10. COMPOSITE FLOUR MANUFACTURING PLANT

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I. SUMMARY

This profile envisages the establishment of a plant for the production of composite flour with a capacity of 8,500 tonnes per annum.

The present demand for the proposed product is estimated at 9,000 tonnes per annum. The demand is expected to reach at 3,217 tonnes by the year 2020.

The plant will create employment opportunities for 61 persons.

The total investment requirement is estimated at Birr 16.14 million, out of which Birr 6 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 24.34 % and a net present value (NPV) of Birr 10.88 million, discounted at 8.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Composite flour is a finely ground meal of cereal crops such as wheat, rye, maize, Soybean, sorghum, rice, etc., obtained by milling and blending different streams. Flour contains various nutrients such as starch, carbohydrates, minerals, proteins and others. Composite flour has better nutritional value in respect to elements of minerals, vitamins, fibers, proteins and the like than flour milled from any specific cereal alone. It can be consumed by infants, adults, and the old.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The demand for composite flour constitutes a very small proportion of the total demand for flour. Therefore, a sound basis for estimating the demand for composite flour would be analyzing the supply and demand for flour in general.

The domestic production of flour during a ten years period of time is shown in Table 3.1.

Table 3.1

DOMESTIC PRODUCTION OF FLOUR

(TONNES)

Year	Local Production
1996	167,237
1997	124,375
1998	145,203
1999	110,185
2000	170,453
2001	206,567
2002	177,312
2003	152,648
2004	151,398
2005	174,466

Source: CSA, Report of the survey of Manufacturing & Electricity Industries, Annual Issues

A glance at Table 3.1 easily reveals that the commercial production of flour in Ethiopia is marked by a general growth trend. The highest level of production, i.e, about 206,000 tonnes, was attained in year 2001. The Average level of domestic supply during the most recent three years covered by the data set (2003-2005) was about 160,000 tonnes; and this amount is considered to approximate the present (2007) local supply of commercial flour.

Apart from local production, the country also imports considerable quantity of flour from European and Asian countries. The import data of flour is shown in Table 3.2.

Table 3.2

IMPORT OF FLOUR

Year	Import (tonnes)
1997	196
1998	5,952
1999	10,651
2000	24,985
2001	3,564
2002	13,757
2003	120,753
2004	19,708
2005	801
2006	2,794

***Source**; External Trade Statistics.*

Import of flour is also characterized fluctuation form year to year. The import registered in the year 2003, i.e, about 120,753 tonnes, could be considered as a record figure. Taking the average of the period under analyses as a point of departure, one can conclude that the present supply of flour originating from overseas is in the order of 20,316 tonnes. When added to the domestic supply, aggregate supply, or apparent consumption would thus be about 180,316 tonnes.

Assuming that the market for flour is competitive, the apparent consumption or supply pattern is used as a proxy measure of demand; and, hence, the above figure is considered as a fair approximation of present effective demand for commercial flour.

As mentioned earlier, composite flour, however, constitutes a small fraction of the total flour demand. According to knowledgeable opinion, the magnitude of demand for composite flour could not exceed 5% of the total flour demand. Based on this, present effective demand for composite flour is estimated at 9,000 tonnes per annum.

2. Projected Demand

Flour demand in general and composite flour demand in particular, is mainly determined by the growth rate of population and the per capita consumption of flour.

The apparent consumption of flour had not, however, exhibited a discernible growth trend in the past as the data in Table 3.1 and 3.2 clearly show. The demand for composite flour, too, could not be expected to grow at a high rate since the population's food habit for this product is still rudimentary. Therefore, a modest growth rate of 3%, which is close to the population growth rate, is used to project future demand for composite flour and the result is shown in Table. 3.3.

Table 3.3

PROJECTED DEMAND FOR COMPOSITE FLOUR

Year	Projected Demand (Tonnes)
2008	9,270
2009	9,548
2010	9,835
2011	10,130
2012	10,433
2013	10,746
2014	11,069
2015	11,401
2016	11,743
2017	12,095
2018	12,458
2019	12,832
2020	13,217

3. Pricing and Distribution

The only locally produced flour having a composite preparation is Faffa, (Dube Duket). Faffa is basically prepared from local cereals and legumes like wheat, chick peas, soya flour, dry skim milk, sugar, vitamins and minerals.

A pack of Fafa weighs 2 kilogrammes and is sold presently at Birr 9.00. Accordingly, after allowing margin for retailers and wholesalers, a price of Birr 3,700 per tonne is proposed for the envisaged project.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

According to the market study, the demand for composite flour in the year 2006 is 10,000 tonnes, and this figure will grow to about 15,125 tonnes by the year 2020. Accordingly based on the demand projection, the proposed plant will have a production capacity of 8,500 tonnes per annum. The plant will operate 3 shifts of 8 hours a day, and for 300 days a year. The average extraction rate of flour and bran is taken to be 85% and 15%, respectively.

2. Production Programme

The plant will start operation at 75% of its installed production capacity during the first year, and will raise its production to 85% during the second year, and then to 100% during the third year and then after (see Table 3.4).

Table 3.4

PRODUCTION PROGRAMME

Year		**1**	**2**	**3-10**
Capacity utilization (%)		75	85	100
Production (Tonne)	Flour	6,375	7,200	8500
	Bran	750	850	1,000

IV. MATERIALS AND INPUTS

A. RAW AND AUXILIARY MATERIALS

For the purpose of this project profile, composite flour shall be produced from wheat, maize, sorghum and soy bean. The impurity rate shall be made not to exceed 5%. The proportion of the composite grains will be 50% wheat, 30% maize, 15% Soya bean, and 5% sorghum. These cereals can be grown in the rural area of the SNNPRS.

Auxiliary materials include: Polypropylene bags (pp bags) of 50 kg, 10kg and 5kg for flour.

Raw and auxiliary materials and corresponding annual costs at full production capacity of the plant is given in Table 4.1.The total cost of raw & auxiliary materials is estimated at Birr 25.567 million.

Table 4.1

ANNUAL REQUIREMENT OF RAW & AUXILIARY MATERIALS & COSTS

Sr. No.	Description	Unit of Meas.	Qty	Unit price	Cost, ('000 Birr)
1	Wheat	Tonnes	5,000	2600	13,000
2	Maize	Tonnes	3,000	1500	4500
3	Soya bean	Tonnes	1,500	4500	6750
4	Sorghum	Tonnes	500	1000	500
5	PP bag – 50kg	pcs	80,000	2.23	178.4
6	PP bag – 10kg	pcs	225,000	1.18	265.5
7	PP bag – 5kg	Pcs	450,000	0.83	373.5
	Total	-	-		**25,567**

B. UTILITIES

The major utilities required by the plant are electricity, water, lubricants and oils. Electricity is used as source of motive power for production equipment, and as sources of lighting and to supply outlet sockets. Water is used for processing and personal use. Oils and lubricants are required for production equipment. The estimated annual requirement at full production capacity of the plant is shown in Table 4.2. The total cost of utilities is estimated at Birr 150,435.

Table 4.2

ANNUAL UTILITIES REQUIREMENT AND COST

Sr. No.	Description	Unit of Measure	Qty.	Unit Cost	Cost, [Birr]
1	Electricity	KWh	300,000	0.4736	142,080
2	Water	m^3	500	5.51	2,755
3	Oil and Lubricants	Lt.	100	56	5,600
	Total	-	-		**150,435**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The major unit operations involved in the production of composite flour is:-

- Grain intake and pre-cleaning,
- Grain cleaning and preparation,
- Milling,
- Blending, and
- Packing and Dispatching.

Grain Intake and Pre-cleaning:- The major operations involved are dumping, conveying, weighing, pre-cleaning, collecting in storage silos or transferring to the working bins of the cleaning room.

Grain Cleaning and Preparation: - The main operations involved are weighing, screening, destoning, long and round impurity separation, ferromagnetic particles separation, scouring, aspiration, dampening, tempering and entoleting. In the grain cleaning room, sieves of different aperture can be interchangeably used for screening of impurities of different grains.

Milling: - Major operations are weighing, breaking open, scalping, scratching, detaching, sifting, purifying, milling (grinding), resifting and entoleting.

Blending: - Flour of different grains and / or different streams of wheat flour are blended in the required proportion. Weighing or volumetric measuring of the product is carried out prior to blending.

Packing and Dispatching: - The major operations involved are collection of flour of different cereal grains, mixing and aeration (recycling), resifting, entoleting, packing, sewing, loading and dispatching.

2. Source of Technology

The technology of grain milling can be obtained from India, China, and European countries like Italy, Germany, UK, Switzerland, etc.

Address of two manufacturers is given below.

1. Buhler Ltd. CH - 5240 Uzwil / Switzerland
   Direct Call: 073 502163
   Fax: 073 5184 50
2. P.O.chittilapilly, Trichur- 680551, kerala, India
   Telephone: 00-91-487-2306170, 2306435
   Fax: 91-487-2308890, cell: 9447481890, 9895077644
   E-mail: novaengg@rediffmail.com
   Web site: www.novaind.net

B. ENGINEERING

1. Machinery and Equipment

The list of production equipment and corresponding costs are given in Table 5.1. The total cost of machinery and equipment for the planned capacity is estimated at Birr 6 million, out of this Birr 4.8 million is required in foreign currency.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT REQUIRED

Sr. No.	Description	Qty.
1.	Screw conveyor for wheat	5
2.	Separator	2
3.	Weigher	5
4.	Trieur cylinder, set	1
5.	Scourer	2
6.	Bucket elevator for wheat	6
7.	Roller mill	27
8.	Plan sifter	2
9.	Purifier	2
10.	Bran finisher	4
11.	Flour cyclone with airlock	27
27.	Flour filter	1
13.	Detacher	8
14.	Pneumatic conveyor	1
15.	Screw conveyor for flour & bran	4
16.	Bucket elevator for flour	2
17.	Pneumatic duct, set	1

2. Land, Building and Civil Works

Total land requirement is 3,000 square meters. Land lease cost for 80 years, at the rate of Birr 0.1 per m^2, is Birr 24,000. The total built-up area for production building, offices, and other utility buildings is about 1,800 square meters. At the rate of Birr 2,500 per m^2 considering that the building are constructed by EGA sheet roof, HCB wall, and cement tile flour, the expenditure on buildings will be Birr 4.5million. Thus, the total investment on land, building and civil works is estimated to be Birr 4.524 million.

3. Proposed Location

Wheat, maize, sorghum and Soya bean can be grown in the region. These raw materials can be made available from the areas that grow these cereals. Considering factors like proximity to market (end-users), availability of infrastructure and utilities, it is proposed that the envisaged plant would be located in Bensa woreda, Daye town .

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The plant requires 61 persons for both production and administrative manpower. A detail of manpower requirement and corresponding annual salary expenditure is given in Table 6.1. The total annual cost of manpower including fringe benefit is estimated at Birr 582,480.

Table 6.1

MANPOWER REQUIREMENT & ANNUAL LABOUR COST (BIRR)

Sr. No.	Description	Req. No.	Salary, Birr	
			Monthly	Annual
1.	General manager	1	2500	30,000
2.	Secretary (Executive)	1	800	9,600
3.	Quality control head	1	1,500	18,000
4.	Chemist (quality controller)	3	2700	32,400
5.	Production and technical head	1	1800	21,600
6.	Commercial head	1	1600	19,200
7.	Finance and administration head	1	1600	19,200
8.	Personnel	1	1,200	14,400
9.	Store keeper	2	1200	14,400
10.	Purchaser	1	900	10,800
11.	Salesperson	1	900	10,800
27.	Accountant	1	900	10,800
13.	Cashier	1	500	6,000
14.	Accounting clerk	1	500	6,000
15.	Production shift leader	3	2700	32,400
16.	Operator	10	6000	72,000
17.	Laborer	15	6,750	81,000
18.	Cleaning worker	2	400	4,800
19.	Mechanic	3	1800	21,600
20.	Electrician	3	1800	21,600
22.	Driver	2	600	7,200
23.	Guard	6	1800	21,600
	Sub-total	**61**	**40450**	**485,400**
	Employee benefit (20% BS)			97,080
	Total	**61**		**582,480**

B. TRAINING REQUIREMENT

The production shift leaders, operators, mechanics, electricians and quality controllers will have to be provided two weeks on-the-job training by the personnel of machinery supplier on technological process, machinery operation, maintenance and quality aspects. The cost of training is estimated to be Birr 30,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the composite flour 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	5 years
Bank interest	8%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30days
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 16.14 million, of which 16 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	24.0
2	Building and Civil Work	4,500.0
3	Plant Machinery and Equipment	6,000.0
4	Office Furniture and Equipment	125.0
5	Vehicle	200.0
6	Pre-production Expenditure*	879.3
7	Working Capital	4,411.5
	Total Investment cost	**16,139.8**
	Foreign Share	16

** N.B Pre-production expenditure includes interest during construction (Birr 879.29 thousand) training (Birr 30 thousand) and Birr 120 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 28.17 million (see Table 7.2). The material and utility cost accounts for 91.28 per cent, while repair and maintenance take 0.43 per cent of the production cost.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)

Items	Cost	%
Raw Material and Inputs	25,567.00	90.75
Utilities	150.44	0.53
Maintenance and repair	120	0.43
Labour direct	349.49	1.24
Factory overheads	116.5	0.41
Administration Costs	232.99	0.83
Total Operating Costs	26,536.42	94.19
Depreciation	907.5	3.22
Cost of Finance	729.41	2.59
Total Production Cost	**28,173.33**	**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.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 30\ \%$$

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 5 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 24.34 % and the net present value at 8.5% discount rate is Birr 10.88 million.

D. ECONOMIC BENEFITS

The project can create employment for 61 persons. In addition to supply of the domestic needs, the project will generate Birr 7.75 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.