

Creating Global Mining Winners in Africa

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The African continent delivers some of the best value in the world for every dollar spent on exploration. Even so, African mining companies have yet to fully tap the continent's reserve potential. Using big data analysis, we found opportunities in productivity, strategy and stakeholder engagement that mining companies can use to steer their way towards world-class performance.

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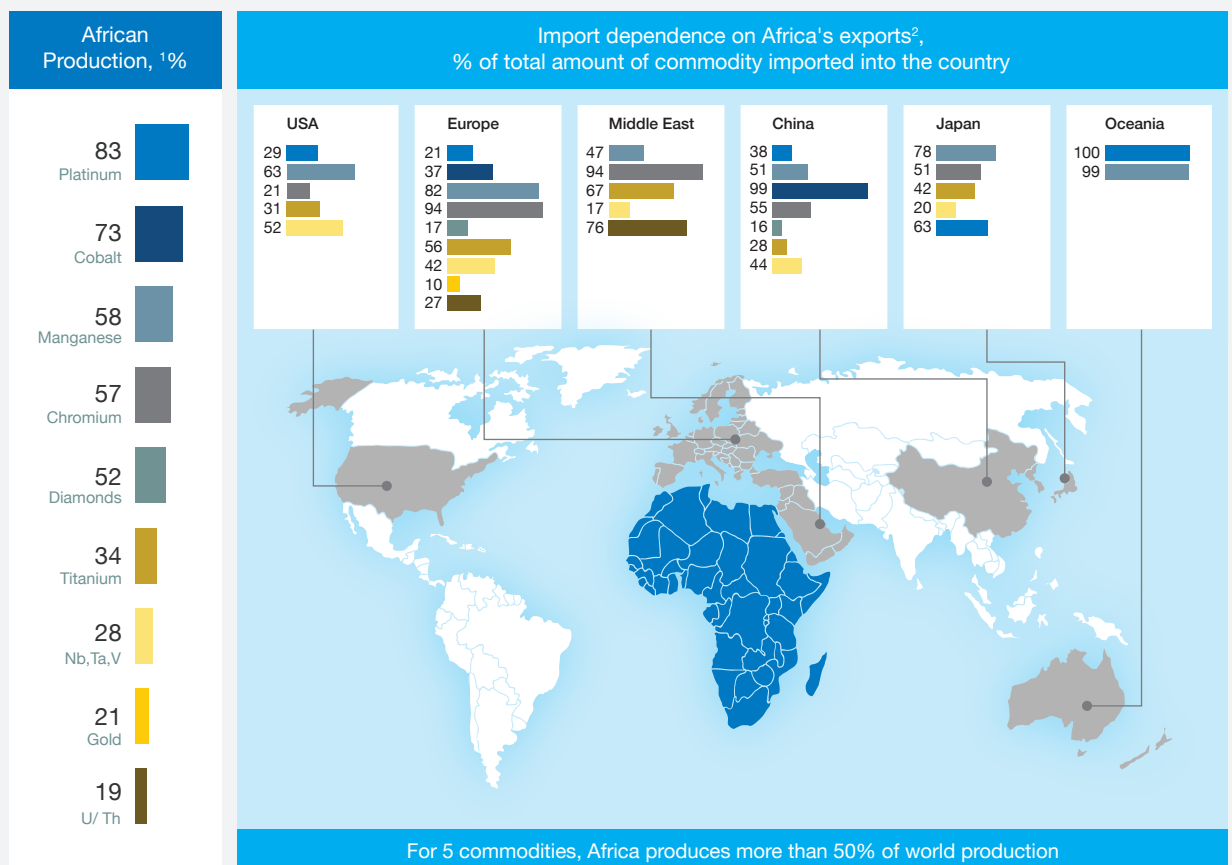
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Introduction

Africa has the luck of the geological draw. It supplies 83 per cent of the world's platinum, 73 per cent of the world's cobalt, and over half of the world's manganese, chromium and diamonds.¹ It is a principal commodity exporter to China, Japan, the United States and Western Europe. Given these endowments, African mining is critical to the region's economies, and its mining companies have the potential to be world-class performers. But when we assessed their performance against global peers, we found that they have underperformed in terms of value creation. If nothing changes, the odds are that African mining companies will fall further behind the world's leading mining companies in the decade ahead.

The good news is that African mining companies have access to a range of levers to triple or quadruple their chances of becoming world-class performers. Below, we examine their options.

African mining is important to the world



1. Africa/Global production in 2014

2. % of African imports on total imports for specific commodities

¹Source: Johnson Matthey, Kimberley Process Certification Scheme, SNL Financial, Trade Map Org, UN Comtrade Website, World Bureau Metal Statistics.

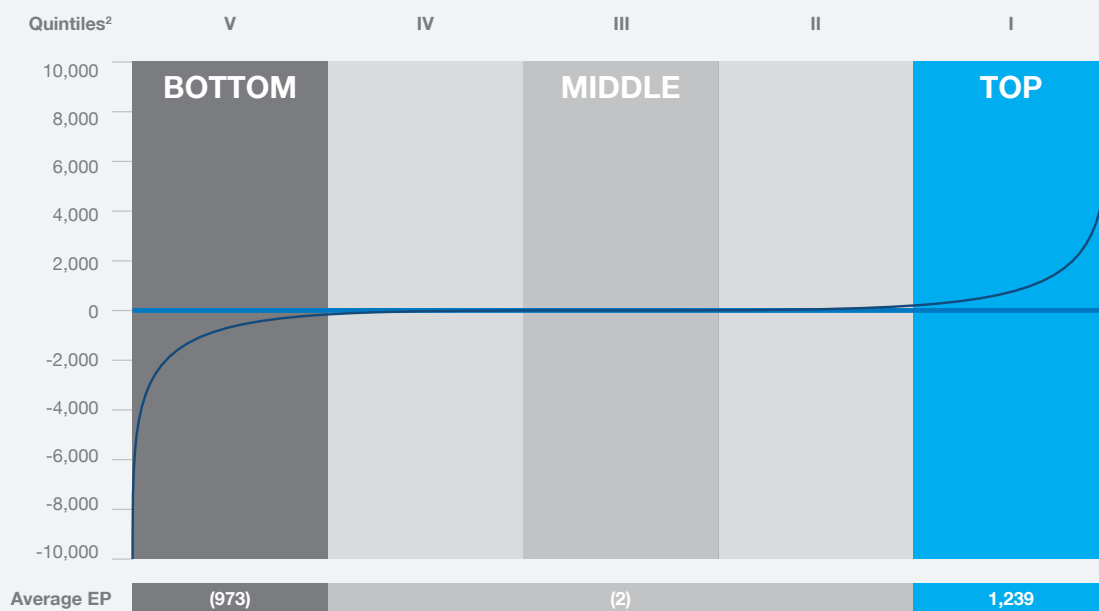
GRAPH SOURCE: Trade Map, UN Comtrade, Johnson Matthey, SNL, WBMS, Kimberley Process Certification Scheme

Introducing the Power Curve

To gauge the performance of 65 publicly listed African mining companies,² we compared their economic profit performance to the world's top 3,999 companies, all of which compete for the same capital.³ By ranking companies this way, we produce what we term “the power curve” of economic profit. The power curve suggests that the world of corporate value creation is far from even: 20 per cent of companies at the top generate 90 per cent of the economic profit; 60 per cent in the middle meet their cost of capital; and 20 per cent at the bottom of the curve make large economic losses.

The Power Curve of Economic Profit

Average annual economic profit generated from 2009-13; \$m; N=2,243¹



1. Top 3000 companies by revenues in 2011 less firms with insufficient data to calculate an accurate average economic profit for 2007-11 and 1997-01.

2. EP for Apple, Exxon Mobi, Microsoft, Bhp Billion, China Mobile, Gazprom Oao and Samsung Electronics were higher than 10,000 and EP for Tokyo Electric Power was lower than -10,000.

²Our methodology is based on the McKinsey’s “Beating the Odds Strategy”. The 65 African mining companies were selected based on the following criteria:(1) have publicly available information; (2) generated over 66% of their revenues in African mining in 2014; and (3) have a net operating profit less adjusted taxes (NOPLAT) figure.

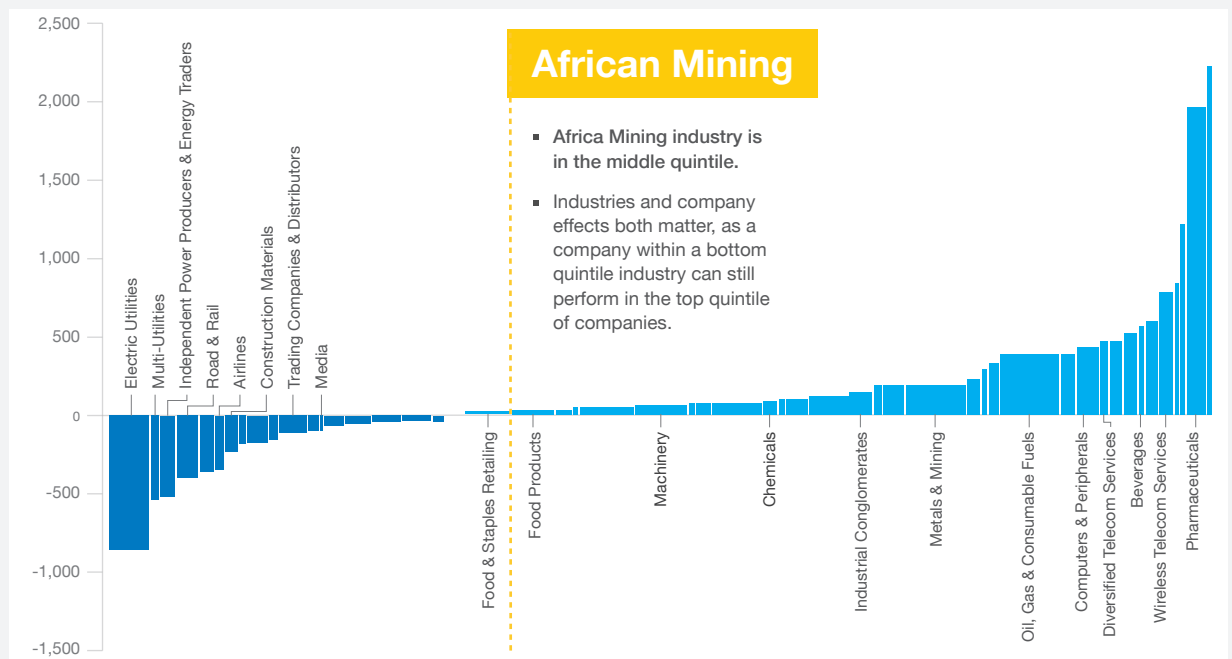
³The Global Power Curve covers the top 3,999 companies by revenue.

GRAPH SOURCE: McKinsey Strategy Practice

Industries have a power curve as well based on the average economic profit of underlying companies

Average annual economic profit generated per Industry¹

\$ Millions; Average 2007-11; N=2,243



1. Economic profit divided by the number of companies, industry granularity of 60 industries

We use economic profit as a single measure of value creation because it considers both scale (or growth) and returns. It is a measure of the profit that a company generates after paying its investors back for the use of their capital, and is calculated as invested capital multiplied by return on invested capital (ROIC) net the weighted average cost of capital, (EP = invested capital * (ROIC-weighted average cost of capital).

An industry view suggests that African miners do not perform well when compared to their global peers. In the first half of the 2000s, African companies were ahead of their global peers⁴ in terms of economic profit. In 2005, African companies started falling behind.⁵ The precise reasons for the change were not immediately obvious. Besides favourable geography, invested capital has actually grown over time. But ROIC has been below average and declining.

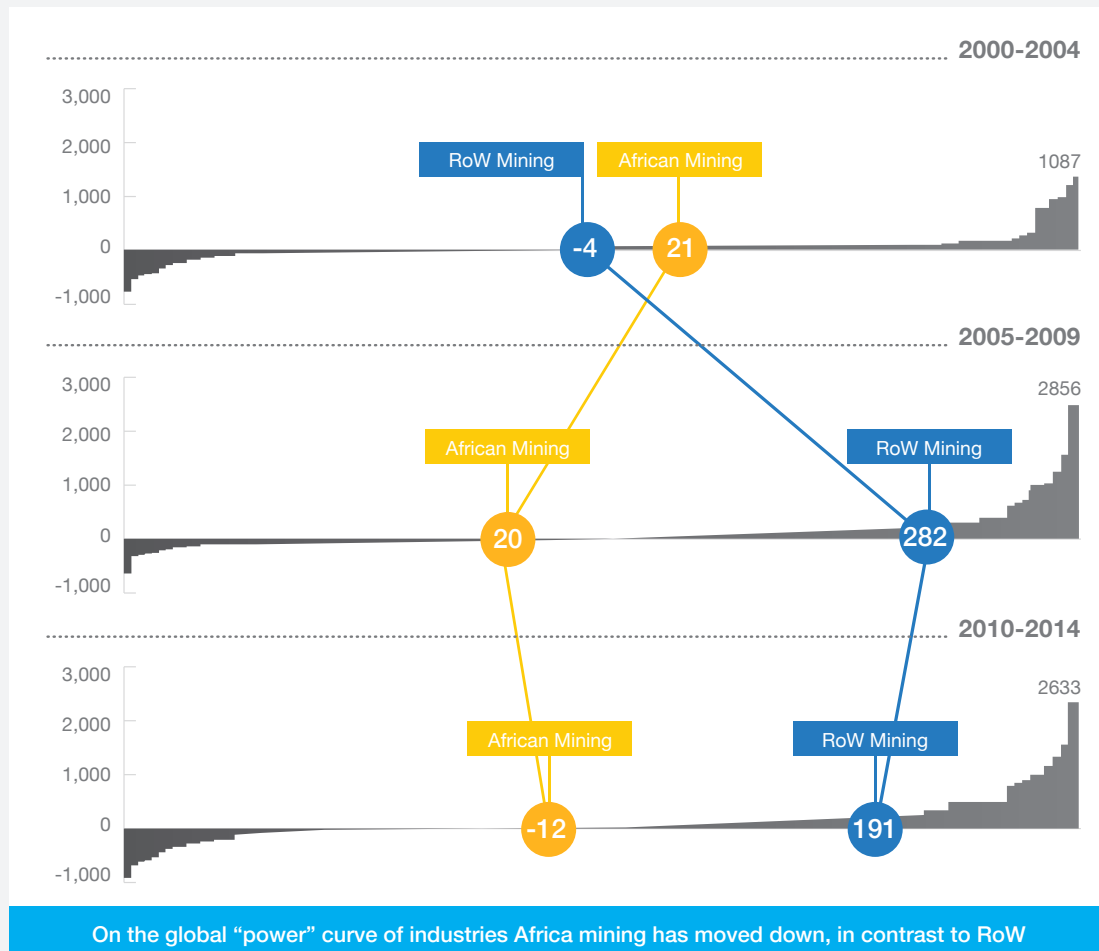
⁴When compared to a Global Mining Power Curve, with 163 companies, of which 65 were African, and 98 were classified as Rest of World (ROW) mining.

⁵Analysis based on McKinsey's "Beating the Odds Strategy," in terms of economic profit.

GRAPH SOURCE: McKinsey Strategy Practice.

In the long term view, African mining has underperformed

Average economic profit¹; USD Million



1. Economic Profit = Invested Capital * (Return on Invested Capital - Weighted Average Cost of Capital)

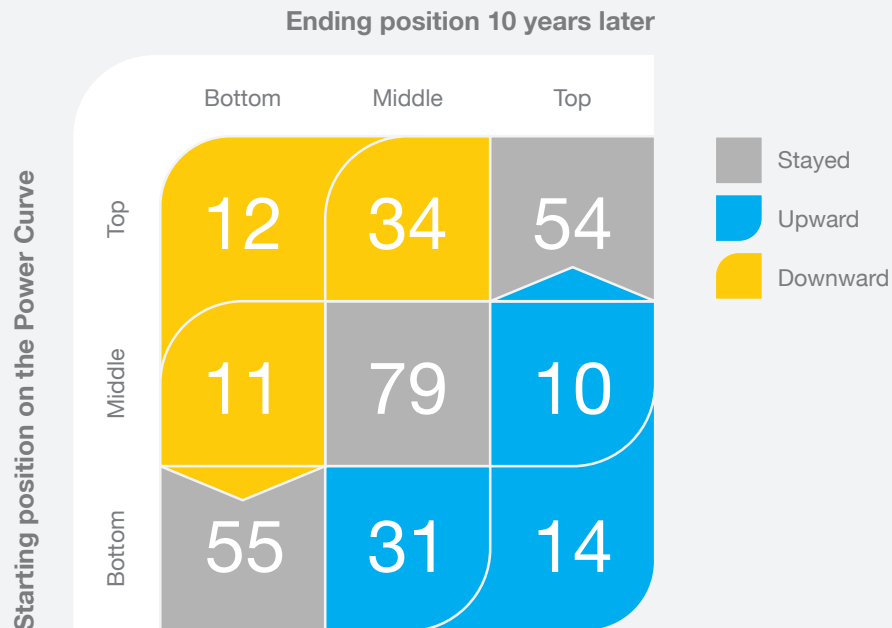
While it is good to know how the current performance of African mining companies compares to that of the world's best corporations, a more interesting question is: How can African mining companies improve their odds of moving up the power curve of economic profit? Our analysis aims to deliver a fact-based answer to this question.

In examining the global data set, we found that, on average, only one in 10 companies move from the middle to the top of the curve over a decade.

GRAPH SOURCE: McKinsey Strategy Practice and Corporate Performance Analysis Tool™ - a McKinsey Solution

The odds of economic mobility - a game of 1 in 10

Economic mobility from 1997-01 to 2007-11; Percent; N=2,243¹



1. Top 300 companies by revenues in 2011 less firms with insufficient data to calculate an accurate average economic profit for 2007-11 and 1997-01

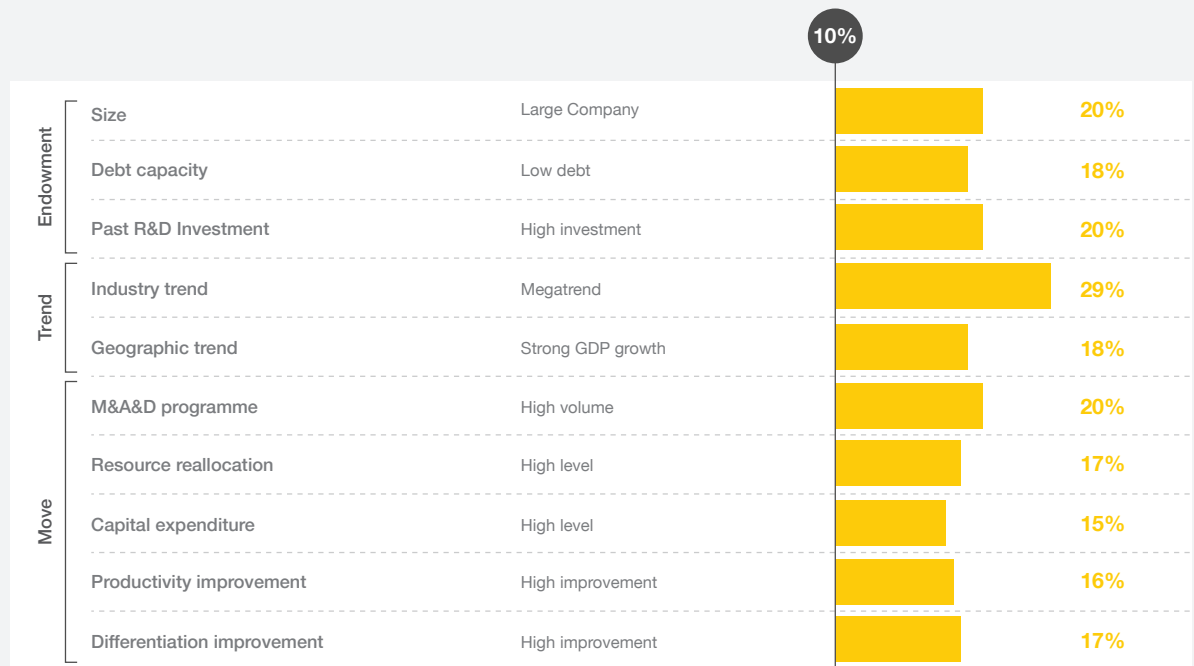
We then used “big data” analytics to understand how companies can boost their odds of scaling the power curve, in other words, what they can do to beat the average. We found that ten attributes matter, and they can be grouped into three categories:

- **Endowment:** A company’s profile today, measured as its size and headroom to fund growth
- **Trends:** The industry and geographic tailwinds and headwinds that can propel a company up and down the power curve
- **Moves:** The big strategic moves that companies can make to improve performance or shift their corporate portfolio towards tailwinds

GRAPH SOURCE: McKinsey Strategy Practice, McKinsey Corporate Performance Analytical Tool

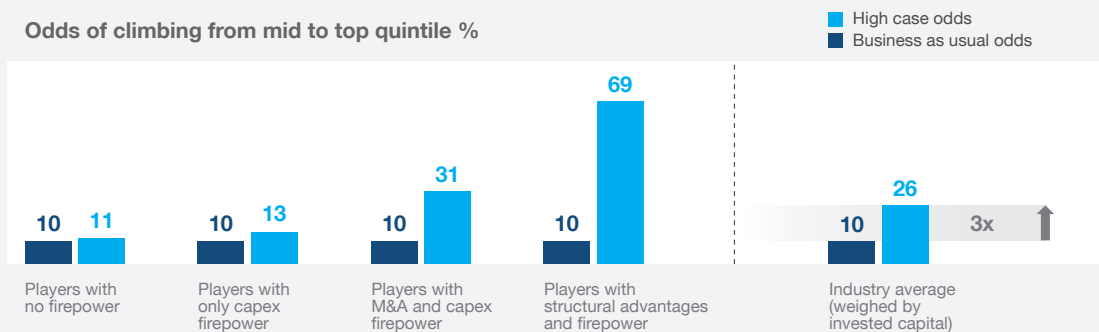
10 Attributes determine a company's chance to improve its position on the Power Curve

Odds of moving from the middle to the top from 1997-01 to 2007-11; %



Our analysis suggests that African mining companies can boost their odds of moving up the power curve by a multiple of three or four if they make bold moves.

African Mining industry has the potential to improve its odds by 3x or more



GRAPH SOURCE: McKinsey Strategy Practice, McKinsey Corporate Performance Analytical Tool

Strategic Moves to Boost the Odds

The most important aspect of any company's strategy is understanding and participating in industry head and tailwinds. Historically, African mining companies have underperformed in this area. For example, as prices of manganese and cobalt declined from 2010 to 2013, African producers actually increased supply.⁶

Companies have four big strategic moves available to grow economic profit by shifting their portfolio towards these tailwinds, or to simply improve their performance in the current context:

- Pursuing high volume M&A
- Dynamically reallocating resources
- Delivering capital investments
- Seeking productivity breakthroughs

All African mining companies can and should take steps to improve productivity and reallocate capital, while about half have the capacity to merge with or acquire companies (M&A). Taken together, productivity improvements and strategic moves that harness market trends (M&A, capital and expenditure reallocation) would improve companies' odds of moving from the mid quintile to the top quintile on the power curve by up to 31 per cent.

Pursuing high volume M&A

M&A can be an effective way to increase exposure to industry or geographic tailwinds, and can help mining companies achieve economies of scale. Companies that engage in high volume M&A almost always generate better shareholder returns than those that pursue large deals or only attempt to grow organically.

Given the global downturn in many commodity prices, including coking coal and iron ore, African mining companies may question whether now is a good time to spend. The answer is 'yes'. A downturn is a good time to buy, and at least half of all African companies have the headroom to fund this growth based on their debt to equity ratio to do it. There are also plenty of targets: 77 per cent of mining companies account for just 30 per cent of the industry's market capitalisation.⁷

⁶Compound annual growth rate (CAGR) for cobalt: Africa: -1.2%, ROW: -1,8%.

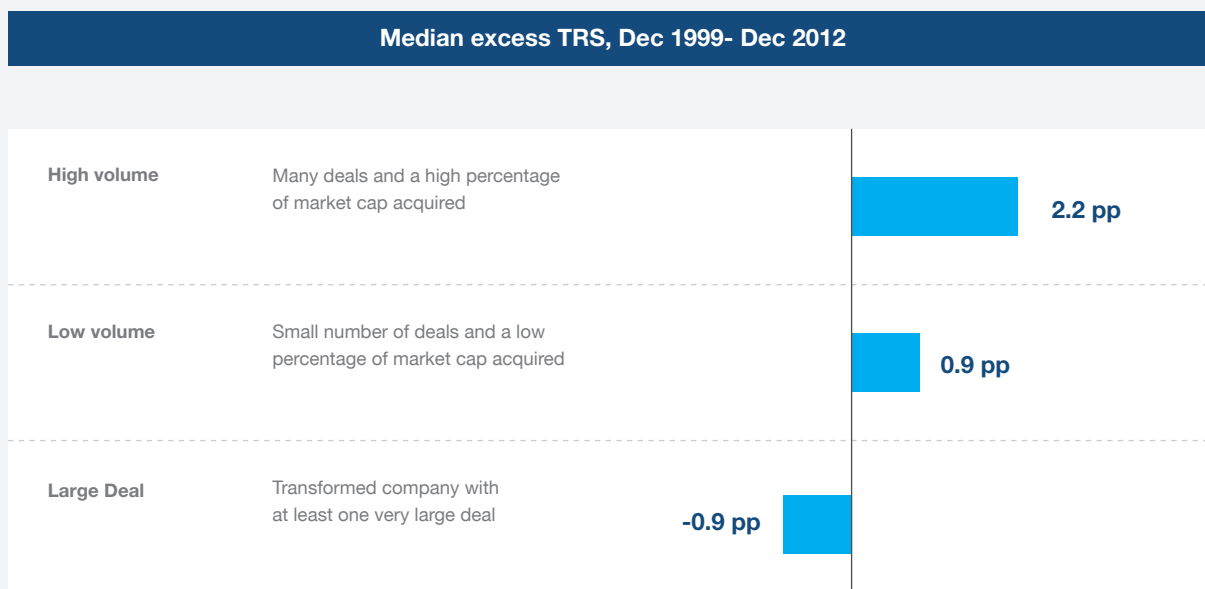
Africa's share of global production rose from 76.9% to 77.2% in the time period.

CAGR for manganese: Africa 8%, ROW: 2.4%. Africa's share of global production rose from 28.7% to 32 % over the time period.

Source: Worldbank.org: CMO Historical Data, 2014 Miners Yearbook, metalbulletin.com,, McKinsey team analysis.

⁷This figure is based on the Global Mining Power Curve assessing 163 companies and their ability to perform mergers and acquisitions (M&A). We define a company's ability to perform M&A as the ability to acquire more than 30% of another company, based on the acquirer's market capitalisation in 2014.

The high volume M&A creates the highest excess TRS among the 3 M&A programme segments for companies across across the globe and industries



Dynamically reallocating resources

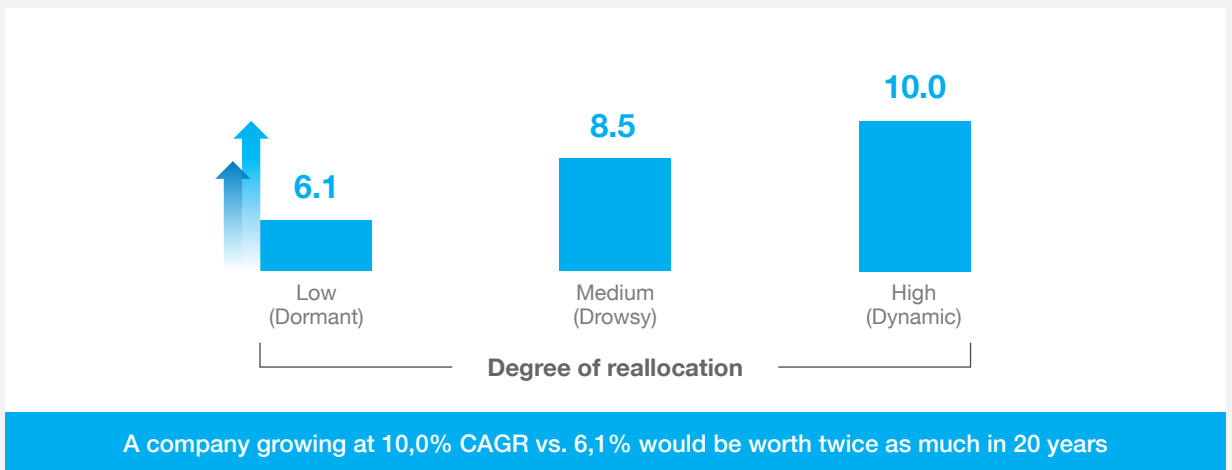
In order to maximise exposure to industry and geographic tailwinds, companies need to shift capital in their portfolios towards areas of faster growth. Our analysis shows that companies that dynamically reallocate capital generate better shareholder returns and boost their odds of economic mobility.

GLOBAL

The reward for high rates of re-allocation is considerable: dynamic re-allocators achieve significantly higher TRS

1,508 companies, 1990-2010

Medium TRS CAGR of companies by degree of reallocation, %



Characteristics of high reallocators compared to the rest

- 1** Dynamic reallocators shift resources over a number of years
- 2** Dynamic reallocators are patient; results may take time
- 3** Dynamic reallocators reallocate frequently across existing businesses, but also enter and exit businesses more than others
- 4** Dynamic reallocators are more than 50% more likely to shift resources between existing businesses than dormant reallocators

Delivering capital investments

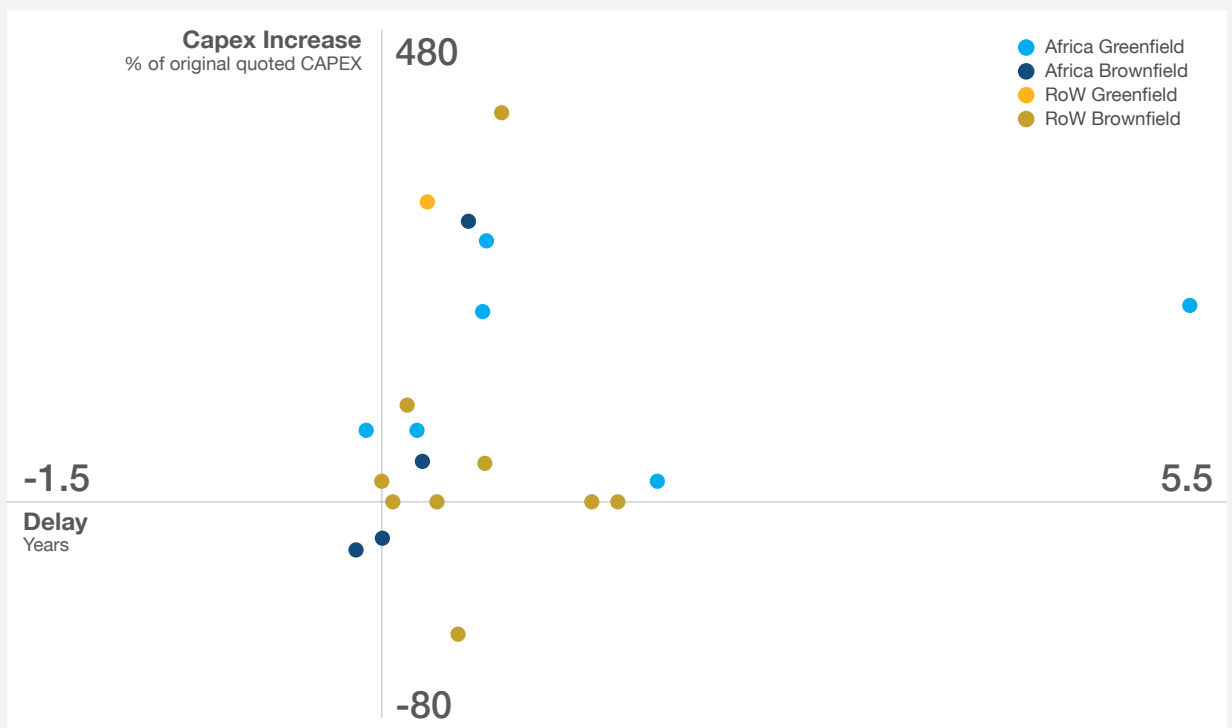
One way to boost their odds of economic profit growth is for mining companies to spend more capital than the industry median.

GRAPH SOURCE: McKinsey corporate strategy research program

Successfully delivering large-scale capital investments remains a challenge for many African mining companies. Large scale capital projects often experience significant budget and time overruns. [See exhibit] On the flip side, a more fragmented portfolio of smaller stay-in-business capital projects could reduce capital by 20 per cent to 30 per cent without compromising overall safety of operations.

Freeing up capital is one of the quickest ways to improve short term agility. Traditionally, the mining industry has resorted to haircut-type methods to cut capital spending to top-down targets. Mining companies could reduce capital more efficiently by first performing detailed portfolio analysis and optimisation of individual projects.

Project execution is poorer in Africa vs RoW with longer delays and capex overruns



Seeking productivity breakthroughs

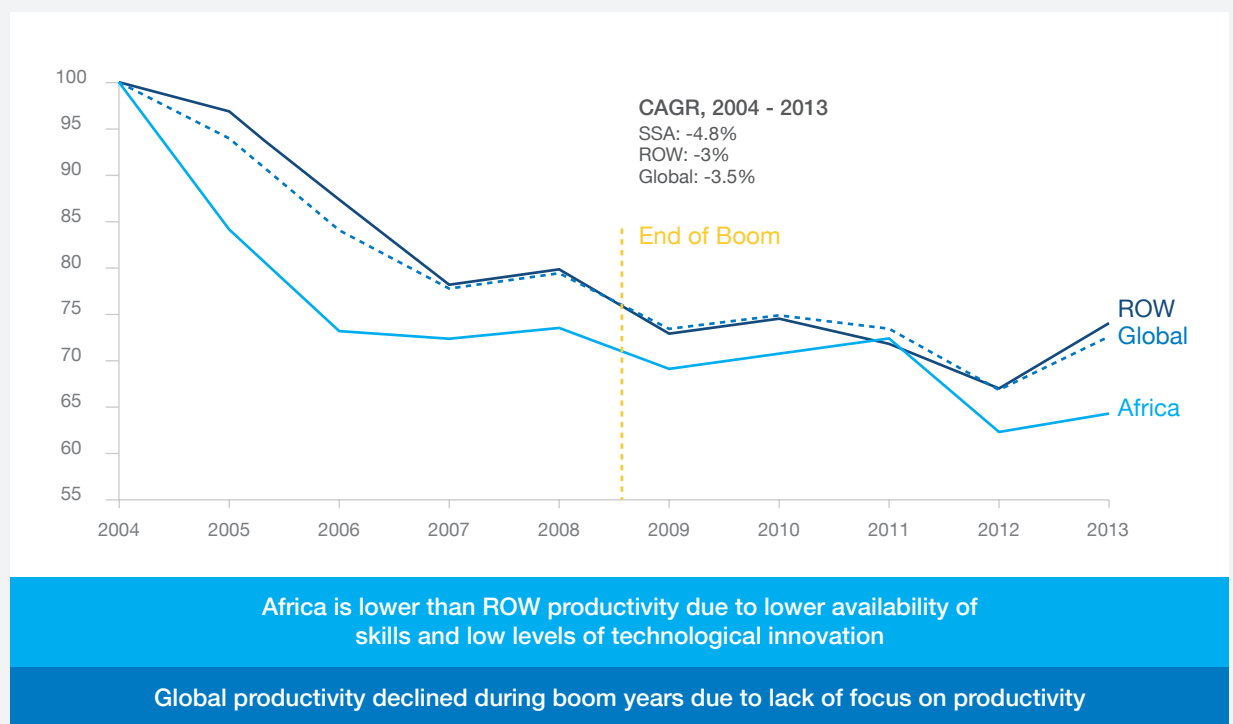
Companies can make additional and substantial improvements to performance by honing in on productivity. Our analysis shows that productivity in the mining industry globally has declined since 2004, but productivity among African mining companies declined more than that of their global peers.⁸

Africa mining productivity was dropping 5% YOY since 2004 vs. 3% for its global peers

MineLens Productivity Index (MPI)

Indexed to 2004 = 100

- MPI is used to measure the underlying productivity of mining companies.
- It is composed of 4 elements physical mining output (measured as total material moved), employment at the mine site, the value of assets at the site, and non-labour costs.



⁸McKinsey's MineLens Productivity Index (MPI). The MineLens Productivity Index uses information from 57 different mines in iron ore, copper, gold, coal and platinum group metals and in all geographies. MPI is formulated in a way that its results are not affected by changes in ore grade, stripping ratio, or the price of the commodity. For further information on this topic, please read the article "Productivity in Mining Operations: Reversing the Downward Trend," McKinsey and Company (May 2015).

GRAPH SOURCE: Company annual reports, Wood Mackenzie

To reverse the trend, African mining companies must employ lean transformation, by streamlining organisational processes, introducing innovative technologies, and cultivating alliances with mining equipment, technology and services suppliers (METS).

Management and employee resistance to change often undermine the success of a transformation programme. But our experience suggests that African mining companies can make successful and rapid transformations by using the right tools.

Technological innovation, including equipment mechanisation and the use of “big data”, increasingly impacts mining productivity. For example, today’s state-of-the-art mining equipment gathers vast amounts of data that companies can use to improve operating modes and reduce maintenance cycles. Machines that enable remote mining operations allow companies to employ fewer front-line workers. Other innovations, such as new geospatial tools that simplify mine planning, and microwaves and lasers that break rocks faster, deeper and more precisely, all help to improve productivity.

One of our African clients increased throughput by as much as 80 per cent in four months by improving labour and equipment productivity, for example.

As another example, Anglo American tripled productivity by introducing low-profile machines at its African mines.⁹

Our research shows that there is a direct correlation between improved productivity and a METS presence in a country. For example, LKAB’s Kiruna iron ore mine in Sweden, where winter temperatures average 15 degrees Celsius below zero, has collaborated extensively with METS partners to introduce automated fleets of load-haul-dump (LHD) machines to dramatically and consistently improve productivity.¹⁰

Compared to their global peers, African mining companies are the least engaged with METS partners, resulting in capital productivity that is nearly three times lower than that of comparable companies in Asia Pacific. Greater METS engagement will help companies achieve productivity breakthroughs across the entire value chain, from exploration to mining extraction to processing. METS engagement can also drive innovation in the industry through cross-pollination of skills and resources, as employees move between mining companies and METS players.

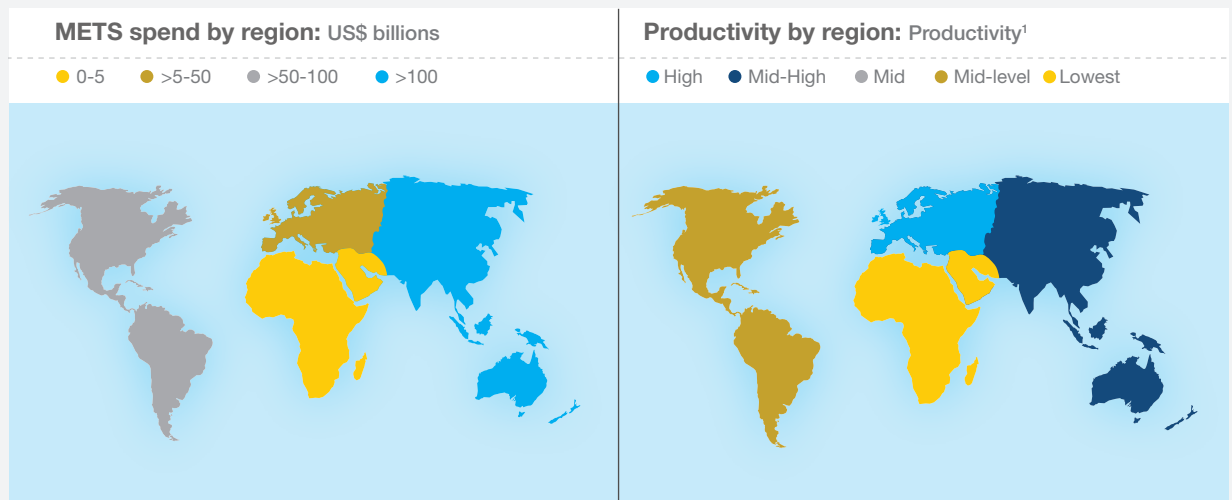
The mining industry can encourage METS to establish a local presence within a country. The supplier base can consist of international distributors and service providers, but should be expanded to include local businesses supported by the mining industry to deliver targeted value add. Industry can facilitate this presence. In South Africa, for example, local, high-quality welding suppliers have historically outperformed international service providers in maintaining the power stations of Eskom.

⁹<http://www.angloamerican.com/~media/Files/A/Anglo-American-PLC-V2/presentations/2015pres/aa-mining-indaba-2015-speech-chris-griffith-1.pdf>

¹⁰Luleå University of Technology Department of Civil, Environmental and Natural Resources Engineering; “The Future Mine,” Mining Magazine (Sep. 2010).

PRODUCTIVITY

Africa has the lowest levels METS engagement, contributing to lower product



- Greater METS engagement will mean higher levels of technological innovation, increasing productivity
- Asia- Pacific has some of the highest levels of METS spend productivity globally
- Europe showed the best levels of overall productivity
- High levels of METS engagements are correlated with improvements in capital productivity

1. Productivity is based on Scale/FTE and Sales/Capex for industry players across regions

To harness the latest technology – and even to drive it – mining companies can also ally with universities and research institutes. Gold Fields, for example, has invested in the University of Witwatersrand’s School of Mining Engineering in South Africa. Randgold recently established a research and training centre at Kinshasa University in the Democratic Republic of Congo. Other companies can replicate these efforts to break the trend of underperformance, since lean transformation alone will not be sufficient to boost the placement of African companies on the power curve.

Becoming market leaders

Companies with structural advantages can improve their odds of performing at the top of the power curve by as much as 69 per cent. These include companies dominating in commodities such as diamonds, cobalt and manganese, where structural advantages enable them to adjust supply in response to changes in commodity prices, thereby facilitating price security. They can also research or sponsor research to investigate new uses for existing commodities, thereby generating demand.

GRAPH SOURCE: Company Financials; SNL data

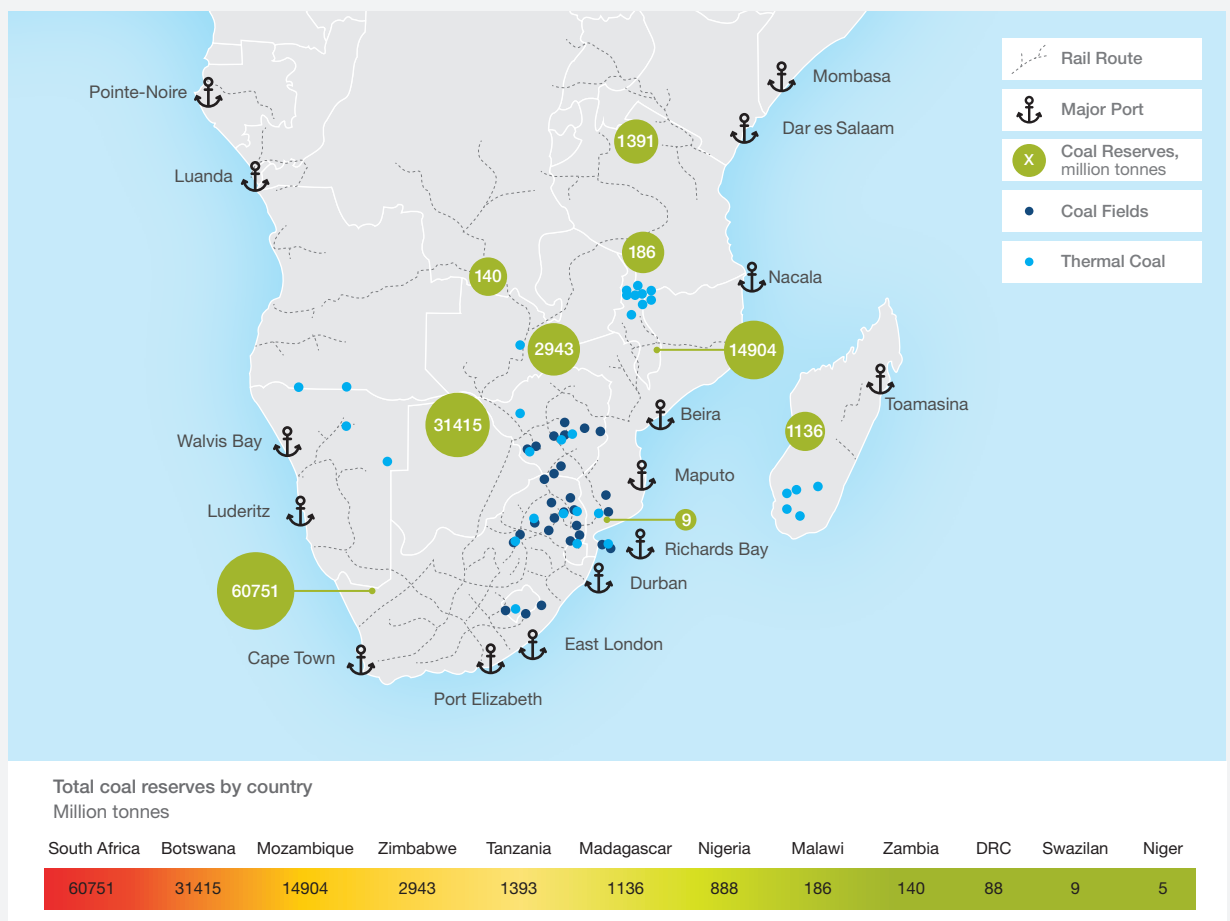
Prerequisites for Investing in the Mining Industry

Our analysis suggests that there are ample opportunities for growth for companies willing to act boldly. However, simply pulling these strategic levers is not enough. Companies must complement these moves with measures in four action areas to secure a favourable business climate:

- Facilitating access to infrastructure
- Collaborating on regulatory frameworks
- Investing in local labour and community development
- Cultivating a local supplier base

Facilitating access to infrastructure

Lack of infrastructure capacity has played a role in Africa's inability to take advantage of its resources



GRAPH SOURCE: Council of Geoscience; SNL

Despite significant infrastructure investment in the past, Africa continues to lack sufficient electric power, water, roads, railways and ports. Limited rail and port capacity makes it especially difficult for mining companies to deliver their products to the global market in time and at a competitive cost. The World Bank estimates that sub-Saharan Africa's infrastructure challenges reduce companies' productivity by as much as 40 per cent.¹¹

The challenges of accessing infrastructure in Africa are well known to investors in Africa's mining industry, and a cause of uncertainty. This is despite the fact that Africa offers the best value per exploration spend: it is the only region in the world where one dollar spent generates over one dollar in value.¹² African governments can alleviate investors' concerns by inviting private participation in infrastructure development and by improving the regulatory environment, as exemplified by Peru and Chile [see sidebar].

But Africa's mining companies need not wait for changes to government policy to improve access to infrastructure. Instead, they should take immediate steps to actively build both the 'hard' and 'soft' infrastructure that profits the entire region surrounding their assets.



The map shows Peru in green, surrounded by Ecuador, Colombia, Brazil, and Bolivia. Major cities marked include Iquitos, Piura, Chiclayo, Trujillo, Chimbote, Lima, Ica, Machu Picchu, Cusco, Puno, Arequipa, and Tacna. The Pacific Ocean is to the west, and Lake Titicaca is to the south. The word 'PERU' is written in large letters across the center of the map.

In the late 1990s, Peru's government began implementing tax and regulation to attract investment to its mining industry.¹³ This included passing mining-related labour laws and promoting private and public investment in the industry. Peru's legal framework also protects private investors from arbitrary changes to the legal terms and conditions of their projects. The result is that, between 2001 and 2014, the mining industry's share of GDP more than doubled to 12 per cent, and Peru's GDP rose 220 per cent.¹⁴

¹¹World Bank Fact Sheet: Infrastructure in Sub-Saharan Africa. <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,contentMDK:21951811~pagePK:146736~piPK:146830~theSitePK:258644,00.html>.

¹²MinEx; SNL 2005-2011.

¹³Sociedad Nacional de Minería, Petróleo y Energía.

¹⁴Sociedad Nacional de Minería, Petróleo y Energía, Banco Central de Reserva del Perú.

‘Hard’ infrastructure

Companies can work directly with governments to introduce infrastructure projects or tax structures that would improve their political and socioeconomic operating environments. For example, when a number of mining companies began coal operations in Australia in the 1990s, it struggled with a lack of railway and port capacity.¹⁵ To expand facilities at Port Waratah, government and industry players, including Port Waratah Coal Services, Newcastle Coal Infrastructure Group and Newcastle Port Corporation, entered into an agreement in 2009 to improve the coal logistics in the region.¹⁶ After collaborating with industry on an expansion plan, the New South Wales government incrementally expanded Port Waratah Coal Services Facilities. It is now the world’s largest coal export port.

In a more recent example, several African mining companies engaged with regulators in Zambia and Uganda to arrive at an optimal tax level.¹⁷

Companies can also work with governments to structure risk-sharing agreements. In Botswana, for example, DeBeers entered into a joint venture with the government to form Debswana Diamond Company in 1969. Debswana is Botswana’s largest private sector employer and a major exporter. It also contributes to public welfare by investing in local enterprises, schools and environmental programmes.¹⁸

‘Soft’ infrastructure

The absence of appropriate regulatory frameworks is another factor often cited as hindering foreign direct investment in Africa. While this is true, it also presents the opportunity to shape regulation in a way that it enhances the value of individual companies or entire industries.

A well-documented example is the way utilities in Europe responded to the challenge of unbundling their generation, transmission, and distribution and implementation of significant environmental requirements (especially carbon dioxide emission certificates). Despite being competitors, major industry players worked together in creating and growing the utility value pool through massive engagement at regional, national and European levels. Through partnering with renowned research institutions, and proactive engagement, the industry was able to work together to arrive at a mutually beneficial outcome.

Mining companies in Africa already cooperate through various associations to promote their interests, but they must intensify this cooperation if they want to shape the regulatory environment in a meaningful way. A key focus should be on creating fairly shared value. Companies should commit to long-term gain sharing, and make explicit commitments as to how much value will remain in the country of operations.

¹⁵Press search, Rio Tinto’s website and annuals reports.

¹⁶Rio Tinto Annual Report (2009). Application for authorisation lodged with the Australian Competition and Consumer Commission by the Port Waratah coal Services Limited, Newcastle Coal Infrastructure Group, and the Newcastle Port Corp.

¹⁷“After Zambia, Uganda Adopts Mining-Friendlier Tax Regime,” Resource Reports (April 2015).

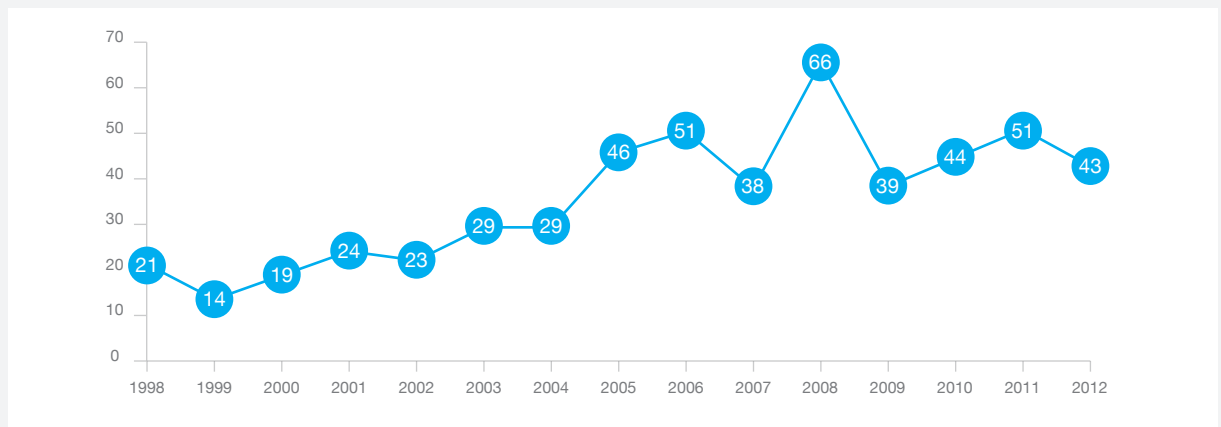
¹⁸See <http://www.debswana.com>.

CASE EXAMPLE: EUROPEAN POWER REGULATION

Throughout the entire period of increased regulation
wholesale prices increased continuously...

EUR/MWh

German electricity wholesale prices



Key developments

Overcapacities after liberalisation

- Significant overcapacity in Germany power generation market in 1998-2000, especially 1999
- Low wholesale price levels lead to decision for significant power plant shutdowns in mayor German utilities

Increase in fuel/CO2 prices mid/end 200

- Introduction of EU-ETS system in 2005 with prices for CO2 emissions leads to electricity price increase
- Strong increase in fuel prices (coal, oil, gas) second main driver for increase

Strong deployment of renewables

- Increasing share of renewables leads to lower level of wholesale prices and shift of pricing pattern within the day
- Fossil-fired power plants under pressure which leads to low activity for conventional new builds and discussion around capacity markets

Cultivating Labour and Communities

Labour

Stakeholder engagement requires companies to reach out to communities, labour and local governments to achieve buy-in, or what we call a 'social license to operate' (SLO). The importance of SLO has increased both globally and in Africa. Developing the SLO requires companies to act more like partners and less like patrons when engaging communities. This means companies must go beyond meeting legal and regulatory requirements to include programmes such as providing labour with meals and housing.

Companies should also work harder to cultivate local talent. Compared to their global peers, African operations lag in consistently identifying high performing miners and systematically developing them into managers. Besides missing out on a potentially large talent pool, current practices of labour brokering tend to create weak emotional bonds between the work force and a company, leading to frequent labour unrest, with the resulting loss of production.

Communities

Mining companies can invest in local communities where they operate, such as by micro-financing local enterprises, or by investing in educational institutions. Ultimately, developing a SLO depends on the quality of social investment, not the quantity. Gold Fields' Cerro Corona gold mine in Peru is a good example. Gold Fields has gone beyond standard initiatives, such as working with local governments, to establishing education and

training programmes, and providing local employment. The company also invested locally to promote economic diversification, including training local dairy farmers to market their cheese nationally and improve their earning power. It has paved roads, established healthcare centres and improved community access to electricity. This kind of broad-based community engagement has helped Cerro Corona avoid some of the labour issues experienced by other mines in the region.¹⁹

In Africa, Randgold Resources has achieved similar success by establishing Community Development Committees (CDC) that enlist local leaders in community engagement. Each CDC manages a budget tied to a mine's production level, and invests the budget in local development. In Mali, Randgold's investment in community development, including portable water and local agribusinesses, helped it to avoid being impacted from national strikes that hit other mining operations in 2014. Less than 15 per cent of the workforce from just one Randgold mine participated in the nationwide strikes, and then only for two days.²⁰

Randgold's other community contributions include US\$ 85,000 towards road maintenance in Cote D'Ivoire, and a research and training centre at Kinshasa University in the Democratic Republic of Congo. By its own account, Randgold's SLO efforts resulted in a 57 per cent decrease in the number of grievances registered, a 99 per cent resolution rate for grievances that did occur, and a 64 per cent increase in local community spending that resulted in part from Randgold's micro-financing programmes.²¹

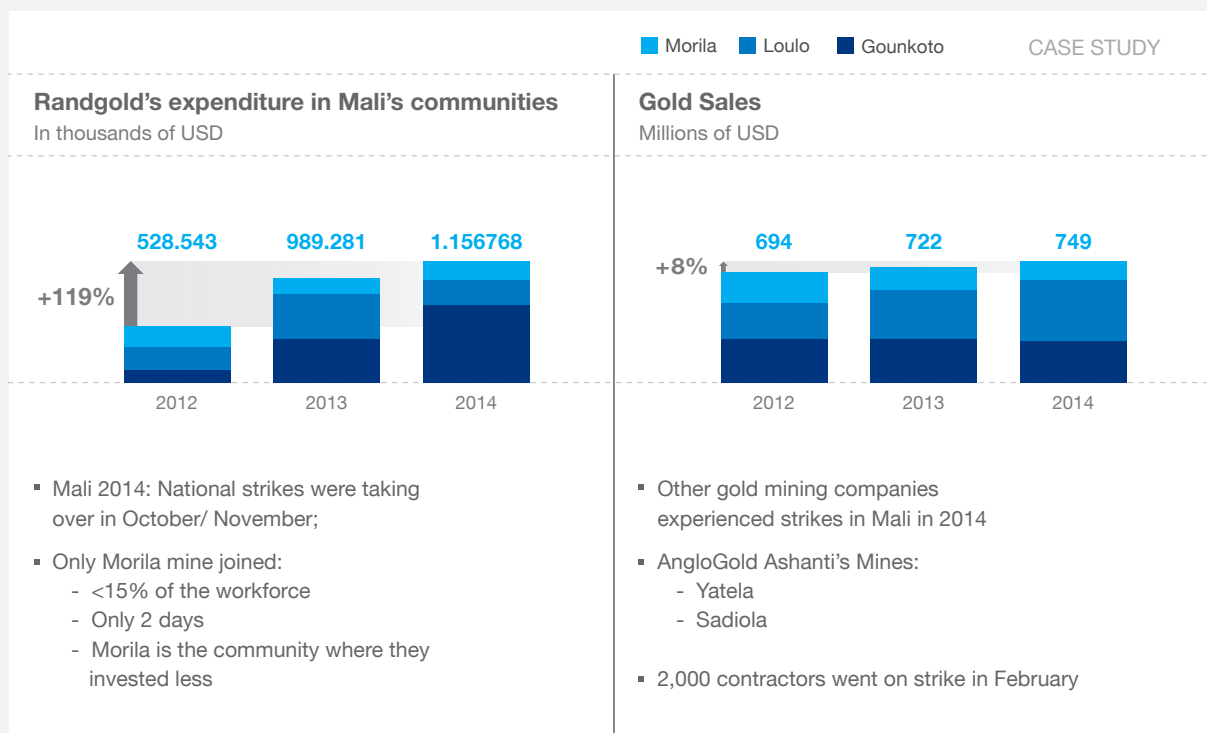
¹⁹The Gold Mining Company of the Future, Nick Holland, CEO, Gold Fields, 28 October 2015, presented at the Gordon Institute of Business Science

²⁰Randgold's Sustainability Report (2014).

²¹Ibid.

COMMUNITIES

Effective SLO allowed Randgold to reduce the impact of operational disruptions caused by labour action



GRAPH SOURCE: Randgold Sustainability Report and 2014 Annual Report; Press Search

Conclusion

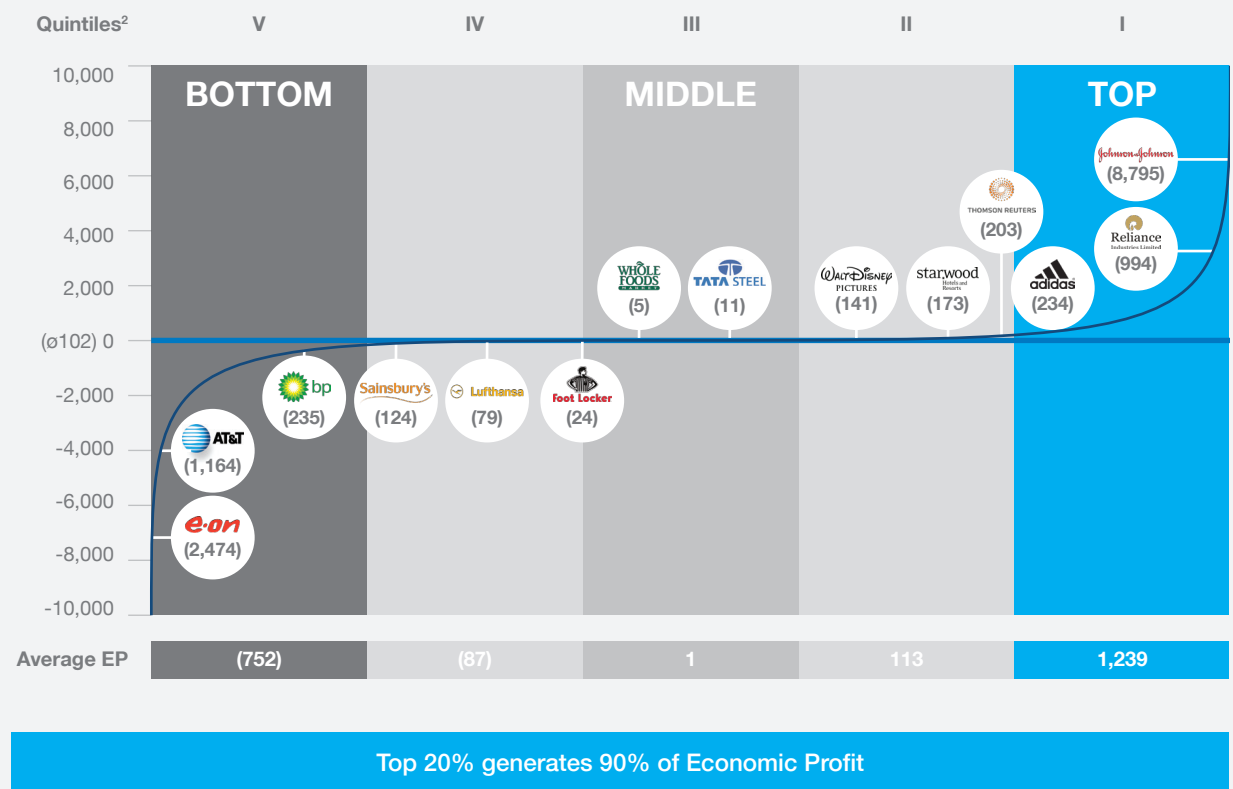
In conclusion we believe it is imperative to explore the possibilities of big, bold strategic moves that offer the best odds of moving companies from good to great. In addition, the industry will have to go beyond the traditional means of collaboration. As such, mining companies should do everything to create a better business environment - they should support regulators to create the right conditions, collaborate with labour to create a mutually beneficial environment for capability building and labour, work with governments to create a more favourable business climate and with communities to build an environment that creates shared value and productivity enhancements.

The time for action is now, and by taking action now, we believe that the odds for the future of African mining companies will be on track as one of the most attractive regions for mining globally.

Appendix: The Power Curve

Our power curve measures success by economic profit. Economic profit is often considered to be the profit generated by a company after paying its investors back for the use of their capital (economic value added, or EVA). Our analysis breaks EVA down into three drivers: endowment, trends and, big moves. Endowment is the attractiveness of a company's starting point and its headroom for economic profit growth. Trends refer to the industry and geographic tail- and headwinds that companies face. Big moves refer to strategic choices in areas such as M&A, resource allocation and business model innovation.

A Power Curve is generated based on individual company's economic profit

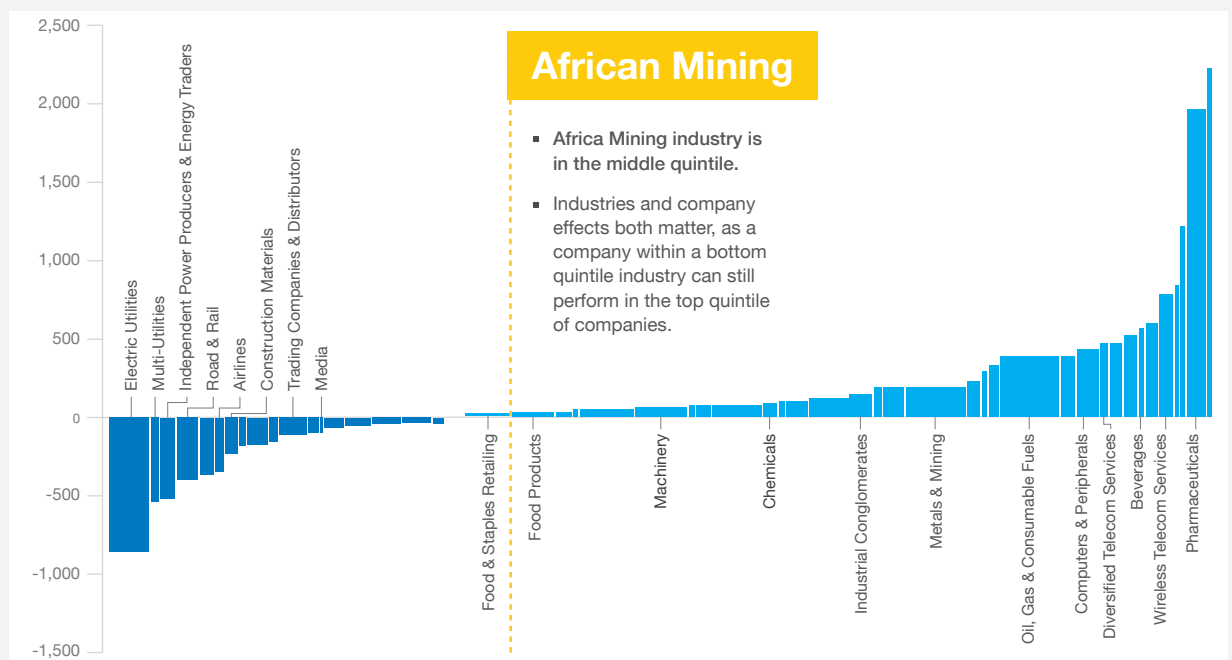


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Industries have a power curve as well based on the average economic profit of underlying companies

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1. Economic profit divided by the number of companies, industry granularity of 60 industries

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