109. PROFILE ON PRODUCTION OF GRAPE JUICE

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I. SUMMARY

This profile envisages the establishment of a plant for the production of grape juice with a capacity of 100 tonnes per annum.

The present demand for the proposed product is estimated at 114 tonnes per annum. The demand is expected to reach at 204 tonnes by the year 2017.

The plant will create employment opportunities for 40 persons.

The total investment requirement is estimated at about Birr 6.03 million, out of which Birr 2.5 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 17% and a net present value (NPV) of Birr 884,820 discounted at 8.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Grape juice is sweetened and preserved non alcoholic beverage extracted by squeezing or crushing grape, an edible, sweet, juicy fruit or berries that grows on a woody grape vines. Grape fruit and the juice consists of water 89.2%, food energy 172 kJ., proteins 0.5 g., fat 0.1g., carbohydrates 9.8g., and ash, calcium, phosphorous, iron, sodium, potassium, vitamin A, thiamin, riboflavin, niacin and ascorbic acid in small amount. Grape used to make juices must have a pronounced flavor combined with high acidity and moderate sugar content. The major consumers of the grape juice are house holds, supermarkets, hotels and restaurants, hospitals and for export.

Processing of fruit juice should comply with Ethiopian Standard (ES 360:2001). The raw materials, additives and the processing procedures should be selected as per the Standard.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past supply and present Demand

In the past mass conniption of processed and packed juice was not accustomed by the Ethiopian population. This could be mainly due to non availability of locally processed and packed juices at a reasonable price and low purchasing power of the population. But as urbanization is expanding and the purchasing power of the population is increasing the high and middle income household are buying expensive fruit juices imported from abroad. The trend is expected to continue for the future in addition to the existing wide export market in neighboring countries and the Middle East. Table 3.1 depicts the import of canned grape juice in the past eight years i.e. 1999-2006

Table 3.1

Import of Grape Juice (kg)

Year	Quantity
1999	15,450
2000	14,812
2001	40,532
2002	22,132
2003	32,771
2004	45,046
2005	30,994
2006	38,702

Source:- *Ethiopian Customs Authority*

Import of grape juice has shown a general increase in the past eight years although there is a fluctuation in some years. The yearly average import during the period 1999-2000 was 15,131 kg. During the period 2001-2003 the yearly average quantity imported has increased to about 32,000 kg which is double compared to the previous years. During the recent three

years, i.e. 2004-2006, the yearly average import was more than 38 thousand k.g which is higher than by 25% compared to the period 2001-2003. This shows that the consumption of canned grape juice in the country is increasing at a faster rate.

Therefore, if the product to be produced locally is competitive in price and quality and proper promotion and distribution is worked out the local market is expected to absorb twice of the average level of import during the period 2004-2006. Hence, the current effective demand that would be expected in the local market is about 76,000 kg. Assuming additional 50% of grape juice will be exported to neighboring and Middle East countries the total present demand is estimated at 114,000 k.g.

2. Demand Projection

As urbanization expands and income rises there is a shift towards more expensive foods such as fruit juices. In the major cities of Ethiopia such as, Awassa, Mekelle, Bahir Dar, Dire Dawa, Addis Ababa, Nazareth and the like there are a number of high and middle income groups who can afford to buy more expensive food products such as canned grape juice if the product is made available in the markets.

The above situation leads to the conclusion that the future demand for grape juice is mainly a function of urbanization, income, price and change in the consumption habit of the population. Moreover, if the product is supplied in competitive price and quality the export potential in neighboring countries and the Middle East is very high. Therefore, considering all the above factors, demand for fruit juice is forecasted to grow at the average of 6% per annum. Accordingly, as shown in Table 3.2 the demand ranges from 120,840 kg in 2008 to 152,558 kg and 204,157 kg by the year 2012 and 2017 respectively.

Table 3.2

PROJECTED DEMAND FOR GRAPE JUICE

Year	Quantity
2008	120.840
2009	128,090
2010	175,776
2011	143,922
2012	152,558
2013	161,711
2014	171,414
2015	181,698
2016	192,600
2017	204,157

3. Pricing and Distribution

The current average retail selling price of different types of juice ranges from Birr 7 to Birr 10 per 500 grams. Taking this price as a reference and allowing margin for wholesalers & retailers a factory gate price of Birr 8 is proposed for the envisaged project.

The existing food and beverage distributors/wholesalers and supermarkets could be used as an outlet for the product.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

The proposed annual processing capacity of the envisaged plant is 100 tones grape juice, based on 300 working days a year and a single shift of 8 hours per day. The capacity can be increased by increasing the number of working hours per day.

2. Production Programme

The production programme is indicated in Table 3.3. At the initial stage of the production, the plant requires some years to penetrate into the market and develop skill in production. Therefore, in the first and second year of production, the capacity utilization rate will be 60% and 85%, respectively. In third year and thereafter, full capacity (100%) production shall be attained.

Table 3.3

PRODUCTION PROGRAMME

Sr. No.	Product	Production Year		
		2007	2008	2009-2016
1.	grape juice (Tonnes)	60	85	100
2.	Capacity utilization (%)	60	85	100

IV. MATERIALS AND INPUTS

A. RAW & AUXILIARY MATERIALS

According to Ethiopian Standard, ES 360:2001, fruits used for canning shall be sufficiently ripe, fresh, wholesome and sound, free from traces of spoilage, insects, parts of insects and foreign matters. The additives shall be clean and shall not be harmful to human health.

The principal raw materials, additives and packing material required by the project are indicated in Table 4.1. The major raw material, grape fruit can be grown in the region or sourced from neighboring regions. The total cost of raw material is estimated at Birr 556.5 thousand.

Table 4.1

RAW & AUXILIARY MATERIALS REQUIREMENT AND COST

(AT FULL CAPACITY)

Sr. No.	Raw & Auxiliary Material	Unit of Measure	Qty.	Cost ('000 Birr)		
				FC	LC	Total
1.	Grape Fruits	Tons	170	-	425	425
2.	Sugar	Kg	1,000	-	6.5	6.5
3.	Plastic bottles (food grade)	Pcs.	100,000	-	50	50
5.	Plastic sheet (for shrink wrapping)	Tons	5	-	75	75
Grand Total					**556.5**	**556.5**

B. UTILITIES

The major utilities of the envisaged project are electricity, furnace oil and water. The annual consumption and cost of utilities is indicated in Table 4.2.The total annual cost of utilities is estimated at Birr 275,832.

Table 4.2

ANNUAL UTILITIES REQUIREMENT AND COST

Sr. No.	Utility	Unit of Measure	Qty.	Unit cost	Total cost
1	Electricity	kWh	120,000	0.4736	56,832
2	Water	m^3	6,000	3.10	18,600
3	Furnace	Lt.	60,000	3.34	200,400
	Total				**275,832**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The most important steps involved in processing juices are:

- Selection and preparation of fruits,
- Extraction of juice,
- Straining, filtration and clarification, and
- Preservation.

The best juice is extracted from freshly picked, sound and suitable varieties, when these fruits shall be properly selected. The selected fruits will be washed by rotary brusher to remove soil and dirt from the grove. Before processing stems and leaves need to be removed from the fruit. Juice from fresh fruits is extracted by crushing and pressing.

Different methods are used to separate suspended matter in the juice which is caused by broken fruit, tissue, seed and skin, and various gums, peptic substances and proteins in colloidal suspension. These impurities can be removed by filtration. Sometimes centrifugation method is applied.

After the juice becomes free from suspended impurities, refrigeration and pasteurization at 90ºc for 30 seconds be conducted for preserving the juice extracted. Finally, the pasteurized juice shall be cooled, filled, labeled and dispatched.

2. Source of Technology

The machinery and equipment required by the envisaged project can be obtained from the following companies specialized in manufacture of machinery for juice production.

1. Pomejuice and products,
   11, Bayajapur, post-pimpal kothetal,
   Satana, Nasik, Mahaashtra,
   India – 423204,
   Tel -91-2555-242625.

2. Vicent corporation
   2810E, 5th Avenue
   Tampa, FL 33605
   United states
   Phone: (813) 248-2650
   E-mail: Sharon@vicent corp.com

B. ENGINEERING

1. Machinery and Equipment

The list of machinery and equipment of the project is indicated in Table 5.1. The total cost of machinery and equipment is estimated at Birr 2.5 million, out of which Birr 2 million is required in foreign currency.

Table 5.1
LIST OF MACHINERY AND EQUIPMENT

Sr. No.	Item description	Qty.
1.	Receiving line and bins	Set
2.	Inspection, washing, sizing	Set
3.	Rasper	1
4.	Juice extractor	1
5.	Finisher	1
6.	Pasteurizer	1
7.	Filler and sealer	1
8.	Cooling machine	1
9.	Labeller	1
10.	Centrifuge	1
11.	Vessels (with 2 pumps)	Set
12.	Boiler	1
13.	Conveying unit	1
14.	Laboratory equipment	Set

2. Land, Building and Civil works

The total land requirement of the project is about 2500m^2, out of which built-up area is 1500m^2. The total construction cost of building assuming a construction rate of Birr 1800 per m^2 is estimated at Birr 2.7 million. The lease value of land, at the rate of 0.10 Birr / m^2, and for 80 years of land holding, is Birr 20,000. The total cost of building and civil works is about Birr 2,720,000.

3. Proposed Location and Site

Celklektu town at Kochere woreda is proposed as a location for the envisaged grape juice plant.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The envisaged project requires 40 work forces. The list of manpower for the envisaged project is indicated in Table 6.1. The annual cost of labour including fringe benefits is estimated at Birr 361.440 thousand.

Table 6.1

MANPOWER REQUIREMENT AND ANNUAL LABOUR COST

Sr. No.	Description	Req. No.	Monthly Salary (Birr)	Annual Salary (Birr)
1.	General Manager	1	2,500	30,000
2.	Secretary	1	700	8,400
3.	Marketing Officer	1	1,400	16,800
4.	Purchaser	1	1,200	14,400
5.	Accountant	1	1,400	16,800
6	Personnel	1	1,400	16,800
7.	Cashier	1	500	6,000
8.	Production Head	1	1600	19,200
9.	chemist	2	1,800	16,800
10.	Mechanic	1	900	10,800
11.	Electrician	1	900	10,800
12.	Store keeper	1	600	7,200
13.	Driver	2	900	10,800
14.	Operators	6	3600	43,200
15.	Laborers	15	4500	54,000
16.	Guards	4	1,200	10,800
	Sub-Total	**40**	**25,100**	301,200
	Benefits (20% BS)		5,020	60,240
	Grand Total		**30,120**	**361,440**

B. TRAINING REQUIREMENT

The training of production head, quality control chemists, electrician and mechanic will take place for about two weeks by the supplier of machinery during erection. Machine operators shall be trained by in-house staff before commissioning. The cost of training is estimated at Birr 10,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the grape juice 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	8%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	15 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 investment cost of the project including working capital is estimated at Birr 6.03 million, of which 29 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 Cost ('000 Birr)
1	Land lease value	20.0
2	Building and Civil Work	2,700.0
3	Plant Machinery and Equipment	2,500.0
4	Office Furniture and Equipment	75.0
5	Vehicle	200.0
6	Pre-production Expenditure*	421.0
7	Working Capital	123.7
	Total Investment cost	**6,039.7**
	Foreign Share	29

** N.B Pre-production expenditure includes interest during construction (Birr 345.98 thousand) training (Birr 10 thousand) and Birr 65 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 1.99 million (see Table 7.2). The material and utility cost accounts for 41.78 per cent, while repair and maintenance take 3.76 per cent of the production cost.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)

Items	Cost	%
Raw Material and Inputs	556.50	27.93
Utilities	275.83	13.84
Maintenance and repair	75	3.76
Labour direct	180.72	9.07
Factory overheads	60.24	3.02
Administration Costs	120.48	6.05
Total Operating Costs	1,268.77	63.68
Depreciation	447.5	22.46
Cost of Finance	276.02	13.85
Total Production Cost	**1,992.29**	**100**

C. FINANCIAL EVALUATION

1. Profitability

According to the projected income statement, the project will start generating profit in the first 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 life-time 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 operate at full capacity (year 3) is estimated by using income statement projection.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 35\ \%$$

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 6 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 17 % and the net present value at 8.5% discount rate is Birr 884,820.

D. ECONOMIC BENEFITS

The project can create employment for 40 persons. In addition to supply of the domestic needs, the project will generate Birr 1.28 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.