

A benefit or hindrance?

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Leadership

The advent of the Fourth Industrial Revolution, the internet of things (IoT) and artificial intelligence (AI) has promoted extensive debate within the mining and natural resources sector from a wide range of stakeholders.

Those in favour are arguing that mechanisation, automation and IoT will, ultimately benefit and improve the sector, while the detractors are concerned about possible job losses and the replacement of people by machines.

Whether these views are based on emotion or objective analysis is largely irrelevant in the face of the fact that the Fourth Industrial Revolution is a reality, and that sustainable "mines of the future" will be heavily reliant on increased mechanisation, automation, IoT and AI. This applies as much to South Africa (and Africa, for that matter), as it does to countries that are leading the way, particularly in relation to the use of electrical vehicles, and the move away from reliance on fossil fuel-driven mining operations. Concerns regarding possible job losses cannot, of course, be dismissed – there will, inevitably, be a repositioning of job requirements and the skills required to perform the jobs, in future.

Historically, the mining and natural resources sector has been highly labour-intensive, with the sector being a large-scale employer. If the publication of the recent employment figures is anything to go by then, while the sector may have employed less people, it remains a significant employer and contributor to growth, development and transformation in South Africa.

The mining and natural resources sector consists of a diverse range of employers from small scale operations all the way through to complex, multi-site operations. In 2018 the sector has had to grapple, again, with significant challengers, including the international and domestic downturn, significant retrenchments, escalating costs, and health and safety performances.

With the most significant number of fatal and other accidents in this sector been attributable to falls of ground and machinery related accidents, it has been reviewing its medium to long-term mining strategy, with a strong emphasis on increased mechanisation and, ultimately, automation, which is becoming increasingly possible and practical by the phenomenon of the Fourth Industrial Revolution, IoT and AI.

The sector appears to have embraced these and the understanding that without technological progress it is unlikely to achieve its target of zero harm, and the successful implementation of health and safety programmes in support of this.

Ultimately, technological progress will assist in creating sustainable mines of the future. The technology programmes in the sector are being accelerated, particularly those in relation to technology that avoids the exposure of employees to adverse ground conditions, and the interaction of persons and machinery, to address these two aspects, which contribute significantly to fatal and other accidents in this sector.

The current key question is whether the technological progress can be applied to South Africa's "mature" mining and natural resources sector. To mines that have been operating for decades, where the practical ability to reconfigure the workings is extremely challenging and limited, because of the historical design and construction of these older mining operations.

To address this question, it is important to focus on two aspects. The first is whether the primary causes of accidents in these older mines are broadly similar to causes of accidents in the more modern mines and, if not, are these unique causes at the very least, capable of being addressed by technological advances.

The second aspect is whether these older mines, which will remain highly labour intensive for the foreseeable future, can, because of the high number of employees required, practically address health and safety through technological advances.

Importantly, these older mines also face the significant challenge and pressure that is brought to bear by government, trade unions and communities that are potentially affected by job losses at mines. Historically, they have provided significant employment for persons from not only "doorstep" communities, but also the areas commonly referred to as "labour sending areas".

The multiplier effect can also not be ignored. It is widely accepted that for each person working at a mine up to ten persons depend on that employee, in some form or another, including direct income, expenditure on transportation, food etc, and support for micro and small enterprises within the communities.

It seems that most fatal and other accidents, which occur at older mines, are as a result of falls of ground and interaction with machinery (predominately winches and their attachments, and underground rail bound equipment). In respect of both these categories, technological advances have significantly mitigated the potential for such accidents. The key issues therefore remain implementation and compliance with these technological advances, changing risk-taking behaviour and developing a more robust understanding of the consequences of risk, in support of the move away from the "normalisation" of risk-taking behaviour, more commonly referred to

as complacency.

With common themes in many accidents being the training and behavioural aspects, the primary aim of implementing technological improvements is to avoid over-reliance on human behaviour and to implement what is commonly referred to as a "hard barrier" that excludes the need for human intervention. Examples include personnel/machinery warning and anti-collision systems that do not rely on intervention by the operator to bring the machinery to a stop before the interaction occurs.

While technological advances will assist, in the interim, it is essential for all stakeholders (mining companies, government, Mine Health and Safety Inspectorate, trade unions, employees and contractors) to go "back to basics". The back-to-basics programme should have, as its starting point, the identification of the health and safety responsibilities that are placed on the stakeholders by the provisions of, primarily, the Mine Health and Safety Act 29 of 1996 (MHSA) and the various regulations that are in force in terms of the MHSA. Unfortunately, it is disappointing that there is often a lack of understanding of legal responsibilities that are placed on key stakeholders and, critically, those persons who manage and supervise work.

No health and safety programme is complete without a component that ensures that management and supervisory personnel are competent to hold the management and supervisory position. Meaning that they are fully familiar with the MHSA and regulations, the working areas, and know and understand the hazards to which persons are exposed, when allocating tasks.

The back-to-basics approach requires the employers (in summary, the entity that holds the right to prospect to mine) and other stakeholders to, at the very least, focus on the following:

- conducting appropriate identification and risk assessments comprising baseline, issued based on continuous hazard identification and risk assessments;
- implementing appropriate measures to address the identified hazards and assessed risks, comprising of codes of practice, standards, procedures and instructions;
- implementing a comprehensive health and safety training and communication system, and communicating the hazards and measures to address them;
- appointment of competent supervisors whose task it is to implement the first three components;
- the implementation of an over inspection system designed to "close the loop"; and
- implementation of contractor management systems aligned with the previous five components.

It is possible, given the high labour intensity of certain aspects of the mining and natural resources sector, that the move to significant mechanisation and automation

may not be practical in the near term, or its implementation may be delayed, emphasising the need to implement and maintain health and safety programmes that focus on "back to basics", in the interim.

The Fourth Industrial Revolution remains an important opportunity for the mining and natural resources sector to contribute meaningfully to a sustainable, safe and healthy mining and natural resources sector. Importantly, it also remains an opportunity to re-design the way in which mining operations are conducted, with the consequential redesign of the work force to align it with the new working environment.

We are not, for a moment, suggesting that this is going to happen overnight. But stakeholders in the sector should acknowledge the opportunity and implement programmes of change that are practical and workable, taking into account the particular circumstances at a mine, the profile of its work force, the surrounding communities and, of course, the practical challenges associated with some of the older mines and their infrastructure.

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