AND COST

Sr. No.	Description	UOM	Qty.	Cost in ('000 Birr)		
				FC	LC	Total
1	Natural rubber	Ton	1,574	70,877	10,632	81,509
2	Synthetic Rubber(different grades)	Ton	1,402	84,263	12,639	96,903
3	Reclaimed rubber	Ton	478	13,880	2,082	15,962
4	Carbon blacks	Ton	1,457	29,232	4,385	33,617
5	Cord(nylon)	Ton	546	16,520	2,478	18,998
6	Accelerator	Ton	100	5,000	750	5,750
7	Process oil	Ton	1,400	35,000	5,250	40,250
8	Zinc Oxide	Ton	648	26,160	3,924	30,084
9	Stearic acid	Ton	326	12,880	1,932	14,812
10	Antioxidant	Ton	220	9,200	1,380	10,580
11	Antiozonant	Ton	100	4,000	600	4,600
12	Bead wire	Ton	1,048	26,640	3,996	30,636
13	Others	Ton	567	28,318	4,248	32,565
Grand Total				361,971	54,296	416,267

B. UTILITIES

Major utilities of the project are electricity and water. Annual cost of utilities is Birr 4.6 million. Annual consumption of utilities and cost at full capacity operation is as indicated in Table 4.2.

Table 4.2

ANNUAL UTILITIES REQUIRMENT AND COST

Utilities	UOM	Qty.	Cost ('000 Birr)
Electrical Energy	kWh	5,010,000	3,006
Water	m ³	160,000	1,600
Total			4,606

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The envisaged plant assumes the production of conventional/or diagonal tires with the production size range of the following: passenger cars (PC), light truck (LT) and Tire and Bus (TB) tires.

The manufacturing process of tire can be broadly be classified into three stages, mixing (compound preparation), building (assembling) and vulcanizing (curing) process

In mixing process the crude and synthetic rubber are weighed and masticated. Mixing takes place in Ban bury mixer followed by an open mill dump roll for cooling and further dispersing ingredients which may not fully homogenized during the mixing process in the mixer. The mixing is taking place either in temperature or time base, the moment the mixed compound reach the set time or temperature, the mixer discharge door opens automatically and dup the material to the open mill.

The compounds prepared in this way, after insuring the required physical and mechanical property parallel with the process test, are met as quality criteria, the materials released for further process like for tread extruding, cord rubberizing, bead making, etc to prepare the semi finished materials/or components of the tire for assembly.

The green tire is built-up as a cylinder on a collapsible, round rotating drum. Layers of cords embedded in a proper compound are applied, one layer tying the heads together in one direction and another layer in another direction. The heads – wire cables embedded in a tough, hard rubber – are “stitched” to the tire by folding the end of the cord fabric over. The tire building drum is collapsed, and the cylindrical tire removed and placed in a press.

Butyl made curing bladder, that resists high temperature and frequent fatigue is used as a media holder for the curing of the inside part of the tire through which hot water or steam is circulating. For the outside part of the tire the media is circulating between the curing press dome and the tire mold through conduction heat transfer. The bladder is also help the green tire to get blown up inside the tire and shape it to the cavity of the curing mold; the press mould is simultaneously closed, and the tire becomes a doughnut. Heat is applied through the mould and by steam inside the bag. After a timed cure at pre selected temperature, the tire is formed. The green tire is inserted into Auto form curing press for an automatic vulcanization.

The tube operation more or less uses the same operation in which the compound come from mixer will be extruded as hollow tube which is dusted both inside and outside and after cooling, the tube cut to the length, extra dust will be de-dusted, valve is applied in specified location, the green tube then spliced. After having adequate rest time the tube then pre-shaped to 85% of the final tube through air in the forming ring and then inserted to the curing mold and then after curing the tube will be inspected for any defect and released for warehouse for sale.

2. Environmental Impact Assessment

The envisaged plant will consider the incineration and disposing practice for packing materials through which raw materials are imported. The cost of incineration unit is indicated with the list of machinery and equipment in Table 5.1.

B. ENGINEERING

1. Machinery & Equipment

The list of machinery and equipment is indicated in Table 5.1. The total cost of machinery is estimated at Birr 213,973 million, out of which Birr 178.311 is in foreign currency.

Table 5.1

MACHINERY AND EQUIPMENT REQUIREMENT&COST

Sr. No.	Description	Qty.	Cost (*000 Birr)		
			FC	LC	Total
1	Tire curing presses	12	31,030.0		31,030.0
2	Tire building machines	6	4,374.0		4,374.0
3	Bias Cutting Equipment(set)	1	486.0		486.0
4	Cord coating(three roll/four roll) calendar	1	24,300.0		24,300.0
5	Duplex Extruding Equipment with cooling and racking system(set)	1	48,600.0		48,600.0
6	Beading making line Equipment(set)	1	3,645.0		3,645.0
7	Ban bury mixers of capacity 290(set)	3	84,300.0		84,300.0
8	Universal testing machine for endurance	1	8,505.0		8,505.0
9	Plunger testing machine	1	607.5		607.5
10	Laboratory equipments and testing m/c(set)		7,290.0		7,290.0
11	Boiler house with its treatment units	2	8,100.0		8,100.0
12	Inner tube processing line(set)	1	36,450.0		36,450.0
13	Incineration equipment	set	340.0		340.0
Total FOB			258,027.5		258,028.0
	Port handling, insurance, inland transport etc (20% of FOB)			51,605.5	51,605.5
Grand Total			258,027.5	51,605.5	309,633.0

2. Land, Building and Civil Works

The total area of the project is about 10,000 m², out of which the built-up area will be 6,000 m². Therefore, the total cost of building is estimated at Birr 30 million.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No. 721/2004) in principle, urban land permit by lease is on auction or negotiation basis, however, the time and condition of applying the proclamation shall be determined by the concerned regional or city government depending on the level of development.

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

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

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

In Addis Ababa, the City's Land Administration and Development Authority is directly responsible in dealing with matters concerning land. However, regarding the manufacturing sector, industrial zone preparation is one of the strategic intervention measures adopted by the City Administration for the promotion of the sector and all manufacturing projects are assumed to be located in the developed industrial zones.

Regarding land allocation of industrial zones if the land requirement of the project is below 5,000 m², the land lease request is evaluated and decided upon by the Industrial Zone Development and Coordination Committee of the City's Investment Authority. However, if the

land request is above 5,000 m², the request is evaluated by the City's Investment Authority and passed with recommendation to the Land Development and Administration Authority for decision, while the lease price is the same for both cases.

Moreover, the Addis Ababa City Administration has recently adopted a new land lease floor price for plots in the city. The new prices will be used as a benchmark for plots that are going to be auctioned by the city government or transferred under the new "Urban Lands Lease Holding Proclamation."

The new regulation classified the city into three zones. The first Zone is Central Market District Zone, which is classified in five levels and the floor land lease price ranges from Birr 1,686 to Birr 894 per m². The rate for Central Market District Zone will be applicable in most areas of the city that are considered to be main business areas that entertain high level of business activities.

The second zone, Transitional Zone, will also have five levels and the floor land lease price ranges from Birr 1,035 to Birr 555 per m². This zone includes places that are surrounding the city and are occupied by mainly residential units and industries.

The last and the third zone, Expansion Zone, is classified into four levels and covers areas that are considered to be in the outskirts of the city, where the city is expected to expand in the future. The floor land lease price in the Expansion Zone ranges from Birr 355 to Birr 191 per m² (see Table 5.2).

Table 5.2

NEW LAND LEASE FLOOR PRICE FOR PLOTS IN ADDIS ABABA

Zone	Level	Floor Price/m²
Central Market District	1 st	1686
	2 nd	1535
	3 rd	1323
	4 th	1085
	5 th	894
Transitional zone	1 st	1035
	2 nd	935
	3 rd	809
	4 th	685
	5 th	555

Zone	Level	Floor Price/m²
Expansion zone	1 st	355
	2 nd	299
	3 rd	217
	4 th	191

Accordingly, in order to estimate the land lease cost of the project profiles it is assumed that all new manufacturing projects will be located in industrial zones located in expansion zones. Therefore, for the profile a land lease rate of Birr 266 per m² which is equivalent to the average floor price of plots located in expansion zone is adopted.

On the other hand, some of the investment incentives arranged by the Addis Ababa City Administration on lease payment for industrial projects are granting longer grace period and extending the lease payment period. The criteria are creation of job opportunity, foreign exchange saving, investment capital and land utilization tendency etc. Accordingly, Table 5.3 shows incentives for lease payment.

Table 5.3

INCENTIVES FOR LEASE PAYMENT OF INDUSTRIAL PROJECTS

Scored Point	Grace Period	Payment Completion Period	Down Payment
Above 75%	5 Years	30 Years	10%
From 50 - 75%	5 Years	28 Years	10%
From 25 - 49%	4 Years	25 Years	10%

For the purpose of this project profile, the average i.e. five years grace period, 28 years payment completion period and 10% down payment is used. The land lease period for industry is 60 years. Accordingly, the total land lease cost at a rate of Birr 266 per m² is estimated at Birr 2,660,000 of which 10% or Birr 266,000 will be paid in advance. The remaining Birr 2,394,000 will be paid in equal installments with in 28 years i.e. Birr 85,500 annually.

VI. HUMANRESOURCE AND TRAINING REQUIREMENT

A. HUMANRESOURCE REQUIREMENT

For effective operation, the plant will require a total of 226 persons. The yearly cost of labor, including employees benefit, is estimated at birr 6.33million. The detail human resource requirement with the corresponding cost estimation is indicated in the Table 6.1.

Table 6.1

HUMANRESOURCE REQUIRMENT AND LABROR COST

Sr. No.	Description	Req. No.	Salary Monthly (Birr)	Annual Salary (Birr)
1	General Manager	1	12,000	144,000
2	Secretary	5	1,800	108,000
3	Commercial Manager	1	8,000	96,000
4	Finance and Admin. Manager	1	8,000	96,000
5	Production & Technical Manager	1	9,000	108,000
6	Quality Assurance manager	1	8,000	96,000
7	Accountant	2	3,000	72,000
8	Clerks	3	1,200	43,200
9	Forman	11	2,500	330,000
10	Operators-skilled	128	1,800	2,764,800
11	Assistant Operators	30	1,200	432,000
12	Laborers	10	600	720,000
13	Technical crew	16	2,000	384,000
14	laboratory staffs	6	2,400	172,800
15	supporting staffs	10	3,000	360,000
	Sub-total	226	64,500	5,278,800
	Benefit (20%)		12900.00	1,055,760
	Total		77,400.00	6,334,560

B. TRAINING REQUIRMENT

The tire technology is very sensitive and complicated engineering process that needs individuals specialized in the field of the technology, mainly rubber formulation and compounding and tire construction. This technology and knowhow transfer requires a minimum of one year for an engineer or chemist having basic grounds of the preliminary technology. Such trainings are carried out both abroad and local during the period of commissioning. An overall cost estimation for such training per person reaches about Birr 250,000 and a total of Birr one million.

VII. FINANCIAL ANALYSIS

The financial analysis of the inner tubes and tire project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity and 70% loan
Tax holidays	3 years
Bank interest	10%
Discount cash flow	10%
Accounts receivable	30 days
Raw material local	30 days
Raw material imported	120 days
Work in progress	1 day
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days
Repair and maintenance	5% of machinery cost

A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 480.49 million (see Table 7.1). From the total investment cost ,the highest share (Birr 341.74 million or

71.12%) is accounted by fixed investment cost followed by initial working capital (Birr 97.66 million or 20.33%) and pre operation cost (Birr 41.07 million or 8.55%). From the total investment cost Birr 258.02 million or 53.70% is required in foreign currency.

Table 7.1

INITIAL INVESTMENT COST ('000 Birr)

Sr. No.	Cost Items	Local Cost	Foreign Cost	Total Cost	% Share
1	Fixed investment				
1.1	Land Lease	266.00		266.00	0.06
1.2	Building and civil work	30,000.00		30,000.00	6.24
1.3	Machinery and equipment	51,605.50	258,027.50	309,633.00	64.44
1.4	Vehicles	1,500.00		1,500.00	0.31
1.5	Office furniture and equipment	350.00		350.00	0.07
	Sub- total	83,721.50	258,027.50	341,749.00	71.12
2	Pre operating cost *				
2.1	Pre operating cost	9,638.99		9,638.99	2.01
2.2	Interest during construction	31,434.05		31,434.05	6.54
	Sub -total	41,073.04		41,073.04	8.55
3	Working capital**	97,669.83		97,669.83	20.33
	Grand Total	222,464.37	258,027.50	480,491.87	100

* *N.B Pre operating cost include project implementation cost such as installation, startup, commissioning, project engineering, project management etc and capitalized interest during construction.*

** *The total working capital required at full capacity operation is Birr 139.51 million. However, only the initial working capital of Birr 97.66 million during the first year of production is assumed to be funded through external sources. During the remaining years the working capital requirement will be financed by funds to be generated internally (for detail working capital requirement see Appendix 7.A.1).*

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 532.89 million (see Table 7.2). The cost of raw material account for 78.11% of the production cost. The other major components of the production cost are depreciation, financial cost and repair and maintenance which account for 12.27%, 5.68% and 1.74%, respectively. The remaining 2.19% is the share of utility, cost of marketing and distribution, labor overhead and administration cost. For detail production cost see Appendix 7.A.2.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY (YEAR THREE)

Items	Cost (in 000 Birr)	%
Raw Material and Inputs	416,267.00	78.11
Utilities	4,606.00	0.86
Maintenance and repair	9,289.00	1.74
Labor direct	5,279.00	0.99
Labor overheads	1,056.00	0.20
Administration Costs	250.00	0.05
Land lease cost	-	-
Cost of marketing and distribution	500.00	0.09
Total Operating Costs	437,247.00	82.05
Depreciation	65,389.40	12.27
Cost of Finance	30,255.27	5.68
Total Production Cost	532,891.67	100

C. FINANCIAL EVALUATION

1. Profitability

Based on the projected profit and loss statement, the project will generate a profit through out its operation life. Annual net profit after tax will grow from Birr 13.38 million to Birr 78 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 603.07 million. For profit and loss statement and cash flow projection see Appendix 7.A.3 and 7.A.4, respectively.

2. Ratios

In financial analysis, financial ratios and efficiency ratios are used as an index or yardstick for evaluating the financial position of a firm. It is also an indicator for the strength and weakness of the firm or a project. Using the year-end balance sheet figures and other relevant data, the most important ratios such as return on sales which is computed by dividing net income by revenue, return on assets (operating income divided by assets), return on equity (net profit divided by equity) and return on total investment (net profit plus interest divided by total investment) has been carried out over the period of the project life and all the results are found to be satisfactory.

3. Break-even Analysis

The break-even analysis establishes a relationship between operation costs and revenues. It indicates the level at which costs and revenue are in equilibrium. To this end, the break-even point for capacity utilization and sales value estimated by using income statement projection are computed as followed.

$$\text{Break -Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 319,984,185$$

$$\text{Break -Even Capacity utilization} = \frac{\text{Break -even Sales Value} \times 100}{\text{Sales revenue}} = 58\%$$

4. Pay-back Period

The pay- back period, also called pay – off period is defined as the period required for recovering the original investment outlay through the accumulated net cash flows earned by the project. Accordingly, based on the projected cash flow it is estimated that the project’s initial investment will be fully recovered within 6 years.

5. Internal Rate of Return

The internal rate of return (IRR) is the annualized effective compounded return rate that can be earned on the invested capital, i.e., the yield on the investment. Put another way, the internal rate of return for an investment is the discount rate that makes the net present value of the investment's income stream total to zero. It is an indicator of the efficiency or quality of an investment. A project is a good investment proposition if its IRR is greater than the rate of return that could be earned by alternate investments or putting the money in a bank account. Accordingly, the IRR of this project is computed to be 18.14% indicating the viability of the project.

6. Net Present Value

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

Accordingly, the net present value of the project at 10% discount rate is found to be Birr 195.39 million which is acceptable. For detail discounted cash flow see Appendix 7.A.5.

D. ECONOMIC AND SOCIAL BENEFITS

The project can create employment for 226 persons. The project will generate Birr 168.38 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also generate other income for the Government.

Appendix 7.A

FINANCIAL ANALYSES SUPPORTING TABLES

Appendix 7.A.2
PRODUCTION COST (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Raw Material and Inputs	291,387	333,014	416,267	416,267	416,267	416,267	416,267	416,267	416,267	416,267
Utilities	3,224	3,685	4,606	4,606	4,606	4,606	4,606	4,606	4,606	4,606
Maintenance and repair	6,502	7,431	9,289	9,289	9,289	9,289	9,289	9,289	9,289	9,289
Labour direct	3,695	4,223	5,279	5,279	5,279	5,279	5,279	5,279	5,279	5,279
Labour overheads	739	845	1,056	1,056	1,056	1,056	1,056	1,056	1,056	1,056
Administration Costs	175	200	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	86	86	86	86	86	86
Cost of marketing and distribution	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	306,223	349,898	437,247	437,247	437,333	437,333	437,333	437,333	437,333	437,333
Depreciation	65,389	65,389	65,389	65,389	65,389	1,235	1,235	1,235	1,235	1,235
Cost of Finance	0	34,577	30,255	25,933	21,611	17,289	12,967	8,644	4,322	0
Total Production Cost	371,612	449,864	532,892	528,569	524,333	455,856	451,534	447,212	442,890	438,568

Appendix 7.A.3
INCOME STATEMENT (in 000 Birr)

Item	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Sales revenue	385,000	495,000	550,000	550,000	550,000	550,000	550,000	550,000	550,000	550,000
Less variable costs	305,723	349,398	436,747	436,747	436,747	436,747	436,747	436,747	436,747	436,747
VARIABLE MARGIN	79,277	145,602	113,253	113,253	113,253	113,253	113,253	113,253	113,253	113,253
in % of sales revenue	20.59	29.41	20.59	20.59	20.59	20.59	20.59	20.59	20.59	20.59
Less fixed costs	65,889	65,889	65,889	65,889	65,975	1,821	1,821	1,821	1,821	1,821
OPERATIONAL MARGIN	13,388	79,713	47,364	47,364	47,278	111,433	111,433	111,433	111,433	111,433
in % of sales revenue	3.48	16.10	8.61	8.61	8.60	20.26	20.26	20.26	20.26	20.26
Financial costs		34,577	30,255	25,933	21,611	17,289	12,967	8,644	4,322	0
GROSS PROFIT	13,388	45,136	17,108	21,431	25,667	94,144	98,466	102,788	107,110	111,433
in % of sales revenue	3.48	9.12	3.11	3.90	4.67	17.12	17.90	18.69	19.47	20.26
Income (corporate) tax	0	0	0	6,429	7,700	28,243	29,540	30,836	32,133	33,430
NET PROFIT	13,388	45,136	17,108	15,001	17,967	65,901	68,926	71,952	74,977	78,003
in % of sales revenue	3.48	9.12	3.11	2.73	3.27	11.98	12.53	13.08	13.63	14.18

Appendix 7.A.4CASH FLOW FOR FINANCIAL MANAGEMENT (in 000 Birr)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
TOTAL CASH INFLOW	351,388	514,954	495,121	550,243	550,000	550,000	550,000	550,000	550,000	550,000	550,000	189,219
Inflow funds	351,388	129,954	121	243	0	0	0	0	0	0	0	0
Inflow operation	0	385,000	495,000	550,000	550,000	550,000	550,000	550,000	550,000	550,000	550,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	189,219
TOTAL CASH OUTFLOW	351,388	436,177	441,765	538,861	512,831	509,874	526,086	523,061	520,035	517,010	470,762	0
Increase in fixed assets	351,388	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	98,520	14,068	28,137	0	8	0	0	0	0	0	0
Operating costs	0	305,723	349,398	436,747	436,747	436,833	436,833	436,833	436,833	436,833	436,833	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	6,429	7,700	28,243	29,540	30,836	32,133	33,430	0
Financial costs	0	31,434	34,577	30,255	25,933	21,611	17,289	12,967	8,644	4,322	0	0
Loan repayment	0	0	43,222	43,222	43,222	43,222	43,222	43,222	43,222	43,222	0	0
SURPLUS (DEFICIT)	0	78,777	53,356	11,382	37,169	40,126	23,914	26,939	29,965	32,990	79,238	189,219
CUMULATIVE CASH BALANCE	0	78,777	132,133	143,516	180,684	220,811	244,725	271,664	301,629	334,619	413,857	603,076

Appendix 7.A.5
DISCOUNTED CASH FLOW (in 000 Birr)

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Scrap
TOTAL CASH INFLOW	0	385,000	495,000	550,000	550,000	550,000	550,000	550,000	550,000	550,000	550,000	189,219
Inflow operation	0	385,000	495,000	550,000	550,000	550,000	550,000	550,000	550,000	550,000	550,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	189,219
TOTAL CASH OUTFLOW	449,058	320,170	377,791	437,247	443,684	445,033	465,576	466,872	468,169	469,466	470,762	0
Increase in fixed assets	351,388	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	97,670	13,947	27,894	0	8	0	0	0	0	0	0	0
Operating costs	0	305,723	349,398	436,747	436,747	436,833	436,833	436,833	436,833	436,833	436,833	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income (corporate) tax		0	0	0	6,429	7,700	28,243	29,540	30,836	32,133	33,430	0
NET CASH FLOW	-449,058	64,830	117,209	112,753	106,316	104,967	84,424	83,128	81,831	80,534	79,238	189,219
CUMULATIVE NET CASH FLOW	-449,058	-384,228	-267,019	-154,266	-47,950	57,017	141,441	224,569	306,400	386,934	466,172	655,391
Net present value	-449,058	58,937	96,867	84,713	72,615	65,176	47,655	42,658	38,175	34,154	30,550	72,952
Cumulative net present value	-449,058	-390,121	-293,255	-208,542	-135,927	-70,750	-23,095	19,563	57,737	91,892	122,442	195,394

NET PRESENT VALUE 195,394
INTERNAL RATE OF
RETURN 18.14%
NORMAL PAYBACK 6 years