

# Investigating strategies to achieve superior sustainable performance in the Namibian mining industry

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## INTRODUCTION

The Namibian mining industry, through the Chamber of Mines subscribes to the principles of sustainable development by establishing and enforcing the best practices guide on environmental principles for mining, the mining charter that caters for the social pillar in terms of the social licence to operate (SLO) and the economic pillar, adherence to the Environmental Management Act 7 of 2007, and establishing a sustainable practice in the mine closure framework<sup>1</sup>. The Namibian mining industry is the world leader in deep-sea mining, and it is currently the second-largest producer of uranium oxide worldwide. Several commodities are produced in the Namibian mining industry, such as gem-quality diamonds, uranium oxide, zinc and lead concentrates, gold bullion, blister copper, semi-precious stones, dimension stones, tin concentrate, manganese concentrate, and iron concentrate - to name a few<sup>2</sup>. The mining industry is the biggest contributing sector to the Namibian economy, having contributed 9.1% and 9.3% to the gross domestic product (GDP) in 2020 and 2021 respectively and it has the potential to drive the country towards industrialisation<sup>3</sup>. It is on this basis that the Namibian government considered developing a mineral beneficiation strategy (MBS) to ensure that the minerals are beneficiated locally to contribute to industrialisation and setting up the manufacturing industry<sup>4</sup>.

Unfortunately, it has been observed that from 2000 to 2021 approximately 52% of the mines in Namibia stopped production by going under care and maintenance at some point, either temporarily or permanently. As a result, Namibia ceased the production of special high-grade zinc (SHG), grade A copper cathodes, acid grade fluorspar, graphite concentrate, lithium concentrate, manganese concentrate, and decreased the production of uranium oxide, gem-quality diamonds, copper, lead, and zinc concentrates. In addition to that, many projects that could have been developed into mines by then have been put on hold. This has/had a drastic effect on the Namibian economy. To make it worse, Namibia's industrialisation vision by implementing the mineral beneficiation strategy depends on acquiring raw materials from mines so that manufacturing industries can be set up and value addition can be done locally. This paper aims to investigate the strategies that may potentially assist with achieving superior sustainable performance in the Namibian mining industry, which will most likely assist with the successful implementation of the mineral beneficiation strategy and therefore contribute toward Namibia's industrialisation vision.

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<sup>1</sup>Chamber of Mines (2022). Chamber initiatives towards sustainable development. Retrieved June 20, 2022, from: <https://chamberofmines.org.na/service/sustainable-development/>

<sup>2</sup>Moongo, T.E. & Michael, S. (2021). A continuous quality improvement framework for electrowinning current efficiency. *Journal of the Southern African Institute of Mining and Metallurgy*, vol. 121, no. 1, pp. 21–28. Retrieved from: <https://www.saimm.co.za/journal/v121n01p21.pdf>

<sup>3</sup>Chamber of Mines (2021), 2021 annual review report. Retrieved from: <https://chamberofmines.org.na/wp-content/uploads/2022/04/2021-Chamber-of-Mines-Annual-Review.pdf>

Sustainable development entails development that meets the needs of the present without compromising the ability of future generations to meet their own needs. However, for operations that exploit limited non-renewable resources from the mines, the definition is slightly different because there is a need to ensure that the life of mine (LOM) is prolonged as far as possible, and the environment is well taken care of. Eventually, the minerals will become depleted, and the mine will have to close, unlike other industries.

The application of strategic management has attracted the attention of many researchers. However, the reviewed literature rarely focuses on investigating the strategies to achieve superior sustainable performance, especially in the Namibian mining industry. Therefore, this paper taps into this uncharted/unexplored knowledge area because the application of strategic management has been positively correlated with improved business performance. There is a void in academia and in practice regarding the use of strategic management to improve superior sustainable performance. Other researchers concluded that approximately 20% of mining companies were not utilising strategic management. Consequently, this makes them unsustainable and they may end up ceasing production because 60% and 30% of them had unsatisfactory productivity and unstable cash flows, respectively<sup>5</sup>.

## **METHODOLOGY**

This research was guided by a pragmatic philosophical worldview of the explanatory sequential mixed methods research approach. The quantitative and qualitative approaches were applied by utilising a self-administered open-ended questionnaire survey method and by conducting semi-structured interviews with participants online using an interview guide with open-ended questions. Both methods targeted a population of 25 mines in Namibia and a response rate of 68% was achieved.

## **RESULTS AND DISCUSSIONS**

The study revealed that most of the mining companies in Namibia are applying strategic management practices. The results indicated that some of the factors influencing sustainability of mining operations are the decline in commodity prices, mine flooding due to underground water, slope failure or geotechnical risks, depleted ore reserves, declined ore grades, and mineralogical changes. The strategies for achieving superior sustainable performance have been categorised into four groups, namely: 1) maxi-maxi strategy, 2) maxi-mini strategy, 3) mini-maxi strategy, and 4) mini-mini strategy.

### **Application of strategic management in the Namibian mining industry**

As shown in Figure 1, a total of 64.7% of the mining companies apply strategic management processes while 5.9% were undecided and 29.4% were not applying strategic management to achieve superior sustainable performance. The mining companies have strategic projects, and it emerged that 58.8% of them were unsuccessfully implemented as shown in Figure 2. These strategic projects are critical for operation sustainability. The areas of focus for the strategic projects and the percentage of the mines applying them are as follows: life of mine extension (88%), increasing production (94%), improving efficiencies (94%), and improving all-in sustaining cost (AISC) and/or cost of production (COP) (100%). Other strategic initiatives implemented by the mines include ore blending (100%), exploration (88%), design modification (76%), opening new mines (35%), pit pushback projects (29%), and importing ore (18%). This clearly shows that although about 52% of the mines had ceased production, most of them were implementing strategies to assist with improving superior sustainable performance.

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<sup>4</sup>Ministry of Mines and Energy. (2019). Terms of reference for a consultant to develop minerals beneficiation strategy for Namibia. Windhoek: Ministry of Mines and Energy

<sup>5</sup>Boikanyo, D., Lotriet, R., & Buys, P. (2016). Investigating the use of strategic management process in the mining industry. *Problems and Perspectives in Management*, 14(3-2), 483-493

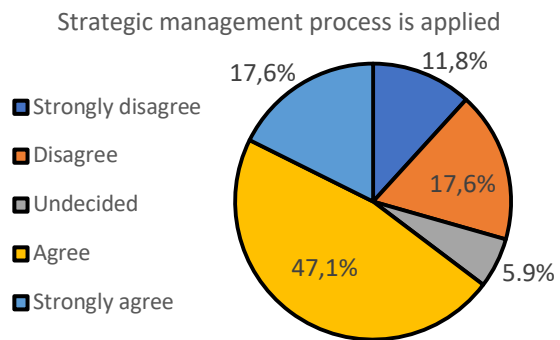


Figure 1. Application of strategic management processes.

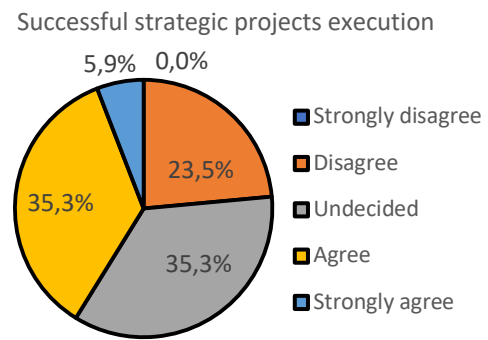


Figure 2. Status of successful implementation of strategic projects.

### Factors influencing sustainability of mining operations

Sustainability issues and the percentage of mines that have been negatively affected in Namibia include a decline in commodity prices (35%), mine flooding due to underground water (24%), geotechnical risks (18%), depleted ore reserves (18%), declined ore grades (12%), and mineralogical changes (12%). Similar sustainability issues were also reported by other authors such as declining ore grades, plummeting commodity prices, increased regulation, and legislation, increased corporate social responsibilities (CSR), escalating costs, water, and energy crisis<sup>6</sup>. Slope failure risks, affordable energy, mine flooding due to underground water, and the decline in commodity prices have become a serious sustainability problem recently because they have resulted in several mines being put under care and maintenance and the execution of major strategic projects delayed. Several best practices and the percentage of mines applying them in order to improve superior sustainable performance include research and development (100%), ore blending (100%), staff motivation (88%), staff training (94%), staff retention (88%), benchmarking (94%), vertical integration (12%), best available technology (BAT) (59%), cost-cutting (29%), and renewable energy (35%). It was observed that the uranium mines could easily survive during times of low commodity price if they apply vertical integration and reduce the COP in addition to other sustainability strategies.

### Strategies for achieving superior sustainable performance

The strategies for achieving superior sustainable performance were developed by applying a strengths, weaknesses, opportunities, and threats (SWOT/TOWS) analysis model after considering various strategic management concepts, mine sustainability, and production-related issues. The proposed strategies can be categorised into the following groups, namely, 1) maxi-maxi strategy, 2) maxi-mini strategy, 3) mini-maxi strategy, and 4) mini-mini strategy. The maxi-maxi strategies include producing efficiently by investing in research and development (R&D) and the use of the BAT, optimising the COP and/or AISC by investing in renewable energy, improving by-product production, establishing vertical integration, negotiating long-term and short-term supply chain contracts, and establishing sustainable yet investor-friendly laws and policies. The mini-maxi strategies involve using R&D projects to find appropriate solutions i.e., via ore homogenisation, exploration, utilisation of new equipment, BAT utilisation, other strategic initiatives based on predicted commodity price trends and increasing transparency, ethical practices and good corporate governance that will enhance trust by the investors i.e., via effective independent external auditing, establishing whistleblower protection, having effective anti-corruption, and anti-bribery policies, etc. The proposed maxi-mini strategies include investing in LOM extension projects by focusing on minerals in high demand and by considering the commodity price, and benchmarking and improving collaboration and sustainability regulations and policies with other countries for mutual benefit, and to ensure regional growth and sustainability of the mining industry. The proposed mini-mini strategy has to do with establishing a memorandum of agreement that will enable information sharing and benchmarking to enhance sustainability.

## CONCLUSION

The study investigated the possibility of improving the superior sustainable performance in the Namibian mining industry by developing suitable sustainability strategies and an integrated strategy map that may ensure long-term sustainability of the mines. Several factors affecting the sustainability of the mining industry have been discussed. It emerged that commodity prices, mine flooding due to underground water, geotechnical risks, depleted ore reserves, declined ore grade, mineralogical change, affordable energy, and other factors contribute significantly to the sustainability of mines. It is recommended that the Namibian mining industry should invest in the generation of nuclear power so they can benefit from the decreased power rating. This is considering the fact that the mining industry is an energy-intensive industry and Namibia is strategically positioned and highly endowed with uranium. This will result in decreased cost of production and improved all-in sustaining cost in the long term. The successful execution of strategic projects i.e., the green hydrogen project and possibly the Kudu gas power station may decrease the electric power rate even further.



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I am a Metallurgical/Process Engineer with six (6) years of experience. I have worked in the Namibian mining industry at Skorpion Zinc Mine and at Tschudi Copper Mine as a Metallurgist-in-Training and as a Process Engineer, respectively. Currently, I am working as a Junior Lecturer and Metallurgy Programme Coordinator at the Namibia University of Science and Technology (NUST) in the Department of Mining and Process Engineering (DMPE). In addition to the Bachelor of Engineering (B. Eng.) degree in Metallurgical Engineering, I hold a Master of Engineering (M. Eng.) degree in Industrial Engineering with a thesis focused mainly in Hydrometallurgy and Electrometallurgy to be more specific. My master's thesis is titled: "*Designing a continuous quality improvement framework for improving copper electrowinning current efficiency*". I am currently studying towards a Master of Business Administration (MBA) specializing in Management Strategy at the Namibia Business School (NBS), University of Namibia (UNAM). I also hold certificates in project management, strategic business management, business finance and business risk management. I am an associate member of the Southern African Institute of Mining and Metallurgy (SAIMM), and I am registered with the Engineering Council of Namibia (ECN) as a Professional Engineer (Pr. Eng.) specializing in Extractive Metallurgical Engineering.

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<sup>6</sup>DMPE. (2022, May 25). Namibia University of Science and Technology. Retrieved from Namibia University of Science and Technology: <https://www.nust.na/?q=news/mining-challenges-impact-local-industry>