

## **45. ALCOHOLIC LIQUOR**

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## **I. SUMMARY**

This profile envisages the establishment of a plant for the production of Alcoholic Liquor with a capacity of 50,000 liters per annum.

At country and regional level the present demand for the proposed product is estimated at 5 million and 42,412 liters per annum respectively. The demand at national level is expected to reach at 6.7 million liters by the year 2010. By the year 2010 demand for the product in BGRS is forecasted to reach at about 56.83 thousand liters.

The plant will create employment opportunities for 15 persons.

The total investment requirement is estimated at Birr 2.8 million, out of which Birr 2 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 13.65% and a net present value (NPV) of Birr 0.84 million, discounted at 8.5 %.

## **II. PRODUCT DESCRIPTION AND APPLICATION**

Alcoholic liquor includes any alcoholic beverages made through the process of distillation, as compared with processes of brewing and fermentation used to produce wine and beer. Alcoholic liquors are the strongest of alcoholic beverages. They are obtained by mixing or redistilling neutral spirits, brandy, gin or other distilled spirit with or over fruits, flowers, plants, pure juices or other natural flavouring materials, or with extracts derived from infusions, percolations, or maceration of such materials.

## **III. MARKET STUDY AND PLANT CAPACITY**

### **A. MARKET STUDY**

#### **1. Past Supply And Present Demand**

The source of alcohol and liquor consumption in Ethiopia is both local production and import. The National Alcohol and Liquor Factory - a state-owned enterprise- is the largest domestic producer having a production capacity of 4.5 million liters per annum. Although there are a number of small private factories too, according to an assessment made by National Alcohol and Liquor Factory, their combined production is about 30% of the state-owned enterprise, which means about 1.5 million liters. Presently, none of these enterprises is involved in export sales.

The aggregate production capacity for alcohol and liquor production in the country is thus at present, about 6 million liters. Table 3.1 shows the actual annual production of alcohol and liquor (public and private combined) during a ten years period.

**Table 3.1****ALCOHOL AND LIQUOR PRODUCTION (1991/92 - 2001/2002)**

<b>Year</b>	<b>Production (Tonnes)</b>
1992/93	3,677,800
1993/94	6,133,300
1994/95	3,137,400
1995/96	3,590,100
1996/97	4,600,100
1997/98	4,395,100
1998/99	4,778,600
1999/2000	4,412,700
2000/2001	5,076,400
2001/2002	5,397,000

*Source : Central Statistical Authority(CSA), Survey of the Manufacturing and Electricity Industries, Annual Issues.*

It is worth noting that the overall production capacity of existing factories (6 million liters) is currently exceeding the actual annual production in the country (4 to 5 million liters).

Apart from domestic production, different types and brands of alcoholic beverages are imported to the country through legal and illegal means. The major imported alcoholic drinks include: Whisky, Gin, Champaign, Wine, Vermouth, Rum, Vodka and Beer. Table 3.2 shows the type and volume of alcoholic beverages legally imported to the country during the period 1997 - 2003.

**Table 3. 2****VOLUME OF IMPORTED ALCOHOL AND LIQUORS (LITER)**

<b>Year</b>	<b>Whisky</b>	<b>Gin</b>	<b>Vermouth</b>	<b>Rum</b>	<b>Vodka</b>	<b>Other Spirit. Bev.</b>	<b>Ethyl Alcohol</b>	<b>Methyl Alcohol</b>	<b>TOTAL</b>
1997	401037	32954	82222	8315	-	174558	19	328	699433
1998	368523	41586	5641	4020	1100	90952	717	25781	538320
1999	214129	51983	2517	407	32391	56893	15	2423	360758
2000	235588	47426	5713	580	25700	11682	172	-	326861
2001	569637	99420	6176	852	80120	258990	141	213	1015549
2002	460102	27960	463	3470	78307	50440	362	4371	625475
2003	303279	21073	12567	1561	139	26601	1557	-	366777

*Source : Customs Authority, External Trade Statistics, Annual Issues.*

One can observe from the table that apart from year 2001 when significant increase in total imports was registered (1,015,549 liter), the data is not characterized by a growth trend. Excluding the figure representing 2001's import, average import of alcohol and liquors is about 500,000 liters per annum. When specific items are considered, whisky accounts for the largest imported volume.

It is also worth noting that imports mainly concern alcohols not available on the local market such as Whisky and Vermouth. The importance of international brands, especially for Whisky, is of particular importance.

The range of alcohol and liquor products of National Alcohol and Liquor Factory, and annual sales volumes during the past three years are shown in Table 3.3. The average total sales volume in this period was about 3.5 million liters. Gin and Ouzo account for the largest share of sales - about 40% each.

**Table 3.3**  
**NATIONAL ALCOHOL AND LIQUOR FACTORY - DOMESTIC SALES OF**  
**SPIRITUOUS BEVERAGES (LITERS)**

<b>Sr. No.</b>	<b>Product</b>	<b>2001/2002</b>	<b>2001/2002</b>	<b>2002/2003</b>
1	Gin	1,233,000	1,280,808	1,415,231
2	Ouzo	1,327,842	1,329,558	1,325,693
3	Double Ouzo	9,907	54,452	74,432
4	Brandy	16,121	16,887	18,469
5	Ferenit	39,817	34,459	44,439
6	Bitter	15,925	15,327	9,327
7	Cognac	1,417	4,948	7,763
8	Coffee Araki	807	580	787
9	Orange Araki	1,537	1,429	1,894
10	Aperitif	33,232	44,002	59,143
11	Pure Alcohol	538,417	535,159	160,640
12	Denatured Alcohol	240,823	276,224	228,264
	<b>TOTAL</b>	<b>3,458,845</b>	<b>3,593,833</b>	<b>3,346,082</b>

*Source : National Alcohol and Liquor Factory.*

The data on Table 3.3 above covers only the official sales of National Alcohol and Liquor Factory. As mentioned before, taking into account small private producers (accounting for about 30% of production), it is possible to estimate the total Ethiopian Alcohol and Liquor market to be about 5 million litres per annum. Taking the current population of Ethiopia, the per capita consumption is estimated at 0.0714 litres per annum.

Taking the estimated per capita consumption of the country, the current demand for alcoholic liquor in BGRS is estimated at 42,412 litres.

## 2. Projected Demand

Alcohol and Liquor consumption is bound to grow as population grows and urbanization intensifies. During the ten years period (1992/93 - 2001/2002) covered by the data set in Table 3.1, the average annual growth rate of production was about 5%. Assuming this rate of growth will be maintained in the future, consumption of alcohol and liquor is projected to range from 5,000,000 liters in year 2004 to about 10 million liters by the year 2018.

**Table 3.4**  
**PROJECTED DEMAND FOR ALCOHOL AND LIQUOR**

<b>Year</b>	<b>Total Projected Demand (Million liters)</b>	<b>Projected Demand For BGRS (Thousand liters)</b>
2004	5	42.41
2005	5.25	44.53
2006	5.51	46.76
2007	5.78	49.09
2008	6.1	51.55
2009	6.4	54.13
2010	6.7	56.83
2011	7.03	59.68
2012	7.4	62.66
2013	7.75	65.79
2014	8.1	69.08
2015	8.5	72.54
2016	9.0	76.16
2017	9.4	79.97
2018	9.9	83.97

## 3. Pricing and Distribution

The factory-gate prices of Alcohol and Liquor products are shown in Table 3.5. The highest priced item is Double Ouzo Birr 17.25, and the least, denatured alcohol Birr 8.00. The factory-gate price for the envisaged product is recommended to be Birr 15 per liter each.

**Table 3.5**  
**CURRENT FACTORY-GATE PRICE OF ALCOHOLIC BEVERAGE**

<b>Sr. No.</b>	<b>Alcoholic Beverage</b>	<b>Factory Gate Price (Birr/bottle)</b>	<b>Bottle Capacity (ML)</b>
1	Gin	15.75	890
2	Ouzo	15.75	890
3	Double Ouzo	17.25	890
4	Brandy	14.00	890
5	Ferenit	15.75	890
6	Bitter	10.50	890
7	Cognac	15.75	890
8	Coffee Araki	13.25	750
9	Orange Araki	12.50	750
10	Aperitif	15.75	890
11	Pure Alcohol	15.05	1000
12	Denatured Alcohol	8.00	1000

*Source: National Alcohol and Liquor Factory.*

## **B. PLANT CAPACITY AND PRODUCTION PROGRAMME**

### **1. Plant Capacity**

Based on the market study, the plant is proposed to have a capacity of 50,000 lt of alcoholic liquor working 300 days of 8 hours each per year.

### **2. Production Programme**

The plant starts at 80% of its full capacity due to the problem in market penetration and skill development reaching 100% is the third year by 10% progressive growth.

## **IV. MATERIALS AND INPUTS**

### **A. RAW MATERIALS**

There are a number of raw materials that are of commercial significance and that can be utilized in the fermentation and potable alcohol industries. They may be fruits like grapes, apples and the like or they may be grains including corn, rye, wheat, barley and rice. On the other hand, they could also be industrial by-products like molasses.

Abundance, low cost, year round availability and high proportion of carbohydrates (fermentable sugars ) altogether, set molasses and corn in good stead in Ethiopia as against grains in the production of high alcoholic content liquors.

The direct raw materials required for the production of alcoholic liquor are cane molasses or corn, sulfuric acid, biammonium phosphate, dry instant yeast, various flavouring agents (essence) and water.

Auxiliary materials used in the alcoholic liquor industry are bottles crowns, labels & glue.

Table 4.1 shows detailed raw material requirements and their cost at full capacity running of the envisaged plant. The total cost of raw material is estimated to be Birr 84,485.625.

**Table 4.1**  
**ANNUAL RAW MATERIALS AND INPUTS REQUIREMENT AND COST**

Sr. No.	Item	Qty	Cost (Birr)		
			FC	LC	TC
1	Corn (quintals)	500	-	25,000	25,000
2	Sulfuric acid (kg)	500	-	2350	2350
3	Ammonium bisulphate (kg)	300	4,800	-	4800
4	Dry instant yeast (kg)	9.25	60.125	-	60.125
5	Essence (lt)	110.65	22,130	-	22,130
6	Bottles (5% loss) (pcs)	3350	-	10.050	10,050
7	Label (pcs)	66670	-	2,000	2,000
8	Crown (metal closure)	66670	-	16,667.50	16,667.50
9	Glue (kg)	133.34	-	1428	1428
	<b>Grand Total</b>		<b>26,990</b>	<b>57,495</b>	<b>84,485</b>

## B. UTILITIES

Utilities required the production of alcoholic liquor include electricity, fuel oil, process and cooling water and compressed air. The annual requirement of such utilities and their respective cost is depicted on Table 4.2. The total cost of utilities is estimated at Birr 47,977.80.

**Table 4.2**  
**UTILITIES REQUIREMENT AND COST**

Sr. No.	Description	Unit of Measure	Qty.	Unit Cost (Birr)	Total Cost (Birr)
1.	Electricity	kWh	4,700	0.474	2,227.80
2.	Water	m <sup>3</sup>	300	2.50	750.00
3.	Fuel Oil	lt	15,000	3.00	45,00.00
	<b>Grand Total</b>				<b>47,977.80</b>



## V. TECHNOLOGY AND ENGINEERING

### A. TECHNOLOGY

#### 1. Production Process

Any material rich in carbohydrate is a potential source of ethyl alcohol, which for industrial purposes, is obtained by the fermentation of materials containing sugar (molasses), or substance convertible into sugar, such as the starches. For the envisaged plant corn is selected since it is available in the region.

Milling of the cleaned corn breaks the outer cellulose protective wall around the kernel and exposes the starch to the cooking and conversion processes. Distillers require an even coarse meal without flour. Then, mashing process follows.

The mashing process consists of cooking, i.e, gelatinization of starch and conversion (saccharification), i.e, changing starch to grain sugar (maltose). Cooking can be carried out at atmospheric pressure in a batch system. After cooling conversion is accomplished in the cooking vessel by the addition of barley malt meal to the cooked grain.

In the fermentation tank, the grain sugars (largely maltose), produced by the action of malt enzymes (amylases) on gelatinized starch are converted nearly into equal parts of ethyl alcohol and  $\text{CO}_2$ . This is accomplished by zymase, which is produced by yeast. Yeast multiply by budding, and a new cell is produced about every 70 minutes. Although yeasts of several genera are capable of some degree of fermentation *saccharomyces cerevisiae* is almost exclusively used by the distilling industries. Fermentation of grain mashes is initiated by the inoculation of the set mash with 2.3 vol% of ripe yeast prepared separately and followed by three distinct phases. The degree of conversion, agitation of the mash, and temperature directly affect the fermentation rate.

The fermented mash is distilled to separate, select and concentrate the alcoholic products. Alcoholic liquor is produced by blending the distilled and condensed vapour (ethyl alcohol) with the required ingredients like essence, sugar, aging agents and stimulants. This simple blending operation is followed by filtration to avoid any suspended impurities. Then, packing and marketing follows.

#### 2. Source Of Technology

The following supplier of machinery and equipment can be contacted to acquire the necessary technology for the production of alcoholic liquor in a small scale.

DURGA INDUSTRIES ESTD 1994 (vipin chou han)

Address 73 Taimoor Nagar, 2<sup>nd</sup> floor, prem comple, New delhi

phone: 011- 6833160/9811455594

Fax: 91-011-6833160

## B. ENGINEERING

### 1. Machinery & Equipment

The machinery and equipment required for the production of alcoholic liquor in a small scale are depicted in detail in Table 5.1. The major ones are the mill, boiler, fermentation tank and distiller. The total cost of machinery and equipment is estimated at Birr 2,000,000.

**Table 5.1**

#### **LIST OF MACHINERY AND EQUIPMENT**

Sr. No.	Description	Qty.
1	Mill	1
2	Tank	4
3	Distiller	1
4	Condenser	1
5	Filter	1
6	Heat exchanger	1
7	Steam boiler	1
8	Pump	2
9	Manual filling and Sealing Machine	1

### 2. Land, Building and Civil Works

The total land requirement of the envisaged plant is 750m<sup>2</sup>, out of which 450 m<sup>2</sup> is a built-up area. Assuming construction cost of Birr 900 per m<sup>2</sup>, the cost of construction is estimated at Birr 405,000. The total land lease value, at a rate of Birr 1.5 per m<sup>2</sup> and 70 years of holding period, is estimated at Birr 78,750. Therefore, the total cost of land, building and civil work assuming that the total land lease cost will be paid in advance is estimated at Birr 483,750.

### 3. Processed Location

The plant is best located near the major raw material source (corn) and market to minimize transportation cost. The plant needs also water supply for the smooth running. Hence, the envisaged plant is proposed to be located at Assosa zone.

## VI. MANPOWER AND TRAINING REQUIREMENT

### A. MANPOWER REQUIREMENT

A total of 15 employees are required to run the plant. The total cost of manpower including fringe benefits is estimated at Birr 111,000. The manpower requirement for the plant and their monthly salary detail is indicated in Table 6.1.

**Table 6.1**  
**MANPOWER REQUIREMENT AND ANNUAL LABOUR COST (BIRR)**

<b>Sr. No.</b>	<b>Description</b>	<b>Req. No.</b>	<b>Monthly Salary</b>	<b>Annual Salary</b>
1	General manager	1	1500	18,000
2	Executive secretary	1	700	8,400
3	Supervisor	1	600	7,200
4	Operator technicians	2	450	10,800
5	Unskilled worker	4	300	14,400
6	Guard	2	250	6,000
7	Chemist	1	800	9,600
8	Accountant	1	600	7,200
9	Driver	2	300	7,200
	<b>Sub-total</b>	<b>15</b>		<b>88,800</b>
	Employees benefit (25% of sub total)			22,200
	<b>Grand Total</b>	<b>15</b>		<b>111,000</b>

### B. TRAINING REQUIREMENT

Since the plant is small scale and the technology is very simple, there is no need for any special training arrangement. The chemist, supervisor and operators will be oriented by the expert of machinery supplier during erection and commissioning.

## VII. FINANCIAL ANALYSIS

The financial analysis of the Alcoholic Liquor 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 2.8 million, of which 72.5 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**

<b>Sr. No.</b>	<b>Cost Items</b>	<b>Total ('000 BIRR)</b>
1	Land lease value	78,750
2.	Building and Civil Work	405,000
3.	Plant Machinery and Equipment	2,000
4.	Office Furniture and Equipment	10
5.	Vehicle	-
6.	Pre-production Expenditure*	258.85
7	Working Capital	15.31
	<b>Total Investment cost</b>	<b>2,767.92</b>
	<b>Foreign share</b>	<b>72.%</b>

\* N.B Pre-production expenditure includes interest during construction (Birr 253.85 thousand), ( Birr 5 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 of the plant is estimated at Birr 0.65 million (see Table 7.2). The material and utility cost accounts for 20.4 percent, while depreciation and financial cost take 56 per cent of the production cost.

**Table 7.2**

### **ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

<b>Items</b>	<b>Cost</b>	<b>%</b>
Raw Material and Inputs	84.5	13.0
Utilities	47.8	7.4
Maintenance and repair	24.9	3.9
Labour direct	88.8	13.7
Factory overheads *	22.2	3.4
Administration Cost **	20.0	3.1
<b>Total Operating Costs</b>	<b>288.2</b>	<b>44.5</b>
Depreciation	226.2	34.9
Cost of Finance	133.0	20.5
<b>Total Production Cost</b>	<b>647.5</b>	<b>100.0</b>

## C. FINANCIAL EVALUATION

### 1. Profitability

According to the projected income statement, the project will start generating profit in the 2<sup>nd</sup> 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.

*\*Factory overhead cost includes salaries and wages of supervisors, insurance of factory workers, social costs on salaries of direct labour, etc.*

*\*\* Administrative cost includes salaries and wages, insurance, social costs, materials and services used by administrative staff etc.*

## 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.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable cost}} = 79.4 \%$$

## 3. Pay-BackPeriod

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 13.65 % and the net present value at 8.5% discount rate is Birr 0.84 million.

## D. ECONOMIC BENEFITS

The project can create employment for 15 persons. In addition to supply of the domestic needs, the project will generate Birr 0.4 million 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.