83. GEMSTONE

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I. SUMMARY

This profile envisages the establishment of a plant for the production of Gemstone with a capacity of 3,000 units per annum.

The present demand for the proposed product is estimated at 69,200 units per annum.

The plant will create employment opportunities for 25 persons.

The total investment requirement is estimated at Birr 1.4 million, out of which Birr 0.3 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 26.3% and a net present value (NPV) of Birr 1.24 million, discounted at 8.5 %.

II. PRODUCT DESCRIPTION AND APPLICATION

Gemstones are semi-precious stones that occur impregnated as nodules within quartz veins injected to intrusive bodies and volcanic rocks. Based on the original rough stones, gemstones can be of different types like ruby, ererald, tourmaline, opal, agate, jasper, topaz.

Gemstones are jewels used for ornamentation, especially cut or polished and valued because of great beauty. Gemstones are used as jewelry, carving, gem and mineral collections.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Gemstones are any mineral or organic materials used for personal ornament, display or object of art because they possess beauty, rarity and durability. Of 2,700 mineral species, only about 100 possess all these attributes.

Gemstones as jewelry are valued according to their beauty, hardness, rarity and the skill with which they are cut and polished. Basically, the beauty of gems mainly depends on their colour and refractory property.

Imported gems dominate the local market for gemstones. The Ethiopian Mineral Development Share Company is one of the gemstone suppliers locally with very limited quantity and has a retail shops at the center of Addis Ababa.

Mining being one of the potential high return sectors of investment in Ethiopia, investors are attracted to exploit the untapped mineral resource particularly gems like opal.

Gemstones could be supplied either as a complete jewel or as loose gemstones. In addition to natural gemstones, synthetic gemstones are also supplied to the market as an imitation of natural gems manufactured from materials that duplicate natural gemstones chemically, physically and optically. In this study, natural gems available in the region are considered.

The local market for gemstones is very limited, while the export market is wider with few countries in the world dominating the supply. According to the US Geological Survey, the US market for unset gem-quality, diamond only was estimated to be more than 12.1 billion USD, accounting more than one-third of world demand. The demand for natural, unset none-diamond gemstones was estimated at 788 million USD, making the US the dominant global consumer of gemstones.

On the other hand, 16 countries among which ten are from Africa dominate the world mine production. According to the latest revised estimate, the world mine production in year 2002 and 2003 are 75,830 and 75,000 thousands of carats, respectively. The world mine production estimated for 2003 by country is presented in Table 3.1.

Table 3.1

MINE PRODUCTION (THOUSAND OF CARATS)

Supplying Country	Year	
	2002	**2003**
Angola	5400	5000
Australia	15100	17000
Botswana	21300	20000
Brazil	700	500
Canada	4980	8000
Central Africa Republic	375	500
China	235	930
Congo (Kinshasa)	9100	4000
Guinea	270	370
Namibia	1350	1400
Russia	11500	11800
Sierra Leon	450	650
South Africa	4350	4720
Tanzania	182	440
Other countries	420	420
Total	**75830**	**75000**

***Source**: US Geological Survey Mineral Commodity Summaries, January 2004.*

2. Projected Demand

The US market demand for gemstones in year 2003 was estimated at 788 million USD. The United States of America share more than one-third of the world gem quality market. Applying this share on the estimated demand for year 2003, the world demand for gemstones is estimated at 2.4 billion USD. Considering the stable market of gemstones, the current effective demand in the world is estimated to be 2.4 million USD or about 69,200 units of gems.

3. Pricing and Distribution.

The local distribution of the envisaged project will employ the existing jewelries in addition to its own jewelry at the center of cities. However, the major target market will be the export market. The international market for gemstone in these days is done through the internet. Numerous suppliers and buyers having attractive websites with brilliant pictures and vast alternatives conduct online transactions. Therefore, exploiting this opportunity will be one of the alternatives in finding markets for the envisaged project.

Price of gemstones varies according to their type, quality and size. Different websites offer a wide rang of prices for different types of gems. The local price of gems is projected to be Birr 300 per piece. This price is adopted for this project.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

This study suggests annual production of 3,000 units of gemstones based on single shift of 8 hours per day and 300 days per annum.

2. Production Programme

The envisaged plant will start operation at 85% of its rated capacity in the first year and 95% in the second year. Full capacity production will be achieved in the third year and thenafter.

IV. MATERIALS AND INPUTS

A. RAW AND AUXILIARY MATERIALS

Materials and inputs required for gemstones lapidary include rough stones, different consumables and utilities. The required materials and inputs and their corresponding costs are indicated in Table 4.1.

Table 4.1

ESTIMATED REQUIREMENT AND COST OF ROUGH STONES

Sr. No.	Description	Annual Requirement (Units)	Cost (Birr)
1	Opal	2100	31500
2	Emerald	1050	15750
3	Tourmaline	630	9450
4	Others	420	6300
	Grand Total	**4200**	**63000**

The annual consumables and other auxiliary materials requirement at the rated capacity of the plant is given in Table 4.2.

Table 4.2

ANNUAL REQUIREMENT FOR CONSUMABLES AND OTHER AUXILIARY MATERIALS AND ESTIMATED COSTS

Sr. No.	Description	Unit of Meas.	Annual Requirement	Cost (Birr)		
				F.C	L.C	Total
1	Carborendum powder (220 mesh)	kg	90.9	5908	680	6588
2	Carborendum powder (400 mesh)	kg	90.0	6250	680	6930
3	Carborendum powder (600 mesh)	kg	45.50	3410	340	3750
4	Diamond powder (15 micron)	carats	450	2925	340	3265
5	Diamond powder (15 micron)	carats	270	9375	226	2701
6	Aluminum oxide (raybrit)	kg	2.06	3060	340	3400
7	Tin oxide	kg	2.06	1020	113	1133
8	Cirium oxide	kg	2.06	453	113	566
9	Chrome oxide	kg	9.1	910	114	1093
10	Grinding laps	pc	11.0	1490	114	1604
11	Precision drill	pc	11	690	114	804
	Total Landed Cost	-		**28591**	**3174**	**31765**

B. UTILITIES

The utilities required by the envisaged project are electric power and water. The estimated annual utilities consumption at full production capacity of the plant and the estimated costs are given in Table 4.3.

Table 4.3

ANNUAL UTILITIES REQUIREMENT AND ESTIMATED COSTS

Sr. No.	Description	Unit of Measure	Annual Requirement	Cost (Birr)
1	Electric power	kWh	44,400	97,680
2	Water	m^3	2,000	5,000
	Total			**102,680**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The process of gemstone lapidary includes grading of the purchased raw stones, cutting, polishing and delivery to customers. Individual stone is, then, examined (graded) and cut into smaller stones along its major line of fracture and inclusions. The smaller pieces are then mounted on cutting tools, which are then faceted on faceting machines. The final operation involves polishing of the faceted stones. The polished stones are then delivered to the customers or sold to the market.

2. Source of Technology

The technology of gemstones lapidary can easily be obtained through contacts with the following company.

Waheed Trade Complex
Khayaban - e-Iqbal, DHA Lahore
Tel. (042) 111-111-456
Fax (042) 5896619, 5899756
Pakistan

B. ENGINEERING

1. Machinery and Equipment

The following combination of machinery and equipment will be required. The estimated cost of acquiring the machinery and equipment is also given in Table 5.1.

Table 5.1
MACHINERY AND EQUIPMENT REQUIREMENT AND ESTIMATED COSTS

Sr. No.	Description	Qty.	Cost (Birr)		
			F.C	L.C	Total
1	Trim saw	2	18975	2070	21,045
2	Facetor	2	56800	6050	62,850
3	Calibrating machine with wheels	2	56800	6050	54,900
4	Dual edge grinding machine	1	18975	2070	18,300
5	Buffing, sanding and polishing sets	1	18975	2070	18,300
6	Gem pack	3	56800	6050	54,900
7	Faceting table	1	1840	930	1,800
	Total Landed Cost		**229165**	**93,600**	**253,765**

2. Land, Building and Civil Works

The total area of land required by the gemstone lapidary plant is 900 m^2. Land lease cost, at a rate of Birr 2/m^2 for 70 years holdings is estimated at Birr 75,600.

The total built-up area will be 500 m^2 and the total cost of construction, at a unit cost of Birr 950 per m^2, is estimated to be Birr 475,000. Total cost of land holding and construction is estimated to be Birr 550,600. Thus, the total investment cost for land, building ad civil works assuming that the total land lease cost will be paid in advance is estimated at 626,200.

3. Proposed Location

The envisaged plant can be located in Sirkole woreda of the region where the raw material for the project is available.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The envisaged project requires a total manpower of 25 persons.

The detailed manpower requirement of the plant at full operation capacity and the estimated annual cost of labour including the fringe benefits are given in Table 6.1.

Table 6.1
MANPOWER REQUIREMENT AND ESTIMATED LABOUR COST

Sr. No.	Description	No. of Persons	Salary (Birr)	
			Monthly	Annual
1	General manager	1	2,200	26,400
2	Secretary	1	650	7,800
3	Finance Head	1	1,800	21,600
4	Accountant	1	850	10,200
5	Cashier	1	500	6,000
6	Commercial head	1	1,800	21,600
7	Purchasor	1	750	9,000
8	Sales person	1	600	7,200
9	Store keeper	1	600	7,200
10	Supervisor	1	1,200	14,400
11	Shift leader	1	1,000	12,000
12	Operator	6	450	32,400
13	Labourer	3	220	7,920
14	Driver	2	450	10,800
15	Guard	3	220	7,920
	Sub-total	**25**	**13,290**	**202,440**
	Employees' benefit (20% of basic salary)			40,488
	Grand Total	**25**		**932,928**

B. TRAINING REQUIREMENT

The production supervisor, the shift leader and six operators should be given a two weeks on-the-job training by an advanced technician of the equipment supplier during commissioning. The training cost is estimated at Birr 35,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the Gemstone 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	6 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 1.4 million, of which 16.9 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	75.6
2.	Building and Civil Work	475.0
3.	Plant Machinery and Equipment	257.8
4.	Office Furniture and Equipment	30
5.	Vehicle	300
6.	Pre-production Expenditure*	114.0
7	Working Capital	147.3
	Total Investment cost	**1,395.7**
	Foreign share	**16.9**

B. PRODUCTION COST

The annual production cost at full operation capacity of the plant is estimated at Birr 0.7 million (see Table 7.2). The material and utility cost accounts for 28.3 per cent, while repair and maintenance take 5 per cent of the production cost.

** N.B Pre-production expenditure includes interest during construction (Birr 74 thousand), training (Birr 35 thousand), and (Birr 5 thousand) costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.*

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

Items	Cost	%
Raw Material and Inputs	94.8	13.6
Utilities	102.7	14.7
Maintenance and repair	34	4.9
Labour direct	202.4	29.0
Factory overheads	401.4	5.8
Administration Cost	30.0	4.3
Total Operating Costs	**504.3**	**72.2**
Depreciation	123.9	17.7
Cost of Finance	69.9	10.0
Total Production Cost	**698.2**	**100.0**

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 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 3) is estimated by using income statement projection.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable cost}} = 51\%$$

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 4 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 26.3% and the net present value at 8.5% discount rate is Birr 1.24 million.

D. ECONOMIC BENEFITS

The project can create employment for 25 persons. In addition to supply of the domestic needs, the project will generate Birr 91,430 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.