

# Mining for growth

May 2017

Mining companies are heading to the ends of the earth to meet demand.

**Dwindling mineral basins** are leading mining companies to remote locations with limited infrastructure. Companies are in these regions for the long haul, often building out entire communities to support their mining operations. In this episode of the *McKinsey Podcast*, McKinsey partner Chris Mulligan and Mukani Moyo, senior expert, discuss the complexities mining companies face in far-flung locations and the impact of technology on productivity.

## Podcast transcript

**David Hunter:** Hello and welcome to this edition of the *McKinsey Podcast*. I'm David Hunter, an editor with McKinsey Publishing. Today we're going to talk about mining—one of the most cyclical, most capital intensive, and to my mind, most fascinating of all industries. With me here to discuss the issues are McKinsey partner Chris Mulligan and senior expert Mukani Moyo. Chris, for listeners who don't closely follow the mining sector, can you start by setting the scene?

**Chris Mulligan:** Over the course of the past 15 years, the most pronounced trend has been what people call the supercycle, which was a Chinese-demand-driven desire for more commodities as they continue to industrialize their country. And that had a lot of effects.

It was a little unexpected how quickly demand grew. And even though China is a resource-rich country, the amount of extra coal, iron ore, and copper, as well as a bunch of other commodities that China needed to consume in order to grow at the rates that it wanted to, entirely outstripped its own national ability to serve their own demand. It created a large global demand for many commodities, which others then scrambled to provide.

**David Hunter:** What did that do to the production and profitability of the industry worldwide?

**Chris Mulligan:** You start with demand and hopefully match it with supply. Where it doesn't, you increase price. Prices certainly went up. Supply also went up, and supply going up is really the interesting part of the equation. There weren't a lot of obvious places where there was underutilized capacity, where people could just say, "Oh yeah, we should just, you know, run the night shift," as it were.

There needed to be a real increase in supply, which needed to be met with new mines. So you saw the mining industry demand a lot of capital in order to build those new mines. The interesting thing about a mine that might be different than almost any other kind of operating asset in other industries, is that they take a long time to build. Ten years would be a good expectation from the time that you actually say, “We like what the ore deposit is here, and we want to build something,” to the time when you ship the first metal or commodity. These things take a long time to get up and running.

It was a unique period at the beginning of the supercycle driven by Chinese demand where the capital required by the industry—and the capital that was available for the industry because of the expected returns—was truly amazing. Hundreds of billions of dollars went into the mining industry on the expectation of continued increasing demand and high price and, therefore, decent profit levels.

**Mukani Moyo:** When you factor in the lead times to understanding the geology and the resource basin, it just adds to those timelines. It might take 10, 20, even longer periods of time, to compete over geological analysis and exploration to unpack what an ore body contains. Then you’ve got these long lead times to invest in the capital in building a functioning asset. By the time you actually get to production, you may well be in a completely different market paradigm to where you were when you made the initial decision to invest in that asset.

And compounding that with what’s happening in terms of where we have to go to look for ore bodies, a fundamental phenomenon that’s occurring is that the mature resource basins of the world, the places that we’ve historically gone to extract minerals, are depleting. More and more, we’re having to turn to new geographies, places that are untapped, often in the far-flung, remote corners of the world—places that have limited or no infrastructure. It just adds to the complexity of what it means to build a new mining operation.

**David Hunter:** So, we saw this big increase in demand, rising commodity prices, and unprecedented levels of investment, often in remote parts of the world. All of that came to a halt, first in 2008, with the global financial crisis, and then again in 2011, as demand growth started to slow. Can you talk a bit about the downswing?

**Chris Mulligan:** For some of the reasons that Mukani spoke about before—the time frames for making investments before earning returns, as well as the scale of those investments—it meant that perhaps people chased the investment opportunity too long in regard to the China supercycle. At least, that would be the conventional wisdom by investors today. In hindsight, it looks like investors deployed too much capital in the mining sector.

When Chinese demand started to decelerate, people said, “Oh, my. Maybe our growth expectations for Chinese demand were a little bit optimistic.” That means that we now have basically put on the tracks a bunch of investments that we either need to write off or see through to their logical conclusion.

**Mukani Moyo:** In this period where we saw strong growth driven by Chinese demands and commodity prices increasing, the profitability of mining companies grew significantly. It grew to unprecedented levels, peaking in about 2011. At this time, mining companies prioritized production, oftentimes at all costs, including also making, as Chris was pointing out, heavy investments in capital to boost output.

And when the slowdown in Chinese demand came, there was this overcapacity on the markets that led to the mine crash that we saw. We have seen prices and equity valuations rebound a little over the last year, but the industry still faces a series of big and important challenges.

The big things that the industry is going to have to address are adapting to the slower demand growth and paying attention to the overcapacity that remains in some commodities. Thinking about how they manage the volatile spikes we see in prices. So volatility is here to stay. And thinking about how they repair their balance sheets and manage the heavy debt loads that many mining companies picked up during the boom, as they made these investments to drive growth.

**David Hunter:** And what sort of initiatives is that translating to?

**Chris Mulligan:** The mining companies post-2008 did a really good job in responding to a dramatically changed environment. So from one in which output was prioritized over cost, they really had to switch gears, which really meant switching operating philosophies throughout the organization.

If you look at the last 15 years, it is a tale of two chapters. Pre-2008 was to increase throughput mainly by applying capital and without maybe as much cost discipline as you might expect. It was an exact turnaround after 2008, where throughput might have grown a little bit but basically moderated, and the real focus was on how to bring down costs to stabilize margins as prices plummeted.

**Mukani Moyo:** We've talked a lot about many of the short-term challenges that the industry faced. But there's a bunch of fundamental and long-term issues the industry is going to have to address. Things like: Where are they going to find the mineral deposits of the future? What's going to fuel demand growth for the next century?

Mining is going to have to turn to more exotic locations at the very edge of civilization. We have gold mines, for example, in South Africa, that are operating at three kilometers or even more deep underground. We have mines in conflict areas and conflict zones in different parts of the world. This is going to become the operating blueprint for mining companies.

**Chris Mulligan:** In many of these places, it's very expensive to keep people housed and safe with good welfare.

And so, whether it's at 14,000 feet in the Andes or on a hot day in the Pilbara in Western Australia, there's been an increasing push for automation—whether that is true autonomous vehicles, of which there are a bunch out and operating, or a remote operation where people are in an air-conditioned office in an office park thousands of miles away, operating this equipment as though it were a video game.

Those really are some of the trends that have improved productivity, mainly by taking people away from the site. It's safer. In many cases, it's cheaper. Certainly in the long term it's cheaper, and the productivity has proven to be higher.

**Mukani Moyo:** I think there are four things that mining companies are going to have to do to address the issues the changed environment has brought. I think, first is restoring their balance sheets, and this means plugging the holes from business development and other endeavors that didn't quite work in this run-up during the boom. And rebuilding the war chest for reorienting and rebuilding a growth agenda.

Mining being an extractive industry, you regress by standing still. You have to, as an imperative, think about growth. Being cyclical, we've come out of a phase where over the last few years post the crash after the boom, growth was the last thing on mining executives' minds. But they're going to have to turn back to that, because we are depleting our natural-resource spaces.

A third thing is exploration—exploring for new deposits, figuring out what the new sources or what the new ore bodies are going to be that will fuel growth into the future. As we've pointed out, a lot of that is going to be in new and more challenging places. Lastly, it's productivity, and this is mining companies improving their efficiencies and thinking about how they can get more with less.

**David Hunter:** How do you develop these mines in very remote places?

**Mukani Moyo:** I'll share an example here. I had a client that was looking at developing an open-pit mining operation in a very remote part of West Africa. This speaks to some of the challenges associated with getting a mine up and running, and building all of the associated infrastructure that you need.

So in their case, it was not only about rehabilitating an old, open-pit operation that had existed previously. It turned out they needed to think about the port that was going to ship the material out. They needed to think about what investments were needed to rehabilitate that.

In fact, in their case, it was pretty much building it from scratch. They needed to think about the rail infrastructure to get the material to the port. Next, the power supply and power generation to power all of that. It was the water and the water reticulation. It was the roads. It was thinking about the logistics and the supply chain for all of the parts, consumables, and the other things that needed to run the operation.

And as importantly, thinking about the talent—you know, where would they get all of the skills, both technical as well as operator, those skills to run this operation. There are some very important points around thinking in a smart way about sharing that infrastructure load with other stakeholders—whether that was with the government, getting in some of the global multilateral institutions to chip in and support with some of that infrastructure, or if it was working with other mining companies that were looking to enter that region. You're talking about many billions of dollars beyond just what it takes to build the operation itself.

**Chris Mulligan:** I think the interesting perspective on the mining industry as it has continued to evolve, and especially over the course of the last 15 or 20 years, is that the core competencies in order to be successful have expanded.

It used to be, back in the day, that all you had to be really good at was operating a bunch of mining equipment, training your workers well, keeping them safe, and producing a lot of ore at a low price. Now, yes, you do have to do that. But increasingly, because you're creating a bunch of infrastructure, usually in concert with other parties—some of them governmental, some of them other companies, perhaps competitors—you have to create a workforce for many of these places.

The competencies that you need are much broader just to get to the start line. You have to be able to negotiate and get to an acceptable social contract—not only in the near term, but in the long term, because these mines will last anywhere from a dozen to 50 years. You have to come to some type of a long-term agreement with the community that is going to host it—the community that you're going to help build.

Many mines are building schools. They're building hospitals. They're building roads. They're building other things that are not direct infrastructure considered in the mining operation but have to work in order for them to be able to do what they need to do.

When we look at mining companies now, the most successful ones, yes, they're good at the prosaic operations of getting stuff out of the ground. But they also are very talented about managing a very complex web of stakeholders that allow them and give them the right to do that.

I think that the mining industry really has pioneered the way in terms of true globalization. When most firms talk about globalization, they talk about really just chasing large pools of potential consumers. The mining industry has been operating under a different metric of globalization—which is, you know, operating at the very ends of the earth.

As the world economy continues to become more interactive and more connected, you will see some of the things that the mining industry has learned about operating in very different locations than the major population centers. Those skills will become important. So when people are thinking about “OK, how do I want to access sub-Saharan Africa? How do I want to think about what my policy is for operations in Latin America?” the mining industry is decades ahead of many other industries, because they're already there, in a way that most other industries really aren't.

**David Hunter:** You mentioned technology and automation earlier. What's the nature of the opportunity for mining companies?

**Mukani Moyo:** Automation has the potential to really change the face of the work that we do in the mining industry. When we talk about digitization, digitization facilitates increased automation and mechanization.

We have automated hauling. We have automated drilling. These are technologies that have now been commercialized—which means that in some mining operations out there, we have these massive fleets of giant ore trucks, pieces of gear that are the size of your house, driving and navigating their way around an open pit without anybody sitting in them. This is a self-driving car on steroids, essentially. On the other hand, we have other technologies like automated blasting and shoveling that are now undergoing testing.

The benefits that all of these innovations bring are not only in reducing the costs of labor, which of course is a major component in the operating-cost buildup of a mining operation, in particular when you consider the remoteness of some of these locations and what it costs to bring talent into these challenging places. These innovations are also making mining operations safer, because we're able to reduce the number of people that we have in some of the most dangerous activities that go on in mining.

There are real opportunities to harness the information and data that we generate in mining operations. Any mining operation today will have in the thousands or hundreds of thousands of sensors capturing in real time a vast swath of data.

**Chris Mulligan:** When we look at utilization—how much a piece of equipment is actually used in terms of the time that it's sitting on-site—mining, unfortunately, is among the lowest that we see across industries. Compared to a chip fab or something that will run 99 percent of the time, or maybe an offshore oil rig, which will be around 80 percent, the mining industry is more like 60 percent, and some parts, even lower. What's really helpful is that over the course of the last generation, all of the equipment that's being used is just bristling with sensors. That big truck that you see hauling hundreds of tons of ore costs millions of dollars.

Those things are pushing out terabytes of information. One of the things that we think is really interesting about the mining industry at this time is that they finally have the information to help them solve the issue on how to better utilize on-site equipment.

**David Hunter:** Has the application of technology started to make mining operations more productive?

**Mukani Moyo:** One of the things that we've done in our research is to create the metric that tries to quantify productivity in a mining context by taking into account all of these inputs that go into a mining operation and also trying to disentangle those variables that a mining management team doesn't have control over.

So things like changes in the price levels of commodities or changes in the price of oil, which influence costs, changes in geology or the grade of a mineral—we've essentially created a metric. We call it the MineLens Productivity Index, which tries to, in an apples-for-apples way, look at how mining companies are doing in terms of productivity.

The really interesting thing that you see here is, over the last decade, we've seen productivity fall pretty precipitously. In fact, our metric shows mining companies today are about one-third less productive at digging out a ton of dirt out of the ground than they were a decade ago. That's pretty stark.

I think there are a number of things the industry is going to have to address to change this trend. I think first and foremost [the industry] will be having a more explicit focus on productivity.

Historically, mining companies have tended to focus either on cost reduction or on throughput improvement, but not necessarily on productivity in the holistic sense. And this matters. Because mining is inherently a game of trade-offs, right? So there's always a tension between capital invested versus your operating costs, for example. If we look at the narrow view of just one versus the other, we don't get the full picture of how we're optimizing those trade-offs. I think a big area of focus is going to have to be in building up the capabilities around lean operations, and asset productivity.

There's the technology opportunity. Historically the mining industry has been pretty slow to adopt new technologies, whether that's been risk aversion or we've gotten comfortable with doing things a certain way. This is something the industry has got to have a go at, in terms of thinking about the next wave of technologies that would change the way that we do mining.

**David Hunter:** Thank you, Chris, and thank you, Mukani. To learn more about McKinsey's research on this and other topics, please visit [McKinsey.com](https://www.mckinsey.com). [□](#)

### About the authors

**Chris Mulligan** is a partner in McKinsey's New York office, and **Mukani Moyo** is a senior expert in the Toronto office. **David Hunter** is an editor with McKinsey Publishing based in New York.