173. PROFILE ON THE PRODUCTION OF HAND PUMPS AND SUBMERSIBLE PUMPS

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I. SUMMARY

This profile envisages the establishment of a plant for the production of 12,000 pieces of hand pumps and 3,000 pieces of submersible pumps per annum. Hand pumps are devices that are used to pull out water from deep or shallow wells to the surface of the earth; and submersible pumps are pumps operated by electric power to lift water from deep wells to the surface point for the user

The demand for hand pumps and submersible pumps is met through import. The present (2012) demand is estimated at 29,015 pieces for hand pumps and 20,437 pieces for submersible pumps. The demand for hand pumps and submersible pumps is projected to reach 40,695 pieces and 28,664 pieces units by the year 2017, respectively and 57,077 units and 40,202 units by the year 2022, respectively.

The principal raw materials required are various sizes of metal sections and rubber seals which have to be imported.

The total investment cost of the project including working capital is estimated at Birr 13.40 million. From the total investment cost the highest share (Birr 9.50 million or 70.93%) is accounted by fixed investment cost followed by initial working capital (Birr 2.53 million or 18.89%) and pre operation cost (Birr 1.36 million or 10.18%). From the total investment cost Birr 3.56 million or 26.56% is required in foreign currency

The project is financially viable with an internal rate of return (IRR) of 25.51% and a net present value (NPV) of Birr 10.63 million discounted at 10%.

The project can create employment for 53 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTIONS AND APPLICATIONS

This project envisages the production of hand pumps and submersible pumps for lifting water to desired points by using manual, electric or engine power.

Hand pumps are devices that are used to pull out water from deep or shallow wells to the surface of the earth. They are operated by the manual reciprocating motion of the handle. It is also possible to operate the pump by the pedal motion of the leg to move the handle. The hand pump is used in rural areas to extract water from wells while the well is still closed from the surface contamination of dirt. Hand pumps are easy to repair and require no fuel or electricity to operate they are thus very popular particularly in rural areas.

Submersible pumps are pumps operated by electric power to lift water from deep wells to the surface point for the user. They operate fully submerged in the bottom of the well serving for along time with out the need for servicing.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Ethiopia imports various types of pumps for liquids. The major types of pumps imported to the country are hand pumps and submersible pumps. Due to inadequate water facilities, especially in remote rural areas, supply with the help of hand pumps is gaining popularity. Hand pumps are preferred in rural areas where there is no electricity and for easy operation and maintenances. Except some efforts made in some workshops to manufacture hand and submersible pumps the products supply is mainly from import. Import of hand pumps for the past ten years is indicated in Table 3.1.

Table 3.1

IMPORT OF HAND AND SUBMERSIBLE PUMPS (PIECES)

Year	Hand Pumps	Submersible Pumps
2002	62,958	11,274
2003	36,978	22,368
2004	30,111	22,270
2005	76,467	20,227
2006	10,371	12,424
2007	5,883	24,962
2008	28,166	47,148
2009	12,214	14,718
2010	52,137	5,921
2011	23,543	13,961

Source: *Ethiopian Revenues & Customs Authority.*

Scrutiny of Table 3.1 reveals that imports of hand pumps during the period under consideration (2002-2011) ranged from 5,883 pieces (2007) to 76,467 pieces (2009) with a mean import of 33,883 pieces. Similarly, during the same period import of submersible pumps ranges from 5,921 pieces in 2010 to 47,148 pieces in 2008 averaging at 19,527 pieces.

Accordingly considering the trend in import of the products the recent four years (2008-2011) average import i.e., 29,015 pieces for hand pumps and 20,437 pieces for submersible pumps is considered to approximate current (2012) demand for the products.

2. Demand Projection

The demand for the products is expected to increase with the plan of expanding water supply coverage in the rural areas of the country in general and also with the expansion of irrigation activities. Moreover, hand pumps are preferred in rural areas compared to other types of pumps because of their low running and maintenance costs. Hence, by taking the estimated current

effective demand as a base annual average growth rate of 7% is employed to project the future demand (See Table 3.2.)

Table 3.2

PROJECTED DEMAND (PIECES)

Year	Hand Pumps	Submersible Pumps
2013	31,046	21,867
2014	33,219	23,398
2015	35,545	25,036
2016	38,033	26,788
2017	40,695	28,664
2018	43,544	30,670
2019	46,592	32,817
2020	49,853	35,114
2021	53,343	37,572
2022	57,077	40,202
2023	61,072	43,016
2024	65,347	46,027
2025	69,922	49,249

3. Pricing and Distribution

The price of hand and submersible pumps varies depending on the capacity of the pumps. An average price of Birr 900 and Birr 2,000 for hand and submersible pumps respectively is taken for sales revenue projection.

The plant can sell its product either directly to government agencies or NGOs involved in water supply projects or through agents that distribute similar products throughout the country.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

From the market study and taking into consideration the complexity of the manufacturing process, the manufacturing capacity of the plant is taken as 12,000 pieces of hand pumps and 3,000 pieces of submersible pumps annually during the start up period of three years.

2. Production Program

Considering the production process involved i.e. the time required for mastering the skill of production and maintenance work, the plant will operate at 75% of its installed capacity during the first year of operation. Then, it is planned to increase to 85% and 100% during the second year and third year and then after respectively. The detail production program is shown in Table 3.3.

Table 3.1

ANNUAL PRODUCTION PROGRAM

Type of product	Year 1	Year 2	Year 3
Hand pump (units)	7,500	10,200	12,000
Submersible pump (units)	2,250	2,950	3,000
Capacity %	75	85	100

IV. RAW MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The selected product requires various sizes of metal sections and rubber seals that are bought out. The total cost raw and auxiliary raw materials is Birr 19.52 million in foreign currency and Birr 3.9 million in local currency. The required raw materials and their cost at full capacity production are shown in Table 4.1.

Table 4.1

RAW MATERIALS REQUIRED AND ANNUAL COST

No	Raw Materials	Annual Requirement		Cost (000 Birr)		
		Units	Quantity	F.C	L.C	Total
1	Galvanized pipe	Ton	50	1,900	380	2,280
3	Foot valve	Pcs.	12,000	900	180	1,080
4	Brass road	Ton	30	1,350	270	1,620
5	Flat Bar	"	36	648	130	778
6	Rubber ring gaskets	Pcs.	15,000	225	45	270
7	Pig iron	Ton	20	560	112	672
8	Cast iron Scrap	Ton	15	180	36	216
9	Brass scrap	Ton	5	150	30	180
10	Casting Sand	Mt.cube	150	75	15	90
11	Molasses	Mt.cube	1.5	54	11	65
12	Furnace oil	Mt.cube	20	200	40	240
13	Body cover with seals	Pcs	15,000	525	105	630
14	Valves, glands, Handles Bushings, Shaft	sets	15,000	600	120	720
15	Axial motor/rotor and stator with cable	Pcs.	3,000	1,350	270	1,620
	Total			**8,717**	**1,743**	**10,460**

B. UTILITIES

Utilities required by the plant are electric power and water. Annual cost of utilities is Birr 47,616. The utility requirement of the plant at full capacity operation is indicated in Table 4.2

Table 4.2

ANNUAL UTILITIES REQUIREMENTS AND COST

No	Utility	Unit	Quantity	Cost(Birr)
1	Electricity	KWh	65,000	37,616
2	Water	Meter cube	1,000	10,000
	Total			**47,616**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

Hand pump is made by the process of fabrication of the different parts of the pump, mostly from galvanized pipes and assembling the parts together by various techniques like welding. The main part of the hand pump is the cylinder; it is made by cutting, boring, threading and welding of a 4" gal pipe.

The piston is made by cutting, turning and assembling of the brass road and fitting to the piston road. The intake pipe is made from galvanized pipe of ¾".The pipe will be made to have the same length as the depth of the well. The bottom end of the pipe which is submerged in the water has a foot valve fitted at the tip.

The rest of the parts like the handle, the support and the anchor base are made by cutting and welding of different metal sections of the metal.

The submersible pump is made mostly from imported parts like the body cover, the axial electric motor, the valve and shaft. The other parts are made on the shop with the final electroplating work to be done on the exposed external parts.

2. Environmental Impact

The Production activity of the plant mainly involves cutting and drilling of metal parts; it does not have any negative impact on the environment. The melting process has a smoke which can be controlled by efficient burners and chimney. Thus the plant has no negative impact on the environment

B. ENGINEERING

1. Machinery and Equipment

The production process of the plant requires manual and machine operations including electroplating work. The total cost of machinery and equipment is Birr 4.58 million out of which Birr 3.56 million would be in foreign currency. For the production of the envisaged hand and submersible pump machine, the list of the necessary machinery and equipment are listed in Table 5.1.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT AND COST

Sr. No.	Machine	Unit	Qty.
1	Power Hacksaw	Nos	1
2	Abrasive circular saw	"	3
3	Lathe machine	'	2
4	Treadle shearing machine	'	1
5	Arc welding Machine	"	15
6	Pedestal Grinding Machine	'	5
7	Portable grinding Machine	"	15
8	Portable Electric drill	"	10
9	Pillar drilling machine	Set	3
10	Tool Sets	Set	3
11	Material Handling Equipment	set	3
12	Painting and compressor set	Set	1
13	Polishing Buffing Machine	Nos	2
14	Capstan Lathe	"	2
15	Pipe threading Machine	'	2
16	Polishing tumbling Barrel	'	1
17	Electroplating Plant	"	1
18	Turning Lathe.	'	1

Sr.	Machine	Unit	Qty.
19	Fly wheel press	‘	2
20	Dies for washer gasket Cutting	set	5
21	Moulds for taps models	set	5

2. Land, Building and Civil Works

The envisaged plant requires a total land area of 1,000 $m^{2,}$ of which 750 m^2 would be built-up area. Building construction cost at a rate of Birr 5000/m^2 is estimated to be Birr 3.75 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 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 266,000 of which 10% or Birr 26,600 will be paid in advance. The remaining Birr 239,400 will be paid in equal installments with in 28 years i.e. Birr 8,550 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The plant employs a total of 53 workers of whom 44 are technical workers; the total annual salary amounts to 1.44million. The human resource requirement by type of job and monthly and annual salary is indicated in Table 6.1.

B. TRAINING REQUIREMENT

On the job training and demonstration of the operators at the start up and at intermediate periods would be enough for workers with technical back ground. For two such sessions it costs an amount of 30,000 Birr.

Table 6.1

HUMAN RESOURCE REQUIREMENT AND ANNUAL SALARY

Sr. No.	Description	No.	Salary (Birr)	
			Monthly	Annual
A. ADMINISTRATION				
1	Plant Manager	1	5,000	60,000
2	Secretary	1	2,500	30,000
3	Accountant	1	2,500	30,000
4	Salesman/purchaser	1	2,500	30,000
5	Clerk	1	1,500	18,000
6	Cashier	1	2,000	24,000
7	General Service	3	800	28,800
Sub- Total		**9**		**220,800**
B. PRODUCTION				
8	Foreman/	1	2,500	30,000
9	Machinery Operators	17	2,000	408,000
10	Assistant Operators	7	1,500	126,000
11	Welder technicians	16	2,000	384,000
12	Quality controller	1	1,500	18,000
13	Laborers	2	800	19,200
	Sub -Total	**44**	**-**	**985,200**
	Total Basic Salary			**1,206,000**
	Employees' Benefit 25%0f Basic Salary	-	-	238,800
	Total	**53**	**-**	**1,444,800**

VII. FINANCIAL ANALYSIS

The financial analysis of the hand pumps and submersible pumps 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 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 13.40 million (See Table 7.1). From the total investment cost the highest share (Birr 9.50 million or 70.93%) is accounted by fixed investment cost followed by initial working capital (Birr 2.53 million or 18.89%) and pre operation cost (Birr 1.36 million or 10.18%). From the total investment cost Birr 3.56 million or 26.56% 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	26.60		26.60	0.20
1.2	Building and civil work	3,750.00		3,750.00	27.98
1.3	Machinery and equipment	1,020.00	3,560.00	4,580.00	34.17
1.4	Vehicles	900.00		900.00	6.72
1.5	Office furniture and equipment	250.00		250.00	1.87
	Sub total	**5,946.60**	**3,560.00**	**9,506.60**	**70.93**
2	**Pre operating cost ***				
2.1	Pre operating cost	487.40		487.40	3.64
2.2	Interest during construction	876.78		876.78	6.54
	Sub total	**1,364.18**		**1,364.18**	**10.18**
3	**Working capital**	**2,531.47**		**2,531.47**	**18.89**
	Grand Total	**9,842.25**	**3,560.00**	**13,402.25**	**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 3.59 million. However, only the initial working capital of Birr 2.53 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 14.93 million (see Table 7.2). The cost of raw material account for 70.05% of the production cost. The other major components of the production cost are depreciation, direct labor and financial cost, which account for 9.16%, 8.08% and 4.84% respectively. The remaining 7.86% is the share of utility, repair and maintenance, labor overhead, cost of marketing and distribution 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	10,460.00	70.05
Utilities	48.00	0.32
Maintenance and repair	137.00	0.92
Labor direct	1,206.00	8.08
Labor overheads	239.00	1.60
Administration Costs	250.00	1.67
Land lease cost	-	-
Cost of marketing and distribution	500.00	3.35
Total Operating Costs	**12,840.00**	**85.99**
Depreciation	1,368.48	9.16
Cost of Finance	723.35	4.84
Total Production Cost	**14,931.83**	**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 1.25 million to Birr 2.64 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 25.46 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 7{,}038{,}221$$

$$\text{Break Even Capacity utilization} = \frac{\text{Break even Sales Value}}{\text{Sales revenue}} \times 100 = 42\%$$

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 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 25.21% 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 10.63 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 53 persons. The project will generate Birr 6.45 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.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	1,830.50	2,092.00	2,353.50	2,615.00	2,615.00	2,615.00	2,615.00	2,615.00	2,615.00	2,615.00
Accounts receivable	761.50	864.33	967.17	1,070.00	1,070.71	1,070.71	1,070.71	1,070.71	1,070.71	1,070.71
Cash-in-hand	17.81	20.36	22.90	25.44	25.56	25.56	25.56	25.56	25.56	25.56
CURRENT ASSETS	**2,609.81**	**2,976.69**	**3,343.57**	**3,710.44**	**3,711.28**	**3,711.28**	**3,711.28**	**3,711.28**	**3,711.28**	**3,711.28**
Accounts payable	78.34	89.53	100.73	111.92	111.92	111.92	111.92	111.92	111.92	111.92
CURRENT LIABILITIES	**78.34**	**89.53**	**100.73**	**111.92**	**111.92**	**111.92**	**111.92**	**111.92**	**111.92**	**111.92**
TOTAL WORKING CAPITAL	**2,531.47**	**2,887.16**	**3,242.84**	**3,598.53**	**3,599.36**	**3,599.36**	**3,599.36**	**3,599.36**	**3,599.36**	**3,599.36**

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	7,322	8,368	9,414	10,460	10,460	10,460	10,460	10,460	10,460	10,460
Utilities	34	38	43	48	48	48	48	48	48	48
Maintenance and repair	96	110	123	137	137	137	137	137	137	137
Labour direct	844	965	1,085	1,206	1,206	1,206	1,206	1,206	1,206	1,206
Labour overheads	167	191	215	239	239	239	239	239	239	239
Administration Costs	175	200	225	250	250	250	250	250	250	250
Land lease cost	0	0	0	0	9	9	9	9	9	9
Cost of marketing and distribution	500	500	500	500	500	500	500	500	500	500
Total Operating Costs	**9,138**	**10,372**	**11,606**	**12,840**	**12,849**	**12,849**	**12,849**	**12,849**	**12,849**	**12,849**
Depreciation	1,368	1,368	1,368	1,368	1,368	175	175	175	175	175
Cost of Finance	0	964	844	723	603	482	362	241	121	0
Total Production Cost	**10,506**	**12,705**	**13,818**	**14,932**	**14,820**	**13,506**	**13,385**	**13,265**	**13,144**	**13,024**

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	11,760	15,120	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800
Less variable costs	8,638	9,872	11,106	12,340	12,340	12,340	12,340	12,340	12,340	12,340
VARIABLE MARGIN	**3,122**	**5,248**	**5,694**	**4,460**	**4,460**	**4,460**	**4,460**	**4,460**	**4,460**	**4,460**
in % of sales revenue	26.55	34.71	33.89	26.55	26.55	26.55	26.55	26.55	26.55	26.55
Less fixed costs	1,868	1,868	1,868	1,868	1,877	684	684	684	684	684
OPERATIONAL MARGIN	**1,254**	**3,380**	**3,826**	**2,592**	**2,583**	**3,776**	**3,776**	**3,776**	**3,776**	**3,776**
in % of sales revenue	10.66	22.35	22.77	15.43	15.37	22.48	22.48	22.48	22.48	22.48
Financial costs		964	844	723	603	482	362	241	121	0
GROSS PROFIT	**1,254**	**2,415**	**2,982**	**1,868**	**1,980**	**3,294**	**3,415**	**3,535**	**3,656**	**3,776**
in % of sales revenue	10.66	15.97	17.75	11.12	11.79	19.61	20.33	21.04	21.76	22.48
Income (corporate) tax	0	0	0	560	594	988	1,024	1,061	1,097	1,133
NET PROFIT	**1,254**	**2,415**	**2,982**	**1,308**	**1,386**	**2,306**	**2,390**	**2,475**	**2,559**	**2,644**
in % of sales revenue	10.66	15.97	17.75	7.78	8.25	13.73	14.23	14.73	15.23	15.74

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	**9,994**	**15,247**	**15,131**	**16,811**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**6,753**
Inflow funds	9,994	3,487	11	11	0	0	0	0	0	0	0	0
Inflow operation	0	11,760	15,120	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,753
TOTAL CASH OUTFLOW	**9,994**	**12,625**	**12,909**	**14,022**	**15,696**	**15,252**	**15,525**	**15,440**	**15,356**	**15,271**	**13,981**	**0**
Increase in fixed assets	9,994	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	2,610	367	367	367	1	0	0	0	0	0	0
Operating costs	0	8,638	9,872	11,106	12,340	12,349	12,349	12,349	12,349	12,349	12,349	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income tax	0	0	0	0	560	594	988	1,024	1,061	1,097	1,133	0
Financial costs	0	877	964	844	723	603	482	362	241	121	0	0
Loan repayment	0	0	1,206	1,206	1,206	1,206	1,206	1,206	1,206	1,206	0	0
SURPLUS (DEFICIT)	**0**	**2,622**	**2,222**	**2,789**	**1,104**	**1,548**	**1,275**	**1,360**	**1,444**	**1,529**	**2,819**	**6,753**
CUMULATIVE CASH BALANCE	**0**	**2,622**	**4,844**	**7,633**	**8,737**	**10,285**	**11,560**	**12,920**	**14,364**	**15,893**	**18,711**	**25,464**

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**	**11,760**	**15,120**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**16,800**	**6,753**
Inflow operation	0	11,760	15,120	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800	0
Other income	0	0	0	0	0	0	0	0	0	0	0	6,753
TOTAL CASH OUTFLOW	**12,525**	**9,494**	**10,728**	**11,962**	**13,401**	**13,443**	**13,837**	**13,873**	**13,909**	**13,945**	**13,981**	**0**
Increase in fixed assets	9,994	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	2,531	356	356	356	1	0	0	0	0	0	0	0
Operating costs	0	8,638	9,872	11,106	12,340	12,349	12,349	12,349	12,349	12,349	12,349	0
Marketing and Distribution cost	0	500	500	500	500	500	500	500	500	500	500	0
Income (corporate) tax		0	0	0	560	594	988	1,024	1,061	1,097	1,133	0
NET CASH FLOW	**-12,525**	**2,266**	**4,392**	**4,838**	**3,399**	**3,357**	**2,963**	**2,927**	**2,891**	**2,855**	**2,819**	**6,753**
CUMULATIVE NET CASH FLOW	**-12,525**	**-10,259**	**-5,867**	**-1,029**	**2,370**	**5,728**	**8,691**	**11,618**	**14,509**	**17,363**	**20,182**	**26,935**
Net present value	-12,525	2,060	3,630	3,635	2,321	2,085	1,673	1,502	1,349	1,211	1,087	2,603
Cumulative net present value	-12,525	-10,465	-6,835	-3,200	-879	1,206	2,879	4,381	5,729	6,940	8,027	10,630

NET PRESENT VALUE	10,630
INTERNAL RATE OF RETURN	25.51%
NORMAL PAYBACK	4 years