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Conceptualization of a mining information model (MIM) using real time information for smart decisio making: a smart economics approach

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ABSTRACT

South Africa is a mineral resource-rich country with the largest concentrations of gold and platinum in the world. Yet the South African mining industry is facing an economic crisis. Some of the reasons for this crisis are: Low commodity prices, escalating production costs, depletion of economically ore grades, volatile currency, volatile exchange rates, difficulty to compete in the international markets, increased concerns of deteriorating relationships with mine-worker unions and the South African Government's Department of Mineral Resources (DMR) etc.

Thus there is a critical need to develop an information and decision-making system that will cater for modern-era needs. Such a system would need to optimize production cost, while properly linking it to current and expected market conditions to enable synchronised and timely decision-making. This can only be done via a framework that is supported by relevant and timely information. This will need to include the following mine and market data (in both current- and anticipated-forms): Production rates; assessment of what is going on underground; incident reporting; scheduling; costing; market updates; inventory management; life cycle management. And such a system, named Building Information Modelling (BIM), was developed for the construction industry. This indicates that development of a Mining Information Modelling (MIM) may also address above-mentioned aspects, allowing maximum production, optimal cost, less uncertainty and more efficiency – something that is difficult to attain via existing mining-software.

The purpose of this research was to investigate and present a conceptual framework for the development of MIM and a smart, real-time decision-making tool. The study reveals that MIM can be achieved via the combination of software from a number of providers, together with some additions. Ideally, the combination should cover the entire mining value chain. With MIM, a decision-making tool (with the support of MIM) can either be developed as a separate software or can be integrated with MIM. Such system will cater for modern-era needs, thereby enhancing mining capabilities without affecting job-creation.