## Development of a framework for evaluating mining technological innovation impact on a company's market value.

Mugebe, Pi., Kizil, M. Si., Yahyaei, Mii. and Low, Riv.

## ABSTRACT

Key words: Mining technological innovation; Autonomous haulage system; Stock market value

Technological innovation development plays a very pivotal role in the economics of minerals mining. History has shown that the difference between a mineral deposit's economic status and its uneconomic status lies in the mining technological innovation most prevalent. The significance of mining technology is that it curbs the negative impact of mineral deposit depletion by improving productivity, thereby keeping mineral exploitation profitable. This relationship makes it imperative to develop a framework that utilizes this concept to sustain mining in the future. The framework will incorporate the benefits of technological innovation implementation to demonstrate its impact on a company's share price. It will help public investors to predict share price while serving as an additional internal new technology investment approval tool for the company.

This paper demonstrates how applying technological development and innovation affects mining processes and its economics. This relationship is evident throughout the four historical mining technological stages, which started in the 18<sup>th</sup> Century with mechanization, then remote control, automation, and currently, autonomous technology systems. At each stage, the need for a more productive technology arose as the effects of mineral resources depletion threatened mining's profitability. Thus, it is evident that the future of mining profitability lies in the current advanced technologies which leverage on artificial intelligence and machine learning systems. Nonetheless, while mineral commodity miners profit and firm market values grow, the growth is not empirically linked to the technological innovation development that drives it. Conversely, in other industries, the firm's technological development innovation resultant economic metrics, along with macroeconomic factors, are captured and empirically linked to stock market value. This exposes a gap in the financial impact evaluation of mining technology innovation implementation. Therefore, this paper lays the basis to developing that framework for the mining industry, utilizing artificial intelligence and machine learning computational methods.

<sup>&</sup>lt;sup>i</sup> PhD student. MMEng; MBA; BSc.(Min) Eng.; MAusIMM. The University of Queensland, School of Mechanical and Mining, St Lucia QLD Australia. Email: p.mugebe@uq.edu.au

<sup>&</sup>lt;sup>ii</sup> A/Professor; PhD; SFHEA; MAusIMM; MSME; MIEAust; MAAEE. The University of Queensland, School of Mechanical and Mining, St Lucia QLD Australia. Email: m.kizil@uq.edu.au

<sup>&</sup>lt;sup>III</sup> A/Professor; PhD; MSc.; B.Eng. The University of Queensland,, Julius Kruttschnitt Mineral Research Centre. Indooroopilly QLD Australia. Email: m.yahyaei@uq.edu.au

<sup>&</sup>lt;sup>iv</sup> A/Professor; PhD; BE(1st Hons); BCompSci; CPEng.; MIEAust; Dip Proj Mgt. The University of Queensland, School of Business, St Lucia QLD Australia. Email: r.low@business.uq.edu.au