158. PROFILE ON THE PRODUCTION OF BRASS HARD WARE (DOOR, WINDOW, FURNITURE)

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I. SUMMARY

This profile envisages the establishment of a plant for the production of brass hard ware (door, window, furniture). Brass hard wares are used in buildings for fixing and movement of doors and windows.

The demand for Brass hard ware is met entirely through import. The present (2012) demand for hand implements and for animal and tractor drawn implements is estimated at 2,215 tones. The demand for demand for Brass hard ware is projected to reach 1,937 tons and 3,120pieces by the year 2017 and 2022, respectively.

The principal raw materials required are brass sheet, sections, extrusions, castings, rolled rods, polishing and plating materials which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 6.03 million. From the total investment cost the highest share (Birr 4.30 million or 71.38%) is accounted by fixed investment cost followed by pre operation cost (Birr 918.09 thousand or 15.23%) and initial working capital (Birr 807.19 thousand or 13.39%). From the total investment cost Birr 1.22 million or 20.24% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 21.51% and a net present value (NPV) of Birr 3.61 million discounted at 10%.

The project can create employment for 17 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current import. The project will also create forward linkage with the construction sub sector and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

With the increase of population more and more houses are required for the livelihood. Builders brass hardware such as hinges, tower bolts handles are used in buildings for fixing and movement of doors and windows. People prefer hardware made of non-ferrous metals because of

corrosion resistance, good appearance larger life. Brass hardware like hinges, tower bolts, door handles have got much popularity like aluminum hardware. These building hardware are also made from other non-ferrous metals and ferrous metals. Other than brass hardware, the hardware are also made of M.S., aluminum, zinc and copper.

Brass hinges, tower bolts, door handles are made of extruded brass, brass sheets, castings, rolled rods etc. depending up on the requirements. In this scheme the above brass hardware will be manufactured in different sizes and shapes. These hardware are most popular in the building industry and are largely used in doors and windows in every building construction work. There are other hardware like latches, locks, etc. made of brass which can be manufactured in the same unit as per the customer requirements.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Brass made hardware for doors and windows has a wide base demand. Product of brass hardware for windows and doors are used as door handle, doorknob, and locks and so on. They come in different design and are being used in every house and commercial building in urban setting. So far there is no manufacturing company involved in production of brass hard ware. Thus, the country's demand for such product is satisfied fully through import.

Table 3.1 shows the country's import of brass hardware (door handle, doorknob, and locks etc) for the period 2002 – 2011.

Table 3.1

IMPORT OF BRASS HARDWARE (in tons)

Year	Total
2002	1,256
2003	1,427
2004	2,143
2005	1,897
2006	2,090
2007	1,818
2008	1,923
2009	2,765
2010	2,341
2011	2,226

Source: *- Ethiopian Revenue and Customs Authority.*

As can be seen from Table 3.1 import of brass hardware fluctuates from year to year. However, a general growth trend can be observed. The yearly average quantity imported during the first five years in the data set (2002-2006) was around 1,763 tons. However, during the recent five years (2007-2011) the average amount supplied to the market has increased to about 2,215 tons. During the period under consideration (2002-2011) import of brass hardware has registered an average annual growth rate of 8.75%.

In estimating the present demand for the product it is assumed that the recent five years average (2007-2011) is a reasonable approximate of current level of demand. Accordingly, current (2012) demand for brass hardware is estimated at 2,215 tones.

2. Demand Projection

The demand for brass hardware is directly related with the growth in the construction sector in general and the housing construction sub sector in particular which in turn depends on the overall economic development of the country.

The construction sector of the country has undergone tremendous changes and development in recent years. The contribution of the construction sector to the GDP during the period 2001 – 2010 have been growing at annual average growth rate of 13 percent which is above the average annual growth rate of real GDP during the period under consideration (11.4 %), indicating a rise in the share of the construction sector within the overall economy. Moreover, during the GTP period (2010 – 2015), the construction sector is expected to grow at annual average growth rate of 20%.

On the other hand among the factors that influence the demand for brass hardware one of the critical factor is identified to be economic growth leading to growth of the construction sector. According to the government's "Growth and Transformation Plan" during the period 2010 – 2015 the GDP of the country is expected to grow at a minimum average annual growth rate of 11.2%.

Accordingly, based on the above discussion and in order to be conservative a growth rate of 10% which is slightly lower than the expected growth rate of the country's GDP during the GTP period (2011 – 2015) is used.

Based on the above assumption and using the estimated present demand as a base the projected demand for brass hardware is shown in Table 3.2.

Table 3.2

FORECASTED DEMAND FOR BRASS HARDWARE (TON)

Year	Projected Demand
2013	1,323
2014	1,455
2015	1,601
2016	1,761
2017	1,937
2018	2,131
2019	2,344
2020	2,578
2021	2,836
2022	3,120
2023	3,431
2024	3,775
2025	4,152

3. Pricing and Distribution

The CIF price of brass hardware per in year 2011 is Birr 93 per kg. Assuming 30% for duty, clearance, and other expenses Birr 120.9 per kg is recommended for sales revenue projection.

The product will find its market outlet through the existing building materials distributing enterprises throughout the country.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

The annual production capacity of the plant is 45,600 kg of brass hardware like hinges, tower bolts, door handles, etc. based on single shift operation and 300 working days per year. The working days are set by deducting Sundays and public holidays in a year and assuming that maintenance works will be carried out during off-production hours.

2. Production Programme

The plant will start operation at 75% of its capacity utilization. It will then raise its production to 85 % in the second year reaching full capacity in the third year. The gradual capacity build up is envisaged considering the times required to master skill in operation and penetrate the market adequately.

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The major raw materials required are Brass sheet, sections, extrusions, castings, rolled rods, and polishing and plating materials. Most of the raw materials have to be imported. Annual cost of raw materials is Birr 2,978,000. The raw materials requirement and corresponding costs at full capacity operation are shown in Table 4.1.

Table 4.1

ANNUAL RAW MATERIALS REQUIREMENT AND COST

Sr. No.	Description	Annual Qty. (Tone)	Cost in '000 Birr		
			FC	LC	TC
1.	Brass sheet, sections, extrusions, castings, rolled rods, etc.	48	2,380	238	2,618
2.	Auxiliary materials (MS polishing and plating materials, wires, packaging materials, other consumables)		260	100	360
	Total		**2,640**	**338**	**2,978**

B. UTILITIES

The utilities required for plant operation include electricity and water. The installed power is 25kw, and annual electric consumption will be 60,000KWh, with the corresponding cost of Birr 34,668. Annual water consumption will be about 800 cubic meters, costing Birr 8,000.

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The various stages for manufacturing different brass hardware like hinges, tower bolts and door handles are described in the following steps:

For brass hinges

- Cut the extruded section into required lengths for flaps;
- Mill slot at taper on a fixture on plain milling the butt of the flap;
- Drill hinges/pin holes on the butt of flaps in drilling fixture on jigs;
- Drill wood screw holes on flaps with the help of drilling fixtures of jigs;
- Countersunk the holes to match the size of wood screws;
- Cut the steel/brass wire to proper length of hinge pin;
- Assemble the flap insert steel/brass hinge pin and rivet by stabling both top and bottom face. The design of stabling tool should be such that it will firm head on wire at fluting point.
- Finishing, polishing or plating;
- Packing and forwarding.

For towel bolts

- Cut the extruded sections into required lengths;
- Mill cross slots and areal slot for up and down movement rod;

- Drill and countersunk holes for wood screws;
- Drill holes on rod and tap;
- Cut threads on small turned and knurled rod;
- Fix the rod inside extruded section and assemble smaller rod in bigger one;
- Remove burrs by file or emery wheel/paper;
- Polishing, stamping, plating etc;
- Packing.

For door handle

- Cut the brass sections in proper length;
- Bend the section on press;
- Drill the holes for wood screws;
- Polishing, stamping, plating etc; and
- Packing.

Brass handles are made in different designs. The above process is for handles made out of single pieces.

2. Environmental Impact

The process of production are basically cutting, milling, drill polishing, stamping, and plating which do not bring any adverse impact on the surrounding areas. Hence, the plant is environmental friendly.

B. ENGINEERING

1. Machinery and Equipment

Total cost of machinery and equipment is Birr 1,682,000, out of which Birr 1,220,000 is required in foreign currency. The list of machinery and equipment required is shown in Table 5.1.

Table 5.1

MACHINERY AND EQUIPMENT REQUIREMENTS AND COST

Sr. No.	Description	Qty.
1.	All geared plain milling machine, table size 860 mm x 200 mm. including accessories	2
2.	Batch drilling machine, 13 mm.	2
3.	Hard fly press	3
4.	Universal mini lathe	1
5.	Punching, riveting, bending m/c	1
6.	Circular sawing m/c, 250 mm diameter	1
7.	Miscellaneous (Bench grinds, spring hammer, polishing/plating equipment, dies material handling equipment, fixture and jigs)	set

2. Land, Building and Civil Works

The envisaged plant requires a total land area of 800 $m^{2,}$ of which 400 m^2 would be built-up area. Building construction cost at a rate of Birr 4,500/m^2 is estimated to be Birr 2 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 5000 m^2, 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 m^2, 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 m^2. 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 m^2 .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 m^2 (see Table 5.2).

Table 5.2

NEW LAND LEASE FLOOR PRICE FOR PLOTS IN ADDIS ABABA

Zone	Level	Floor price/m^2
Central Market District	1st	1686
	2nd	1535
	3rd	1323
	4th	1085
	5th	894
Transitional zone	1st	1035
	2nd	935
	3rd	809
	4th	685
	5th	555
Expansion zone	1st	355
	2nd	299
	3rd	217
	4th	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 m^2 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 criterions 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 m^2 is estimated at Birr 212,800 of which 10% or Birr 21,280 will be paid in advance. The remaining Birr 191,520 will be paid in equal installments with in 28 years i.e. Birr 6,840 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENTS

A. HUMAN RESOURCE REQUIREMENT

The total human resource requirement of the plant is estimated to be 17. Annual cost of labor is Birr 277,200. The human resource list and salary costs are shown in Table 6.1.

Table 6.1

HUMAN RESOURCE REQUIREMENT & LABOUR COST

Sr. No.	Job Position	Req. No.	Salary per Month	Salary per Year
	A. Administration			
1.	Manager cum administrator	1	6,000	72,000
2.	Secretary	1	2,500	30,000
3	Accountant	1	2,500	30,000
4	Guard	2	1,500	18,000
	Sub-total	5	12,500	150,000
	B. Production			
1.	Supervisor			
2.	Skilled workers (Operators & technicians)			
3	Unskilled workers (Labours)			
	Sub-total	12	10,600	127,200
	Total	**17**	23,100	277,200

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 brass hard ware (door, window, furniture) 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 6.03 million (See Table 7.1). From the total investment cost the highest share (Birr 4.30 million or 71.38%) is accounted by fixed investment cost followed by pre operation cost (Birr 918.09 thousand or 15.23%) and initial working capital (Birr 807.19 thousand or 13.39%). From the total investment cost Birr 1.22 million or 20.24% 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	21.28		21.28	0.35
1.2	Building and civil work	2,000.00		2,000.00	33.18
1.3	Machinery and equipment	462.00	1,220.00	1,682.00	27.90
1.4	Vehicles	450.00		450.00	7.46
1.5	Office furniture and equipment	150.00		150.00	2.49
	Sub total	**3,083.28**	**1,220.00**	**4,303.28**	**71.38**
2	**Pre operating cost ***				
2.1	Pre operating cost	523.70		523.70	8.69
2.2	Interest during construction	394.39		394.39	6.54
	Sub total	**918.09**		**918.09**	**15.23**
3	**Working capital ****	**807.19**		**807.19**	**13.39**
	Grand Total	**4,808.56**	**1,220.00**	**6,028.56**	**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 1.10 million. However, only the initial working capital of Birr 807.20 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 5.07 million (see Table 7.2). The cost of raw material account for 58.71% of the production cost. The other major components of the production cost are depreciation, financial cost, direct labour, and cost of marketing and distribution which account for 12.34%, 7.48%, 5.46%, and 7.89% respectively. The remaining 8.12% is the share of utility, repair and maintenance, labour 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	2,978	58.71
Utilities	43	0.85
Maintenance and repair	50	0.99
Labour direct	277	5.46
Labour overheads	69	1.36
Administration Costs	250	4.93
Land lease cost	0	0.00
Cost of marketing and distribution	400	7.89
Total Operating Costs	**4,067**	**80.17**
Depreciation	626	12.34
Cost of Finance	380	7.48
Total Production Cost	**5,073**	**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 538 thousand to Birr 1.13 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 9.70 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 2{,}430{,}540$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 48.40\%$$

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 5 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 21.51% 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 3.61 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 17 persons. The project will generate Birr 2.74 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 import. The project will also create forward linkage with the construction sub sector generate other income for the government.

Appendix 7.A

FINANCIAL ANALYSES SUPPORTING TABLES

Appendix 7.A.1
NET WORKING CAPITAL (in 000 Birr)

Items	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Total inventory	558.38	632.83	744.50	744.50	744.50	744.50	744.50	744.50	744.50	744.50
Accounts receivable	262.52	293.08	338.92	338.92	339.49	339.49	339.49	339.49	339.49	339.49
Cash-in-hand	6.73	7.63	8.97	8.97	9.07	9.07	9.07	9.07	9.07	9.07
CURRENT ASSETS	**827.63**	**933.53**	**1,092.39**	**1,092.39**	**1,093.05**	**1,093.05**	**1,093.05**	**1,093.05**	**1,093.05**	**1,093.05**
Accounts payable	20.44	23.16	27.25	27.25	27.25	27.25	27.25	27.25	27.25	27.25
CURRENT LIABILITIES	**20.44**	**23.16**	**27.25**	**27.25**	**27.25**	**27.25**	**27.25**	**27.25**	**27.25**	**27.25**
TOTAL WORKING CAPITAL	**807.19**	**910.37**	**1,065.14**	**1,065.14**	**1,065.80**	**1,065.80**	**1,065.80**	**1,065.80**	**1,065.80**	**1,065.80**

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	2,234	2,531	2,978	2,978	2,978	2,978	2,978	2,978	2,978	2,978
Utilities	32	37	43	43	43	43	43	43	43	43
Maintenance and repair	38	43	50	50	50	50	50	50	50	50
Labour direct	208	235	277	277	277	277	277	277	277	277
Labour overheads	52	59	69	69	69	69	69	69	69	69
Administration Costs	188	213	250	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	7	7	7	7	7	7
Cost of marketing and distribution	400	400	400	400	400	400	400	400	400	400
Total Operating Costs	**3,150**	**3,517**	**4,067**	**4,067**	**4,074**	**4,074**	**4,074**	**4,074**	**4,074**	**4,074**
Depreciation	626	626	626	626	626	95	95	95	95	95
Cost of Finance	0	434	380	325	271	217	163	108	54	0
Total Production Cost	**3,776**	**4,577**	**5,073**	**5,019**	**4,971**	**4,386**	**4,332**	**4,277**	**4,223**	**4,169**

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	4,340	4,919	5,787	5,787	5,787	5,787	5,787	5,787	5,787	5,787
Less variable costs	2,750	3,117	3,667	3,667	3,667	3,667	3,667	3,667	3,667	3,667
VARIABLE MARGIN	**1,590**	**1,802**	**2,120**	**2,120**	**2,120**	**2,120**	**2,120**	**2,120**	**2,120**	**2,120**
in % of sales revenue	36.63	36.63	36.63	36.63	36.63	36.63	36.63	36.63	36.63	36.63
Less fixed costs	1,026	1,026	1,026	1,026	1,033	502	502	502	502	502
OPERATIONAL MARGIN	**564**	**776**	**1,094**	**1,094**	**1,087**	**1,618**	**1,618**	**1,618**	**1,618**	**1,618**
in % of sales revenue	12.99	15.77	18.90	18.90	18.78	27.96	27.96	27.96	27.96	27.96
Financial costs		434	380	325	271	217	163	108	54	0
GROSS PROFIT	**564**	**342**	**714**	**768**	**816**	**1,401**	**1,455**	**1,510**	**1,564**	**1,618**
in % of sales revenue	12.99	6.95	12.34	13.28	14.10	24.21	25.15	26.09	27.02	27.96
Income (corporate) tax	0	0	0	231	245	420	437	453	469	485
NET PROFIT	**564**	**342**	**714**	**538**	**571**	**981**	**1,019**	**1,057**	**1,095**	**1,133**
in % of sales revenue	12.99	6.95	12.34	9.30	9.87	16.95	17.61	18.26	18.92	19.57

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	**4,827**	**5,562**	**4,922**	**5,791**	**5,787**	**5,787**	**5,787**	**5,787**	**5,787**	**5,787**	**5,787**	**2,681**
Inflow funds	4,827	1,222	3	4	0	0	0	0	0	0	0	0
Inflow operation	0	4,340	4,919	5,787	5,787	5,787	5,787	5,787	5,787	5,787	5,787	0
Other income	0	0	0	0	0	0	0	0	0	0	0	2,681
TOTAL CASH OUTFLOW	**4,827**	**4,372**	**4,599**	**5,148**	**5,165**	**5,133**	**5,253**	**5,215**	**5,177**	**5,140**	**4,559**	**0**
Increase in fixed assets	4,827	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	828	106	159	0	1	0	0	0	0	0	0
Operating costs	0	2,750	3,117	3,667	3,667	3,674	3,674	3,674	3,674	3,674	3,674	0
Marketing and Distribution cost	0	400	400	400	400	400	400	400	400	400	400	0
Income tax	0	0	0	0	231	245	420	437	453	469	485	0
Financial costs	0	394	434	380	325	271	217	163	108	54	0	0
Loan repayment	0	0	542	542	542	542	542	542	542	542	0	0
SURPLUS (DEFICIT)	**0**	**1,190**	**323**	**643**	**622**	**654**	**534**	**572**	**610**	**647**	**1,228**	**2,681**
CUMULATIVE CASH BALANCE	**0**	**1,190**	**1,512**	**2,156**	**2,778**	**3,432**	**3,966**	**4,537**	**5,147**	**5,794**	**7,022**	**9,703**

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**	**4,340**	**4,919**	**5,787**	**5,787**	**5,787**	**5,787**	**5,787**	**5,787**	**5,787**	**5,787**	**2,681**
Inflow operation	0	4,340	4,919	5,787	5,787	5,787	5,787	5,787	5,787	5,787	5,787	0
Other income	0	0	0	0	0	0	0	0	0	0	0	2,681
TOTAL CASH OUTFLOW	**5,634**	**3,253**	**3,672**	**4,067**	**4,298**	**4,319**	**4,494**	**4,510**	**4,527**	**4,543**	**4,559**	**0**
Increase in fixed assets	4,827	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	807	103	155	0	1	0	0	0	0	0	0	0
Operating costs	0	2,750	3,117	3,667	3,667	3,674	3,674	3,674	3,674	3,674	3,674	0
Marketing and Distribution cost	0	400	400	400	400	400	400	400	400	400	400	0
Income (corporate) tax		0	0	0	231	245	420	437	453	469	485	0
NET CASH FLOW	**-5,634**	**1,087**	**1,247**	**1,720**	**1,489**	**1,468**	**1,293**	**1,277**	**1,260**	**1,244**	**1,228**	**2,681**
CUMULATIVE NET CASH FLOW	**-5,634**	**-4,548**	**-3,300**	**-1,580**	**-92**	**1,377**	**2,670**	**3,946**	**5,206**	**6,450**	**7,678**	**10,360**
Net present value	-5,634	988	1,031	1,292	1,017	912	730	655	588	528	473	1,034
Cumulative net present value	-5,634	-4,646	-3,616	-2,323	-1,306	-395	335	990	1,578	2,106	2,579	3,613

NET PRESENT VALUE	3,613
INTERNAL RATE OF RETURN	21.51%
NORMAL PAYBACK	5 years