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# IMPACT OF NEW MINING TECHNOLOGIES ON LOCAL PROCUREMENT IN THE DEMOCRATIC REPUBLIC OF THE CONGO



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#### **IISD HEAD OFFICE**

111 Lombard Avenue  
Suite 325  
Winnipeg, Manitoba  
Canada R3B 0T4

[IISD.org](https://www.iisd.org)  
 [@IISD\\_news](https://twitter.com/IISD_news)

#### **IGF/IISD OTTAWA OFFICE**

220 Laurier Avenue W.  
Suite 1100  
Ottawa, Ontario  
Canada R3B 0T4

[IGFMining.org](https://www.igfmining.org)  
 [@IGFMining](https://twitter.com/IGFMining)

## **Impact of New Mining Technologies on Local Procurement in the Democratic Republic of the Congo**

December 2021

Written by TDi Sustainability

Report funded by





## ABOUT TDi SUSTAINABILITY AND ACKNOWLEDGEMENTS

This report was produced by TDi Sustainability, an advisory firm specialized in unlocking the value of sustainability for businesses in the raw materials value chain—from mine to market, production to retail, site to shelf. Through its Strategy, Audit, Research, and Impact business lines, TDi enables businesses to better anticipate and manage risks, build resilient sourcing strategies, capture value from corporate communications and invest for social impact.

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## EXECUTIVE SUMMARY

New mining technologies are becoming available to the mining industry, bringing not just increased efficiency and productivity, but also transformative change in the areas of health and safety and environmental protection. The Democratic Republic of the Congo (DRC), one of the top 10 resource-rich countries in the world, presents an interesting case study. On one hand, mining in the DRC is still strongly associated with artisanal and small-scale mining (ASM), known for its low levels of mechanization; on the other hand, industrial or large-scale mining (LSM) producers in the DRC are adopting some of the most advanced mining technologies, two key examples being the Kibali gold mine and the Kamo-a-Kakula copper project.

New technologies come with their own challenges and opportunities. A concern is the potential impact on the local procurement market, with traditional suppliers at risk of being passed over by international providers, where a lack of skills, capital, access to markets, legal protection, or fair price may push them out of the supply chain. So far, local suppliers have struggled to fully benefit from the increased uptake of new mining technologies by large industrial mining projects. Challenges to local procurement in the context of new mining technologies in particular, and in the procurement market in general, echo the broader social, economic, and political landscape in the DRC. The disabling economic, business, and industrial environment, lack of access to capital, skills, and technologies, and ongoing issues of corruption, prevent the local procurement market from fully leveraging the opportunities that new mining technologies present.

To what extent new mining technologies will catalyze economic opportunities, as opposed to instigating disruptive change to local suppliers, depends on the capacity of the country to create a more enabling environment for the adoption of new technologies and the creation of local supply capacity. A key instrument and step in this direction is the country's new Mining Code of 2018, which is a clear effort by the Congolese government to foster the local economy through the introduction of new local content requirements, in line with the country's broader development objectives. However, due to the lack of implementation of such requirements, caused by unclear interpretations of the law, it is premature to judge whether the new Mining Code will represent a concrete opportunity for the local procurement market.

To fully tap into the benefits brought by the adoption of new mining technologies and convert resource wealth into economic revenue for the local economy, a strong(er) collaboration between the government, mining companies and the local procurement market is needed to overcome current gaps and to work together toward shared objectives.



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# INTRODUCTION

In October 2019, the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF) published the *New Tech, New Deal: Technology Impacts Review* (Ramdoo, 2019). The review examines the key drivers of technological change in the mining sector and the likely impact of those technologies, in the areas of labour and skills. It aims to formulate recommendations for policy makers on how to address the challenges as well as how to capitalize on the opportunities arising from new technologies.

The aim of this report is to contribute to the IGF investigation on the challenges and opportunities that new mining technologies may bring to economic development in resource-rich countries. It examines the level of adoption of new mining technologies in one of the most resource-rich areas in the world, the Democratic Republic of the Congo (DRC), and how such technologies will affect the development of a local procurement market for mining products and services in the DRC. This report also aims to formulate pragmatic policy solutions to local procurement market development challenges that will allow mining investments to continue while ensuring that host countries and communities manage and navigate the changes and continue to derive sustainable socio-economic benefits from mining activities.

## METHODOLOGY AND LIMITATIONS

This report has been developed to answer the following key research questions: What is the current uptake of new mining technology in DRC, and what is the evidence of its implications for local providers? More generally, what are the challenges and opportunities for local providers of products and services to the mining industry in the DRC? Finally, how has the enabling environment engendered the capture of more value from procurement practices of the mining industry in the DRC, and what part could it play in the future?

To answer these questions, the report draws on literature review and desk-based research; interviews with representatives of mining companies, service providers and local experts; and information collected through TDi's in-country staff and expert knowledge.

This study has some potential limitations. First, as of today, there is little to no specialized literature or statistics available about new mining technologies in general, and on their adoption and consequences in DRC. Second, for a country that is more accustomed to in-person meetings for the exchange of information, the travel limitations brought by the COVID-19 pandemic posed challenges to the timely and effective set up of interviews, which were mostly carried out remotely, and responses to electronic questionnaires.



## SETTING THE SCENE

**The DRC is one of the top 10 resource-rich countries in the world, providing many of the key minerals needed today to sustain global economic growth and to power the transition to a low-carbon economy.** The DRC is the world's largest producer of cobalt, a key ingredient in smartphone batteries and laptops, and essential for the lithium-ion batteries that power electric vehicles and store renewable energy. The country accounts for approximately 70% (0.84 million tonnes) of world cobalt mine production and is home to more than half of the world's cobalt reserves. The DRC also produces large quantities of copper, supplying approximately 6.5% (1.06 million tonnes) of world copper mine production, as well as gold, diamonds, gemstones, oil, tin, tantalum, tungsten, and zinc (U.S. Geological Survey, 2021).

**The mining industry in the DRC boomed with the liberalization of the mining sector in 2002.** Then, the DRC was a post-conflict country characterized by a damaged economic fabric dominated by the informal economy, an inadequate regulatory framework, a complex and heavy taxation system, lack of access to credit and financing, a dilapidated physical infrastructure, a glaring deficit in the supply of electrical energy, and systemic corruption. The Code was the response of the Congolese legislator to breathe new life into the national economy, by attracting and encouraging foreign direct investment in the mining sector. A significant flow of foreign direct investment followed, in particular from China, with 70% of mine production being dominated by Chinese investors (Kinch, 2020).

**The DRC is a mineral-dependent country.** The extractive industry generated USD 1.68 billion in 2017, accounting for 17.40% of GDP, 55.16% of total government revenues, 99.3% of total exports, and a quarter of total employment (Extractive Industries Transparency Initiative, 2021). The mining boom in the DRC, stimulated by the 2002 Mining Code's liberalization of the industry, was driven by the hope of growing the national economy, wealth, and of a local procurement market for mining products and services, benefiting national industrial and commercial companies. However, the national market has had little benefit to date from the mining sector, and the local procurement market has struggled to grow. The tough new Mining Code of 2018 was signed into law to address this issue, albeit with varying results, as is described in the following sections.

**At the national level, artisanal and small-scale mining (ASM) remains relevant,** with an estimated two million artisanal miners actively recovering minerals, especially in gold, diamonds, and coloured gemstones. In the cobalt sector, ASM has attracted much attention because of public reports of child labour, poor working conditions, and fatalities at sites. It accounts for about 11% of domestic cobalt production currently. Outside the country, the DRC mining sector is often portrayed as being populated by predominantly low-mechanized, low-capital, labour-intensive ASM operations, which are often illegal. This is not the complete picture, however. Such basic economic actors are juxtaposed against some of the most technically



advanced modern industrial mining producers in the world, such as the Kibali gold mine and the Kamoā-Kakula copper project.

**Concerns have been raised that international buyers, increasingly pressured by legal and market compliance on responsible sourcing and due diligence, may seek to diversify away from the DRC** because of the risks associated with sourcing from ASM and from so-called Conflict-Affected and High-Risk Areas (CAHRA). Although this is a valid concern, grounded on experience resulting from the introduction of the Dodd-Frank Act in the United States, it is believed that the principles of engagement that guide the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from CAHRA will help mitigate this risk. While some investors are concerned about the human rights and governance issues associated with the DRC, the impressive resource base of minerals critical to the electrification of our global economies in the country is compelling and not easily ignored.



# ADOPTION OF NEW MINING TECHNOLOGY IN THE DRC: CURRENT EFFECTS AND FUTURE IMPLICATIONS FOR LOCAL SERVICE AND PRODUCT PROVIDERS

**The DRC boasts some of the most advanced examples of new mining technologies,** which include an array of innovations bringing increased efficiency and productivity, as well as transformative change in the areas of health and safety and environmental protection. The most notable example is the Kibali gold mine, one of the most autonomous underground mines globally, located in one of the world's most remote and infrastructurally under-endowed regions.

## BOX 1. THE KIBALI GOLD MINE: A UNIQUE CASE OR THE NEW NORMAL?

The Kibali gold mine is owned by Kibali Goldmines SA, a joint venture company owned 45% each by Barrick and AngloGold Ashanti, and 10% by Société Minière de Kilo-Moto (SOKIMO). The project is operated by Barrick. The operating mine comprises the Kibali Karagba-Chauffeur-Durba (KCD) underground mine, the KCD open pit, satellite deposits, a processing plant producing gold doré bars, three hydropower stations, together with other associated mine operation and regional exploration infrastructure (Quick et al., 2018).

The mine is located approximately 220 kilometres (km) east of Isiro, the capital of the Haut-Uele province, 150 km west of the Ugandan border town of Arua and 1,800 km from the Kenyan port of Mombasa. Personnel access to the project is commonly through charter flight directly to the site from Entebbe, Uganda, which is served daily by commercial flights from European cities. Road access is available from Kampala, Uganda, and is approximately 650 km, which provides the primary route for operational supply chains.

The mine has implemented a fully automated production level and material handling system. It is equipped with an integrated, automated ore-handling and shaft system, the first of its kind in Africa, and includes features such as multiple driverless loaders that load and haul on a single haulage drive, and a smooth, high-strength roller-compacted concrete haulage surface, which improves haulage speed with minimal spillage. On the surface, drones are used for pit and stockpile measurements (Ramdoo, 2019). The entire automation system is remotely operated from a safe control room located on surface. This means that driverless loaders descending into a massive orebody close to 800 m below surface can be safely managed above ground. Mark Bristow, Barrick president and chief executive, said, "That's a big safety undertaking because since we've started, we've had a couple of loaders that have been buried under rock falls" (Creamer, 2017).

The high degree of technological innovation can partly be explained by the nature of the project, which was set up in what previously was an underdeveloped mining area. Within the project area, although mining activity was undertaken already during the 1950s



after independence, in 1960 gold production dropped sharply and was mainly recovered by artisanal operations. Underground mining conducted after 1960 reaped negligible amounts of gold. The KCD deposit, one of the key mineral deposits of the project, was discovered by a joint venture between Barrick and AngloGold Ashanti in 1998 but they were forced to withdraw due to local unrest and civil war. Moto Goldmines Limited acquired a stake in the project in 2004 and completed feasibility studies between 2006 and 2009, when Randgold and AngloGold Ashanti entered a joint venture and acquired Moto. Construction was approved in 2012.

The objective of the mine, as described by Ismaili Traore, Kibali's Technical Services Manager, is to become one of the most efficient Tier One mines globally where safety is a focal point of the operation (Gleeson, 2020b). To this end, a significant amount of time was spent studying and improving the traffic management and human interaction with the autonomous mining equipment. A system for personnel safety tracking and ventilation on demand was recently integrated at the mine.

Bristow told media that the company is also maintaining a strong focus on energy efficiency through the development of a battery grid stabilizer project completed in 2020 to augment the mine's three hydropower stations and offset the cyclical load of the winder. In line with Barrick's global move to cleaner energy sources, the new technology will further reduce the mine's carbon footprint and use of thermal power:

This uses new battery technology to offset the need for running diesel generators as a spinning reserve and ensures we maximise the use of renewable hydro power. The installation of three new elution diesel heaters will also help improve efficiencies and control power costs. It's worth noting that our clean energy strategy not only achieves cost and efficiency benefits but also once again reduces Kibali's environmental footprint. (Gleeson, 2020a, n.p.)

A review of the *Technical Report on the Kibali Gold Mine* issued by Randgold in 2017 (Quick et al., 2018) shows that local suppliers may not have benefited from the highest-value contracts during the development of the project. A policy promotes local procurement by stating that, where possible, goods and services should be procured locally; this includes produce from the various agribusinesses (eggs, pork, maize), which is purchased for use in the mine canteens. When it comes to the procurement of high-value items and services, contractors are mostly foreign. For example, open-pit mining was conducted by contractor Kibali Mining Services (KMS), a local subsidiary of DTP Terrassement (a French company); emulsion explosives are supplied as a down-the-hole service by Orica (Australian); and certified reference materials (CRMs) are sourced from Ore Research and Exploration Pty Ltd (Australian). A few success stories, however, are emerging. Azambi HPS, the first hydropower station, was awarded exclusively to Congolese construction enterprises, with the main contractors comprising Inter Oriental Builders (IOB), Traminco and Top Engineering Services (TES). None of these contractors had former hydropower construction experience, and it thus became an opportunity for capacity building in a region notoriously bereft of infrastructure or experienced hydropower contractors. At the peak of construction, over 700 people were working directly on the project, with over 95% being residents (Knight Piesold Consulting, 2019).

The share of total contract spend on local suppliers has increased over the past 5 years due to the contribution of construction contracts, general services, and supply chain contracts. Spending for specialist contracts, instead, continues to be dominated by international providers.



**FIGURE 1. LOCAL AND INTERNATIONAL CUMULATIVE SPEND**



Source: Barrick, 2021.

Kibali’s contribution to the local economy remains significant. Kibali paid some USD 200 million to its Congolese business partners in 2020. As reported by Barrick (2021), this included:

- Ongoing civil construction and roadworks performed by Congolese contractors (IOB, TES, and BTC).
- Partnership with a Congolese engineering contractor (TES) for plant maintenance.
- Catering and camp services supplied by a Congolese company, Golden Camp Solutions (GCS); with 100% of quality food purchased locally and maintenance contracted to a local company, DCMS.
- Trucking, with Cargotrans performing over 2,400 rotations in 2020, an increase of 33% from 2019.
- Various corporate social responsibility activities in support for COVID-19 and other community initiatives. The mine also launched a campaign to stimulate the Durba economy by issuing local shopping vouchers to employees.

Overall, Kibali contributed to an in-country investment of USD 3.4 billion in the form of taxes, permits, infrastructure, salaries, and payments to local suppliers between 2010 and 2020. 94% of Kibali’s roughly 5,000 employees and contractors, including its management, are Congolese nationals (Barrick, 2021). As described by Bristow, much has been invested in people, and important skills have been transferred to a full Congolese team at Kibali, which transitioned to owner mining in 2018. According to Bristow (Barrick, 2020),

Automation is often associated with reduced employment, but we use it as an opportunity to further upskill our workers and to reduce our need for expatriate specialists. It is worth noting that Kibali—one of Barrick’s elite corps of Tier One mines—is led by a predominantly Congolese management team in line with our policy of employing and advancing host country nationals.

Broader benefits to the local community also emerge. See the case studies below.



More recent examples of extensive new mining technologies uptake include the Kamo-a-Kakula copper project, whose goal is to produce the world's "greenest copper."

## BOX 2. THE KAMO-A-KAKULA COPPER PROJECT

On December 1, 2020, Ivanhoe Mines and Zijin announced the closing of an equipment financing facility for their Kamo-a-Kakula copper project in the DRC, in the Kolwezi District of Lualaba Province, within the DRC Copperbelt. The project's goal is to produce the world's "greenest copper," having one of the most favourable environmental footprints of any Tier One copper mine worldwide. The mine will be powered by clean, renewable hydroelectricity and be among the world's lowest greenhouse gas emitters per unit of copper produced.

As explained on Ivanhoe's website,

Our Kamo-a-Kakula and Kipushi projects in the Democratic Republic of Congo are already using clean, sustainable, hydropower-generated electricity, and we are looking at ways to incorporate solar power to augment grid-supplied power at all our operations. As technology advances, we plan to incorporate electric and where appropriate automated vehicles into our mining fleet, replacing diesel-powered alternatives to further reduce emissions and keep our employees safe.

The project will be operated by automated mobile mining equipment, controlled remotely or semi-remotely, to in turn reduce the risks of injury to employees as they will not be directly at the mine face, thereby reducing human exposure to risks like rockfalls, earth tremors and other dangerous situations (Campbell et al., 2021).

The project is built on recently discovered deposits. Although exploration was first undertaken in the current project area by the Tenke Fungurume Consortium between 1971 and 1975, Ivanhoe discovered the Kamo-a copper deposit in 2008, and the high-grade Kakula deposit in 2015 (Peters et al., 2020).

Although stating that consideration is paid to sourcing locally, the Kamo-a-Kakula Integrated Development Plan 2020 shows that key suppliers used are mostly foreign. For example, comminution testing was contracted to Mintek (South African); flotation flow sheet development testing was contracted to XPS (Canadian); pilot plant scale high-pressure grinding testing was contracted to ThyssenKrupp (German); concentrate regrind testing was contracted to Grinding Solutions Ltd (UK) etc. (Peters et al., 2020).

Desk-based research and interviews with mining companies operating in the DRC and local suppliers confirmed an increasing use of new mining technologies, albeit not at the scale of capital required for complete automation or mechanization. Appendix I of this document describes the technologies and applications that have been identified as the most widely used in the DRC, including smart sensors, geo-positioning devices, advanced analytics, radio frequency identification, cloud computing, connected portable devices, drones, water-management technologies, electric mining equipment, and fuel additives for reduced emissions.



Key drivers of new mining technologies uptake and benefits brought by such innovations identified during the interviews include:

- **The possibility of using real-time data to improve decision-making processes.** From cloud-based management systems to smart sensors, access to real-time data provides mining companies with the visibility needed to make fast decisions, including via artificial intelligence, machine learning and predictive tools. This has been identified as a key driver for new mining technology uptake in the DRC, which is primarily driven by efficiency.
- **Improved human safety and environmental protection.** Pressured by the international community and relevant stakeholders, including the national government, mining companies in the DRC are increasingly aware of the impacts of mining and look to the adoption of new mining technologies to minimize risks to human health and the environment. When it comes to environmental protection, efficiency remains a primary driver--one that contributes, however, to a low-carbon future.
- **Increased collaboration with technical teams based outside of the DRC.** Mining companies in the DRC are often owned by international groups, with multiple mining operations and/or processing activities located worldwide. The adoption of new mining technologies has been identified by interviewees as an opportunity to foster collaboration across different operations and departments.
- **Productivity.** New mining technologies allow companies to maintain and/or increase production rates while working in increasingly complex environments. In the context of increasing competition for critical minerals, the adoption of new mining technologies to increase productivity and reduce costs is seen as an important driver for innovation.

Additional benefits brought by innovative technologies include the positive spillover effect on local communities, such as increased access to electricity, water, infrastructure, and a cleaner environment. Other more commonly understood economic multipliers from large mining projects include job opportunities, expanding supplier businesses, and access to markets.



### BOX 3. KIBALI'S POSITIVE IMPACT ON THE LOCAL COMMUNITIES

The innovative technologies adopted at Kibali have brought positive change in the mine's area of influence and potentially beyond. A portion of the mine's power grid capacity is provided free to local communities, reducing their reliance on felling timber from local forests for energy supply (See Box 11). Another positive spillover effect of Kibali's investment in the region is the Kibali-built Durba/Watsa concrete road, with the first section completed in 2020. Kibali also contributed to access to potable water sources for the surrounding villages. Ten community water sources were built in 2020.



*Completion of concrete road section.  
Source: Barrick, 2021.*

Some common concerns also emerged as both local mining companies as well as local suppliers expressed what they perceived to be the biggest barriers to new mining technologies uptake:

- **Difficulty of changing mine workers' mentality.** As expressed by both mining companies and local suppliers, mineworkers often rely on mining skills that they have honed and perfected through decades of practising the same techniques, movements, and rituals, and it can be extremely difficult to change their way of working by introducing new technology.
- **Difficulty of quantifying future benefits of new mining technologies and whether they may make business sense given the large investments required.** New mining technologies require extensive investment and the benefit to shareholders is often difficult to quantify. Asad A. Khan, CEO of Foxwood African Holdings (FAH) highlighted this very challenge: "One issue we have is understanding the real bottom-line impact to our operations. Analyzing our new technology investments as well as future larger investments that new tech will bring to our shareholders is hard to quantify" (A. Khan, personal communication, March 2, 2021). A representative of an important copper and cobalt producer in the DRC, specialized in environmental, social and governance (ESG) issues, observed that "Without government support or preferential policies, new technologies in climate change or automation may turn out to be inefficient in a county without appropriate infrastructure support. The DRC government should give more focus on the business environment and economic diversification, which I think is a key factor to the development of local procurement" (Anonymous).



There is a general trend toward increased adoption of new mining technologies in the DRC. Based on the case studies of Kibali and Kamoā-Kakula, adoption of some of the most advanced technologies in the world may have been enabled, paradoxically, by the lack of an enabling environment. Kibali, in particular, is set up in one of the most remote areas of the country. Here, the lack of basic infrastructure may have driven investors and engineers to really be bold and creative in investing and designing in new systems and technologies. Kamoā-Kakula is a very recent development, built upon deposits discovered only in the early 2000s. In the rest of the country, new mining technologies may not be as advanced. Still, the trend is growing, driven by the need to increase efficiency and productivity, and by increased awareness around health and safety and environmental concerns. Meanwhile, the divergence is increasing between LSM and ASM, which is still widely prevalent in the country.



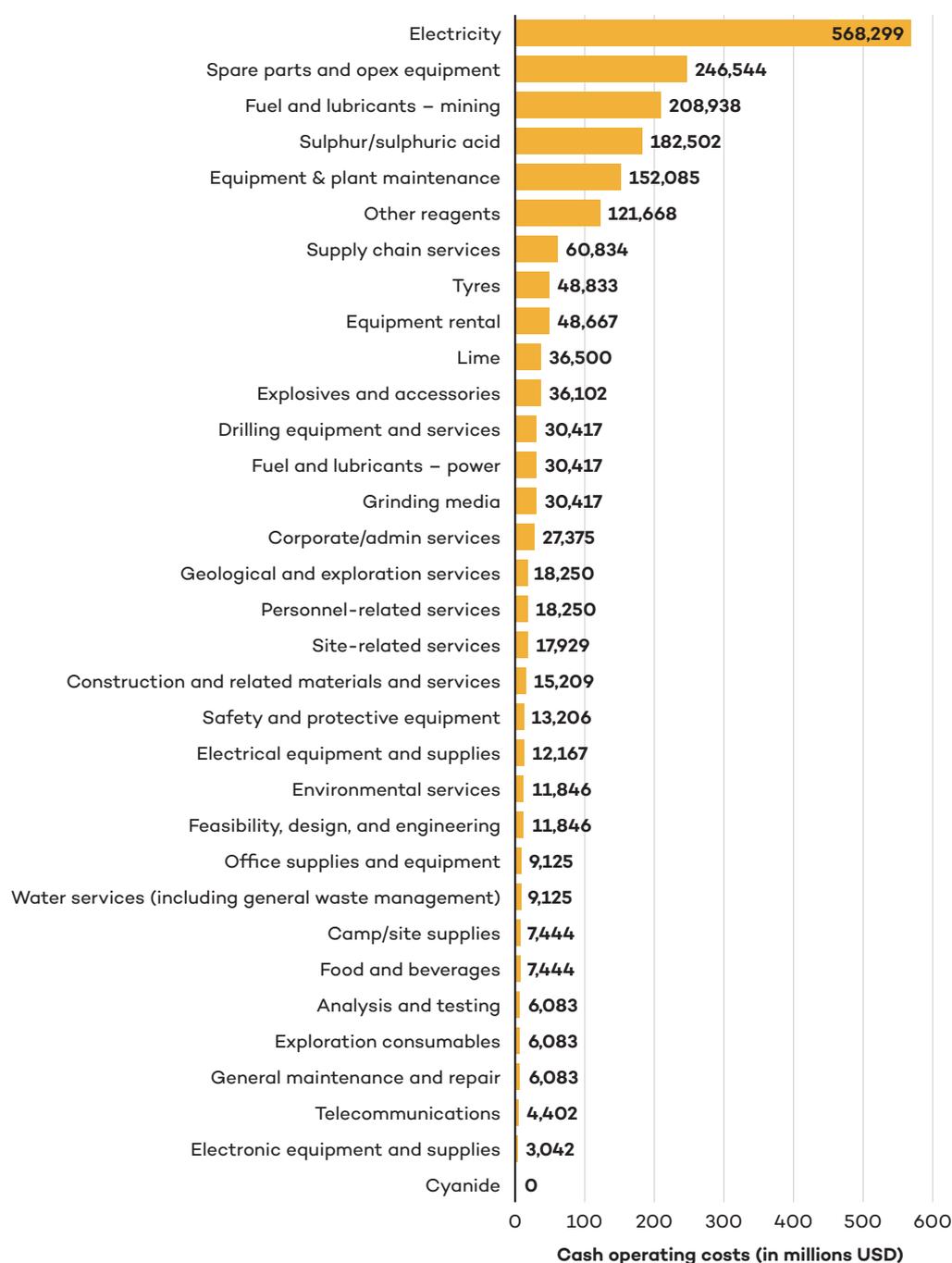
# BARRIERS AND OPPORTUNITIES FOR LOCAL SUPPLIERS IN THE DRC MINING SECTOR

The case studies of Kibali and Kamaoa-Kakula suggest that **local suppliers struggle to fully benefit from the increased uptake of new mining technologies by large industrial mining projects**. This has been confirmed by interviews with both mining companies and local suppliers and is indicative of the wider system of procurement in the DRC.

Today, international companies dominate the supply of products and services, as evidenced at the “DRC Mining Week.” The event’s purpose is to promote engagement between key mining decision-makers and industry and enable collaboration and business matchmaking. More than 90% of exhibitors are foreign companies, and the exhibition space is a melange of international pavilions from China, South Africa, the United Kingdom, Zimbabwe, France, and Germany. This is especially the case when it comes to new information and communication technologies (ICTs).

Foreign investors normally enter the industry in DRC by bringing their own subcontracting companies, which can be specialized businesses or functions within the same international corporate group. Mining companies prefer to hire outside services and products from providers from their home country. This is especially noticeable with Chinese mining companies, which are well known for investing and capturing value along whole supply chains and for building success through tight business ecosystems based on shared ownership and trade deals. Given that Chinese companies account for up to 70% of companies in the mining industry, this is significant.

According to recent data from a market study carried out by the Fédération des Entreprises du Congo (FEC), a Congolese chamber of commerce, less than 10% of the equipment and operational procurement market is captured by Congolese companies with Congolese capital. Appendix II of this document lists the top 20 national companies involved in transactions with the mining sector. As illustrated in Appendix II, these are mostly involved in the sale of reagents and explosives, catering, printing, building maintenance, logistics and customs, environmental and wastewater management, labs, electrical energy supply, workforce placement and human resources services, metallurgical construction, medical services, and transport.


**FIGURE 2. PROCUREMENT VOLUME BY EXPENDITURE CATEGORY**


Source: Federal Ministry for Economic Cooperation and Development, 2021

**If we compare the activities performed by the companies most involved with the mining sector in the DRC (see Appendix II) with the key procurement expenditures by mining companies in the DRC, it is clear that the biggest opportunities remain untapped.** In Figure 2 the absolute spend on inputs and services is ranked. The availability of local suppliers for each expenditure category is analyzed in detail in Appendix II.



What emerges is a pattern; except for electricity, almost all top expenditure categories are either supplied by foreign companies or by local enterprises or subsidiaries of foreign companies adopting foreign technologies and supported by foreign capital. While the goods and services produced locally are often capitalized by foreign entities, there is a suggestion, however, that local entrepreneurship is growing.

Patrick Musoya Mukebo, Managing Director of Solution Address Sarl, explained that

When we talk about local suppliers, there are two categories of companies: the first category is represented by companies founded by Congolese citizens and supplying non-critical parts/services. These companies have proved to not be viable and therefore unreliable due to the lack of capital and skills. The second category is represented by companies registered locally but founded through foreign capital. These companies are more reliable as they can be supplied, approved and certified goods/services. These companies have also proved to be financially stable and have the required expertise and skills to deliver the goods and services. (P. Mukembo, personal communication, April 18, 2021)

Even low-value items, including food, are often imported from across borders. There are, however, some success stories emerging of mining companies starting to source food locally.

#### **BOX 4. SUCCESS STORIES ON LOCAL FOOD SOURCING**

The local supply of equipment and high-value machinery in the DRC is under-developed. This can be quite easily explained by the country's economic structure, which is heavily reliant on exports and lacks industrial capacity. When it comes to agricultural products and small and medium-sized enterprises (SMEs), however, the country is thriving. If this is the case, why do mining companies in the DRC continue to source food and low-value items, such as uniforms and personal protective equipment (PPE) from neighbouring countries, if not as far away as China? From the interviews, it emerged that a key barrier is the lack of a clear contact with whom to build a trusted, long-term partnership to coordinate activities. However, a few success stories have emerged, such as the Maize-Credit Program by Tenke Fungurume.

In the Tenke Fungurume area, where Tenke Fungurume Mining's (TFM's) copper-cobalt mine is located, agriculture is the most important livelihood of residents. To ensure the food security of residents and increase the income of local farmers, TFM has implemented a series of agricultural stimulus programs through its community development department. In particular, the Maize-Credit Program is designed to teach local farmers to become self-sufficient: at the start of each cropping season, inputs are given on credit to registered farmers by TFM's community development department. At the harvest season, the farmers need to reimburse the amount of corn proportional to the amount of inputs received, making it possible to reinvest in the program and expand the number of beneficiaries. Customary chiefs in villages are involved and play an educational role throughout the process, and TFM agronomists provide necessary technical support to beneficiary farmers.



At the end of the 2019 growing season, the farmers reimbursed nearly 18,000 bags of corn, or nearly 900 tonnes, to TFM under this program. For the 2019 cropping year, the sown area was 795 hectares (ha) and there were 757 planters registered, including 240 women.

A local food sourcing program has also been set up by Alphamin Resources at its Mpama tin mine. It created The Lowa Alliance, a not-for-profit company through which Alphamin's contributions to community social development are managed. The organization is managed jointly by community representatives and Alphamin. Its goal is to positively impact the 15,000 households (or 90,000 residents) that live within the mine's area of influence. So far, approximately 90 women farmers benefit from the program, earning USD 200 a month producing cabbage, watermelon, and other vegetables.



Maize-credit program. Source: Barrick, 2021.

The lack of a presence of local manufacturing, such as for tires, health and safety equipment, and equipment for plant maintenance, limits the opportunity for capturing value from procurement revenue in the DRC.

When sourcing locally, key cited reasons include:

- **The monopolistic nature of the market.** This is the case for electricity, which is provided by the national electricity company, SNEL. Local suppliers are finding ways to contribute to the market, however, for example when it comes to the supply of renewable energy. One example of local entrepreneurship is GoShop, a local supplier that has been able to leverage the technologies of foreign partners to support local businesses, including mining companies, in the transition toward a low-carbon economy (see Box 5).
- **Convenience and price.** This is the case for the procurement of fuels and lubricants. Suppliers are, however, mostly represented by the distribution network for foreign companies, and the highest proportion of the production value stays outside of the DRC.



## BOX 5. GOSHOP: A “LOCAL” SUPPLIER FOSTERING THE LOW-CARBON TRANSITION

GoShop is a leader in the field of autonomous energy and energy savings in the DRC. It has been active for 38 years in the markets of energy, solar public lighting, hydroelectric applications, energy mobility and connected supervision (Internet of Things and monitoring) of individual and collective installations. More than a simple distributor, GoShop describes itself as a system integrator of autonomous energy solutions.

Although based on foreign technologies (GoShop is the authorized reseller of Victron Energy as well as a wider portfolio of brands specialized in water pumps, smart lighting solutions, water heaters, etc. in the DRC), the owner and CEO of GoShop, Dominique Otjacques, originally from Belgium, has always invested and believed in the future of the DRC. An electromechanical engineer himself, Dominique has spent the last 38 years training highly qualified technicians and engineers in the DRC.

GoShop’s services include energy systems diagnosis, technical studies, distribution, installation, maintenance, and training. More than 10,000 energy projects were built in the DRC within the last 30 years. Some of these projects have been developed to promote access to electricity, medicines, and water, thanks to funding from UNICEF and other partners.

## BOX 6. IMPACT GLOBAL GROUP SARL ON THE CHALLENGES AND OPPORTUNITIES FOR THE DEVELOPMENT OF LOCAL TECHNOLOGIES

When it comes to local procurement, it is not uncommon in the DRC to be able to source products locally. However, for the most part, these products are not local themselves but rather produced by foreign companies or technologies. To understand which factors facilitate the development of technologies within the country, we interviewed Emmanuel N’zadi N’zaïon N’santu, founder of Impact Global Group Sarl (IGG Sarl), a company of Congolese nationality based in Lubumbashi. The company is active, in addition to the mining sector, in the ICT sector, agri-food, real estate, mass distribution, civil engineering, logistics sector, and transport.

The company has entered a partnership with Jika Mining for the complete management of mining operations at its manganese site. In addition, the company benefits from an exclusive partnership with Optimus Blue Sarl, representing the American companies Syntech Global and LiveElite International for the distribution of the product Xtreme Fuel Treatment throughout the DRC. XFT is a complete fuel additive that offers four key benefits: fuel economy, extended engine life, reduced emissions, and improved performance.

When asked to explain the use of foreign technologies for the development of XFT, Emmanuel replied: “Opportunities are difficult to be seized by local suppliers alone, to achieve them, they have to join forces with foreign suppliers. Local skills are sufficient, it is the technology which is not yet available at the local level.” (E. N’zadi N’zaïon N’santu, personal communication, February 25 and April 6, 2021). Asked what might contribute to the development of local technologies, he cited access to capital and a higher rate of technology transfer, in addition to promoting a sustainable environmental policy and raising awareness of the benefits of green products.



When sourcing from overseas, key drivers are the lack of availability and lack of quality to meet buyers' specifications. In the interviews, it emerged that key challenges to local procurement for mining companies are:

- **Lack of supply for products and services related to equipment and machinery.**

Previous sections of the report address the current state of the economy in DRC and the under-development of the manufacturing sector in the country. This is true of manufacturing in general, and manufacturing of new mining technology equipment and components in particular, where market entry is very difficult due to the high entry barriers of capital investment and knowledge needed to compete with the international providers. Patrick Musoya Mukebo of Solution Address Sarl described the situation as follows:

Mining companies are reluctant sourcing some of the critical parts/services locally due to the poor quality and lack of the equipment bill of materials on the parts and/or lack of certifications and specialized skills. For example, expertise on the plant construction and design is always outsourced abroad because we cannot find these skills locally. As another example, Congolese welders are not certified working with acetylene, therefore the mining companies source this skill from neighbouring countries such as Zambia and Zimbabwe. (P. Musoya Mukebo, personal communication, May 18, 2021)

- **Lack of quality supply for products and services requiring higher levels of expertise.** A number of schools for software developers and coders have started to emerge in the country. Although the pool of local qualified people in digital technologies is not yet comparable to that of other countries abroad, such as the United States, India, or China, which have been heavily investing in education and the fostering of digital hubs. A growing number of Congolese innovators and entrepreneurs (See Box 9) show that the skills and aptitude exist but have yet to be fully discovered and utilized. According to Christian Panga, a local consultant to mining companies with over 16 years of experience in the mining industry and currently Managing Director of Optimus Blue Sarl,

There are many new developers in the DRC. Lots of new schools on information and communication technologies are being set up. At the same time, however, the challenges present interesting opportunities to the right kinds of entrepreneurs. Understanding the country's context and the problem's many facets can reveal solutions that stand to help millions of people climb the economic ladder. (C. Panga, personal communication, July 5, 2021)

- **Lack of trust in the local suppliers' reliability** or ability to provide the agreed goods and services, including following payment of upfront capital. According to Ghana's sub-contacting law, companies are expected to provide 30% of upfront capital when contracting with a supplier (Law No. 17/001, Article 16). However, past issues with the lack of reliability of local companies to deliver



the agreed goods and services following the payment of upfront capital make companies extremely cautious in entering new contracts with new local suppliers.

### BOX 7. THE TECHNICAL INSTITUTE OF MUTOSHI: A SUCCESS STORY - IN FINANCIAL NEED

The secondary Technical Institute of Mutoshi in Kolwezi is considered one of the key institutes for mining engineering in the DRC, having graduated some of the best talents that today work in the industry. Supported by Gécamines, the school hosts more than 100 students, including women. A report by Mutoshi Technical Institute (2011), albeit now old, sheds light on the need for better financing and poor living conditions of the students.

### BOX 8. SOLUTION ADDRESS SARL - CONTRIBUTING TO DURABLE INDUSTRIAL DEVELOPMENT IN AFRICA

If, on the one side, there is a shortage of higher levels of expertise in DRC, on the other side of the coin is an opportunity for training and capacity-building development. This is the opportunity sized by Solution Address (SOLAD), a multi-services company based in the DRC, which provides a wide range of services including (but not limited to): labour brokering (provision of contract labour); training and development; and materials/goods supplies. Aware of the lack of specialized skills, one of the key issues in the development of the local labour and procurement market in DRC, SOLAD has become highly experienced in supporting its partners through employees' skills and knowledge development, including in the following areas: mining industry-related knowledge and skills; supply chain; leadership and management; computer skills; and health and safety. Technical training for the mining industry includes, but is not limited to: lean maintenance planning and scheduling; industrial electricity; welding and boiler making; plant mechanics; industrial instrumentation; ore processing and metal recovery; millwright.

Three key challenges experienced by local suppliers include:

- **Lack of access to capital.** In line with the above, past episodes of failure by local suppliers in delivering goods and services to mining companies have led companies—but also banks—to become more stringent when providing upfront capital or loans. Interviewees expressed concerns about their ability to grow due to the difficulty in accessing capital.
- **Lack of access to information and language barriers.** During the interviews conducted, local suppliers explained that offers for local procurement are often difficult to find in the public domain, or are published too close to deadline, if not after, making it difficult and sometimes impossible to apply. In addition, the use of the English language as the management language



in a context where the business language is French creates a first selection criterion for procurement, at the expense of many SMEs. To access public procurement notices, companies are required to register in advance on an online “Business Partner Application” portal. Such use of digital technologies does also not favour national SMEs, for which the digital culture is not yet part of their day-to-day management practice.

- **Unfair business environment and procurement protocols.** Local interviewees raised concerns over the procurement practices of local procurement departments, due to a general lack of transparency. It was noted that political influences and company staff connections or interests in other businesses hinder a fair supplier selection process at the expense of local SMEs. Steps are being taken to increase transparency at the company and the government levels; however, change is slow due to the influence exercised by those looking after their own interests.

## BOX 9. HOW SOFTWARE DEVELOPERS AND ENTREPRENEURS ARE HELPING REIMAGINE THE DRC ECONOMY

Dan Ndombe, a Congolese software developer and entrepreneur now living in the United States and co-organizer of the Kinshasa Hackathon, a 48-hour weekend computer programming competition, the first of its kind ever organized in the country in 2016 (Ndombe, 2016) had the following to say:

When people think about the DRC, they often think about its abundant natural resources, the musical influence the nation has had on the rest of the African continent, or the war conflict the country faced at the turn of the century. Growing Congolese interest in technology is not often top of mind; and yet, technology is just the sector that has the potential to transform the Congolese economy.

It is true that the DRC is still much affected by a lack of technology infrastructure, as evidenced, among other factors, by most businesses’ lack of a digital presence, which makes it difficult for them to sell their goods and services nationally, let alone internationally. However, it is also true that the DRC, and in particular the capital city of Kinshasa, is ripe for innovation.

A growing number of initiatives have been set up to boost entrepreneurship and innovation. For example, in 2016, the DRC Ministry of Industry launched the Innovation Award to honour inventors and entrepreneurs. Among the first recipients is Flech Tech CEO Dieudonné Kayembe, inventor of the Motema Tab, a Congolese-produced mobile tablet equipped with a solar panel.

Other innovators that have distinguished themselves for their tech-savviness in DRC include, to name a few, Carlo Lekea, mobile app developer and designer and founder of tech firm Idea IT & Conception; Sam Yongo, a Congolese U.S.-educated software developer, now iBurst DRC President and Chairman who relocated to the DRC to build App Corner, a curation platform for apps built by local Kinshasa developers. The growing number of entrepreneurs and innovators is reflected in the technology innovation and



coworking spaces that are popping up in the country—in Kinshasa, these include Congo iHub, Lumumba Lab, and the Mwasi Tech Hub, specific to women entrepreneurs.

Kinshasa Digital Week was established in 2018 to foster digitalization as a solution for the development and growth of Congolese companies and institutions. In 2019, the event brought together more than 1,500 visitors, including 300 companies and startups. Building on this success, Kinshasa Digital Week has become African Digital Story, an event to promote open innovation during a preparatory tour in five African cities that will lead to a 3-day regional summit in Kinshasa set to host 5 country pavilions, 100 stands, and 5,000 visitors in order to shed light on the innovative solutions of private, public, civil society, non-governmental organizations, and tech players in the African digital ecosystem as a way to put them in the forefront of the biggest pan-African institutional challenges, thereby offering potential solutions. The event, scheduled for 2020, has been postponed due to COVID-19.

While the lack of technology infrastructure may be a constraint for economic development in the DRC, it is safe to say that there is no shortage of talent, passion, and creativity among Congolese entrepreneurs and innovators. How this talent can be leveraged for the benefit of the local mining industry, however, is a challenge that mining companies should take.



# ENABLING ENVIRONMENT: WHAT CAN THE DRC GOVERNMENT—AND KEY PLAYERS—DO TO ENGENDER MORE LOCAL PROCUREMENT AND TRANSFER OF TECHNOLOGY?

The challenges to local procurement outlined previously echo the broader social, economic, and political landscape in the DRC. The extent to which new mining technologies bring economic opportunities, as opposed to disruptive change to local suppliers, depends on several factors that, together, comprise the enabling environment needed for business to flourish: the regulatory framework, a country's overall economic, business, and industrial development, infrastructure, access to technologies, and digital skills.

## REGULATORY FRAMEWORK GOVERNING THE MINING SECTOR

The mining sector was liberalized in 2002 with the adoption of the 2002 Mining Code, modified recently with the introduction of the new Mining Code of 2018 (consolidated as Law No. 38/2003 of March 26, 2003), after months of uncertainty during which the proposed legislation faced significant criticism from some of the largest mining companies operating in the country. The Mining Code of 2018 reflects a shift in favour of the role of the state, with key changes including a greater share of royalties and taxes to be paid to the government (especially in relation to proceeds from “strategic substances” such as cobalt) and greater state ownership, doubled to 10% in all mining companies awarded a mining licence and increased by an additional 5% interest upon each mining licence renewal (DLA Piper, 2018; Herbert Smith Freehills, 2018).

The Mining Code of 2018 (Law No. 38/2003 of March 26, 2003) also places a greater emphasis on local development, through several provisions:

- 10% of royalty payments must be paid to a sovereign mining fund dedicated to future generations (*Fonds minier pour les générations futures*).
- Mining companies must contribute a minimum of 0.3% of turnover to development projects for communities affected by the mining activities.
- At least 10% of the capital must be owned by Congolese citizens.
- The exporting of raw minerals is forbidden in favour of domestic processing and beneficiation, and mining permit holders must present a plan for the refinement of their minerals to the mining authorities.
- Companies must establish a provision of 0.5% of turnover for mine rehabilitation.



- Finally, the Mining Code of 2018 introduces requirements on local procurement, reinforcing local content requirements as described in the next section.

The Code also regulates the employment of local labour and training. According to Article 405d, the holders of mining or quarrying rights and the holders of permits as processing or transformation entities must comply with the labour legislation in terms of employment, in particular with regard to the percentages allowed, the list of jobs prohibited to foreigners, as well as the regulation determining the conditions of foreigners' employment.

With equal skills, they must recruit nationals as a priority and comply with the minimum quota of Congolese employees by category for each phase of a mining project as described in the table below:

**TABLE 1. QUOTA OF CONGOLESE EMPLOYEES BY JOB CATEGORY IN THE MINING CODE OF 2018**

JOB CATEGORY	PROJECT PHASES				
	EXPLORATION	DEVELOPMENT AND CONSTRUCTION	COMMERCIAL PRODUCTION		
			1ST-5TH	6TH-10TH	11TH AND ABOVE
Managers	20%	25%	60%	65%	70%
Senior managers	30%	35%	70%	75%	80%
Skilled workers	60%	40%	80%	85%	90%
Manual workers	80%	85%	90%	95%	100%

According to Article 405e, these entities must also establish and implement a training program for Congolese personnel identified for their needs, covering all qualifications, to enable them to acquire the skills required by the management of the company to occupy leadership and management positions within 10 years of the start of commercial production, in accordance with the quota set out in Article 405d above. This plan includes a component of training courses in favour of pupils and university students, at higher technical education establishments whose school and academic curriculum relates to mining sciences and techniques as well as to the mining professions.

The changes introduced by the Mining Code of 2018 are in line with a growing trend in the African continent toward greater state ownership and increased local development. However, some of these modifications have attracted concern from investors, and are feared to contribute to a wider environment of uncertainty, with



foreign companies having threatened to challenge the Code through international investment arbitration.

It is also not yet clear to what extent the Mining Code of 2018 will be effectively implemented, considering its current loopholes and challenges in its interpretations, as described in the following sections with a focus on local procurement. Companies are already finding ways to circumvent certain requirements. For example, the DRC prohibits the export of raw mined material to ensure that maximum value is kept in-country through its transformation. Some companies, however, process mined ore in primary refineries to sufficient level of purity to meet these laws, but then export this crudely refined product abroad where it is further processed to make a more valuable product for onward sale.

## KEY LEGAL INSTRUMENTS AND REQUIREMENTS FOR LOCAL PROCUREMENT AND LIMITATIONS

Local procurement or “subcontracting” is regulated in the DRC by the following key instruments:

- The Subcontracting Law (Law No. 17/001 of February 8, 2017, establishing the rules applicable to subcontracting in the private sector)
- The Mining Code of 2018 (Law No. 38/2003 of March 26, 2003, as amended and completed by Decree No. 18/024 of June 8, 2018).

**The Subcontracting Law** (Law No.17/001 of February 8, 2017) establishes rules for procurement activities in the private sector and restricts, with limited exceptions, procurement to Congolese enterprises. The procurement activity is, in fact, reserved for Congolese companies with Congolese capital, regardless of their legal form, whose head office is in the national territory (Article 6). The law also limits procurement activities to 40% of the overall value of a contract (Article 11). Penalties for non-conformances include the shutdown of the company, cancellation of the contract, and fines ranging from USD 25,000 to USD 100,000. The law introduces an exception in Article 6, giving the possibility to resort to other Congolese companies (i.e., Congolese companies with foreign capital) or foreign companies, in the event of unavailability or inaccessibility of local expertise. To be able to use this exception, however, the activity cannot exceed 6 months, and proof of the unavailability or inaccessibility of local expertise must be provided to the competent authority. The details on the conditions and modalities of this derogation are organized by Ministerial Decree No. 03 / CAB / MIN / CMPMEA / 2021 of January 6, 2021.

**The Mining Code of 2018** defines a mining company as any legal person whose corporate purpose relates exclusively to mining activities (Article 23 *litteras* a and b of paragraph 1). This means that, unlike other companies, mining companies cannot participate in other economic activities concurrently with mining. By establishing this clause of exclusivity, the legislature wanted to prevent mining companies carrying out other activities that would contribute to their social objectives themselves, thus encouraging a spillover effect on local entrepreneurship and the local market.



**The Mining Code of 2018** requires mining companies to comply with the Subcontracting Law, and this is generally accepted to mean that contractors must be Congolese and owned by Congolese shareholders. In addition, any service contract entered with a foreign company is subject to a 14% tax on the amount of the total contract value (DLA Piper, 2018).

Although Law No. 17/001 was adopted with the purpose to “promote small and medium-sized enterprises (SMEs) with Congolese capital, to protect the national labour force” (Article 1), and the Mining Code of 2018 has taken further steps to promote local procurement, concerns have been raised over the somewhat unclear rules for procurement activities.

One clear uncertainty relates to the definition of subcontractor. Law No.17/001 defines subcontracting as an activity or transaction carried out by a so-called subcontracting company on behalf of a so-called main contractor (*entreprise principale*) and which contributes to the carrying out of the main activity of that undertaking or performance of one or more services of a main business contract. Instead, the Mining Code defines the subcontractor as “a Congolese legal entity with Congolese capital providing equipment or carrying out necessary works and / or services on behalf of the holder (mining company) as part of its mining activities.”

The two definitions have raised concerns of being contradictory. It follows from the definition of subcontracting in Law No.17/001 that procurement should be carried out within the framework of a tripartite relation involving a mining company, a main contractor (*entreprise principale*) and a subcontractor. In such a case, the main contractor could be a foreign company or a Congolese company with foreign capital and promoted by foreigners. Instead, the Mining Code of 2018 seems to equate the main contractor to the subcontractor.

If the provisions of the Mining Code are interpreted strictly and the mining subcontractor is, in fact, the main contractor of the mining company, then another question arises concerning the limit of subcontracting to no more than 40% of the overall value of a contract. It is unclear whether a mining company would not be able to grant an entire contract to a service or goods provider and would instead need to break it down into many contracts. As a result, the law is feared to encourage cartels of subcontractors, which is illegal (McGuireWoods Consulting, 2017).

Finally, it should be noted that the definitions of subcontractor tend to exclude certain entrepreneurs exercising their activities as a natural person or occasional trader commonly in the exercise of subcontracting activities in the mining sector.



## **BOX 10. COMPATIBILITY OF NEW REGULATORY REQUIREMENTS WITH CONTRACTUAL AND INVESTMENT COMMITMENTS**

Although the changes introduced by the Mining Code of 2018 may be praised for their efforts to increase local development, questions have been raised about the extent to which governments can regulate, when they already have commitments under bilateral investment treaties and stabilization clauses in mining contracts. In the Kamoia-Kakula Integrated Development Plan 2020, key risks and concerns associated with the introduction of the New Mining Code (Peters et al., 2020) are described as follows:

These new rules increase the costs of the Project and could be considered as being contradictory, without limitation, to the stability guarantee to which Kamoia Copper SA is entitled. It is also incongruent with Article 273f of the Mining Code, which provides that mining companies holding mining rights are free to import goods, services as well as funds necessary to their activities subject to giving priority to Congolese businesses. This priority must be given for all contracts in relation to the mining project, provided that the Congolese business offer equivalent conditions in terms of quantity, quality, price, delivery deadlines and payment.

Kamoia Copper SA is nevertheless doing its best efforts to ensure voluntary compliance with the new requirements, without waiving its rights under the stability guarantee and the share transfer agreement. This includes ongoing and increasing development of local suppliers and voluntary compliance with laws regarding main contractors and subcontractors.

## **REGULATORY FRAMEWORK GOVERNING INTELLECTUAL PROPERTY RIGHTS**

A clear and robust regulatory framework, particularly in the areas of patenting and intellectual property rights (IPR), data protection laws, and cybersecurity, is key for promoting new mining technologies uptake, and to ensure that local suppliers have incentives to invest in new technologies and yield the benefits of their work.

When it comes to the regulatory framework in the DRC, IPR are, in principle, legally protected by Law No. 82-001 on Industrial Property (1982) and Law No. 86-022 on the Protection of Copyright and Neighbouring Rights (1986). However, according to Privacy Shield Framework (n.d.), enforcement of these—quite outdated—IPR regulations is considered to be virtually non-existent. The country joined the 1883 Paris Convention for the Protection of Industrial Property and is also a signatory to a number of relevant agreements with international organizations, such as the World Intellectual Property Organization (WIPO) and the World Trade Organization (WTO), and is thus ostensibly subject to the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), an international legal agreement between all the member nations of the WTO that sets out minimum standards for the regulation by national governments of many forms of IPR, including industrial designs and patents. TRIPS also specifies enforcement procedures, remedies, and dispute



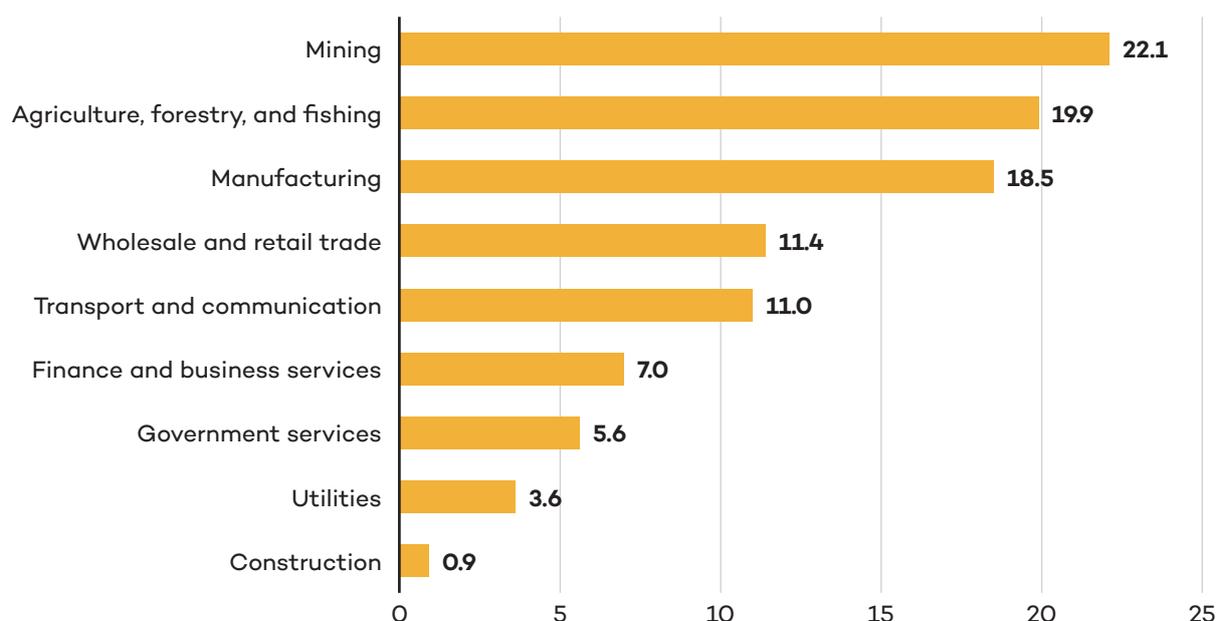
resolution procedures. As a least-developed country member, the DRC was given a longer transition period, through 2006, to comply with TRIPS, which has not been fully domesticated yet, but to this day it continues to be out of compliance with its international IPR obligations. For instance, Congolese laws provide only 15 years of protection on a number of patents, not 20 as in other pertinent conventions, and do not include all the means mentioned in TRIPS for enforcement of IPR (Privacy Shield Framework, n.d.).

During the second Trade Policy Review carried out by the WTO in 2016, the authorities acknowledged the existence of numerous gaps in the regulatory framework and shortfalls in terms of administrative capacity in the DRC that still need addressing. For example, it should be noted that the DRC does not have any courts specializing in IPR. In addition, a barrier to IPR has been the frequent turnover of Ministers of Trade, who oversee and sign off the registration of patents, leading to a negative impact on the applications process in DRC (Adams & Adams, n.d.).

## ECONOMIC, BUSINESS, AND INDUSTRIAL DEVELOPMENT IN THE DRC

Where a country is home to an ecosystem of innovative, technological, and digital or ICT businesses, local companies will be more prepared to provide new mining technologies solutions to innovating mines. However, less-developed and more resource-dependent countries will find it more challenging to provide local solutions for new technologies, or local skills to sustain them (KPMG, 2017).

**FIGURE 3. ECONOMIC STRUCTURE**



Source: KPMG, 2017.



The economic structure in the DRC is primarily driven by the mining industry, the extraction of oil offshore (all of the country's crude output is exported), and agriculture. An under-developed manufacturing sector makes the economy reliant on imports, particularly the import of machinery, electrical equipment, and vehicles. The manufacturing sector is limited by small domestic markets, dependence upon foreign investment, and a lack of skilled labour. Most products produced include processed foods (particularly flour and sugar), beer and other beverages, cigarettes, textiles and clothing, footwear, processed wood and paper, chemicals, cement and bricks, glassware, and metal goods such as nails and metal furniture (Britannica, n.d.).

The private sector in the DRC consists predominantly of micro and small businesses. Over 90% of firms employ fewer than 10 workers, and almost half of the firms are less than 5 years old. Micro and small businesses represent a strong potential to create jobs and contribute to economic growth as demonstrated by their annual employment growth rates (5.2% to 6% versus 1.3% of large firms) (International Finance Corporation, 2019). In the DRC, the informal sector represents over 80% of the economy and is dominated by women entrepreneurs, who own approximately 64% of all informal businesses.

Economic and industrial growth in the DRC is still restrained by the challenges of developing adequate infrastructure throughout the country. A deteriorating security situation and uncertainty over policy direction have reduced donor assistance and discouraged foreign direct investment (FDI) in recent years. In 2019, FDI to the DRC decreased by 9% to USD 1.5 billion. Foreign investment continued, however, to be directed toward mining, especially of cobalt, due to continued increasing demand for this material other and for other metals used in batteries, such as lithium, nickel, and copper.

Although the DRC performs poorly in international indices developed by financial institutions and think tanks, its large endowment of critical minerals continues to underpin investment flows to the country despite profound political and economic challenges. For example, although it is listed among the 10 least attractive jurisdictions for investment by the Fraser Institute's 2020 annual survey of mining and exploration companies, which attempts to assess how mineral endowments and public policy factors such as taxation and regulatory uncertainty affect exploration investment, the report also shows that uncertainty over the quality of infrastructure and political stability are not necessarily a deterrent to investment.

**TABLE 2. INTERNATIONAL BUSINESS INDICES FOR DRC**

<b>BUSINESS ENVIRONMENT OF THE DRC</b>					
Global Competitiveness Index (GCI) 2019 (World Economic Forum, 2019)	Doing Business 2020 (World Bank Group, 2020a)	Index of Economic Freedom (The Heritage Foundation, 2021)	Corruption Perceptions Index (Transparency International, 2021)	Investment Attractiveness Index (Yunis & Aliakbari, 2021)	Resource Governance Index (Natural Resource Governance Institute, 2017)
139th out of 141 countries	183rd out of 190 countries	165th out of 178 countries	170th out of 180 countries	57th out of 77 countries	75th out of 89 countries

## **INFRASTRUCTURE AND ACCESS TO TECHNOLOGIES AND (DIGITAL) SKILLS**

A third factor to foster an enabling environment for new mining technologies uptake is a country's infrastructure and access to technologies and digital skills. To adopt new mining technologies, infrastructure such as access to the Internet, high-speed connectivity, and 4G/5G infrastructure are a key priority.

The DRC has one of the lowest rates of electrification in the world. With the launch of The Plan National Stratégique de Développement (PNSD)—the country's national development plan and the main policy tool for achieving the United Nations Sustainable Development Goals (SDGs)—the country has set the goal of providing 65% electrification in 2025 and universal access by 2050 (World Energy Council, n.d.). However, as presented in the World Bank's 2020 report on "Increasing Access to Electricity in the Democratic Republic of the Congo" (World Bank Group, 2020b) challenges to the development of the power sector include weak governance, lack of infrastructure, investment needs exceeding government fiscal capacity, and very high barriers to doing business that constrain private sector development (World Energy Council, n.d.). The lack of infrastructure has led mining companies to invest heavily in their own power generation. One such example is offered again by Kibali.



## **BOX 11. DEVELOPMENT OF POWER GENERATION FACILITIES AND SPILLOVER EFFECTS AT KIBALI**

Because of its remote location, Kibali is completely dependent on its own power generation facilities for the supply of electrical power. These include three separate thermal power stations and two regional hydropower installations. The hydro station installations are Nzoro 2 (four 5.5 megawatt [MW] turbines), Ambarau (two 5.3 MW turbines), and Azambi (two 5.3 MW turbines). Nzoro 1 is pre-existing legacy hydrostation built in the 1930s and has a capacity of less than 1 MW. It was refurbished by Kibali Goldmines as part an agreement with SOKIMO, such that the produced power is dedicated to providing power to the local communities (Quick et al., 2018).

According to We Are Social's 2020 Digital Report (We Are Social, 2021), there were 16.35 million Internet users in the DRC in January 2020, i.e., 19% of DRC's total population. The number of Internet users in DRC increased by 9 million (+122%) between 2019 and 2020, and Internet penetration in the DRC stood at 23.2% in January 2021 (against, for example, 64% in South Africa).

In addition to access to the Internet and infrastructure, to develop new mining technologies solutions locally, local suppliers need to draw from a pool of talents that have the necessary skills to keep up with an increasingly internationalized labour market. More than 70% of the population in the DRC lives below the multidimensional poverty threshold (which includes a measure of low income, unmet food needs, poor access to health care and schooling, decent housing, etc.).

The literacy rate was 88.5% for men and 66.5% for women in 2016, against a worldwide average of 89.6% and 82.3% respectively. Focusing on advanced education (comprising short-cycle tertiary education, a bachelor's degree, a master's degree, or a doctoral degree or equivalent), it can be seen that 13.6% of men and 9.1% of women over 25 years of age have completed a short-cycle tertiary education as of 2016. Only 5.6% of men and 1.5% of women had attained at least a bachelor's degree or equivalent, and the percentage of population over 25 years of age attaining at least a master's or equivalent is close to zero (0.1% for males) (World Bank Group, n.d.).

It is to address this skills gap that mining companies have started investing in local talents as part of their corporate giving programs and in line with the expectations of the Mining Code of 2018. One such example is the University Scholarship Program financed by Tenke Fungurume Mining Social Fund (Box 12). Another example is Kibali's investment in the upgrading of the Kokiza Training Centre for engineers.



## BOX 12. UNIVERSITY SCHOLARSHIP PROGRAM FINANCED BY THE TFM SOCIAL FUND

To address the skill gap in DRC, TFM initiated a university scholarship program to support young students within the concession of the mine to pursue university studies. These scholarships are granted to the best students after a rigorous selection process organized by a multidisciplinary jury. This program grants a right of preference to young girls to fight against all forms of discrimination against women. In short, this program is in line with the objectives of TFM's Community Social Fund, which consists of promoting education and eradicating poverty within the communities living in the mining areas of TFM.



*Scholarship program student.*  
Source: Interviewee.

This program, started in 2016/7, was approved for a period of 5 years. During each academic year, the program recruits 15 finalist students from secondary schools in the TFM concession. At the end of the program, a total of 75 students will have gone through their university studies.

Currently, 74 students (16 girls and 58 boys) are in the program, which also covers academic fees, housing, food, and supplies.

The fields of study chosen by the students are the following:

- Human medicine
- General care
- Public health
- Law
- Economics
- Computer science
- Electrical engineering
- Mathematical computer science
- Electromechanics
- Construction
- Marketing
- Human resources
- Metallurgy
- Industrial chemistry
- Mining
- International relations



*Scholarship program graduates.*  
Source: Interviewee.

The first graduating class of 2016/7 will complete the full degree in this academic year 2020/1.



“All mining companies are looking for Congolese qualified workers and university graduates,” says Julie Wei Liang, director of China Molybdenum (CMOC)’s sustainability executive committee, highlighting the demand for local qualified professionals in the DRC. “At TFM we even recruited some Congolese who graduated from Chinese universities, giving them an opportunity to return to the DRC with a career path ahead. There is no doubt that the students who are now taking part in this university scholarship program will also be welcomed if they wish to work for TFM.”

In conclusion, the challenges to local procurement growth echo the broader social, economic, and political landscape in the DRC. Several factors create a disabling environment for local procurement, however. These include a potentially promising, but currently unclear, regulatory framework for local procurement, which has raised questions over its practical implementation; an outdated and insufficient regulatory framework for intellectual property rights; an overall under-developed business, economic, and industrial environment, based on exports, and insufficient infrastructure, access to technologies, and digital skills. Although companies are aware of these gaps and have been investing heavily to overcome them, a wider national plan and close collaboration among the government and key players are needed to create a more enabling environment for new technologies and business development.



## CONCLUSION

**The DRC is a country of contrasts. It is one of the top 10 resource-rich countries in the world**, providing many of the key minerals needed today to sustain global economic growth and to power the transition to a low-carbon economy. However, more than 70% of its population lives below the multidimensional poverty threshold, a combined measure of low income, unmet food needs, poor access to health care and schooling, decent housing, etc., confirming once again the resource curse that still affects many resource-rich countries around the world.

**At the national level, ASM remains relevant, yet the DRC hosts some of the most technically advanced modern industrial mining producers in the world**, such as the Kibali gold mine, one of the most autonomous underground mines globally and located in one of the world's most remote and infrastructurally under-endowed regions, and the Kamo-a-Kakula copper project, whose goal is to produce the world's "greenest copper." Together, these two projects include a wide array of innovations bringing increased efficiency and productivity, as well as transformative change in the areas of health and safety and environmental protection.

**Uptake of new mining technologies in the DRC is increasing**, albeit not at the scale of capital required for complete automation or mechanization, driven mostly by the possibility to use real-time data to improve decision making processes, improved human safety and environmental protection, increased international collaboration within multi-national companies and, above all, increased productivity.

**Barriers to new mining technologies uptake, however, remain.** These include the need for a cultural shift to increase acceptance of the potential changes introduced by new technology on day-to-day operations, and the difficulty of quantifying future benefits of new mining technologies given the large investments required.

The case studies of Kibali and Kamo-a-Kakula suggest that **local suppliers struggle to fully benefit from the increased uptake of new mining technologies by large industrial mining projects**, being mostly involved in the supply of lower-spending categories of goods and services. The challenges to local procurement to tap into the highest-value categories of contract spent echo the challenges faced by local suppliers in the wider procurement market, as well as the broader social, economic, and political landscape in the DRC. Today, only a fraction of the equipment and operational procurement market is captured by Congolese companies with Congolese capital, and the biggest opportunities remain untapped. With the exception of electricity, almost all top expenditure categories are either supplied by foreign companies, or by local enterprises or subsidiaries of foreign companies adopting foreign technologies and supported by foreign capital.

**Key challenges to local procurement include the lack of a local manufacturing sector and the unavailability of the quality needed to meet buyers' specifications.** The lack of specialized skills and access to capital make it difficult for local providers to meet the demand. The demand/supply disconnect is accentuated, on both sides, by lack of



trust. From the miners' perspective, their experience prejudices trust in the suppliers' ability to provide goods and services needed within pre-agreed costs and timelines. From the supplier's perspective, unfair business environment and procurement protocols create frustration in the system. While the goods and services produced locally are often capitalized by foreign entities, and local suppliers struggle to provide even lower-capital goods such as food, there is a suggestion, however, that local entrepreneurship is growing.

From a regulatory perspective, the tough **new Mining Code of 2018** is expected to address these issues, by creating incentives—read, requirements—for mining companies to contribute to the local economy through procurement, employment, and community development, in addition to higher taxes and royalties for the government. However, it is too soon to tell whether the new Mining Code will be able to effectively address the challenges above.

Overall, the extent to which new mining technologies bring economic opportunities, as opposed to disruptive change to local suppliers, depends not only on the capacity of the government to implement the requirements of the Mining Code, but also on a number of factors that, together, comprise the enabling environment needed for business to flourish: the regulatory framework, a country's overall economic, business and industrial development, infrastructure, access to technologies, and (digital) skills.

To effectively leverage the opportunities brought by new mining technologies, **it is important that the government provides investors with the clarity needed to make effective investment decisions.** At stake is not only their productivity but also the health and safety of workers, the well-being of communities, and the preservation of the environment. To make important investment decisions, trust is key.

To be able to capture the economic value of new mining technologies, it is also important that the government works to address those structural challenges that make it difficult, and at times impossible, to ensure a local supply of goods and services. This is being partially addressed through the DRC's Plan National Stratégique de Développement, the country's national development plan and main policy tool for achieving the United Nations SDGs, which aims to make the DRC an emerging market economy by 2030 and a developed country by 2050. It aims to do this through economic diversification and development, as well as through improved human development and social protection, and combating climate change and strengthening environmental sustainability. These are not easy tasks. To foster economic diversification and development, extensive infrastructural interventions are needed. The role that mining companies can play, and are playing, in this regard should not be undervalued.

**Where the true untapped opportunity lies, however, is in DRC human capital.**

The growth of local entrepreneurship in a country where access to mainstream technologies and educational opportunities remain low is testament to the richness of talents in the DRC. Mining companies can, and should, do more to do their part to cultivate these talents. It remains a responsibility of the government, however,



to invest in its youth and provide educational opportunities that will unlock the potential for Congolese citizens to create, supply, and adopt new (mining) technologies.



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## APPENDIX I: NEW MINING TECHNOLOGIES

The table below describes the new mining technologies that have been more frequently cited during interviews with mining companies and local suppliers in the DRC.

**TABLE A1. NEW MINING TECHNOLOGIES CITED IN INTERVIEWS**

<b>NEW MINING TECHNOLOGY CATEGORY</b>	<b>NEW MINING TECHNOLOGY</b>	<b>CHARACTERISTICS (RAMDOO, 2019)</b>	<b>KEY APPLICATIONS IDENTIFIED THROUGH INTERVIEWS</b>
Smart mining technologies	Smart sensors	Sensors that convert information from the physical environment into electrical signals transferred to the controller	Geographic information systems; photogrammetric logging software; truck movement sensors
Smart mining technologies	Geo-positioning devices	Satellite-based navigation systems that provide information, including the position of the satellite, velocity and the precise time of transmission	Tracking of people, equipment, and other assets
Smart mining technologies	Advanced analytics	Treatment of large volumes of data	Management of specialized equipment
Smart mining technologies	Radio frequency identification (RFID)	Small devices, similar to a sticker, which can be attached or built into any object. They contain antennas that can receive and respond to requests by radiofrequency from a transceiver	Control of PPE; control of personnel to access mining sites



<b>NEW MINING TECHNOLOGY CATEGORY</b>	<b>NEW MINING TECHNOLOGY</b>	<b>CHARACTERISTICS (RAMDOO, 2019)</b>	<b>KEY APPLICATIONS IDENTIFIED THROUGH INTERVIEWS</b>
Smart mining technologies	Cloud computing	Technological model that allows firms and individuals to access a set of computer resources on demand and in a personalized manner	Interconnected workstations; department specific management software
Smart mining technologies	Connected portable devices	Devices that allow interface between machines and humans to enhance productivity	PPE with built-in tag; touch technologies; captive pads
Automation technologies	Drones	Unmanned aerial vehicle that can navigate autonomously, without human control or beyond the line of sight	Operating inspections of conveyors belts and other working plants
Green mining technologies	Water-management technologies	Technologies meant to minimize the use of water in mining operations, minimize/eliminate the risk of pollution, and recycle water for mining and/or other uses	Closed-loop water recycling; dry tailings water disposal
Green mining technologies	Electric mining equipment	Battery-powered vehicles and equipment to replace fuel and diesel equipment	Electric vehicles for underground mining
Green mining technologies	Fuel additives to reduce emissions	Combustion catalyst that helps maximize fuel usage	Used in mining vehicles



## APPENDIX II: TOP CONGOLESE MINING SECTOR COMPANIES

The table below, developed by the Fédération des Entreprises du Congo (FEC), a Congolese chamber of commerce, illustrates the top 20 Congolese companies involved in transactions with the mining sector.

**TABLE A2. TOP 20 CONGOLESE COMPANIES INVOLVED IN TRANSACTIONS WITH THE MINING SECTOR**

<b>COMPANY</b>	<b>DOMAIN</b>
BKM	Sale of reagents and explosives
EMANY PLAZZA	Catering
COPY-N-MORE	Printing
ZM CONTRACTOR	Building maintenance
MAYA SERVICES	Logistics and customs
KNIGHT PIESOLD	Environmental and wastewater management
SSM	Laboratory for the control of mining substances
KIPAY ENERGY	Supply of electrical energy
FTHABITA	Workforce placement
GMB	Metallurgical construction
TRADE SERVICE	Logistics and customs
ATLANTIC'S GROUP	Logistics
COPPERLINE SA	Logistics and customs
COREDIS	Logistics and customs
KING FOODS	Catering
ITM	Workforce placement and HR management
CMDC	Medical service
MULYKAP SARL	Transport and sale of fuel (imported)
TI-AFRICA	Workforce placement and HR management
ECOENERGY	Supply of electrical energy



Additional key local suppliers (both private and state-owned companies) of goods/ services emerged from the interviews include the non-exhaustive list below:

- Congo Equipment, the Caterpillar dealer in the DRC, supplying spare parts and providing maintenance service on the equipment
- Chemical of Africa (Shemaf) producing sulphuric acid locally
- The SNEL, the national electricity company
- United Petroleum and MulyKap supplying fuel and transport to mining companies
- AEL and Afridex, supplying explosives and accessories
- ITM providing training and labourers
- Auto Lubumbashi supplying spare parts and tires
- Cargo Congo, SDV, Bertling, Connex Africa, providing supply chain services
- IFS, Sodexo, Bush Camp, providing catering services



## APPENDIX III: PROJECTED LOCAL PROCUREMENT MARKETS

The table below presents an overview of the local procurement market for the key expenditure categories presented in Figure 3. TDi augmented the sparse literature on this subject with a rapid qualitative survey based on locally available data and expert local knowledge. These results affirm a pattern but are not statistically significant.

**TABLE A3. LOCAL PROCUREMENT MARKET FOR THE KEY EXPENDITURE CATEGORIES<sup>1</sup>**

<b>PRODUCT/SERVICE</b>	<b>EXPENDITURE</b>	<b>LOCATION AND OWNERSHIP OF SUPPLIERS AND SERVICE PROVIDERS</b>	<b>CITED REASONS FOR SOURCE OF PRODUCT/SERVICE</b>
Electricity	USD 734 million	Electricity is supplied locally by SNEL (the national electricity company). SNEL is a Congolese company founded with Congolese capital. Currently, the electricity utility market is open to private companies that want to become a partner in the rehabilitation or construction of dams in partnership with SNEL.	Monopolistic position by a national company
Spare parts and operational expenditures (OPEX) equipment	USD 355 million	Most spare parts for equipment and machinery come from overseas. In-country suppliers are mostly foreign companies with a local presence required to have registration in the DRC. There are a small number of local Congolese companies. All the maintenance equipment for factories comes from abroad.	Quality Reliability of supply
Fuels and lubricants	USD 345 million	Fuels and lubricants are supplied directly by local companies. These local companies are the distribution network for foreign companies, however, and the highest proportion of the production value stays outside of the DRC.	Convenience Reliability of supply

<sup>1</sup> Expenditure figures from the Federal Ministry for Economic Cooperation and Development. (2021)



<b>PRODUCT/SERVICE</b>	<b>EXPENDITURE</b>	<b>LOCATION AND OWNERSHIP OF SUPPLIERS AND SERVICE PROVIDERS</b>	<b>CITED REASONS FOR SOURCE OF PRODUCT/SERVICE</b>
Sulphur and sulphuric acid	USD 251 million	Sulphuric acid is a key input for the production of cobalt and copper. The sulphur used in the manufacture of sulphuric acid is imported from overseas. Congo miners import about 3 million tonnes of sulphuric acid a year, mainly buying from smelters in Zambia, and about 450,000 tonnes of granulated sulphur (the ingredient to make the acid) mostly coming via suppliers in South Africa. A significant supplier of sulphuric acid is from local providers that use the foreign granulated sulphur, which costs less than importing acid from overseas. These local firms, which are located in Lualaba and Haut-Katanga provinces, are mostly Congolese controlled, but supported by foreign capital.	Price Availability
Equipment and plant maintenance	USD 209 million	All equipment for plant maintenance comes from overseas.	Quality
Other reagents	USD 167 million	Vast majority from overseas.	Availability
Supply chain services	USD 83 million	Vast majority of service companies are foreign, very few Congolese companies.	Availability
Equipment rental	USD 67 million	Majority are foreign-owned local companies in the rental business. Slowly growing number of Congolese controlled companies that rent mining, transport, extraction, and construction equipment.	Availability



<b>PRODUCT/SERVICE</b>	<b>EXPENDITURE</b>	<b>LOCATION AND OWNERSHIP OF SUPPLIERS AND SERVICE PROVIDERS</b>	<b>CITED REASONS FOR SOURCE OF PRODUCT/SERVICE</b>
Explosives and accessories	USD 55 million	Explosives and accessories are supplied by local companies, some are Congolese-owned and some are foreign owned. But LAfridex (The African Explosive), a public company owned by the Congolese state, holds the exclusive monopoly on explosives in the DRC with the probability of signing a partnership contract with foreign companies (explosives involved in industrial mining).	Monopolistic position
Lime	USD 50 million	Much of the lime is produced and supplied by local, Congolese-owned companies, but some is imported from abroad. This large part is produced by GCM Kakontwe in Haut-Katanga.	Availability Cost
Drilling equipment and services	USD 42 million	The vast majority of survey equipment is provided by foreign-owned local companies, there is a minority of Congolese-controlled companies.	Availability
Fuel and lubricants - power	USD 42 million	The supply and service chain is the exclusive domain of Congolese national companies which can sign partnership contracts with foreign companies.	Monopolistic position
Corporation administration services	USD 38 million	General and administrative services are reserved only for Congolese national companies which can sign partnership contracts with foreign companies.	Monopolistic position



<b>PRODUCT/SERVICE</b>	<b>EXPENDITURE</b>	<b>LOCATION AND OWNERSHIP OF SUPPLIERS AND SERVICE PROVIDERS</b>	<b>CITED REASONS FOR SOURCE OF PRODUCT/SERVICE</b>
Geological and exploration services	USD 25 million	Concerning the geology and exploration sector, it is reserved only for local companies if it is a permanent job, but if it is a fixed-term job, the foreign companies can perform this work.	Monopolistic position
Personnel related services	USD 25 million	The personnel service is reserved to nationals but they can sign partnership contracts with foreign companies.	Monopolistic position
Construction and related materials and services	USD 21 million	<p>The vast majority of construction of large factories is the responsibility of foreign companies because they have expertise, but some Congolese companies are increasingly acquiring expertise in the construction of buildings.</p> <p>Construction materials are supplied locally, although production is still rudimentary and in small quantities (ironwork, wire ties, nails, sheets, etc.)</p> <p>The wood is produced locally, given the potential of the DRC.</p> <p>The aggregates are produced locally (sand, gravel, rubble, etc.)</p>	Quality/ Expertise
Electrical equipment and services	USD 17 million	Electrical equipment is not produced locally for lack of a manufacturing plant, it is imported from abroad. Local businesses only sell foreign products.	Availability
Safety and protection equipment	USD 16 million	Safety equipment is produced largely by foreign factories. Local production and quality are considered to be poor.	Availability Quality
Environmental services	USD 15 million	Environmental services are provided locally by Congolese institutions.	



<b>PRODUCT/SERVICE</b>	<b>EXPENDITURE</b>	<b>LOCATION AND OWNERSHIP OF SUPPLIERS AND SERVICE PROVIDERS</b>	<b>CITED REASONS FOR SOURCE OF PRODUCT/SERVICE</b>
Food and beverages	USD 9 million	Although the agricultural sector represents a key sector in the DRC economy, food and beverages are often imported from abroad.	Cost
Telecommunications	USD 5 million	The telecommunications workforce is 80% local, but the technology is foreign.	Quality/ Expertise Availability
Electronic equipment	USD 4 million	Electronic equipment is supplied 100% from abroad due to a lack of processing units.	Quality/ Expertise Availability
Cyanide	Below USD 1 million	The reagents used in the manufacture of cyanide are imported from abroad, but cyanide is also produced locally.	Availability



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