

Is the African mining industry prepared for the transition towards sustainable development?

M.G. Ncube

University of the Witwatersrand, South Africa

INTRODUCTION

Mining is one of the fundamental industries upon which other industries' survival depends. The Minerals Council of South Africa aims to reposition the South African mining sector as the country's foremost industrial sector. Zimbabwe's vision for an upper middle class economy by 2030 is premised on the mining sector¹ while Namibia's vision for an industrialised country by 2030 will be developed by, among other things, her mineral resources². All these targets feed into the attainment of Sustainable Development Goal number 9 (SDG9): building resilient infrastructure, promoting inclusive and sustainable industrialisation and fostering innovation.

The burden to grow economies rests on the shoulders of this industry, an industry that has been characterised by some of the most unsustainable practices in the past. Coal mining across the continent has contributed to the increase in air and water pollution as well as cardiopulmonary diseases³. In 2016, it was alleged⁴ that Zimbabwe had lost up to \$15 billion worth of diamond revenue to corruption, and it would further lose over \$1.5 billion worth of gold due to smuggling in 2020⁵. The Cradle of Humankind in South Africa came under threat when massive acid mine drainage from the West Rand Basin was reported in 2011 and the same country has witnessed various disasters such as the Marikana Massacre (2012) and the Merriespruit Tailings Dam Disaster (1994). Civil wars around Angola, Democratic Republic of Congo (DRC) and Sierra Leone in the 90s were fuelled by blood diamonds and recently in Kenya, mines around the Kakamega area have become a death trap for artisanal miners.

APPROACH

These examples represent a minute proportion of instances where the continent's mining industry has witnessed and recorded economically, socially and environmentally unsustainable events, all of which have compromised the sector's ability to support long term economic growth and development. However, the call for a transition to sustainable development within the sector presents stakeholders with an opportunity to reconsider mining and allow learned practices to be contextualised in solving unique country-specific mining challenges. Beyond the heavy-worded sustainability themes and blueprints, are there suitable systems in place to support this move? Do existing skills, policies, technologies, economies and environment, social, and governance (ESG) commitments within the mining industry have the capacity to usher in this new dawn?

¹ Todd, F. (2019) NS Energy Business. Zimbabwe aims to triple its mining industry revenue to \$12bn by 2023. Available at <https://www.nsenegybusiness.com/news/zimbabwe-mining-industry-2023/>

² Office of the President (2004). Namibia Vision 2030 - Policy Framework for Long-Term National Development. Available at https://www.npc.gov.na/wp-content/uploads/2021/11/Vision_2030_Summary.pdf

³ Reuters. (2021). The cost of coal in South Africa: dirty skies, sick kids. Available at <https://www.reuters.com/business/cop/cost-coal-south-africa-dirty-skies-sick-kids-2021-11-04/>

⁴ Malaba, B. (2016). African Independent. Mining companies looted more than US\$15 billion in diamonds from Marange, says Mugabe. Available at <https://www.business-humanrights.org/en/latest-news/mining-companies-looted-more-than-us15-billion-in-diamonds-from-marange-says-mugabe/>

⁵ Bertelsman Stiftung's Transformation Index (BTI) Country Report: Zimbabwe (2022). Pg. 35. Available at https://bti-project.org/fileadmin/api/content/en/downloads/reports/country_report_2022_ZWE.pdf

In an attempt to answer these questions, this paper uses country and company examples to paint a picture of sustainable development within Africa's mining industry. It establishes the continent's current position in relation to sustainability and provides a summary of practices that would help in the transition.

With so much global attention on sustainability, mining practices must contribute to the ultimate goal of sustainability that seeks to reconcile economic growth, environmental balance and social progress, ensuring that all people have the same opportunities and can lead a better life without compromising the planet⁶. The end goal is to have a mining industry whose practices collectively address issues to do with water scarcity, climate change, resource scarcity, energy efficiency, ecosystems, land use, health and safety, human rights violations and socio-economic development.

Sustainability commitments in the African mining industry

Gold Fields Limited is constructing a 40 MW solar power plant at its South African operation, South Deep Gold Mine⁷. The plant, set to be commissioned this year (2022) with an estimated capital investment of approximately R660 million, will employ over 200 workers and will generate over 20% of the mine's electricity consumption, ensuring reliability of power supply and reducing the cost of electricity. Significantly, the project will reduce the company's carbon footprint by almost 100 000 tonnes of carbon dioxide per year. The initiative, along with others related to tailings management, water stewardship, gender diversity, stakeholder value creation as well as safety, health, wellbeing and environment, falls under the company's ESG commitments. These commitments are concise, with clear targets and initiatives aligned with relevant sustainable development goals and supported by comprehensive sustainability policies and guidelines.

Namibia plans to set up a second desalination plant to meet the demands of water from its uranium mines in the Erongo region⁸. This initiative is directed at alleviating the water scarcity challenge and will ease pressure on fresh water sources, allowing water to be supplied to the widely distributed sparse population.

One of the outcomes of the COP26 summit in 2021 spoke to supporting the conditions for a just energy transition. This move would assist South Africa to decarbonise its economy, moving away from coal usage towards a low emission, climate-resilient economy based on clean, green energy and technology⁹. Zimbabwe has the largest lithium reserves in Africa and the projects in Arcadia, Bikita and Kamativi possess the potential to position the country among leaders in meeting world lithium demands, given a favourable investment environment¹⁰. All these projects, at various stages of initiation and implementation, represent strides taken towards attaining sustainability in the African mining industry. Their success and/or failure in the respective countries provides other players in the sector with valuable lessons.

The South African government has set up a mining extraction, research, development and innovation strategy (SAMERDI). Under this strategy, a public-private partnership, the Mandela Mining Precinct, was established in 2018. Its aim is to revitalise the mining research, development and innovation in the country to ensure the sustainability of the industry. The initiative comprises six research-based programmes focusing on mechanised drill and blast, non-explosive rock breaking, longevity of current mines, real time information management systems and successful application of technologies centred

⁶ United Nations. (2015). Transforming our world: The 2030 Agenda for sustainable development

⁷ Gold Fields (2021). The South Deep Khanyisa solar plant. Available at <https://www.goldfields-southdeep.co.za/resources/the-south-deep-solar-plant>

⁸ Magoum, I. (2021). Namibia: Towards the construction of a new desalination plant in the coastal zone. Available at <https://www.afrik21.africa/en/namibia-towards-the-construction-of-a-new-desalination-plant-in-the-coastal-zone/>

⁹ Annex to the G7 leaders statement partnership for infrastructure and investment. (2021). Available at <https://www.g7uk.org/wp-content/uploads/2021/12/ANNEX-TO-G7-LEADERS-STATEMENT-PARTNERSHIP-FOR-INFRASTRUCTURE-AND-INVESTMENT-FINAL-3-DECEMBER.pdf>

¹⁰ Hobi, A. (2021). Lithium in Zimbabwe: A future boom of doom? Available at <https://blogs.prio.org/2021/01/lithium-in-zimbabwe-a-future-boom-of-doom/>

around people. Since its inception, the Precinct has covered significant ground in becoming the vehicle that facilitates healthy, safe, innovative, economically viable and sustainable solutions to South African mining.

Advancement of sustainable practices

If the continent's mining sector is to transition towards sustainable development, there needs to be more than cherry-picked examples of front runners. Different stakeholders in the industry, with governments at the helm, each have a role to play in an effort to bring about the desired state. Most African countries have low mining research output from their institutions. Some centres dedicated to research have become dysfunctional or under-capacitated. Apart from producing new knowledge, research in the mining industry also devises ways of applying that knowledge. Research and development are fundamental to finding new technological innovations and mechanisms towards ensuring sustainability.

Tertiary institutions boast of brains capable of carrying the sector forward given the appropriate industry guidance. Proper investment into establishing centres of excellence will enable students to keep the mining industry competitive. The Wits Mining Institute in South Africa is one leading centre that seeks to promote innovation and sustainability in the extractive sectors through skills and technologies. The Namibia University of Science and Technology recently launched an innovation hub for sustainable technology transfer¹¹. These facilities exist in other countries at different scales and are doorways for producing solutions aligned with clean and renewable energy, optimal resource consumption, as well as mining waste management among others. In addition, mining companies can partner with universities to conduct research for them. This symbiotic relationship closes the academia-industry gap and ensures that mining companies address their operational challenges, while universities increase the quantity and quality of their research output.

Artisanal and small-scale mining (ASM) activities in Sub-Saharan Africa engage over 10 million people, who in turn support over 60 million livelihoods¹². Over 40% of the labour are women and children. As the population and its needs grow, so does the demand for more minerals to support livelihoods. This has led to overcrowded sites characterised by unsafe practices and gross human rights violations. In some instances, these miners even encroach into protected properties and mine boundaries. To ensure future generations meet their own needs and have the right skills and knowledge for sustenance, the ASMs require integration into the main sector where there is dialogue between ASM stakeholders, capacity building, conducive and comprehensive legal framework as well as access to geological data, capital and equipment¹³. The importance of ASMs in mining is discussed in the African Mining Vision as well as in the national strategies of Ghana, Liberia and South Africa¹⁴. These are best practices other countries can emulate to attain socio-economic value.

The advent of technology has opened room for sustainable practices within operations and the mining value chain. To ensure optimal resource consumption, technologically advanced mines can explore options of profitably mining low grade ores, blending, stockpiling and recycling. The emergence of new and improved mine planning software packages enables cost effective resource expansion that extends the life of the mine and allows for advanced mine closure and reclamation planning. Mechanisation and automation would reduce the health and safety burden, while the use of eco-friendly equipment would

¹¹ Matthys, D. (2021). Namibia Economist. State-of-the-art innovation hub for sustainable technology opened at NUST. Available at <https://economist.com.na/62923/technology/state-of-the-art-innovation-hub-for-sustainable-technology-opened-at-nust/>

¹² The World Bank (2019). Shining a light on a hidden sector. Available at <https://www.worldbank.org/en/news/feature/2019/06/19/shining-a-light-on-a-hidden-sector#:~:text=Regional%20findings%20include%3A,million%20reliant%20on%20the%20sector.>

¹³ Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development. (2018). Six key factors for successful ASM formalization. Available at <https://www.igfmining.org/six-key-factors-successful-asm-formalization/>

¹⁴ Gisore, R., Matina, Z. (2015). Sustainable Mining in Africa: Standards as essential catalysts, Nairobi. Pp. 36-44

reduce the carbon footprint. Unmanned aerial vehicles¹⁵ for mining surveys, stockpile management, quarry management, drilling and blasting, tailings dam surveillance, security and underground workings are another avenue that mining companies in Africa could leverage on to make a smooth transition towards sustainable development as they enhance safety, and collect data more efficiently.

Strategic plans and scenario planning for companies have to encompass major components of sustainability. They must go beyond mining and include aspects of mineral processing, value addition, beneficiation, marketing and sales. Each strategy needs to be broken down into projects that have clear purposes, scopes, contributions, resource requirements and timing. Tactical plans should be monitored and have feedback channels for informing future strategy. The key performance indicators for mining operations should at all times align with the strategic goal(s), be simple and understandable to all levels of employees, be constantly updated and tracked on performance dashboards.

Mining companies that manage their value chain well can establish a significant source of competitive advantage and value creation. Comprehensive mine-to-market analysis assists in identifying and fixing bottlenecks in the value chain contributing to sustainable operations. Harmonising mining with other industries builds synergies crucial for sustainable development as it closes the gap between Africa's contribution of raw materials to leading industries with the benefit it gets in return in the value chain. For instance, the DRC as a major producer of cobalt could emerge as a leading electric vehicle producer in Africa if partnerships with the appropriate industries are made.

CONCLUSION

The cases highlighted in this paper lay a foundation to the start of a continuous evaluation system that checks the preparedness of the continent's mining industry to transition towards sustainable development. For most countries, the levels of readiness are not optimum. More work needs to be done to set out clear road maps. Further work needs to be done to ensure that what happened with the diamond revenue does not happen with lithium in Zimbabwe, and assuring mining communities in South Africa that after the phasing out of coal, their livelihoods would improve through other sustainable projects. The onus is upon governments to act in the best interests of their citizens and honour the commitments they made through creating environments conducive to a transition into sustainable development in Africa's mining sector.



Musawenkosi G. Ncube

Student
University of the Witwatersrand

Musa is a MSc. Mining Engineering candidate at the University of the Witwatersrand. His experience in underground, surface as well as artisanal and small scale mines has moulded him into an innovative and motivated young professional with the zeal to positively influence the mining industry. He envisions the African mining industry embracing emerging digital technologies and principal elements of the fourth industrial revolution to bring about high safety, environmental sustainability and productivity standards while saving on time and costs. His goal is to earnestly drive himself to being a relevant engineer with the right skills, providing solutions that cater for the present without compromising the needs of those to follow.

¹⁵ Park, S., Choi, Y. (2020). Applications of Unmanned Aerial Vehicles in Mining from Exploration to Reclamation: A Review. *MDPI Journals*, 10 (663). Pp. 1-31. Available at <https://doi.org/10.3390/min10080663>