PROFILE ON THE PRODUCTION OF VINEGAR

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I. SUMMARY

This profile envisages the establishment of a plant for the production of vinegar with a capacity of 20,000 kg per annum. Vinegar is an important condiment and food preservative.

The country`s requirement of vinegar is met through local production and import. The present (2012) demand for vinegar is estimated at 105,754 litters. The demand for the product is projected to reach 105,754 litters and 105,754 litters by the years 2017 and 2022, respectively.

The principal raw materials required are fruits, yeast, sugar, colorants and chemicals such as phosphates, ammonium and potassium salts, potassium meta- bisulphate, etc. Fruits and sugar are available locally while the other raw materials have to be imported.

The total investment cost of the project including working capital is estimated at Birr 3.93 million. From the total investment cost the highest share (Birr 3.26 million or 82.99%) is accounted by fixed investment cost followed by pre operation cost (Birr 564.43 thousand or 14.37%) and initial working capital (Birr 103.64 thousand or 2.64%). From the total investment cost Birr 1.4 million or 34.30% is required in foreign currency.

The project is financially viable with an internal rate of return (IRR) of 23.86% and a net present value (NPV) of Birr 2.59 million discounted at 10%.

The project can create employment for 13 persons. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create forward linkage with the food processing sub sector and backward linkage with horticulture farming sub sector and sugar producers and also generate income for the Government in terms of tax revenue and payroll tax.

II. PRODUCT DESCRIPTION AND APPLICATION

Vinegar is an important condiment and preservative which is produced through the action of acetic acid bacteria on dilute solutions of ethyl alcohol derived from a previous yeast fermentation in sugar solution or fruit juice.

It may also be produced from fermented agar, fruit juices or other fermented alkali solutions derived from barley malt, hydrolyzed cereals and starches or other carbohydrates. Vinegar contains about 4 to 5% acetic acid, coloring matter, salts and few other fermented products which impart characteristic flavor and aroma to it.

Vinegar is used in food industries for processing of sauce, pickle etc. Thus vinegar has its uses both in urban households as well as industries, hotels and restaurants.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Vinegar, as an important condiment and preservative, is complementary to vegetables. The country's requirement for vinegar has been met through domestic production and import. Later, IPS study estimated the average annual domestic production of the product at 50,000 liters for the period 2001-2010. Recent data on domestic production of the product is not, however, available, although different local brands of the product are exhibited in the shelves of retail shops, including small merchandise shops, department stores and supermarkets. Therefore, following the result of IPS's study, the domestic production of vinegar is estimated at 50,000 liters for the year 2012.

Vinegar import data obtained from the Ethiopian Revenue and Customs Authority for the period covering 2000 – 2011 is given in Table 3.1.

Table 3.1

IMPORTS OF VINEGAR (LITERS)

Year	Import
2001	13,476
2002	31,392
2003	26,008
2004	21,458
2005	6,701
2006	33,879
2007	47,082
2008	45,507
2009	31,002
2010	81,832
2011	42,428

Source: -*Ethiopian Revenue and Customs Authority.*

As can be seen from Table 3.1, the pattern of import was highly erratic especially during the period 2001—2005. Import at the beginning was about 13,500 liters and increased to about 31,400 liters the following year, increasing by more than two fold. However, in the subsequent 3 years (2003-2005) import level declined continuously and fell to magnitude of 6,701 tones by 2005. Then import surged to over thirty thousand liters, increasing by more than five times, in 2006. From 2007-2011 import level has swung up from year to year. During this period the imported quantity varied from the lowest 31,002 liters (year 2009) to the highest 81,832 liters in the year 2009. Accordingly, it was found more appropriate to consider the average of annual imports of the last three years as the amount of the product imported in the year 2012. Accordingly, import for 2012 was estimated at 51,754 liters.

Thus, adding local production and import, the effective demand for the product in the year 2012 is estimated at 101,754 liters.

2. Demand Projection

Demand for vinegar is influenced mainly by urbanization and income. Addis Ababa is a cosmopolitan city and home to majority of the county's middle class and a considerable number of catering establishments. This is favorable for inducing demand for vinegar via demand for fresh fruits and vegetables. Moreover, growth of regional capitals and other towns will spur demand for vinegar. Hence, the demand for vinegar is projected making use of the 4% annual growth rate of the urban population. Assuming the existing vinegar production in the country will grow by 1.5%, the projected demand and supply gap (unsatisfied demand) for the product is shown in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR VINEGAR (LITERS)

Year	Projected demand	Existing production	Unsatisfied Demand
2013	105,824	50,750	55,074
2014	110,057	51,511	58,546
2015	114,459	52,284	62,175
2016	119,037	53,068	65,969
2017	123,798	53,864	69,934
2018	128,745	54,672	74,073
2019	133,895	55,492	78,403
2020	139,251	56,324	82,927
2021	144,821	57,169	87,652
2022	150,614	58,026	92,588

3. Pricing and Distribution

Currently, the average retail price of domestically produced vinegar is Birr 60 per 500 ml bottle. Allowing margin of 25% for distributors and retailers, a factory gate price of Birr 45 is adopted for 500 ml vinegar for the envisaged project.

The envisaged project can use the wholesale and retail network, which includes department stores, merchandise shops and supermarkets as well as direct sales to food processing industries to distribute its product.

B. PLANT CAPACITY AND PRODUCTION PROGRAM

1. Plant Capacity

Based on the outcome of the market study and considering the minimum economic scale of production, the plant is proposed to have a capacity of 20,000 liters of vinegar per annum. This capacity is proposed on the basis of single shift per day and 270 working days per annum. If demand rises, the capacity can be increased by increasing the production shits.

2. Production Program

Taking the time required by the envisaged plant for market penetration and skill development, the plant is planned to start operation at 70% of the installed capacity which will grow to 80% in the second year. Full capacity production will be achieved in the third year and onwards. Details of the annual production program are shown in Table 3.3.

Table 3.3

ANNUAL PRODUCTION PROGRAM

Sr.No.	Description	Unit of Measure	Production Year		
			1st	2nd	3rd & Onwards
1	Vinegar	lt	14,000	16,000	20,000
2	Capacity utilization rate	%	70	80	100

IV. MATERIALS AND INPUTS

A. RAW MATERIALS

The major raw materials for the production of vinegar are fruits. Yeast, sugar, colorants and chemicals such as phosphates, ammonium and potassium salts, potassium meta- bisulphate, etc. are the other raw materials used in small amount. Fruits and sugar are available locally while the other raw materials have to be imported. The annual raw materials requirement and the estimated costs at full capacity operation of the plant are depicted in Table 4.1.

Table 4.1

ANNUAL RAW MATERIALS REQUIREMENT AT FULL CAPACITY AND COST

Sr. No.	Description	Unit of Measure	Required Qty	Unit Price, Birr/Unit	Cost, ('000 Birr)		
					F.C.	L.C.	Total
1	Fruits	ton	17.92	9,000		161.28	161.28
2	Sugar	kg	500.00	14		7.00	7.00
3	Yeast, colorants and chemicals	kg	lump sum		13.440	3.36	16.80
Grand Total					**13.44**	**171.64**	**185.08**

The auxiliary materials required for the envisaged plant include packing materials like glass bottles, labels and carton boxes. The auxiliary materials are locally available. The annual auxiliary materials requirement at full capacity operation of the plant and the estimated costs are shown in Table 4.2.

Table 4.2

ANNUAL AUXILIARY MATERIALS REQUIREMENT AT FULL CAPACITY AND COST

Sr. No.	Description	Unit of Measure	Required Qty.	Unit Price, Birr/Unit	Total
1	Glass bottle	pc	27,000	4.00	108.00
2	Label	pc	27,540	0.60	16.52
3	Carton box	pc	1,550	6.00	9.30
Total					**133.82**

B. UTILITIES

Utilities required for the production of vinegar from fruit are electric power, water and fuel oil. The annual power and utilities requirement at full capacity operation of the plant and the estimated costs are given in Table 4.3.

Table 4.3

ANNUAL UTILITIES REQUIREMENT AT FULL CAPACITY AND COST

Sr. No.	Description	Unit of Measure	Annual Requirement	Unit Price, Birr/Unit	Total
1	Electric power	kWh	22,400	0.5778	12.943
2	Water	m^3	1,000	10.00	10.000
3	Fuel oil	lt	2,000	14.84	29.680
Total					**52.623**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Three distinct processes are involved in the production of vinegar from fruits. Each distinct process is described briefly hereunder.

a) Alcohol Fermentation

Fruit juices and sugar solutions of low concentration ferment of their own accord due to wild yeast normally present in the fruits and in the atmosphere but this is not desirable because different yeasts produce different kinds of decomposition products. In order to get good vinegar it is essential to destroy all these naturally occurring yeasts and other micro organisms by pasteurization and then to inculcate the sterilized juices thus obtained with pure yeast. Pure wine is available in the market in a compressed form. A starter is prepared from this by adding to the fruit and sugar solution to be fermented.

Alcoholic fermentation occurs in two stages. The first is preliminary or the vigorous fermentation and the second is slow fermentation. During the first 3 - 6 days most of the sugar is converted into alcohol and carbonates. The second fermentation is much slower and usually takes 2 - 3 weeks. Under favorable conditions, the fermentation completes in a period ranging from 72 to 96 hours, completely fermented juice usually exhibits a reading of about zero or less.

When fermentation is complete, the yeasts and the fruit pulp settle to form a compact mass at the bottom of the cask. The fermented liquid is separated from this sedimentation by siphoning.

b) Acetic Acid Fermentation

Acetic acid fermentation is brought about by acetic acid bacteria called acetobacter. Acetic acid fermentation should be carried in dark rooms fitted with orange and red glass pans. For acetic

acid fermentation, the alcohol content of the fermented liquid is adjusted to 7 - 8% alcohol because acetic acid bacteria do not function properly at high strength.

c) Ageing

When the vinegar has reached its maximum strength, it must be aged so that it is at its best quality for table use. The ageing is generally brought about in tanks or in barrels that are kept full and closed so that destruction of acid by oxidation of the vinegar bacteria will not occur. The aged vinegar should be blended as per the recipe by adding caramel, colour, etc. and is filtered. It is then filled in glass bottles and sealed with polypropylene caps. The sealed bottles are cooled, labeled and packed in cartons for marketing.

2. Environmental Impact

The envisaged plant does not have any pollutant emitted from the production process. Thus, the project is environment friendly.

B. ENGINEERING

1. Machinery and Equipment

The total cost of plant machinery and equipment is estimated at Birr 1.75 million, out of which Birr 1.4 million will be required in foreign currency. The list of plant machinery and equipment required for the envisaged project and the estimated costs are given in Table 5.1.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT AND ESTIMATED COST

Sr. No.	Description	Unit of Measure	Required Qty	Cost, ('000 Birr)		
				F.C.	L.C.	Total
1	Screw type juice extractor	set	1	56.00	14.00	70.00
2	Fermentation tank with stirrer	set	2	98.00	24.50	122.50
3	Air compressor	set	1	84.00	21.00	105.00
4	Generator for acetic fermentation	set	2	98.00	24.50	122.50
5	Blending tans and utensils	set	2	98.00	24.50	122.50
6	Filling, capping and sealing machine	set	1	168.00	42.00	210.00
7	Pasteurization tank	set	2	112.00	28.00	140.00
8	Bottle washing machine, motorized	set	1	126.00	31.50	157.50
9	Filter press	set	1	98.00	24.50	122.50
10	Pump	set	4	182.00	45.50	227.50
11	Lab equipment	set	1	126.00	31.50	157.50
12	Weighing scale	set	1	56.00	14.00	70.00
13	Boiler	set	1	98.00	24.50	122.50
Grand Total				**1,400.00**	**350.00**	**1,750.00**

2. Land, Buildings and Civil Works

The overall area of land required for the envisaged project is about 350 m^2, out of which 200 m^2 is built - up area. The total cost of buildings and construction, at a rate of Birr 4,500 per m^2, is estimated at Birr 900,000.

According to the Federal Legislation on the Lease Holding of Urban Land (Proclamation No 721/2004) in principle, urban land permit by lease is on auction or negotiation basis, however, the time and condition of applying the proclamation shall be determined by the concerned regional or city government depending on the level of development.

The legislation has also set the maximum on lease period and the payment of lease prices. The lease period ranges from 99 years for education, cultural research health, sport, NGO , religious and residential area to 80 years for industry and 70 years for trade while the lease payment period ranges from 10 years to 60 years based on the towns grade and type of investment.

Moreover, advance payment of lease based on the type of investment ranges from 5% to 10%.The lease price is payable after the grace period annually. For those that pay the entire amount of the lease will receive 0.5% discount from the total lease value and those that pay in installments will be charged interest based on the prevailing interest rate of banks. Moreover, based on the type of investment, two to seven years grace period shall also be provided.

However, the Federal Legislation on the Lease Holding of Urban Land apart from setting the maximum has conferred on regional and city governments the power to issue regulations on the exact terms based on the development level of each region.

In Addis Ababa, the City's Land Administration and Development Authority is directly responsible in dealing with matters concerning land. However, regarding the manufacturing sector, industrial zone preparation is one of the strategic intervention measures adopted by the City Administration for the promotion of the sector and all manufacturing projects are assumed to be located in the developed industrial zones.

Regarding land allocation of industrial zones if the land requirement of the project is below 5,000 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 93,100 of which 10% or Birr 9,310 will be paid in advance. The remaining Birr 83,790 will be paid in equal installments with in 28 years i.e. Birr 2,993 annually.

NB: The land issue in the above statement narrates or shows only Addis Ababa's city administration land lease price, policy and regulations.

Accordingly the project profile prepared based on the land lease price of Addis Ababa region.

To know land lease price, police and regulation of other regional state of the country updated information is available at Ethiopian Investment Agency's website www.eia.gov.et on the factor cost.

VI. HUMAN RESOURCE AND TRAINING REQUIREMENT

A. HUMAN RESOURCE REQUIREMENT

The total human resource required for the envisaged plant is 13 persons. Annual labor cost, including employees benefit, is estimated at Birr 183,600. The human resource requirement and the estimated annual labor cost, including fringe benefit, is shown in Table 6.1.

Table 6.1

HUMAN RESOURCE REQUIREMENT AND LABOR COST

Sr. No.	Job Title	Required No. of Persons	Salary, Birr	
			Monthly	Annual
1	Plant manager	1	4,000	48,000
2	Secretary	1	800	9,600
3	Accountant /salesman	1	900	10,800
4	Cashier	1	800	9,600
5	Store keeper	1	800	9,600
6	Chemist/supervisor	1	2,000	24,000
7	Mechanic	1	900	10,800
8	Operator	1	550	6,600
9	Production worker	3	1,200	14,400
10	Guard	2	800	9,600
Sub - total		**13**	**12,750**	**153,000**
Employees benefit, 20% of basic salary			**2,550**	**30,600**
Total			**15,300**	**183,600**

B. TRAINING REQUIREMENT

One chemist, a mechanic and an operator need to be given a 3 weeks training on processing, operation and maintenance of machinery during the erection and commissioning period by an advanced technician of the machinery supplier. The training cost is estimated at Birr 120,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the vinegar 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 3.93 million (see Table 7.1). From the total investment cost the highest share (Birr 3.26 million or 82.99%) is accounted by fixed investment cost followed by pre operation cost (Birr 564.43 thousand or 14.37%) and initial working capital (Birr 103.64 thousand or 2.64%). From the total investment cost Birr 1.4 million or 34.30% 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	9.31		9.31	0.24
1.2	Building and civil work	900.00		900.00	22.92
1.3	Machinery and equipment	350.00	1,400.00	1,750.00	44.56
1.4	Vehicles	450.00		450.00	11.46
1.5	Office furniture and equipment	150.00		150.00	3.82
	Sub total	**1,859.31**	**1,400.00**	**3,259.31**	**82.99**
2	**Pre operating cost ***				
2.1	Pre operating cost	307.50		307.50	7.83
2.2	Interest during construction	256.93		256.93	6.54

	Sub total	**564.43**		**564.43**	**14.37**
3	**Working capital ****	**103.64**		**103.64**	**2.64**
	Grand Total	**2,527.38**	**1,400.00**	**3,927.38**	**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 152.2 thousand. However, only the initial working capital of Birr 103.6 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 1.64 million (see Table 7.2). The cost of depreciation account for 33.64% of the production cost. The other major components of the production cost are cost of raw material, financial cost and labor, which account for 19.42%, 15.06% and 9.32%, respectively. The remaining 22.56% is the share of utility, repair and maintenance, labor overhead and administration cost. For detail production cost see Appendix 7.A.2.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY (YEAR THREE)

Items	**Cost (000 Birr)**	**%**
Raw Material and Inputs	318.90	19.42
Utilities	52.62	3.20
Maintenance and repair	87.50	5.33
Labour direct	153.00	9.32
Labour overheads	30.60	1.86
Administration Costs	75.00	4.57

Land lease cost	-	-
Cost of marketing and distribution	125.00	7.61
Total Operating Costs	**842.62**	**51.30**
Depreciation	552.50	33.64
Cost of Finance	247.30	15.06
Total Production Cost	**1,642.42**	**100**

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 673 thousand to Birr 772 thousand during the life of the project. Moreover, at the end of the project life the accumulated net cash flow amounts to Birr 6.31 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.

$$\text{Break- Even Sales Value} = \frac{\text{Fixed Cost + Financial Cost}}{\text{Variable Margin ratio (\%)}} = \text{Birr } 840{,}000$$

$$\text{Break- Even Capacity utilization} = \frac{\text{Break -even Sales Value}}{\text{Sales revenue}} \times 100 = 52.83\%$$

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 23.86% 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 2.59 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 13 persons. The project will generate Birr 1.55 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports. The project will also create forward linkage with the food processing sub sector and backward linkage with horticulture farming sub sector and sugar producers. The project will also generate income for the Government in terms of payroll tax.

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	59.79	67.77	79.73	79.73	79.73	79.73	79.73	79.73	79.73	79.73
Accounts receivable	55.27	61.25	70.22	70.22	70.47	70.47	70.47	70.47	70.47	70.47
Cash-in-hand	3.61	4.09	4.81	4.81	4.85	4.85	4.85	4.85	4.85	4.85
CURRENT ASSETS	**118.67**	**133.10**	**154.75**	**154.75**	**155.04**	**155.04**	**155.04**	**155.04**	**155.04**	**155.04**
Accounts payable	15.03	17.04	20.04	20.04	20.04	20.04	20.04	20.04	20.04	20.04
CURRENT LIABILITIES	**15.03**	**17.04**	**20.04**	**20.04**	**20.04**	**20.04**	**20.04**	**20.04**	**20.04**	**20.04**
TOTAL WORKING CAPITAL	**103.64**	**116.06**	**134.71**	**134.71**	**135.00**	**135.00**	**135.00**	**135.00**	**135.00**	**135.00**

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	239	271	319	319	319	319	319	319	319	319
Utilities	39	45	53	53	53	53	53	53	53	53
Maintenance and repair	66	74	88	88	88	88	88	88	88	88
Labour direct	115	130	153	153	153	153	153	153	153	153
Labour overheads	23	26	31	31	31	31	31	31	31	31
Administration Costs	56	64	75	75	75	75	75	75	75	75
Land lease cost	0	0	0	0	3	3	3	3	3	3
Cost of marketing and distribution	125	125	125	125	125	125	125	125	125	125
Total Operating Costs	**663**	**735**	**843**	**843**	**846**	**846**	**846**	**846**	**846**	**846**
Depreciation	553	553	553	553	553	51	51	51	51	51
Cost of Finance	0	283	247	212	177	141	106	71	35	0
Total Production Cost	**1,216**	**1,570**	**1,642**	**1,607**	**1,575**	**1,038**	**1,003**	**967**	**932**	**897**

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	1,500	1,700	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Less variable costs	538	610	718	718	718	718	718	718	718	718
VARIABLE MARGIN	**962**	**1,090**	**1,282**	**1,282**	**1,282**	**1,282**	**1,282**	**1,282**	**1,282**	**1,282**
in % of sales revenue	64.12	64.12	64.12	64.12	64.12	64.12	64.12	64.12	64.12	64.12
Less fixed costs	678	678	678	678	680	179	179	179	179	179
OPERATIONAL MARGIN	**284**	**413**	**605**	**605**	**602**	**1,103**	**1,103**	**1,103**	**1,103**	**1,103**
in % of sales revenue	18.95	24.27	30.24	30.24	30.09	55.17	55.17	55.17	55.17	55.17
Financial costs		283	247	212	177	141	106	71	35	0
GROSS PROFIT	**284**	**130**	**358**	**393**	**425**	**962**	**997**	**1,033**	**1,068**	**1,103**
in % of sales revenue	18.95	7.64	17.88	19.65	21.26	48.10	49.87	51.64	53.40	55.17
Income (corporate) tax	0	0	0	0	0	289	299	310	320	331
NET PROFIT	**284**	**130**	**358**	**393**	**425**	**673**	**698**	**723**	**748**	**772**
in % of sales revenue	18.95	7.64	17.88	19.65	21.26	33.67	34.91	36.15	37.38	38.62

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	**3,567**	**1,876**	**1,702**	**2,003**	**2,000**	**2,000**	**2,000**	**2,000**	**2,000**	**2,000**	**2,000**	**941**
Inflow funds	3,567	376	2	3	0	0	0	0	0	0	0	0
Inflow operation	0	1,500	1,700	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	941
TOTAL CASH OUTFLOW	**3,567**	**1,039**	**1,385**	**1,465**	**1,408**	**1,376**	**1,629**	**1,604**	**1,579**	**1,555**	**1,177**	**0**
Increase in fixed assets	3,567	0	0	0	0	0	0	0	0	0	0	0
Increase in current assets	0	119	14	22	0	0	0	0	0	0	0	0
Operating costs	0	538	610	718	718	721	721	721	721	721	721	0
Marketing and Distribution cost	0	125	125	125	125	125	125	125	125	125	125	0
Income tax	0	0	0	0	0	0	289	299	310	320	331	0
Financial costs	0	257	283	247	212	177	141	106	71	35	0	0
Loan repayment	0	0	353	353	353	353	353	353	353	353	0	0
SURPLUS (DEFICIT)	**0**	**837**	**317**	**538**	**592**	**624**	**371**	**396**	**421**	**445**	**823**	**941**
CUMULATIVE CASH BALANCE	**0**	**837**	**1,153**	**1,692**	**2,284**	**2,908**	**3,279**	**3,675**	**4,096**	**4,541**	**5,364**	**6,306**

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**	**1,500**	**1,700**	**2,000**	**2,000**	**2,000**	**2,000**	**2,000**	**2,000**	**2,000**	**2,000**	**941**
Inflow operation	0	1,500	1,700	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	0
Other income	0	0	0	0	0	0	0	0	0	0	0	941
TOTAL CASH OUTFLOW	**3,670**	**676**	**754**	**843**	**843**	**846**	**1,134**	**1,145**	**1,155**	**1,166**	**1,177**	**0**
Increase in fixed assets	3,567	0	0	0	0	0	0	0	0	0	0	0
Increase in net working capital	104	12	19	0	0	0	0	0	0	0	0	0
Operating costs	0	538	610	718	718	721	721	721	721	721	721	0
Marketing and Distribution cost	0	125	125	125	125	125	125	125	125	125	125	0
Income (corporate) tax		0	0	0	0	0	289	299	310	320	331	0
NET CASH FLOW	**-3,670**	**824**	**946**	**1,157**	**1,157**	**1,154**	**866**	**855**	**845**	**834**	**823**	**941**
CUMULATIVE NET CASH FLOW	**-3,670**	**-2,846**	**-1,900**	**-742**	**415**	**1,569**	**2,435**	**3,290**	**4,135**	**4,969**	**5,792**	**6,733**
Net present value	-3,670	749	782	870	790	717	489	439	394	354	317	363
Cumulative net present value	-3,670	-2,921	-2,139	-1,269	-479	238	726	1,165	1,559	1,913	2,230	2,593

NET PRESENT VALUE 2,593
INTERNAL RATE OF RETURN 23.86%

NORMAL PAYBACK 4 years