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Evaluating the effects of paper-based reporting systems on safety and data management in South African gold mines.

Abstract

The number of reported fatalities in the South African mining industry has declined between 2023 and 2025, with the mining sector closing off the 2025 year with only 41 known fatalities. This is a new all-time low compared to 2024's 42 fatalities, however, the decline is not necessarily significant. Workplace accidents and incidents persist in South African mines, therefore there is a need for further interventions to improve safety performance and work towards the zero-harm goal. This study aims to evaluate how paper-based reporting systems in some gold mines might be a contributing factor to some of these accidents. The objectives of this study are to assess how paper-based reporting systems affect the quality, speed, and completeness of safety information in gold mining operations and to develop recommendations for improving incident reporting and safety information management in the gold mining industry. This study employs a mixed method approach where a review of data collected during pre-shift risk assessments in underground gold mines, and a time study analysis will be used to track where this information goes and ultimately determine how long it takes to reach the control room and relevant parties responsible for ensuring that everything runs smoothly underground should there be an issue that needs to be fixed. This will reveal the total elapsed time and highlight where delays occur.

The results indicate that paper-based checklists are prone to loss and damage in harsh underground environments, leading to gaps in critical safety information and reduced accountability. Furthermore, the manual and static nature of these systems limits real-time visibility, delays data analysis, and results in reactive rather than proactive safety management. This study proposes a real time application that can provide instant reporting from underground to the control room.

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