38. VINEGAR

TABLE OF CONTENTS

I. SUMMARY

This profile envisages the establishment of a plant for the production of Vinegar with a capacity of 20,000 kg per annum.

The present demand for the proposed product is estimated at 70,500 liters per annum. The demand is expected to reach at 89,200 liters by the year 2010.

The plant will create employment opportunities for 10 persons.

The total investment requirement is estimated at Birr 0.86 million, out of which Birr 0.5 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 11.6% and a net present value (NPV) of Birr, 0.17 million, discounted at 8.5 %.

II. PRODUCT DESCRIPTION AND APPLICATION

Vinegar is sour tasting condiment and preservative prepared by two successive microbal processes, the first being an alcoholic fermentation effected by yeast and the second an oxidation of alcohol by Acetobacter, a genus of aerobic bacteria. Diluted solutions (4 to 8 per cent) prepared by the above method from wine, cider or malt are called vinegar. Vinegar also contains small quantities of ash, sugars, phosphoric acid, alcohol and glycerol.

Vinegar is used in food processing industries such as sauce, pickle, etc. and also directly used by the consumers in making chutney, salads etc. The vinegar, thus, has its uses both in urban households of higher income group 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. Its consumption is influenced, among other things, by urbanization and income. The major consumers of the product are, therefore, high- and middle-income urban households. Other users of the product include food processing industries, hotels and restaurants, whose customers are essentially urban households. The demand for vinegar is, thus, highly associated with urbanization.

The country's requirement for vinegar has been met through domestic production and import. The 1993 Report on the Survey of Private Industries in Addis Ababa, puts the average annual domestic production of the product at 30,000 liters. Recent data on

domestic production of the product is, however, not readily available, albeit different local brands of the product are widely exhibited in the shelves of various retail shops, including small merchandise shops, department stores and all sorts of supermarkets. Previous IPS study, estimated the average annual domestic production of the product at 50,000 liters for the period 2001-2010. Following the results of the study, the domestic production of vinegar is set at 50,000 liters for the year 2004.

Table 3.1 provides data on imports of vinegar during 1989-2003. Apparently, the trend of imports is quite erratic. Accordingly, it was found more appropriate to consider the average annual imports for the period under reference (i.e. 17,808 liters) as the amount of the product imported in the year 2003. Assuming supply was driven by demand, the supply data, which constitutes imports and domestic production, is considered as a proxy for demand in estimating the demand for the product. Thus, the demand for the product stands at 67,808 liters for the year 2003. Further assuming the demand for vinegar grows at a rate of 4 per cent that corresponds to the rate of urban population growth, the demand for the product for the year 2004 is estimated at 70,520 liters, of which 52,000 liters are estimated to be met through domestic production and the remaining 18,520 liters through imports. Thus, domestic producers account for about 73.7 per cent of the market for the product.

Table 3.1
IMPORTS OF VINEGAR (LITERS)

Year	Import
1989	300
1990	-
1991	-
1992	570
1993	-
1994	-
1995	540
1996	540
1997	975
1998	5224
1999	2277
2000	4451
2001	22142
2002	28761
2003	130108
Average	**17808**

Source: *Customs Authority, External Trade Statistics, various years*.

2. Projected Demand

The demand for vinegar is projected making use of the 4% annual growth rate of the urban population. Assuming the existing vinegar producers in the country will maintain their market share (i.e. 73.7 %) of the projected demand, the market share of the envisaged plant (i.e. the demand gap for the product) is shown in Table 3.2.

Table 3.2
PROJECTED DEMAND FOR VINEGAR (LITERS)

Year	Projected Demand	Market Share	
		Existing Factories	Envisaged Plant
2005	73341	54080	19261
2006	76274	56243	20031
2007	79325	58493	20832
2008	82498	60833	21666
2009	85798	63266	22532
2010	89230	65797	23434
2011	92800	68428	24371
2012	96511	71166	25334
2013	100372	74012	26360
2014	104387	76973	27414
2015	108562	80052	28511
2016	112905	83254	29651
2017	117421	86584	30837
2018	122118	90047	32071
2019	127003	93649	33353
2020	132083	97395	33488

3. Pricing and Distribution

Currently, the average retail price of domestically produced vinegar is Birr 15 per liter. This price is adopted for the envisaged project.

The envisaged plant can use the existing 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 PROGRAMME

1. Plant Capacity

The plant is proposed to have a capacity of 20,000 lt per annum basing on the market study, availability of the major raw material (fruit) and minimum economies of scale.

2. Production Programme

The plant is expected to start its operation with a capacity of 70% and progressive increment of 15% reaching full capacity at the third year and thenafter due to the problem in market penetration and skill development. The plant will operate 270 days in a year and single shift of 8 hours each day. If the demand rises, it can be satisfied by increasing the number of shifts.

IV. MATERIALS AND INPUTS

A. RAW MATERIAL

The major raw material for the production of vinegar is fruit. Yeast, sugar, colourants and other chemicals such as phosphates, ammonium and potassium salts, potassium meta- bisulphate, etc. are also used as raw materials in small amount. The plant will use bottles, labels and cartons for packing of the finished product. The annual requirement of raw materials and their cost when the plant operates at full capacity is depicted in Table 4.1 below. The total cost of raw materials is estimated at Birr 60,273.

Table 4.1
ANNUAL REQUIREMENT OF RAW MATERIALS AND COST

Sr. No.	Description	Unit of Measure	Qty.	Cost ('000)		
				FC	LC	TC
1	Fruits	Ttonne	17.92	-	17.92	17.92
2	Yeast, sugar colorant and chemicals	-	lumpsum	4.2	2.5	6.7
3	Bottles	Pcs	27,000	-	20.252	20.252
4	Labels	Pcs	27,540	-	7.711	7.711
5	Carton box	Pcs	1550	-	7.69	7.69
	Grand Total			**4.2**	**56.073**	**60.273**

B. UTILITIES

The utilities required for the production of vinegar from fruit are electricity, water and fuel oil. 2000 m^3 of water, 2000 lt of fuel oil and 22,400 kWh of electricity are required by the plant, annually when it operates at full capacity. The total cost of utilities is estimated to be Birr 20,617.

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Three distinct processes are involved in the preparation of vinegar, i.e.:

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 yeast produce different kinds of decomposition products. In order to get a 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 sold 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 favourable condition, the fermentation complete in a period ranging from 72 to 96 hours, completely fermented juice usually exhibit a reading of about zero or less.

When fermentation is complete, the yeast 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 (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 does not function properly at high strength.

c) Aging

When the vinegar has reached its maximum strength it must be aged so that it is at its best quality for table use. The aging 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 p.p caps. The sealed bottles are cooled, labeled and packed in cartons for marketing.

2. Source of Technology

The suppliers' address that can be considered as source of technology is given below.

1. Uchibori Vinegar, Inc. (Uchibori Jozo k.k)
   437, Igitsurhi, yaotsu - cho, kamo-gun, Gifu 505-0303
   Tel. 0574-43-1185
   Fax: 0574-43-1781
   Email: Sales@uchibori.com

2. Kates sp.J. Bulscy igrabinscy
   ul. sprzetowa 3b
   10-347 015ztyn
   Polland
   phone: +48895333924
   + 4889533530
   Fax: +4889533544

B. ENGINEERING

1. Machinery and Equipment

The list of machinery and equipment and their quantity is shown in Table 5.1. The total cost of machinery and equipment is estimated to be Birr 500,000, out of this Birr 400,000 is required in foreign currency.

Table 5.1
LIST OF MACHINERY AND EQUIPMENT

Sr. No.	Description	Qty.
1	Boiler	1
2	Screw type juice extractor	1
3	Fermentation tanks with stirring arrangement	2
4	Air compressor	1
5	Generator for acetic fermentation	2
6	Blending tanks and utensils	2
7	Filling, capping and sealing machine	1
8	Pasteurization tanks	2
9	Bottle washing machine motorized	1
10	Filter press	1
11	Pumps	4
12	Lab equipment	set
13	Weighing scale	1

2. Land, Building and Civil Works

The overall land requirement by the envisaged project is about 300 m^2, of which 200 m^2 is built-up area. The buildings for the production line and offices will be constructed with EGA roof HCB wall and cement tile floor. The total construction cost, at a rate of Birr 1200 per m^2, is estimated to be Birr 240,000. The total land lease value, at a rate of Birr 1.2 per m^2 and for 70 years holding period, is estimated to be Birr 25,000. The total cost of land, building and civil works assuming that the total land lease cost will be paid in advance is estimated to be Birr 265,000.

3. Proposed Location

The plant should be located near the major raw material (fruit) source with a view to minimize transportation cost as well as the difficulty and wastage caused by longer transportation. The site should also have access to basic infrastructure facilities. Therefore, the proposed location for the vinegar plant is at Assosa zone.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The detailed manpower requirement for the plant is shown in Table 6.1 below together with the monthly and annual salary cost. The plant is small scale and require a total of 10 employees. The total annual labour cost is estimated to be Birr 57,000.

Table 6.1
MANPOWER REQUIREMENT AND ANNUAL LABOUR COST (BIRR)

Sr. No.	Description	Req. No.	Monthly Salary	Annual Salary
1	General manager	1	1000	12,000
2	Secretary	1	500	6,000
3	Accountant / sales person	1	800	9,600
4	Store keeper	1	300	3,600
5	Operator (technician)	1	450	5,400
6	Unskilled workers	2	300	7,200
7	Chemist / supervisor	1	600	7,200
8	Guard	2	250	6,000
	Total	**10**		**57,000**

B. TRAINING REQUIREMENT

An operator and a chemist need to be given training on processing, operation and maintenance of machinery during the machinery erection and commissioning period for about two weeks by the expert of machinery supplier. The training cost is estimated at Birr 20,000.

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 years
Source of finance	30 % equity
	70 % loan
Tax holidays	3 years
Bank interest	7.5 %
Discounted cashflow	8.5 %
Repair and maintenance	3 % of the total plant and machinery
Accounts receivable	30 days
Raw material, local	30 days
Raw materials, import	90 days
Work in progress	5 days
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days

A. TOTAL INITIAL INVESTMENT COST

The total initial investment cost of the project including working capital is estimated at 0.86 million, of which 34.5 per cent will be required in foreign currency.

The major breakdown of the total initial investment cost is shown in Table 7.1

Table 7.1
INITIAL INVESTMENT COST

Sr. No.	Cost Items	Total ('000 BIRR)
1	Land lease value	25
2.	Building and Civil Work	240
3.	Plant Machinery and Equipment	500
4.	Office Furniture and Equipment	20
5.	Vehicle	-
6.	Pre-production Expenditure*	70.8
7	Working Capital	7.6
	Total Investment cost	**863.4**
	Foreign share	**34.5%**

* *N.B Pre-production expenditure includes interest during construction (Birr 45.8thousand), training (Birr 20 thousand), and (Birr5 thousand) costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 0.3 million (see Table 7.2). The material and utility cost accounts for 29.7per cent while repair and maintenance take 6.7per cent of the production cost.

Table 7.2
ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)

Items	Cost	%
Raw Material and Inputs	60.3	22.1
Utilities	20.6	7.6
Maintenance and repair	18.3	6.7
Labour direct	57.0	20.9
Factory overheads	1.1	0.4
Administration Cost	5.0	1.8
Total Operating Costs	**162.3**	**59.5**
Depreciation	70.3	25.8
Cost of Finance	40.2	14.7
Total Production Cost	**272.7**	**100.0**

C. FINANCIAL EVALUATION

1. Profitability

According to the projected income statement, the project will start generating profit in the 3rd year of operation. Important ratios such as profit to total sales, net profit to equity (Return on equity) and net profit plus interest on total investment (return on total investment) show an increasing trend during the lifetime of the project.

The income statement and the other indicators of profitability show that the project is viable.

2. Break-even Analysis

The break-even point of the project including cost of finance when it starts to operates at full capacity (year 4) is estimated by using income statement projection.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable cost}} = 81.6\ \%$$

3. Pay-Back Period

The investment cost and income statement projection are used to project the pay-back period. The project's initial investment will be fully recovered within 7 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 11.6 % and the net present value at 8.5% discount rate is Birr 0.17 million.

D. ECONOMIC BENEFITS

The project can create employment for 10 persons. In addition to supply of the domestic needs, the project will generate Birr 12 thousand per annum in terms of tax revenue when it starts to operate at full capacity. Moreover, the Regional Government can collect employment, income tax and sales tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.