McKinsey & Company

How digital innovation will transform Indonesia's mining industry

Technology that is readily available today can help mine operators improve their productivity and their workers' well-being.

by Vivek Lath and Greg Peacocke

March 2020

For mining companies, small improvements in yield, productivity, and utilization can have an extraordinary impact—amplified in a country like Indonesia, where mining contributes close to 5 percent of GDP and 15 percent of exports. The benefits of digitizing are abundant: Innovators with intelligent mining operations can raise margins by up to 20 percent. Technology advances can create more standardized processes—with consistently higher production levels—and improve worker safety. But though successful case studies make the digital journey seem easy, companies attempting transformation face several common challenges. For sustainable benefits, changes need to go well beyond the technology: new skills and change management are equally crucial.

Avoiding the pilot trap

Industry 4.0—or the use of digital technology (such as advanced analytics, the Internet of Things, automation, machine learning, and robotics)—has delivered significant savings in mining. Increased quantities of data, cheaper computing, and the spread of connected devices all make its benefits more available to businesses. Although Indonesia's mining companies recognize Industry 4.0's potential, most have moved toward it slowly. A recent McKinsey study of Southeast Asian operators found that 80 percent had heard about the new technologies but almost 85 percent had not gone beyond pilots.[1]

Numerous large Indonesian companies are moving toward Industry 4.0, but many of them face difficulties in capturing the business impact and scaling up use cases. Low internet connectivity at mine sites, limited awareness of digital ecosystems, relatively few local reference cases, and a lack of digital skills also challenge success rates in Indonesia's mining industry.

Digital's secret sauce

Some companies, locally and globally, have transformed themselves by using digital technologies to integrate mining operations. Successful transformations have several common elements:

— **Having a value-backed road map and commitment from the top.**
Top executives must understand, buy into, and model the digital vision. None of them can remain on the sidelines, and each C-suite leader is as important as the CEO and the chief digital officer in a digital transformation's success. Clarity about what delivers the greatest value is also crucial. Use cases should link to value, and leaders should know the productivity, cost, and safety impacts of whatever they change. Executives must learn from experience and constantly—and rapidly—refine business cases and resource allocations. At one Indonesian mining company, the board leads the digital transformation and reviews progress every two weeks to support it with quick decisions.

— **Creating the right foundations of scalable data.**
Getting better data is key to eliminating the unknowns of a digital transformation. Using data effectively at scale requires having the right data architecture built in a modular fashion and on a foundation of business requirements. Leading institutions build data-governance systems with data dictionaries and full lists of metadata into their architecture. They ingest data based on prioritized use cases and clean the data only if the business case proves positive, thereby ensuring that investments always link to value creation.

— **Building new skills and talent.**
A digital transformation requires new skills, such as those of developers, data scientists, data engineers, and user-experience specialists.

---

[1] Imanol Arbulu, Vivek Lath, Matteo Mancini, Alpesh Patel, and Oliver Tonby, "Industry 4.0: Reinvigorating ASEAN manufacturing for the future," February 2018, McKinsey.com.

The competition to hire employees with such expertise is tough, and mining companies haven't historically been their first choice, so the career path and value proposition must be clear for employees and outside experts alike. When skills aren't present, innovation hubs, third-party partnerships, and joint ventures can help. Digital transformations also need existing employees to play the role of a translator, bridging the gap between the technical expertise of data engineers and data scientists and the operational expertise. One leading Asian metal-and-mining company upskilled hundreds of existing employees to act as translators.

— **Collaboration between the business and technology teams.**
 Although a digital transformation requires close collaboration between the business and technology teams, the latter often designs and leads the effort, with suboptimal involvement from the business team. This frequently leads to low levels of business acceptance at the implementation stage, or insufficient solutions to business problems. Tight collaboration and leadership across both teams are critical for successful digital transformation. One leading mining company set up a digital hub to have business and technology teams working in an agile manner to build ownership and deliver rapid impact

The next performance horizon
Companies that drive successful digital transformation reap several advantages.

First come the vast performance improvements, especially for line workers and supervisors in tough mining conditions. Digital technology can improve employee safety, provide operating transparency, and enable quicker decisions. It also attracts a more diverse and talented workforce. Group leaders and supervisors can exchange real-time information about production, adjusted work plans, and emerging safety hazards to improve overall performance. Fatigue-monitoring devices can alert operators and supervisors when drivers need rest—before accidents occur. For one global mining company, these technologies raised shift productivity by more than 10 percent

The second advantage is better handoff through increased transparency across the full value chain. Mining supply chains comprise interdependent systems from pit to port to market, so real-time transparency can enable better decision making and maximized margins. Technology and a single source of data truth across an entire company can help it rapidly tweak its plans and schedules to balance inventory needs, improve blending, and reduce demurrage costs.

Finally, data-driven insights from technology implementations can help leaders better understand their businesses. Mining companies generate a significant amount of data, but most use less than 5 percent of that data to capture real value. Leading companies are proving the value of harnessing existing data. For instance, several use advanced analytics to increase component lifetime, reduce inventory, and forecast bottlenecks. To improve recovery while reducing costs, companies apply similar analytics to key processing steps.

Mining has always involved dealing with uncertainty and variability. Today, these problems can be alleviated—and, in some cases, eliminated. By embracing technology-enabled operations, Indonesia's mining industry can significantly improve its productivity, costs and the well-being of its workers. Mining companies that successfully navigate this shift today will win tomorrow.

Vivek Lath is a partner in McKinsey's Singapore office, and **Greg Peacocke** is a partner in the Jakarta office.