

Innovation in Mining

Africa 2016

Monitor
Deloitte.

DOBLIN



CHAMBER OF MINES
of South Africa

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FOREWORD

The African mining sector is in the early stages of innovation, and it's now time to move forward and create the mine of tomorrow.

Mining globally has come under pressure to gear down following a period in which commodity prices plunged to historical lows. Add to that the fact that mines are now deeper and more dangerous, geology is more difficult to navigate and continuous improvement is no longer sufficient to survive. In times of threat there is a flipside that requires interrogation, as the industry gains the opportunity to reconsider the status quo and activate innovation.

The tide for taking innovation seriously as a business imperative has come in. While talk of this has drummed on for years, often constrained to boardroom discussions, now is when mining houses will succeed or falter based on whether innovation strategy is brought to life and whether it is integrated across departments. It is now critical for companies to push beyond what this report terms Core innovation.

The findings in this survey underpin some key questions for the industry. Are we as an industry future proofing our collective prospects through innovation? If not, how can this impact the success stakes for each and every one of our operations? Are we integrating our innovation strategies throughout our organisations? If we are failing to respond to the rapid pace of industry change, how quickly can we apply innovation effectively?

The sector understands the innovation concept, but has been slow to realise the benefits. Significant research and has been undertaken to date; however it is now imperative to join the dots and capitalise on the groundwork. Innovation on the continent..... has also been rooted in a laboratory mindset, remaining limited to a focus on technology. The sector is starting to understand that there is scope to do things differently, and to innovate across the organisation and stakeholder set.

Definitively, now is the perfect time to take African mining into an age where technological and organisational sophistication meet social conscience.

Andrew Lane
Africa Energy & Resources Leader
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About the study

Africa Mining edition 2016

This Mining Indaba and Monitor Deloitte study was conducted with the goal of engaging mining companies and understanding how they are innovating, in order to identify ways to strengthen and enhance their efforts.

As the mirage of change and implications thereof become real for mining companies, this series of reports examines current perspectives on and realities of innovation. Through a series of executive interviews and using the Innovation Scorecard survey methodology developed by the Deloitte innovation unit, Dublin, the aim of this study was to:

- Assess participants' current innovation efforts.
- Build a deeper understanding of key pain points and gaps in companies' innovation capabilities.
- Explore the broader issues the sector faces and hopes to resolve by becoming more effective at innovating.
- Assess the role of innovation in mining.
- Pinpoint where different innovation types can unearth greater business value.

This edition of the survey focuses on the results of the state of innovation at work in Africa, presenting the innovation landscape as it stands and identifying key innovation drivers and focus areas from which to bring to life the mine of tomorrow. It provides a platform from which to engage with African mining players. Notably it builds on the first study undertaken in Canada in 2015 by Monitor Deloitte and The Prospectors and Developers Association of Canada. The third in the series will be undertaken in Australia.

Key definitions

Innovation context and meaning

The word innovation is the ultimate white label word. It is widely open to interpretation and can be tagged on to anything that successfully changes the status quo or solves a problem in life, whether at a commercial or social level.

For the purpose of this study, Deloitte applies the following definition with the view to making innovation more meaningful for business:

Innovation is the creation of a new, viable business offering.

More to the point:

Innovation [as separate from invention] is the creation of a new [to our market or the world], viable [creating value for both our customers and ourselves] business offering [ideally going beyond products to platforms, business models and customer experiences].

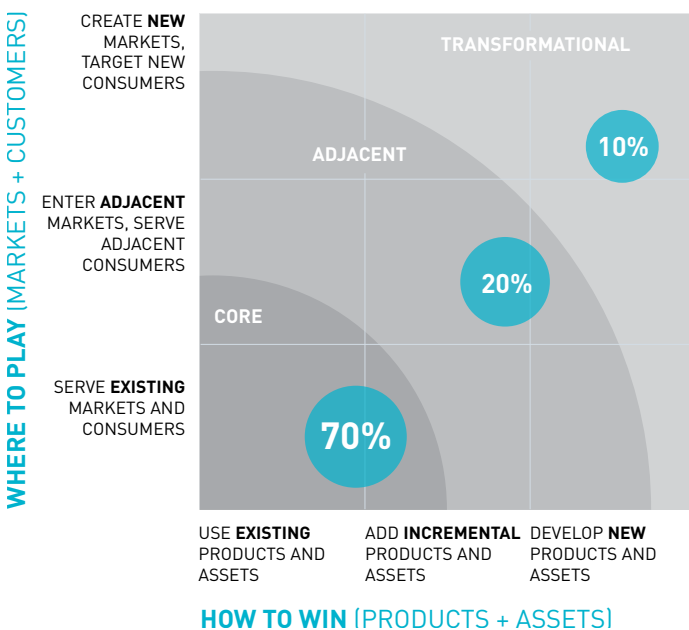
Innovation may be complex but it's not always complicated. Moreover, it can occupy one of three "ambition levels" that define its purpose or result:

- Core innovations optimise existing products for existing customers.
- Adjacent or incremental innovations expand existing business into "new to the company" business.
- Transformational or new innovations are breakthroughs and inventions for markets that don't yet exist.

The innovation imperative

When it comes to innovation, ambition levels serve not only as a useful way to align activities with the goals and objectives that should be aspired to, but also as a framework to manage innovation investments. Doblin research suggests that the most successful innovators manage their innovation efforts and investments as a portfolio of activities that is balanced across the levels (see Figure 1). And while every company's circumstances are unique, the world's leading industrial innovators have on average 70% of their innovation investments and activity occurring at the Core level, 20% at the Adjacent level and 10% at the Transformational level.

Figure 1: Innovation ambition matrix



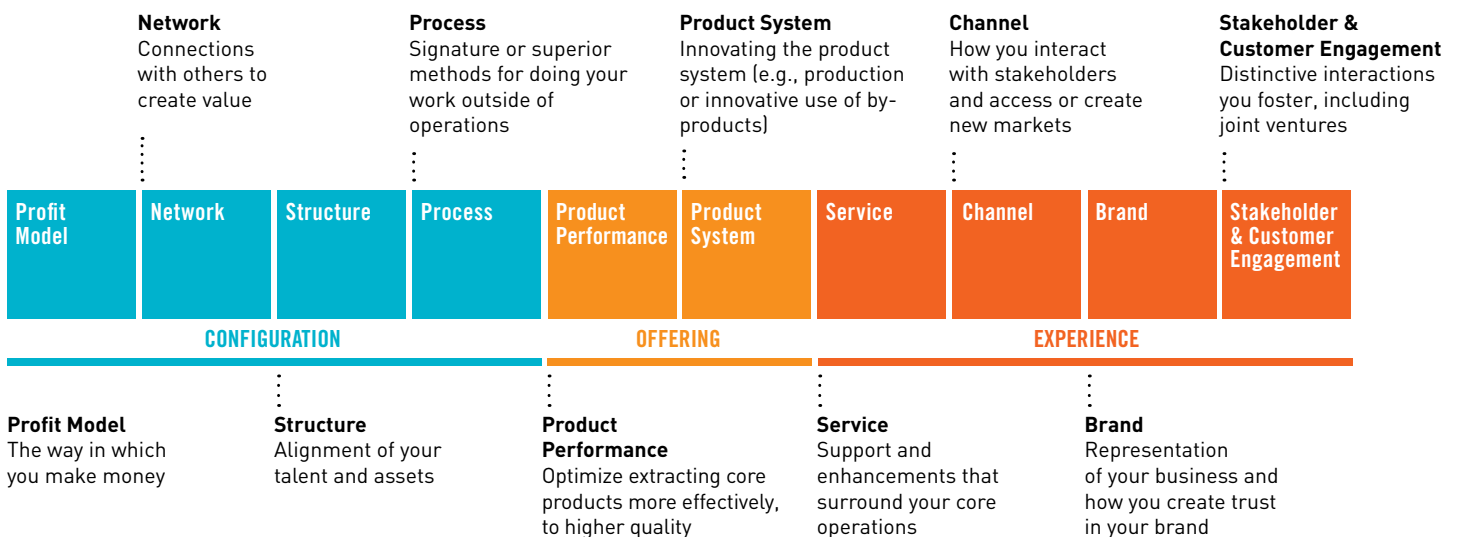
Managing this portfolio of innovations is a key discipline that companies need to build. The mining sector is no exception. Doing so, will allow the firm to allocate capital across these frontiers and consciously manage the risk profile.

Innovation’s complexity, however, doesn’t end with ambition levels. Organisations can innovate in very distinct ways, though many firms, particularly mining companies often get trapped into thinking that innovation is purely about technology. Doblin identifies 10 distinct types of innovation across three categories (see Figure 2) which provides a useful framework to think about different ways in which firms can innovate:

- Configuration innovations apply to profit models, networks, structures and processes. This comprises the “back of the house” activities needed to develop the offering.
- Offering innovations apply to product performance and product systems. This is what companies produce or how they produce their minerals and byproducts in their core operations.
- Experience innovations apply to services, channels, brand, and customer/stakeholder engagement. This is how an offering is delivered to customers or stakeholders.

The ten types of innovation as applied to the Mining Industry are articulated in Figure 2 below.

Figure 2. Ten types of innovation

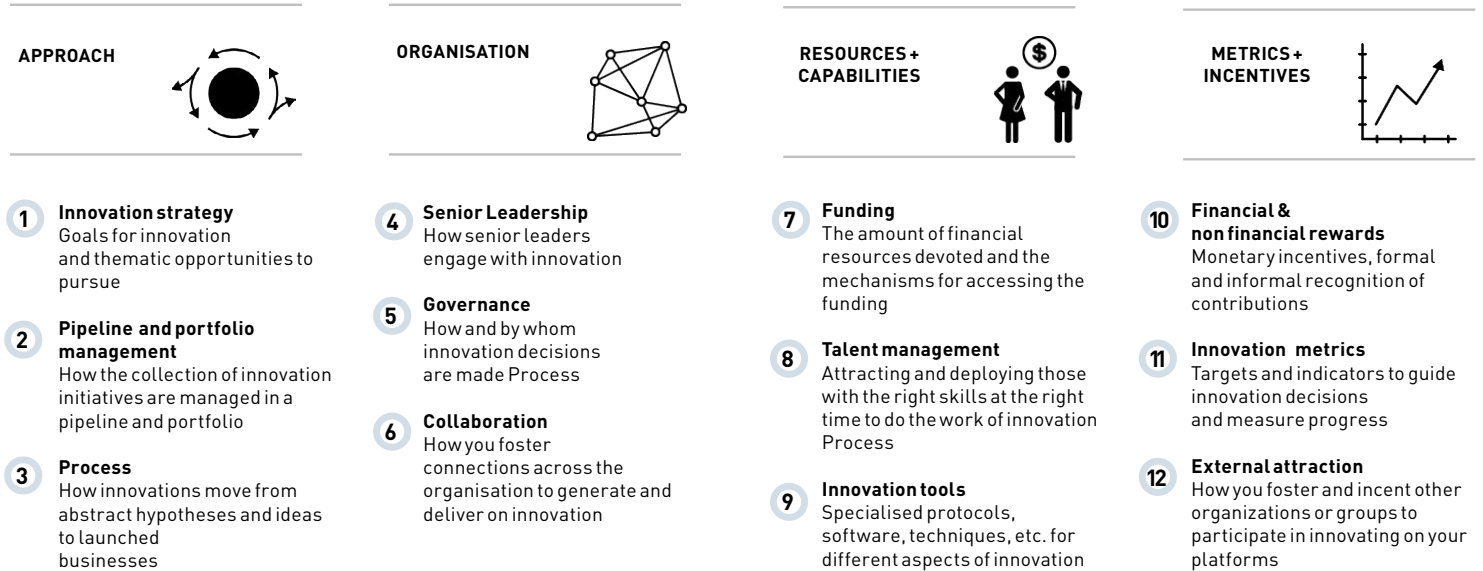


To drive innovation beyond just technology requires us to mobilise innovation beyond the technology and R&D groups and into the wider organisation and it is here that some of our traditional organisation systems work against us. Some examples may include:

- When we identify new technologies which could make step changes in performance we often face organisational resistance because the organisational incentives work against us. We expect operations to jump at the new technology, but if we are incentivising those leaders on short term production performance, the risk inherent in the technology adoption works against us
- Innovations around big data and predictive analytics hold significant opportunities for mining companies, but adoption is difficult because in many cases our underlying processes haven't been standardised or automated and data quality is compromised because of manual entry
- Many organisations experimenting with lots of so called new toys, but often there is a frustration that these so called point solutions lack a wider strategic context. In essence leaders haven't created a vision for the world that this technology needs to enable
- A lot of the new innovations – be it around new technologies or leveraging data analytics or redesigning the way on which we tackle work, require people with very different skills tomorrow relative to today. Successful implementation will require different skills sets, new modes of collaboration and different teaming structures

These are all enterprise model problems which need to be addressed. While organisations know that innovation is important and that it should be central to a CEO's agenda, they often fail to get the traction they desire. We believe that it is because they have failed to systematically build the organisational systems, capabilities and metrics to become serial innovators. In working across different companies, we see four broad organisational buckets that successful innovators focus on - four key building blocks (see Figure 3):

Figure 3. Innovation building blocks



1. They employ a tailored Approach built around clear definitions and approaches for the work to be done in generating innovations – phases, activities, deliverables, and decision rights.
2. They have structured the Organisation to house the innovation competency—teams, divisions, leadership—and interfaces that connect it to the broader enterprise and the world.
3. They acquire and nurture the appropriate Resources and Competencies, the people who perform the work of innovation, the skills, tools, and training they need to do it capably, as well as the funding and time to fuel it.
4. They have developed the right Metrics and Incentives with targets to guide performance, measures to evaluate progress, and incentives (monetary and non-monetary) to drive the supporting behaviours.

Each of these four building blocks is associated with specific capability levers, which any organisation can emphasise or adjust to ensure that they can consistently and continuously identify, develop, and deliver new value to their customers. There are 12 in total including innovation strategy, pipeline/portfolio management and process (approach); non-financial rewards, innovation metrics and external attraction (metrics and incentives); funding, talent management and innovation tools (resources and competencies); and senior leadership, governance and collaboration (organisation).

With the right use of these levers, organisations can innovate at will.

Key findings

Africa's innovation imperative

The stakes in Africa's mining sector are extremely high as these companies face challenges of profitability in the form of unfavourable commodity prices and tougher operating conditions. While commodity prices have improved slightly since their 2008 lows, prices remain stagnant, limiting revenue potential for mining companies. Declining ore grades at current depths also mean that companies have to mine deeper to reach new deposits, significantly increasing the cost of extraction. Particularly in deep level hard rock mining, significant resources cannot be safely and profitably mined with existing mining methods. The imperative to modernise will in turn have social consequences. As a result, social innovation becomes as important as technical and business innovation. Mining at these depths also introduces additional safety issues due to the high risk of rock falls, flooding, gas discharges, underground earthquakes and ventilation problems.

To an even greater extent than their global counterparts, the margins of the continent's mines are under pressure. The combination of stagnant or falling global commodity prices and rising input costs are forcing these business leaders to make difficult decisions in an attempt to sustain short-term operations, while still aligning these decisions with long-term objectives. In particular, labour and energy costs have exceeded inflation. Over and above the requirements of workers, there are rising demands by government and civil society as to the role that mines should play in society.

The scores within this study tell of an African mining industry that is rich in innovation strategy but substantially poor when it comes to realisation of the benefits of innovation. In integrating innovation across their organisations. Africa, similar to Canada, mirrors a mining sector that wants to innovate, that knows it has to innovate. The sector also has the strategy in place, yet so far has been unable to jumpstart the process due to a lack of a systemic approach.

Against a backdrop of declining grades, substantial labour unrest and an industry that has lost a significant share of the global mining market, the imperative to innovate is even greater. The underpinning of any competitive cluster is innovation because without it, one is unable to drive productivity and overall long term competitiveness. To move the needle in this cluster requires committed leadership, a shared vision and a plan to mobilise the cluster.

Innovation is not only key to protect the future of the mining sector but that of the entire mining system, from the country in which the resources are harnessed to the people in its workforce, government and the broader mining community. This survey finds that in the business of today much is committed to in the name of innovation. There is much talk of the need for commitment to the mine of tomorrow - rather too much talk and limited action and integration.

One participant summarises the context: “We have focused too heavily on looking at innovation as needed for a specific area within the organisation rather than it being part of the fundamental DNA of the organisation. Accordingly, our innovation levels are generally low.” This is a common trend in this sector and while this is not a negative indicator, it is merely a starting point. It is just the beginning of tapping into the potential that innovation holds for mine performance.

Organisations can innovate across the Ten Types of Innovation within any of the three levels of innovation ambition (Core, Adjacent and Transformational).

Based on the dynamics highlighted through this research, we would go so far to say that innovation is a lifeline for mining companies as they slip down a shaft that has been sunk by external risk and threats.

IN YOUR OWN WORDS

- “It is critical to attract and empower appropriately skilled persons for innovation management in addition to the core specialised discipline knowledge experts.”
- “A clear understanding of innovation is emerging and will be understood by most players. Critical though is who, where and how innovation is driven and it must form part of our organisation’s culture.”
- “Innovation is understandably underfunded and under resourced. We have experienced enormous resistance to change in the mining sphere and have not found innovation in the metallurgical, exploration and service parts of the value chain. I think there is too much focus on near-term benefits.”
- “Innovation capabilities are specific to particular areas and not consistent across the company.”

EXAMPLE OF COLLABORATION IN COAL

The Coal Tech Research Association is a collaborative association between industry, labour, higher education institutions, the government as well as other research organisations. It was formed to address the needs of the industry by developing technologies and applying research findings to enable the South African coal industry to remain competitive, sustainable and safe well into the 21st Century.

In the past eight years, over 100 research projects have been completed or are still ongoing. Some of the most successful innovation projects to date include:

- Categorisation, quantification and location of the remaining resources in the Witbank/ Highveld coalfields
- The beneficiation of fine and ultra-fine coal
- The binderless briquetting of fine coal

Drawing this back to the definition of innovation, Coal Tech developed new to market or the world, valuable products and processes for the mining sector.

Source: <http://www.coaltech.co.za/>

03

Innovation analysis

African mining state of play

Across the board, innovation ambition is focused on technological solutions to optimise old techniques “as needed.” Innovation for study participants, in other words, is mostly a means to an end, either (1) reducing costs or (2) finding better ways to discover deposits.

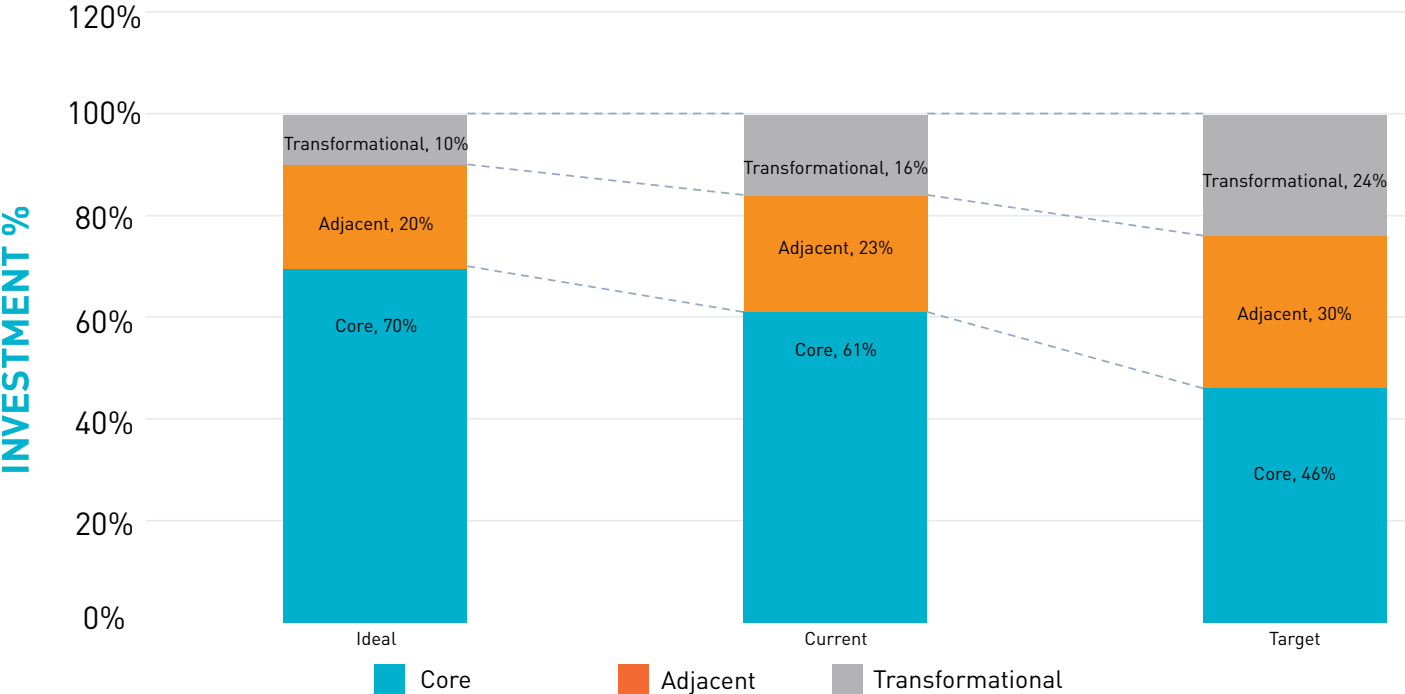
Mining companies are unanimous in their belief that they need to become more innovative if they are to succeed and grow. One participant noted it best: “The desire to innovate is there. Investing in innovation doesn’t occur during downturns in the commodity cycle when it is most required to position companies to rapidly exit the trough and improve competitiveness.” Something, however, is stopping them. And while the barriers vary significantly, they are all considerable. For some, reluctance to take on additional risk associated with innovation has become entrenched. For others, the perception that innovation requires large capital investments that companies on their own don’t want to make is compounded by a perceived funding gap.

Long-established leaders, meanwhile, see innovation as fundamental neither to their business nor to their future competitiveness, resulting in the non-existence of a formalised innovation strategy in most organisations. Similarly, most companies lack systemic processes, formal structures and internal incentives to foster and encourage innovation, making it incredibly difficult for majors in particular to change. To top it off, the complexity of the mining business coupled with the intensity of competition has led to an internal, functional focus, such that collaboration not only internally but also with other industry players remains sporadic at best.

Innovation ambition matrix

Based on the responses from study participants, the current breakdown in the region’s mining innovation was a relatively balanced 61% Core, 23% Adjacent and 16% Transformational (Figure 4).

Figure 4. Innovation investment distribution, African region



While the current breakdown is reasonably balanced, it is interesting to note the industry's target is to be able to reduce their current focus on Core to allow them to give more time to Adjacent and Transformational innovation. Does this indicate a view that the days of mining the traditional way are numbered and hence a need to fundamentally change the way they operate, or even move into new industries?

This innovation ambition matrix, which has a similar trend line to that of the Canadian market, is considered to be healthy. For comparison purposes, Canada's mining sector scored 68% Core, 19% Adjacent and 13% Transformational. While both markets have a strong focus on Core products and markets, which include an emphasis on technological solutions to optimise old techniques as and when needed, there is significant scope to unlock higher levels of Adjacent and Transformational innovation.

Specific to the African context, it emerged that companies find it a challenge to spread risk and are less likely to adopt Adjacent and Transformational innovations in house, but may be successful through an external ecosystem. Innovation needs to address the mine system holistically, incorporating it into the likes of social, labour and stakeholder spheres. This is a view that is more inclined to be embedded in Africa's mining players and one behind which there is a rallying call to capitalise on more.

Social innovation is, to a large degree what makes mining in Africa unique due to the heavy reliance on labour and the environmental and social impact the industry creates. Deloitte considers it imperative to think innovatively to balance the social equation. Asking and answering questions of how we use the procurement process and social spend to create livelihoods for people in the communities surrounding mine operations in the face of modernisation.

Mines should think more broadly around how to make the biggest impact by considering the categories within the ten types of innovation model and asking questions such as:

- Stakeholder engagement: "How do mines leave a positive legacy of livelihood creation that exists beyond the life of the mine?"
- Product System: "How do we instill knowledge not only on how to operate machinery but on how to design and manufacture it?"

Moving forward there is also a need to engage in more innovation-centric discussions around the intersection between mining, energy, water and agriculture. Around, for example the reprocessing of wastewater, dump rehabilitation and renewable energy because therein lie a host of business opportunities for entrepreneurs within affected communities.

What's needed is a more systematic environment in which all innovation can thrive. To minimize or remove the perceived barriers to innovation, mining companies and the broader ecosystem of industry participants would significantly benefit from coming together in a structured manner to discuss, promote and foster innovation. Some collaboration is taking place organically but on a very small scale. More structure, organisation and support is required to help develop major mining innovation hubs—the likes of which would include companies, educational institutions, incubators and the various levels of government.

INNOVATION REALISATION

We have already mentioned that organisations know that innovation is important, yet fail to get the traction they desire because they have not systematically built the organisational systems, capabilities and metrics to become serial innovators.

What can be done to get innovation off the ground?

Mining Innovation Hub

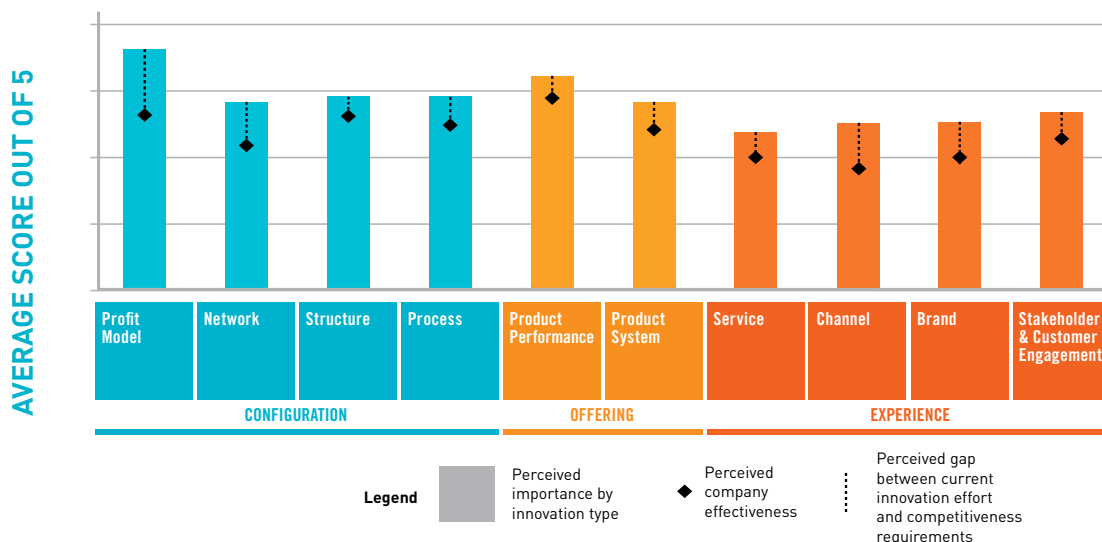
There is a business case for the establishment of a multi-stakeholder collaboration hub that focuses on creating new markets, industries and product applications. A collective that works innovatively to share and showcase innovation at work in mining. This meeting of minds would require a step change to forums that focus on optimising across the mining value chain and system. It would call for a more inclusive mind-set for the greater good of African economies. Engagement could include the sharing of successful approaches to solve geological problems. It could go so far as to share, through site visits, the workings of new technology with non-competitive similar operations. An example of where this is already happening is the Canada Mining Innovation Council (CMIC). This is a national non-profit organisation that coordinates and develops research development and innovation (RDI) projects and programmes amongst 80 members in response to life of mine challenges defined by these members. This allows for shared financial and technology adoption risk and faster development of solutions.

Source: <http://www.cmic-ccim.org> and wider spread benefits.

Healthy competition: Innovation focus by type

Respondents were asked to rate how important innovating in each of Doblin's 10 Types of innovation is to driving competitiveness in their company.

Figure 5. Innovation Capability Maturity



The African study rated Profit Model as most important. This seems to indicate a realisation of the need for fundamental changes to the way in which we do business and make money. This is interesting given the industry's current and historical focus on technology and methods for better and cheaper extraction. Other considerations behind the prioritisation of the Profit Model could be due to mines responding to the changing legislative and regulatory environment. South Africa, for one, awaits the outcome of the review of the Mineral and Petroleum Development Act. This legislative change could see mines needing to support the beneficiation and upstream manufacturing sector.

Current industry performance would indicate that the industry is yet to realise the benefits of this focus. This is borne out of the significant gap between the importance rating and the company effectiveness rating.

Second in importance to driving competitiveness is Product Performance, defined as the optimisation of extracting core products more effectively, to higher quality. This is not a surprising second-place ranking, as mines continue operational excellence initiatives in response to the slowdown in demand and increasing price pressures.

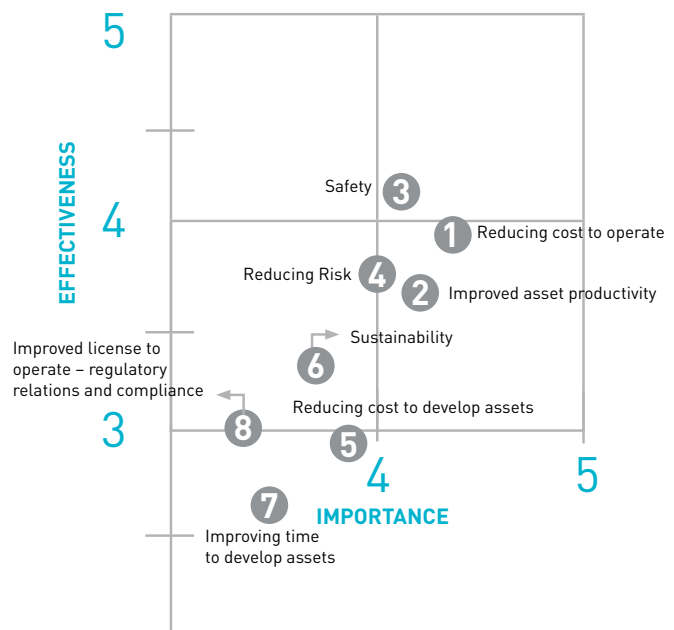
Given the social context on the continent it is surprising that stakeholder and customer innovation did not get rated higher.

Innovation drivers

Respondents were asked to rank what areas they felt were most important to drive innovation. The top five results mirror the Canadian survey responses. The reduction of the cost to operate is the most important driver of innovation, followed by improved asset productivity. Safety featured in third place, reducing risk and reducing the cost to develop assets was rated fourth and fifth in order of importance. The Canadian and African results suggest a like mindedness between these regions when it comes to what will heighten innovation in operations, offerings, processes and behaviour.

The focus on risk, productivity, cost and safety is unsurprising, given that these have been key focus areas in the sector for some time. What is interesting is the relatively low importance and effectiveness attached to sustainability and licence to operate. Given the socio-economic and political environment, particularly in South Africa, one might have expected these to score higher. It will be interesting to see how these ratings evolve in the years to come.

Figure 6. Innovation drivers, African region



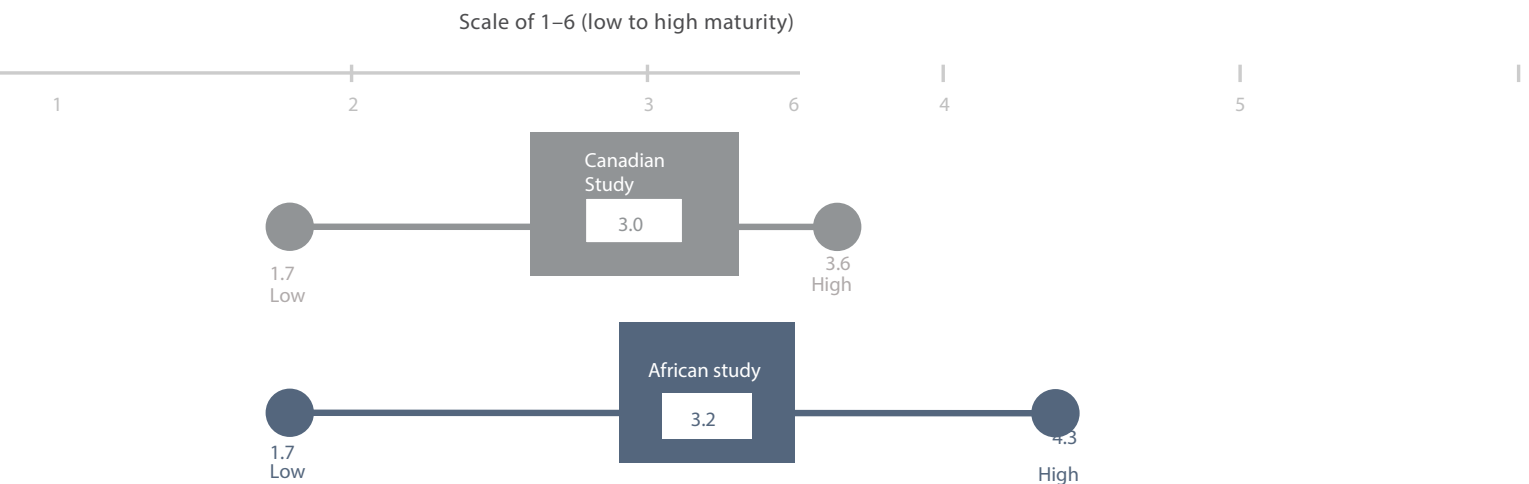
1.	Reducing cost to operate	This driver to develop assets displayed a significant disparity between its Importance score (3.8) and Effectiveness score (2.9), highlighting a real need to improve innovative processes. Macro-economic factors such as lower demand for commodities due to the slow-down in global economic development and reduced growth of the Chinese economy are forcing mines to reduce operating costs. Decisions around the long-term economics of moving towards mechanisation are also top of mind.
2.	Improved asset productivity	In this tough economic environment, mines need to increase margins by leveraging and optimising their assets
3.	Safety	This was the only driver that scored higher than 4.0 for both Effectiveness and Importance, further illustrating the imperative to innovate in this field. With some of the deepest and most structurally complex mines in the world, it is not surprising that mines operating in Africa rank themselves as being effective in their innovation efforts when it comes to safety. The South African Mining Industry has made an 86% improvement since 1993 in OHS performance.
4.	Reducing risk	Creating regulatory, political, labour and financial stability are ways in which governments of resource-rich countries can help to reduce the operating risks for mines. This is of extreme importance but in reality, governments are not effective in this regard. Mines need to collaborate more closely with government in this space.
5.	Reducing cost to develop assets	There are still large mineral deposits needing to be explored and developed across the African continent. Finding ways to reduce costs to develop these assets is becoming increasingly important if any new development is going to take place in the current economic environment.

04

Industry maturity

Figure 7 shows the scale used by Doblin to measure the extent to which companies have integrated innovation into their organisation—their relative innovation maturity. Scoring low on the scale (1-2) suggests innovation efforts that are highly random, haphazard and lacking discipline—characteristics of a novice. At the other end of the scale (6), companies have become truly excellent innovators, demonstrating adaptive capabilities that are ingrained at their organisational cores and supported by refined innovation systems.

Figure 7. Innovation maturity, Africa and Canada (Source: Innovation state of play: Canada Mining edition 2015)



Novice

Highly random efforts

- Innovation capability is not considered a key strategic imperative by leadership
- No disciplined approach to innovation exists, rather haphazard processes, governance, and resourcing are the norm
- Innovation successes, if any, likely attributable to a few heroic individuals but difficult to replicate

Sporadic

Highly random efforts

- Need for systemic innovation capability often recognised among leadership
- Parts and pieces of an innovation system begin to emerge
- Innovation efforts are not widely known or understood

Competent

Increasingly repeatable

- Systemic innovation capability is nascent and senior leadership is taking action to develop maturity
- Pockets of reliable and repeatable processes, governance and resourcing are surfacing
- Innovation leadership roles are beginning to be defined

Advanced

Systematized efforts

- Critical capabilities for innovation functioning as a cohesive system are being developed
- Processes, governance and resourcing are well defined
- Clear innovation strategies are emerging

Excellent

Adaptive capability

- Innovation becomes an organizational core capability
- Processes, governance and resourcing are refined and additional reinforcing mechanisms are implemented to accelerate outcomes
- Novel, specialised capabilities created to adapt to new opportunities

African mines are midfield in terms of innovation focus and impact, and feature on the lower end of Competent on the industry maturity scale (0.2 above the Canadian average). This hints at an opportunity for the continent to push ahead and truly lead through innovation, particularly as the operational context lends itself to thinking and working differently to unlock efficiencies.

There was a significant spread in the results by company (1.7 to 4.3), which is telling of dynamics in which innovation capability building strength is strongly company dependent. However there is a common challenge, namely the need for formalisation of the innovation imperative in organisational structures. Mines need to focus on implementing structured innovation processes that cut across all business units. The fact is that innovative ideas can come from any level of the business, but will only be captured if employees and services providers know how to correctly channel these.

Critically, metrics and incentives must be in place to recognise the contributions. Ideas are easy. What's important is prioritising the right ones and having a structured innovation process to drive them through to a result.

To safeguard the mine of tomorrow, today's mines need to be thoughtful, even creative about the messaging that they put into the market to attract new talent. With an ageing workforce, it is imperative that the industry gets new blood into the system. Consider just one area requiring innovative DNA in the near future of the sector - the mines of tomorrow will require more highly skilled workers leveraging remote technologies, which allow mines to exploit ore bodies that cannot safely be accessed by humans. Just this one change in operational processes will require a combination of innovative approaches, organisation, resources and competencies, as well as metrics and incentives.

05

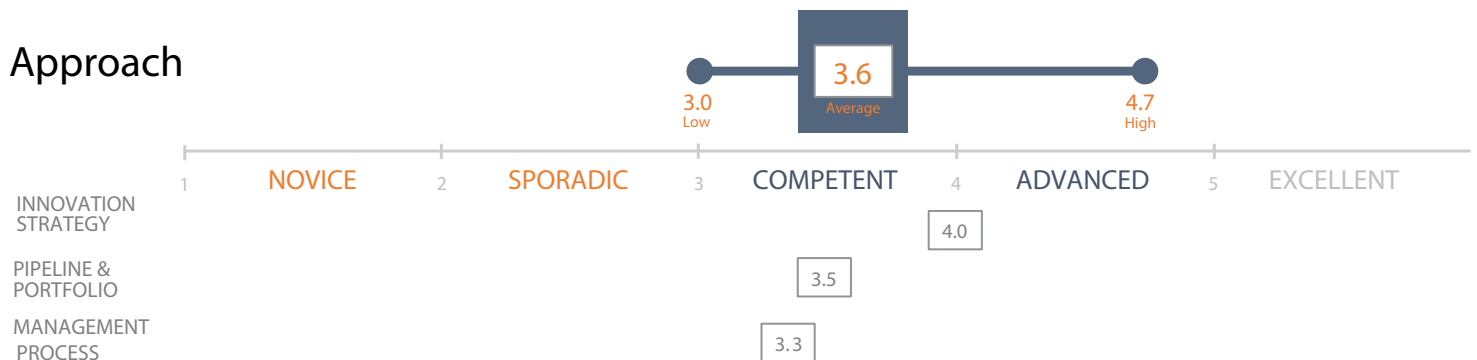
Innovation capability lever analysis

Within each component, there are four critical levers to foster innovation competence: Approach, Organisation, Resources and Competencies, and Metrics and Incentives. The 12 innovation capability levers are also scored on the maturity scale (see Figure 9). On those terms, the sector shows particular strength in innovation strategy, pipeline and portfolio management, and external attraction to collaboration. Areas of weakness are funding, financial and non-financial rewards, governance, and metrics.

Figure 8. Maturity of innovation building blocks



Approach

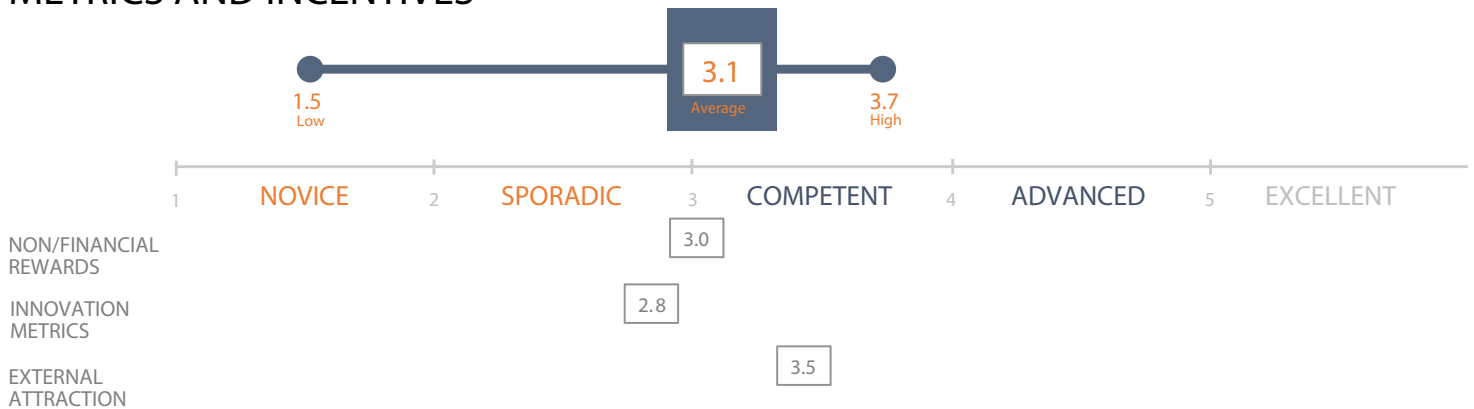


“Due to a lack of a targeted innovation strategy, innovations are reactive and dependent on isolated team efforts as opposed to systemic.”

Respondents were most confident around the Approach Lever. There is a feeling of confidence around innovation strategy and clarity of goals to be achieved and choices to be made given the current operating environment. On average, respondents felt they were competent in their process to harvest ideas, manage their portfolio and launch ideas into the business. While there is general confidence in choices around strategic areas of opportunity, around one third of respondents feel that there is room for improvement in this regard.

There is also significant variance between companies in terms of innovation strategy quality and several mines lack a disciplined approach to monitor innovation initiatives from conception to launch. Most participants note a need to improve on effective processes for the iteration of ideas.

METRICS AND INCENTIVES



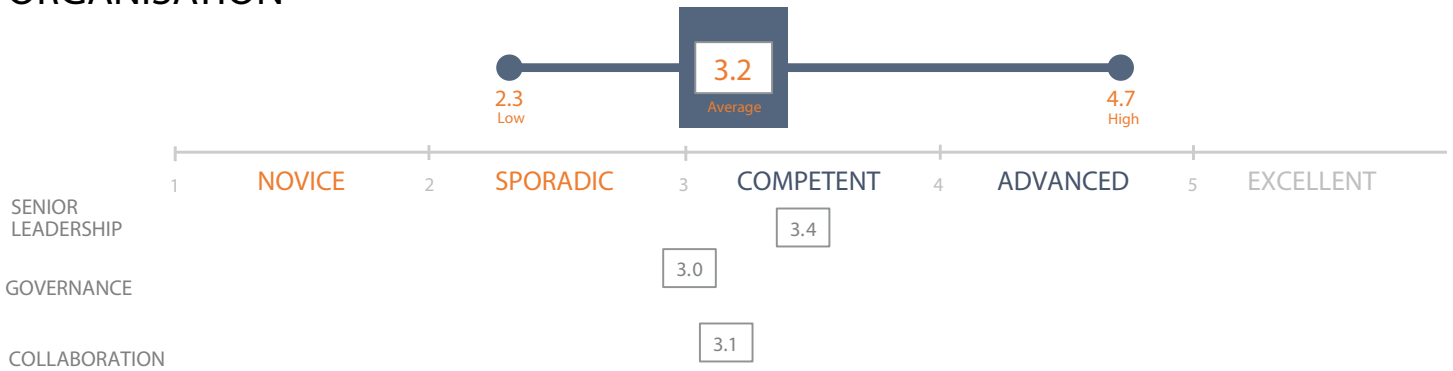
“Compliance to safety standards and reducing fatalities has driven us towards finding more innovative ways to mine”

On the opposite end of the scale, most respondents cited a crippling lack of incentive systems, together with inadequate innovation metrics as being major inhibitors of innovation in their companies. Scores on financial and non-financial rewards and on innovation metrics are notably low, with a lack of motivation to pursue higher risk/reward innovations and taking a long-term perspective.

Innovation metrics are under-developed and sporadic in most organisations and poorly integrated with overall management metrics. Incentives are divorced from innovation ambition levels. With little recognition or measurement system in place to enable innovation, managers are deterred from seeking out innovation and employees don't feel empowered to explore and find new ways to approach operations and problems. A system is needed to differentiate between day-to-day management and innovation, to cultivate the behaviours and culture that will enable innovation to flourish.

Over half of the respondents believe that consistent evaluation using appropriate metrics and an iterative process at different stages of innovation is non-existent.

ORGANISATION

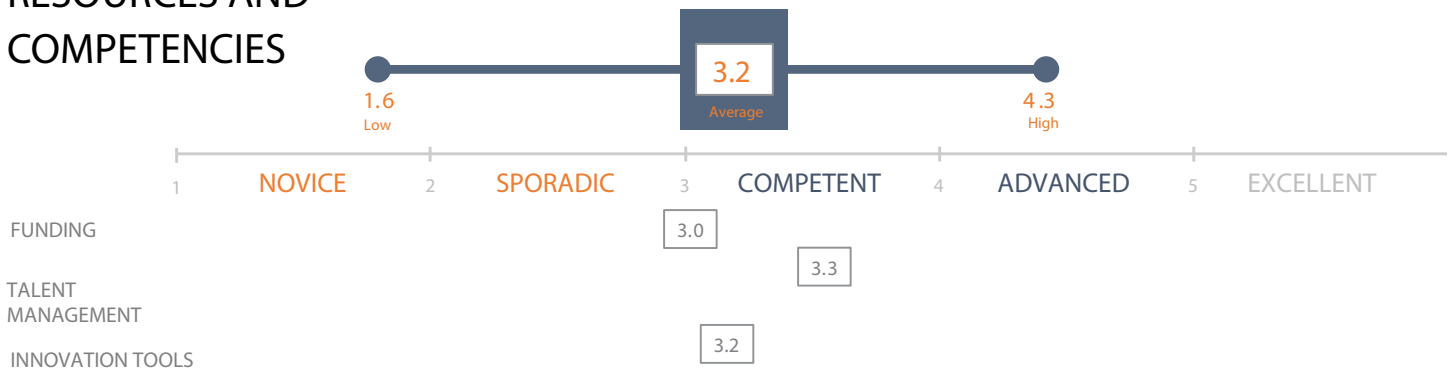


“Innovation is merely seen as technical only, whereas it may not necessarily be so.”

There is significant attention being given to innovation by senior leadership in African mining entities. Yet although this healthy level of support exists from decision makers, most respondents feel the organisational structure doesn't adequately support innovation due to a sluggish decision-making process and inhibitive resource allocation.

Formal governance structures to enable innovation seem to be missing and decision-making is therefore frequently slow and fragmented. Innovation is largely dependent on the views and beliefs of senior leaders and would benefit from increased collaboration across both internal functions and the sector at large, whether between mining companies themselves or inclusive of a wider set of multidisciplinary partners. Still too many believe that longstanding approaches to mineral extraction aren't broken, and thus don't need fixing.

RESOURCES AND COMPETENCIES



“In a cost constrained environment, innovation is often de-prioritised.”

A lack of funding, which often competes with operational budgets and the inability to secure funding timeously are seen as major hurdles. Across the region, funding is deemed to be in proportion to the amount of potential that an innovation initiative has, i.e. high potential innovation projects receive substantial financial investment.

Most respondents feel that their organisation doesn’t have a reputation for being innovators, which makes it difficult to attract and retain talent with the distinct skills and propensity for innovation. Despite having the capability to leverage cross-functional talent from across the organisation, most respondents do not feel that suitable innovation teams with the right mix of skills and experiences have been assembled. A lack of proper tools and methods to generate proprietary customer insights is further detracting from innovation having a business impact.

INCENTIVISING INNOVATION

Observations on government incentives

“There is an issue in dealing with government organisations in terms of whether you fund or don’t fund work through government organisations - possession of Intellectual Property (IP) may not be yours even if you have paid for it.”

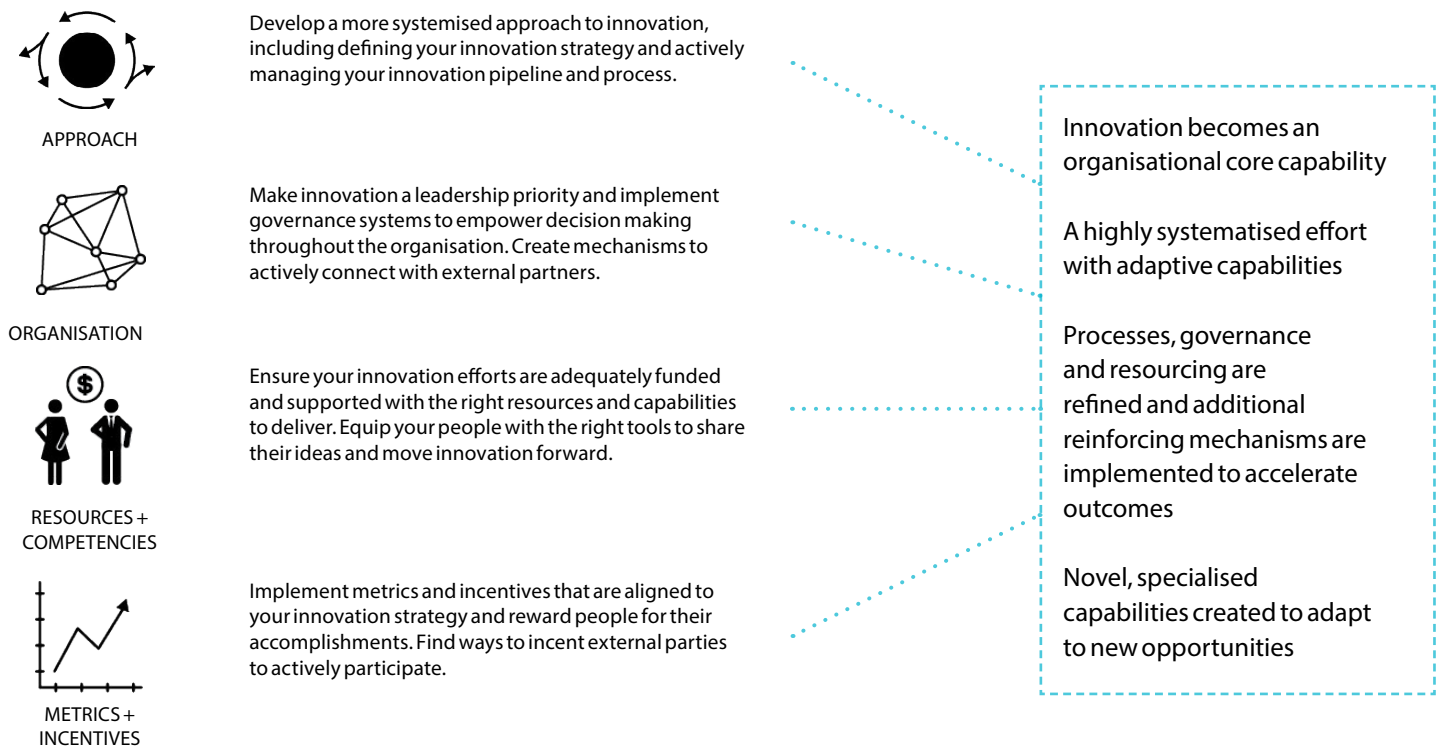
A crippling lack of government incentives is viewed as a major hurdle to mining innovation on the continent. There is the belief that incentive benefit payouts are not being reinvested in the appropriate departments to continue to foster innovation. Less than 5% of survey respondents feel that government programmes are sufficient for promoting and incentivising the innovation process in the mining industry. Considering the above quote from a participant, there is a deeper issue in that IP, which is core to enabling innovation, is an area of distrust between the public and private sector. Government mechanisms are deemed to not be “user friendly”, with over 70% of respondents feeling a lack of effective means to capitalise on government and external programmes. This indifference towards government support means that most companies do not maximise all potential government incentives that relate to innovation.

Creating a sustainable mining sector by embracing innovation

Innovation needs to be led by the business imperative. Without this formalised approach to planning, implementing and measuring its value it will continue to feature loosely in a company – and particularly so in the case of expansive and complex mining entities. The findings of this study uncover an African mining context in which mines are grappling with realising real business value from innovation.

Undoubtedly, there is the will to make innovation work to bolster profitability through better efficiencies. What remains the challenge is the actual change that comes with this. The mining sector is encouraged to consider the general advice offered in Figure 9 for enhancing overall effectiveness of their innovation culture.

Figure 9. Moving toward “excellent” innovation capabilities



Scale of 1–6 (low to high maturity)



The most important answer in the innovation process is to the question: “Why are we innovating?”

The easy part of innovation is the generation of ideas but these seeds of ideas need to be correctly aligned to the business problem or objective, and it’s about picking the right ideas and driving them effectively to conclusion. The innovation mandate needs to start with innovation goals. In mining specifically this must contribute to the creation of a sustainable mining community.

In the emerging market context it is of further importance to consider that no single innovation will provide the required developmental results. Innovation has a multitude of touch points that it needs to be activated within, from exploration technology to on-site mobility, from customer analytics to workforce engagement. Innovation cannot remain exclusive to the likes of drone technology but needs to integrate across multiple dimensions and mining functions.

To truly unlock the potential of innovation in the mining sector calls for companies to be clear about what they are working on and to be exact in how they envision their business of tomorrow. Senior management championing innovation and a robust governance structure are also crucial. Without a collective, collaborative mindset, no life can be breathed into innovation that makes a material difference to developing Africa’s economic future and ensuring a sustainable mining sector.

FOR FURTHER READING

Innovation State of Play - Canada: Mining Edition 2015

Innovation is critical to success and growth at a time when the mining industry is at crossroads. How can majors, juniors and service companies successfully navigate the downturn? PDAC and Monitor Deloitte examine the strategic, organisational, financial and performance requirements to develop and support an innovative environment within companies. [Download the report here](#)

Ten Types of Innovation

Ten Types of Innovation: The Discipline of Building Breakthroughs is the culmination of thirty years of analysis and research. The innovation framework was built around a seminal Doblin discovery, that there are ten distinct types of innovation that need to be orchestrated with care to make game-changing innovations. [Learn more](#)

Tracking the trends 2016

The 2016 edition of Tracking the trends takes a look at the issues miners will face in the coming year and outlines a wealth of potential responses proposed from mining professionals at Deloitte member firms around the world. [Download the report here](#)

The future of mining in Africa: The innovation imperative

A closer look at the macro drivers of innovation in South Africa. In the report we share our ideas on how the approach to the entire mining system needs a step-change in order to survive. [Download the report here](#)

Managing Your Innovation Portfolio

People throughout your organisation are energetically pursuing the new. But does all that activity add up to a strategy? Firms that excel at total innovation management simultaneously invest at three levels of ambition, carefully managing the balance among them. [Read more here](#)

ABOUT THE FIRMS

Monitor Deloitte

To grow with confidence, organisations need to make clear choices about where to play and how to win. And in a world where the pace of change is rapid and sometimes unexpected, leaders need to act nimbly and decisively. Monitor Deloitte strategy consultants employ cutting-edge approaches embedded with deep industry expertise, working with leaders to resolve critical choices, and drive enterprise value.

Doblin

Doblin is a global innovation practice deeply committed to helping clients innovate with confidence while advancing the frontiers of strategy and innovation leadership. Doblin possesses an ever-evolving set of multi-disciplinary capabilities and diverse perspectives, which are effectively integrated in highly collaborative teams and client programs. Taking a user-centric approach, Doblin practitioners combine design, research, and strategy expertise to help organisations innovate more boldly and effectively.

Mining Indaba

The Investing in African Mining Indaba is an annual professional conference that is dedicated to the capitalisation and development of mining interests in Africa. It is the world's largest mining investment conference and the largest mining event on the continent.

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