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Resource-Based Industrialization: Comparative Studies of Chinese and Non-Chinese Mining Companies in Zambia

Lingfei Weng[1]

Abstract: Africa holds about 30 percent of the world's critical mineral reserves. These minerals are essential in clean energy technologies, including wind turbines, electricity networks, and electric vehicles. Chinese Foreign Direct Investment in Africa has grown since 2003, reaching USD 3.96 billion in 2023. China has secured supply chains for copper, cobalt, magnesium, graphite, and other critical minerals. There is growing awareness that Africa can leverage demand for critical minerals to build an industrial base and transform its economies. However, there is little empirical evidence to analyze the effects of transforming these mineral resources on industrialization. To address this gap, we use Zambia as a case study. We compare China's copper-extraction investment model with those of non-Chinese investors and assess the impacts on Zambia's industrialization. We argue that, unlike traditional mining investors from developed countries, emerging economies such as China and India are reshaping the extraction landscape by investing across both upstream and downstream industries related to copper mines. The Multi-Function Economic Zones serve as industrial instruments to foster manufacturing in the mining sector. For African policymakers, government intervention is crucial for expanding industrial capacity and adding value to raw materials. A long-term vision and an integrated regional plan are necessary to leverage Africa's mineral resources for sustainable prosperity.

Keywords: Resource-based industrialization, critical minerals extraction, China, Africa, Zambia

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1. Introduction

There have been debates for centuries on whether extractive industries have brought resource curses or blessings to African countries. The extractive industries have been viewed as pragmatic, recognizing that both the successes and failures of resources for development exist. A substantial amount of literature focuses on the issue of this sector being an enclave that hinders economic diversification. The commodity sector is often perceived as an enclave, extracting resources from the country for export, with limited linkages to the rest of the domestic economy, and most of the profits being shipped abroad (Weisskoff and Wolff, 1977). This raises questions about whether backward and forward linkages between natural resources and other sectors of the economy can spur economic diversification for industrialization (Savona and Bontadini, 2023). A proper account of these questions requires expanding the perspective of the traditional 'resource curse' debate and engaging with structural transformation, as well as the importance of domestic specialization in changing the export portfolios of countries (Lederman & Maloney, 2006).

Africa is estimated to hold about 30 percent of the world's proven critical mineral reserves (Hine & Mayes, 2023).Some minerals, such as lithium, copper, and cobalt, have emerged as critical to the clean energy transition. Global demand for critical minerals, largely driven by the energy transition, presents practical opportunities to cultivate a growing industrial base for Africa. Critical mineral exploitation remains a crucial aspect of African development and global trade networks, offering opportunities to drive industrial development and structural transformation on the continent, necessitating the creation of horizontal and vertical linkages across sectors (Andreoni and Robert, 2022). However, those countries rich in critical minerals may have limited incentives to diversify their economic structures, especially when high demand and prices for natural resources reinforce their comparative advantage and specialization. If Africa is to truly benefit from the critical minerals boom, it will require an agenda placing its own development needs at the center, ensuring that the social and economic benefits of critical mineral extraction are equitably shared among local communities (Weng et al., 2015).

The literature on the relationship between natural resources and economic development dates back to at least the 14th century. Contrary to the 'resource curse' and 'one thing leads to another' argument, empirical evidence revealed that the linkage development in the resource sector will not occur as a natural outcome of market forces; the government played a key role in promoting successful 'unrelated' activities by guiding investments and effectively 'correcting' the market failure (Morris et al., 2012).The role of the state experienced a historical evolution that played in controlling its natural resources, particularly in resource-rich countries with significant mineral deposits. The mining industry has been a focus of government regulation and control for centuries, whether state-owned or privately owned (World Bank, 2011). The state control over metal and mineral supply to the economy has been considered vital for political and economic reasons in most societies. The government aims to control resources to generate financial revenues and create jobs by controlling the ownership of mines, while also adding value to raw materials through processing, thereby increasing productivity from low to high levels. However, some studies found that most state-owned mining companies in developing countries have not been able to operate successfully. The failure of state control in the mining industry led to the privatization of the sector (World Bank, 2011).

The theory of conforming comparative advantage has already been debated by mainstream economists. The neoclassical economic theory (Heckscher–Ohlin–Samuelson) conceptualizes comparative advantage in terms of differences in factor endowments. From this perspective, countries with their own comparative advantage, such as those rich in natural resources, can diversify their economies by specializing in the export of processed minerals. Lin pointed out that the failure of neoliberalism in developing countries was undermining domestic industries' comparative advantage; thus, self-reliance in these countries is lacking in open, competitive markets (Lin, 2012). A catch-up state was to make use of the country's current comparative advantage in the factors of production that it had now; reliance on existing comparative advantage was insufficient and developing countries should seek strategic integration that enables them to integrate up to the point where it is in their interests to do so (Lin and Chang, 2009). This was the strategy followed by the East Asian Miracle countries.

However, David Ricardo theorized comparative advantage in different measurements. He adopted the indicator of labor hours required to produce the same thing in different countries (based on his labor theory of value), that is, in terms of international differences in technological capabilities. In the mining industry, resource-rich countries could produce sophisticated products through integrating raw metals and minerals into vertical upstream and downstream industries. Rather than conforming to comparative advantages, Ha-Joon Chang argued that only defying comparative advantages can enable developing countries to catch up with advanced countries. In other words, adding value to related industries is not enough; developing unrelated industries, as some developed countries have successfully done, will also be needed. In this theory, the government will need to play a role, implementing policies to ensure it happens (Chang, 2007).

In this study, we do not debate whether developing countries conform to or defy comparative advantages during their catch-up stage, as more empirical evidence is needed. Instead, we focus on resource-based industrialization in Africa and address the following questions. First, what are the prevailing trends and profiles of international mining firms investing in Africa, with particular attention to Chinese companies active in the critical minerals sector? Second, what aspects are overlooked in efforts to industrialize African economies by leveraging critical minerals? Third, what policy measures should governments pursue to facilitate industrialization in resource-rich African countries, especially those abundant in critical minerals? Through these questions, our research aims to contribute to scholarly debates concerning the role of state intervention in resource-based industrialization. Rather than endorsing a singular model of 'success' consistent with mainstream narratives, we seek to move away from prescribing a one-size-fits-all solution for African industrialization.

This paper begins with an overview of the literature on the history of resource-based industrialization. Section 3 examines the role of the government and firms in utilizing minerals for industrialization. Section 4 presents a general trend and profile of foreign mining investment in Africa, with a focus on critical minerals such as lithium, cobalt, and copper. In Section 5, by focusing on the Zambia case, we attempt to identify the Chinese mining investment model and understand how it differs from that of non-Chinese firms in copper mining, refining, and manufacturing. Section 6 summarizes the successes and failures of resource-based industrialization in Zambia by drawing lessons from SEZs. In section 7, this paper concludes with a summary of the main research findings, offering insights into how African countries could leverage their critical minerals to industrialize their economies.

2. Literature review

2.1 History of resource-based industrialization in Africa

The idea that Africa should industrialize is not new. The continent's post-independence leaders, like those in many developing countries in the 1960s and 1970s, looked to state-led, import-substituting industrialization as the key to rapid economic growth (Page, 2012). However, the industries they created were often uncompetitive, and efforts to spur industrial development in Africa largely vanished with the economic collapses, caused by structural adjustment programs in the 1980s and 1990s, a set of economic reform policies driven by neoliberalism (Page, 2012). Since the mid-1980s, Africa has undergone decades of deindustrialization. Manufacturing as a share of output and employment has fallen, and the diversity and sophistication of the region's manufacturing sectors have declined. Many of the state-owned manufacturing facilities in higher-sophistication activities closed following the trade liberalizations and privatizations of the adjustment period (Hausmann et al., 2007). Exports of low-sophistication goods increased but did not grow robustly; only high-sophistication activities linked to the minerals sector remained. Africa experienced structural adjustment without structural change.

Resource-based industrialization strategies have been subject to considerable debate following the deleterious economic experiences of various mineral- and oil-rich developing countries. In Africa, the economies of those countries rich in natural resources are often closely tied to resource extraction and relevant industries (Signé & Johnson, 2018). While non-resource-rich economies successfully diversified their economies, resource-rich countries experienced the opposite. Based on this experience, dependence on natural resources is regarded by many development economists as a 'resource curse' rather than a blessing for industrial development (Asiamah et al., 2022). Foreign-owned and -operated mineral extraction, in theory, benefits countries through fees and royalties. Resource-based industrialization, through the creation of these linkages, aims to maximize revenue from commodities by reallocating labor and capital to the industrial sector (Morris et al., 2012). However, many African countries currently operate in the upstream segment, extracting minerals and exporting raw materials without substantial value addition (IRENA, 2023). Large-scale international mining operations are creating an 'extraction enclaves' scenario in resource-rich developing countries. Many of these benefits are captured by elites rather than benefiting local communities (Ferguson, 2005).

For proponents, who argued that if the proceeds generated from the resource base, such as oil, gas and minerals, are reinvested into other sectors more productively, then it can diversify the economy and stimulate long-term economic growth. It thus appears that natural resources are not necessarily detrimental to economic development (Chang, 2007). The narrative of 'resource curse' is a model that is essentially an observation rather than a systemic explanation. For instance, Nigeria is one of the typical resource-rich countries in Africa. Since the end of the Nigerian Civil War in 1970, and as one of the largest economies and the richest oil resource centers across the African continent, the oil industry has played a pivotal role in Nigeria's economy (Signé & Johnson, 2018). To diversify their economy and deepen backward linkages to the oil sector, the government enacted the Petroleum Act of 1969, which contained a section protecting local Nigerian firms (World Bank, 2002). For example, 'the quantum of composite value added to the Nigerian economy through the utilization of Nigerian human and material resources and services in the exploration, development, exploitation, transportation, sale and processing of Nigerian crude oil and gas' (Morris el tal., 2009). Significant progress has been made in deepening backward linkages in the Nigerian oil and gas industry. The contribution of the oil sector, including relevant local supply industries, to Nigerian GDP has been significant over the years, exceeding 20 percent since the early 1980s and, in some years, accounting for more than one-third of GDP (Signé & Johnson, 2018).

Botswana is another African country that represents a rich natural resource-driven industrial economy. With four decades of sustained economic growth, Botswana's per capita income has placed it among middle-income countries (Morris, 2011). The driver of Botswana's rapid economic growth has been the production of diamonds, accounting for more than one-quarter (by value) of global diamond production. The sector contributed more than 40 percent of the GDP and over half of all government revenue. In the early 1980s, the long-recognized need to diversify away from the heavy dependence on diamonds had previously led the government to promote the development of a cutting and polishing industry (Morris et al., 2012). In 2005, De Beers, the global mining company, which dominated production in Botswana, was due for the renewal of its 25-year mining license. The Botswana government pushed De Beers to establish forward linkages in the diamond industry, thereby creating a viable and globally competitive cutting and polishing industry for economic diversification. In the same year, De Beers signed an agreement with the government to add value to diamonds by beneficiating them locally. By 2014, 20 cutting and polishing firms had been licensed and were operating in Botswana (Morris, 2011). The cutting and polishing industry has significant linkages with the local economy, accounting for an additional 33 percent of the value generated in mining, which creates around 3,000 jobs in the industry, as outlined in the De Beers contract (Mbayi, 2011).

Apart from exceptional cases, from comparative perspective with other developing countries in the rest of the world, Africa has failed to industrialize. After a brief period of industrial growth following independence, largely driven by state investment and import substitution, Africa’s industrial sector entered a quarter-century of decline. Due to Africa's natural resource wealth, much of the region’s industrial production remains centered on resource-based manufacturing in resource-rich countries (Page, 2012). In 2017, manufacturing’s share of sub-Saharan Africa’s total GDP was just under 10 percent. Nowadays, Africa faces a significantly different industrialization challenge from that faced by earlier developing countries that entered manufacturing. Africa lags far behind the rest of the world, even among developing countries. China has become one of the largest emerging economies in manufacturing. The ‘factory Asia’, mostly dominated by China and India, has become a major player in global manufacturing and services trade. Some raw materials, such as metals and minerals, have been exported from Africa, primarily to China, for further processing in refineries (Boafo et al., 2024). As African countries missed past chances for the industrial revolution, there is a strong interest in Africa to leverage the region’s mineral wealth to transform economic structures and economic growth through industrialization.

2.2 Lessons of resource-based industrialization from the developed world

While Africa’s experience with resource-based industrialization has been patchy and generally disappointing, many resource-rich countries elsewhere have demonstrated that the mining sector can be leveraged to support broader industrial upgrading. Academics, think tanks, and even African policymakers have looked to the industrialization experiences of the developed world, including the Nordic countries and North America, in the hope of deriving lessons to guide future industrial development paths for developing countries (Power, 2002; Walker and

Jourdan, 2003). While the United States, Finland, Sweden, Canada, and Australia have all managed to transition over the last century from the simple extraction and processing of primary raw materials to high-tech, knowledge-intensive industries, natural resources remain a significant sector in their economies. The economic environment is different today from that of the 19th century; however, emerging resource-based industrializing countries share similar possibilities and constraints for growth (Maloney, 2002). Thus, only if an in-depth study of the economic histories of successful resource-based countries can be conducted can the real story and lessons of the dynamics that engender growth based on natural resources be drawn upon. Identifying the critical lessons for sustained growth in the developed world is an essential step to elaborate a dynamic and appropriate approach to resource-based industrialization (Wright, 2001; Maloney, 2002; Power, 2002).

In Australia, while the production of agricultural products and wool initially provided the impetus for growth, exports of expertise and know-how linked to the minerals sector (environmentally friendly techniques, mine closure methods, and mineral detection technologies) now exceed those of wine production (McKay et al., 2002). In 2000, resource-based manufacturing industries accounted for approximately 42% of employment and 50% of manufacturing value added to the Australian economy (Stockall and Associates, 2000). Sweden successfully diversified from its iron ore deposits into the iron and steel industry, and then into various steel-based products, including ships, cars, and armaments (Chang, 2007). Canada is one of the world's most high-tech producers of mining-related goods and services. Canada provides regional bases for supporting exploration, mining and allied industries through specialized equipment and service suppliers (Government of Canada, 2025). For example, thousands of firms in Canada are available to provide technical, legal, financial, environmental and other expertise services to the exploration and mining industry. As global demand for critical minerals is rising, Canada is building vertically integrated supply chains, which range from zero-emission vehicles (including Li-ion batteries, permanent magnets and specialty alloys) to wind turbines and hydrogen fuel cells, to information and communication technologies (including semi-conductors).

The experiences of Scandinavia, Canada, Australia, and the US provide key learnings for resource-based industrialization, which can be adapted and tailored to Africa (David and Wright, 1997; Wright and Czelusta, 2007). The country experiences reviewed above highlight that investment in domestic technological capabilities underlined the success of resource-based industrialization (downstream, upstream, and horizontal). Firms' capabilities can be strengthened through spillovers from Foreign Direct Investment (FDI) in resource extraction, which link domestic and foreign investment in building the vertical supply chain (Page, 2012). Investment in education and training, particularly in engineering and vocational skills, as well as the establishment of strong government-private sector partnerships and the alignment of various policy tools, including industrial strategy, are recurring factors. Ultimately, these hinged on the countries' capabilities in making and implementing policy frameworks to enhance the ability of their economic actors to move raw materials to technologically advanced, high-value products; in other words, the government should find ways to mobilize resources, interact with stakeholders, and create national capabilities to exploit natural resources productively in the long run.

3. The role of the government and firms in Africa's resource-based industrialization

3.1 The role of the government in resource-based industrialization

The mining industry has been a focus of government regulation and control for centuries. Despite a growing recognition of the role of policy actions in harnessing natural resources for growth, the academic literature on resource-based development remains divided, or even opposite, regarding the state's role in promoting Africa's industrialization (Chang, 2007). Led by European countries, State ownership of the Western world's mining industries grew rapidly in the late 1940s and 1950s, when the political climate was generally favorable to state intervention, influenced by the experience of the Soviet Union and social-democratic countries. State control of the mining industry continued to rise until the early or mid-1980s. In industrialized countries, mineral nationalizations persisted mostly for political reasons. Until the end of the 1980s, the trend reversed as a result of the general political climate, emphasizing the 'free market' and private sector initiatives, led by the UK and the US (World Bank, 2011).

A wave of nationalizations also swept through developing countries in the late 1960s and early 1970s, the governments of recently independent former colonies and other emerging economies limited the participation of international mining companies to minority holdings and non-equity arrangements with state-owned companies (Raw Materials Group,1999). They placed high hopes in the socio-economic development potential of the mining industry, based on the strong metal markets that followed the Second World War. Over a period of resource nationalization, politicians in developing economies largely overlooked the mineral sector. Some metals and minerals have become increasingly vital to modern society; however, they do not have the overall strategic importance and direct impact on all aspects of the economy that energy like oil and gas does, resulting in a much lower level of political interest in controlling the minerals sector (World Bank, 2011). In developing countries, particularly those with abundant natural resources, poor governance frameworks, inadequate capital and assets, and significant political risks often result in governments lacking the capacity to effectively control the mining sector. As the prices of metals and minerals began to decline in the 1990s and continued during the early 2000s. This led to a decrease in profits and Politicians' interests in the mining industry. Many developing countries opened their economies to foreign direct investment in the mining industry and began privatizing it, at a time when metal prices were at their lowest in over 30 years. This led to increasing problems with ineffectiveness and poor management of state-owned companies. The failure of state control in the mining sector accelerated the sector's privatization. Until the early 2000s, the privatization process in the mining industry was largely completed.

The structure of Zimbabwe's economy has undergone significant changes since the 1990s. While it was once a highly diversified economy, economic dependence on the mining sector has increased significantly relative to the manufacturing and agricultural industries (World Bank, 2014). Despite attempts at structural transformation of ownership and community participation in mining in the 2010s, foreign companies continued to dominate large-scale mining investment. In 2019, the government approved the Zimbabwe local content strategy to promote local value addition and linkages through the utilization of domestic resources. However, the local content strategy fell short in charting a path forward for the mining industry. It placed emphasis on less viable downstream linkages and stopped short of mandating local content quotas and provisions for state enforcement. The principal legislation governing the sector, the Mines and Minerals Act, remained silent on prioritizing indigenous actors in supply chains and on quotas to encourage greater local participation. As a result, large-scale miners continued to set the terms of local procurement for a wide range of upstream services, with little incentive to invest in value-added mining services (See box 1).

Box 1. Nationalization of Mining Industry in Zimbabwe

In Zimbabwe, the mining sector produces around 40 commercial minerals. Zimbabwe's diversified mineral sector, which includes world-class deposits of platinum group metals, diamonds and lithium, has historically been dominated by large-scale foreign-owned companies. By 1980, up to 95% of the country's mineral output was produced and controlled by foreign companies. Following its independence in 1980, the government seized control over the mining industry and nationalized some assets into a holding company, Zimbabwe Mining Development Corporation (ZMDC), and set up a compulsory marketing company, Minerals Marketing Corporation of Zimbabwe (MMCZ), through which all sales were directed. Since Zimbabwe obtained its independence, the Mugabe government nationalized 52 foreign-owned mining companies, including the world's third-largest platinum mine, Unki Mine. However, initiatives aimed at boosting local content and industrial linkages to mining were hesitant and largely unenforced. They have not been assembled following a preset strategy but rather ad hoc and are not managed in a coordinated way, often lacking professional management. According to World Bank data, mining investment plummeted by 92% during this period, exemplifying a model of the 'resource curse.'

The Democratic Republic of the Congo was the second-most-industrialized country in Africa, after South Africa, when it gained independence in 1960. Since its independence, the DRC has experienced deindustrialization over the past few decades, similar to many resource-rich countries. The manufacturing share of GDP fell from 15 percent in 1980 to 5 percent in 2001. Deindustrialization was a result of the poor domestic industrial policy implemented in the early 1970s, an inappropriate policy response to external shocks, coupled with 32 years of political instability (Otchia, 2015). The mining industry dominated economic growth and experienced a period of nationalization between the 1970s and the 1980s. However, the state-owned cobalt-producing assets began to fail after twenty years of underinvestment in maintenance and repair amidst an economic breakdown. The DRC government adopted the Washington Consensus, which held that private (as opposed to state-run) companies should be the driving force of the economy. Rather than prioritizing industrialization as their economic development agenda, they have been replaced by the extraction of various minerals for the benefit of the West and the self-interest of political leaders. The government failed to transform its economic structure by participating in the mining industry to leverage its mineral reserves (See box 2).

Box 2. Nationalization of Mining Industry in DRC

The mining industry in the DRC has a 120-year history, experienced the colonial era, the post-independence nationalization period, and the post-war reopening to foreign investment. After gaining independence in 1960, the copper mining experienced a prosperous period of nationalization. In 1971, Gécamines evolved from Union Miniere du Haut-Katanga (UMHK), becoming a 100% state-owned enterprise. In the early years, Mobutu government focused on economic development, coupled with the surge in copper prices, Gecamine generated 70-80% of the country's foreign exchange earnings and 20-30% of government revenue, undoubtedly becoming the most important enterprise. However, by the end of the 20th century, the mining industry had fallen into stagnation due to the two Congo wars in the DRC, and the copper price had plummeted.

To revive the domestic mining industry and attract foreign investment, the DRC government enacted a new Mining Law in 2002 and promulgated Mining Regulations in 2003. These measures encouraged foreign investors to invest in mining operations in the DRC, allowing them to purchase mining concessions while stipulating that at least 5% of the equity must be held free of charge by a state-owned enterprise of the DRC (Shedd, 2005). The new Mining Law established policies highly favourable to investors, allowing them to engage in international trade activities related to products such as raw ore, semi-processed metals, and refined metals while obtaining exploration and mining licences (Gulley, 2022).

To support the development of the domestic mineral value chain, African policymakers are increasingly aware of the importance of implementing national strategies to transform the economic structure across sectors. There is growing government interest, mostly in emerging economies, in controlling domestic mine production to capture a larger share of the mining sector's rents. Many African economies swing towards resource nationalism to maximize mineral extraction, and governments are demanding larger shares of mining projects (IEA, 2024). Since 2014, 31 African countries have reformed their mining codes to increase the participation of governments and local communities in the exploitation of mineral resources (African Mining Legislation Atlas, 2025). In Zambia, the government announced a new strategy that would see a state-owned company control at least 30% of future critical minerals mines. In Tanzania, the government receives at least 16% of the mines free, with the option to acquire up to 50%. In 2021, Namibia announced that 15% of all new licenses should be locally owned. Ghana sets aside 10% of its mines for the government; when it licensed its first lithium mine last year, it took a 13% free stake and an option to buy an additional 6%. In Botswana, the law allows the government to opt for a 15% stake in mining projects (Bhatty and Bownes, 2025). In Zimbabwe, the government introduced export controls in 2022 and further enacted the Base Minerals Export Control Order in 2023. The order introduces stringent controls on the export of lithium, a key mineral used in the production of electronic batteries and renewable energy technologies.

3.2 FDI, firms, and clusters in the mining industry

Developing countries are increasingly recipients of Foreign Direct Investment (FDI). Many developing countries strive to attract FDI, hoping that knowledge brought by multinational enterprises (MNEs) will spill over to domestic industries and increase their productivity (Gerschewski, 2013). The process of firms' capability building often results from FDI, but it can also take other forms. The reality is that the transfer of capabilities to other firms in the local economy primarily occurs through the vertical supply chain (Page, 2012). In developing countries, the horizontal spillover from the MNEs is negatively associated with local firms; the presence of MNEs is likely to lead to productivity losses for local competitors of MNEs (Javorcik, 2004).

Moreover, studies suggest that the positive spillover effect originates from investments made through mergers and acquisitions or joint ventures, rather than from fully owned foreign affiliates (Ramdoo, 2015b). For instance, affiliates with joint foreign ownership are more likely to source from the host country to develop local linkages. In the mining sector, policies to stimulate beneficiation through the vertical supply chain differ significantly from those in other sectors, such as manufacturing or agriculture. To encourage resource-based industrialization, the governments of many resource-rich countries have traditionally employed policies such as export restrictions to discourage the export of unprocessed products or imposed local content requirements on procurement and employment in mining contracts (Sutton, 2005). However, historical experience has shown that this policy instrument has not been very successful, partly because the policies did not target the right stakeholders. For instance, as the skills required across sectors, from raw material processing to equipment manufacturing, for mining activities differ, miners are not necessarily manufacturers and are unlikely to transition into manufacturers despite the incentives provided to them (Ramdoo, 2015a). Thus, generating more positive spillovers between MNEs and their local suppliers through backward linkages will be essential for developing the productive capability of local firms through facilitating knowledge transfer and technology diffusion.

Spillover effects from MNEs to local firms and linkages are often essential for developing countries, as they can serve as key channels for building the capabilities of local firms. However, the spillover effects don't automatically happen; the extent of spillovers depends largely on the ability of local firms to emulate and integrate the knowledge of MNEs. In other words, only local companies possess the 'absorptive capacity', and as a prerequisite, spillover effects occur when MNEs invest in developing countries. Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (e.g., universities, standards agencies, trade associations) in a particular field that both compete and cooperate (Porter, 2000). Interconnections and spillovers within a cluster often are more important to productivity growth than the scale of individual firms. Economists have emphasized that clusters take advantage of agglomeration economies, economies of scale, and reduce transaction costs (Greenwald and Stiglitz, 1989).

Clusters can be developed by establishing Special Economic Zones (SEZs), which are typically equipped with facilities that support the activities of firms and the economic agents operating within them (Krugman, 1991; Lin and Monga, 2011). In Botswana, to shift its economy from raw exports to localized value addition. In 2008, the Diamond Technology Park was established to attract diamond technology companies focused on diamond cutting and polishing, diamond jewelry manufacturing, and related support industries (Bakwena, 2023). The park now hosts manufacturers, gem labs, and innovation clusters adjacent to the Botswana Innovation Hub. In Zambia, the Chambishi Multi-Facility Economic Zone, established in 2007, aimed to leverage Zambia's copper resources to develop the non-ferrous metals industry, building upon extraction while linking downstream industries, from a smelting and processing cluster to the non-ferrous metal (such as copper) processing industrial chain (Zeng, 2016).

4. Foreign investments in Africa's mining industry

4.1 Critical minerals extraction in Africa

Critical minerals such as copper, lithium, nickel, cobalt, graphite and rare earth elements are essential in many of today's rapidly growing clean energy technologies (World Bank, 2020). Several African countries, such as the Democratic Republic of the Congo, Namibia, Zimbabwe and Zambia, remained key destinations for new exploration and mining projects. Many expect that the new commodity boom, particularly in copper and cobalt, will revive Africa's waning manufacturing industry. Critical minerals-rich countries will have a 20 to 30-year window to tap into expected investment flows, generating long-term economic development. Investment in energy transition sectors can accelerate economic diversification and drive a shift from resource-based economies to industry-based economies. Thus, critical minerals and the implementation of clean energy technologies present practical opportunities to cultivate a growing industrial base for Africa (IEA, 2024).

Table 1. Distribution of selected critical minerals in Africa in 2022

Critical mineral (unit)	Countries	Stock (Reserves)	Total global of reserves (rounded)	Share of global reserves (%)	Mine Production	Total global production (rounded)	Share of global production (%)
Arsenic (metric tons)	Morocco	NA	NA	NA	5450	60100	9.0
Cobalt (metric tons)	DRC	4000000	8300000	48.2	130000	190000	68.4
	Madagascar	100000	8300000	1.2	3000	190000	1.6
	Morocco	13000	8300000	0.2	2300	190000	1.2
	Zambia	NA	NA	NA	367	170000	0.2
Copper (thousand metric tons)	DRC	80000	1000000	8.0	2350	21900	10.7
	Eritrea	NA	NA	NA	21725	21000	0.1
	Mauritania	NA	NA	NA	28491	21000	0.1
	Tanzania	NA	NA	NA	12	21000	0.1
Graphite (natural) (metric tons)	Madagascar	26000000	330000000	7.9	110000	1300000	8.5
	Mozambique	25000000	330000000	7.6	170000	1300000	13.1
	Tanzania	18000000	330000000	5.5	8000	1300000	0.6
Lithium (metric tons)	Zimbabwe	310000	26000000	1.2	800	130000	0.6
	Mali	700000	26000000	2.7	NA	130000	NA
Manganese (thousand metric tons)	DRC	NA	NA	NA	5	20000	0.0
	Cote d'Ivoire	NA	1700000	NA	360	20000	1.8
	Gabon	61000	1700000	3.6	4600	20000	23.0
	Ghana	13000	1700000	0.8	940	20000	4.7
	South Africa	640000	1700000	37.6	7200	20000	36.0
	Zambia	NA	NA	NA	30	20000	0.2
Nickel (metric tons)	Madagascar	NA	NA	NA	9900	2700000	0.4
	Zambia	NA	NA	NA	3251	2700000	0.1
PGMs (kilograms)	South Africa	63000000	70000000	90.0	220000	400000	61
	Zimbabwe	1200000	70000000	1.7	12000	210000	6.7
Rare Earths (metric tons)	Burundi	100	130000000	0.0	200	290000	0.1
	Madagascar	NA	130000000	NA	960	300000	0.3
	South Africa	790000	130000000	0.6	NA	300000	NA
	Tanzania	890000	130000000	0.7	NA	300000	NA
Tin (metric tons)	DRC	130000	4600000	2.8	20000	310000	6.5
	Nigeria	NA	NA	NA	1700	310000	0.5
	Rwanda	NA	NA	NA	2200	310000	0.7
Vanadium (metric tons)	South Africa	3500	26000	13.5	9100	100000	9.1
Zirconium (ores and concentrates)	Madagascar	NA	NA	NA	25.3	1200	2.1
	Mozambique	1800	68000	2.6	100	1400	7.1
	Senegal	2600	68000	3.8	70	1400	5.0
	Sierra Leone	NA	NA	NA	6.6	1200	0.6
	South Africa	5900	68000	8.7	320	1400	22.9

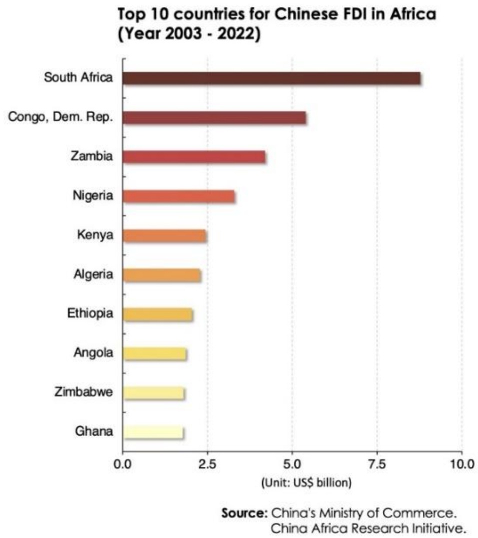
Sources: Andreoni & Avenyob., 2023; USGS, Mineral Commodity Summaries, 2024.

A resource-based African industrialization and development strategy must be rooted in the use of Africa's significant natural resources to catalyze diversified industrial development and achieve other long-term goals, such as poverty reduction. The Africa Mining Vision (AMV), adopted at the African Union (AU) Summit in 2009, is first and foremost a developmental mining approach that is Africa's response to the paradox of great mineral wealth, aimed at building economic and social linkages that benefit Africa itself (African Union, 2009). A key element of the AMV utilizes mineral resources to catalyze broad-based growth and development, maximizing the concomitant opportunities offered by a mineral resource endowment, particularly by deepening the resources sector through the optimization of linkages along value chains. The most recent Africa Green Mineral Strategy, aligned with AMV, provides a roadmap for harnessing Africa's mineral wealth for broad-based socio-economic development. One of the key pillars is to ensure industrialization through local beneficiation, green technology manufacturing, and mineral-based economic transformation.

Historical development experiences reveal that, in most African countries, the mining sector has played a limited role in transformation. If the primary interest of foreign investors remains sourcing critical minerals from Africa without complementary investments in domestic processing or in environmental and social sustainability, the growing demand for these minerals is unlikely to yield a mutually beneficial outcome for Africa (Kelley et al., 2021). There is strong interest in Africa in leveraging the region's mineral wealth to transform its economic structures and support job creation and economic growth through industrialization.

4.2 Chinese mining investments in Africa

China has been considered the key driver of the acceleration in global demand for metals and minerals since the early 2000s, due to its rapid economic growth (Garnaut, 2012; Stuermer, 2018). However, until the global financial crisis in 2008, Chinese overseas mining investments had remained below USD 5 billion annually (China National Bureau of Statistics, 2020). The total value of mining production controlled by Chinese companies overseas was considerably less than 1% of the total global metal production value. This is much less than that controlled by traditional mining companies from Canada, Australia, and the UK. Chinese FDI flows have increased across most of Africa since the 2000s. Between 2013 and 2023, the top three countries in accumulated FDI flows were South Africa, Zambia, followed by the DRC. Among the top three sectors, construction, mining and manufacturing, China's FDI flows to the mining industry have maintained their shares around 25% of the total. The top ten countries receiving China's FDI flows are South Africa, the DRC, Zambia, Nigeria, Kenya, Algeria, Angola, Ethiopia, Ghana, and Zimbabwe, as shown in Figure1. The mining, construction and manufacturing are the three largest sectors invested by China (see Figure 2).



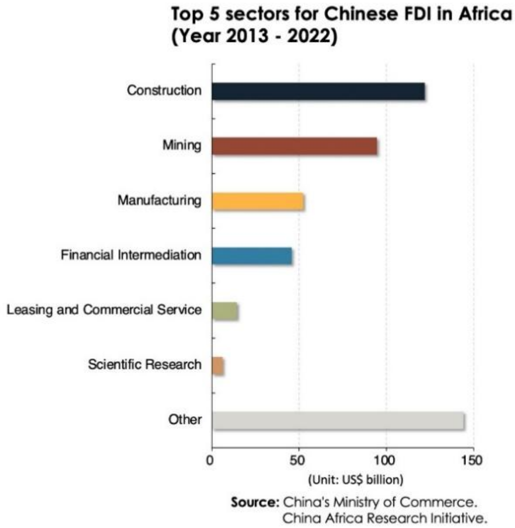


Figure 1. Chinese FDI to Africa

Figure 2. Top sectors of Chinese FDI in Africa

Source: China-Africa Research Initiative

China's dependence on some mineral imports has rapidly increased, and it has become a major producer of many metals and minerals, like lithium, cobalt, rare earth elements and copper. The three largest imports of critical minerals from Africa to China are copper, cobalt, and lithium. While copper is mainly from the DRC and Zambia, cobalt is from the DRC, and lithium is from the DRC, Nigeria and Zimbabwe. China plays a dominant role in refining critical minerals globally, leading the global supplier of clean energy technologies and a net exporter for many of them. Particularly, China holds at least 60% of the world's manufacturing capacity for most mass-manufactured technologies (e.g., solar PV, wind systems, and batteries), and 40% of electrolyser manufacturing (IEA, 2023).

Of the minerals extracted from Africa and exported to China, lithium is experiencing the most rapid growth in demand (Weng, 2025). In Africa, lithium mining is a relatively recent phenomenon; the total lithium production is predicted to rise to 70 kt by 2030 (IEA, 2024). Currently, there are twelve lithium mine projects in Africa under production, including Arcadia, Bikita, Sabi Star, Kamativi, Zulu, Goulamina, Bougouni, and Blesberg, with a total production capacity of 2.436 million tonnes of lithium concentrate. China is the major investor in lithium in Africa, particularly in Zimbabwe (See Table 2). Sinomine, Huayou, Yahua, CATL, Premier African Minerals, Chengxin, and Qingshan are the major Chinese mining companies in Africa's lithium. In Zimbabwe, Chinese companies invested in most of the lithium mine projects. Arcadia mine, owned by Huayou, Bikita mine, owned by Sinomine, and Kamativi mine, owned by Yahua. Apart from Zimbawe, China's import of lithium from Nigeria accounts for approximately 92%

of the country's total production. In 2025, projects including Kamativi Phase II, Bougouni, and Blesberg are expected to come into operation, while Ewoyaa and Karibib are anticipated to begin production within the same year. This is projected to add 730,000 tonnes of capacity compared to 2024. However, the actual progress of lithium mine project commissioning in Africa often falls short of expectations due to factors such as poor infrastructure and policy uncertainties.

Table 2. The Chinese investments on lithium in Africa

Chinese firms	Type of firms	Deposits	Country	Production capacity per year	Investment	Type of mines
Huayou	Private	Arcadia	Zimbabwe	450,000 metric tons	US$192 million	Spodumene and petalite
Sinomine	Shareholding reform from state- to private owned	Bikita	Zimbabwe	480,000 metric tons	US$422 million	Petalite
Yahua	Private	Kamativi	Zimbabwe	300,000 metric tons	US$249 million	Spodumene
Chengxin	Private	Sabi Star	Zimbabwe	300,000 metric tons	US$130 million	Spodumene
Tsingshan	Private	Gwanda	Zimbabwe	200,000 metric tons	US$54 million	Spodumene
Huayou/Tsingshan	Private	Sandawana	Zimbabwe	800,000 metric tons	US$310 million	Spodumene
Zijin/KoBold Metals/AVZ Minerals	Private	Manono	DRC	500,000 metric tons	US$545 million	Spodumene

Source: companies' websites

The DRC and Zambia rank as Africa's largest copper producers and world leaders in cobalt production, with the DRC alone contributing about 71% of the output and being home to nearly 3.4% of global lithium resources (IEA 2022; USGS,2022). It is estimated that nearly 80% of the DRC's copper and cobalt output is processed in China (USGS, 2022). Through large shares of capital held in various mining joint ventures created in partnership with the Gécamines, Chinese corporations control the leading copper/cobalt producers in the DRC. These include China Molybdenum's (CMOC) Tenke-Fugurume Mining and Sicomines (Bloomberg, 2021). In 2022, 55% of the copper in the DRC were exported to China, 29% of the copper is exported from Zambia to China, and 58% is exported to South Africa. Approximately 38% of the cobalt produced in the DRC is exported to China (See Table 3).

Table 3. Chinese investments in copper in the DRC

Deposits	Chinese firms	Shareholders	Type of firms	Reserve Cu	Reserve Co	Production capacity per year
Tenke Fungurume Mining S.A(TFM)	China Molybdenum 80%,	Gecamines 20%	Joint Venture	371.3	53.0	copper production capacity of 450,000 tons
MMG Kinsevere SARL (Kinsevere)	China Minmetals Nonferrous Metals 95%	Gecamines 5%	Joint Venture			63,000 and 69,000 tonnes of copper
Ruashi mining S.A.S(RUASHI)	Jinchuan Limited 75%,	Gecamines 25%	Joint Venture	17.8	1.3	10,000 tonnes of copper and 1,000 tonnes of Cobalt
Musonoi Project(MUSONOI)	Jinchuan Limited 75%,	Gecamines 25%	Joint Venture	59.4	17.4	31,000 tonnes of copper cathode and 10,000 tonnes of cobalt
Societe Miniere de Deziwa S.A.S(DEZIWA)	China Nonferrous Metal Mining 51%	Gecamines 49%	Joint Venture	460.0	42.0	
La Miniere de Kasombo S.A.S(MIKAS)	Huayou Cobalt 72%,	Gecamines 28%	Joint Venture			28,034.0 t Copper Production/2,684.0 t Cobalt Production
La Sino-Congolaise des Mines S.A (SICOMINES)	China Railway Group Limited 41.72%,Power China 25.28%	Gecamines 32%	Joint Venture	868	54	
Compagnie Miniere de Luisha S.A.S (COMILU	China Railway Group Limited 72%	Gecamines 28%	Joint Venture	54.8	3.3	30,000 tonnes of cathode copper and over 1,000 tonnes of cobalt hydroxide.
La Miniere de Kalumbwe Myunga S.A.S (MKM)	China Railway Group Limited 80.2%	Gecamines 19.8%	Joint Venture	3.1	0.3	18,000 tonnes of cathode copper
Compagnie Miniere de Kambove(COMIKA)	Northern Mining 70%,	Gecamines 30%	Joint Venture	137	33.0	https://congomines.org/fr/entreprises/entree/6940/
Shituru Mining Corporation S.A.S(SMCO)	Pengxin 72.5%	Gecamines 27.5%	Joint Venture	2.7		32,755 tonnes of copper
La Compagnie Miniere de Musonie Global S.A.S(COMMUS)	Zijin Mining 72%	Gecamines 28%	Joint Venture			7,195.0 tons of cobalt 142,630.0 tons of copper
Kamoa Copper S.A(Kamoa-Kakula)	Zijin Mining 49.5%	Citic Metal 50.5%	Joint Venture			600,000 tonnes
Kinsenda Copper (KINSENDA)	Jinchuan Limited 77%	Sodiminco 23%	Joint Venture	29.4		20,000 tons of copper
Kisanfu mining(KFM)	China Molybdenum 71.25%,Contemporary Amperex Technology 23.75%	Congo Real Estate 5%	Joint Venture			480,000 metric tons
CNMC Congo Compagnie Miniere SARL(PANDA)	China Nonferrous Metal Mining 100%		Wholly Forign-Owned			18,02 tons of copper
Lualaba Copper Smelter S.A.S(LCS)	China Nonferrous Metal Mining 62%	Yunnan Copper 38%	Joint Venture			71,172tons
Huachin Metal Leach S.A(HUACHIN)	China Nonferrous Metal Mining 67.5%	Shanghai China,32.5%	Joint Venture			21,193 tons of copper 1,176 tons of cobalt
La Compagnie Miniere de Kambove S.A.S (KAMBOVE)	China Nonferrous Metal Mining 55%	La Generale des Carrieres Et Des Mines SA 45%	Joint Venture	32.0		39,212 tons of copper 10,965 tons of cobalt
CNMC Huachin Mabende Mining S.A(MABENDE)	China Nonferrous Metal Mining 65%	Shanghai China Fortune 35%	Joint Venture			36,576 tons of copper
Congo Dongfang International Mining S.A.S(CDM)	Huayou Cobalt 100%		Wholly Forign-Owned	28.3	3.5	49,609 tons of copper 6,490 tons of cobalt
La Miniere de Kalukundi S.A(LAMIKAL)	Northern Mining 75%, Managem20%	Congo Real Estate 5%	Joint Venture	76.1	12.1	45,000 tonnes of copper 5,000 tonnes of cobalt

Source: Xie et al., 2021. Review of development status of copper-cobalt mining in the DRC; Companies' websites.

4.3 How does China become the major player in critical minerals extraction in Africa?

China currently dominates the critical minerals market, producing 29 commodities, including 22 metals and 7 industrial minerals, making it the world's most important customer and supplier of critical minerals (Renneboog et al., 2022). China has established dominant positions in mining and refining most critical minerals, including lithium, cobalt, and graphite. China's growing demand for critical minerals and metals is driven by its ambition to transform its industrial structure from a medium to a high-technology economy, positioning itself as a world manufacturing power. As set up in the agenda in China's 14th five-year plan (2021-2025) and vision for 2035, 'seeking critical minerals and raising the stakes over access to them in a push to maintain its pace in achieving a modern industrial system in optimizing the existing economic structure' (National Development and Reform Commission, 2021). Thus, Government policies incentivize and subsidize strategic industries such as renewable energy, AI, chips and semiconductors, and other high-tech sectors. For example, China is the largest consumer of lithium, accounting for about 39% of global consumption. To address its weakness, particularly in this case, China is steadily acquiring stakes in lithium mines in Africa and the countries of the Lithium Triangle (Goodenough et al., 2021).

Apart from being driven by China's surging demand and consumption of critical minerals, the foresight of the Chinese government enabled it to implement policies that expanded China's control of critical metals by acquiring mines abroad and increasing processing capacity onshore (Kumar and Vishwanathan, 2025). The 'Go Out' Strategy, also known as the 'Going Global Strategy', was China's national policy, formally adopted in 2000 to encourage and support Chinese enterprises to invest in international sources of natural resources (State Council of China, 2015). In 2020, the Chinese policy reinforced that 'foreign resources are to be siphoned off while domestic ones are to be defended' (Runganga et al., 2025). The 'Go Out' Strategy and the 'Two Markets, Two Resources Policy' have given China control over a significant proportion of global critical mineral mines, raising awareness from countries within the Global North (e.g., Canada, Australia, and the US) and the Global South (e.g., Chile) (Ericsson et al., 2020).

In 2024, Chinese mining firms completed ten major overseas acquisitions, each valued at more than USD 100 million, marking their busiest year since 2013 (Financial Times, 2025). Despite Western countries being 'increasingly wary' about Chinese investment in buying mining assets, Chinese companies are adopting ambitious M&A strategies and tapping cheaper assets in the developing world, such as in Africa. According to a 2020 report issued by the U.S.-China Economic and Security Review Commission, under a 'state-led, enterprise-driven' approach, Chinese firms' investments in African countries' mining industries have grown significantly in the past three decades (Fornillo and Lampis, 2023). The report further details China's growing economic footprint in Africa, which has bolstered its energy security, positioned Chinese firms to control critical segments of global supply chains, and allowed it to enjoy unparalleled access to Africa's emerging consumer markets (Kumar and Vishwanathan, 2025).

5. Foreign mining investment in Zambia: boon or bane?

5.1 Extracting copper in Zambia: a historical review

Zambia possesses some of the world's highest-grade deposits for copper and is the seventh largest copper-producing country in the world. The mining sector is the backbone of Zambia's economy, contributing 13.7 percent to the Gross Domestic Product (GDP) in 2023, accounting for over 70 % of the country's export earnings. Inherited an unbalanced resource-based economy with an enormous dependence on copper, Zambia has a long history of copper mining dating back to the early twentieth century. After independence in 1964, the copper mines were nationalized, and later consolidated into the Zambia Consolidated Copper Mines (ZCCM), which was majority-owned by the Government (60 percent of equity) and had a minority share owned by Anglo American Corporation (27.3 percent). Copper mining generated the bulk of government revenues in the early post-independence period. In 1969, President Kaunda announced an economic reform policy to take over 51 per cent of shares in each enterprise in the mining industry, to control the mining companies and secure foreign reserves. Following the announcement, the Zambia Industrial and Mining Corporation Limited (Zimco) was formed as a holding company. Mindeco Limited and Indeco Limited, two state-owned subsidiaries established under Zimco. From the late 1960s to the 1990s, Zambia had strategic control over its mining sectors.

The high copper prices enhanced the government's ability to quadruple its spending without facing a budget deficit. In the meantime, copper nationalizations also negatively impacted the attitude of private investors, who were mostly concerned about fluctuating prices, the cost of production in mining and manufacturing, and Zambianization. As the government's role shifted from participation to control, the state failed to develop plans for the mining sector and enhance its production capacity to secure the country's foreign reserves. However, the state mining corporations came under financial distress, leading the countries from the late 1990s onwards to recapitalize them through a process of re-privatization. The Structural Adjustment Programmes (SAPs) were introduced in Zambia during the 1990s, following the implementation of IMF/World Bank-supported policies aimed at liberalizing their economies. Policies towards the mines were subsumed under the general provisions of the SAPs, resulting in the gradual privatization of the mines, a process that was nearly completed by 2001.

As a consequence of the liberal fiscal regime accompanying privatization, none of the resource revenue accruing from copper mining in Zambia has gone to the government. That is, whereas copper mining had contributed an average of 45 percent of government revenues between 1965 and 1975, it made virtually no direct contribution to government revenues during the post-2002 price boom (Bova, 2009). The low revenue stream was due to the very generous fiscal regime included in the bilateral development agreements. Moreover, alleged transfer pricing, whereby copper was sold by the mining companies to their subsidiaries at prices well below market prices, further lowered the corporate taxable basis (Al Jazeera, 2011). Ultimately, attempts to develop copper production to its final stage for end users (cable wires, sheets, and rods) failed because Zambia found it difficult to compete in external markets, and the local market had not yet developed enough to consume the final copper products. The Zambian government's initial policy of state participation was successful until the state over-intervened. The privatization of the mining industry led to foreign investors controlling the majority of mines in Zambia, with national companies' participation, such as ZCCM-IH.

5.2 Foreign investments in Zambia's copper mines

Zambia's mining sector is characterized by the coexistence of small-scale, artisanal mining and large-scale mining, with foreign investors predominantly driving the latter. For the large-scale mining operation, the FDI into Zambia remains dominated by foreign investments from Canada, Australia, Switzerland, the United Kingdom, China, India and the United States (see Figure 4). Between 2010 and 2021, Zambia produced an average of 800k tons of copper, with an export value ranging from USD 7000 to USD 8000 each year (see Figure 3).

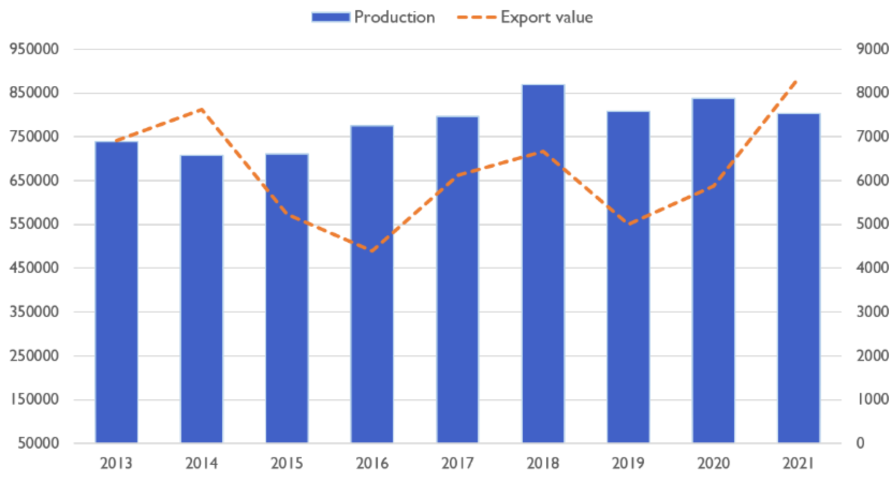
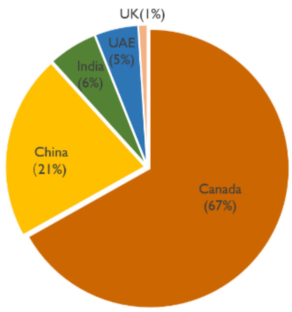


Figure 3. Copper production and export value in Zambia between 2013 and 2021. Source: OECD, Trade in Raw Materials, 2024

Exporting copper is one of the largest sources of revenue for Zambia's government. Between 2000 and 2017, China was the largest importer of raw copper from Zambia, accounting for more than 50% of Zambia's annual exports. Since 2018, Switzerland has taken over China, becoming the largest exporter of copper (see Figure 5). In 2023, Zambia exported USD 3.13 billion in raw copper to Switzerland, accounting for 45.1% of its total exports. In the meantime, since 2011, India has experienced stable growth in copper imports from Zambia, with the share increasing from 4.84% (USD 71.8 million) to 24.9% (USD 1.73 billion).



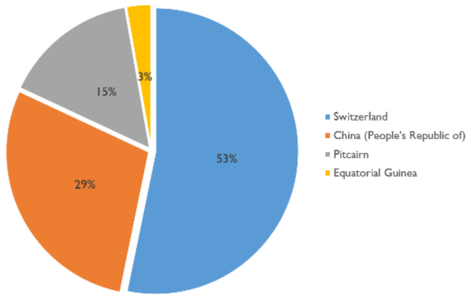


Figure 4. The major producers of copper

Figure 5. The major exporters of copper

Source: British Geological Survey; Companies' websites; OECD, Trade in Raw Materials, 2024

According to UNCTAD's World Investment Report, FDI flows into Zambia increased from USD 65 million in 2022 to USD 108 million in 2023, representing slight growth but still below the average for 2019-21 (USD 500 million) (UNCTAD, 2024). Based on recorded investments of almost USD 10 billion between 2020 and 2023, the Zambia Development Agency (ZDA) has announced committed foreign investments totaling USD 18.74 billion across multiple sectors in 2024. The mining sector led with over USD 5 billion in investments, including major projects such as Barrick Gold's USD 2 billion investment to transform the Lumwana Mine into a 'super-pit', and First Quantum Minerals' USD 1.3 billion expansion of the Kansanshi Mine (Llyods Bank, 2024). Additionally, China's JCHX Mining invested USD 300 million in the Lubambe Copper Mine, and Sinomine Resource Group committed USD 600 million to the Kitumba Mine (see Table 4).

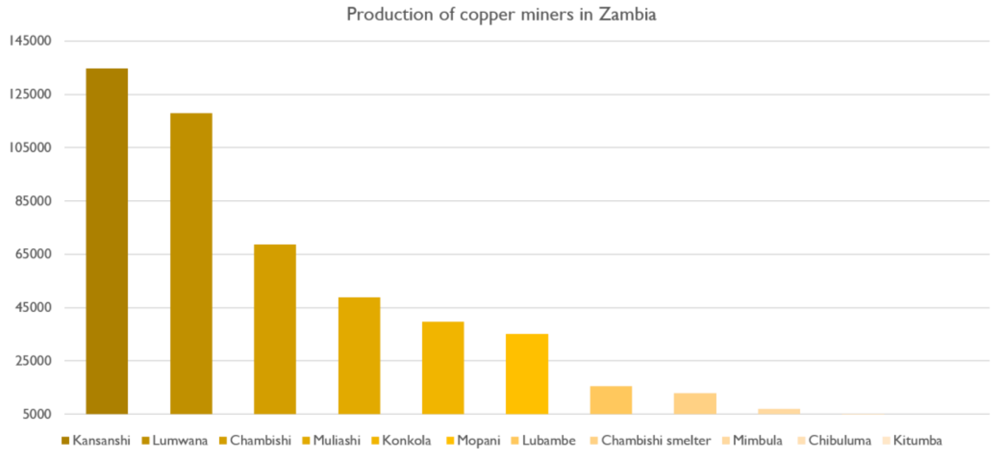


Figure 6. Production of copper mines in Zambia in 2023.   Source: British Geological Survey

The domestic economy in Zambia has predominantly been dependent on copper mining and is currently producing 4 percent (800,000 metric tons) of the world's copper. International investors account for a significant portion of Zambia's copper and cobalt production, contributing advanced technologies and substantial capital investments (see Figure 6). The mining industry is a capital-intensive sector, requiring large-scale capital investment in the pre-mining stage. Most African countries lack sufficient financial capital for mining investments, which international mining companies could support through various financial sources (Sambo, 2019). After a dispute that led to a seizure in 2019, Vedanta regained control of Konkola Copper in late 2023. As agreed with the Zambian government, Vedanta Resources Limited is exploring a USD1 billion fund to boost copper output at Konkola mine to about 300,000 metric tons per year over the next five years. Vedanta is working with RMB to structure appropriate debt packages of up to USD 1 billion. Meanwhile, they are also seeking other capital-raising methods, such as leveraging cash flow from existing global operations or through equity markets. In addition, discussing offtake agreements with commodity traders has become increasingly common in copper mining, with global trading companies like Trafigura and Glencore actively participating in these deals throughout Africa (Zadeh, 2025).

Table 4. Active Zambian copper mines and production in 2023

Deposit	Commodity	Ownership	Country of owner	Production in 2023 (tonnes)
Konkola	Cu	Vedanta (79.4%) ZCCM-IH (20.6%)	India	39598
Chibuluma	Cu	Jinchuan Group (85%) ZCCM-IH (15%)	China	3697
Kansanshi	Cu-Co-Ni	FQM (80%) Kansanshi Mining Plc (20%)	Canada	134821
Mopani	Cu-Co-Ni	CMCL – Delta Mining Ltd (51%) ZCCM-IH (49%)	UAE	35048
Muliashi	Cu	CNMCL (80%) ZCCM-IH (20%)	China	48904
Sentinel	Cu-Co-Ni	FQM-Trident Ltd	Canada	214224
Lumwana	Cu	Barrick Gold – operated by LMC	Canada	118001
Chambishi	Cu-Co-Ni	NFCA, CNMCL (85%) ZCCM-IH (15%)	China	68760
Lubambe	Cu	JCHX (80%) ZCCM-IH (20%)	China	15495
Chambishi smelter	Cu-Co-Ni	SMLZ – subsidiary of CNMCL	China	12925
Mimbula	Cu	Moxico Resources Plc (85%) Mimbula Minerals Ltd (15%)	UK	7093
Kitumba	Cu	Sinomine (65%) Chifupu Resources Ltd (35%)	China	

LMC: Lumwana Mining Company Limited; FQM: First Quantum Minerals; MCML: Mopani Copper Mines Ltd; ZCCM-IH: Zambia Consolidated Copper Mines Investments Holdings; NFCA: Non-Ferrous Company Africa Mining; CNMCL: China Non-Ferrous Metals Company Ltd; SMLZ: Sino Metals Leach Zambia. Source: Ministry of Mines and Minerals Development, 2025

The privatization of the mining sector since the 1990s has led state-owned mines to sell their majority stake in most of their mining holdings to foreign investors. The resulting dominance of private investment and the state's minority stake in Zambia's mining sector arguably make the country a largely privatized mining landscape. This led to the establishment of joint ventures between the state and the private sector for the mining of copper deposits (Abdelaal, 2023). Initially formed to manage copper mining in the early 1970s, ZCCM-IH now holds minority stakes, ranging from 15% to 20%, in privatized mining companies and assets, thereby maintaining strategic influence over Zambia's mining sector (See Table 4). Taking Vedanta as an example, Vedanta Resources Limited is a UK-based mining company that owns 80% of Konkola Copper Mines (KCM), the remaining 20% is owned by ZCCM-IH under the control of the Zambian government. While Vedanta Resources Limited was listed on the London Stock Exchange, the main operating entity is led by the Indian mining giant, Anil Agarwal, who took Vedanta Resources private in 2018 (Sambo, 2019). Another case is China's acquisition of western mining companies on copper mine. In 2019, the largest Chinese copper smelter company, Jiangxi Copper, has expanded its ownership in Canadian metals company First Quantum Minerals by acquiring an additional stake for USD 212 million, owning an 18.5% stake and becoming the second-largest shareholder in the company, while ZCCM-IH is the largest shareholder (See box 3). Foreign investors are operating in Zambia's mines with a variety of share transactions. The government actively participates in mining operations through its investment vehicle, ZCCM Investments Holdings PLC (ZCCM-IH).

Box 3. The largest mining company in Zambia: First Quantum Minerals

First Quantum Minerals Ltd. ("First Quantum", "FQM" or the "Company") was incorporated under the Company Act (British Columbia) in 1983, under the name of Xenium Resources Ltd. In 1996, the Company changed its name to its current name, First Quantum Minerals Ltd. Among the five subsidiaries, Kansanshi Mining PLC and FQM Trident Limited are the two companies operating in Zambia. Acquired in 2005, Kansanshi mine is a large open-pit copper and gold mine in Solwezi in the North-Western Province of Zambia. Kansanshi has one of the largest copper reserves in Zambia, with estimated reserves of 727 million tonnes of ore graded at 0.86% copper. The Kansanshi mine is owned and operated by Kansanshi Mining PLC, which is 80 per cent owned by First Quantum. ZCCM-IH holds the rest of 20%.

In 2010, First Quantum acquired Enterprise and Sentinel through the purchase of Kiwara PLC. In 2010, First Quantum bought Kiwara plc and the prospecting license for the periphery of the Kabompo Dome, including the Kalumbila copper deposit (now Sentinel) and the Kawako nickel deposit (now Enterprise). The Sentinel open-pit copper mine is 150km west of Solwezi in North-Western Province of Zambia. Enterprise is 12km from the Sentinel copper mine in the North-Western Province of Zambia. The combined project, named Trident, shares processing infrastructure and tailings facilities. Enterprise is a standalone nickel orebody in the Trident license area that will benefit from operational and infrastructure synergies with Sentinel, making it a low-cost production site. Sentinel and Enterprise are 100% owned and operated by First Quantum.

As the country largely depends on the mining sector, the government is seeking to diversify the economy and reduce its dependence on exporting raw copper. Zambia has a long tradition of mining and extractive activities in base metals such as copper but this has not transform copper extraction into diversified economic activities. In 2024, the Zambian government announced a national strategy to more than triple its copper production to 3 million metric tonnes annually by 2031. To leverage copper production for driving Zambia's industrialization, aligned with Zambia's Eighth National Development Plan, the Zambian government announced the National Critical Minerals Strategy (2024-2028), two of the strategic objectives highlight the strategic partnerships between the government and the private sector in developing the critical mineral value chain. To transform the wealth generated from increased values, state intervention through policy and regulatory reforms is outlined in the strategy, further to underpin Zambia's socio-economic development towards an industrialized economy.

5.3 Chinese mining investment in Zambia

While China has a long diplomatic and economic engagement with Zambia since the country's independence in 1964 (Musiitwa, 2021), its most well-known role in investment and development corporation was with the building of the Tanzania-Zambia (TAZARA) rail line in the 1970s. The TAZARA provided a lifeline for Zambia's copper exports when the southern rail corridor down through Zimbabwe and on to South Africa was disrupted due to the political circumstances of Zimbabwe's liberation wars and apartheid in South Africa. Over the years, Chinese mining corporations and related investments, such as those in metal refining, have been increasing in Zambia (Mukete, 2016), as has the country's demand for commodities like copper and cobalt (Kodo, 2022). Notable among Chinese-related investments are China Non-Ferrous Metals' ownership of the Luanshya copper mine and its development of the Muliashi concession, as well as the large-scale Chambishi Copper Smelter, located within the Zambia-China Economic and Trade Cooperation Zone, also in the Copperbelt Province.

As the world's largest consumer of copper, China is active in developing mines in Zambia, with 88% of its investment in mining or related activities (Asada, 2023). In 1998, the state-owned China Nonferrous Metals Mining Corporation acquired the Chambishi copper mine, valued at USD 15 million, marking China's first overseas investment in a nonferrous metal mine (China Nonferrous Metal Mining Group, 2024). Currently, there are approximately 20 Chinese mining companies registered for mining exploration and exploitation. State-owned enterprises dominate the largest share of the mining sector, with a focus on copper extraction and refining in Zambia. The middle- and small-scale mining companies account for only a small share of mineral production, including copper, gold and cobalt. Merger and Acquisition/joint ventures have become a key feature of multinational mining companies investing in Zambia. Among Chinese companies operating in Zambia, the Chambishi mine is the largest copper mine in the Copperbelt Province, in northern Zambia. Several other Chinese companies, including JCHX and SINOMINE, are involved in mining development in Zambia. Zambia has become the sixth-largest African country with China's FDI flows, increasing from USD 5.53 million in 2003 to USD 116 million in 2023.

As a latecomer, China initially invested in Zambia's unattractive mining sites, which had been abandoned by the West due to a lack of profit prospects or financial crisis (Brautigam, 2021).

Zambia's copper mines have been operated by companies from India, Canada, Switzerland, China, and South Africa; however, many foreign companies scaled back production or ceased operations during the 2008 global financial crisis. Rather than withdraw their operation, China acquired several mining projects from Western mining companies, responding in the exact opposite way (Asada, 2023). For example, China Non-ferrous Metal Mining Co Ltd (CNMC), announced that it would 'not reduce investment by a penny, not reduce production by a tonne, and not lay off a single employee.' They also expanded their operations by acquiring the Luanshya mine in the Copperbelt, which was originally owned by a consortium of India and Switzerland and had ceased production during the crisis (Brautigam, 2021).

Developing large copper projects requires billions of dollars in upfront capital and ongoing investment in fixed assets, including equipment, infrastructure, and technology for exploration and operation. Chinese state-owned enterprises have access to low-cost, long-term loans from policy banks (such as China Exim Bank and China Development Bank) and operate under national strategic mandates rather than on driven by pure commercial profits (Wood Mackenzie, 2025). Their flexible lending approach, such as the infrastructure-for-resources model, has enabled China to dominate DRC copper and cobalt production, for example, through projects like Sicomines and Tenke Fungurume. In contrast, Western mining companies rely on private lenders, which are imposing increasingly demanding conditions. Financing terms include stress-tests at copper prices 20–30% below forecasts, high equity contributions for greenfield projects (particularly for smaller firms) and stringent ESG compliance. These conditions discourage investment in politically volatile jurisdictions that hold some of the richest undeveloped deposits, such as the DRC. While Western companies have retreated from high-risk jurisdictions, Chinese firms will continue to integrate mining, refining, and manufacturing, thereby cementing their control over future copper supply chains.

5.4 Refining copper in Zambia

In Zambia, foreign mining firms from Canada, China, and India are developing a vertically integrated industrial chain encompassing copper mining, beneficiation, hydrometallurgical processing, pyrometallurgical processing, and sales. CNMC is the earliest and largest Chinese copper industry enterprise in Zambia. China Nonferrous Metals Mining was established on June 28, 1998. It was a joint venture between China Nonferrous Metals Mining Group (85%) and the government-owned United Copper Mines of Zambia (15%) (China Nonferrous Metal Mining Group, 2025). In 2011, it restructured four Zambian copper mining enterprises into China Nonferrous Metals Mining Co., Ltd., which was subsequently wholly owned by China Nonferrous Metals Mining Group (see Figure 7). The four copper mining enterprises are: (1) China Nonferrous Metals Africa Mining, (2) China Nonferrous Metals Luanshya, (3) Chambishi Copper Smelter, and (4) Chambishi Hydrometallurgical Plant. Among these, China Nonferrous

Metals Africa Mining operates a copper mine; China Nonferrous Metals Luanshya operates copper mining and hydrometallurgical cathode copper production; Chambishi Copper Smelter operates a crude copper smelter; and Chambishi Hydrometallurgical Plant operates a cathode copper smelter (Shanshan et al., 2016).

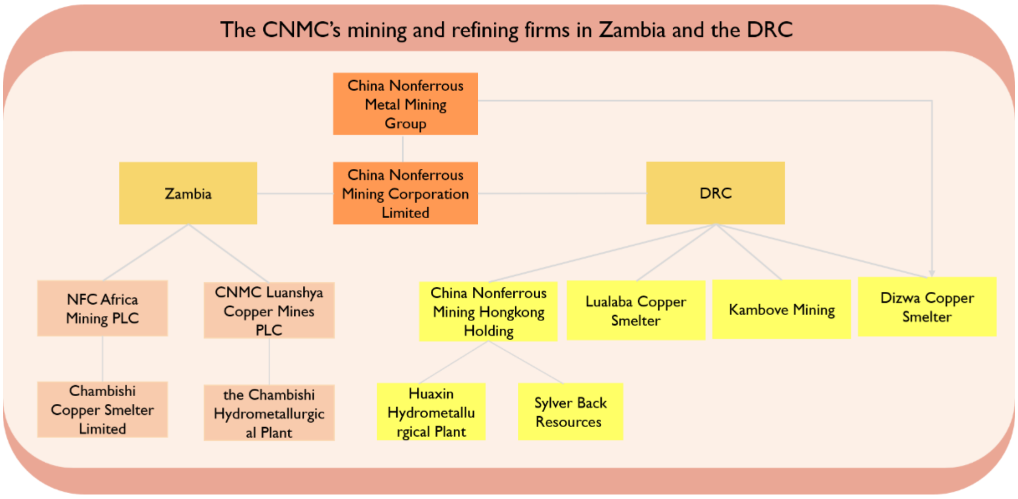


Figure 7. The mining and refining firms of CNMC in Zambia and the DRC. Source: the CNMC website

To understand why Chambishi Copper Mine became China's earliest mining acquisition, it is necessary to analyze this case in the context of its specific economic and political history (See box 4). In the early times, Chinese investments in Zambia's copper mines primarily took the form of joint ventures and cooperative ventures, partnering with the Zambian government's state-owned mining companies to develop mineral resources (Sikamo et al., 2016). With China's rapid economic growth and increasing strategic demand for copper, the pattern of Chinese investment in Zambian copper mines shifted from joint and cooperative ventures to complete control through mergers and acquisitions (Ericsson et al., 2020).

Historically, apart from economic factors, the political environment of the 1980s and 1990s was also a key driver in making China become Zambia's earliest investor in copper mining and smelting. In the late 1980s and early 1990s, the Taiwan authorities proposed offering USD 300 million in foreign aid in exchange for establishing diplomatic relations with Zambia (Lin et al., 2017). Taiwan has attempted to secure Zambia's diplomatic recognition of its independence through foreign aid, also known as 'diplomatic silver bullet' tactics (Hu, 2017). Ultimately, negotiations between the Chinese and Zambian governments forced Zambia to abandon its plans to establish diplomatic relations with Taiwan. The Chinese government increased aid and investment to African countries, including Zambia, in exchange for their political support, namely adherence to the 'One-China principle'.

Box 4. The copper smelters in Zambia

Economic and Trade Cooperation Zone in Copperbelt Province, Zambia. Its primary asset is the Qambishi Copper Smelter. This facility ranks among Zambia's three major smelters and is China's sole large-scale pyrometallurgical copper smelter overseas, but the DRC established another copper smelter in 2020. Phase I production capacity is 150,000 metric tons of crude copper and 400,000 metric tons of sulfuric acid annually. Following Phase II expansion, annual capacity will reach 250,000 metric tons of crude copper (anode copper), 600,000 metric tons of sulfuric acid, 17,500 metric tons of cobalt-copper alloy, and 300 metric tons of bismuth oxychloride (see Figure 8).

Another smelter lies within the Zambia-China Economic and Trade Cooperation Zone in Zambia's Copperbelt Province: the Chambishi Hydrometallurgical Plant. Primarily processing ore from the Mwamba Copper Project, the Chambishi facility controls copper metal resources of 500,000 to 700,000 metric tons, supporting an annual production capacity of 30,000 metric tons of copper.

In the meantime, the Zambian government privatized the mining industry to attract foreign investment in copper mines (Sikamo et al., 2016). The Chambishi copper mine was operated by the British mining company for 23 years. Due to exploitation challenges and management issues, it closed in 1987. The Zambian government was seeking foreign investors to continue operating the Chambishi copper mine. China Nonferrous Metals Group, a state-owned enterprise, bid for the Chambishi Mine in 1998. Since then, the acquisition of the Chambishi mine has marked the first nonferrous metal mining project approved by the Chinese government for overseas investment. It also represents the first Chinese company to invest in Zambia's copper mines since the industry's privatization began in the 1990s (Brautigam, 2021).

Other foreign mining firms also built their smelter refinery in Zambia. For instance, Vedanta Resources plc ('Vedanta'), an Indian copper mining company, but is a London-listed diversified resources group which owns 79.4% of KCM (Konkola Copper Mines Plc) in Zambia. KCM operates two major open-pit mines, with satellite pits at Nchanga, and three underground mines: Nchanga mine in Chingola, Nampundwe mine in Central Province, and Konkola mine in Chililabombwe (Konkola Copper Mine Plc, 2025). KCM is one of Zambia's largest integrated copper producers, with an entire production value chain comprising open pit and underground mines, concentrators, a state-of-the-art smelter, a tailings leach plant, and a refinery.

Figure 8. Copper refining in Zambia.　Source: photos were taken in the Chambishi copper smelter in Zambia

In 2019, the Zambian government seized KCM assets and placed them under provisional liquidation, accusing Vedanta of failing to expand production and pay taxes. In 2024, after a five-year standoff, the Indian mining giant regained 80% control of KCM, accompanied by substantial financial commitments of USD1 billion over five years to revitalize the operation. In 2025, the company announced plans to raise USD 1.5 billion in the US market to fund operational expansion, modernization, and the deployment of AI-driven exploration and extraction technologies at KCM (Sambo, 2019). Vedanta's plans went beyond mining. The company intends to introduce smelting and processing activities - an approach aligned with the government's long-standing emphasis on value addition. The KCM has established an integrated production chain from extraction to refinery.

The Kansanshi copper smelter, commissioned in the first half of 2015, has enabled First Quantum to optimize the value of the copper it produces in Zambia, and created a further 784 specialist jobs. In 2012, First Quantum Minerals first proposed the S3 project, which includes a new processing plant, expanding smelter throughput by about 25%, and opening a new pit for mining (Mining Indaba, 2025). The Zambian expansion provides much-needed production growth following 2023's closure of the USD10 billion Cobre Panamá mine. It accounts for more than 90% of First Quantum's copper output through the Kansanshi and Sentinel mines. The S3 expansion project was officially commissioned by Zambian President

Hakainde Hichilema in August 2025. The new processing plant is expected to ramp up to full capacity by 2029 (Laura, 2022).

6. Special Economic Zones: leading Zambia towards resource-based industrialization?

Mineral resources are often regarded as a paradox for development. Africa's tremendous natural resource endowments, such as metals and minerals, combined with a surge in global demand for critical minerals, could underpin a viable resource-based industrialization strategy that extends beyond supplying raw materials to international trade networks. Linking the mining sector through upstream and downstream could industrialize their economies by increasing human resource development, technology development, supporting activities and skills training, as these resource-dependent industrial clusters transition into diversified economic activities (Walker and Jourdan, 2003).

The idea that Special Economic Zones (SEZs) can promote economic structural transformation in developing countries has a long history (Krugman, 1991). SEZs are a crucial policy instrument of industrial clusters situated along physical infrastructure pathways such as railways and roads. Available evidence suggests that setting up SEZs can exploit the close complementarity between spatial industrial policy and infrastructure development (Fujita et al, 2001; Newman and Page, 2017). Since 1975, more than 5400 SEZs have been built in the world, covering 147 countries (UNCTAD, 2019). Growing rapidly in the past 20 years across the world, Asia owns the largest number and proportion of SEZs in the world. The majority of the SEZs in Asia was established in countries that were well on their way towards structural transformation. Such development practices have also been successfully applied in Japan, Singapore, Korea and China (Zeng, 2016).

The plethora of literature on Africa's experience with SEZs reveals varied outcomes in terms of industrialization, economic agglomeration and diversification (Farole & Akinci, 2011). In the 1960s, many African countries explored their industrialization path after independence, and establishing SEZs became an important industrial instrument for building spatial industrial clusters. Some African countries implemented closed trade protection policies and actively cultivated a number of state-owned enterprises to enter the steel, machinery, manufacturing, automobile, and chemical industries. They were also given corresponding policy preferences and subsidies to prevent similar products from entering the domestic market and reduce foreign exchange expenditures, thereby gradually improving their terms of trade in the international market (Singer, 1950). Some African countries have notable, market-driven clusters of industries, such as the garment and footwear industries in Ethiopia and the vehicle parts cluster in Nigeria (Brautigam, 1997). Nevertheless, the general outcome of SEZs has been lackluster. Of the 240 existing industrial parks in Africa, approximately 40% occupy less than 25% of their land, and only 15% are fully operational. Yet these spontaneous clusters have significant weaknesses, notably poor infrastructure, weak linkages to innovative technology, and a lack of a long-term government development plan and political commitment (Lin, 2012).

There has been a long-running debate over the value of SEZs as an industrial policy instrument in Africa. However, East Asia's successful experience in accelerating industrial development through SEZs paved the way for their use as policy instruments in Africa. In Zambia, the MFEZ program was first introduced by the Japan International Cooperation Agency in 2005 as a tool to promote economic development and enhance Zambia's competitiveness through increased trade and manufacturing. The Forum on China-Africa Cooperation (FOCAC), held in 2006, presented an opportunity for both China and Africa to enhance their long-term industrial cooperation. At this FOCAC, the Chinese Government pledged to support the establishment of Special Economic Zones (SEZs) in Ethiopia, Mauritius, Nigeria, and Zambia (Davies, 2010). With the bilateral political commitment, China proposed that Zambia develop its first private Multi-Facility Economic Zone, Chambishi MFEZ, driven by the copper mining industry in the Copperbelt province (Zeng, 2016). From then on, several MFEZs have been established in Zambia, and minerals can be leveraged for or not for industrialization, returning to the center stage among academia, international agencies, and governmental officials.

6. 1 Multi-Facility Economic Zones (MFEZs) in Zambia

Before delving into the main aspects of the Multi-Facility Economic Zones, it is important to understand the definitions of a special economic zone in Zambia. As defined in the Investment, Trade and Business Development Act, 2022, a 'Special Economic Zone' means an area subject to unique economic regulations, including Multi-Facility Economic Zones, industrial parks, inter-country trade zones, and export processing zones (National Assembly of Zambia, 2022). Currently, Zambia has two types of special economic zones, commonly referred to as Multi-Facility Economic Zones (MFEZs) and Industrial Parks (See Table 5). To be specific, a Multi-Facility Economic Zone (MFEZ) is a Special Economic Zone (SEZ) defined as 'a special geographical region which has unique economic regulations compared to other areas in the same country' (ZDA, 2015).

MFEZs in Zambia were established under the ZDA Act No. 11 of 2006 (ZDA, 2006), and are broken down into two types, namely Production MFEZs (for manufacturing-related businesses) and Export Trade MFEZs (for commercial trading, warehousing, and many others to exploit export markets). It is envisaged that this approach will, through FDI, enhance the transfer of the much-needed knowledge and technology to local industries, a prerequisite for modern industrialization. If the MFEZs attract a critical mass of FDI, stimulate high-value-added manufacturing activities, and generate productivity spillover, their impact on industrial development in Zambia would be dependent on the domestic linkages created and the technology transfer achieved, both of which are a function of the local manufacturing absorptive capacity (Brautigam et al., 2018).

Table 5. Special Economic Zones in Zambia

MFEZ	Ownership	Original Country of Investors	Target Industries	Area (Ha)	Year
Jiangxi MFEZ	Private	Jianxi Interntiional/China	Agro-processing, Mechanical and electrical equipment, green energy, contruction, mining service facilities	2088	2023
Kalumbila MFEZ	Private	FQM/Canada	Mining service, light manufacturing, agro-processing, and logistics	97	2022
Roma Industrial Park	Private	CPD Investments Limited	Light manufacturing, assembly, warehousing, and other commercial activities	113	2011
Lusaka South MFEZ	State-Owned	Zambia government	Garments, Information Communication Technologies (ICT), household appliances, tobacco, beverages, agro-processing	2100	2010
Lusaka East MFEZ (ZCCZ)	Private	ZCCZ/China	Copper related industries, agro-processing, garments, electric, electronic, tobacco	520	2009
Lumwana MFEZ	Private	Barrick/Canada	Explosives, fishery, agro-processing, construction, electrical, electronics, chemicals, heavy machinery.	13000	2008
Chambishi MFEZ	Private	ZCCZ/China	Copper and copper related industries, appliances, motor parts, explosives	1158	2007
Sub Saharan gemstones Industrial Park	Private		Lapidary, plastic, paper pulp, non-ferrous metals, wood, manufacturing	130	2007

Source: Zambia Development Agency

Among the eight MFEZs, Chambishi MFEZ is a zone established to support and develop copper mine extraction and downstream industries. Chambishi is a mining area 420 km north of landlocked Zambia's capital, Lusaka, home to a major copper mine complex operated by China Nonferrous Mining Group (CNMC) since 1998. In 2003, CNMC began planning an adjacent industrial processing zone, which would comprise a smelter and ancillary factories. The zone was grounded in copper mining, aiming to form a non-ferrous metals mining and metallurgy industrial cluster, extend the non-ferrous metals processing industrial chain, and develop supporting industries and services to the non-ferrous metals industry. The zone developers highlighted an intention to add value to Zambian copper: "We want to add value to copper as much as we can to enhance Zambia's industrial base and create employment for Zambians" (Trademark Southern Africa, 2011). In 2011, the zone developers announced that they were seeking investment in specific categories, including electrical wire and cable, fertilizer, mine equipment, building materials, and fire-resistant materials (ZCCZ, 2011).

The Kalumbila Multi-Facility Economic Zone (MFEZ) is another newly established economic zone, located in the North-Western Province, where most of Zambia's mining activities are now shifting from the Copperbelt Province. In 2022, the Zambian government designated Kalumbila Town as a Multi-Facility Economic Zone (MFEZ), developed by the Kalumbila Town Development Corporation (KTDC), a subsidiary of First Quantum Minerals (FQM). FQM has invested over USD110 million in the planning and development of Kalumbila Town, to attract new entrepreneurs and existing local businesses in Lusaka and the Copperbelt to enable

North-Western Province to become the 'Copper Mining Capital of Africa' (Mumba, 2022). Currently, KTDC is in detailed negotiations with six different manufacturers to set up production within the Kalumbila MFEZ, in a designated 97-hectare industrial area. The initial investments will create a mining service cluster that supports mineral extraction – offering services such as surveying, drilling, consulting, logistics, and laboratory analysis - and extend to other related industries in the downstream sector (Mining for Zambia, 2022).

Historically, development experiences have demonstrated that state intervention plays a crucial role in creating and implementing policy instruments essential to transforming their economic structure from low to high productivity (Chang, 2002). In Zambia, the government is positively skewed towards promoting value addition to minerals, such as copper, through incentives in the mining sector. The government aims to increase copper production from 800 000 Mt to 3 million Mt per year by 2031, as espoused in the Eighth National Development Plan. To achieve this goal, the Zambia Revenue Authority offers various fiscal incentives for investment in the mining sector. For instance, one of those is a 25% deduction on mining capital expenditure for buildings, railways, equipment, or similar works, as well as zero-rating of capital on certain equipment and machinery when supplied to a large-scale mining license. This ambitious goal, combined with policies, further presents more investment opportunities in copper exploration, the supply of mining equipment and machinery, and other supporting services (Mining Sector Profile, 2024).

Fostering clusters has been proven a way to stimulate innovation and foster linkages. The establishment of MFEZ in Zambia extends beyond relying solely on mineral exploration and extraction. The projects located in the MFEZ that will qualify for incentives focus on eight manufacturing sub-sectors. One of the prioritized sectors is to link mineral processing to the downstream sector, producing high-value products for export overseas. In particular, as one of Africa's leading copper producers, producing 800,000 metric tons per annum, the Zambia Development Agency (ZDA) addressed the value-added aspects of copper for fabrication, smelting, and refining. Fiscal incentives were initiated to all sectors that are qualified for investing in MFEZ, including those involved in metallic and non-metallic processing and product beneficiation. For example, for the first 10 years, a zero percent tax will be imposed on their profits. From years 11 to 13, 50 percent of profits will be taxed, and from years 14 and 15, and 75 percent of profits will be taxed (Manufacturing Sector Profile, 2024).

Fiscal incentives are one of Zambia's policy instruments, which are expected to stimulate and encourage value addition on critical minerals such as copper, as a means of increasing national export earnings and creating employment opportunities. If implemented well, this will transform the domestic economy into a diversified, competitive, and industrialized economy. But this is not always the case. Instead of reducing tax rates, in 2025 corporate income tax rates were increased from 15% to 20% for companies engaged in manufacturing products from copper cathodes (IEA, 2025). As the Zambian government declared, this revision aims to capture more revenue from profitable industries while promoting reinvestment in sectors critical to Zambia's economic diversification (National Assembly of Zambia, 2022). However, the challenge confronting the government is that the midstream and downstream copper industries, such as copper cathode production, will be hindered by the increased tax rate. The capture of mineral resource rents through resource taxes and the re-investment of resource rents into human resource development, skills and R&D for technology development to capitalise on the resource linkages opportunities, our study revealed a lack of industrial policies aimed at maximizing revenue for reinvestment in key industries, thereby promoting economic diversification.

6.2 Transboundary battery and electric vehicle Special Economic Zones

To take advantage of the global demand for electric vehicles and power batteries, Zambia also aims to establish an industrial value chain closer to the production sites. This would lead to the emergence of an industrial ecosystem in the copper-rich region that covers mining, refining. In 2022, the DRC and Zambia signed a Common Governance Framework, called the 'DRC – Zambia Battery Council'. This common governance framework focused on establishing the electric battery and clean energy sectors in industrial zones in the DRC and Zambia, supported by multi-stakeholders such as Afreximbank, UNECA, and the ARISE Integrated Industrial Platform, which provided financial and technical assistance (Nsakaza and Maponga, 2025). To achieve transition from exporting raw minerals to producing EV batteries and vehicles locally, both governments have introduced reforms and financial incentives to encourage EV manufacturing. Zambia, for example, has removed all taxes on electric vehicles except for VAT and has waived VAT entirely for EVs manufactured locally.

The processing of minerals in the region would need to expand beyond copper and cobalt, on which DRC and Zambia's mining industries have focused. The manufacture of electric vehicle batteries requires the additional development of production chains for lithium, nickel, manganese, and bauxite (to produce aluminum). Notably, both the DRC and Zambia possess substantial reserves of several key battery minerals, including cobalt, lithium, and manganese (USGS, 2022). However, they have not established an industrial ecosystem for the processing of the entire range of these minerals. This may or may not be feasible within the region for special economic zones, and an entire regional approach (SADC) should be explored to determine what is economically viable. Most importantly, and related to the implementation of an integrated African economy initiative, the feasibility of an African battery industry should go beyond electric vehicles, to prioritize the continent's industrialization trends and the related demands for energy storage and electrification (Mususa and Shengo, 2024).

The favorable factors that incentivize Zambia and the DRC to build a battery minerals industrial sector hinge on their ability to leverage and navigate the complex geopolitical terrain characterized by the economic contest between the USA and China. The MoU signed with the USA, which came a year after DRC and Zambia's own cooperation agreement, was understood as an indication of the USA's interest in countering China in the region and in securing a critical mineral supply for its high-tech industries, which China dominates (Castillo and Purdy, 2022). A recent study indicated that two-thirds of the mining companies operating in the former province of Katanga have benefited from Chinese foreign direct investment. This poses a dilemma for the DRC and Zambia, as well as their cooperation with the USA and its allies, who have banded together through the Mineral Security Partnership (Ntumba et al., 2015).

How will DRC and Zambia mobilize these partnerships to build the Transboundary Battery and Electric Vehicle Special Economic Zone amid geopolitical rivalry, when the EU, the US, and Japan are seeking to secure the mineral supply chain and diversify away from Chin (Nsakaza and Maponga, 2025)? A complex picture emerges on the ground. While there are moves by both the governments of the DRC and Zambia to increase state participation in the mining sector (through, for example, joint ventures), the current trends in both countries are not inclined towards majority state ownership, in other words, a nationalized extractive industry (Mususa and Shengo, 2024). Zambia's special economic zones are under the administration of ZDA, and their regulations are subject to their national industrial development. Currently, there is no publicly available data on the location of the special economic zone. If it is situated on the border of these two countries, the DRC and Zambia will need to negotiate a set of new rules in operating the zone. A balance of shared benefits between the two governments, coupled with long-term and multiple obstruction from US, EU and China will need to be considered.

6. 3 Challenges for Special Economic Zone fostering Zambia's resource-based industrialization

Economies of scale and competition would be greatly enhanced by common regional (and, ultimately, continental) markets (customs unions). The success of an African resource-based development strategy would be dramatically compromised without it. Major challenges for Zambia include sustainability and maximizing the multiplier effects of SEZs through the effective integration of local suppliers in both backward and forward linkages. Some SEZs in Zambia were designed with mining in mind, but our case studies are not anchored on any strategic industry.

- Weak linkages between the zones and local firms

The provision of attractive incentives and benefits seeks to attract multinational companies (MNCs), which in turn transfer knowledge and technology to the domestic economy. In Zambia, many firms in the zones show interest in sourcing locally, such as those in the mining sector, which will help them reduce logistics and transaction costs. However, they found that most local SMEs cannot meet their requirements in terms of stable volume, quality and standards, etc. If local firms' productivity and quality can be improved, it will greatly help with the zone-local firm linkages. A usual concern with the development of SEZs is their inclusiveness and embeddedness in the host economies.

- Coordination mechanism among multi-stakeholders

Previous studies have argued that many African SEZs have experienced poor performance due to conflicting interests among governmental departments. This development may complicate the work of building the authority, capacity, and communications between people that an SEZ scheme needs, thus hindering coordination across government bureaucracies (Moberg, 2017). In Zambia, the resulting coordination failure among official departments can sometimes result in the creation of multiple, overlapping SEZ regimes. For instance, the two ministries involved, the Ministry of Finance, and the Ministry of Commerce, Trade, and Industry should speak with one voice on an agreed position instead of issuing conflicting decisions that only work to discouraged investors from setting up operations in the zone. There ought to be clear communication and coordination among government institutions to avoid overlapping decisions that adversely affect the operations of the zone.

- Inconsistent Policy incentives to attract the FDI

Fiscal and non-fiscal incentives are central to the design of SEZs; however, incentives are perceived to have been distorted in Zambia, and now arguably act as a constraint to attracting investors into the zones. Preliminary findings revealed that policy inconsistency existed from the initiation to implementation. When the Multi-Facility Economic Zone concept was introduced, incentives were announced for the benefits of investing in the SEZ, among other zones in Zambia. Our findings indicate that these have been eroded over time, with each annual budget address by the Finance Minister introducing policy changes. Following the expiration of policy incentives, there is no particular distinction in the type of incentives on offer to SEZ-based firms and non-SEZ-based firms. Many companies withdraw their investments and establish their own plant outside the zones, like Chambishi economic zone.

7. Conclusions

It has been debated for decades whether minerals bring African countries rich in resources a curse or a blessing (Auty and Warhurst, 1993; Auty, 2004). Africa accounts for much of the global reserves of minerals critical to the production of low-carbon technologies, creating opportunities to diversify the mining and processing of these minerals (Zero Carbon Analytics, 2024). A growing awareness raised from African governments is that there is an opportunity for Africa to leverage the demand for critical minerals to cultivate a growing industrial base and transform their economies into a productive structure.

The dominance of China in the critical minerals supply chain poses geopolitical and mineral security threats to Western countries, who are playing catchup as geopolitical rivalries driven by energy security intensify around the supply of critical minerals (Andreoni and Robert, 2022). Compared to traditional mining investors from developed countries, emerging economies, such as China and India, are reshaping the extraction landscape by investing in upstream to downstream industries related to the copper mine. The establishment of Multi-Function Economic Zones, as an industrial instrument, provides a possible way to develop manufacturing capability through copper wire production. To create industrial clusters in operating the zones, a long-term, stable, and consistent development strategy is essential in fostering a strategic partnership between the government and the private sector, as outlined in the government plans.

Regional economic integration and multi-state cooperation will be a key step in realizing the latent economic potential through resource-based industrialization, which would provide tangible benefits to all participating parties. The global transition to a low-carbon economy presents an opportunity for resource-rich African countries to leverage their critical minerals as a comparative advantage in developing industrial capabilities, such as the transboundary battery and electric vehicle economic zone in the DRC and Zambia. Only the future will tell whether the balance of local and international forces will permit the realization of an African resource-based industrialization and development strategy, which has the potential to unleash sustainable growth and development across the continent.

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