

Innovation trends in the mining and quarrying sector, 2019-2021



In 2021, mining and quarrying contributed nearly one-tenth (8.5%) to the South African economy. But the sector faces critical infrastructure bottlenecks and is extremely sensitive to fluctuations in global commodity prices and supply shocks. New advanced technologies have become a distinct feature of mining industrial advantage, compelling industry to pursue a modernisation agenda.¹

This brief examines how much innovation happened in the mining and quarrying sector from 2019 to 2021, including the types of technologies mining and quarrying businesses used, the innovation challenges they faced, and the outcomes of their innovations.

During 2019-2021, over half of businesses in the mining and quarrying sector carried out activities intended for innovation, and almost all of them had developed product or process innovations by the end of 2021.

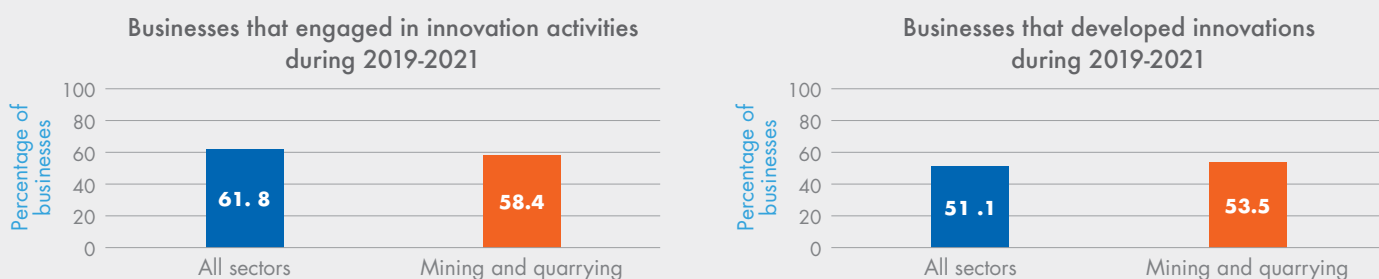


Figure 1: Percentage of businesses in mining and quarrying that engaged in innovation and developed innovations.

What types of advanced and emerging technologies did mining and quarrying businesses use and/or develop during 2019-2021?

Internet of Things was most widely used and developed (55.4% of businesses) followed by **Computerised design and engineering** (24.2%).

While the use of technologies such as **VR, AI, geospatial technologies, and robotics**, is key for modernising the sector, very small portions of businesses engaged with these technologies.

Mining and quarrying businesses did not engage with a wide variety of advanced or emerging technologies, despite these being important for the modernisation of the sector.

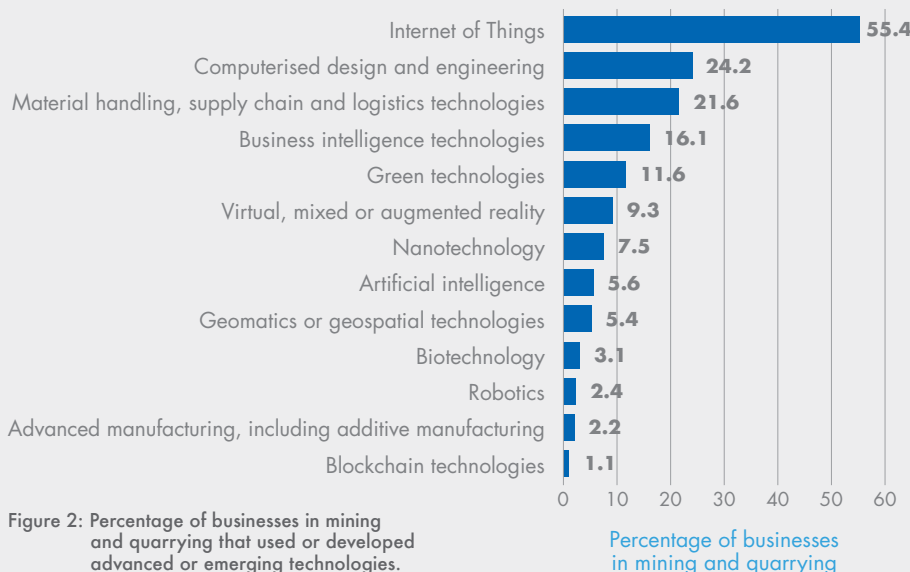


Figure 2: Percentage of businesses in mining and quarrying that used or developed advanced or emerging technologies.

¹ Department of Science and Innovation (2022). Decadal Plan on Science, Technology and Innovation 2022-2032, p. 37. The World Bank (2019). Digging Beneath the Surface: An Exploration of the Net Benefits of Mining in Southern Africa. Available at: <https://openknowledge.worldbank.org/handle/10986/32107>. Last accessed: 19 January 2024. Also: PWC and Minerals Council South Africa (2023). The State of Digital Transformation in the South African Mining Industry: Ten Insights into 4IR (and ESG). Available at: <https://www.pwc.co.za/en/publications/ten-insights-into-4ir.html>. Last accessed: 19 December 2023. Also: South African Mining Ecosystem Review, 2017 to 2022. Available at: www.mineralscouncil.org.za. Last accessed: 8 December 2023.

What were the most important barriers to innovation that mining and quarrying businesses faced during 2019-2021?

One-fifth of businesses in the sector reported that the **high costs associated with innovation** were the most important barriers to innovation. **Market domination** by other established mining and quarrying businesses was also rated as a highly important barrier.

Lack of technical and engineering skills were regarded as being less important challenges, despite severe national shortages of these types of skills.

Costs and competition factors were the most significant barriers to innovation in the sector.

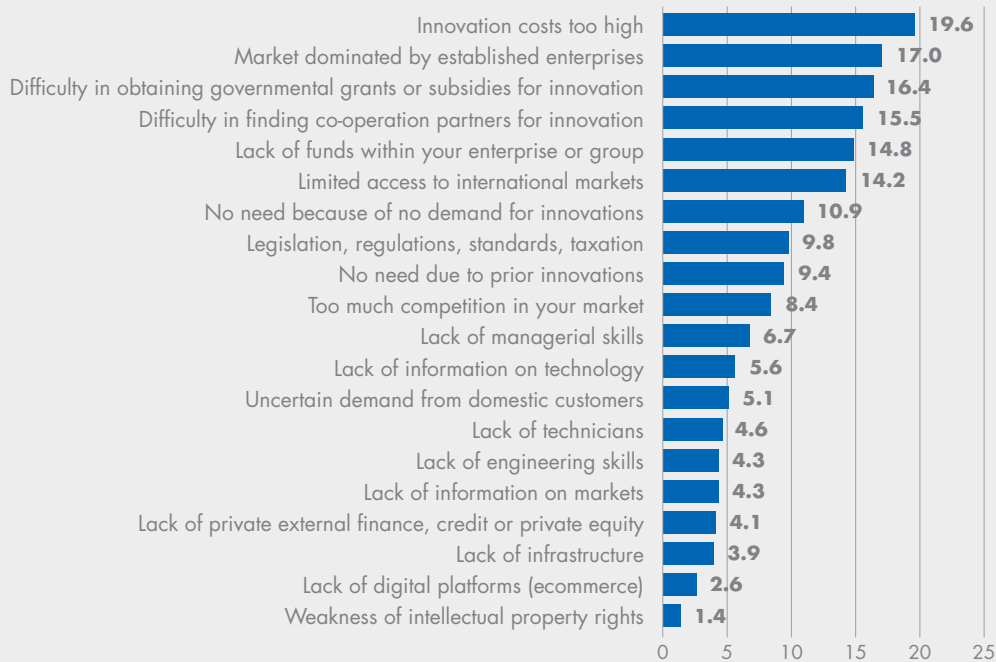


Figure 3: Percentage of businesses in mining and quarrying that rated barriers to innovation as highly important.

Percentage of businesses in mining and quarrying

What did innovative mining and quarrying businesses perceive to be the most important outcomes of their innovation(s) during 2019-2021?

The most important outcomes of the mining and quarrying sector's innovations were related to change in business practices. **Increased business resilience and adaptability to change** and the **implementation of a new business model** were the most frequently reported, by 85.9% and 79.9% of businesses respectively.

Innovations in the sector also appear to have had positive impacts on the **health and safety of the businesses' personnel** as well as the **environment**.

Innovation outcomes related to production costs, productivity, export performance and intellectual property were generally perceived to be of low importance.

Innovation helped to facilitate change and adaptation in mining and quarrying businesses.



Figure 4: Percentage of innovative businesses in mining and quarrying that rated outcomes as highly important.

Percentage of businesses in mining and quarrying

About this brief

This brief is one of eight sector-specific analyses drawn from the South African Business Innovation Survey 2019-2021. It provides deeper insight into innovation trends in the **mining and quarrying sector**, so that businesses can compare and benchmark their innovation activities. Industry associations and policymakers can use the data in their efforts to mobilise and support innovation activities across the mining and quarrying sector. Contact us: innovation@hsrc.ac.za | First published March 2024