

49. PROFILE ON THE PRODUCTION OF GELATIN

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I. SUMMARY

This profile envisages the establishment of a plant for the production of gelatin with a capacity of 150 tons per annum. As a foodstuff, gelatin is the basis for jellied desserts, used in the preservation of fruit and meat, and to make powdered milk. Gelatin's industrial applications include: medicine capsules, stabilizers for oil emulsions and glycerinated gelatin for suppositories.

The country's requirement of gelatin is met through import. The present (2012) demand for gelatin is estimated at 102 tons. The demand for the product is projected to reach 180 tons and 291 tons by the year 2018 and year 2023, respectively.

The principal raw materials required are animal bones, skins, and tissue which are obtained from slaughter houses and meat processing industries.

The total investment cost of the project including working capital is estimated at Birr 25.43 million. From the total investment cost the highest share (Birr 20.23 million or 79.57%) is accounted by fixed investment cost followed by initial working capital (Birr 2.48 million or 9.76%) and pre operation cost (Birr 2.71 million or 10.67%). From the total investment cost, Birr 11.25 million or 44.23% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 20.21% and a net present value (NPV) of Birr 12.93 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. The project will also create backward linkage with the livestock sector and forward linkage with the manufacturing sector and also generates income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION & APPLICATION

Gelatin is a protein substance derived from collagen, a natural protein present in the tendons, ligaments, and tissues of mammals. It is a colorless to yellowish transparent collides protein that is hard and brittle when dry but swells in water, dissolving in hot water and forming a jelly on cooling, that is obtained usually in sheets, flakes, or powder form.

It is produced by boiling the connective tissues, bones and skins of animals, usually cows and pigs. Gelatin's ability to form strong, transparent gels and flexible films that are easily digested, soluble in hot water, and capable of forming a positive binding action have made it a valuable commodity in food processing, pharmaceuticals, photography, and paper production.

As a foodstuff, gelatin is the basis for jellied desserts; used in the preservation of fruit and meat, and to make powdered milk, merinque, taffy, gummed candies, marshmallow, and fondant. It is also used to clarify beer and wine. Gelatin's industrial applications include medicine capsules, stabilizers for oil emulsions and glycerinated gelatin for suppositories photographic plate coatings and as a component in silver halide emulsion coatings, and dyeing and tanning supplies.

III. MARKET STUDY AND PLANT CAPACITY

A MARKET STUDY

1. Past Supply and Present Demand

Gelatin is widely employed in the food industry for its elastic consistency, property of holding air and water and inhibits the crystallization of sugar. The current demand for gelatin is met through import. Import data covering the years 2002-2011 is provided in Table 3.1.

Table 3.1
IMPORT OF GELATIN

Year	Qty. (Tons)	Value ('000 Birr)
2002	72.7	513.5
2003	93.0	2,253.3
2004	74.1	3,309.0
2005	108.8	2,918.0
2006	213.1	4,011.1
2007	125.1	5,099.8
2008	73.6	4,779.2
2009	104.7	7,013.5
2010	119.7	11,798.9
2011	80.0	9,149.3

Source: - Ethiopian Revenues and Customs Authority.

As could be seen from Table 3.1, import data during year 2002-2011 has been fluctuating from year to year which ranges from the lowest 73 tons to the highest 213 tons. However, a close scrutiny to the data shows somewhat an upward trend, especially during the years 2005 – 2007. After year 2007 the import figure has again started to decline slightly. In the initial three years (2002-2004) of the data set the annual average level of import was about 80 tons. In the following three consecutive years (2005-2007) it increased to a yearly average of 149 tons. After declining to 74 tons by the year 2008 it again increased to an annual average of about 102 in the recent three years (2009-2011) of the data set.

To estimate the current effective demand, the import level of year 2009-2011 has been considered. Therefore, the current effective demand is estimated at 102 tons.

2. Projected Demand

Gelatin in its purest form is used as a constituent of foods, such as in making jams and jellies, ice cream and in medicine as a coating and other applications in the chemical sector. Hence, the

demand for gelatin depends mainly on the growth of the manufacturing sector particularly the food and pharmaceutical industries. Considering the growth of urban population and the increasing number of food and pharmaceutical manufacturing enterprises demand is projected by applying a 10% conservative annual growth rate (see Table 3.2).

Table 3.2
PROJECTED DEMAND FOR GELATIN (TONS)

Year	Projected Demand
2013	112
2014	123
2015	136
2016	149
2017	164
2018	180
2019	199
2020	218
2021	240
2022	264
2023	291

Demand for gelatin will grow from 112 tons in the year 2013 to 180 tone and 291 tons by the year 2018 and year 2023, respectively.

3. Pricing and Distribution

Based on the average CIF price and other charges of year 2011 obtained from the Ethiopian Revenues and Customs Authority, the ex-factory price is estimated at Birr 129,509 per ton.

Direct sale to the end-user industries is recommended with regard to the distribution channel as the product is an industrial input.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

According to the market study, the demand of gelatin in the year 2013 is 112 tons, whereas this demand will grow to 291 by the year 2023. Considering two years for implementation of the project and three years for full capacity attainment, the envisaged plant is proposed to have an annual production capacity of 150 tones of gelatin. Production capacity is based on a schedule of 300 working days per annum and 3 shifts of eight hours per day.

2. Production Program

At the initial stage of production, the plant requires some years to penetrate the market. Therefore, in the first and second year of production the capacity utilization rate will be 80% and 90%, respectively. In third year and thereafter, full capacity production shall be attained. The production program is indicated in Table 3.3.,

Table 3.3
PRODUCTION PROGRAM

Product	Year		
	1	2	3 - 10
Gelatin (tons)	120	135	150
Capacity utilization rate (%)	80	90	100

IV. RAW MATERIAL AND INPUTS

A. RAW MATERIALS

The principal raw materials used in gelatin production today are animal bones, skins, and tissue which are obtained from slaughter houses and meat processing industries. Gelatin processing plants are usually located nearby so that these animals by -products can be quickly processed.

Acids and alkalines, such as caustic lime or sodium carbonate, are used to extract minerals and bacteria from the animal parts. The annual cost of raw materials is estimated at Birr 8,401,000. Table 4.1 indicates the annual requirement of raw materials at full production capacity.

Table 4.1
ANNUAL RAW MATERIALS REQUIREMENT & COST

Sr. No.	Raw Material	Unit of Measure	Qty	Cost ('000 Birr)
1	Slaughterhouses by product	Tons	1,500	7,500
2	Quick lime	Tons	130	390
3	Hydrochloric acid	Tons	45	270
4	Sodium carbonate	Tons	50	125
5	Sweeteners, flavorings, and colorings	Ton	3	90
6	Packing Material (pp bag of 50kg)	Pcs	2,600	26
Total				8,401

B. UTILITIES

The major utilities of the project are electricity and water. The total annual cost of utilities is estimated at Birr 2,630,100. Annual requirement and cost of utilities is indicated in Table 4.2.

Table 4.2
UTILITIES REQUIREMENT AND COST

Sr. No	Description	UOM	Qty.	Cost ('000 birr)
1	Electricity	KWh	165,000	95.7
2	Water	m ³	60,000	600.0
3	Furnace oil	Lt.	130,000	1,934.4
Total				2,630.1

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The production process steps of different grades of gelatin consists of inspection and cutting, degreasing and roasting, chemical treatment, boiling, evaporation and grinding, flavoring and coloring, and packaging. Each of these process steps are briefly described hereunder.

➤ Inspection and Cutting

When the animal parts arrive at the food processing plant, they are inspected for quality. Rotted parts are discarded. Then, the bones, tissues, and skins are loaded into chopping machines that cut the parts into small pieces of about 5 in (12.7cm) in diameter.

➤ Degreasing and Roasting

The animal parts are passed under high-pressure water sprays to wash away debris. They are then degreased by soaking them in hot water to reduce the fat content to about 2%. A conveyer belt moves the degreased bones and skins to an industrial dryer where they are roasted for approximately 30 minutes at about 200° F (100° C).

➤ Acid and Alkaline Treatment

The animal parts are soaked in vats of lime or some other type of acid or alkali for approximately five days. This process removes most of the minerals and bacteria and facilitates the release of collagen. The acid wash is typically a 4% hydrochloric acid with a pH of less than 1.5. The alkaline wash is a potassium or sodium carbonate with a pH above 7.

➤ Boiling

The pieces of bone, tissue, and skin are loaded into large aluminum extractors and boiled in distilled water. A tube running from the extractor allows workers to draw off the liquid that now contains gelatin. The liquid is sterilized by flash-heating it to about 375° F (140° C) for approximately four seconds.

➤ **Evaporating and Grinding**

From the extractor, the liquid is piped through filters to separate out bits of bone, tissue or skins that are still attached. From the filters, the liquid is piped into evaporators, machines that separate the liquid from the solid gelatin. The liquid is piped out and discarded. The gelatin is passed through machines that press it into sheets. Depending on its final application, the gelatin sheets are passed through a grinder that reduces them to a fine powder.

➤ **Flavoring and Coloring**

If the gelatin is to be used by the food industry, sweeteners, flavorings, and colorings may be added at this point. Pre-set amounts of these additives are thoroughly mixed into the powdered gelatin.

➤ **Packaging**

The packaging process is automated, with preset amounts of gelatin poured into overhead funnels through which the gelatin flows down into bags made of either polypropylene or multi-ply paper. The bags are then vacuumed sealed.

2. Environmental Impact Assessment

The production of gelatin from slaughtering house wastes does not involve any adverse environmental impact since the waste to be generated from the production process shall also be used as animal feed or fertilizer. The VOC's to be generated during the production process will be scrubbed and treated in a well designed waste water treatment plant before disposal to environment. The cost of waste water treatment system is included in the cost of machinery and equipment.

B. ENGINEERING

1. Machinery and Equipment

The total cost of machinery is estimated at Birr 15 million of which Birr 11.25 million is required in foreign currency. The list of machinery and equipment of gelatin production project is indicated in Table 5.1.

Table 5.1
LIST OF MACHINERY AND EQUIPMENT

Sr. No.	Description	Qty. (No.)
1	Chopping machine	
2	Washer	
3	Degreaser	1
4	Dryer	2
5	Crusher	2
6	SS Treatment tanks (Assorted)	4
7	Multiple hot water extractor	1
8	Filter	1
9	Evaporator	2
10	Sterilizer	1
11	Polish filter	1
12	Chiller	1
13	Extruder	1
14	Mill	1
15	Blender	1
16	Packing machine	1
17	Waste water treatment plant	Set

2. Land, Building and Civil Works

The plant requires a total of 1,500 m² area of land, out of which 800 m² is built-up area which includes processing area, raw material stock area, offices, etc. Assuming construction rate of Birr 5,000 per m², the total cost of construction is estimated to be Birr 4,000,000.

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 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 399,000 of which 10% or Birr 39,900 will be paid in advance. The remaining Birr 359,100 will be paid in equal installments within 28 years i.e. Birr 12,825 annually.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The envisaged project requires 52 labor persons. The total annual cost of labor is estimated at Birr 1,078,500. The list of human resource and the annual cost of labor is indicated in Table 6.1.

Table 6.1
HUMAN RESOURCE REQUIREMENT AND LABOR COST

Sr. No.	Description	Req. No.	Monthly Salary (Birr)	Annual Salary (Birr)
1.	General Manager	1	6,000	72,000
2.	Secretary	1	1,500	18,000
3.	Marketing Officer	1	2,500	30,000
4.	Purchaser	1	2,500	30,000
5.	Senior Accountant	1	2,500	30,000
6.	Cashier	1	900	10,800
7.	Production Head	1	4,000	48,000
8.	Quality Control Head	1	3,000	36,000
9	Chemists	3	6,000	72,000
10	Senior Mechanic	2	4,000	48,000
11	Mechanic	2	4,000	48,000
12	Senior Electrician and instrument technician	2	2,400	28,800
13	Electrician and instrument technician	2	2,400	28,800
14	Operators	12	18,000	216,000
15	Laborers	12	7,200	86,400
16	Drivers	2	1,600	19,200
17	Guards	3	1,800	21,600
18	Messenger and cleaner	4	1,600	19,200
	Sub-total	52	71,900	862,800
	Benefit (25% Basic Salary)		17,975	215,700
	Grand Total		89,875	1,078,500

B. TRAINING REQUIREMENT

The experts of the machinery supplier shall train the production head, quality control head and the production head shall also train senior mechanic during plant erection at the project site and other operators before commissioning the plant. Therefore, the total training cost is estimated at Birr 55,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the gelatin 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 25.43 million (see Table 7.1). From the total investment cost the highest share (Birr 20.23 million or 79.57%) is accounted by fixed investment cost followed by initial working capital (Birr 2.48

million or 9.76%) and pre operation cost (Birr 2.71 million or 10.67%). From the total investment cost, Birr 11.25 million or 44.23% 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	39.90		39.90	0.16
1.2	Building and civil work	4,000.00		4,000.00	15.72
1.3	Machinery and equipment	3,750.00	11,250.00	15,000.00	58.97
1.4	Vehicles	900.00		900.00	3.54
1.5	Office furniture and equipment	300.00		300	1.18
	Sub total	8,989.90	11,250.00	20,239.90	79.57
2	Pre operating cost *				
2.1	Pre operating cost	1,050.00		1,050.00	4.13
2.2	Interest during construction	1,664.15		1,664.15	6.54
	Sub total	2,714.15		2,714.15	10.67
3	Working capital **	2,483.64		2,483.64	9.76
	Grand Total	14,187.68	11,250.00	25,437.68	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 3.09 million. However, only the initial working capital of Birr 2.48 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 18.19 million (see Table 7.2). The cost of raw material account for 46.18% of the production cost. The other major components of the production cost are depreciation, utility and financial cost which account for 19.68%, 14.46% and 8.80%, respectively. The remaining 10.88 % is the share of labor, 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 (in 000 Birr)	%
Raw Material and Inputs	8,401.00	46.18
Utilities	2,630.10	14.46
Maintenance and repair	450.00	2.47
Labor direct	862.80	4.74
Labor overheads	215.70	1.19
Administration Costs	150.00	0.82
Land lease cost	-	-
Cost of marketing and distribution	300.00	1.65
Total Operating Costs	13,009.60	71.52
Depreciation	3,580.00	19.68
Cost of Finance	1,601.74	8.80
Total Production Cost	18,191.34	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 ranges from Birr 334 thousand to Birr 8.21 million during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 36.43 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.

$$\text{Break Even Sales Value} = \frac{\text{Fixed Cost} + \text{Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 11,223,310$$

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

4. Pay-back Period

The pay-back period, also called pay – off period is defined as the period required for recovering the original investment outlay through the accumulated net cash flows earned by the project.

Accordingly, based on the projected cash flow it is estimated that the project's initial investment will be fully recovered within 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 20.21 % 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 12.93 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 11.24 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 backward linkage with the livestock sector and forward linkage with the manufacturing sector and also generates income for the Government in terms of payroll tax.

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	6,721	7,561	8,401	8,401	8,401	8,401	8,401	8,401	8,401	8,401
Utilities	2,104	2,367	2,630	2,630	2,630	2,630	2,630	2,630	2,630	2,630
Maintenance and repair	360	405	450	450	450	450	450	450	450	450
Labour direct	690	777	863	863	863	863	863	863	863	863
Labour overheads	173	194	216	216	216	216	216	216	216	216
Administration Costs	120	135	150	150	150	150	150	150	150	150
Land lease cost	0	0	0	0	13	13	13	13	13	13
Cost of marketing and distribution	300	300	300	300	300	300	300	300	300	300
Total Operating Costs	10,468	11,739	13,010	13,010	13,022	13,022	13,022	13,022	13,022	13,022
Depreciation	3,580	3,580	3,580	3,580	3,580	190	190	190	190	190
Cost of Finance	0	1,831	1,602	1,373	1,144	915	686	458	229	0
Total Production Cost	14,048	17,149	18,191	17,963	17,747	14,128	13,899	13,670	13,441	13,212

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

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Sales revenue	15,540	17,483	19,425	19,425	19,425	19,425	19,425	19,425	19,425	25,000
Less variable costs	10,168	11,439	12,710	12,710	12,710	12,710	12,710	12,710	12,710	12,710
VARIABLE MARGIN	5,372	6,044	6,715	6,715	6,715	6,715	6,715	6,715	6,715	12,290
in % of sales revenue	34.57	34.57	34.57	34.57	34.57	34.57	34.57	34.57	34.57	49.16
Less fixed costs	3,880	3,880	3,880	3,880	3,893	503	503	503	503	503
OPERATIONAL MARGIN	1,492	2,164	2,835	2,835	2,823	6,213	6,213	6,213	6,213	11,788
in % of sales revenue	9.60	12.38	14.60	14.60	14.53	31.98	31.98	31.98	31.98	47.15
Financial costs		1,831	1,602	1,373	1,144	915	686	458	229	0
GROSS PROFIT	1,492	334	1,234	1,462	1,678	5,297	5,526	5,755	5,984	11,788
in % of sales revenue	9.60	1.91	6.35	7.53	8.64	27.27	28.45	29.63	30.80	47.15
Income tax	0	0	0	439	504	1,589	1,658	1,726	1,795	3,536
NET PROFIT	1,492	334	1,234	1,024	1,175	3,708	3,868	4,028	4,189	8,251
in % of sales revenue	9.60	1.91	6.35	5.27	6.05	19.09	19.91	20.74	21.56	33.01

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	21,290	19,775	17,494	19,436	19,425	19,425	19,425	19,425	19,425	19,425	25,000	7,204
Inflow funds	21,290	4,235	11	11	0	0	0	0	0	0	0	0
Inflow operation	0	15,540	17,483	19,425	19,425	19,425	19,425	19,425	19,425	19,425	25,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	7,204
TOTAL CASH OUTFLOW	21,290	14,703	16,176	17,218	17,109	16,960	17,815	17,655	17,495	17,335	16,559	0
Increase in fixed assets	21,290	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	2,571	318	318	0	1	0	0	0	0	0	0
Operating costs	0	10,168	11,439	12,710	12,710	12,722	12,722	12,722	12,722	12,722	12,722	0
Marketing cost	0	300	300	300	300	300	300	300	300	300	300	0
Income tax	0	0	0	0	439	504	1,589	1,658	1,726	1,795	3,536	0
Financial costs	0	1,664	1,831	1,602	1,373	1,144	915	686	458	229	0	0
Loan repayment	0	0	2,288	2,288	2,288	2,288	2,288	2,288	2,288	2,288	0	0
SURPLUS (DEFICIT)	0	5,072	1,318	2,218	2,316	2,465	1,610	1,770	1,930	2,090	8,441	7,204
CUMULATIVE CASH BALANCE	0	5,072	6,391	8,609	10,924	13,390	15,000	16,770	18,700	20,790	29,232	36,435

Appendix 4
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	15,540	17,483	19,425	19,425	19,425	19,425	19,425	19,425	19,425	25,000	7,204
Inflow operation	0	15,540	17,483	19,425	19,425	19,425	19,425	19,425	19,425	19,425	25,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	7,204
TOTAL CASH OUTFLOW	23,774	10,775	12,046	13,010	13,450	13,526	14,612	14,680	14,749	14,818	16,559	0
Increase in fixed assets	21,290	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	2,484	307	307	0	1	0	0	0	0	0	0	0
Operating costs	0	10,168	11,439	12,710	12,710	12,722	12,722	12,722	12,722	12,722	12,722	0
Marketing and Distribution cost	0	300	300	300	300	300	300	300	300	300	300	0
Income (corporate) tax		0	0	0	439	504	1,589	1,658	1,726	1,795	3,536	0
NET CASH FLOW	-23,774	4,765	5,437	6,415	5,975	5,899	4,813	4,745	4,676	4,607	8,441	7,204
CUMULATIVE NET CASH FLOW	-23,774	19,009	-13,572	-7,156	-1,181	4,718	9,532	14,276	18,953	23,560	32,001	39,205
Net present value	-23,774	4,332	4,493	4,820	4,081	3,663	2,717	2,435	2,181	1,954	3,254	2,777
Cumulative net present value	-23,774	19,442	-14,948	10,128	-6,047	-2,384	333	2,768	4,949	6,903	10,158	12,935

NET PRESENT VALUE 12,935
INTERNAL RATE OF RETURN 20.21%
NORMAL PAYBACK 5 years