CHAPTER VI

ECONOMIC RETURN ANALYSIS

This chapter attempts to analyse the economics of the zircon mineral plant in Tamil Nadu. Three measures of economic return viz. Net Present Value (NPV), Internal Rate of Return (IRR) and simply pay back period are used in these estimations. The NPV of the project is calculated at various rates and is presented in graphical form. This chapter also tries to identify some of the important factors to which the IRR is sensitive. The return of the project is estimated at 2009-10 prices for the mineral plants like Zircon. The results of the economic viability study are discussed under three main heads: (a) revenue estimation, (b) return estimation, and (c) risk impact analysis.

6.1 Revenue Estimation

The annual revenue of the zircon mining enterprise is calculated by taking into consideration the annual, the percentage of zircon minerals found in the mineral sand, the recovery efficiency of the zircon mining technology and the prices of zircon minerals considering the reserve found in the study area, the present technology of zircon mining and the market. The study assumes the capacity of the plant to be 1080 tonnes per annum. The current recovery efficiency in the zircon mineral industry in India is 32 per cent and
the average zircon mineral percentage in the study area is 8. The present study considers the life of the zircon mining plant to be 20 years. At present, zircon is the only mineral liberally permitted for export. Hence, the present study has considered only zircon for economic the return estimation. The prices of zircon are considered from the publications of the Indian Bureau of Mines, Nagpur for the year 2009-10; the annual revenue estimation is based on the data. The annual revenue of the zircon mining venture is estimated to be equal to Rs.972.00 lakhs, taking Rs.9000 as the price and 1080 tonnes as the annual production of zircon.

6.2 Return Estimation

The economic return analysis as explained in the methodology is carried out by employing the standard budgeting techniques viz., net present value (NPV), internal rate of return (IRR), and simple payback period. In this study, the cost and revenue estimation analysis show that for the base case, the capital cost, operating cost and annual revenue of the placer mining unit are Rs.1055.00 lakhs, Rs.566.00 lakhs and Rs. 972.00 lakhs respectively. The payback period of the zircon mining venture is estimated to be 2.5 years. This clearly indicates that the investment in zircon mining business in the coast of Central Tamil Nadu is got back in a short period.
Figure 6.1 shows the net present values for different discount rates. Here, discount rate is shown on the ‘x’ axis and the net present value on the ‘y’ axis. As stated the above, internal rate of return is that discount rate which makes the net present value of the project zero. Since the curve touches the ‘x’ axis at 24.5 where the net present value is zero, the internal rate of return takes the same value. This indicates the economic feasibility of zircon mineral in the study area. In short, the analysis explains that a zircon mineral plant, with a capital cost, operating cost and annual revenue of Rs.1055.00 lakhs, Rs. 566.00 lakhs and Rs.972.00 lakhs, respectively, generates an internal rate of return of 24.5 per cent which is observed to be well above the present market rate of interest (14.25 per cent rate of interest, State Bank of India, 2011) in India. Thus, the results of economic return analysis prove that the zircon mining in India is economically viable. Therefore the first hypothesis that ‘the mining of zircon mineral in India is economically viable’ is proved.
FIGURE 6.1

ESTIMATION OF NET PRESENT VALUE
6.3 Risk Impact Analysis

The risk impact analysis has been worked out with respect to the unforeseen changes expected to occur greatly in capital cost, operating cost and annual revenue.

6.3.1 Capital Cost

In applying the sensitivity analysis, a high risk is attached to the capital cost. So, capital cost is varied up and down by 10 per cent. The effects of 10 per cent changes in capital cost on the profitability of the project are estimated and the results are given in Figure 6.2. The IRR for the case of a 10 per cent increase in capital cost is 22.5 per cent and the payback is 2.8 years. For the 10 per cent decrease, the IRR increases to 26.5 per cent and the payback period decreases to 2.3 years. It is here observed that an unexpected rise of capital cost by 10 per cent does not significantly affect the profitability of the zircon mineral unit in the study area. Hence, the second hypothesis is held true.
The major component of capital cost is the machinery cost. Since some of the sophisticated machines are imported from outside India, price changes in the foreign markets and volatile exchanges rates affect the capital cost more. In addition to this, the prices of building materials like cement also fluctuate steeply.
6.3.2 Operating Cost

The major components of operating cost are the wages paid to the laborers, technicians, and managers, the charges paid to the consumption of fuel and electricity and the expenses on maintenance and repair. It is obvious that in recent years the prices of fuel in the form of oil and gas and electricity are fluctuating. Such fluctuations affect the profit earning capacity of the zircon mineral unit through operating cost. Hence, the operating cost is increased and reduced by 10 per cent of the base case.

The results of the sensitivity analysis of the operating cost for plus or minus 10 per cent are shown in Figure 6.3. For 10 per cent upward shift in the operating cost, the IRR declines to 22.75 per cent from 24.5 per cent of the base case. A 10 per cent downward shift in the operating cost improves the rate to 32.5 per cent. The payback periods for the respective cases are calculated to be around 3.0 and 2.5 years. The downward shift in the operating cost by 10 per cent does not significantly affect the profitability of the zircon mining venture and the second hypothesis is true.
6.3.3 Annual Revenue

High risks of power failures, labour union strikes, instability in the foreign prices of zircon minerals, unfavourable trade policies, etc., may affect the annual revenue of the project. To verify the extent of influence of the above factors on the profitability of the placer mineral unit, the annual revenue is increased and reduced by 10 per cent from its value of the base case. For the case of 10 per cent increase in the annual revenue, the IRR stands at 28.5 per cent and for a decrease of 10 per cent the IRR declines
considerably to 22.75 per cent. Figure 6.4 represents the relation between the NPV’s and the discount rates for 10 per cent fluctuations in the annual revenue from the base case. The pay back period for the 10 per cent upward and downward changes in the annual revenue are 2.9 years and 3.4 years, respectively. Hence in this case the second hypothesis is proved correct.

FIGURE 6.4
6.4 Inference of Economic Return Analysis

The economic viability analysis adopted for the zircon mining venture in the coast of Tamil Nadu especially in the study are exhibits that the zircon mining is feasible. The feasibility expressed in the form of the IRR is well above the market rate of interest, and also well above that of the mining activities in the offshore and deep-sea.

The results of the sensitivity analyses prove the first hypothesis of the present research that zircon production is profitable except that of the sensitivity of annual revenue variations by 10 per cent which indicate that the viability of the zircon mining venture is not affected except for 10 per cent changes in annual revenue. The proposition that the annual revenue is an important factor in determining the profitability of the zircon unit is proved especially in the coast of Tamil Nadu.

Hence, it is suggested that the importance in regard to research and development given to zircon mining by the Government of India through its ministries like the Department of Ocean Development may also be extended to zircon mining. A favourable government policy at this juncture may arouse the interest of the business community to come with new investments and this may help to generate employment opportunities especially to the
fisher women and alleviate poverty among them who are the vulnerable section of the society living in the fragile coastal zone.

Moreover, the development of the zircon mining industry designed in tune with environment may also bring the valuable foreign exchange to our country since most of the non magnetic minerals produced are exported. In addition, the coastal placer industrial development may go a long way in narrowing down the income inequality found between the villages and cities of the coastal region.

6.5 Overview

This chapter deals with the economic returns of zircon. There are three measures of economic return viz. Net Present Value (NPV), Internal Rate of Return (IRR) and simple payback period analysis are used in this estimation. The NPV of the project is calculated at various rates and are presented in graphical form.

The zircon mining plant, with a capital cost, operating cost and annual revenue of Rs.1055.00 lakhs, Rs.566.00 lakhs and Rs. 972.00 lakhs respectively generates an internal rate of return of 24.5 per cent which is deemed to be well above the present market rate of interest in India.
The researcher concluded that assessment further identify- how is the driving force that makes the zircon industry viable. The researcher also suggests that as this industry is capital intensive in nature and therefore government funding at reasonable interest rate is necessary to induce private players to undertake such industries. A public-private model is very much welcome.