

The Case for Innovation

The imperative case for innovation in the mining industry

by Peter Bryant



The case for innovation in the mining industry has never been more compelling—whether you believe the industry is in a sharp dip in a significant ‘sawtooth’ cycle or in the midst of a bust — the imperative is the same. Despite record production levels and still above-average prices compared to the lows of 2000, the industry is struggling to make profits and provide the returns on capital that investors are seeking. This represents a large-scale destruction of value over the last 15 years.

The last 10 years have seen a sustained rise of operation expenses and capital development costs while there has been a rapid decline in productivity. This trend is unsustainable especially against other key structural challenges and forces shaping the future of the industry:

1. Despite short-term fluctuations, there is long-term sustained demand for commodities.

- Demand is driven by relentless urbanization, population growth and a rapidly growing middle class.

2. Environmental concerns continue to mount.

- Existing mining methods and their environmental footprint

are becoming increasingly unacceptable to society.

3. Geopolitical pressures and community activism are growing.

- An estimated \$25 billion worth of projects are on hold due to community activism.
- Increasing nationalism tendencies and government expropriations of close to \$30 billion.
- Social license to operate is being challenged.

4. Finding, building, operating and closing a mine just keeps getting harder and more expensive.

- Costs have been increasing at an annual rate of 10 to 15 percent for the last 10 years.
- More assets are stranded as they become uneconomical to mine under current mining methods, e.g. Olympic Dam.
- Ore grades continue to decline.
- Declining productivity at an annual rate of more than 10 percent for the last 10 years.

5. The industry has consistently underinvested in technology and innovation.

- Research and development and

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innovation investment rates are lower than almost any other industry.

- Mining suppliers remain wary of long-term investments and transformative innovation.

Those wanting to reverse the negative impact of these trends and the associated erosion of value, and begin to capture the full value of their investments, will need to make important transformations in their business systems including: rapid and accurate characterization of orebodies; faster development of mines; a faster, modular and more flexible method of extraction and improved recovery rates and mine planning. The degree of transformation required can only be realized if we discover a new approach to openpit and underground mining.

Transformation requires a new paradigm

The Mining Company of the Future is the transformational paradigm that serves as the focus for this innovation agenda. Several mining companies have developed approaches to the Mining Company of the Future. Rio Tinto, the most notable example, recognized the beginning of this super cycle in 2006 and invested accordingly. The results: Rio Tinto has dramatically increased its output of iron ore, earning the company record profits. However, while Rio Tinto focused on the necessary area of optimizing and automating current mining methods, it didn't pursue truly transformative approaches and processes. Indeed, the company recently made significant cuts on its innovation team.

We are seeing truly transformational initiatives from Anglo American with FutureSmart, from BHP Billiton, and to a lesser extent Vale. AngloGold Ashanti's effort, though now stalled, led to the development of reef bore drilling.

The innovation deficit is real and the long-term underinvestment in innovation, currently around 0.5 percent of revenue (compared to 2 to 2.5 percent for the oil and gas industry), has placed the mining industry in a difficult situation that demands a renewed focus on both technology and business-model innovation.

For technology innovation we need to look at a two-part model of (1) knowledge-based analysis and planning and (2) a new operating platform. The former drives value creation while the latter turns value potential into reality. These are complementary activities that require different skills and management approaches. Also, an analysis by Clareo of energy efficiency and operating costs in a

sample mining company shows that opportunity for significant operational efficiencies exists, even when those improvements are not immediately apparent.

The benefits of technology-driven improvements are evident. The reality, however, is that many mining companies do not have the knowledge or resources to implement dramatic technological solutions. Therefore, open innovation — through collaboration and alliances with world-leading partners in key areas — is needed to achieve rapid and effective change. Open collaboration and alliances can help companies more rapidly develop and implement a new production, knowledge and planning platform. Furthermore, as more companies successfully adopt Mining Company of the Future initiatives, alliances will be further strengthened as member companies become more competitive. The mining industry lags far behind other industries in technological advancement, but the technologically driven performance breakthroughs in those industries demonstrate the potential for mining.

Business-model innovations that result in more effective ways to secure rights to resources, including the social license to operate, are an important part of the Mining Company of the Future concept and also influence the direction of technology innovation. The Kellogg Innovation Network (KIN) Catalyst for Mining, which is co-chaired by the author with Anglo American chief executive officer Mark Cutifani, generated the creation of the multi-stakeholder Development Partner Framework (DPF). The DPF calls for mining companies to move from extraction companies to true development partners focusing on the three pillars of shared purpose, thriving ecosystems, and competitive companies, communities and countries.

To build competitive advantage, reverse the trends of the past and set the industry on a new course, mining companies must begin taking the necessary steps toward transformative change today. By opening dialogue with world-class leaders, especially those from outside the mining ecosystem, companies will drive rapid and effective change. Embracing technology and business model innovation is no longer an option, but an imperative.

Clareo's full report, written by the author of this article, titled "The case for innovation in the mining industry" can be found at the *Mining Engineering* website at www.miningengineeringmagazine.com in the Web Only section. ■