

**108. PROFILE ON THE PRODUCTION OF ROOF
 TILES AND BRICKS**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of roof tiles and bricks with a capacity of 50,000 roofing tiles and 300,000 bricks per annum. Roof tiles are used for roof covers and bricks are used for construction in buildings, for partition and for lining various types of kilns and furnaces used in iron and steel plants, cement and fertilizer, petro-chemicals, glass and ceramics and other chemical industries.

The demand for roof tiles and bricks is met through local production. The present (2012) demand for roof tiles and bricks is estimated at 8.75 million pieces and 26.25 million pieces respectively. The demand for roof tiles and bricks is projected to reach 17.60 million pieces and 52.797 million by the year 2017. By the year 2022 the demand will increase to 35.4 million pieces of roof tiles and 106.2 million pieces of bricks.

The principal raw materials required is clay which is available in and around the city of Addis Ababa.

The total investment cost of the project including working capital is estimated at Birr 7.83 million. From the total investment cost, the highest share (Birr 6.87 million or 87.77%) is accounted by fixed investment cost followed by pre operation cost (Birr 918.27 thousand or 11.72%) and initial working capital (Birr 40.43 thousand or 0.542%). From the total investment cost, Birr 3.96 million or 50.52% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 24.53% and a net present value (NPV) of Birr 5.38 million, discounted at 10%.

The project can create employment for 16 persons. The project is fully based on locally available resource. The project will also create backward linkage with mining sector and forward linkage with the construction and manufacturing sub sectors and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Roofing tiles made out of clay are used for roof covers. The existing practice is to use galvanized iron sheets whose raw material is imported in bulk as it is relatively cheaper and simpler to use. The product comes in different gauges ranging from 28 to 32 in thickness. Producing roofing tiles with locally available clay could reduce the cost of houses construction. Although the product is new to the market, it is believed to gain wide acceptance in a short time.

Brick is physically expressed as a rectangular prism of clay or soil which has been burnt in a kiln. It is usually red in color because of the selected clay ingredient for which the bricks are made. It has a high temperature resistance property. Depending on the type of raw materials used for the manufacture, bricks can be of different types such as fire-brick and sand - lime bricks. The standard size of bricks indicated in some literatures is about (6 x 10 x 25 cm.).

The principal application of bricks is for construction in buildings, for partition and for lining various types of kilns and furnaces used in iron and steel plants, cement and fertilizer, petrochemicals, glass and ceramics and other chemical industries, extensively.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The source of supply for roof tiles and bricks is local production. The data source for local production CSA's "Report on Large and Medium Scale Manufacturing Survey" does not indicate local production of roof tiles and bricks separately, the report presents the data for the two products together as brick products. Accordingly, local production of roof tiles and bricks is shown in Table 3.1.

Table 3.1**LOCAL PRODUCTION OF ROOF TILES AND BRICKS**

Year	Local Production (in 000 pcs)
2000	10,782
2001	12,715
2002	14,647
2003	16,579
2004	14,334
2005	24,785
2006	13,893
2007	44,957
2008	13,909
2009	13,087
2010	17,645

Source: CSA, Statistical Abstract, various years.

As can be seen from the above Table, local production (total supply) of roof tiles and bricks ranges from 44.95 million pieces in 2007 to 10.78 million pieces in 2000. During the period under consideration (2000 – 2010) total supply of roof tiles and bricks exhibits an increasing trend registering an average annual growth rate of 24.52%.

For estimating the present demand for the products, it is assumed that the average growth registered in the past will also continue in the near future. Accordingly, taking recent four years (2007-2010) average local production or apparent consumption as a base and applying a growth rate of 25% the present (2012) demand for roof tiles and bricks is estimated at 34.99 million pieces. According to knowledgeable persons from the total production of roof tiles and bricks about 70% is bricks and the remaining 25% is roof tiles. Hence, the present demand for roof tiles and bricks is estimated at 8.75 million pieces and 26.25 million pieces, respectively.

2. Demand Forecast

The demand for roof tiles and bricks 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 roof tiles and bricks ,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 a growth rate of 15% which is equivalent to the average of the expected growth rate of the country's GDP and the construction sector 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 roof tiles and bricks is shown in Table 3.2.

Table 3.2**FORECASTED DEMAND FOR ROOF TILES AND BRICKS (000' PIECES)**

Year	Projected Demand		Existing local Production		Unsatisfied Demand	
	Roof Tiles	Bricks	Roof Tiles	Bricks	Roof Tiles	Bricks
2013	10,062	30,187	10,000	30,000	62	187
2014	11,572	34,715	10,000	30,000	1,572	4,715
2015	13,307	39,922	10,000	30,000	3,307	9,922
2016	15,303	45,910	10,000	30,000	5,303	15,910
2017	17,599	52,797	10,000	30,000	7,599	22,797
2018	20,239	60,716	10,000	30,000	10,239	30,716
2019	23,275	69,824	10,000	30,000	13,275	39,824
2020	26,766	80,298	10,000	30,000	16,766	50,298
2021	30,781	92,342	10,000	30,000	20,781	62,342
2022	35,398	106,194	10,000	30,000	25,398	76,194
2023	40,708	122,123	10,000	30,000	30,708	92,123
2024	46,814	140,441	10,000	30,000	36,814	110,441
2025	53,836	161,507	10,000	30,000	43,836	131,507

3. Pricing and Distribution

The factory -gate price of the envisaged plant is recommended at Birr 8 per pieces and Birr 16 per pieces for bricks and roof tiles respectively. The products of the envisaged plant can be distributed directly to contractors and other end users.

B. PLANT CAPACITY AND PRODUCTION PROGRAM**1. Plant Capacity**

The plant will have a capacity of producing 50,000 roofing tiles and 300,000 bricks on a single shift of 8 hours a day and 300 working days per annum considering 52 Sundays and 13 public holidays as non-working days.

2. Production Program

The plant will operate at 75% and 85% capacity utilization in the first and second year, respectively. Full (100%) capacity will be reached on the third year. Gradual capacity build-up is required to allow the operators gain experience on working with the plant machinery and equipment. Co-ordination of sufficient supplies and inputs as well as penetration of the market is also expected to take sometime.

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The raw material used for the production of ordinary type of bricks is clay. Clay is available in most part of the country. This raw material must possess special properties and composition or constituents such as hydrous silicates of aluminum together with some color in imparting materials like hematite and limonite. The annual requirement of clay is estimated at 1,100 tones, which cost Birr 33,750 for royalty since it will have its own quarry.

B. UTILITIES

Major utilities for bricks production are fuel oil for drying and burning the product, electric power for machine drive and water for general purpose. The annual consumption of these utilities is shown in Table 4.1.

Table 4.1

ANNUAL CONSUMPTION OF UTILITIES AND COST

Sr. No.	Description	Qty.	Cost ('000 Birr)
1	Fuel oil (tonnes)	28	108
2	Electric power (kWh)	60,000	35
3	Water (m ³)	1,300	13
	Grand Total	-	156

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The most common practice of roof tiles and bricks production involves several unit of operations such as material excavation and transportation, grinding and mixing, brick shaping, drying of semi-finished brick, burning, classifying and packing of the finished product. In the proposed plant, the process starts from grinding operation in order to reduce investment cost.

The quarried raw material is subsequently crushed and wetted several time before it is passed or fed to the press vacuum chamber where air is extracted in order to obtain compact mix. Then a well prepared clay mix is extruded through a mold to get the required shape and dimensions. The wet semi-finished brick is transported to the batch drying chamber, where drying is carried out by blowing in warm air and expelling of humid air with intensive fanning. Then, the dried batch is transported to the kiln for the final process. Burning of batch in the kiln is accomplished by a flame traveling in circle on top of the roof tiles and bricks. Upon completion of the burning of roof tiles and bricks, the products are sorted in a storage place where preliminary sorting is made. Finally, the selected roof tiles and bricks are made available for market.

2. Environmental Impact

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

B. ENGINEERING

1. Machinery and Equipment

The total cost of the machinery and equipment is estimated at Birr 4.11 million. The machinery and equipment required along with estimated cost are listed in Table 5.1.

Table 5.1
MACHINERY AND EQUIPMENT REQUIREMENT AND COST

Sr. No.	Items	Qty. No.	Cost '000 Birr		
			FC	LC	Total
1	Excavator	1	1200	-	1200
2	Loader	1	900	-	900
3.	Box feeder	1	315	-	315
4.	Roller crusher	1	420	-	420
5.	Vacuum press with mixer	1	375	-	375
6.	Cutter (Semi-automatic	1	225	-	225
7.	Drying kiln	1	525	-	525
	F.O.B		3,960	-	3,960
	C & F		-	150	150
	Grand Total		3,960	150	4,110

2. Land, Building and Civil Works

The overall land required by the envisaged project is about 1,200 m², of which 625 m² is allotted for building and production spaces. The total construction cost at a unit cost of Birr 3,500 per m² is estimated to be Birr 2,187,500.

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 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 319,200 of which 10% or Birr 31,920 will be paid in advance. The remaining Birr 287,280 will be paid in equal installments with in 28 years i.e. Birr 10,260 annually.

VI. HUMANRESOURCE AND TRAINING REQUIREMENT

A. HUMANRESOURCE REQUIREMENT

The envisaged bricks project requires a total of 16 workforces. The list of manpower required and corresponding labor cost is shown in Table 6.1.

Table 6.1**HUMANRESOURCE REQUIREMENT AND ANNUAL LABOUR COST**

Description	Required Number	Salary in Birr	
		Monthly	Annually
A. Administrative staff			
Manager	1	3,500.00	42,000.00
Secretary	1	1,250.00	15,000.00
Accounting clerk	1	1,250.00	15,000.00
Store man	1	1,250.00	15,000.00
Guards	2	750.00	18,000.00
Sub-total A			105,000.00
Production staff			
Production head	1	2,500.00	30,000.00
Supervisor	1	2,000.00	24,000.00
Machine operators	2	1,200.00	28,800.00
Mechanic /Electrician	1	1,200.00	14,400.00
Unskilled /workers	5	750.00	45,000.00
Sub-total B	16		142,200.00
Total (A+B)			247,200.00
Benefits (25%)			61,800.00
Grand Total	16		309,000.00

B. TRAINING REQUIREMENT

Due to focus of the government on technical training, skilled workers on construction materials production are available. So, no special training is required.

VII. FINANCIAL ANALYSIS

The financial analysis of roof tiles and bricks 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
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 7.83 million (see Table 7.1). From the total investment cost, the highest share (Birr 6.87 million or 87.77%) is accounted by fixed investment cost followed by pre operation cost (Birr 918.27 thousand or 11.72%) and initial working capital (Birr 40.43 thousand or 0.542%). From the total investment cost, Birr 3.96 million or 50.52% 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	31.92		31.92	0.41
1.2	Building and civil work	2,187.50		2,187.50	27.91
1.3	Machinery and equipment	150.00	3,960.00	4,110.00	52.44
1.4	Vehicles	450.00		450.00	5.74
1.5	Office furniture and equipment	100.00		100.00	1.28
	Sub- total	2,919.42	3,960.00	6,879.42	87.77
2	Pre operating cost *				
2.1	Pre operating cost	405.50		405.50	5.17
2.2	Interest during construction	512.77		512.77	6.54
	Sub -total	918.27		918.27	11.72
3	Working capital**	40.43		40.43	0.52
	Grand Total	3,878.12	3,960.00	7,838.12	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 51.12 thousand. However, only the initial working capital of Birr 40.43 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 2.38 million (see Table 7.2). The cost of raw material account for 1.45% of the production cost. The other major components of the production cost are depreciation, financial cost, utility, and labor, which account for 45.80%, 20.73%, 6.55%, and 10.37%, respectively. The remaining 15.22% is the share of repair and maintenance, 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 FOUR)**

Items	Cost (in 000 Birr)	%
Raw Material and Inputs	34.00	1.43
Utilities	156.00	6.55
Maintenance and repair	123.00	5.17
Labor direct	247.00	10.37
Labor overheads	62.00	2.60
Administration Costs	75.00	3.15
Land lease cost	-	-
Cost of marketing and distribution	100.00	4.20
Total Operating Costs	797.00	33.47
Depreciation	1,090.60	45.80
Cost of Finance	493.55	20.73
Total Production Cost	2,381.15	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 373 thousand to Birr 1.60 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 3.07 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.

$$\text{Break- Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 1,522,141$$

$$\text{Break -Even Capacity utilization} = \frac{\text{Break- even Sales Value}}{\text{Sales revenue}} \times 100 = 48 \%$$

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 24.53% 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 5.38 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 16 persons. The project will generate Birr 3.78 million in terms of tax revenue. The project will also create backward linkage with mining sector and forward linkage with the construction and manufacturing 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	26	29	34	34	34	34	34	34	34	34
Utilities	117	133	156	156	156	156	156	156	156	156
Maintenance and repair	92	105	123	123	123	123	123	123	123	123
Labour direct	185	210	247	247	247	247	247	247	247	247
Labour overheads	47	53	62	62	62	62	62	62	62	62
Administration Costs	56	64	75	75	75	75	75	75	75	75
Land lease cost	0	0	0	0	10	10	10	10	10	10
Cost of marketing and distribution	100	100	100	100	100	100	100	100	100	100
Total Operating Costs	623	692	797	797	807	807	807	807	807	807
Depreciation	1,091	1,091	1,091	1,091	1,091	98	98	98	98	98
Cost of Finance	0	564	494	423	353	282	212	141	71	0
Total Production Cost	1,713	2,347	2,381	2,311	2,250	1,187	1,116	1,046	975	905

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	2,400	2,720	3,200	3,200	3,200	3,200	3,200	3,200	3,200	3,200
Less variable costs	523	592	697	697	697	697	697	697	697	697
VARIABLE MARGIN	1,877	2,128	2,503	2,503	2,503	2,503	2,503	2,503	2,503	2,503
in % of sales revenue	78.22	78.22	78.22	78.22	78.22	78.22	78.22	78.22	78.22	78.22
Less fixed costs	1,191	1,191	1,191	1,191	1,201	208	208	208	208	208
OPERATIONAL MARGIN	687	937	1,312	1,312	1,302	2,295	2,295	2,295	2,295	2,295
in % of sales revenue	28.61	34.45	41.01	41.01	40.69	71.73	71.73	71.73	71.73	71.73
Financial costs		564	494	423	353	282	212	141	71	0
GROSS PROFIT	687	373	819	889	950	2,013	2,084	2,154	2,225	2,295
in % of sales revenue	28.61	13.71	25.59	27.79	29.68	62.91	65.12	67.32	69.52	71.73
Income (corporate) tax	0	0	0	267	285	604	625	646	667	689
NET PROFIT	687	373	819	623	665	1,409	1,459	1,508	1,557	1,607
in % of sales revenue	28.61	13.71	25.59	19.45	20.77	44.04	45.58	47.12	48.67	50.21

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	7,285	2,976	2,723	3,205	3,200	3,200	3,200	3,200	3,200	3,200	3,200	1,909
Inflow funds	7,285	576	3	5	0	0	0	0	0	0	0	0
Inflow operation	0	2,400	2,720	3,200	3,200	3,200	3,200	3,200	3,200	3,200	3,200	0
Other income	0	0	0	0	0	0	0	0	0	0	0	1,909
TOTAL CASH OUTFLOW	7,285	1,199	1,969	2,007	2,192	2,151	2,398	2,349	2,300	2,250	1,496	0
Increase in fixed assets	7,285	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	64	7	11	0	1	0	0	0	0	0	0
Operating costs	0	523	592	697	697	707	707	707	707	707	707	0
Marketing and Distribution cost	0	100	100	100	100	100	100	100	100	100	100	0
Income tax	0	0	0	0	267	285	604	625	646	667	689	0
Financial costs	0	513	564	494	423	353	282	212	141	71	0	0
Loan repayment	0	0	705	705	705	705	705	705	705	705	0	0
SURPLUS (DEFICIT)	0	1,777	754	1,198	1,008	1,049	802	851	900	950	1,704	1,909
CUMULATIVE CASH BALANCE	0	1,777	2,531	3,729	4,737	5,787	6,588	7,439	8,340	9,290	10,994	12,903

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	2,400	2,720	3,200	3,200	3,200	3,200	3,200	3,200	3,200	3,200	1,909
Inflow operation	0	2,400	2,720	3,200	3,200	3,200	3,200	3,200	3,200	3,200	3,200	0
Other income	0	0	0	0	0	0	0	0	0	0	0	1,909
TOTAL CASH OUTFLOW	7,325	627	699	797	1,065	1,092	1,411	1,432	1,454	1,475	1,496	0
Increase in fixed assets	7,285	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	40	4	6	0	1	0	0	0	0	0	0	0
Operating costs	0	523	592	697	697	707	707	707	707	707	707	0
Marketing and Distribution cost	0	100	100	100	100	100	100	100	100	100	100	0
Income (corporate) tax		0	0	0	267	285	604	625	646	667	689	0
NET CASH FLOW	-7,325	1,773	2,021	2,403	2,135	2,108	1,789	1,768	1,746	1,725	1,704	1,909
CUMULATIVE NET CASH FLOW	-7,325	-	-	-	1,007	3,115	4,904	6,671	8,418	10,143	11,847	13,756
Net present value	-7,325	1,612	1,670	1,805	1,458	1,309	1,010	907	815	732	657	736
Cumulative net present value	-7,325	5,714	4,043	2,238	-779	529	1,539	2,446	3,261	3,993	4,650	5,386

NET PRESENT VALUE 5,386
INTERNAL RATE OF RETURN 24.53%
NORMAL PAYBACK 4 years

108-25