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Development of a mining model and a financial analysis for the Entuba Coalfields - Zimbabwe

Botha, Quentin

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ABSTRACT

The mining sector plays a significant role in the economy of Zimbabwe. The mining sector is the second largest contributor to the country's GDP at over 20%. Zimbabwe as a country is endowed with abundant mineral resources. The top three commodities in terms of estimated resources are iron ore, coal and platinum with resources of 30 billion tonnes, 26 billion tonnes and 2.8 billion tonnes respectively. Zimbabwe's vast mineral resources and reserves are of strategic importance to the Zimbabwe economy. Coal mining is one of the major economic contributors to the mining industry in Zimbabwe.

The purpose of the study is to determine the optimal operational model for Makomo Resources from a mining and processing point of view. The study is based on a coal-mining project in the Zimbabwean mining industry. Makomo Resources is the largest privately owned coal mining company in the country, which has a mining licence to perform coal-mining activities in the north-west part of the Bulawayo Mining District of Zimbabwe. Makomo Resources applies a conventional strip mining method by means of truck and shovel to extract the coal reserves. Makomo Resources is supplying over 200,000 tonnes of coal per month to the local and export market.

The mine has invested in USD20 million capital to commission a wash plant. The study investigates how to optimise the plant throughput by comparing two mining options:

Mining Option 1 - crush and screen 2m power coal, crush & screen and wash a full 7m low ash coal seam and wash 2m of coking coal.

Mining Option 2 – crush and screen 2m power coal, crush & screen a 3m low sulphur coal seam and wash low ash coal and coking coal of 4m and 2m respectively.

The study investigated all the marketing, geology, mining and financial parameters in the Zimbabwean coal mining context. The study determines the appropriate mining methodology and explore to optimise the coal processing. Two financial models were developed to evaluate and compare the two proposed mining options, determine their

feasibility and conclude the optimal mining model. Financial techniques were used to analyse and evaluate the two mining options.

The financial models were used to analyse and evaluate the following:

- The cashflow over the 10-year period.
- The Net Present Value (NPV) and Internal Rate of Return (IRR) of each mining option.
- The payback period of the washing plant.
- Profitability Index per mining option.

The NPV of a project determines the economic value of the mining project. The decision on a mining investment is mostly related to the NPV and IRR of the project.

Discounted Cash flow (DCF) models were developed for both mining options that shows project cash in and out flows and calculates economic indicators, such as IRR and NPV. The NPV and IRR were the main methods for the evaluation of the two mining options. The resulting DCF models were developed in an Excel spreadsheet format designed for a 10-year Life of Mine (LOM) period. Mining Option 1 has a higher NPV of USD38.2 million in comparison to USD9.7 million for Mining Option 2. The IRR for Mining Option 1 was calculated at 48%, which is bigger than the IRR for Mining Option 2 of 26%. Mining Option 1 has a simple payback period and discounted payback period of 2.7 years and 4.9 years respectively. Mining Option 2 has a simple payback period and discounted payback period of 3.9 years and 11.9 years respectively. Mining Option 1 has a shorter payback period than Mining Option 2. Both mining options have a Profitability Index (PI bigger than one with Mining Option 1 and Mining Option 2 recording values of 1.87 and 1.18 respectively. Mining Option 1 has the better PI value and is therefore more profitable.

Based on the economic evaluation, Mining Options 1 is by far more attractive than Mining Option 2, which results in a better return on the investment and profitability, therefore the preferred option.