

Africa's Mining Potential: Trends, Opportunities, Challenges and Strategies

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In collaboration with Chelsea Johnson

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As such, the PCNS brings together researchers, publishes their work and capitalizes on a network of renowned partners, representative of different regions of the world. The PCNS hosts a series of gatherings of different formats and scales throughout the year, the most important being the annual international conferences «The Atlantic Dialogues» and «African Peace and Security Annual Conference» (APSACO).

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Abstract

Africa is endowed with abundant mineral resources, including gold, silver, copper, uranium, cobalt, and many other metals which are key inputs to manufacturing processes around the world. The mining and extractive sector has contributed and continues to contribute a significant share of Africa's exports, revenue and GDP annually. In 2019, minerals and fossil fuels accounted for over a third of exports from at least 60% of African countries. Additionally, 42 out of 54 African countries are classified as resource dependent, with 18 countries classified as dependent on non-fuel minerals, 10 as dependent on energy or fuel exports and the rest as dependent on agricultural exports. Mineral resources contribute a significant amount of fiscal revenues, foreign currency reserves and employment to African countries. Clearly, the mining and natural resources sector is critical in driving economic growth and development on the continent. Discussions about Africa's extractive sector are often overshadowed by an over-emphasis on oil and gas resources. This makes it imperative to discuss non-fuel mineral extraction industries in-depth. This Policy Paper discusses the untapped potential of Africa's mining sector, especially the key trends, drivers, opportunities, challenges, and strategies needed to expand the sector and drive economic transformation on the continent.

Africa's Mining Potential: Trends, Opportunities, Challenges and Strategies

I. Introduction¹

Emerging economies in Africa are at the forefront of the re-investment of natural resource rents for the sustainable growth of the overall economy. Africa has immense natural resource endowments, especially in minerals used for technological development and manufacturing. As concerns about global climate change continue to fuel transitions to renewable energy, Africa is poised to benefit since the continent is endowed with many of the metals and minerals critical in clean energy production. For example, Africa produces about 80% of the total world supply of platinum, 50% of manganese, two-thirds of cobalt, and a significant amount of chromium². Demand for these minerals is expected to increase substantially in the near future because they are required in the production of batteries, wind turbines, and solar energy³. Even though global climate change presents some challenges to the mining industry, it also creates an opportunity for investors to benefit from increased global demand for minerals required in clean energy production⁴.

Sub-Saharan Africa is mostly dependent on natural resource rents for economic growth⁵. Minerals, ore, and metal exports accounted for 20% on average of total merchandise exports in 2017⁶. In some countries, minerals constitute more than 50% of total merchandise exports. For example, minerals and metals accounted for 92% of total merchandise exports from Botswana between 2013 and 2017 and 81% of total merchandise exports from the Democratic Republic of Congo during the same time period⁷.

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2. International Energy Agency. 2019, p. 157

3. Ibid, p. 28

4. UNCTAD. 2019, p. 44

5. In 2019, minerals and fossil fuels accounted for over a third of exports from at least 60% of African countries (International Energy Agency. 2019, p. 177). Additionally, 42 out of 54 African countries are classified as resource dependent, with 18 countries classified as dependent on non-fuel minerals, 10 as dependent on energy or fuel exports and the rest as dependent on agricultural exports (UNCTAD. 2020, p. 3, 25-30).

6. International Energy Agency. 2019, p. 202

7. UNCTAD. 2020, p. 53, 77

II. Background Facts and Trends

Africa is the world's top producer of a range of valuable resources, and is also thought to have some of the largest remaining untapped reserves⁸. Because of a lack of systematic geological mapping and exploration, the full extent of the region's mineral base remains unknown⁹, even though the race for Africa's mineral wealth has been raging for over two centuries. In the post-colonial period, African leaders and international development organizations have become increasingly interested in building linkages between the mining sector and broader processes of economic and social development. In the 1960s and 1970s, the dominant ideology was nationalization, resulting in large state-owned mining companies in countries including Ghana, Zambia, and Zaire (now the Democratic Republic of Congo). Following stagnation of the industry, however, a process of privatization since the 1990s has led to diversification of the mining sector in most countries¹⁰. Today, mineral exploration and production are helping to redefine geostrategic relationships between Africa and the rest of the world, as the major emerging markets—namely, China, Brazil, and India—are increasingly investing in Africa's resources¹¹. Chinese investment, in particular, has increased substantially since 2000, with Africa accounting for 75% of all Chinese foreign mining investment as of 2011¹².

Much of the international narrative on Africa's natural resource reserves has been dominated by the notion of the 'resource curse', which fails to recognize countries like Botswana that have managed their resources well. The notion of the resource curse, which is also called the 'paradox of plenty', often arises when a state has a major revenue-generating natural resource sector but the resulting revenues ultimately lead to negative development outcomes, including political tensions, economic stagnation, social grievances, and ecological destruction¹³. The existence of natural resources in tandem with corrupt institutions, individuals, and policies is usually the ultimate driver of the resource curse. Once the idea of a resource curse is applied to a country, it can be difficult to perceive the positive economic impacts of mining. However, a recent focus on mining and natural resources in some emerging markets, where key commodities including copper, bauxite, iron ore, and precious metals are available for mass production, is highlighting Africa's potential to generate well-managed revenues from the mining sector and support economic transformation. Since 2003, several countries have adopted the Extractive Industries Transparency Initiative (EITI), which has established a common standard of transparency and accountability for extractive industries by requiring implementing countries to publish comprehensive government and corporate reports, including revenue flows to ensure good governance of natural resources¹⁴. The fact that 24 African countries have joined the EITI¹⁵ demonstrates their commitment to improving transparency across the extractive industry value-chain, and to reducing illicit practices.

Over the past decade, Africa's mining sector has proved resilient to adverse conditions in the global economy, such as the financial crisis of 2007-8 and the decline in world commodity prices since 2014, even if the COVID-19 pandemic has recently exacerbated the forward pressure on commodity prices. Most base metals and precious minerals have experienced sharp price declines because of demand-

8. Barnejee et al., 2015, p.11; USGS, "2012 Minerals Yearbook", 2012, p.1;3

9. Africa Union. 2009, p.5

10. Africa Union. 2009, p.13

11. Elliott Lauri et al. 2020.

12. Campbell, 2013; USGS, "2012 Minerals Yearbook", 2012, p.1-2

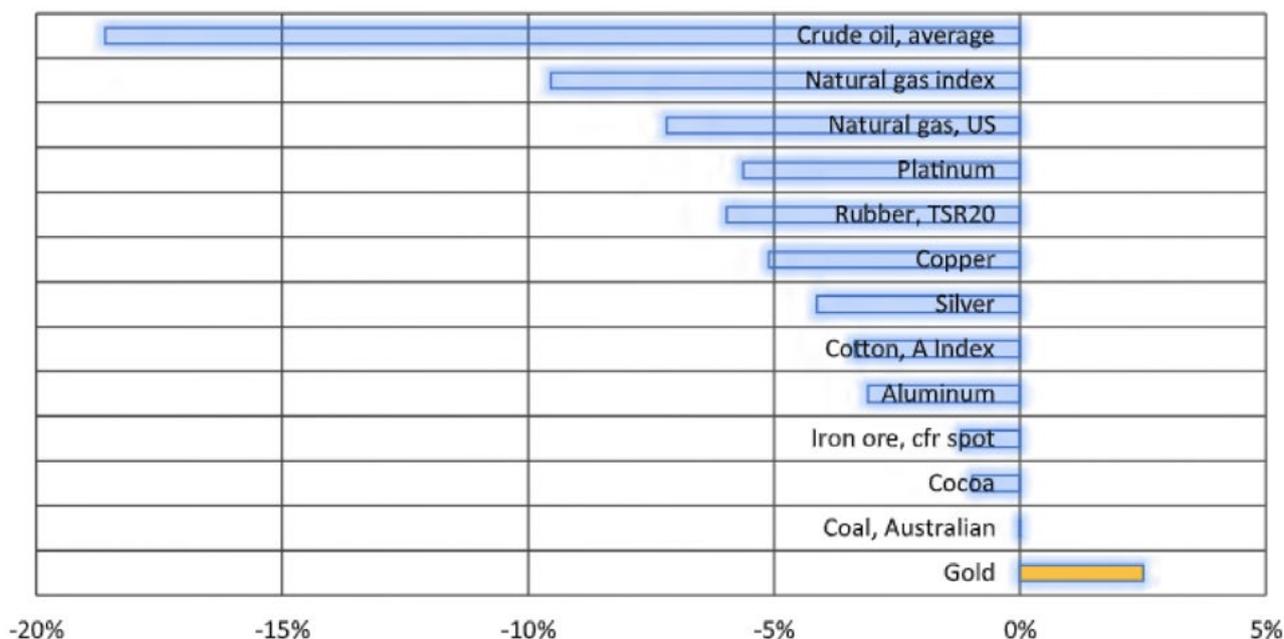
13. NRG1.2015; See Auty 2001, for an in-depth discussion of the impact of the "resource curse."

14. The Extractive Industries Transparency Initiative. 2020, p. 1

15. EITI Official Website

side shocks when pandemic-related shutdowns started. The only exception was gold, the price of which has increased because of its perceived value as a safe-haven asset. Figure 1 shows the changes in the prices of different commodities between January and April 2020.

Figure 1: Changes in Commodity Prices (January to April 2020)



Source: Africa Development Bank 2020. Africa Economic Brief - Covid-19 and gold mining in Africa Turning Challenges into Opportunities.

In 2008, the mining sector was bolstered by the African Union's Africa Mining Vision (AMV), which seeks to build capacity, improve transparency and management of revenues, confront environmental and social challenges, and develop linkages with other productive sectors, especially manufacturing¹⁶. Africa accounts for a substantial share of global production of bauxite, chromite, cobalt, industrial diamonds, gold, iron ore, lead, copper, manganese, phosphate, and uranium¹⁷. Mining now makes up a significant portion of many of Africa's national economies, with ores and metals accounting for 20%, on average, of total merchandise exports¹⁸. However, there is a substantial variation in the significance of mineral production across the continent, which tends to be driven more by differences in structural endowments than by the investment climate. For example, the mining sector accounts for more than half of total exports from countries including Burkina Faso, the DRC, Guinea, Mauritania, Mozambique, and Zambia. In such places, mining accounts for a significant concentration of economic production and a significant amount of foreign exchange earnings—in DRC, Botswana, and Guinea, for example, mining represented more than one-fifth of total fiscal revenues in 2015¹⁹. On the other hand, many countries in North Africa and Central Africa produce less non-fuel minerals, largely depending instead on oil extraction and agriculture respectively, although Morocco represents an exception to this rule as a world leader in phosphate reserves.²⁰

16. AfDB, 2012

17. USGS, 2020; British Geological Survey, 2018

18. International Energy Agency, 2019, p. 202

19. Banerjee et al., 2015, p.11

20. USGS, 2020

Despite the seemingly contradictory relationship between mining and development, there is some evidence that the sector has been an important source of employment and infrastructural development in some of Africa's most poorly managed economies. During Zimbabwe's period of relative stability at the turn of the century, mining accounted for roughly half of all foreign currency earnings and provided jobs for up to 60,000 people. The sector also stimulated construction of roads, railways, telecoms, and other infrastructure projects in rural mining towns such as Hwange and Kadoma²¹. In post-conflict Sierra Leone, an increase in iron ore production accounted for 93.4% of export revenues in 2013 and, combined with indirect spillover effects in agriculture, construction, and business services, contributed to 20.1% growth in real GDP that year²². Recognizing the potential for resource wealth to drive economic growth, most African governments are investing heavily in infrastructure to support the sector. This contributes to the sector's continued expansion, despite the recent decline in world commodity prices. In Namibia, for example, Project 2050 seeks to build barriers along the coastline to provide a protected area for mining. In South Africa, roughly 220 billion Rand was committed to new mineral projects by the public and private sectors in 2018²³. One main challenge to the mining sector in Africa is that the clear majority of resource exports leave the continent unrefined. However, some countries are ratcheting up efforts to build linkages between mining and manufacturing, such as by the construction of cement factories. Roughly 12% of the new investments in South Africa are targeted towards processed minerals²⁴.

Across the continent, thirty new major mining projects were expected to become operational by the end of 2018, representing a total of \$18 billion in new investment²⁵. While much of this investment was concentrated in the traditional mining powerhouses—especially South Africa, DRC, Mauritania, Namibia, Zimbabwe, Zambia and Guinea—analysts predicted that the fastest growth in mining would likely occur in West Africa because of the size of its untapped reserves, improving business climates, and infrastructure improvements. In a 2019 survey of fund managers by Exploration Geological Consulting (EGC), the majority of respondents selected West Africa, particularly Ghana, Mali, and Burkina Faso as the best places to invest in Africa²⁶. This is partly due to West Africa's perceived favorable mining regulations. When it comes to specific minerals, the best investment opportunities were perceived to be gold, cobalt, copper, diamonds, and rare earth metals²⁷.

III. Importance of the Sector

The mining and natural resource sector is just as critical to human development as to economic growth. The stabilization of mining industries can be a necessary step to curtailing detrimental inflation, national debt, and outsized shocks to commodity prices. Political stability is a critical aspect of the mining industry's success because it gives positive assurance that countries can avoid the resource curse, and encourages greater foreign investment.

The export of raw materials, particularly oil, diamonds, and platinum, has represented a key source of revenues on the continent for decades, but many African countries have been unable to receive

21. Matsika Batanai. 2010.

22. USGS, "2013, p.36

23. Benton, Dale. 2018

24. USGS, "2012 Minerals Yearbook", 2012, p.1-2

25. Deloitte, 2015, p.9

26. ECG. 2020.

27. Ibid

the full economic benefits associated with their natural resources because of the so-called resource curse, which is discussed in greater detail below. Gold also has been a key resource, although its economic contribution varies based on whether its extraction is sourced from small-scale, artisanal mines or larger industrial mines that are subject to regulations that typically require the payment of royalties and other taxes to the federal government²⁸. Likewise, many regions remain underexplored, suggesting there is a high probability that the continent hosts natural resource wealth that, if leveraged correctly, could pull countries out of economic stagnation and into an era of emerging market growth. Protecting and expanding access to natural resources is also an important method of supporting pro-poor growth. Preventing the privatization of resources on which the poor depend encourages wealth distribution and inclusive economic activity²⁹. In addition to the potential for inclusive growth in the mining sector, there is a major potential for value-addition to minerals before exporting. In general, rising exports contribute to higher government finances, which provide the funding needed for building human and physical capital.

Natural resource abundance may lead to weakened private and public incentives to grow human capital and redistribute wealth, because of the prevalence of non-wage income including dividends, social spending, and low taxes³⁰. Countries need strong institutions to overcome the challenges of managing natural resource discoveries, investment from foreign extractive and development companies, and domestic production. In Africa, where countries still struggle to adjust to diversity within their societies, good governance and the rule of law are essential to prevent the benefits from natural resources from becoming a source of ethnic or identity-based conflicts³¹. These types of preventive policies and intentions are not adopted proportionally to the discovery of natural resources in Africa. However, in 2008, the AU adopted the AMV with the goal of using Africa's mining growth to meet the United Nations Millennium Development Goals through socio-economic development³². Increasing trade liberalization across the continent supports the mining and natural resource sector and supports the push for more equitable, sustainable growth in countries with new natural resource wealth.

IV. Key drivers

The mining industry has been a key driver of growth throughout history—first the iron and bronze ages, then the industrial revolution, and now the infrastructure of the modern information era³³. Research and analyses of the mining and natural resource sector are often focused on the macroeconomic impacts of the sector. Well-managed resources can be fundamental to overall economic growth, while also contributing to employment growth and income generation. Research shows that the number of direct jobs created by the mining sector is usually minimal, ranging from 1% and 4%, at most³⁴. However, the mining sector creates a lot of indirect employment through the linkages between the sector and other industries, but these indirect jobs are difficult to measure³⁵. There are several major drivers of the mining industry in African countries. Due to the varying degree to which states have

28. World Gold Council, 2021

29. OECD, 2008, p. 49

30. Gylfason et al., 1999

31. Nyamwaya Christabel. 2013

32. AfDB, 2012

33. Ashraf et al. 2015.

34. Addison, Tony and Alan Roe. 2018, p.62

35. Ibid

adopted new technologies, legislation, and incentive structures, the drivers of the mining sector are not necessarily uniform to all resource-rich African countries. These drivers can be divided into three categories: macroeconomic, governance, and operations.

- **Macroeconomic**

Financing and tax incentives

African governments have discovered a fortuitous balance between incentivizing exploration and gaining revenue from new mining projects within their borders. Despite a global trend of rising mineral royalty taxes, most African countries have maintained a stable tax regime on which mineral companies can rely on for future planning³⁶. This provision of revenue then impacts the quality of education and social services available to local workers seeking employment in mineral extraction jobs that require increasing technical skills in order to operate and maintain more digitally-advanced equipment. In most regions, local workers fill more than 90% of gold mining jobs. This job creation has an important two-fold effect on increasing the distribution of real wages to local populations and creating a workforce with the necessary skills to manage the growth of the sector.

International investment

Of the 29 major mining projects identified by Deloitte as in development in 2015, more than half met their investment needs through international stock exchanges³⁷: “the Toronto Stock Exchange is funding 28% of projects, followed by Hong Kong stock exchange funding 17% and the National Stock Exchange of India funding 10% of these projects”³⁸. The London Stock Exchange, the Australian Stock Exchange, Euronext Paris, the Russian Trading System, and the Johannesburg Stock Exchange are also important investors in the continent’s various mining projects. These international stock exchanges drive the exploration and transition of projects to online, ongoing extraction thanks to their access to capital and their ability to market Africa’s mineral opportunities to interested global parties.

- **Governance**

Accountability

Initiatives and policy movements, such as the Extractive Industries Transparency Initiative (EITI), are critical to growing and improving the natural resource sector. EITI represents a broader push for public disclosure of natural resource revenues—globally, 70% of developing countries within the top 30 gold-producing countries have implemented the EITI³⁹. Reducing corruption in the natural resource and mining sector has the potential to create substantial growth in national and local economies. Transparency and accountability are the first steps in revolutionizing the sector to avoid the resource curse, or the negative externalities of a booming natural resource sector, such as deindustrialization, the underdevelopment of other sectors, and state fiscal dependence on resource rents.

36. PwC. 2012

37. Deloitte. 2015.

38. Deloitte. 2015.

39. World Gold Council, Maxwell Stamp, 2015, p. 1

Efficiency

A growing focus on citizens' rights as workers and as inhabitants of areas near mines or natural resource deposits has created pressure to "secure the social license to operate"⁴⁰. Mining companies are increasingly pushed to make heavy investments in the socio-economic conditions of host communities, covering areas such as healthcare, education, training, and sanitation. Mining impacts local communities positively because of this political pressure, including increased employment and income, improved infrastructure, worker training, and management⁴¹. These localized investments help to offset the benefit to national government revenue, and governments facilitate these investments through efficient handling of licensing and permit issuance. Private firms and investors are aided in their pursuit of ownership and operative control of extractive activities and employment by the increased efficiency of governments. Efficiency offsets many of the costs of doing business. For example, in South Africa, mining companies face rising electricity costs, which have risen at double the rate of inflation over the past few years⁴². This is making it necessary for mining companies to invest in innovative ways to achieve energy efficiency.

- **Operations**

Infrastructure development

A global decline in mineral exploration has left the continent to advance its ongoing extractive projects and fund supporting infrastructure projects, such as the development of roads, ports, and electricity grids. These projects reinforce the economic reliability of investing in African mineral projects and lower costs for firms. Between 2003 and 2030, Deloitte estimates over 830 infrastructure projects will be undertaken, and approximately \$50 billion will be invested in mining projects during the same period⁴³. This comparison indicates the potential level of simultaneous development of roads, bridges, railways, power grids, and water systems with the mining sector, suggesting mutual growth for mutual gain.

Faster transition from exploration to online projects

The speed with which firms transition their initial investments into establishing the infrastructure and operational capacity to begin extracting minerals is not necessarily correlated with the potential revenue success of these activities. However, perceptions of mineral quality can influence firms to transition faster to the production stage. Africa's mineral deposits, particularly in Zambia and the DRC, are becoming globally known for the grade and quality of ore deposits⁴⁴. Higher-grade deposits encourage increased investment and make it more urgent to capitalize on the mineral's potential, even during periods of commodity price declines, as in 2016. The speed of projects' transition is also critical to increasing competition between investors and firms.

40. World Gold Council, Maxwell Stamp, 2015, p. 1

41. Punam et al., 2017, p. 67-68

42. McKinsey, 2019, p. 2

43. Ibid

44. Ibid

V. Key players

The mining sector in Africa has evolved in recent years, between the usual multinational mining companies and the emergence of players such as China, although activities remain focused in key countries in Africa.

- **Multinational mining companies**

Multinational companies have been at the forefront of the sector's growth. Most mining companies in Africa are internationally operated, with headquarters and stock listings in Johannesburg, London, Toronto, and Sydney. Examples include African Copper Plc, Aquarius Platinum, Anvil Mining, Rio Tinto, Oando Energy Resources, De Beers Group of Companies, Kinross, Kumba Iron Ore, and Cardinal Mining Services. Uranium has attracted numerous multinational companies to explore and produce exports for Europe, the Americas, and Asia. Australia has recently shown a keen interest in investing in the extractive sector in Africa and the number of Australian companies involved in the exploration and production of minerals has steadily increased over the past two decades⁴⁵. The Australia-Africa Minerals and Energy Group is one particular body that facilitates the trade relationship between Africa and Australian mining companies operating in Africa. The African mining sector is therefore comprised of various interconnected local and global players.

- **Emerging economies and new players (China, India, Brazil)**

Emerging economies are catching on to Africa's resource boom of the past decade and the continent's potential to remain dominant on the global market. India, Russia, and Brazil are expanding in Africa's mineral resource sector, increasing their investments and becoming more competitive for rights to known-resource-rich land and unexplored land. Africa still offers low costs of production, and the continent's growing workforce provides a further incentive to expand operations. Around 2012, more multinational companies—BHP Group, Rio Tinto, Anglo American, and Xtrata—started moving from high-cost projects, such as in Australia, to Africa⁴⁶. India has increased its investments in the continent's metals and minerals sector, offering the potential to incentivize infrastructure development, increase mineral production, and create an entrenched system of value-added processing⁴⁷.

China in particular has demonstrated a formidable presence in Africa. Between 2005 and 2015, China's investment in African mining industries multiplied by 25⁴⁸. A 2007 loan from China to the DRC totaled \$5 billion, indicating to western countries China's serious intentions to invest in African resource extraction⁴⁹. In 2017, Chinese demand for base metals composed 40% of the global market⁵⁰. In order to establish a stable source of commodities to fuel economic expansion, China has continued to develop deals ranging from infrastructure projects, resource extraction, joint ventures, indirect investments, and a diverse array of other agreements. Meanwhile, concerns over Chinese mining in Africa have been a prominent feature of U.S.-China trade negotiations⁵¹.

45. PwC. 2018, p.11, Australia Government Department of Foreign Affairs and Trade. 2019.

46. AfDB, 2012

47. AfDB, 2012

48. Basov Vladimir. 2015

49. Vedie, Henri-Louis. 2017

50. Institute of Developing Economies Japan Trade Organization. 2009

51. Basov Vladimir. 2015; Vedie, Henri-Louis 2017

- **Key countries and companies**

Some African countries including South Africa, Niger, Guinea, Ghana, Tanzania, Zambia, DRC, Namibia, and Mozambique are endowed with more mineral resources than others. For example, Botswana is the world-leading supplier of diamonds and accounted for 35% of Africa's total diamond's supply in 2017⁵². Debswana which is a 50-50 joint-venture between the Government of Botswana and the De Beers Group of Companies is the leading diamond producer and employer in the country⁵³. The Democratic Republic of Congo also supplies a significant amount of diamonds, but it is widely known for having large reserves of copper and cobalt⁵⁴. The Democratic Republic of Congo is increasingly becoming important in the extractive sector because of its production of two-thirds of the world's supply of cobalt, which is required in renewable energy production⁵⁵. One of the key players in the country is Gécamines, which is the largest state-owned cobalt and copper-producing company in the DRC⁵⁶. Gécamines entered into joint-venture agreements with Chinese companies under the Sicomines agreement, which allows the DRC to obtain infrastructure projects support in exchange for giving Chinese companies some mining rights⁵⁷. First Quantum, a large Canada-based copper producer in Zambia, which accounted for 44% of Zambia's total revenue from minerals, is also partially owned by Chinese companies. Gold production in Africa is dominated by Ghana and South Africa⁵⁸. Ghana recently overtook South Africa and became Africa's leading gold producer⁵⁹. Ghana is home to key companies including Gold Fields, Asanko Gold, and AngloGold Ashanti⁶⁰. The largest gold producer in Ghana is U.S.-based Newmont Mining Corporation, which operates Aykem mine and Ahofa mine⁶¹. The second largest gold producer in Ghana is Gold Fields, a subsidiary of South Africa's Gold Fields company, which operates Tarkwa mine, the largest gold mine in Ghana⁶². South Africa led global gold production for a century, but its gold output is shrinking as a result of increased mining difficulty as its gold deposits now tend to be much deeper⁶³. South Africa is now the second largest gold producer in Africa and its largest gold-producing company, Sibanye Gold Ltd, has diversified into platinum production to counter the rising costs of gold extraction in South Africa⁶⁴. For similar reasons, the Anglo Gold company in South Africa began shifting its focus to other countries with lower-cost mines, including Ghana, Mali, and Guinea⁶⁵. In 2018, West Africa received the largest portion of mining investment (oil, gas and gold), followed by Southern Africa (gold, platinum, nickel, and cobalt)⁶⁶. East Africa and Central Africa received the least amount of mining investment because of political instability, especially in Central Africa which limits exploration activities⁶⁷.

52. Rising Africa. 2017.

53. PRnewswire 202, Debswana. 2020.

54. USGS, 2020, p.51, Rising Africa. 2017

55. International Energy Agency. 2019, p. 28

56. EITI, 2018, p. 37

57. Ibid

58. Brightmore Daniel. 2020.

59. Ibid

60. Rashotte Nicole. 2019.

61. Oxford Business group. 2019.

62. Ibid

63. Brightmore Daniel. 2020.

64. Ibid

65. Ibid

66. PwC. 2018, p. 11

67. Ibid

VI. Opportunities

Despite the presence of significant challenges and risks within the Africa mining sector, several opportunities for investors are still available for exploration. Table 1 summarizes some of the key opportunities and risks within the extractive sector in Africa.

Table 1: Opportunities and Risks within the African Mining Sector

OPPORTUNITIES	RISKS
New technology (Digitization and automation)	The COVID-19 Pandemic
Growing demand for minerals and metals used in renewable energy production	Fluctuating commodity prices
Availability of underexplored mineral resources	Global trade tensions
Increasing urbanization	Rising extraction costs
Need for mineral processing plants	Inadequate infrastructure
AfCFTA (African Continental Free Trade Agreement)	Local content policies
Localization	Negative externalities

Source: Author using data from KPMG 2020, Mining Indaba 2019, and Mckinsey 2019.

• Availability of Underexplored Mineral Resources

Africa is home to many mineral resources, a significant portion of which unexplored or underexplored. West Africa as a region is endowed with underexplored mineral resources, especially in countries including Burkina Faso and Côte d'Ivoire, which are the least-explored countries that are part of Birimian Greenstone Gold Belt, which stretches across Ghana, Côte d'Ivoire, Guinea, Mali, and Burkina Faso⁶⁸. Burkina Faso is an attractive investment destination as it has recently begun shifting its focus from agriculture by incentivizing investment in its underexplored mining sector⁶⁹. Roxgold, one of the first companies to invest in exploration in Burkina Faso, has grown dramatically in just five years since the drilling of its first mine⁷⁰. A variety of other companies in Burkina Faso have also recently benefited from new lucrative gold deposit discoveries. These companies include IAMGOLD, Teranga Gold, B2Gold, NordGold, and SEMAFO⁷¹. Burkina Faso is currently an attractive destination for low CAPEX companies because of its easy geology, which allows for shallow, open-pit mining which

68. Global Business Reports & Mining Indaba. 2019, p. 3, 92

69. Ibid, p.121

70. Stancu Lorena. 2020.

71. Global Business Reports & Mining Indaba. 2019, p. 122-125

reduces costs⁷². Like Burkina Faso, Côte d’Ivoire and Senegal are currently on the radar for investors because of their underexplored geological potential and stabilizing political situations⁷³. Guinea also has gained attention, as the country boasts the largest amount of untapped iron ore reserves globally, with the Mount Simandou region in particular having an estimated 1.8 billion tons of high quality iron ore⁷⁴. While under-explored regions offer significant investment opportunities, investors should be prepared to overcome infrastructural challenges: the reason why some of these countries are largely unexplored tends to be poor infrastructure. In fact, the development of Simandou mountain range has been delayed both by difficulties accessing the region and legal challenges⁷⁵.

Zambia. For more than twenty years, Zambia has received significant investment from foreign mining companies because of its favorable geology, its political and macroeconomic stability, its competitive tax environment, and the progressive privatization of state-owned mines⁷⁶. In addition to a recent series of new laws that seek to rationalize regulations across mining subsectors, and to coordinate and centralize decision-making in the Presidency, a new mining fiscal regime came into effect in January 2015 to standardize taxes at 8% for underground operations, 20% for open-cast operations, and 30% for income earned on tolling or processing of minerals. These are relatively low and clear rates by regional standards⁷⁷.

Coal has been produced in Zambia since 1967, and although it is currently one of the smallest producers of coal in the Southern African region—output fell from 214,000 short tons in 2000 to 1,000 short tons in 2010. Zambia’s coal output grew rapidly prior to the commodities market decline in 2014, and there are still at least 20 million metric tons of proven coal reserves to be exploited⁷⁸.

Zambia is currently the sixth-largest copper producer in the world, with 4.4% of global output in 2011. In light of the high quality of its copper deposits and a number of substantial expansion projects already underway—especially those by First Quantum in Sentinel and Kansanshi—it is likely to break into the top five global producers in the near future⁷⁹. Other key deposits in Zambia include emeralds (20% of global supply in 2013), copper-cobalt ore (an estimated 2 billion tons in remaining reserves), iron ore (900Mt in estimated remaining reserves) gold, and uranium. There is also an abundance of industrial minerals—including feldspar, talc, sands and clay, limestone, dolomite, apatite, and barite—which have the potential to contribute to future growth in manufacturing and agriculture in the region, as well as in mining.

Since Zambia is a landlocked country, transit infrastructure and port access remain primary constraints to returns on investment. However, there has been impressive investment in Zambia’s infrastructure from both public and private sectors in recent years, and several significant new mining projects have been launched as a result. Four major new mines started operating in recent years—in uranium, gold, copper, and iron ore—contributing to substantial increases in government revenues

72. Ibid

73. Global Business Reports & Mining Indaba. 2019, p. 102, 109

74. Ministry of Mines and Geology, n.d.

75. “Timeline: The Battle for Simandou,” 2021

76. World Bank, 2016

77. Deloitte, 2015, p.7. See the Mines and Minerals Development Act No. 7 of 2008, Mines and Minerals Development (General) Regulations of 2008 and Mines and Minerals Development (Prospecting Mining and Milling of Uranium Ores and other Radioactive Mineral Ores) Regulations 2008.

78. KPMG, 2013, p.24-25

79. KPMG, 2013, p.4

and export earnings in 2015 and 2016⁸⁰. With \$8 billion in investment between 2008 and 2013 alone, figures that are continuing to accelerate, Zambia is expected to become one of Africa's most competitive destinations for future mining projects⁸¹.

Ghana. Under British colonial rule, Ghana was known as the Gold Coast—an illustration of its historical status as a cradle of valuable resources. In the decades following independence, investment in the extractive sector suffered from political instability, state-led protectionism, policy reversals, and macroeconomic crises caused by over-reliance on cocoa exports⁸². Several positive developments since the mid-1980s have improved the investment climate and, combined with rising gold prices, have resulted in impressive growth in the mining sector. As early as 1995, Ghana was rated among the world's top ten emerging markets for mining—the only African country to be included—in an international survey⁸³.

Today, Ghana is Africa's second largest gold producer after South Africa. Gold contributed 41% to total export revenues and more than 5% of overall GDP in 2015⁸⁴. Unsurprisingly, Ghana's gold subsector is relatively well saturated, with at least six large mining companies operating 10 major gold mines⁸⁵. Although gold accounts for 95% of all mineral revenues, there are also operative mines producing bauxite, manganese ore, and diamonds. In total, Ghana's mining sector contributed roughly \$1.6 billion to annual government revenues in 2016—a 23% increase from 2015 levels⁸⁶.

Since 2006, licensing and tax regulations facing the mining sector have been further liberalized and streamlined through Ghana's Minerals and Mining Act. It allows renewable 30-year mining leases across subsectors, while ensuring the state receives an automatic 10% stake and that new leases obtain approval from local, traditional authorities as well as from the national Minerals Commission⁸⁷. Although this represents an important step in addressing concerns about the lack of linkages between mining companies and local communities and the broader national economy, a debate rages on in Ghana about the best way to ensure that the population benefits from the country's resource wealth. Potential investors should consider whether the norms or policies that emerge in the future in response to this debate are likely to impact returns to investment. In 2008, for example, members of Ghana's Chamber of Mines spent more than \$12 million on voluntary social responsibility projects, and industry players also paid for a University of Mines and Technology to create opportunities for locally generated capacities. Moreover, significant challenges remain in Ghana in terms of the capacity of, and coordination between, the commissions that exist to oversee the industry. These commissions lack of adequate funding, which heightens uncertainty about the way tax laws are interpreted and implemented⁸⁸.

80. Chamber of Mines. 2019.

81. KPMG, 2013, p.4

82. World Bank 2007; Leith 1996; Ayee et al, 2011, p.13

83. Business in Africa 1997; Ayee et al, 2011, p.13

84. Ayee et al, 2011, p.12; Mensah et al., 2015

85. Goldfields Ghana Ltd (Tarkwa and Abooso mines); Anglo Gold Ashanti (Obuasi and Iduapriem mines); Central Africa Gold (formerly, AngloGold Ashanti Bibiani Mines) Golden Star Resources (Bogosu/Prestea and Akyempim mines); and recently Redback Mining Ltd (Chirano mine) and Newmont Ghana Gold Ltd (Ahafo and Akyemmines). See Amponsah-Tawiah Kwesi and Kwasi Dartey-Baah. 2011, p.2

86. Ghana Business News. 2017

87. See Deloitte, 2015, p.7

88. Ayee et al, 2011, p.5

South Africa. The South African government has taken major steps to prioritize the mining sector as an engine of economic growth for the country. The government has debated several measures in the past decade to determine the best configuration to enable companies to lower costs, raise revenues, and mitigate labor grievances. Though the country and the mining industry suffered a heavy blow from the 2012 Marikana massacre, investors have still determined that South African gold is a safe bet and have increased their market capitalization from 22% in 2014 to 48% in 2016⁸⁹. Platinum mining companies also improved their market capitalization, increasing from 155 billion Rand in 2015 to 178 billion Rand in 2016, although platinum prices declined between 2014 and 2018 as diesel vehicle production slowed⁹⁰. South Africa's coal industry has seen a significant increase in market share, and has proven to be a steady investment in recent years. Total revenue in the coal industry increased by 1.3 billion Rand from 2015 to 2016, and global prices rose through 2018⁹¹.

Iron ore extraction in South Africa showed real production growth over the last 10 years. Infrastructure development in transportation aided high production levels, which have been maintained despite mid-2010s drops in commodity prices. Iron ore has also sharply decreased in price⁹². In 2019, however, iron ore prices increased to the highest levels since early 2017, due in part to a dam collapse in Brazil that spurred the shutting down of 10 other dams connected to iron ore production⁹³. In 2020, the trajectory of production and prices was unclear, though Africa's considerable reserves offer long-term potential for production levels⁹⁴.

Kenya. The Kenyan economy is booming with mining currently considered by industry analysts to be one of the key opportunities for investment. In 2018, the mining sector contributed less than 1% to Kenya's total GDP, but the Kenyan government is working towards growing the mining sector's GDP to as much as 10% by 2030. This suggests the sector will likely experience a favorable investment and regulatory climate⁹⁵. Kenya already has a well-developed mining subsector focused on industrial materials—including limestone, marbles, soda ash, fluorspar, and dolomites—that help to support growth in manufacturing and construction. Growth in domestic cement production, which requires supplies of gypsum and limestone, is expected to increase rapidly in the near future in order to support the government's 'Vision 2030,' which has dedicated substantial investment to infrastructure and construction projects⁹⁶. In addition to the wealth of non-metallic commodities already being exploited, recent discoveries of rare earth deposits along the coastal region, which are relatively cheap and easy to distribute to seaports, are valued at approximately \$62.4 billion, placing Kenya among the top five countries in the world for such reserves.

Mozambique. Mozambique's mining sector has experienced a recent increase in nationalization. A new Mining Law, introduced in August 2014, states that mineral resources found within the country's boundaries are considered to be state property. This policy has demonstrable impacts on the distribution of wealth within the country and on the participation of the local population in the mining industry. Additionally, there must be between 5% and 20% local shareholders in each major mining project or concession that lasts up to 25 years⁹⁷. These laws and stipulations reflect the government's

89. PwC, 2016, p. 5

90. PwC, 2016, p. 5; Arcadia. 2019, p. 221

91. PwC, 2016, p. 8; Arcadia. 2019, p. 235

92. PwC, 2016, p. 12

93. Arcadia. 2019

94. *Ibid.*, p. 209

95. Ukaid et al. 2018, p. iii

96. Yager, Thomas. 2013, p.24.1-24.2

97. Deloitte, 2015, p. 7

awareness of the country's vital natural resources. Mozambique hosts some of the world's largest untapped coal deposits—both high quality coking coal and thermal coal—and deposits of graphite, iron ore, titanium apatite, marble, bentonite, bauxite, kaolin, copper, gold, and tantalum⁹⁸. Other major investment projects in Mozambique include the mining and processing ventures of its heavy sand deposits. The Moma Heavy Sands and Corridor Sands projects operated by Kenmare Resources and BHP Group, respectively, require investments of more than \$1 billion⁹⁹. These projects highlight the vast investment and revenue potential of Mozambique's natural resources.

VII. Challenges and risks

The challenges of investment and growth in Africa's mining sector depend, to a large degree, on the type of mining activity pursued. For example, deposits that tend to be located in landlocked areas, such as ferrochrome and cobalt, are liable to face higher distribution costs, while sub-industries that have longer histories on the continent, especially coal, tend to face more barriers to accessing commercial credit and higher interest rates due to legacy debts¹⁰⁰. As in any economic sector, investment risk and operating costs also vary depending on the target country, especially as several African countries attempt to overhaul their regulatory and tax structures that apply to mining companies¹⁰¹. In general, however, some common challenges can be identified across the sector.

The COVID-19 Pandemic. The COVID-19 pandemic and its associated business disruptions has both immediate and long-term implications for the mining industry. Because countries implemented quarantine measures and restrictions on movement of people to curb the spread of the coronavirus, many businesses shut down and the mining industry experienced immediate demand-side shocks¹⁰². Demand contracted because construction projects and industrial production, especially of non-essential goods, almost came to a halt¹⁰³. Commodity prices tanked as a result of contraction of demand globally and aluminum and copper initially took the hardest hit within the mining sector¹⁰⁴. Some companies had to shut-down non-essential mining operations in response to new regulations to control the pandemic. The most impacted region in Africa is Southern Africa¹⁰⁵, primarily South Africa, which has the highest number of COVID-19 infections in the region. In response to COVID-19, South Africa initially ordered all underground mining activities to be halted temporarily in order to protect workers¹⁰⁶. In April 2020, The South African government mandated mining companies to operate at a “reduced capacity of not more than 50%” and to provide rigorous testing and quarantine facilities for employees at mining sites¹⁰⁷. Other African countries were also subjected to labor restrictions, but the severity of this disruption's impact on operations largely depended on different factors including the level of automation. Some industry players, especially large-scale and labor-intensive mine sites, were more affected than others¹⁰⁸. For example, while the Rio Tinto mine in Mongolia was forced temporarily

98. Export Gov, 2019

99. Export Gov, 2019

100. State of the Mining Survey Report 2015, p. 24

101. Mining Review Africa, 2015

102. McKinsey. 2020b

103. Laing Timothy. 2020, p. 580, Mackinsey. 2020b.

104. Laing Timothy. 2020, p.580

105. EITI. 2020. “Southern Africa Economic Outlook, p. 6, 37

106. Ibid, p. 181

107. South African Government. 2020.

108. Intergovernmental Forum on Mining, Mineral, Metals and Sustainable development. 2020, p. 6

to shut down non-essential operations, leading to a slowdown in production¹⁰⁹, Syama mine in Mali, which is a fully automated mine, equipped with self-driving vehicles and drills, continued to operate at near maximum capacity through its already established remote operation center¹¹⁰. These outcomes could potentially accelerate the adoption of automation technology in mining in the near future.

The COVID-19 pandemic is continuing to impact the global demand for commodities and mining companies are expected to continue facing challenges for as long as the COVID-19 restrictions and disruptions stay in place. One of the biggest risks of COVID-19 is economic slowdown in China, a key driver of global commodity demand growth and the main trading partner of many African countries¹¹¹. Commodity-dependent African countries will be more vulnerable to external shocks presented by COVID-19¹¹². Disruption in the global supply chain could drive up costs of operation as mining companies are forced into longer delays or to source raw materials locally. Localization can result in higher costs in the short-term but also has the potential to benefit companies in the long run in the form of less vulnerability to global supply-chain disruptions, lower transportation costs and shorter delivery times. Due to the evolving nature of the COVID-19 pandemic, it is difficult to predict the future impact of the pandemic on the mining industry; therefore, mining companies face high levels of uncertainty and this might hold back investments in new projects and operations. The pandemic is also increasing the possibility for an economic recession and this can exert even more downward pressure on commodity prices and hurt the mining industry.

Resource curse/Dutch Disease. In developing countries, where institutions tend to be weaker and economies less diversified, resource wealth can often have adverse effects on the potential for future growth and good governance. Investment in human and physical capital is often hampered by the fact that revenues generated from resource extraction are finite, and that they create opportunities for public officials to engage in rent-seeking behavior. In these conditions, the public and private sectors are prone to corruption and less likely to invest in the development of broader infrastructure, strong institutions, or public goods that would contribute to a productive workforce and encourage entrepreneurial behavior. These public goods include education, healthcare, and legal mechanisms for enforcing contracts and protecting property rights¹¹³. Meanwhile, competition over resource wealth, particularly in the absence of gainful employment opportunities—since the mining sector tends to employ a disproportionately low share of the local workforce—enhances the likelihood of violent conflict between identity groups who feel a sense of ownership of the land, as well as the political elites who become entrenched in lucrative networks of corruption¹¹⁴.

In macroeconomic terms, countries also become more susceptible to boom-and-bust cycles, especially as they rely increasingly on resource exports¹¹⁵. The high value of resources during boom periods tends to strengthen the local currency, which discourages investment in other productive sectors of the economy and thereby enhances dependence on resources for generating export revenues. A subsequent decline in the world market price of commodities causes rapid and unpredictable losses in state revenues and trade deficits, resulting in central government debt and inflationary pressures on

109. Laing Timothy. 2020, p. 581, Hall Matthew. 2020

110. Intergovernmental Forum on Mining, Mineral, Metals and Sustainable development. 2020, p. 6, Hall Matthew. 2020

111. EITI. 2020. "Southern Africa Economic Outlook, p. 33, 36

112. EITI. 2020. "Central Africa Economic Outlook, p.6

113. Auty, Richard M. 2001; Gelb, A. 1988; Thorvaldur and Gylfi. 1999, p. 6; Nyamwaya, Christabel. 2013

114. Thorvaldur and Gylfi. 1999, p. 6; Nyamwaya, Christabel. 2013; OECD. 2008, p.18

115. OECD, 2008, p.18

the currency, thereby further hampering investment—a vicious cycle known as the Dutch Disease¹¹⁶. Many African countries are already highly dependent on resources, with two of the continent's 54 countries generating more than 75% of their annual export earnings from mineral products¹¹⁷. Under these conditions, the potential for economic diversification and development is especially low, since foreign and domestic companies are unlikely to invest in non-extractive sectors, such as manufacturing or agriculture. Much of the minerals produced in Africa is actually exported without processing, illustrating the absence of effective linkages between mining and other productive economic sectors. As a result, resource-dependent economies have already been negatively impacted by the decline in global commodity prices since 2014, especially those with substantial exports of coal, metals, and diamonds¹¹⁸.

Negative externalities. Beyond the well-established negative correlation between resource wealth and economic indicators, mining exploration and extraction have been shown to impact local environments and populations in several ways¹¹⁹. Despite increasing attempts to combat pollution and climate change through regulation at national and international levels, the sector continues to contribute to environmental degradation—a problem that is especially pronounced at the local level. Mining contributes to deforestation and land degradation, generates substantial volumes of industrial waste, creates large-scale surface disturbances, and releases potentially harmful noxious gases into the air, even when complying with current best practices¹²⁰. For example, the heavy machinery used to extract minerals such as gold generates large amounts of dust, which often destroys surrounding vegetation and is associated with respiratory problems, especially among children and the elderly¹²¹.

Thus, social dislocation is not only a product of people being forcibly relocated to make room for mining concessions. Negative spillovers in terms of water, soil, and air pollution also reduce the agricultural productivity of remaining farms, while the sector generally fails to provide alternative employment opportunities or health services for people whose livelihoods have been affected¹²². The inability of the public sector to address these social issues has often resulted in conflict—for example, several strikes in South Africa's platinum and gold mines have resulted in deaths¹²³. There is variation across countries, however. In some countries, the local population's health indicators actually appear to improve around mining sites, possibly because of higher incomes and more available infrastructure, such as electricity and clean water. In Mali, areas surrounding mining sites have lower infant mortality rates, less stunted growth, and lower incidences of respiratory disorders.

Infrastructure. The relative logistics-related cost of mining in Africa is estimated to be 250% of the world average because of infrastructure gaps, especially in terms of transit and energy networks¹²⁴. Only 10% of land on the African continent falls within 100km of the coastline—compared to 27% in Latin America, for example—and there are few navigable rivers connecting the high plateau inland to seaports. This often means that much of Africa's resource reserves are stranded inland, in part because individual mining projects are unable to absorb the full cost of the infrastructure development that would be necessary to access and export the minerals.

116. Africa Union. 2009, p. 27; Thorvaldur and Gylfi; Corden, W. Max. 1984; Tryggvi Thor, Herbertsson and Gylfi Zoega 1999

117. OECD, 2008, p.18

118. State of the Mining Survey Report 2015, p. 24

119. Veiga, & Beinhoff, 1997; Warhurst, 1994, 1999; Akabzaa, 2000

120. Amponsah-Tawiah Kwesi and Kwasi Dartey-Baah. 2011, p.6; Chiaro, P.S., & Joklik, G.F. 1998, p. 13-206

121. Aragón Fernando M. and Juan Pablo Rud. 2013.

122. Punam et al., 2017, p.20; Amponsah-Tawiah Kwesi and Kwasi Dartey-Baah. 2011p.5; Aragón and Rud 2015

123. African Development Bank, 2012

124. Africa Union. 2009, p.28-29

Energy supply tends to be expensive and unreliable in Africa, which is a challenge for mining ventures in gold, aluminum, platinum, and copper. Depending on the extractive sector, electricity accounts for between 15% and 40% of operating costs for mining companies working in the region, with supply fluctuations having substantial impacts on profitability¹²⁵. As a result, self-supply has increased substantially, from 6% of mining projects in 2000 to an estimated 18% in 2020. At the same time, demand for power in the mining sector is expected reach 23,443 megawatts per year by 2020—roughly 150% the volume of demand in 2012—and account for up to 35% of total grid supply in the region¹²⁶.

Access to finance. In the current commodities market, it is likely to be difficult for any mining company to secure adequate or favorable financing, and not only those working in Africa. There has been a dramatic decline in the world market prices of hydrocarbons, copper, and other minerals since 2014, and Chinese demand for minerals has decreased markedly in recent years, because of the deceleration of domestic economic growth in China. In the future, the global shift toward renewable energy is likely to undermine the prospects for thermal coal ventures in particular. As a result of these conditions, however, many mineral producers have attempted to ratchet-up existing operations in order to reduce costs per unit or to capture market share, which is likely to give heavily invested corporations an advantage over future competition should commodities markets rebound. In the meantime, further mineral exploration and market entry are likely to be impeded unless companies are willing to accept unfavorable credit terms¹²⁷.

Local content policies. Local content policies refer to the requirements put in place by communities directly adjacent to extraction projects, usually requiring specific benefits to be guaranteed to local populations and the national economy at large. Approximately nine out of ten resource-rich nations implement some sort of local content policies in employment, domestic involvement in material processing, or other forms of economic investment¹²⁸. For instance, South Africa’s 2018 Mining Charter has local procurement requirements that mandate 70 percent of total mining goods procurement spending be on domestic manufactured goods.¹²⁹ Though designed to ensure protection for those most directly affected by mining sites and to enhance education, infrastructure, and incomes, among other benefits, local content policies have often been poorly executed and even detrimental to those involved¹³⁰. In fact, of the average national contributions of mining in low- and middle-income countries in 2016, only 1 to 2 percent went to job creation.¹³¹ In some cases, these requirements have demanded unrealistic levels of local employment that assume training and skillsets that could be better found in other regions of the nation, resulted in supply-and-demand bottlenecks, and leading to more expensive projects that benefit the local community less¹³². This type of agreement can and has effected positive change in numerous contexts but must be carefully designed to avoid unintended consequences¹³³. For instance, in Nigeria, a recent studying evaluating the impact of local content policies found that while Nigeria’s policies had a positive, significant impact on local value creation, the value created was lower than the expected target.¹³⁴ To enact effective local content policies, it is

125. Deloitte, 2015, p.7

126. Banerjee et al., 2015, p.4-6

127. Mining Review Africa, 2015

128. Intergovernmental forum on mining, 2019.

129. IGF. 2019

130. Arcadia. 2019.

131. AMDC. 2017

132. Ibid, p. 221

133. Niran Adedeji et al. 2016.

134. Ibid

essential for governments and firms to consider available capacity, practicality, evaluation tools, and inclusivity.

VII. Investment Strategies

The development benefits of mining can be measured in numerous African countries, and more countries who capitalize on their resource potential will enjoy these benefits. The distribution of wealth, the reduction in poverty, and the accumulation of capital that can occur from a booming natural resource sector must be facilitated by sustained investment. Partnerships are key to unlocking the potential of the mining industry across Africa. Where countries have succeeded with heavily state-regulated industries, others can tout the benefits of private participation and even management. In gold-producing countries, evidence suggests that gold mining companies can be reliable, growth-inducing development partners¹³⁵. Public-private partnerships imply greater coordination of regulations, strategies, and information sharing for the overall benefit of the sector. Government bodies must adapt their technical processes and regulations surrounding private ownership and management of extractive mining industries, to free-up capital and debt issuance for these privately-owned industries. Private firms should take the lead in conducting research on the socioeconomic impacts of mining in individual countries. Social development is a critical area in need of significant investment from private corporations that have the floating capital to provide education, health, and social services for the benefit of host communities—from which many workers are likely to be employed. The mining industry can lead directly to socioeconomic benefits for African countries, whose governments would greatly benefit from domestic-based development assistance.

Countries with confirmed natural resource endowments, including Botswana, the Democratic Republic of Congo, South Africa, Namibia, and Tanzania, are reliable locations for investment because of the availability of infrastructure and technical support for mining operations, in addition to current extraction projects. Other countries, including Ghana, Zambia, Mozambique, and Kenya, will require substantially higher sums of investment, but offer the potential for higher returns for first movers. Buying stock in resource companies is important to the continuation of ongoing projects and mineral extraction, while direct investment in exploration or mining projects is important to influence the direction of mineral extraction in a country.

Many researchers advocate for investment to go into long-term infrastructure projects that can underpin the extractive industries and support an array of sectors that will bring capital to local economies and elevate the business environment¹³⁶. The AU contends, “such stabilization or future funds would also go some way in providing ‘intergenerational equity’ over non-renewable resource extraction, as future generations would be the beneficiaries of the investments into improving the national infrastructure platform”¹³⁷. This long-term strategy requires the maintenance of strong partnerships between African stakeholders and foreign investors or firms.

135. World Gold Council, Maxwell Stamp, 2015, p. 1

136. Africa Union. 2009, p. 27-28

137. Ibid

While the mining sector does not always provide for equitable growth or wealth distribution, it presents an opportunity for foreign and multinational investors to engage in development and economic growth plans with the potential for higher profits than in other less resource-rich regions of the world. These revenues can be injected back into host communities, assuming effective, accountable governance, and thus improve the value chain of firms entering a country's mining sector. The International Council on Mining and Metals (ICMM) is in favor of revenue transparency among governments to ensure that companies are accountable to their shareholders. African governments' adherence to ICMM recommendations should be a signal to investors of the levels of accountability within countries. Mining companies currently operating across Africa are also responsible for adhering to ICMM commitments to transparency, for the sake of elevating Africa's mining sector to a level of global competition. Investments in the sector should target long-term infrastructure projects that will catapult mineral extraction industries to the forefront of economic development and growth.

VIII. Looking to the Future

Collaboration among mining companies, governments, civil society, and other stakeholders is the key to unlocking the potential of Africa's mining and natural resource sector. Each of these stakeholders must avoid disputes and ensure equitable sharing of opportunity, wealth, and decision-making. The mining sector has suffered from fluctuations of conflict, commodity price booms and busts, corruption, and lack of accessible capital, but there is significant potential to overcome these challenges and ensure the mining sector is a revenue-generating stalwart for future decades. The COVID-19 pandemic is exacerbating the challenges faced by the mining sector, but some opportunities still remain for companies to explore during and after the pandemic. Africa is set to emerge as a key supplier of the minerals and metals required in the production of clean energy globally¹³⁸. Energy transitions are creating new opportunities for a set of mineral resources including cobalt, lithium and platinum¹³⁹. The rising demand for these minerals shows that investing in their exploration and extraction has the potential to bring in sustainable revenue and profits. It is difficult to make accurate predictions of actual economic growth or contraction figures as a result of the COVID-19 pandemic because of the still-evolving nature of the pandemic and governments' responses to it.

New Technology: The challenge of rising costs faced by mining companies can be mitigated by the adoption of artificial intelligence, automation, and big data. Such technologies can help companies reduce operational costs, boost productivity, and increase their profit margins¹⁴⁰. For example, drones can be used to significantly shorten surveying time, while improving accuracy. Smart protective devices are also a good option for companies to increase worker safety. In 2018, Syama mine in Mali launched its autonomous mining operation, which consists of self-driving trucks, drillers, and loaders¹⁴¹. OptiMine, the technology used to power autonomous mining at Syama mine is capable of providing descriptive and predictive insights that can be used to optimize production processes¹⁴². Other mining companies are exploring the effectiveness of this digital solution for potential implementation. The Chamber of Mines in South Africa has set up a Digital Mine Laboratory at the University of Witwatersrand

138. International Energy Agency. 2019, p. 3

139. International Energy Agency. 2019, p. 28, 157

140. McKinsey 2019, p. 8

141. Hall Matthew. 2020

142. Ibid

to explore innovative digital solutions to improve productivity and safety in mining operations¹⁴³. Another opportunity mining companies can utilize is applying advanced analytics to optimize mine planning, increase yields, and reduce equipment downtime. A 30-year old gold processing plant in South Africa applied advanced analytics across key processes and managed to improve its processing efficiency by up to 2%¹⁴⁴. Continued adoption of new technologies and strategies can help extractive companies to remain competitive.

Another important technological advancement that mining companies can utilize is the adoption of renewable, energy-efficient systems. Globally, at least 41 mining sites have installed renewable capacity, including Essakane gold mine in Burkina Faso which installed 130,000 photovoltaic solar panels to reduce its reliance on fossil fuels and to lower its carbon footprint¹⁴⁵. Similar plans to adopt efficient renewable energy systems are underway in many other mines but are at different stages of execution¹⁴⁶. While the adoption of new innovative technologies can mean high initial costs for companies, it provides an opportunity to cut costs in the long-term with long-lasting benefits in terms of productivity and safety, which are essential to the resilience of the extractive sector in Africa.

The Sustainable Development Goals (SDGs) place additional responsibility on mining companies to ensure that they are development partners, contributing to a positive presence in local economies and creating socio-economic benefits for the countries from which they source¹⁴⁷. A study on the impact of mining in various African countries concluded that while Tanzania reduced extreme poverty from 84% to 67% between 2000 and 2007, Ghana and Mali experienced little to no reduction in poverty during the same period¹⁴⁸. These figures indicate that political and regulatory changes must occur for African countries to transition, and for multinational corporations to move from transactional relationships to mutually-beneficial partnerships.

Many have characterized the transformation of minerals on the African continent as a viable way to spur economic growth and industrialization¹⁴⁹. In particular, African governments have increasingly expressed interest in the value-added transformation of minerals, as shown by the Ghanaian government's interest in establishing an aluminum industry to capitalize on its bauxite deposits¹⁵⁰. However, an immediate shift to transforming minerals on the African continent will not automatically drive development, as Africa currently lacks much of the infrastructure needed for these processes. The mining sector as a whole is a huge consumer of electricity, accounting for approximately 53.6% of consumption in the Central African copper belt¹⁵¹. Additional minerals processing activities will only add to the electricity burden from this sector, while many Africans still suffer from insufficient access to electricity. In 2018, nearly half of all Africans lacked access to electricity, and frequent electricity disruptions caused economic losses for approximately 80% of sub-Saharan African companies¹⁵². In order to make African countries competitive compared to other countries for value-added minerals transformation, significant investments need to be made in infrastructure, particularly in electricity access. Even after these investments, however, the value added in minerals transformation is often

143. University of Witwatersrand, 2020.

144. McKinsey, 2019, p. 6

145. UNCTAD, 2019, p. 48

146. Ibid

147. World Gold Council, Maxwell Stamp, 2015, p. 1

148. World Gold Council, Maxwell Stamp, 2015, p. 14

149. Gudyanga, 2020

150. UONGOZI Institute, 2017

151. Imasiku and Thomas, 2020

152. IEA, 2019

unstable. Transformation typically results in another product that can also suffer from commodity price shocks, as seen in the case of bauxite and aluminum. As a result, promoting mineral transformation should not be the sole or most important strategy employed to underpin long socioeconomic development on the continent.

The mining and natural resource sector is an important player in the overall economic development of African countries. Institutional strength is exceptionally important to the mining sector; this report has outlined both the risks and benefits of growing the natural resource sector amidst both strong and weak institutions. Credibility and accountability are essential to encourage further investment and exploration of Africa's vast mineral and natural resource wealth, which has the potential to boost the continent's economies for decades.

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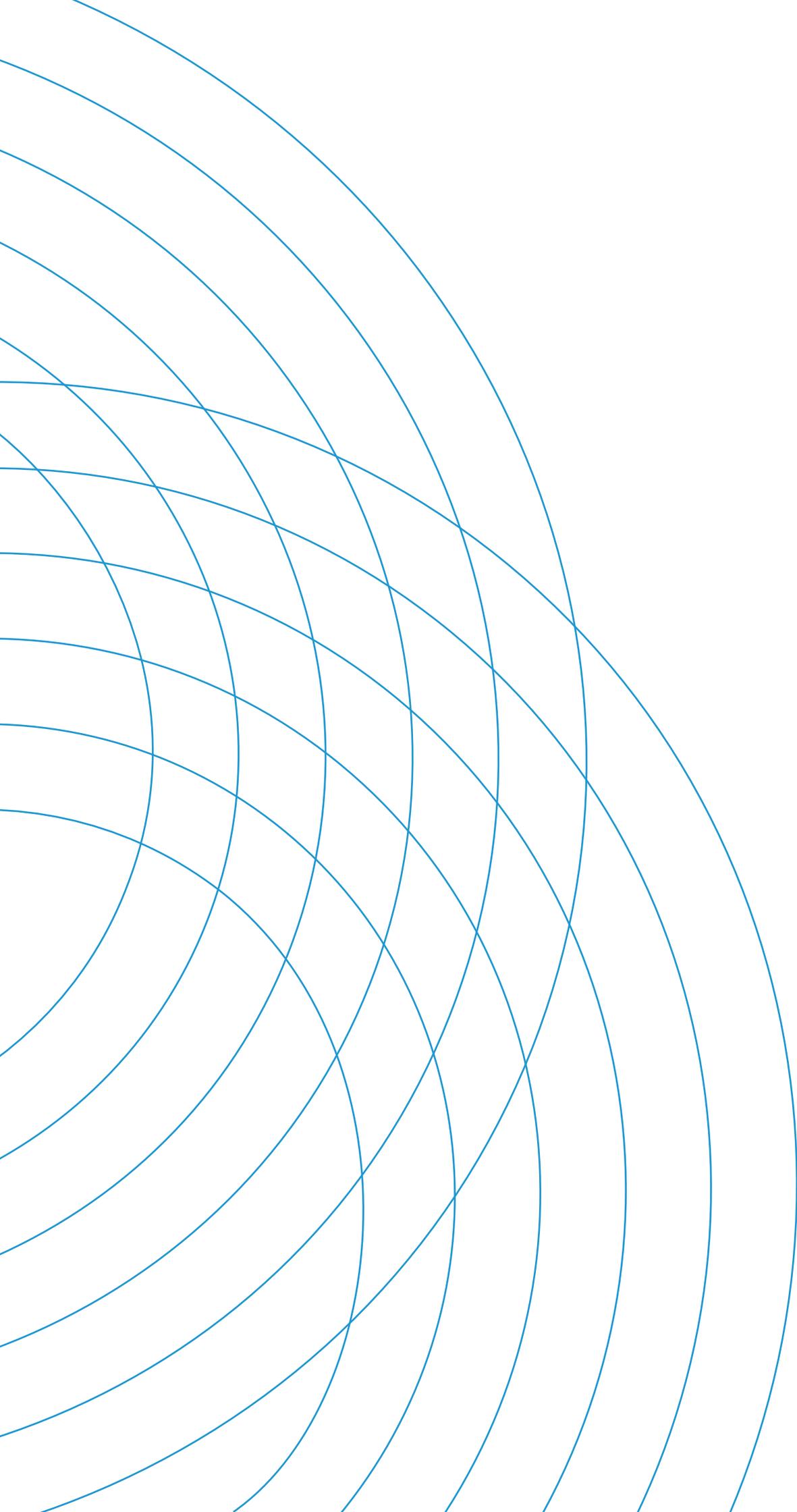
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