

**160. PROFILE ON THE PRODUCTION OF
COMPRESSORS**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of compressors with a capacity of 300 units per annum. Compressors are used in many industrial processes, from construction, through manufacturing, to drilling oil wells.

The demand for compressors is entirely met through import. The present (2012) demand for compressors is estimated at 14295 pieces. The demand for compressors is projected to reach 21,005 pieces and 30,863 pieces by the year 2017 and 2022, respectively.

The principal raw materials required are C.I. castings, M.S plate, expanded mesh, and M.S. sheets. All the raw materials have to be imported.

The total investment cost of the project including working capital is estimated at Birr 6.27 million. From the total investment cost the highest share (Birr 4.54 million or 72.42%) is accounted by fixed investment cost followed by initial working capital (Birr 895.78 thousand or 14.28%) and pre operation cost (Birr 834.84 thousand or 13.31%). From the total investment cost Birr 2.09 million or 33.31% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 26.23% and a net present value (NPV) of Birr 5.24 thousand discounted at 10%.

The project can create employment for 31 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 create forward linkage with the manufacturing and construction sub sectors and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Compressed air is used in many industrial processes, from construction, through manufacturing, to drilling oil wells. It may be produced in low volume (up to 150 CFM-cubic feet per minute) at low pressure (up to 120 psi). Or it may be required at high volumes (2000CFM) and at high

pressure (3300 psi). Very high pressures (22,000psi) are some times required for testing lines used in specialists' applications.

This profile will consider only low pressure applications. Most applications in the developing Ethiopian industrial bases will require lower volumes, but the profile will allow for production of large compressors.

Compressors come in two generic forms: piston type (Reciprocating) and screw type (Rotary and Hydro Vane). Screw types are more efficient for certain applications but have reputations for being susceptible to failure in their electronic control systems. They are acceptable in a maintained environment such as a factory but are less practical for 'site uses'. The screw compressor is a relatively recent innovation.

Reciprocating compressors, on the other hand, have been around for very much longer. They are more rugged than screw types. The principle of operation is similar to that of the internal combustion engine: a piston moves in a cylinder, driven through a crankshaft by a connecting rod. It has moving parts which have to be serviced, is noisy, and is more expensive to maintain. But it is reliable. Also it is easy to assemble. It lends itself for portability and may be driven by diesel, petrol or electricity. It is readily understood, requires no sophisticated solid state control, and is repairable 'on site'. This profile will assume production of reciprocating compressors.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Since there is no plant in the country that produces compressor in Ethiopia, the requirement of the country is entirely met through import. Compressors are devices, as one of the utilities for industries, which commonly used to generate kinetic energy by compressing air above atmospheric pressure that can be quickly burst on demand. Despite the existence of numerous types of compressors with varying compression capacity, the Ethiopian Customs Authority categorized them into two based on their purpose (end-use); these are "Compressors of a kind

used in refrigerating equipment and [All purpose] Air Compressors mounted on a wheeled chassis”.

As there is no data reporting the magnitude of effective demand, the import data of compressors are used as closer estimators of present demand for the product. Table 3.1, thus, portrays the volume of imported compressors during the period 2001 to 2011.

Table 3.1
IMPORT OF COMPRESSORS (NUMBER)

Year	Compressors of a kind used in Refrigerating Equipment	Compressors Mounted on a Wheeled Chassis	Total
2001	3,096	190	3,286
2002	4,819	189	5,008
2003	3,526	719	4,245
2004	5,104	3,379	8,483
2005	5,194	4,261	9,455
2006	5,285	5,142	10,427
2007	5,998	10,968	16,966
2008	4,915	3,261	8,176
2009	1,881	1,234	3,115
2010	9,260	4,869	14,129
2011	9,521	4,941	14,462

Source: Ethiopian Revenue & Customs Authority.

Import of compressor during the ten years has shown a general increasing trend although it exceptionally declined in 2008 and 2009. During the period 2001-2007, a yearly average growth of 15% and 135% was registered for compressors used for refrigerant and multi-purpose compressor respectively. However, in the subsequent two years, the volume of import of both types of compressors declined sharply at an average rate of 39% and 66% respectively. In the interview conducted with randomly selected end-users, the abrupt decline in import was not a response to lack of demand rather it was a supply reaction to the momentary confusion upon introduction of new tax (VAT). In 2010 and 2011, non-the-less, aggregate import had

remarkably upturned to register a volume that was closer to that of the year 2007, a period that was a record high.

Considering the nature of the supply data it is assumed that the recent two years (2010-2011) average approximates the present demand. Accordingly, current (2012) demand for compressors used for refrigerating equipment and all purpose compressors is estimated at 9,390 pieces and 4,905 pieces respectively.

2. Projected Demand

Compressors are widely used in industrial, construction and other operations as a power supply utility and refrigerating equipment used for commercial and household purposes,. Hence, the demand for the product is expected to grow parallel with the development of these sectors. The industrial sectors in the past few years has been growing by 8 to 10% per annum and are planned to grow in the future from 7-12% per annum. Considering this a conservative estimate of 8% annual average growth of demand for the product is taken to forecast the future demand (see Table 3.2).

Table 1.2

PROJECTED DEMAND FOR COMPRESSOR (NUMBER)

Year	Compressors of a kind used in Refrigerating Equipment	Compressors Mounted on a Wheeled Chassis	Total Projected Demand for Compressor
2013	10,142	5,297	15,439
2014	10,953	5,721	16,674
2015	11,829	6,179	18,008
2016	12,775	6,673	19,449
2017	13,798	7,207	21,005
2018	14,901	7,784	22,685
2019	16,093	8,406	24,500
2020	17,381	9,079	26,460
2021	18,771	9,805	28,577
2022	20,273	10,590	30,863

3. Pricing and Distribution

Based on the 2011 CIF price of the products and allowing for duty and other import related costs the recommended factory gate price is Birr 23,908 and Birr 94,293 for compressors used for refrigerating equipment and compressors mounted on a wheeled chassis, respectively.

The product will find its market outlet through the existing industrial, electrical and related materials and equipments distributing enterprises.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

The suggested plant capacity based on the indications of the market study is 300 units per annum. The plant will operate on a single shift (8 hours) per days per year. Production can be doubled or tripled by increasing the number of shifts at later stages.

2. Production Programme

Considering the time required for the development of skill in plant operation, the plant will commence at 75% and 85% of the installed capacity during the first and the second year, respectively. Full capacity production will be achieved from third year on wards. The production program is set by deducting Sundays and public holidays in a year and assuming that repair and maintenance works will be carried out during off-production hours.

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The major raw materials required for the manufacture of air compressor are C.I. castings, M.S plate, expanded mesh and M.S. sheets, etc. Other bought out components like pressure gauges, V-belts, electric motors, switches, pressure valves, piston and rings, safety valves, etc. are also required for the manufacturing process. All the raw materials have to be imported.

The breakdown of the annual raw material requirement and the total estimated cost at full capacity operation are shown in Table 4.1.

Table 4.1
SUMMARY OF ANNUAL CONSUMPTION FOR RAW AND AUXILIARY
MATERIALS AND COST

Sr. No.	Description	Qty. Ton	Cost in '000 Birr		
			FC	LC	TC
1.	C.I casting for pulleys, fly wheel, cylinder head	24	319.708	111.898	431.606
2.	M.S plate 3 mm. to 6 mm. thickness	9	81.808	28.632	110.440
3.	Expanded mesh and M.S. sheet 18-20 SWG for belt guards	0.5	9.404	3.292	12.696
4.	Other bought out components like pressure gauges, v-belts, electric motors, switches, pressure valves, piston and rings, paints, safety valves, cooler pipes and dishes for air receiver tank	Ls	2,194.08	767.928	2,962.01
	Total		2,605.00	911.75	3,516.75

B. UTILITIES

The major utilities required for the plant are electricity and water. Total installed electric power is 40 kw. Annual electric consumption required for 300 days in single shift operation of the plant amount to 96,000 kwh. Annual cost of electricity is estimated to be Birr 55,468. Water consumption of the plant is 240 cubic meters per annum. Total cost of water is estimated at Birr 2,400.

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The manufacturing process of air compressor involves the following production operation:

Casting of standard grades would be procured from outside and machining of the components would be done inside the factory. The important parts in the machining would be cylinder block and cylinder head. Apart from this, the machining of tools etc. will be undertaken in the unit itself.

M.S. sheet from varying 3mm. to 6mm. thickness would be procured and rolled in the unit to produce the storage tank body. The two end parts of the storage tank would be made in the factory and finally be welded. The storage tank is subjected to a pressure test keeping in safety factor where it would then be passed on the assembly section.

The piston, piston rings, etc. will be procured from outside and will be well lapped before they are made ready for the final assembly. The air compressor will then be finally assembled.

The pressure controlling and measuring devices will be fitted and the compressor will be put to test in accordance with the standard norms. After testing, the oil would be drained out and necessary cleaning would be done before it is finally painted and packed for dispatch. Strict inspection and quality control measures are to be adopted while machining the components.

2. Environmental Impact

The project does not have any negative impact on the environment.

B. ENGINEERING

1. Machinery and Equipment

The total cost of plant machinery and equipment is estimated at Birr 2.48 million out of which Birr 2.09 million will be required in foreign currency. The list of machinery and equipment required for the plant is given in Table 5.1.

Table 5.1
MACHINERY AND EQUIPMENT REQUIREMENTS

No.	Description	Qty. (pcs.)
1.	Center lathe machine bed length-6ft (0.3048mt)	5
2.	Universal milling machine	1
3.	Shaper (Stroke:24")	1
4.	Vertical boring machine, Honing (sharpening)	1
5.	Housing (Sharpening) machine (manually operated)	1
6.	Hand press	1
7.	Sheet rolling machine	1
8.	Bench drilling machine	1
9.	Double ended bench grinder	1
10.	Welded transformer, 5KVA,	1
11	Portable grinder, portable drill	1 each

2. Land, Building and Civil Works

The entire space requirement of the plant is 500 meter square. Total built-up area of the land is suggested to be 200 square meters. Total cost of building at the rate of Birr 4500/sq. meter amounts to Birr 900,000.

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
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 ayment
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 133,000 of which 10% or Birr 13,300 will be paid in advance. The remaining Birr 119,700 will be paid in equal installments with in 28 years i.e. Birr 4,275 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENTS

A. HUMAN RESOURCE REQUIREMENT

Total human resource requirement of the plant is 31 persons. Annual cost of labor, including employees benefit, is Birr 610,500. Detail of human resource requirement and the estimated annual labor cost are given in Table 6.1.

Table 6.1

HUMAN RESOURCE REQUIREMENT & LABOUR COST

Sr. No.	Job Position	Req. No.	Salary per Month	Salary per Year
1.	Manger	1	6,000	72,000
2.	Accountant	1	2,500	30,000
3.	Clerk/Typist	1	1,500	18,000
4.	Sales Clerk	1	1,500	18,000
5.	Store keeper	1	1,500	18,000
6.	Driver	1	1,500	18,000
7.	Watchperson	2	1,500	18,000
8.	Foreman/Forewoman	1	2,500	30,000
9.	Machine operator	9	10,800	129,600
10.	Fitter Technicians	6	7,200	86,400
11.	Helpers & Factory cleaning workers	7	4,200	50,400
	Sub Total		40,700	488,400
	Employees' Benefit (25% of Basic Salary)		10,175	122,100
	Total	31	50,875	610,500

B. TRAINING REQUIREMENT

All operators need basic training so that they can be acquainted to the operation. This can be done during the commissioning period of the plant. The cost of such training is estimated at Birr 50,000.

VII. FINANCIAL ANALYSIS

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

Construction period	1 year
Source of finance	30 % equity & 70% loan
Tax holidays	3 years
Bank interest	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 6.27 million (See Table 7.1). From the total investment cost the highest share (Birr 4.54 million or 72.42%) is accounted by fixed investment cost followed by initial working capital (Birr 895.78 thousand or 14.28%) and pre operation cost (Birr 834.84 thousand or 13.31%). From the total investment cost Birr 2.09 million or 33.31% 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	13.30		13.30	0.21
1.2	Building and civil work	900.00		900.00	14.35
1.3	Machinery and equipment	390.00	2,090.00	2,480.00	39.53
1.4	Vehicles	900.00		900.00	14.35
1.5	Office furniture and equipment	250.00		250.00	3.98
	Sub total	2,453.30	2,090.00	4,543.30	72.42
2	Pre operating cost *				
2.1	Pre operating cost	424.40		424.40	6.76
2.2	Interest during construction	410.44		410.44	6.54
	Sub total	834.84		834.84	13.31
3	Working capital **	895.78		895.78	14.28
	Grand Total	4,183.93	2,090.00	6,273.93	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 1.28 million. However, only the initial working capital of Birr 895.73 thousand 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 6.22 million (see Table 7.2). The cost of raw material account for 56.58% of the production cost. The other major components of the production cost are financial cost, depreciation, labor, and cost of marketing and distribution which account for 6.36%, 13.22%, 7.85% and 8.04% respectively. The remaining 7.89% is the share of utility, repair and maintenance, 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 (000 Birr)	%
Raw Material and Inputs	3,517	56.58
Utilities	58	0.93
Maintenance and repair	74	1.19
Labor direct	488	7.85
Labor overheads	112	1.80
Administration Costs	250	4.02
Land lease cost	0	0.00
Cost of marketing and distribution	500	8.04
Total Operating Costs	4,999	80.42
Depreciation	822	13.22
Cost of Finance	395	6.36
Total Production Cost	6,216	100.00

C. FINANCIAL EVALUATION**1. Profitability**

Based on the projected profit and loss statement, the project will generate a profit throughout its operation life. Annual net profit after tax will grow from Birr 707 thousand to Birr 1.47 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 12.32 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 3,011,400$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 49.49\%$$

4. Pay-back Period

The payback 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 4 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 26.23% 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 principal 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 5.24 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 31 persons. The project will generate Birr 3.61 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 create forward linkage with the manufacturing and construction sub sectors and also generates 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	2,462	3,165	3,517	3,517	3,517	3,517	3,517	3,517	3,517	3,517
Utilities	41	52	58	58	58	58	58	58	58	58
Maintenance and repair	52	67	74	74	74	74	74	74	74	74
Labour direct	342	439	488	488	488	488	488	488	488	488
Labour overheads	78	101	112	112	112	112	112	112	112	112
Administration Costs	175	225	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	4	4	4	4	4	4
Cost of marketing and distribution	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	3,649	4,549	4,999	4,999	5,003	5,003	5,003	5,003	5,003	5,003
Depreciation	822	822	822	822	822	61	61	61	61	61
Cost of Finance	0	451	395	339	282	226	169	113	56	0
Total Production Cost	4,471	5,822	6,216	6,159	6,107	5,290	5,234	5,177	5,121	5,064

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	5,019	6,453	7,170	7,170	7,170	7,170	7,170	7,170	7,170	7,170
Less variable costs	3,149	4,049	4,499	4,499	4,499	4,499	4,499	4,499	4,499	4,499
VARIABLE MARGIN	1,870	2,404	2,671	2,671	2,671	2,671	2,671	2,671	2,671	2,671
in % of sales revenue	37.25	37.25	37.25	37.25	37.25	37.25	37.25	37.25	37.25	37.25
Less fixed costs	1,322	1,322	1,322	1,322	1,326	565	565	565	565	565
OPERATIONAL MARGIN	548	1,082	1,349	1,349	1,345	2,106	2,106	2,106	2,106	2,106
in % of sales revenue	10.91	16.77	18.82	18.82	18.76	29.37	29.37	29.37	29.37	29.37
Financial costs		451	395	339	282	226	169	113	56	0
GROSS PROFIT	548	631	954	1,011	1,063	1,880	1,936	1,993	2,049	2,106
in % of sales revenue	10.91	9.77	13.31	14.09	14.82	26.22	27.01	27.79	28.58	29.37
Income (corporate) tax	0	0	0	303	319	564	581	598	615	632
NET PROFIT	548	631	954	707	744	1,316	1,355	1,395	1,435	1,474
in % of sales revenue	10.91	9.77	13.31	9.87	10.37	18.35	18.91	19.46	20.01	20.56

Appendix 7.A.4
CASH 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	4,968	6,358	6,462	7,175	7,170	7,170	7,170	7,170	7,170	7,170	7,170	2,226
Inflow funds	4,968	1,339	9	5	0	0	0	0	0	0	0	0
Inflow operation	0	5,019	6,453	7,170	7,170	7,170	7,170	7,170	7,170	7,170	7,170	0
Other income	0	0	0	0	0	0	0	0	0	0	0	2,226
TOTAL CASH OUTFLOW	4,968	4,988	5,818	6,085	6,205	6,169	6,357	6,318	6,278	6,239	5,635	0
Increase in fixed assets	4,968	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	929	253	127	0	0	0	0	0	0	0	0
Operating costs	0	3,149	4,049	4,499	4,499	4,503	4,503	4,503	4,503	4,503	4,503	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	303	319	564	581	598	615	632	0
Financial costs	0	410	451	395	339	282	226	169	113	56	0	0
Loan repayment	0	0	564	564	564	564	564	564	564	564	0	0
SURPLUS (DEFICIT)	0	1,370	644	1,090	965	1,001	813	852	892	931	1,535	2,226
CUMULATIVE CASH BALANCE	0	1,370	2,014	3,103	4,068	5,069	5,882	6,734	7,626	8,557	10,092	12,318

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	5,019	6,453	7,170	7,170	7,170	7,170	7,170	7,170	7,170	7,170	2,226
Inflow operation	0	5,019	6,453	7,170	7,170	7,170	7,170	7,170	7,170	7,170	7,170	0
Other income	0	0	0	0	0	0	0	0	0	0	0	2,226
TOTAL CASH OUTFLOW	5,863	3,893	4,671	4,999	5,303	5,322	5,567	5,584	5,601	5,618	5,635	0
Increase in fixed assets	4,968	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	896	244	122	0	0	0	0	0	0	0	0	0
Operating costs	0	3,149	4,049	4,499	4,499	4,503	4,503	4,503	4,503	4,503	4,503	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income (corporate) tax		0	0	0	303	319	564	581	598	615	632	0
NET CASH FLOW	-5,863	1,126	1,782	2,171	1,867	1,848	1,603	1,586	1,569	1,552	1,535	2,226
CUMULATIVE NET CASH FLOW	-5,863	-4,738	-2,956	-785	1,082	2,930	4,533	6,119	7,688	9,240	10,775	13,001
Net present value	-5,863	1,023	1,473	1,631	1,275	1,147	905	814	732	658	592	858
Cumulative net present value	-5,863	-4,840	-3,368	-1,736	-461	686	1,591	2,405	3,137	3,795	4,387	5,245

NET PRESENT VALUE 5,245
INTERNAL RATE OF RETURN 26.23%
NORMAL PAYBACK 4 years