OPERATING CASH FLOWS OF A CEMENT PLANT BASED ON A LIMESTONE DEPOSIT IN MONGOLIA*

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1. Introduction

Mongolia has 2 cement plants currently operating and supplying only 35 percent of the total demand whereas 65 percent[1)] of the supply is imported from China which has negative impact on the foreign trade balance of the country. There is a need for an additional cement plant to be built in the country with reduced investment risk and low-cost.

This paper is intended to analysis of cash flows of the cement plant project to be built in Mongolia based on a limestone deposit 'Biluut'. The license holder of the deposit tends to implement the cement plant project with production capacity of 3,000 tons a day. The feasibility of the above cement plant project is evaluated by the expected cash flows generated by operation of the plant. Limited financial resources in the country and lack of educated human resource however, constrain private companies to enhance economic development and to attract foreign investment. The private company, owner of the license for the 'Biluut' deposit, plans to attract investors to successfully implement the project. From the viewpoint of investors, repayment of financing relies on the cash flow and the assets of the project itself. Annual present value of future cash flows is estimated and net present value and profitability index are analyzed[4)].

Significance of the cash flow analysis is evaluated as an attractive way to show the project is economically viable and to make 'go or not go' decision by potential investors. Net operating cash flows are estimated based on 10-years projection under several assumptions. Considering the inflation, social security reduction of the plant's employees, foreign exchange risk and market demand are further development issues of financial feasibility of the project. The paper consists of three main parts; estimate of net operating cash flow expected from the project, computation of present value of expected future cash flows and the net present value which shows if the project is worth more than it costs.

2. Background Information

'Biluut' limestone deposit located in Dalanjargalan soum of Dornogobi province located in 320 kilometers south-east from capital Ulaanbaatar city of Mongolia. The deposit is located in 17 kilometers north-west from 25th railway cross-road in Dalanjargalan soum, Dornogobi province. The geographical position of the deposit is located in the longitude of 108.55.33"and in the latitude of 45.50.20" (Figure 1).

The construction industry in Mongolia is growing rapidly at the rate of 15 to 20% a year. This is in response to the rapid economic growth of the country of about 7% a year and a population growth rate in the Ulaanbaatar city of about 2.8% a year.

The total consumption of cement in Mongolia is over 1 million tons a year, according to the statistics in 2008[1)] and is growing at about 20% per annum. Due to tax optimization strategies and border smuggling, it is quite possible that actual consumption is substantially higher.

Figure 1: Location of 'Biluut' limestone deposit

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3. Estimation of Net Operating Cash Flow

A feasibility study of the cement plant in Mongolia will be conducted as a part of research. Economic outcome is an important part of the feasibility study. Financial feasibility of the project is one of the paramount concerns. Cash flow estimation is used in financial projections and investment decision analysis to determine the project's ability to repayment of finance[1]. In order to estimate the value of this potential cement plant project, discounted cash flow is evaluated. I assumed that the project has a finite life with constant annual cash flows. Typically it is assumed that the project has infinite life with constant annual cash flows. But this analytic simplification deprives us of the ability to model and analyze the *varying* annual profile of the cash flows of the project[3]. However domestic inflation rate and other misleading factors will later be developed in order to avoid the oversimplification. Table 1 below shows the calculation of the annual revenue from the sales of the project.

Table 1: Revenue from sales a year

Market Sales Price*,US$	83.00**
Production	3,000.00
Days operating/year	265.00***
Total sales/revenue from sales, US$	65,985,000.00

The current market price for 1 ton of cement in Mongolia is 120,000 MNT equals with US$ 83.
** Based current exchange rate US$ 1 = 1,440 MNT
***The days of operating a year is considered as 265 days a year due to seasonality constraint of the country. According to the estimation in the above table, US$ 65,985,000.0 is the total annual revenue from sales. No increase is assumed in the sale's price each year. The table 2 shows cash flow from operating activities based on the estimates on the annual sales revenue.

Table 2: Operating cash flow in 2012

	2010	2011	2012
Revenues from sales	-	-	65,985,000.00
Cost of goods sold			27,825,000.00
Administrative expense (payroll)	58,360,000.00	58,360,000.00	2,040,000.00
Depreciation			7,295,000.00
Operating income/taxable income	-	-	28,825,000.00
Tax payable @10%			2,882,500.00
Net income			25,942,500.00
Depreciation			7,295,000.00
Net operating cash flow	58,360,000.00	58,360,000.00	33,237,500.00

In the Table 2, the project's net operating cash flow in 2012 is calculated as follows:

Cash inflow from sales – cost of goods sold – general, administrative expense (payroll to employees) – Depreciation[2]
= Taxable income – Tax payable (Corporate income tax)
= Net Income + Depreciation
= NET OPERATING CASH FLOW (1)

The company plans to employ 200 staff with monthly salary of US$ 850. The total annual cost for payroll to the employees is estimated to be US$ 28,875,000. The Corporate income tax is 10% a month, according to the Law of Mongolia on Enterprise and Corporate Income tax.

(1) Cost of goods sold

The Cost of Goods Sold is cost of sales and is Beginning Inventory + Purchases - Ending Inventory. Given the fact that annual consumption for cement in the country is 1 million tons, an assumption is made for the sales of the prospective

[1] For further discussion on project financing relies on the project's cash flows, Project finance in Developing countries, IFC, 1999 – lessons of experience is referred.
[2] Depreciation amount is 40 year linear depreciation for building and facility as well as 10 year linear depreciation for equipments of manufacturing plant, according to the clause 1.1 of Chapter 5, Law of Mongolia on Enterprise and Corporate Income tax.

plant is to be 100%. The cost of goods is considered in the above table as cost of buying raw materials in order to produce the finished product. It is assumed as US$ 35 per ton annually for cement. The total annual cost of goods sold is estimated as follows:

$$3{,}000 \text{ tons x } 265 \text{ operating days x US\$35} = \text{US\$ } 27{,}825{,}000. \quad (2)$$

The license holder (the company) has signed a “Lump Sum - Turn Key” contract with International Engineering Firm for Engineering, Procurement, Construction and Start up of the plant with a price proposal of US$ 116,720,000. The scope of the contract is design, engineering, supply & erection, construction, performance testing, and commissioning of production machinery and equipment. The total investment required is the US$ 116,720,000. It is assumed that the amount is divided into two parts; one for constructing the facility and other for installing equipments.
The time period of years of 2010 and 2011are considered as construction period. Since the plant will start operating from year 2012, estimated net operating cash flow is US$ 30,833,500 per year. If 10-years projection is considered then the estimated net operating cash flows in the end of year 2021 is expected to be US$ 308,335,000. The discussion is followed by present value of the above estimated net operating cash flows up to year 2021.

4. Present value of operating cash flows

In order to estimate the present value of the net operating cash flows generated from the project, 8 percent of discount rate is assumed which is widely used in practice in the country. Then the discounted cash flow is estimated as follows:

$$DCF = \frac{CF_1}{(1+0.08)^1} + \frac{CF_2}{(1+0.08)^2} + \cdots + \frac{CF_{10}}{(1+0.08)^{10}} \quad (3)$$

Based on the eqation (3), Table 3 is illustrates the computation of the discounted cash flows based on 10-years projection.

Table 3: Computation of discounted cash flows

Year	Discount rate	Yearly Cash flow	Present Value
2012	1.08	30,833,500.00	28,549,537.04
2013	1.17	30,833,500.00	26,434,756.52
2014	1.26	30,833,500.00	24,476,626.40
2015	1.36	30,833,500.00	22,663,542.97
2016	1.47	30,833,500.00	20,984,762.01
2017	1.59	30,833,500.00	19,430,335.19
2018	1.71	30,833,500.00	17,991,051.10
2019	1.85	30,833,500.00	16,658,380.65
2020	2.00	30,833,500.00	15,424,426.53
2021	2.16	30,833,500.00	14,281,876.41
Total sum			**206,895,294.81**

5. Net Present Value

Considering year 2010 and year 2011, the cash flows for these years during construction period is considered US$ 58,360,000 and US$ 58,360,000, respectively.

DFC	206,895,294.81
CF - 2010 & 2011	-116,720,000.00
NPV	90,175,294.81

If we consider the cement plant project is worth US$ 116,720,000 then according to the above NPV calculation, Net Present value is US$ 90,175,294.81 which is less than the project costs (Initial investment required is US$ 116,720,000). According to the rough calculation above, the positive NPV value shows that the project is worth undertaking within time period of more than 10 years. It also shows that the project is economically viable and the project could still

generate a surplus of benefits if discount rate remains at 8%.

As the initial investment for construction of the plant is considered to be US$ 116,720,000, the present value of the future cash flows are discounted at 8 percent and calculated as US$ 206,895,295.81. The profitability index is also computed in order to identify the relationship of initial cost and benefit of the project.

$$PI = \frac{PV\ of\ Future\ cash\ flows}{Initial\ Investment} = \frac{US\$\ 206,895,295.81}{US\$\ 116,720,000} = 1.77 \quad (4)$$

The Profitability Index (PI) above shows 1.77 in ration which could be considered as the lowest acceptable measure.

6. Conclusions

As presented above, cash flow analysis can play significant role in the decision to make investment to the project. If under assumption US$ 116,720,000 is required as an initial investment then the project is viable to repay its finance during its operation life time. With simplification of our assumptions, we can derive simple projection of the generated cash flows from the plant's operation. There are number of factors in the operating costs to be considered in the above analysis such as fixed costs and variable costs (assuming that the facility will be running at 100% capacity) as well as sunk costs. However these information and data will further be collected and integrated to the analysis in order to complete the financial feasibility analysis as well as risk profile of the project.

The Internal Rate of Return can be further analyzed to be as highest discount rate which the project can support and still break even. Though net operating cash flows are estimated, the rate of return is used to measure and to compare the profitability of the investment. Further information and data will be collected and analyzed for verifying economic viability of the project as part of my further research.

According to the above simplified cash flows estimate, the project is expected to repay its finance during its span of life time. The paper reviews the project's own operating cash flow which can be helpful to reduce the investment risk and to raise finance at low cost to the implementation.

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