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## Can mining promote industrialization? A comparative analysis of policy frameworks in three Southern African countries

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WIDER Working Paper 2016/83

## **Can mining promote industrialization?**

A comparative analysis of policy frameworks in three Southern African countries

Judith Fessehaie, Zavareh Rustomjee, and Lauralyn Kaziboni\*

June 2016

**Abstract:** This paper explores the potential to leverage large-scale mineral extraction in Botswana, Zambia, and Zimbabwe to foster mineral beneficiation and upstream industries. The evidence suggests that the success or failure of a resource-based industrialization approach is country and sector specific, requiring the deployment of different and appropriately tailored policy instruments. We also find that the design and implementation of resource-based industrialization policies is heavily influenced by power relationships, in terms of control over mining rents, relationships between mining companies and domestic business, and across different segments of the domestic business sector.

**Keywords:** linkage development, supplier development, beneficiation, Southern Africa, resource-based industrialization

**JEL classification:** L5, L6, O1, O25

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## 1 Introduction

Many sub-Saharan African (SSA) economies are largely dependent on mineral commodity exports, which until 2015 benefitted from high world prices. Whilst SSA record of resource-based industrialization has been patchy and generally disappointing, the historical experience of many resource-rich countries elsewhere has shown that the mining sector can be leveraged to support broader industrial and technological upgrading. Important factors underlying these successful experiences include effective policy frameworks, which provided incentives for linkage development, catalysed investment in education, and granted access to foreign capital and know how.

This paper looks at the policies and strategies designed by Botswana, Zambia, and Zimbabwe to leverage their mining sectors to foster upstream and downstream linkage industries and support upgrading of technological capabilities. The literature on technological capabilities suggests that in developing economies, skills development, rather than Research and Development (R&D), provide the foundation to support technological upgrading. For this reason, this research focuses, among other issues, on the coherence between industrial policies and human capital investment in terms of engineering, technical, and vocational skills.

Botswana, Zambia, and Zimbabwe have well-established mineral sectors. In the past or present, these countries designed a variety of linkage development strategies and established training and research institutes related to mining. Apart from these shared features, the research uncovered important cross-country variations in terms of (1) breadth and depth of technological complexity of existing industrial sectors, (2) opportunities created by specific mineral commodities, (3) ambition and scope of industrial and linkage development strategies, and (4) institutional capabilities to ensure enforcement and coherence with other policies. These factors have resulted in different outcomes in terms of local upgrading trajectories and institutional coherence.

The paper is organized as follows: Section 2 consists of the literature review, while Section 3 provides an overview of the mining sectors in Botswana, Zambia, and Zimbabwe. Sections 4, 5, and 6 discuss the case studies of Zambia, Zimbabwe, and Botswana, respectively. In Section 7, we present a brief discussion of political economy issues emerging from the case studies. Section 8 concludes.

## 2 Literature review

Between 2000 and 2012, SSA's gross domestic product (GDP) growth rates per capita reached almost 3 per cent, a radical departure from the previous two decades (MacMillan et al. 2013). For most countries, this economic performance was underpinned by the commodity price boom. Whilst an optimistic view for the continent—the Africa rising narrative—has gained popularity, concerns over the poor record in terms of the continent's structural transformation have persisted. As a result, economic growth had a lower impact on poverty reduction compared to other countries such as those in South Asia<sup>1</sup> (Fosu 2014). Growth of the manufacturing sector needs to happen at faster pace to achieve high, sustained growth rates and structural transformation (MacMillan et al. 2013; Rodrik 2014).

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<sup>1</sup> South Asia is the only other region with historically comparable levels of poverty.

Productive linkages to the resource sector can be categorized in terms of forward and backward linkages. Forward linkages refer to industries processing raw materials while backward linkages refer to the production of inputs that are employed in resource extraction. Furthermore, lateral linkages refer to the provision of transport, communication, and financial services (Amoako-Tuffour et al. 2015). Resource-based industrialization, through the creation of these linkages, aims to maximize the benefits derived from commodities by reallocating labour and capital into the industrial sector (Morris et al. 2012).

The relationship between natural resource endowment and industrialization has historically been viewed with some scepticism. The most sceptical views include those by Prebisch (1950) and Singer (1950), dependency theorists (Girvan and Girvan 1970, 1973), and proponents of the *resource curse* argument whether from a political economy perspective (Auty 2001; Auty and Gelb 2001), or an economic perspective (Sachs and Warner 1995, 1997; and later Gylfason et al. 1999; Gylfason 2001; Isham et al. 2005). The latter identified Dutch Disease as a critical growth-reducing factor characterizing resource-rich countries (Sachs and Warner 1995, 1997). An in-depth analysis of this literature is beyond the scope of this section; however an important finding highlights the role of institutions in explaining the resource curse. Firstly, policies can be implemented to offset the Dutch Disease effect, yet many developing countries have failed to adopt them prompting the research question ‘why’ (Ross 1999; Rosser 2006). Secondly, studies found that weak institutions explain the poor performance of resource-rich countries such as capital market imperfections, low levels of human capital, and weak knowledge systems (Gylfason 2001; de Ferranti et al. 2002; Stijns 2005; Lederman and Maloney 2006).

Economic historians have reviewed the experience of resource-rich countries and concluded that technology, skills, knowledge, and policies are instrumental in the success of resource-based industrialization. Indeed, these factors have enabled the expansion of the natural resource sector, by improving resource discovery, resource extraction, and resource processing technologies and processes, as well as moved the countries into new industries related to the resource sectors. The experiences of Scandinavia, Australia, and the United States (US) provide key learnings for resource-based industrialization, which can be adapted and tailored to SSA (David and Wright 1997; Wright and Czelusta 2007).

In observing Sweden’s export boom of cereals and sawn wood and later, pulp, paper, and iron ore from the mid-19<sup>th</sup> century, Blomström and Kokko (2007) explained that Sweden progressed from adopting foreign technology, to adaptation and subsequently innovation. This technology transfer was made possible through previous investments in dynamic domestic knowledge clusters. Such clusters were comprised of networks of private sector-led research institutes, universities, firms, and public investment in industry-oriented skills formation. A similar trajectory characterized Finland, which underlined Nokia’s successful move from pulp and paper milling into cellular technology. By upgrading materials, products, and processes, Scandinavian resource-based industries, including capital equipment suppliers, maintained their competitiveness over time and against new low cost competitors.

In the 19<sup>th</sup> century, Norway’s endowment of fisheries and forestry led to the development of significant forward and backward linkages, such as pulp and paper machinery manufacturing, and logistics and shipping industries (Andersen 2012). Foreign capital and skills played an important role in the early stages, whilst state ownership of natural resources became more important later on. Oil and gas reserves were discovered after the Second World War and at that time, the country lacked knowledge and capabilities to explore, process, or distribute the oil and gas. Policies and strategies were thus designed to develop domestic knowledge through organized learning and technology transfers via Statoil, a parastatal. Tertiary education and public procurement were also aligned to developing local skills, services, and manufacturing capabilities.

This allowed the restructuring of dilapidated shipyards belonging to manufacturing companies into oil-related capital equipment producers (Andersen 2012).

Resource-based industrialization also played an important role in the US. In the 20<sup>th</sup> century, manufacturing was focused on iron ore, coal, lead, nickel, zinc, antimony, copper, and oil (Wright and Czelusta 2007). Research, innovation, and technology enabled resource extraction and beneficiation. In addition to these drivers, an accommodating legal environment, investment in infrastructure of public knowledge such as the US Geological Survey, and education in mining, minerals, and metallurgy played a key role in the success of resource industrialization (Andersen 2012).<sup>2</sup>

Australia is a relative latecomer among resource-rich countries, with mineral extraction of bauxite, nickel, silver, copper, and gold dating back to the 1960s. To compensate for the lack of mineral-related capabilities, Australia undertook massive investment in engineering education, training, and R&D where mining R&D accounted for 20 per cent of total R&D in 1995/1996 (Wright and Czelusta 2007). Today, Australia is a world leader in mining software systems, home to global mining exploration ventures, and an important global supplier of high-tech services and equipment to meet the demand for safer and cleaner mineral extraction and processing processes.

The country experiences reviewed above highlight that investment in domestic technological capabilities underlined the success of resource-based industrialization (downstream, upstream, and horizontal). Investment in education and training especially engineering and vocational skills; strong public-private partnerships, and alignment of different policy tools, including industrial strategy ones, emerge as recurrent factors. Ultimately, these hinged on the countries' policy frameworks and institutional capabilities.

Rodrik (2014) argues that developing linkages to the natural resource sector could be one of the options for SSA to move into an accelerated and sustained growth scenario. However, he argues, this strategy is difficult and not many countries have succeeded. The recent commodity price boom has indeed highlighted that a number of institutional factors need to be addressed. These range from inadequate tax regimes and financial mismanagement, to weak investment in human and physical infrastructure, to poor institutional capabilities (Morris and Fessehaie 2014; Ramdoo 2015). Hence SSA needs to bolster institutional capabilities to leverage the resource sector so that it supports industrialization. The opportunities for the development of downstream and upstream industries, which hinge on technological innovation, advancement of skills, and capital accumulation, are country- and sector-specific (Andersen 2012; Morris et al. 2012; Morris and Fessehaie 2014).

In Africa, local content policies have been a very popular policy instrument to support upstream linkage development (Amoako-Tuffour et al. 2015). These require that the specified final product be composed of a certain proportion of domestic value added or components.<sup>3</sup> The impetus for local content policies stem from three arguments: infant industry protection (providing incentives and protection to new industries until they can compete on an equal foot), market power (market dominance or buying power by international players can curtail entry by

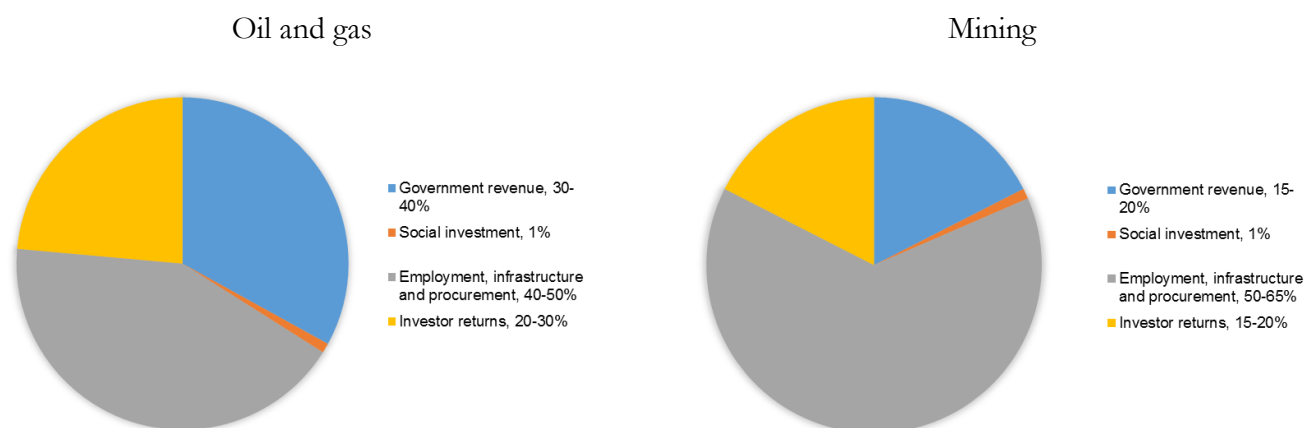
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<sup>2</sup> By 1917, the US had more than 7,500 mining engineers in the country.

<sup>3</sup> More recently, the concept of local content policy has been broadened to include other factors beyond value addition (Amoako-Tuffour et al. 2015). The AfDB (2014) defines local content under four themes, namely purchases from local supplies of goods and services; the employment of local staff; investment in local enterprise development; and social responsibility support local economic development.

small domestic players), and social compensation (social benefits to offset environmental impact of extractive industries) (Melitz 2005; Ado 2013).<sup>4</sup> The average composition of oil and mining industry expenditures in Africa are illustrated in Figure 1. Between 40 per cent and 65 per cent of total expenditures is directed at employment, procurement, and infrastructure, which highlights the potential for local upstream linkage development (AfDB 2014).

Figure 1: Average distribution of spending in extractive projects in Africa



Source: AfDB (2014).

Over time, a number of best policy practices have emerged. The plausibility and variability of the content protection structure is contingent on factors such as substitution possibilities in production, the conditions of supply in the domestic industries, and the market structure of the product (Grossman 1981). Hence local content policies should gradually target more complex goods and services, focusing first on the low hanging fruit where there are existing, albeit weak, capabilities (Morris et al. 2012). Local content policies should be accompanied by complementary measures with interventions to raise productivity of supply firms. If local supply firms are not competitive, they may hamper the performance of the mining companies (Grossman 1981). The design should be carried out in multi-stakeholders fora, leveraging strong buyer-supplier cooperation and effective monitoring mechanisms (Morris et al. 2012). The relative success of suppliers of oil sector fabrication and construction in Nigeria can be ascribed to a combination of the aforementioned policy recommendations (Oyejide and Adewuyi 2011).<sup>5</sup>

The same holds true for forward linkages development policies, such as export taxes or incentives to processing industries. These need to be supported by complementary policies targeting competencies of processing industries. Processing industries need to be (or at least aim to become) globally competitive in terms of market drivers such as price, quality, lead times, and dynamic innovation capabilities. Firms in these value chains also have to comply with a variety of technical, private, health, and environmental standards that are set by lead firms or domestic and foreign buyers. Linkage development is thus a progressive and cumulative process, and requires continuous investment in, among others, technologies, R&D, and skills (African Union and Economic Commission for Africa 2013).

<sup>4</sup> Failure to meet the specified requirements has traditionally resulted in a penalty being imposed on intermediate imports or other sanctions (Grossman 1981).

<sup>5</sup> Over time, local content in the Nigerian oil industry has increased from 3–5 per cent in the 1970s, to 20 per cent in 2004, and 39 per cent in 2009 (estimates by Oyejide and Adewuyi 2011).

The relationship between mining, manufacturing, and services is critical and opens important opportunities for countries to move into high value added and productivity enhancing services activities. Whilst mining operations open localized opportunities in low value added services, such as gardening, cleaning, and safety, where SSA suppliers have usually registered high levels of participation (Morris et al. 2012), there are services where local participation has been more limited. In terms of engineering services, local participation in SSA is relatively successful in civil engineering, but more limited in mining engineering, specialized services (environmental, safety) and Engineering, Procurement, Construction, and Management or *turnkey* contracts. Mining exploration services have also seen low levels of localization. Mining and mining-related manufacturing activities require complex services related to, among others, finance, transport, logistics, and quality assurance. These tend to be dominated by large foreign services companies.

The above-mentioned services are important for the industrialization trajectory of SSA because they are amongst the highest value added segments of the mining supply chain, can catalyse investment in skills development, and technology transfer, and once domestic capabilities are established, these services can support growth in other sectors of the economy, including manufacturing.

Poor implementation of linkage development policies has been a common problem in Africa (Ado 2013). The private sector has often been too weak to respond to policy incentives and local demand (Ramdoo 2015). Finally, as regional economic integration gains momentum, it is obvious that linkage development policies in Africa are often designed without considering the potential of regional value chains as markets and source/destination of investment projects (Fessehaie 2015). Research on linkage of development strategies in SSA is however limited, especially with regard to recent experiences and different approaches adopted by countries since the commodities boom.<sup>6</sup>

### **3 Mining sector in Botswana, Zambia, and Zimbabwe**

Mining has played a fundamental role in the economic trajectory of post-independence in Botswana, Zambia, and Zimbabwe.

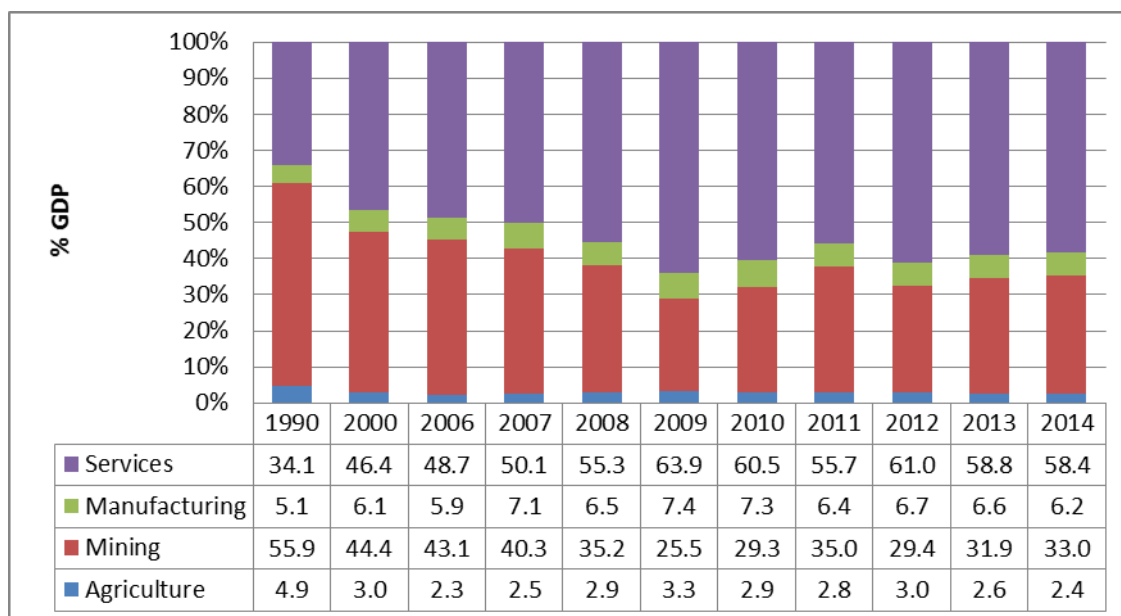
Botswana's mineral sector is dominated by diamond production. Although it is still the largest productive sector, contributing 33 per cent of GDP in 2014, its share has declined by 23 per cent since 1990 (Figure 2). The services sector has grown quite substantially, from 34.1 per cent of GDP in 1990 to 58.4 per cent in 2014. Botswana's economy has evolved around diamond extraction with current efforts aimed at leveraging linkages and diversifying out of resource dependence. In earlier decades, Botswana's government leveraged its unique position as the world's largest gem diamond producer by establishing a strategic relationship with De Beers in a 50–50 per cent government–De Beers joint venture (JV) called Debswana. The JV is the largest corporate entity in Botswana and the largest procurer of goods and services after government. The considerable resource rents have historically been managed effectively by investing in human resources and infrastructure.

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<sup>6</sup> A recent contribution in this area has been the Making the Most of the Commodities Programme (MMCP) (Morris et al. 2012).



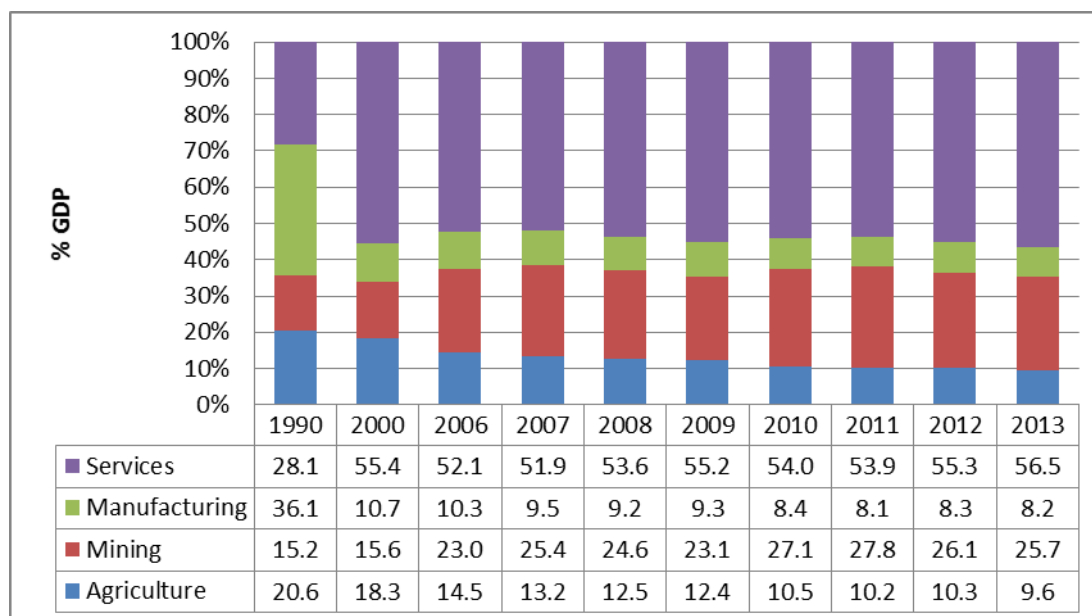
Figure 2: Botswana—Sectoral composition of GDP



Source: World Bank (2016).

Unlike Botswana, Zambia's mining sector contribution to GDP has increased by more than 10 per cent between 1990 and 2013, due to the commodity price boom and production expansion in the second half of the 2000s. During the same period, the contribution of the services sector has also increased by 100 per cent to 56.5 per cent (Figure 3).

Figure 3: Zambia—Sectoral composition of GDP



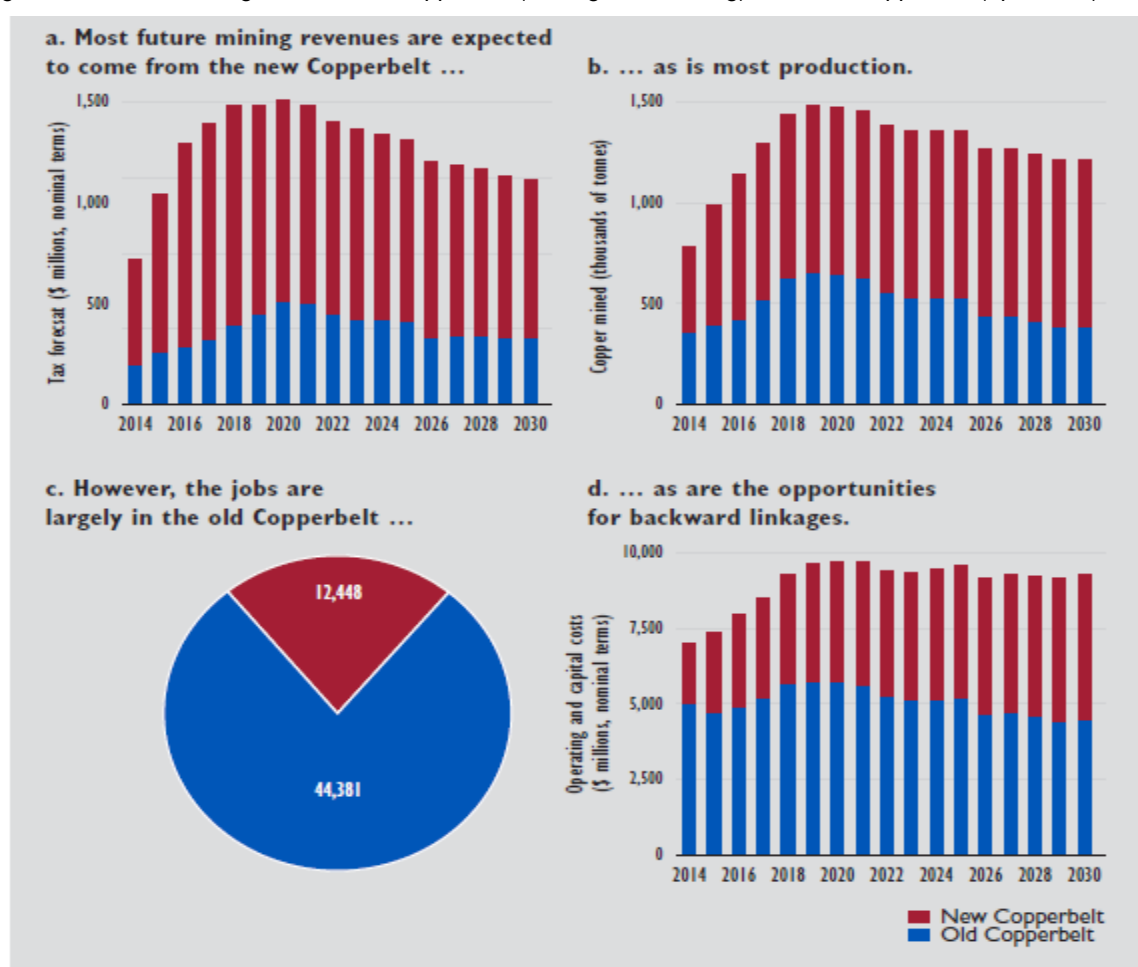
Source: World Bank (2016).

Zambia's mining sector is largely based on copper, with smaller output of cobalt, nickel, gold, and others. Traditionally, the mining sector was characterized by underground mines in the Copperbelt. Since 2000, new mining and associated infrastructure investment has been targeted in the Northwest Province, which utilizes capital-intensive open cast mining techniques. As a

result, the old Copperbelt is becoming less important in terms of revenues and output, even though it remains the largest source of employment (Figure 4).

The current environment of lower commodity prices has impacted more adversely on the old Copperbelt underground mines whose cost structure is more labour-intensive and dependent on a wider range of domestically and imported manufactured inputs. Conversely, the opencast mines costs are largely associated with imported earthmoving machinery, spare parts, and diesel fuel, which benefits from the fall in global oil prices. Rising domestic electricity costs and unstable supply in 2015 has impacted the smelting operations of both openopen castcast and underground mines. It should be noted that the older, more vulnerable, and (currently) marginally profitable underground mines of the old Copperbelt offer greater potential for utilizing mining sector procurement expenditure to deepen domestic manufacturing (First Quantum Minerals 2015; Vendanta Resources 2015).

Figure 4: Zambian mining sector—Old Copperbelt (underground mining) and New Copperbelt (open cast)

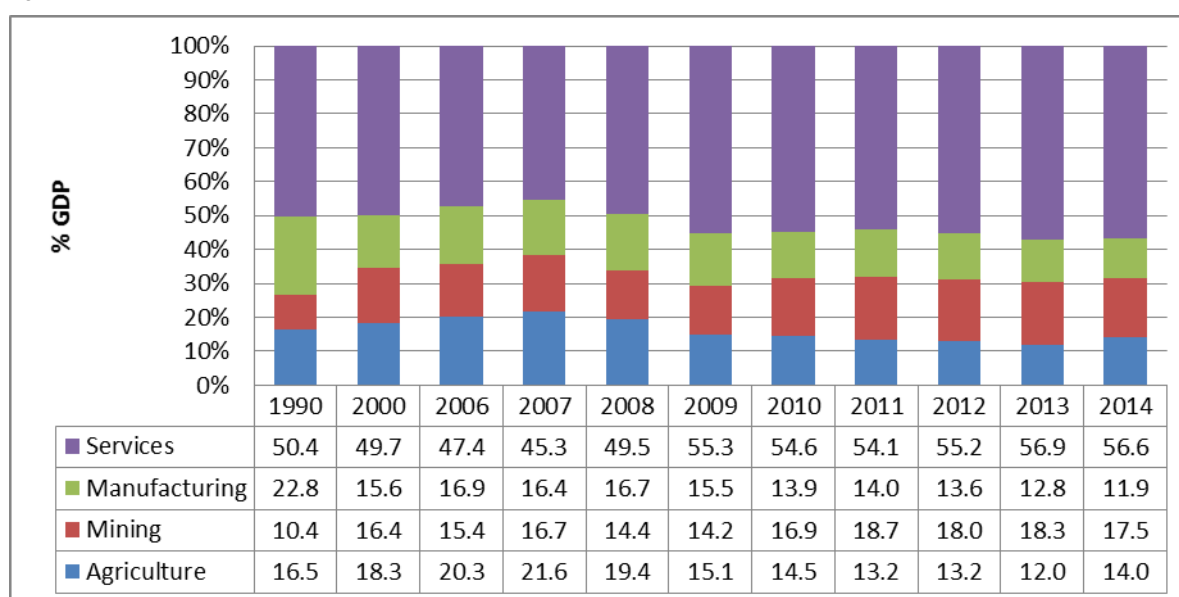


Source: World Bank (2015).

Zimbabwe's mining sector contribution to GDP is lower than Botswana and Zambia hovering between 10.4 per cent and 18.7 per cent between 1990 and 2014. Since 2000, its relative contribution to GDP has been higher than in the previous decade. Zimbabwe's mining sector produces around 40 commercial minerals. The main products include platinum and diamonds while a small proportion of these are beneficiated. The services sector in this economy is also quite dominant estimated at 56.6 per cent in 2014.

The structure of Zimbabwe's economy has changed considerably since the economic crisis. While it used to be a highly diversified economy, since 2000, dependence on the mining sector has increased significantly relative to the manufacturing and agriculture industries. In addition, there is high export concentration, mainly due to the collapse of the agriculture and manufacturing industries (Hawkins 2009). The mining sector has undergone significant changes. The industry used to be dominated by gold and small-scale production of more than 40 minerals, but is now led by large-scale platinum production and to a less extent diamonds (World Bank 2014). Because of the uncertain investment climate, mining output and investment are below potential, with insufficient investment in recapitalization of the mines, greenfield projects of known deposits, and exploration (World Bank 2014).

Figure 5: Zimbabwe—Sectoral composition of GDP



Source: World Bank (2016).

Figures 2, 3, and 5, depict the sectoral composition of GDP among the three countries and illustrate that, services are the largest contributor to GDP, growing particularly fast in Zambia (by 28 per cent during the period 1990–2013) and Botswana (24 per cent in 1990–2014). The growing importance of services has not contributed to structural transformation of these economies because labour moved to low productivity service sectors (government, community services, wholesale, and retail), whilst high productivity sectors, which are high skills intensive, are not absorbing large shares of the labour force. Indeed, the highest value-added services related to mining and manufacturing (engineering, logistics, etc.) have seen relatively low levels of localization in the three economies.

At the same time, according to World Bank (2016) data, the manufacturing sector continues to underperform. In Zambia and Zimbabwe, the manufacturing sector contribution to GDP has declined compared to 1990 and 2000 levels. In Zambia, it declined from 36.1 per cent in 1990, to 10.7 per cent in 2000, to 8.2 per cent in 2013. In Zimbabwe, it declined from 22.8 per cent in 1990, to 15.6 per cent in 2000, to 11.9 per cent in 2014. Botswana's contribution remains stagnant, increasing its contribution to GDP by 1 per cent between 1990 and 2000, and by 0.1 per cent between 2000 and 2014. These dynamics highlight how important it is to promote formal manufacturing activities to create employment and value added. For this reason, all the countries analysed are engaging with linkage development strategies aimed at building upstream

and downstream industries to mining. The next sections review these strategies country by country.

#### **4 Developing upstream linkages in Zambia**

Developing upstream and downstream linkages to copper mining has been a feature of Zambia's industrial policy ambitions since the 1970s. Copper beneficiation has been mainly undertaken by the Metal Fabricators of Zambia (ZAMEFA), which passed through different stages of ownership (from private to state-owned and then private again in the 1990s). The main policy instrument used to support beneficiation has been foreign direct investment (FDI) promotion, through the setting of legislation granting fiscal and non-fiscal incentives to foreign investors. Chinese investors responded to these incentives by building an industrial park in Chambishi (Copperbelt Province) in 2007.<sup>7</sup> The investment targets copper semi-fabricates manufacturing, but interviews with the Ministry of Commerce, Trade and Industry (MCTI) in early 2016 suggest that this project is still in the pipeline. Policy developments around upstream linkage development on the other hand have been more complex and involved a multitude of institutional and private sector actors.

Following the nationalization of mining assets by the state in 1969, upstream linkage development became a critical component of Zambia's industrialization strategy (Fessehaie 2012). This was pursued through a combination of direct state ownership, preferential procurement from the state-owned Zambia Consolidated Copper Mines (ZCCM), import substitution industrialization, and intense linkages between ZCCM, its suppliers, and public research and training institutions. These policies were partially successful. They supported the development of a manufacturing sector, which tapped into a skilled local workforce where the extensive technical and vocational education system and programmes sponsored by the mining sector played a key role. The cluster however was characterized by low levels of competition and weak R&D, and suppliers often fell below international standards.

Zambia's manufacturing capabilities in the mining supply chain were largely eroded during the 1990s, with the privatization of mining assets and the introduction of trade and investment liberalization measures (Fessehaie 2012). The private mining companies moved away from local procurement policies and largely relied on direct imports and sourcing from a large network of local agents and subsidiaries. Even though a few supply firms seized the opportunities of a larger customer base through upgrading and specializing, a large part of Zambia's manufacturing base has been replaced by small-scale importers. Zambia's inputs cluster is hampered by (1) operation of outdated equipment, (2) lack of RDI capabilities, (3) weak quality assurance mechanisms, and (4) high-cost inputs and business operating environment (Fessehaie 2012; Kasanga 2012). Costly access to long-term capital to refinance production infrastructure, and to maintain large stocks of inputs and spares in order to supply within short lead times has also been a major challenge. Firms operate in a high cost environment, exacerbated by variable foreign exchange rates. Lack of skills at technical and tertiary levels has also worsened firms' competitiveness.

Previous research has shown that firm ownership matters for local supplier development (Fessehaie 2012; Fessehaie and Morris 2013). In the late 1990s and 2000s, the ownership

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<sup>7</sup> NFCA from China, although relatively small in terms of copper output, has been fast-growing and has invested in the Chambishi Zambia-China Economic and Trade Cooperation Zone (ZCCZ), a US\$800 million-worth investment, inclusive of the Chambishi Copper Smelter, acid plants, as well as a copper semi-fabricates manufacturing plant.

structure of Zambia's copper sector became heterogeneous, with the entry of mining houses from Canada, Europe, Australia, China, and India (Table 1) who currently dominate the mining sector, with state-owned ZCCM holding minority stakes. Chinese and Indian mining companies have generally been reluctant to engage in formal or informal mechanisms of local supplier development.<sup>8</sup>

Table 1: Zambia— Mining industry ownership and employment structure

Operation	Ownership (2014)	Direct Employees (2014)
Albidon (Z) Ltd	-	63
Chambishi Copper Smelter	CNMC 60%, Yunnan Copper Group 40%	1,600
Chambishi Metals Plc (Main, West, & SW); Luanshya (Baluba Center, East, North, and South and Muliashi North)	CNMC 85%, ZCCM-IH 15%	741
Chibuluma Mines Plc	Jinchuan Group 90%, ZCCM-IH 10%	602
Kansanshi Mining Plc (Kansanshi & Sentinel)	First Quantum 80%, ZCCM-IH 20%	4781
Konkola Copper Mines Plc (Konkola, Nchanga, and Nampundwe)	Vedanta 79.4%, ZCCM-IH 20.6%	7,000
Lubambe Copper Mines	VALE 40%, Africa Rainbow Resources 40%, ZCCM-IH 20%	1,200
Lumwana Mining Co.	Barrick Gold 100%	1,882
Mopani Copper Mines Plc Nkana; Mufulira Mine, concentrator, smelter, and copper refinery in Zambia.	First Quantum 16.9%, Glencore 73.1%, ZCCM-IH 10%	10,000
NFC Africa Mining	CNMC 85%, ZCCM-IH 15%	1,064
Sino Metals	-	-
Total	-	28,993

Source: Sikamo (2014), ZCCM-IH (2014), ENRC (2016).

#### 4.1 Increasing public pressure for mining local content measures

In recent years, pressure to develop upstream industries to the mining sector has increased. The International Council on Mining and Metals (ICMM) estimated that domestic manufacturers supplied very little share of Zambian mining inputs (ICCM 2014). Although the mining companies report very high figures for 'domestic' procurement (around 80 per cent), much of this (95 per cent) represents goods that are not manufactured in Zambia. Extrapolating from data from four large mining companies, the total industry procurement of goods was estimated to be around US\$1.75 billion annually, of which 5 per cent (or US\$87 million) represents locally manufactured goods (ICMM 2014). Interviews at the MCTI and industry bodies indicate that manufacturing firms supplying the mining companies are closing down due to lack of orders. The reasons for this are nuanced.

Industry players reason that a key challenge for local suppliers' competitiveness is weak entrepreneurship skills. The old generation of entrepreneurs who established themselves during the import substitution industrialization regime now show low levels of dynamism in marketing and finding new business opportunities and clients. Some firms are not competitive and they are characterized by high finance costs, low technological capabilities, and are unable to meet standards.

In addition to the inability to meet industry standards for various reasons, interventions in the capital market to ease access to working and investment capital have been insufficient so far.

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<sup>8</sup> Many Zambian and regional suppliers have however been able to do business with the Chinese mining companies (Fessehaie and Morris 2013). These firms supply critical equipment and are highly competitive.

Firms face high interest rates since commercial banks are risk-averse when dealing with manufacturing firms and small-to-medium enterprises SMEs. Attempts to re-capitalize the Development Bank of Zambia (DBZ) have not produced results. On the certification side, there has been significant international donor support. The Zambia Bureau of Standards has more than 1,000 standards, and new testing and metrology laboratories, some of which are applying for accreditation from the Southern African Development Community (SADC) accreditation system (SADCAS). However, firms requiring certification from an internationally accredited body still have to incur significant expenses and use specialized services from Alfred Knight—accredited by the United Kingdom (UK) Accreditation Services—or general services from the South African Bureau of Standards (SABS).

The Zambia Association of Manufacturers (ZAM) alluded to information asymmetry among the relevant stakeholders. Procurement departments of the mining house lack knowledge of what is locally available, and potential suppliers do not know how to access procurement opportunities by the mining sector. For example, ZAM reports that in 2013, in Kalumbila, it interacted with mining procurement managers who were unaware of local manufacturing of roofing sheets. Yet roofing sheets manufacturing has been very significant, with Kafue Steel exporting 40 per cent of its sales to South Africa. Information gaps are partly due to supply managers who are not exposed to the companies based in Lusaka. The structure of the value chain is also such that mining houses outsource procurement of an entire category of supplies to a solution provider. These solution providers procure from global suppliers, with whom they have established relationships, excluding domestic manufacturers in this process irrespective of their performance. Across interviews with several respondents, there is an overall perception that mining companies are not committed to local sourcing because they prefer to source from their home countries.

Whilst civil society and government have so far focused on taxation and labour issues, local content is becoming increasingly important in the public debate. The Mines and Mineral Development Policy (2013) aims to address the issue of local content. A number of high level statements were made over the need to develop local upstream industries. In 2013, the Vice President of Zambia told investors attending the Zambia International Mining and Energy Conference and Exhibition in Lusaka that ‘our interest is to provide an enabling environment where people become full beneficiaries of the minerals by having access to jobs, fair payments of taxation and this can only be done through local content initiative whereby Zambians start playing a key role in adding value to minerals’ (TST 2013). This was also reiterated by the Central Bank Governor in 2013 (Gondwe 2013; TZ 2014). Despite the increased attention on local content, stakeholders have failed to produce a coherent policy approach in this area.

## **4.2 Policy framework**

Zambia’s economic development is driven by the National Vision 2030, which sets the country’s aspiration to be a prosperous middle-income country by 2030 (GRZ 2006). The economic development agenda is operationalized in five year-National Development Plans (TST 2013). The Sixth National Development Plan (SNDP), 2011–15, sets general objectives in terms of industrial development, including increasing mining value addition and establishing metallurgical processing facilities for copper and ferromanganese. The SNDP also focuses on facilitating the up-scaling of the manufacturing sector towards higher value addition. This is pursued particularly through Multi-Facility Economic Zones, JVs with local investors, micro, small, and medium enterprises (MSMEs), and rural-based industrial enterprises. Compared to previous National Development Plans (NDPs), which focused on economic diversification away from the mining sector, the SNDP aims to leverage mining for industrial development. This shift may reflect very real concerns on how to maximize the impact of the commodity price boom on local economic

development, but also awareness that a strategy based on export orientation and FDI promotion as espoused in previous NDPs may not deliver sufficient investment in manufacturing.

At sectoral level, there are three policies supporting industrial policy in Zambia. The Commercial, Trade and Industrial (CTI) Policy adopted in 2008 identified six priority sectors namely processed foods, textile and garments, engineering products, gemstones, wood products, and leather products (GRZ 2008). This was followed by the Strategy Paper on Industrialisation and Job Creation in 2012, designed by the Cabinet and to be implemented by a coordination unit in the Office of the President. The objective is to create one million new formal sector jobs between 2012 and 2017 through growth in agriculture, tourism, construction, and manufacturing. One of the strategic issues raised in the strategy is enforcing sourcing of locally manufactured engineering products by the mining companies and operationalizing Section 13 of the Mines and Minerals Development Act to support local manufacturing and procurement in the mining sector.<sup>9</sup> In April 2012, the MCTI in collaboration with Japan International Cooperation Agency (JICA) released a strategy for the engineering manufacturing sector (GRZ 2012). Within the engineering sector, copper fabrication and iron and steel products have been expressly identified by the MCTI as presenting opportunities for accelerated growth.

Interviews with key stakeholders highlight three aspects of industrial policy-making that are constraining the development of a coherent strategy for upstream linkage development.<sup>10</sup> These are: (1) lack of clear policy objectives; (2) lack of coherence between various policy instruments and organizations; and (3) poor implementation capability. We discuss each of these issues in turn.

#### *4.2.1 Lack of clear policy objectives*

The three policy instruments do not visibly prioritize linkage development. Firstly, the CTI Policy did not consider local suppliers to the mining sector, notwithstanding the fact most manufacturing capabilities in the Copperbelt were present at the time the policy was drafted. Secondly, even though the 2012 Strategy made reference to the local content provisions of the Mines and Minerals Development Act, the large number of sectors and sub-sectors identified do not result in a prioritization process, which gives clear guidance at ministerial level. Finally the Engineering Sector Strategy was not linked to opportunities supplying the mining sector rather construction, according to interviews with Ministry officials.

Zambia's policy framework supports local manufacturers with other instruments but again the focus is not on local suppliers. The Zambia Public Procurement Act grants preferential treatment to local manufacturers, but does not apply to the mining sector. The government has not leveraged its 10–15 per cent shareholding in individual mining companies to promote issues such as local content. This was raised by several respondents as a 'lost opportunity'. The Citizen Economic Empowerment Commission Act envisaged promotion of 'indigenous' businesses with a similar approach to South Africa's Broad-Based Black Economic Empowerment (BBBEE). However this Act has been ill designed. According to several respondents, the focus is on indigenous ownership rather than local value addition. There is no development of a sectoral chart and there is incomplete implementation of the scorecard system. MCTI is putting pressure to change the system to support local industrialization instead of ownership.

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<sup>9</sup> Private Sector Development Reform Programme was established in 2005 by the government as a framework to improve the business environment.

<sup>10</sup> For a list of interview respondents, please refer to Appendix 1.

A more explicit focus on local content can be found in the *Proudly Zambian* campaign, with policy makers currently focusing on defining local content, and possibly changing the nature of this instrument into a mandatory regulation. Policy makers envisage a fixed local content threshold, applicable to all large companies, including mining houses. The use of such a simple and blunt instrument may arise due to frustration with previous approaches to local content, which relied on best endeavour provisions and voluntary collaboration of the private sector. Under the bilateral development agreements signed by government with the individual mining companies, there were local business development requirements, which have been largely dismissed and not systematically monitored.

#### 4.2.2 *Lack of coherence between various policy instruments and organizations*

There is need for alignment between local content development to existing trade and investment policies, however, at the moment this is not the case. FDI promotion is the most important policy instrument promoted by the main piece of legislation for industrial development, the Zambia Development Agency Act (2007) (GRZ 2007). The Act includes the establishment of the Zambia Development Agency (ZDA), an implementation body. However, the area that received more attention at political and institutional levels was incentives for investors and the establishment of Multi-Facility Economic Zones (MFEZs).<sup>11</sup> These are areas in which the government offers improved infrastructure (physical, utilities, and services) with firms that invest more than US\$0.5 million, thus qualifying for fiscal and non-fiscal incentives. ZDA grants investors duty-free import and value-added tax (VAT) deferment for five years for machinery and equipment. In theory, the ZDA Act permits withdrawal of duty free incentives once local production of manufacturing equipment is underway. On the other hand, officials argue that this has not really been implemented. For example, Hitachi has made substantial investments in local equipment assembly but the duty free incentives have not been withdrawn. Moreover, there is a concern that changing the duty free incentives may discourage investors creating uncertain *ex-post* conditionality.

Moreover, imports of spares and components are subject to Zambia's national tariff schedule and attract duties. This tariff structure discourages investment in local assembly operations, and is an issue of concern in the industry. This motivates a more complex approach with some locally manufactured components requiring some level of protection, and others being allowed duty free. The call for a more complex and strategic design of the import tariff schedule however has been met with some diffidence from institutions responsible for imposing and collecting import tariffs. The structure raises their concerns in terms of monitoring what feeds into assembly operations and what is sold at retail level.

Interviews also highlighted a level of incoherence between organizations.<sup>12</sup> Whilst MCTI is looking at mandatory local content provisions, ZDA is focusing on light manufacturing and agro-processing, which indeed have performed very well recently. The institution favours a gradual, targeted approach to localization rather than blunt local content targets. According to this approach, early wins and simpler products should be identified first, and then upgrading programmes should be developed around these. In line with this, an incubation centre is being set up in the Copperbelt for suppliers to feed into the mining sector, especially focusing on engineering and entrepreneurship skills. The agency will target MSMEs, and light engineering

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<sup>11</sup> The ZDA Act also includes provisions on privatization, priorities for trade and industry development, investment promotion and protection, Micro and Small Enterprise development, and the establishment of the Trade and Industrial Development Fund.

<sup>12</sup> For a list of interview respondents, please refer to Appendix 1.



under the initiative, Copperbelt Economic Diversification programme. The initiative receives funding of US\$3–5 million per year and is supported by the Copperbelt Development Foundation and ZDA.<sup>13</sup>

The government emphasis on FDI has been partially successful: according to interviews with Ministry officials, four MFEZ's and two industrial parks have been established to date with three more to be established by the private sector (Chambishi, Lumwana, and Lusaka East), and one by the public sector (Lusaka South). The industrial parks (Roma Park in Lusaka and sub-Sahara Park in Ndola focusing on gemstones) are both owned by the private sector. Respondents reported that in 2015, the Chambishi MFEZ attracted 38 Chinese manufacturing companies while Lusaka East had 10. In 2008–09, through investment promotion in Japan, Zambia attracted Hitachi to invest in a re-manufacturing facility to supply Zimbabwe, Botswana, Tanzania, and Democratic Republic of the Congo (DRC). The facility is located on government land. The trading arm of Toyota, Toyota Tsusho, also set up a re-manufacturing facility on a smaller scale compared to Hitachi. Policy makers interpret these investments positively; however, the recent fall in manufacturing FDI has negatively impacted local industrialization with government having little leverage on enforcing conditions.

Part of the problem is that Zambia has not invested in complementary policies to ensure that FDI impacted positively on the broader industrialization process. For example, investment in technical skills has lagged behind, leading to the situation where firms in the MFEZs struggle to access skilled and/or trained labour. Moreover, there has been no incentive for local manufacturers to upgrade their technological capabilities. Companies have not received soft loans or incentives to upgrade skills or machinery. This is likely to marginalize these firms from the supply chain of the MFEZs firms and will make it difficult to compete.

#### *4.2.3 Poor implementation capability*

The 2008 Commercial, Trade and Industrial Policy was not implemented and after some years, the MCTI undertook a policy review process in order to split the different components into separate policies. The Engineering Strategy includes 20 action plans over eight strategy components, to be completed by 2017. However, at the time of fieldwork in 2015, implementation had not started hence timely implementation seems improbable. Zambia spent considerable resources in designing industrial policies and strategies, with a poor track record on implementation. Under-resourced departments and lack of unequivocal support from the highest political level have been important underlying reasons.

In spite of the emphasis on industrialization, active responses are not reflected in higher budgetary resources for the ministry, ZDA, nor key agencies in charge of technical skills or SME technology upgrading. Some of the funding constraints have been addressed through international donor participation. United Nations Industrial Development Organization for example, developed Zambia's national quality infrastructure policy (standards, conformity assessment, metrology), whilst United Nations Development Programme supported national industrial policy design, and capacity building for SMEs (mobile testing laboratory for the Eastern Province). In most instances, the priorities of international donors are reflected in what is implemented. Lack of finance is exacerbated where underfunded agencies focus on new programmes that require new funding and support their operating expenses, rather than contributing to existing programmes/initiatives from other stakeholders. This contributes to

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<sup>13</sup> The Copperbelt Development Foundation relies on yields from a trust set up by AngloAmerican, which left Zambia in 2002 (<http://www.cdfl.co.zm/>).

fragmentation of policy design and implementation programmes, sometimes with key institutions not being involved in key projects.

Mobilizing the private sector in the implementation process has been challenging. Implementation was supposed to be undertaken by a Sectoral Advisory Group, a public-private sector platform, to support industrial policy implementation, inter-ministerial coordination, and rally the private sector into addressing some of the challenges. However engagement by industry was poor, evidenced by participation of lower ranking employees rather than management or representation by the industry association and not industry participants.

The local content procurement provisions in the Mines and Mineral Act have been found to be difficult to execute because of their best endeavour nature and lack of a clear mandate in terms of ministerial responsibility. Over the years, because of strong political connections in company boards and large importing agents, government has struggled to exercise leverage over the mining sector in enforcing local content. On the mining companies' side, weakness of local content impetus has meant that compliance has not filtered down the organizational structures. Procurement managers are assessed on the basis of total cost of procurement and not on local sourcing; hence, they are not incentivized to invest in local supplier development.

#### **4.3 The role of industry in promoting local content**

Weak policy initiatives have led the private sector to take a leading role on the issue of local content. Zambia Association of Manufacturers (ZAM), the industry body, is currently driving the local content agenda with little support from government. The Zambia Mining Local Content Initiative is a product of a memorandum of understanding between ZAM and Chamber of Mines. The participation from the mining houses also reflects the need by the mining houses to be seen as contributing to localization before mandatory requirements are adopted by government. The main activities of the Local Content Initiative revolve around addressing information gaps. ZAM is organizing exhibitions to match local manufacturers and supply chain managers, and holds workshops for local manufacturer on mining procurement procedures. Building on this, the initiative is launching an online Business-to-Business (B2B) platform, which will include local manufacturers and large buyers such as mining houses, supermarkets, and large manufacturers. The objective of the platform is to build trust between buyers and suppliers, which has been a problem in the past. The platform serves also to reduce screening costs for perspective buyers.

ZAM, with support from the UK International Cooperation Agency, is conducting a capacity assessment between potential suppliers inclusive of management and technical capabilities, growth performance, employment, and value addition. If there are gaps that require interventions, these will be targeted by business development services. Some service providers have been included among potential suppliers on the platform for example; fabrication is sometimes linked to repair and maintenance. Original Equipment Manufacturers (OEMs) have not been involved yet. According to the Ministry responsible for education and science, as OEMs expand to meet growing demand, there is an assumption that OEMs will increase localization in terms of assembly and maintenance and repair services. These engineering services open opportunities for local suppliers and local value addition, and mining houses should be encouraged to engage with OEMs and local SMEs in these areas.

#### **4.4 Technical skills and innovation as components of industrial policy**

Currently, Zambia's government does not offer incentives or support at the firm level for technology upgrading. Duties on capital equipment imports are mostly zero-rated, but spare

parts are not. To finance new equipment, firms have to resort to the banking system, which does not cater to their needs and charges commercial interest rates.<sup>14</sup> Incentives or support mechanisms for firms to upgrade skills, access consultancy services, improve operations, and access information on inputs suppliers or technologies are not available.

Between the 1970s and 1990s, the mining industry contributed greatly to skills development. Through ZCCM, a large number of Zambians were trained directly and indirectly by the mining industry. Training took place within the mining company, through peripheral training institutions, and within the manufacturing complex linked to mining. This manufacturing complex included private firms and state-owned enterprises (SOEs) and resulted in significant levels of capacity building. The training capability has been eroded and today, the total output of technically qualified people is lower than before. Several respondents agreed that Zambia is not able to supply the skills required by growth in the mining sector, especially as far as technical skills are concerned.

Since the decline of ZCCM and associated fiscal revenues, Zambia's education policy has been predominantly focused on basic education. This is also due to international aid programmes, which tend to prioritize basic education. The decline in financing of the secondary and upper secondary sector has contributed to a decline in math and science education.

At the engineering level, there are constraints in terms of output and quality of graduates from the universities. The growth of mining investment using open cast and mechanized mining technologies in the new Copperbelt region of Zambia since 2000 has increased demand for mechanical and electrical engineers. Whilst the Schools of Mines were the traditional source of skills for the industry, the Schools of Engineering have become increasingly important.

Structural challenges in terms of basic knowledge of Science, Technology, Engineering, and Math (STEM) subjects trickle down to the competency of graduate students. Understaffed departments struggle to fill these knowledge gaps adequately. At both University of Zambia (UNZA) and the Copperbelt University (CBU), high vacancy rates and non-existent laboratories force lecturers to teach with no equipment and without being able to perform practical demonstrations. According to Association of Consulting Engineers of Zambia (ACEZ), the quality of UNZA graduates is of a high standard, but lack of practical experience is a major issue.

The universities are plagued with high vacancy rates and inadequately trained lecturers. At UNZA, half of the teaching positions in two departments at the School of Mines are vacant, and one-third of the teaching positions at the School of Engineering are vacant (see Table 2). Out of 300 lecturers at CBUs' Schools of Mines/Engineering/Natural Resources/Built Environment, only 50 have PhDs. There is no funding to upgrade the qualifications of the teaching body; hence, vacancies are filled with underqualified staff. UNZA struggles to retain experienced teaching staff and academic staff vacancies are frozen due to budget constraints.<sup>15</sup>

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<sup>14</sup> MCTI used to have a SMEs board, which at least provided technical services, but this was collapsed under the ZDA and its functions have been limited.

<sup>15</sup> This gap is echoed by the Southern African Institute of Mining and Metallurgy (SAIMM). Interview 11 November 2015 with Malcolm Walker, Regional Development Manager (<http://www.saimm.co.za/about-saimm/branchessaimm>).

Table 2: Production of mining and engineering graduates and post-graduates—Zambia (2015)

	Graduates per annum	Masters per annum	PhD enrolled	Staff and (vacancies)
School of Mines, University of Zambia	50	7–12	A few	Geology Dept. 6 (6) Mining Engineering 6 (6) Metallurgy 11(1)
School of Engineering, University of Zambia	70 Civil/ Environmental 20 Mechanical 20 Electrical 20 Agricultural 5 Geomatics 5	-	-	Agricultural 11 (5) Civil & Environmental 11 (5) Electrical & Electronic 11 (5) Geomatic 11 (5) Mechanical 11 (5)
School of Engineering, Copperbelt University	Approx. 300–400 students at graduate and diploma level	5	-	-
School of Mines and Mineral Sciences, Copperbelt University	150 graduates 150 diploma	30–40	-	-

Source: Authors' field interviews.<sup>16</sup>

While there is a gap in Zambia's graduate engineering skills, the shortage of technical and artisan skills is more severe, estimated at 11,000 in 2015. For some time, there has not been a coherent skills development policy in Zambia. Following the establishment of Zambia's Technical Education, Vocational, and Entrepreneurship Training Authority (TEVETA) 2000, its budget has decreased over time, especially with the merger of the Ministries responsible for Education and Science. Increasing recognition of the importance of technical/vocational skills has not been matched by funding evidenced by resources being cut by 5 per cent in the 2015 annual budget. The TEVETA budget cut has been partially cushioned by private sector funding.

In the Sectoral Advisory Groups for construction, manufacturing, tourism, and services, TEVETA participates as the lead agency for curriculum and competencies development. While industry participation in some sectors has been positive, it has not been interested in contributing funding with the exception of construction firms. Moreover, a structured collaborative process is currently underway between TEVETA, the Chamber of Mines, and individual mining firms to integrate company-specific qualifications within a National Qualifications Framework. The programme seeks to recognize retrospectively prior company-specific training within the National Qualification Framework.

There is no training or skills development obligation on the mining companies under current Zambian legislation. The Zambian Government has been discussing a mandatory skills levy, but on industry side, part of the reason for opposing the levy has been concern about the ability of government to collect and spend the levies appropriately. This has resulted in the setting up of the Zambia Mining Skills and Education Trust (ZAMSET) the end of 2014. All the major mining companies (except Chinese-owned Chambishi) have joined the initiative, under the Chamber of Mines. ZAMSET was expected to become operational by the end of 2015, with strategies in place and more importantly, financing.

<sup>16</sup> For a list of interview respondents, please refer to Appendix 1.

## 4.5 Summary

Despite the recent commodity price decline, there is latent potential in Zambia's domestic manufacturing sector to respond to the significant demand for mining inputs. Indeed there are still large FDI-led projects taking place (MW 2016). Analysis reveals an important conflict in Zambia's policy around legislation and regulation aimed at increased local content. The conflict straddles mining and industrial policy frameworks.

At political level there has been increasing pressure to revive local manufacturing supplying the mining sector; however, this has failed to result in a comprehensive vision on local content. Different policies and organizations within the MCTI, the Ministry of Mines and Mineral Development, and the ZDA have or are developing separate approaches to local content measures. These approaches somehow do not complement each other but rather create a level of policy uncertainty. Moreover, the lack of an overall vision means that critical areas are not being tackled, including the development of engineering, technical, and vocational skills.

In this context, the increasingly organized manufacturing interests within the domestic private sector have taken the lead in developing an initiative to promote local content. This approach has important advantages. It secures the *buy in* and involvement of key buyers and will reduce red tape to a minimum given that it is independent from government structures. The ZAMSET initiative on skills development has the same benefits.

However, even if mining companies were to launch ambitious supply chain development strategies, which are reflected in an ad hoc internal department and the procurement managers' key performance indicators (KPIs), the marginal participation by the state poses several challenges. Firstly, being completely voluntary, these initiatives rely on the willingness of the mining companies to provide funding. The funding may vary year-to-year, with some mining companies not participating at all. There is little pressure for mining companies to comply, unless the legal provisions of the Mining Act or strong political leadership are exerted. Secondly, upgrading local manufacturers requires a comprehensive approach that cannot be fully addressed via industry initiative. Critical areas related to access to finance, education, infrastructure development, and so on, would require a more proactive and coordinated government intervention.

## 5 Uncertain policy directions in linkage development strategies in Zimbabwe

Historically, Zimbabwe's mining sector was characterized by well-developed upstream and downstream industries (Jourdan et al. 2012). Except for platinum and gold, Zimbabwe's mineral output used to be locally processed, and in such cases as copper, pyrites, and coal, fed into the domestic manufacturing complex. Large firms included Zimbabwe Iron and Steel Co (ZISCO), Zimbabwe Alloys (low carbon ferrochrome), and Zimbabwe Mining and Smelting Company (ZIMASCO, for high carbon ferrochrome) (Hawkins 2009). Before the economic crisis, upstream industries included manufacturers of, among others, ball mills, conveyors, rail and rolling stock, pumps, headgear, ventilation ducting, and electrical equipment (Jourdan et al. 2012). Consumables such as mining chemicals and explosives were also manufactured locally. During the 1980s and 1990s, the mining sector was employing mostly local skills including at professional and managerial level.

The economic crisis in the early 2000s dented the local availability of skills and technological competencies significantly, along with the local mining inputs cluster. Real GDP cumulatively declined by more than 50 per cent between 2000 and 2008 (MEPIP 2011). The manufacturing

sector was characterized by double-digit negative growth rates in six out of the 12 years period 1996-2010 (MEPIP 2011: 121). Capacity utilization declined from approximately 80 per cent in 2000 to 10 per cent in 2008 and recovered to 44 per cent in 2012 (MEPIP 2011). According to industry, by 2015, capacity fell to 26 per cent. Capacity utilization in the engineering and metals sector has declined from 36.7 per cent in 2012 to 27.7 per cent in 2013 (ZEPARU 2014). Due to the decline in manufacturing and agriculture industries, there has been a decline in a number of products and markets for exports (Newfarmer and Pierola 2015). In particular, medium to high technology exports have stagnated. The large-scale loss of indigenous skills has negatively affected the mining industry, supplier firms, as well as teaching and technology institutions. The Zimbabwe Chamber of Mines estimates that more than half of the industry's skilled personnel emigrated from the country since 2007 (Hawkins 2009).

Since 2010, FDI inflows have resumed from a low level, coupled with significant imports of capital equipment. The mining sector is currently the main driver of economic recovery in Zimbabwe, and the World Bank (2014) argues that the growth prospect for manufacturing rests mainly in domestic demand, in particular linked to the resource sector. This is confirmed by a 2014 firm survey where engineering firms indicated that their main customers were farming and mining companies (ZEPARU 2014). Most of Zimbabwe's mining capital goods are imported, but Jourdan et al. (2014) argued that the revival of the mining sector would likely have a positive impact on the local supply chain (2012).

Manufacturing is still highly diversified compared to other African countries, but firms have downsized considerably and import penetration in the supply chains is high (World Bank 2014). Davies et al. (2012) argue that supply-side constraints are now more critical than demand side ones. After a decade of crisis and hyperinflation, firms operate obsolete machinery, struggle to access finance, and operate in a high cost and volatile environment due to regular power outages, imported inputs, and unreliable supply-chains. A 2011 survey on supply linkages across the manufacturing sector shows that the majority of firms reported problems with quality, insufficient quantity, and higher prices of inputs (World Bank 2014). Hence, the majority of firms have reduced local inputs supply. Moreover, a 2014 firm survey identified power and water shortages, licensing and permits; tax rates; political instability; corruption and crime; and theft and disorder as additional hurdles (ZEPARU 2014). These factors have made it very difficult for local manufacturers to compete with imports (MEPIP 2011). However, labour productivity and unit labour costs are still competitive (Davies et al. 2012).

## 5.1 Policy framework

Zimbabwe's Mid-Term Plan 2011–15 prioritized employment creation and equitable growth through SMEs development, indigenization, and resource management (MEPIP 2011). The machinery and equipment sector has been targeted for investment promotion, although no reference is made to the sector's linkages to mining. Conversely, beneficiation is included as a priority in the Mid-Term Plan and more recently in Zimbabwe Agenda for Sustainable Socio-Economic Transformation (Zim Asset) 2013–18, the latest blueprint for economic development developed in light of the struggle to find international lenders (GZ 2013). Zim Asset also makes a generic reference to the introduction of an Import Substitution Programme particularly targeted at machinery, equipment, fuels, chemicals, and consumer products (GZ 2013: 103–13).<sup>17</sup>

Another guiding document has been Zimbabwe's Industrial Development Policy (IDP) 2012–16, aimed at the recovery of the manufacturing sector in terms of contribution to GDP, exports, and

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<sup>17</sup> This intervention however is not included in the Value Addition and Beneficiation Cluster Matrix.

capacity utilization (GZ 2012).<sup>18</sup> Industrial financing and import substitution are the key strategic instruments identified by the policy. Moreover, according to the Ministry of Economic Planning and Investment Promotion, government will develop export-oriented special economic zones to link domestic firms to global markets and attract FDI. The IDP targets metals and electrical as priority sectors, mainly aiming to re-establish operations at New Zim Steel (ex-ZISCO).<sup>19</sup> ZISCO closed in 2008 due to the economic climate, which limited capacity utilization to less than 60 per cent. Inconsistent supply of critical raw materials like coal from Hwange, unreliable transport systems, erratic power and water supply, and lack of adequate capital to purchase spares for maintenance and to upgrade equipment (ZEPARU 2014) adversely affected operations. The National Trade Policy, which aims to diversify exports towards manufacturing products and new markets, is aligned to the objectives and priority sectors of the IDP.

However, coordinated implementation of industrial and trade policies has been very weak, and there are no instruments targeting the supply side, such as subsidies, incentives, or firm upgrading schemes. As a response to the crisis, the Confederation of Zimbabwe Industries (CZI) has engaged government to set up industry-specific trade protection for limited duration. These interventions have been mostly focused on agro-processing firms. Under temporary trade protection, domestic firms have been able to operate at higher capacity levels and reduce prices, becoming more competitive in the domestic market. For example, the four largest domestic dairy farms have been able to double production capacity and are now import competitive. Industry has lobbied for trade restrictions as a privileged industrial policy instrument compared to others. These however seem to be ad hoc interventions possibly driven by the relative power of different domestic vested interests in specific industries, rather than a structured strategy to revitalize local manufacturing.

The mineral sector is regulated by the 2005 Mines and Minerals Act, which does not include very strong provisions on local content.<sup>20</sup> A Minerals Policy has thus been in drafting process for many years, inclusive of a number of interventions related to stimulation of backward, forward, spatial, and fiscal linkages, improved transparency, and the introduction of progressive taxation.<sup>21</sup> Interviews with key respondents highlight that the failure to conclude the design of this policy has hindered the development of strategies related to skills development, FDI, and local content. The position of the Ministry of Economic Planning and Investment Promotion is that infrastructural bottlenecks and low manufacturing capacity need to be addressed before the mining companies can be encouraged to source locally. There is concern that at the moment, more policy emphasis on local content would result in shortages and high costs of supplies for the mining companies.

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<sup>18</sup> Objectives are: contribution of manufacturing to GDP to 30 per cent by 2015, 50 per cent of total exports by 2015, capacity utilization to 80 per cent by 2016.

<sup>19</sup> Other priority sectors are: agri-business, textile and clothing, leather and footwear, wood, chemicals, and pharmaceuticals.

<sup>20</sup> The Act states that an applicant for a special mining lease should submit a plan, which includes information on the extent to which local goods and services will be utilized in the development. Bullet point xii) of paragraph e) of sub-section 3 of section 158 (GZ 2005).

<sup>21</sup> Other mining-related policy measures include a draft mining exploration bill, re-building the national geological survey units to ensure government has leverage in negotiating mining rights, and support for small scale mining sector (interviews with ZIE).

## 5.2 Beneficiation and indigenization

The recent commodity price crisis led government to reconsider its policy approach to the mining sector. According to interviews with the Ministry of Economic Planning and Investment Promotion, the main objective of this process has been to review the mining fiscal regime, which has been undermined by weak institutional frameworks concerning commodities marketing, linkage development, and revenues. Concerns over tax avoidance are leading policy makers to look at beneficiation as a mechanism to introduce transparency in the sector. Whilst not party to Publish What You Pay and the Extractive Industry Transparency Initiative, government is pursuing domestic beneficiation as an avenue to force mining companies to declare output values.

Currently, there is very limited local beneficiation and value addition of minerals, resulting in about 90 per cent of the minerals being exported raw or semi-processed (ZEPARU 2014). Zim Asset emphasizes the introduction of a PGM refinery. To promote beneficiation, government has reduced royalties applicable to mineral output destined to domestic downstream industries.<sup>22</sup> This policy however has to be tempered by consideration of existing production capabilities.

For example, government had initially banned the export of unprocessed ferrochrome in a bid to encourage value added exports of high carbon ferrochrome. Beneficiation of chrome led to higher revenues between 2009 and 2013 even though they started to decline. In 2014, three out of five smelters were not operational due to several viability challenges, and one was new and under construction. Of the two operational ones, one major actor was operating at about 70 per cent capacity whilst the other one operated below 15 per cent. While current smelting capacity in Zimbabwe is 500,000 t, only 50 per cent is being utilized.<sup>23</sup> This led government to relax the ban in light of the lack of domestic capacity until a time when the mining companies have built up sufficient revenues.

The main challenges affecting high carbon ferrochrome beneficiation were as follows:

- (1) Lack of investment for recapitalization;
- (2) Use of obsolete equipment resulting in high production costs;
- (3) High tariffs and power shortages;
- (4) Price fluctuations of chrome on the world market;
- (5) High mining fees and levies;
- (6) Claims lying idle and inaccessible to small scale participants;
- (7) Low smelting capacity as compared to chrome ore production capacity;

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<sup>22</sup> Mines and Minerals Act of 2005 [Chapter 21: 05] Section 247 provides the Minister with the power to grant royalty rebates to investors in mineral beneficiation (GZ 2005).

<sup>23</sup> AfroChine Smelting, a new smelting company, invested US\$25 million in, among other things, two smelters with capacity of 50,000 tonnes each. An additional 250,000 tonnes will be installed for projected completion in 2015 resulting in total capacity of 800,000 tonnes per annum, a 60 per cent increase (from 500,000 tonnes) (ZEPARU 2014: 36).



- (8) Perceived political/economic instability in the country (although investment in platinum production has increased);
- (9) Transport (ZEPARU 2014).

Together with beneficiation, indigenization has been another key policy objective, which is influencing the design of policies in the mineral and industrial sector.<sup>24</sup> Currently, there is no interest in linking the indigenization agenda to increasing mining local content, even if several stakeholders interviewed<sup>25</sup> for this research indicated that there would be concrete opportunities in this area. During the last part of 2015, under pressure from the CZI, local content had begun to feature on the political agenda.

The new indigenization policy developed in line with Zim Asset and the 10 Point Plan for Economic Growth was unveiled on 4 January 2016. The new framework includes empowerment credits and rebates to investors, an indigenisation compliance and empowerment levy and a 50 percent local procurement requirement at all Government levels (Share 2016). Companies in Zimbabwe are expected to submit indigenization plans by 31 March 2016.

### **5.3 Impact on local mining inputs cluster**

As mentioned earlier, Zimbabwe had one of Africa's most technologically sophisticated and high value added mining inputs cluster. With the economic crisis, mining companies closed/cut back on operations, which led to a decline in both the number and value-added content of domestic suppliers. The crisis had a two-fold impact on the local supply chain. Some firms moved away from manufacturing to distribution while other international OEMs sold their subsidiaries to local investors. In the latter case, even though the equipment is still available it is becoming obsolete. According to interviews with CZI, many firms have decided not to close down because the costs of retrenchment are higher than the costs of continuing operations. New regulations stipulate that retrenchments are now only allowed under a minimum package of one month's pay for every two years (Share 2015; *News24* 2016), compared to one-to-two weeks per year in the rest of the region. These costs have been exacerbated by the dollarization of the economy.

The overall decline has been staggering with more than 50 per cent of foundries having closed down out of more than 20 foundries in operation a decade ago (ZEPARU 2014). In metal fabrication, 25 per cent of firms identified by the same study had closed down and 40 per cent in heavy machinery. When mining production recovered, local suppliers struggled to keep up with demand and to re-invest to catch up with pre-crisis capabilities. In recent years, there has been an inverse relationship between mining and manufacturing output as mining companies' demand for goods and services has risen but output by the manufacturing sector fell.

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<sup>24</sup> The indigenization policy and legal framework is composed of the following: the 1998 Policy Framework on the Indigenization of the Economy, revised in 2004 and adopted by Cabinet as the Revised Policy Framework for the Indigenization of the Economy. This resulted in the formulation of the Indigenization and Economic Empowerment Act (Chapter 14: 33), 2008. Section 3 of the Act states that at least 51 per cent of the shares of every public company and any other business shall be owned by indigenous Zimbabweans. This was operationalized by the Indigenization and Economic Empowerment (General) Regulations in 2010 through SI 21, amended in 2011. The Regulations provide that all businesses with a net asset value equal to or greater than US\$500,000 located in Zimbabwe should formulate plans that will lead to 51 per cent of the shares in the firm being transferred to 'indigenous' Zimbabwean shareholders within five years from the date of operation of the regulations (Magaisa 2015).

<sup>25</sup> For a list of interview respondents, please refer to Appendix 1.

According to interviews, local mining procurement is currently mostly limited to transport, fuel, and some consultancy services. The CZI argues that there is existing manufacturing capacity for crushing equipment, engineering services, mill balls, liners, and chemicals. Capacity in electronics instead has been largely lost. However constraints in terms of costs, reliability, quality, and payments (need for advance payments, and arrears to be paid) need to be urgently addressed.

Chamber of Mines statistics (Kwesu 2015) show that the expenditure breakdown of the approximately US\$2 billion revenue generated by the mining sector in 2012 was as follows:

- 39 per cent spent on suppliers of materials and consumables;
- 19 per cent spent on workers' salaries and wages;
- 14 per cent spent on other operating expenditures;
- 17 per cent paid out to the government in form of taxes and other related charges;
- 11 per cent paid out as average profit after tax (most of this figure was ploughed back as capital).

Kaseke et al. (2014) found that domestic inputs into the mining sector amounted to 20.5 per cent of mining output, with 11.2 per cent of this sourced from the manufacturing sector. Thus, mining is still an important market for local manufacturers, corroborating the argument by the World Bank that these linkages are necessary to revive domestic manufacturing. The largest inputs included electric power (3.9 per cent of mining output); iron and steel products (2.6 per cent); distribution (2.6 per cent); non-electrical machinery and equipment (2 per cent); plastics, rubber, and fibres (1.3 per cent); mining itself (1.2 per cent); and matches, ink, candles, other chemicals (1.1 per cent).

Nevertheless, Kaseke et al. (2014) conclude that whilst the mining sector procures several goods, equipment, and services locally, imports are very significant for major equipment, spares, gear boxes, motors, bearings, and laboratory consumables. This was reiterated by CZI as the majority of suppliers are involved in low value-added activities. Table 3 shows the share of local expenditure in Zimbabwe's mining sector. It can be seen that local procurement is still very significant for chemicals, reagents, steel balls, fuel, lubricants, mobile equipment, and consumables. However, local procurement does not coincide with local value added and many supply chains are dominated by importers. It was estimated that in the case of Zimplats, only 11.7 per cent of local procurement is locally manufactured. Indeed manufacturing is five times larger as a market for the mineral output than as a source of inputs (Kaseke et al. 2014). According to the CIZ, the largest source of imports is the UK (the largest supplier, US\$800 million–1 billion in the past two years), Germany, South Africa, and China. China is still a relatively small supplier due to quality concerns.

Table 3: Local vs foreign procurement in Zimbabwe's mining sector (2014)

Product	Local Supply (%)	Comment
Chemicals and Reagents	43	These are mostly imported since there is no local manufacturer. These are chemicals used in mineral hydro processing.
Plant and Equipment	28	Comprised of imported plant, machinery, and equipment.
Explosives and Accessories	20	These are imported since there is no capacity on the local market. Most locals fail to meet the mine requirement.
Steel Balls	49	Product is being imported due to improved quality as compared to the local market. The local market is being considered again after the improvements in their manufacturing process and capacity.
Fuel and Lubricants	93	The bulk of the consumables are being sourced from the local market
Mobile Equipment	88	These critical spares are being sourced from local agents.
Process Consumables	40	These are incidental consumables being imported from the equipment manufacturers since they are not available via other sources.
General Consumables	79	These consumables are universal in nature, are available on the local market, and are sourced locally.
Mining Consumables	56	N/A
Grand Total	64	36% of the procurement for the period under review was from the local market. The sector continues to engage and capacitate local suppliers to supply competitively.

Source: Based on data from Kaseke et al. (2014).

Foundry products are in high demand by the mining sector and some could be produced locally, including grinding media (high chromium and forged steel media); wire rode products (ropes, chains, and slings); and cast products (mantle, bowl, mill liners, locomotive wagons, frames, slagpots, ladles) (ZEPARU 2014). In particular, together with cement producers, mining companies cumulatively consume more than 2,000 tonnes of mill balls per month at an average price of US\$1,100 per tonne (ZEPARU 2014). However, they import medium to high chrome mill balls from mainly China, India, and South Africa.

The main problems with local procurement, which have been identified by the mining companies are cost, unreliable supplies, poor quality, poor back-up service, and the need for upfront payment (Kaseke et al. 2014). Industry owes these constraints to high domestic operating costs and unreliable input markets. Overall, these problems are those found in the manufacturing sector in general.

#### 5.4 Declining National System of Innovation

The decline of local supplier capacity has been accompanied by the decline of the National System of Innovation (NSI). This is illustrated by the extent of brain drain and the performance of national research and teaching institutes. The trajectories of the Institute of Mining Research (IMR) and Scientific and Industrial Research and Development Centre (SIRDC) are instructive in this regard. The IMR was established in 1969 with a four-fold mandate for innovation, responsive research for government, sample analysis, and mining exploration. Before the crisis, the IMR produced significant output in terms of technical reports and explorations, as well as successfully registering a patent for fertilizer production. The downward trend started in 2002, and in 2009, it accelerated. Most laboratories are not functional, only three out of 14 post-PhD position posts are filled (with no geologist and only one of two chemists), three out of five technician positions are filled, and there are no research assistants. Government funding is insufficient to cover operational costs.

The SIRDC was established in 1993 to undertake research for the mining sector, and as such works with the Ministry of Mines and the Chamber of Mines. In particular, it provides environmental impact assessments, optimization services, and waste management solutions for mining companies. It also has a foundry for spares casting and lab testing services, which support manufacturing firms. There are 12 institutes; of which three are mining-related that is geo-information and remote sensing, metallurgical research, and national metrology. At full capacity, SIRDC employs 400 engineers, scientists, and artisans; however in 2015, only 150 were employed and mostly in low-level positions. Brain drain has been severe, across all staff categories. The reduction in personnel means that laboratories are not fully utilized and as a result not maintained. For the current staff, the laboratories are not conducive for operations. Government funding has been shrinking and at the moment only covers salaries. Operations are not paid for, with the exception of a recent purchase of lab equipment for cross-cutting analysis. As a result, the mining sector mainly taps into the South African NSI and engineering services sector for research, consultancies, and various services.

Reduced public spending on education mostly affected quality and access to primary and secondary education (World Bank 2014). Zimbabwe has 40 universities, polytechnics, and vocational schools. The Zimbabwe NSI has been unravelling since the early 2000s. This is reflected in the decline of registered engineers from more than 3,000 in 2001 to 600 in 2012 (Nkala 2012).

Out of the ten-member staff complement, there are six vacancies. Due to inability to sustain separate entities and share operating costs, the Mining and Metallurgical departments were merged in 2006–07. The Department currently has 30 undergraduate students. A major impediment to practical training is the lack of support from mining firms in Zimbabwe. As with other countries surveyed, mining firms in Zimbabwe have also stopped sponsoring engineering students and providing work placements. Equally importantly, firms are not assisting with industrial placements for practical training during the study period.

Notwithstanding the existence of the National Manpower Advisory Council of Zimbabwe (NAMACO), according to the Zimbabwe Institute of Engineering, there has not been an updated assessment of skill requirements for the mining industry since the IS152 paper of 1990 and a UN study in 1996. This is despite the heavy industrial policy emphasis being placed today on the beneficiation of platinum (interviews with ZIE).

On the other hand, the vocational training segment of Zimbabwe's NSI seems to have been more resilient against economic decline. Training institutions in Harare, Bulawayo, and Gweru are still producing high calibre mining and metallurgy skills. The Zimbabwe School of Mines in Bulawayo, established in 1926, provides technical and artisanal training to National Diploma and Higher National Diploma level Mine Geology, Mine Survey, Mining Mineral Processing and Extractive Metallurgy, and Metallurgical Assaying.<sup>26</sup> It is actively supported by the Chamber of Mines and by the mining industry and provides training for students from across the SADC region. According to the Southern African Institute of Mining and Metallurgy (SAIMM),<sup>27</sup> the quality of the graduates and diplomates is higher than in South Africa.

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<sup>26</sup> Zimbabwe School of Mines website ([www.zsm.ac.zw/zsmsite/index.php](http://www.zsm.ac.zw/zsmsite/index.php)).

<sup>27</sup> Interview 11 November 2015 with Malcolm Walker, Regional Development Manager, SAIMM.

## 5.5 Summary

Zimbabwe's policy framework is in flux. As in the case of Zambia, a conflict prevails between the extractive mining policy institutions and the institutions responsible for industrial and trade policy. The overall economic decline appears to have deepened the policy conflict. The state is interested in securing higher revenues from the mining sector and securing higher levels of local ownership in the industry. These interests have opened a series of negotiations with the mining companies that will determine the future of the industry.

The overall economic decline of the Zimbabwe economy has impacted severely on the country's productive manufacturing capacity. Industrial activity seems to be more significantly impacted by regular power outages, unreliable and expensive supply chains, and an unfavourable financial environment, setting Zimbabwe apart from Zambia and Botswana. The highest priority today lies in rebuilding linkages between the mining companies and the local manufacturing basis. A once very diversified and competitive mining inputs cluster has been eroded. The number of firms operating and the level of value added have diminished. Manufacturers have turned into distributors and import penetration in their Tier 2 supply chain continues to increase.

In the high-level power struggle over mining rights and revenues, local content issues have been relatively marginalized. The decline of the NSI has also impacted negatively on the mining inputs cluster, with loss of skilled workers from the firms, and skilled technicians and researchers from training and research institutions.

To arrest and reverse the decline, it is critically important that the mining companies cooperate with industry to develop local supply chains, given that government resources are very limited. Even though Zimbabwe still has high quality infrastructure compared to other African countries, firms' lack of access to finance has prevented them from upgrading equipment. Access to finance, and upgrading and maintaining utilities are two key areas where government intervention should focus.

## 6 Betting on diamond beneficiation in Botswana

In 1996, Botswana adopted Vision 2016, which sets broad long-term goals for the country and has served as a guiding framework for national development programmes and policies. One of its most important objectives has been economic diversification; however in 2008, government noted that 'Botswana's narrow economic base remains dominated by mining and government. The private sector remains highly dependent on general public expenditure through government contracts as well as consumption expenditure by civil servants' (GB 2008: 7). Recent policy reviews highlighted that the goal of trebling GDP per capita by 2016 will not be attained. Although the country's ranking by international business scales has improved, this has not translated into an inflow of investment, the economy has not diversified, and formal employment growth stems from the public sector only (MFDP 2013; GB 2015). Given that diamond production is expected to decline by 2025–27, when open pit mining operations will cease, Botswana is under pressure to devise strategies to diversify its economic structure in the next 10–15 years (Africa News Hub 2014). Moreover, reducing the current unemployment rate of 20 per cent requires the creation of new poles of economic activity beyond government and mining, which employ 40 per cent and 4 per cent of the working population respectively (*Mining Weekly* 2015b).

Economic diversification policies and strategies have been articulated at different levels. The National Development Plan 9 (2003–09) and National Development Plan 10 (2009–16)

established six hubs, namely Diamond, Health, Education, Agriculture, Innovation, and Transport (GB 2008; MFDP 2013). The 2008 Botswana Excellence Strategy defined the policy strategy in terms of strong emphasis on action plans, implementation and monitoring of policies, and readiness to amend, or even abandon these policies if unsuccessful. The policies further stress the importance of openness to trade, investment, information, technology, and skills flow from the global economy; focus on skills and capabilities upgrading; and government direct investment in leading projects, to pave the way for the private sector.

The Economic Diversification Drive (EDD) 2011–16 (GB 2011) identifies strategies for market and sector diversification. In the short term, the strategy relies on public procurement,<sup>28</sup> but the longer-term goal is to promote internationally competitive enterprises from primary to tertiary sectors such as finance and hospitality. Mineral beneficiation is included in the strategy and is indeed where significant progress has been made. The EDD, together with the country's investment and trade policies, and export strategies, fed into the latest policy document, the 2014 New Industrial Development Policy. This assessed progress made so far noted that the pre-existing policy framework did not achieve Botswana's industrialization and diversification goals due to a number of factors (GB 2014). Ineffective coordination and implementation of industrial policy initiatives, low firm technological capabilities, inadequate infrastructure, and mismatch of industry skills were among these factors. It also envisaged a number of different approaches, including export-orientation and resource-based industrialization. At the institutional level, however, there is significant level of fragmentation with the Ministry of Minerals, Energy and Water Resources (MMEWR) responsible for diamond beneficiation, the Ministry for Agriculture responsible for agro-processing industries, and the Ministry of Trade and Industry responsible for other manufacturing activities.

At the same time, Botswana is also promoting FDI into coal and copper exports. Botswana has developed a national strategy on coal development—the Coal Roadmap. With estimated coal deposits of 200 billion tonnes, of which 7.1 billion tonnes are measured reserves, coal presents a growth opportunity for Botswana and a route to mineral diversification, reducing overreliance on diamonds (*Mining Weekly* 2012b).

Diversification into manufacturing is hampered by the fact that Botswana is a small market comprised of approximately two million people. The closest market is Johannesburg, which is already saturated and difficult to penetrate. Zambia and Zimbabwe are potential markets but most domestic firms are reluctant to enter these markets due to high entry costs.

Tokafala, established in 2013 and funded by Anglo American, De Beers, and Debswana, is the leading private programme that supports enterprise development. Government was initially supposed to fund half of the budget, but the financing was only received in 2016. The three-year programme provides business development services to 150 SMMEs. Whilst some firms supply services and goods to the mines, the objective is to support economic diversification. According to interviews with Tokafala's managing director, skills and finance are not as problematic for Botswana's manufacturing sectors relative to Zambia and Zimbabwe. Entrepreneurs tend to be educated, urbanized, and computer savvy. Most could find a salaried job but were willing and motivated to set up their own business. Business management skills however are weak; and this is where Tokafala plays a strategic role.

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<sup>28</sup> According to interviews, leveraging public procurement has been difficult because the ministry responsible has limited power to condition procurement decisions of public entities. Moreover, this was not accompanied by firm upgrading programmes; hence, a critical supply-side intervention was missing.

Botswana has been relatively effective in providing credit to private firms through the Citizen Entrepreneurial Development Agency (CEDA) and the Botswana Development Corporation (BDC). CEDA offers loans at affordable rates (5–7 per cent versus commercial rates of 15 per cent in 2015). SMMEs however still struggle to access capital, due to a combination of lack of collateral, insufficient owners' equity contribution, inadequate record management, and poorly prepared business plans (GB 2014).

Debswana's procurement is significant, but tenders are too large for local SMMEs.<sup>29</sup> Launched in 2014, the Chamber of Mines' Business Development Forum represents the mining industry's objectives to create efficiency and cost savings for the mining companies, enterprise development, and economic diversification for Botswana. The Chamber also coordinates purchasing power to support local companies and attracts FDI from foreign OEMs (Botswana Chamber of Mines 2014).

### **6.1 An ambitious mineral beneficiation strategy**

Diamond production has historically been controlled by a joint venture between the government and De Beers, namely Debswana Mining Company. In 2005, through this partnership, the government realized an opportunity to adopt a diamond beneficiation policy (Mbayi 2011).

The diamond beneficiation policy has been remarkable in supporting Botswana's ambition to move up the global value chain. A key strategic aspect of the policy is that it was designed around De Beers, which exerts significant market power on domestic and global production, as well as global marketing and distribution channels. Botswana's position in upstream production is important to understand how its beneficiation strategy was designed. The State owns 50 per cent of diamond reserves through Debswana, while Debswana represented 60 per cent of De Beers global production. This position allowed the government to force De Beers to support diamond beneficiation at the time of licence renewal.

Botswana's beneficiation policy targets three stages of the diamond global value chain: sorting and valuing, marketing and polishing, and cutting (Mbayi 2011). Diamond sorting and valuing for De Beers global production was historically done by the London Mix, but government has compelled De Beers to move this activity to the Gaborone International Mix. To capture a larger share of diamond marketing, government owns Okavango Diamond Company, a distribution company that receives an allocation of 15 per cent of national output.

Relocating the Mix and government marketing have been critical in capturing a larger share of downstream revenues and allowed localization of a small niche of highly skilled, high value services to support sorting, valuing, and marketing in Gaborone. According to the site holding systems, a small selected number of global buyers place orders with De Beers (size, colour, share, etc.) one year in advance, allowing them to plan manufacturing operations and downstream marketing to jewellery manufacturers. Relationships between these players and De Beers are intensive in information flows. Localizing these operations has required sophisticated client management skills and support services' skills such as issuing Kimberley Certifications (*Mining Weekly* 2012a). As of 2014, the bulk of De Beers' rough diamond production is sold in Botswana. A large group of representatives of De Beers' sight holders—more than 80 of the world's leading diamantaires—travel to Gaborone up to 10 times a year, creating additional demand for local goods and services (De Beers 2014).

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<sup>29</sup> De Beers mainly sources urban-based services and security.

The policy required that at least US\$500 million per annum of De Beers Botswana's diamond output be reserved for local beneficiation, later raised to US\$800 million a year. The policy was well articulated, with clear targets, a combination of export restrictions, penalties and fiscal incentives, private and public investment in public goods and skills, and effective implementation mechanisms. Diamond cutting and polishing firms are granted licences to operate in Botswana and access reserved diamonds subject to strict local training requirements. According to industry sources, having access to Botswana diamonds is critical, especially given the large size and high quality of the stones. Even if local processing is 15 per cent more expensive than the international benchmark, local beneficiation remained a good investment.

According to industry, the institutional framework to implement the strategy has been particularly effective. Implementation rests within the Diamond Hub, in charge of coordinating activities in the diamond sector. Moreover, government has set up a Diamond Technology Park, which has enabled government service providers to be close to processing firms, and to respond promptly to their needs. Government agencies have been very open to industry and have established good relationships with businesses. The Diamond Office, located in the park, focuses on building strategic alliances with cutting and polishing companies, developing infrastructure, and enabling a favourable fiscal regime. Moreover, the park has allowed for firm clustering, with specialized suppliers such as trading, financial, brokering, logistical, security, and machinery suppliers. The Gemological Institute of America has also located within the park to ensure achievement of short lead times and security of transactions. In 2013, Botswana was reported to have exported polished diamonds worth BWP6.6 billion (approximately US\$759 million). Employment increased from 2,200 workers in 2008 to 3,750 in 2013.

Skills transfer has been a key element of the beneficiation strategy because cutting and polishing is skill intensive. Polishing and cutting is a repetitive job, which requires precision and concentration. Employees start with small stones and it takes several years before they master the skills required for large stone cutting and polishing. These skills can only be transferred with significant on-the-job and in-house training. Some firms train workers across the entire production process whereas others prefer specialized skills on each task. Training is resource-intensive, as it requires time and supervision. A company reports that out of 15 trainees only three to five people can be employed after four years of training. Firms that have underinvested in in-house training have faced challenges because of restrictions in obtaining work permits for expatriated skills. Overall, skills transfer with regard to management has been less successful, and parent companies prefer to send their expatriate staff to control operations. In addition to labour costs, the main factors negatively affecting firm competitiveness are unreliable and expensive provision of water and electricity.

In 2015, Botswana's beneficiation strategy was in a serious crisis. The predicament was due to the misalignment of supply and demand at different stages of the value chain. The price of rough stones spiked and the market collapsed. Financialization led to the increase in the prices of rough stones, which was also noted in other commodities. Financial investors supported increased demand for rough stones and viewed them as investment assets. According to Morgan Stanley Research, between 2009 and 2014, the value of rough diamonds financed with debt increased from 70 per cent to 120 per cent (De Diamond Loupe 2015). All the excess financing allowed miners to sell more rough diamonds at higher prices without taking the fall in end-user demand into consideration. Meanwhile, rough prices rose by 76 per cent while polished rose by only 12 per cent, with cutting and polishing margins falling from 15 per cent pre-financial crisis to between 0 and 5 per cent currently. The most renowned expert in the field, Even-Zohar, claimed this was not a cyclical downturn but resulted from over-financing (De Diamond Loupe 2015). Market fundamentals however caught up, with differential between 2015's first and second half sales falling sharply to an extent that had not been experienced in 40 years.



The market for polished stones collapsed due to an oversupply of polished diamonds and falling demand from the Chinese market. Luxury retailer Chow Tai Fook has been driving demand in China with 1,700 stores. Before the crisis, Chow Tai Fook was opening new outlets at spectacularly high rates (300 stores in one year), each outlet requiring US\$50 million in stock for display. Indeed, demand for such stocks outpaced the actual demand by final consumers. As final consumer demand fell, the company was holding US\$3 billion in polished diamond stocks, which caused prices to decline dramatically. Moreover, globally, finance costs for mid-stream diamond polishing and cutting firms increased, leading to industry consolidation with the exit of less well-established firms, and intense investment in value added offers, specialization, and technology (in particular laser and IT technologies by Indian firms) (De Beers 2014).

For most of 2015, prices for polished diamonds were lower than those for rough stones, which compressed profit margins for manufacturers. In 2015, diamond cutters MotiGanz, Leo Schachter and Teemane Manufacturing Company, owned by Diarough, closed their plants in Botswana resulting in 500 job losses (Grynberg 2015). With a total reported employment in the diamond cutting and polishing industry of 3,750 in 2013, this is a relatively large retrenchment. Given the scale of the crisis, government set up a task force; however, the consultative process has been inconclusive (*Mining Weekly* 2015a).

The global squeezing of margins for cutting and polishing exacerbated Botswana's weak cost competitiveness. Botswana's cutting and polishing industry faces higher labour costs and lower labour productivity than Indian firms do, the main competitors for lower carat stones. In 2013, cutting and polishing costs ranged between US\$60–120 per carat in Botswana, which was more competitive than Namibia (US\$60–140) and South Africa (US\$30–150) (De Beers 2014). However, costs in India ranged between US\$10–50. Processing costs in Israel and Belgium are high, US\$140–300 and more than US\$150 respectively, but they specialize in high-value stones and are still competitive.

It has been argued that Botswana's regulatory framework had facilitated rather than slowed down the exit of diamond manufacturers from the country and their relocation to lower cost countries (*Mining Weekly* 2015a). This is because beneficiation obligations only applied to the US\$800 million reserved for this policy. The rest of Botswana's rough diamond production however can still be purchased and processed overseas if it is sold under the 'international mix', which sells all of De Beers' output across countries. Moreover, the beneficiation obligations did not apply to diamonds marketed through the state-owned Okavango Diamond Company and private smaller producers. Hence diamond manufacturers relocating out of Botswana only lost access to one relatively small stream of De Beers' output.

Within this crisis, Botswana's government has not been in a position to formulate a decisive response because it had conflicting interests in two different stages of the value chain, at rough production stage and cutting and polishing stage. Equity participation upstream of the diamond value chain has generated stable revenues from the industry for most of 2015. The multipliers at this level of the value chain are much higher than in any downstream activity. Hence, while having spent considerable political capital and having mobilized resources and organization to secure the success of the beneficiation policy, Botswana cannot support measures to compress prices upstream or subsidize downstream activities. Policy space is also restricted by De Beers reduced market power. In the past, markets were cleared through De Beers' market power to control supply. Today, however De Beers controls only 33 per cent of global output, the rest being produced by Russia's Alrosa (25 per cent) and smaller producers like Rio Tinto, SODIAM,

and Zimbabwe's Marange (4–6 per cent each), and artisanal mining (12 per cent) (De Beers 2014).<sup>30</sup>

Declining prices for rough diamonds since the end of 2015 may cause major problems for the government because that will affect upstream revenues. In the long term though, De Beers (2014) estimates that demand growth will increase in real terms for the next ten years and will outstrip production, due to lack of major new discoveries and declining output at existing mines. According to industry sources, however, this will require large investment in marketing because diamonds are now competing with other luxury goods (handbags, electronics).

## **6.2 Moving towards a knowledge economy?**

The establishment of the Innovation Hub and the 2008 Botswana Excellence Strategy represent the government's intention to move Botswana towards a knowledge economy. Until now, innovation was hampered by a number of factors. A small domestic market and narrow resource base discouraged investment in manufacturing. For this reason, Botswana's current focus is on upgrading technological capabilities for niche industries. Interviews highlighted that the main gaps in the development of a dynamic NSI consist of insufficient R&D funding, poor commercialization, and weak management skills of start-up firms. Private firms spend little on innovation and public R&D efforts have been limited with most university staff being more committed to teaching (90 per cent of their time) than research. Moreover, research output has often been a lost opportunity because researchers have not been supported in patenting and there was no interest from the private sector in taking over. R&D and skills development have also not been aligned to industry needs. Two organizations have been designed to address these constraints.

In 2012, Botswana established the Botswana Institute for Technology Research and Innovation (BITRI) to coordinate and undertake basic research. During the subsequent three years, the policy framework had been finalized and offices and labs had been constructed, and by 2015, BITRI had equipped almost all laboratories. BITRI's task is to identify, absorb, and innovate technologies. Hence, there are significant efforts to acquire intellectual property, adapt foreign technologies to domestic conditions, and pursue incremental innovation. In this spirit, BITRI has concluded an agreement with Singapore Solar Energy Research Institute (SERIS) to develop new applications for their existing product. BITRI is funded by government and parastatals commissioning services from their labs and research centres. So far, cooperation with the mining sector has been minimal with management forecasting a change.

The institute has three sites and several centres devoted to information and communication technology (ICT), chemistry, engineering, and industrial workshops (CNC equipment and metalworking). The two broad areas of research are technologies (ICT, electronics, energy) and natural resources (nano-material, climate change, water). At full capacity, BITRI has a staff complement of 250 personnel. However, in 2015, it had 97 staff and 60 interns. Personnel include expatriates in strategic positions, with large numbers of juniors trained to take senior roles in future. BITRI replaced two pre-existing research institutions. The previous institutions had five PhDs in total, while BITRI already has 35.

BITRI is establishing two pilot plants for the coal to liquid and coal beneficiation research programme in line with resource-based industrialization. It is particularly interesting that the coal

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<sup>30</sup> Whilst De Beers no longer has the same price-setting prerogatives of the past, other mining companies still price rough stones following indication from De Beers. This may however change in future.

to liquid plant research is targeting chemicals and fertilizers rather than fuel (which are the main products of coal to fuel technology perfected by SASOL). Interviews with management indicated that future areas of research would target copper, gold, and soda ash. Gold in particular may be critical for the newly established research facility for nano-materials, which aims to be one of the best facilities in the world. Whilst BITRI aims to focus on long-term basic research, it is also undertaking short-term innovation work to deliver quick wins and garner support, such as helping brick makers optimize operations and develop patents on Kalagadi sand-based brick manufacturing.

The Botswana Innovation Hub (BIH), established in 2008, has a staff complement of 20. Its mandate is to attract FDI in innovation-driven economic activities, develop a science and technology park, support commercialization of innovation, and intellectual property protection of domestic innovators. The four priority areas are ICT, energy and environment, mining technologies, and biotechnology. BIH has transformed from being completely government owned to being 51 per cent parastatal in 2012 and aspires to become fully private in future. The model of transformation enables BIH to pursue a very dynamic and responsive business strategy securing more than 80 partnerships with academic, research institutes, and the private sector. The most noticeable partnership is with Microsoft where they managed to establish a fully equipped laboratory and has supported software development start-ups.

The activities under the BIH are being developed on 57 hectares of land scheduled to be completed by 2016. There will be an incubator to foster technological innovation and entrepreneurship, a national technology transfer office to help firms with IP management, and a science and technology park. International investors have been incentivized to locate to the park through lower taxes and labour laws dispensations, which allow companies to import skills. A labour dispensation was published for a company manufacturing drilling rigs dependent on the investor's ability to meet skills transfer, exports, and turnover targets. One of the incubators is the mining entrepreneurship development programme, based in Phikwe, funded and supported by BCL, a large copper and nickel producer. There are 18 companies involved in hydrogeology, aero-spatial mapping, pumps re-engineering, and software development. There are also manufacturers of protective clothing and containers for mining samples, which were included.

It is worth noting that by creating two institutions of excellence, government has also externalized a lot of policy advice as these are better placed to influence policy design. The importance of BITRI and BIH is two-fold. Firstly, BITRI and BIH compensate for the lack of private funding going into research, development, and innovation. The lack of funding is compounded by the lack of incentives at the firm level for technology upgrading or innovation. Secondly, the management of BITRI noted that private and public funds can be attracted for incremental investment. Hence government has to incur huge sunk costs of developing research capacity, to be able to attract specific research project financing. This is particularly true for areas where Botswana still has to build its reputation, and that are more technologically sophisticated, such as nano-material technologies.

With regard to skills, the 1990s and 2000s witnessed considerable public investment in the technical and engineering segments. The number of graduating engineers increased during this period and was rapidly absorbed by the mineral industry. Botswana's PhD intake has increased recently to 15-20 student per year through a consortium of ten African universities sponsored by the European Union, which promotes intra-African exchange students for PhDs (see Table 4). Mining companies have assisted in retaining the academic staff through salary supplementation and consultancies. The Mining Engineering department has a Memorandum of Understanding with the Botswana Chamber of Mines, which also covers student placement during their practical training.

Table 4: Production of mining and engineering graduates and post-graduates—Botswana (2015)

	<b>Graduates per annum</b>	<b>Masters/yr</b>	<b>Post-grads/yr</b>	<b>Staff and (vacancies)</b>
University of Botswana	100–130, (Civil/Mining 40, Mechanical/Industrial 60, Electrical 30,	15–20	15–20	Approximately 65 per cent of posts are filled.

Source: Authors' field interviews.<sup>31</sup>

Botswana does not have a significant manufacturing sector and this disadvantages mechanical engineering students, as they do not have placement opportunities during their study. Civil engineering students, however, do not encounter this problem due to higher levels of national construction activity. Graduates struggle to find employment in non-mining private activities and end up mainly in government, parastatals (utilities), engineering consulting firms, and the mining sector.

Recent years have witnessed an increased role by private providers of tertiary education and training skills. These institutions are driven by short-term profit motives and tend to offer courses for skills, which are not necessarily in short supply. Partly as a result, Botswana has found itself in 2015 with a surplus of IT graduates and diplomas, estimated at around 10,000. This situation arose from a confluence of factors, including the practice of accepting government to government ICT-specific training offers, for example to Malaysia. It is also a result of a lack of planning.

The TVET agency (previously known as the Botswana Training Authority, BOTA) focuses on developing new unit standard-based occupational qualifications and accrediting their delivery. The BOTA is also responsible for qualifications offered by private and employer-based providers. The government of Botswana has recently moved to address this gap by converting BOTA into the Botswana Qualifications Authority.<sup>32</sup> Similar issues that impeded the implementation of a coherent TVET qualifications framework in Zambia have also affected Botswana. There is lack of clarity regarding the institution in charge of TVET qualifications, which has resulted in duplication of effort and lack of clarity pertaining to roles (UNESCO 2013). Responsibility for trade tests and craft qualifications are the responsibility of the Labour and Education Departments.

### 6.3 Summary

Botswana's beneficiation policy has been characterized by remarkably ambitious goals, coherent design, and effective implementation. Within a decade, Botswana has moved up the global diamond value chain, increasing its participation in sorting and valuing, marketing, and cutting and polishing. The critical factor in this trajectory was the government's 50 per cent stake upstream in Debswana, and the institutional capability to mobilize state resources effectively by providing an industrial park and government support services to the beneficiation industry. Good relationships with the private sector were important to uncover competitiveness bottlenecks and address them, whilst political leadership gave sufficient credibility to the policy to ensure that firms relocated to Botswana and invested in in-house skills development.

<sup>31</sup> For a list of interview respondents, please refer to Appendix 1.

<sup>32</sup> Old BOTA website redirects to Botswana Qualifications Authority (BQA) website.

The recent price crisis for cut and polished stones due to a glut of supply in the market has exposed the vulnerability of Botswana's beneficiation strategy. As firms shut down and retrenched workers, the state was not in a position to intervene. Its ownership stake upstream allowed it to extract higher rents from rough diamond sales such that restricting rough diamond supply would have been counterproductive. There were also structural factors over which Botswana has little leverage, such as De Beers' decreased market power in global output, increased financialization of the industry, and developments in the Chinese market. As such, its beneficiation project was subjected to severe pressure. The recent downturn in rough diamond market however could change both Botswana's and De Beers' response to the crisis.

In a bid to diversify the economy away from diamonds and take into account the structural challenges facing a strategy aiming for large-scale industrialization, Botswana is now moving towards becoming a knowledge economy. Whilst it is too early to assess the outcomes, it seems that some of the ingredients of the beneficiation policy have been replicated. There is a strong private-public partnership, a Hub to coordinate different policy instruments, a technology park to allow for agglomeration effects and shared facilities, a mix of incentives and performance requirements, access to foreign skills coupled with strong training and knowledge transfer requirements, and a willingness for direct state investment if necessary.

## **7 Political economy issues**

The evolution of the policy framework around mining is shaped, amongst others, by the power relationships between different vested interests in respective countries. This requires analysis of the different segments of domestic, regional, and global private interests participating in and around mining value chains. Such analysis is beyond the scope of this study, but cannot be ignored. This section of the report draws out some of the more apparent political economy issues that have impacted, both positively and negatively, on the respective country's policy frameworks.

### **7.1 Stability of economic growth and fiscal revenues**

The stability of mineral rents in resource-based economies is an important facilitating factor in the coherence and development of industrial policy strategies. Commodity price uncertainty and volatility has adversely impacted all of the countries surveyed, with the exception of Botswana. Because the dominance of De Beers in the global diamond market and the high proportion of high-value gem diamonds sourced from Botswana, diamond export revenues have been far less volatile than those of other commodities have. In addition, the Botswana government followed very conservative and prudent fiscal policies over past decades, which have supported higher investment in human capital compared to Zambia and Zimbabwe. This is most apparent in the gap between the tertiary enrolment statistics (Botswana 24.8 per cent, South Africa 19.7 per cent, SSA average 8.6 per cent), the Gross Expenditures on R&D/ GDP (Botswana 0.43 per cent, Zambia 0.1 per cent), and FTE researchers per million of population (Botswana 139, South Africa 135, Zambia 23, Zimbabwe 42).

### **7.2 Control over mineral rights**

The Botswana state has been able to exercise a greater degree of leverage over its share of mineral rents from diamond mining for a variety of reasons that will not be fully explored in this paper. It entered into an arrangement with private mining capital companies in a unique way that is not easily replicable in other mining countries and as a result, Botswana is an active participant at the apex of the global diamond industry. This relationship continues as the monopoly position

of Debswana as the current dominant player in a broader global diamond producer oligopoly continues, despite the recent erosion of its production market share.

On the other hand, the Zambian state adopted a different approach to leverage and increase mineral rent flow through nationalizing copper mines (with full compensation paid up front) to create the ZCCM. The initial rent flow supported the growth and deepening of infrastructure, the NSI, and the manufacturing sector. Different from diamonds, copper rent flow was not stable and its decline after the 1970s adversely impacted the NSI. Following privatization, the commodity price boom resulted in rent increases, but only in the last part of the 2000s. Nonetheless, these have been insufficient to sustain NSI growth, which competes with a range of other public policy interests in an economy driven by important rural interests.

However, Zambia's large rural constituency is effectively delinked from the mining economy so that mineral rents are spread more thinly across contending rural, urban, industrial, and infrastructure policy targets. This partly explains the low priority accorded to mining-related components of the NSI in Zambia, outlined in earlier sections of this report. Moreover, the tax regime negotiated with the mining companies and enshrined in the bilateral Development Agreements (DAs) provided very favourable terms for the mining companies. The mining tax regime was negotiated at a time of low prices and the mines required significant re-capitalization (Fraser and Lungu 2007). During the copper price boom, the mining tax regime rapidly became an issue of major contention in national political debates. Following the commodity boom, like other mineral- and oil-producing developing countries Zambia revised its mining sector fiscal regime. In 2008, the Zambian government repealed the 1995 Minerals and Mineral Development Act and replaced it with a new Act. The new Act unilaterally suspended the DAs and increased both corporate tax and mineral royalties. A windfall tax and a variable profit tax were also introduced. In 2009 the National Budget scrapped the windfall tax and increased the capital allowance to 100 per cent due to the copper price fall in 2008. The elimination of the windfall tax was reconfirmed in the 2010 National Budget. The tax regime was further revised in 2015.

The controversial reversal of the Zambian government's proposals on increased mineral rents/royalties in 2009 and 2015 makes an interesting assertion. The Zambian state seems to have lost the battle over mineral rents with foreign mining interests, which may have adverse effects on Zambian NSI. This is evident in the debate on the introduction of a training levy on the mining companies. After years of being on the political agenda, mines opposed the levy. Rather surprisingly, this point is astutely observed and condemned by the World Bank.

Mining companies need to play their part in areas of environmental management and local content. Performance in the areas of environmental stewardship, provisions for future cleanup, and degree of procurement from Zambian producers has been lackluster. If mining companies put as much effort into tackling these issues as they have into overturning the recent royalty and VAT tax issues, Zambia would go a long way towards having solutions to these problems (World Bank 2015: ix).

Zimbabwe has a large rural constituency with a more industrialized and diversified economy that is less dependent on mineral rents compared to Zambia and Botswana. Zimbabwe's well developed NSI strengthened during the Unilateral Declaration of Independence (UDI) and sanctions period. Post-independence public policy focused on land reform and on redirecting the skill-related components of the NSI towards primary, secondary, and vocational training sectors.

The struggle between the state and the mining companies over mining rights is now focused on indigenization of ownership and beneficiation requirements. At this stage it is not clear what the outcome of this struggle will be and how it will re-shape the profile of the mining sector. In

addition, the approach to indigenization is based on the identity of individual corporations rather than state ownership such that the impact on revenue will not be as significant as the one that characterized Botswana and Zambia (during the ZCCM era). This phase of re-negotiation is creating a climate of uncertainty over the mining regime, which is discouraging investment in mineral exploration and development, as well as in industries and skills related to mining.

### **7.3 Conflicting interest groups**

#### *7.3.1 Relative influence of domestic vs foreign business interests*

Categorizing different interest groups is complex and varies according to country. However, this categorization is a useful exercise that assists in interpreting drivers that impact the content and implementation of industrial policies. It is useful to distinguish between foreign mining, foreign mining supplier interests, and domestic interests involved in trading, industrial production, and finance as their respective impact on skills development differs.

In the case of Zambia, during the ZCCM era, a number of domestic productive industries were developed around the mining sector, which subsequently contracted during privatization. Foreign mining investors demanded and received a range of legislative and regulatory concessions that undermined domestic suppliers of goods and services. These were enshrined in the Development Agreements and later, in the 2008 Minerals and Mineral Development Act. The domestic interests affected by this were not powerful enough to counter this. For example, the Mines and Minerals Act legislation and regulations allowed the import of capital goods at zero duty while components and spare parts, which could be used to assemble capital goods in Zambia, have a range of duties. The ZAM, representing domestic manufacturers, advocates an evidence-based process to review and reorient the national import tariff structure to support existing and latent domestic manufacture and localization of supply.

The duties on components impede local manufacturers from sourcing their inputs competitively. Many countries address this conundrum through a rebate mechanism. However, the ZAM argue that such an approach is not supported by the Ministry of Finance and the ZDA because of mistrust that such imported inputs may end up being sold instead of being used for manufacture. Another reason for the Finance Ministry's stance may be that import tariffs are not used as an instrument of industrial policy, but rather as an instrument of fiscal policy to raise revenue for the national budget.

Despite the tariff inconsistencies, there is evidence that the capabilities and organized influence of domestic manufacturers are growing. Local manufacturer, Scaw, recently began producing pump casings for a global pump OEM and has recently commissioned a hardening plant for mill balls, which are largely imported. According to interviews with ZAM, local production is only 11 per cent of the Zambian market. Scaw is already exporting to the DRC. Konkola Copper Mines is also reported to be investing in mill ball production. Localization is also happening in other sectors. Toyota Zambia recently sub-contracted production of prop-shafts to a Kitwe fabrication firm.

#### *7.3.2 Local content—complexities of corporate supply chain management systems*

The procurement power of the mining sector in countries surveyed is propulsive. After government expenditure, Debswana is the biggest procurer of goods and services in Botswana. In Zambia, Vedanta decimated a large part of the country's mining supply capacity after it withheld payment for a year and a half during the copper price crisis in 2008–09. The government of Zambia was unable to apply any leverage to avert the destruction of domestic

productive capacity. This illustrates the relative power of mining companies, which raises a number of issues for the domestic stakeholders.

The corporate supply chain management systems are structured in ways that are not conducive for domestic manufacturers and service suppliers. The complexities of supply chain management (SCM) also contribute to undermining local suppliers where the firms do not have access to the market due to the perception that local firms' products and services are suboptimal. Best practice in SCM involves a sub-discipline known as supplier development, which enhances medium-term profitability that requires specific skills training and time. Firms with a short-term horizon often neglect this. For example, supply chain managers of foreign mining firms are usually seconded from within the respective firm's global SCM system with no inherent knowledge of domestic supply capabilities. Their KPIs are focused on short-term realization of price reduction together with quality and reliability. These KPIs often work against developing local supply because of the time required. Furthermore, supply chain managers often have well developed relationships with home country or global suppliers and are averse to taking a risk with unknown local suppliers. In addition, global mining houses often have strategic sourcing agreements with OEMs for key inputs such as earthmoving equipment and mining machinery.

Supply chain management transaction costs are significantly increased if the firm contracts with many different suppliers in the absence of economies of scale. Firms often seek to consolidate procurement of categories of goods with trading houses. In the Copperbelt and countries surveyed for example, foreign and domestic trading houses have established strong relationships with mine SCM managers making it difficult for local suppliers to penetrate the supply chain. Traders provide solutions rather than specific products, relying on global sourcing of branded products. Issues of patronage and corruption often ensue whereby these procurement structures force local suppliers to partner with connected local businessmen with established relationships with the procurement managers in the mines. The scale of such procurement is significant. In Zambia, it is reported that six of the larger mines procured some US\$1.7 billion of manufactured products in 2014, of which US\$1 billion was procured through Zambian-registered trading houses (ICMM 2014). However only 5 per cent of the local spending consisted of goods actually manufactured in Zambia.

An example of the destructive nature of this relates to safety equipment. Mining companies require full personal protective equipment (PPE) suppliers and choose to procure from a centralized trader rather than a manufacturer. Zambian domestic shoe manufacturer Bata had been supplying shoes through an intermediary trader but following the arrival of a new mine procurement manager, the mine gave the PPE contract to another trader who cut the local Bata safety shoe supplier out of the supply chain.

### *7.3.3 Relative power of financial vs productive business interests*

The trade-off between industrial policy and financial policy objectives is well illustrated by Botswana's recent diamond beneficiation strategy. The beneficiation strategy was made possible by the establishment of Debswana. The state extracted rents at all the ownership levels but allowed some additional rent to be extracted at the cutting stage of the value chain in order to achieve industrial policy objectives of job creation, skill development, and technology transfer. In addition, Botswana participates further downstream at the cutting and polishing stage. The conditions for such a strategy to succeed sustainably were based on the high proportion of Botswana gem quality stones in global production. Other supportive factors include complementary policies—local content, efficient logistics conditions, etc.



However, the strategy was undermined by the increased financialization of parts of the value chain over the past five years. This has been recognized by Even-Zohar (De Diamond Loupe 2015) as the main culprit of the current crisis. A large number of newly created cutting and polishing jobs have been lost as a result. The Botswana government has chosen to continue to extract rent at the producer level and allow parts of the downstream manufacturing segment of the value chain to collapse.

Botswana has moved towards partially insulating their fiscal system from resource rent instability through co-ownership and control of the De Beers holding company. This is also the best position to manage the global value chain and is unique to diamonds implying that it cannot be easily replicated with other commodities.

#### *7.3.4 Relative power of trading vs productive business interests*

In Zambia, it appears that there are three discernible segments of the domestic business class. The first is an ‘old guard’ that established itself during the ZCCM era. This class is more dependent on doing business with government departments and agencies, including ZCCM in the past, and less able to operate successfully in the current more competitive environment. The second group are the products of the ZCCM-era NSI. This group however, has had to develop greater entrepreneurial skills in order to survive the economic downturns of past decades. There is evidence that, through the ZAM, they are organizing and asserting themselves in a proactive and increasingly aggressive manner, through the Zambia Mining Local Content Initiative. The third segment of domestic business relates to traders who allegedly often represent the interests of the political elite, some of these acting as front for specific political personalities or well-connected individuals.

Domestic trading interests can be further disaggregated according to their retail interface with domestic consumers. There are domestic businesses that play an established wholesaling role or act as conduits for imported finished goods. There are also more opportunistic and entrepreneurial business people, for example, termed the ‘briefcase businessmen’ operating in rapidly growing and dynamic environments like the old and new Copperbelt areas.

Illustrating the relative power of mining interests, it is notable that in all countries surveyed, investment agreements between respective Governments and South African investors into the domestic retail sector usually include local content and supplier development requirements. However, according to the ZAM, the ZDA appears to have also a ‘sweetheart’ relationship with foreign retail sector investors. The ZDA has never conducted an evidence-based assessment (using the ZABS) of the capabilities of ZAM members to produce goods for the retail sector supply chain and analysing their entry thereto. The popularly cited example is of Trade Kings, a successful domestic manufacturer. Trade Kings has a broad product range and the capacity to scale up production, but struggle to supply chain stores.

## **8 Conclusions**

This paper analysed the design, implementation, and effectiveness of mineral linkage development strategies in three countries, namely Botswana, Zambia, and Zimbabwe. Our analysis validates the thesis that resource-based industrialization is possible through the development of requisite skills, increasing domestic technological capabilities, knowledge, appropriate designed and implemented policies, and strong institutional capabilities.

The countries have a number of shared features. Firstly, they all have well-established mining sectors, with commercial mining dating back 50 to 100 years ago. This has enabled the growth and deepening of human capital, institutional competences, the NSI and, in some cases, upstream industries related to mining, which inevitably takes time to develop. In all these contexts, policies have played a critical role in opening up or closing down the opportunities for resourced-based industrialization.

Secondly, the respective governments played a key role in fostering linkage development. This happened in Botswana in 2005, in Zambia in the 1970s, and in Zimbabwe in the late 1960s–1970s. In Botswana, government intervened through the beneficiation policy, direct ownership in Debswana, and investment in the Diamond Technology Park. In Zambia and Zimbabwe, upstream industries were developed through import substitution policies. In Zambia, state ownership of ZCCM and some large manufacturers was also key. As a counterfactual, in Botswana, no polish and cutting industry was set up until government promoted beneficiation, and in Zambia, the mining inputs cluster declined when government withdrew drastically from any form of industrial policy. This would suggest that there is an important role for government in the linkage development trajectory of resource rich countries. Left to market forces, these linkage industries may not take off or may take off only with limited value addition and technological capabilities.

Our research also demonstrates that the success or failure of a resource-based industrialization approach is country and sector specific, requiring the deployment of different and appropriately tailored policy instruments. Furthermore, the shaping of resource-based industrialization policies and the extent to which they are implemented (or not implemented) is heavily influenced by power relationships within a specific economy and relationships across different segments of the domestic and global value chains for specific resource types and the value chains of products purchased by resource firms. In all cases, the issue of skills is pertinent to the success of mineral extraction, processing, and manufacturing activities and, although alluded to in this paper, will be covered in an upcoming paper.

In Zambia and Zimbabwe, we find significant conflict around legislation and regulation aimed at increased local content. While this conflict is visible mainly between extractive mining policy and industrial policy institutions, and often depicted as policy ‘incoherence’, it is actually reflective of the conflict between divergent domestic interest groups. On the one side, there are domestic manufacturing interests with not insignificant productive capacity who find it difficult to penetrate mining company supply chains. On the other side, stand a set of foreign and domestic interests involved directly in export-oriented mineral extraction activities. They are allied with other domestic interests involved in the import and distribution of equipment, machinery, and consumable items used by the mining firms. It would appear that in Zambia and Zimbabwe, the domestic manufacturing interests are not sufficiently organized or powerful enough to influence national policy makers and/or policy implementers.

In Zambia, power relations have obviously been tilted towards the mining companies, which have managed to secure favourable tax regimes, and non-mandatory approaches to local content and training. This is also evident in the reliance of Zambia’s industrial policy on FDI, which has meant that for example, its beneficiation ambition is solely dependent on Chinese investment in Chambishi industrial zone. Finally, in Zimbabwe, these power relations are being re-defined, in particular around the issues of ownership and beneficiation.

As a result different Zambian policy and legislative instruments have tackled the topic of local content without actual implementation taking place, while local content is missing from key industrial policy documents. At the same time, different organizations are undertaking initiatives

that are not always aligned. Local content objectives are also not reflected in the FDI implementation (although this may change through the Chambishi and other industrial zone experiments) and trade policies, which actually hamper the potential for a local equipment and machinery assembly industry.

In Zambia's case, our research identified other factors relating to supply chain management and information asymmetry between mine procurement officials and supplier industries, which have impeded domestic manufacture. These most likely exist in other countries (Hanlin and Hanlin 2012).

Private domestic manufacturing interests have responded differently in these contexts. In Zambia, some have taken the lead in promoting local content. However, industry alone may not be able to tackle the range of constraints facing local manufacturers, and which require among others, development finance and infrastructure development. In Zimbabwe, domestic manufacturers recently raised the profile of local content issues with government, pushing for a stronger policy implementation. Botswana, on the other hand, has created an environment very conducive for public-private partnerships. Industry confirmed that the relationship with government has been remarkably supportive.

In Zimbabwe, beneficiation has been pursued to capture a larger share of revenues rather than for industrialization objectives. On the other hand, local upstream industries, which have been very competitive in the past, have been marginalized by industrial policy until recently. Most importantly the government appears to lack the resources to support local manufacturers other than through trade protection, and to curtail the decline of the NSI.

Botswana is a country with a small population and large per capita diamond mineral endowment. The stability of the global diamond commodity market, a De Beers monopoly initially, and later a global oligopoly, underpinned the success of Botswana's resource-based development policy approach. Botswana, however, did not develop its industry to the same extent as Zambia or Zimbabwe. Instead, the country used its mineral rights legislation to leverage a direct and significant state-ownership stake in the global diamond supply industry in partnership with De Beers.

Other countries have been unable to leverage mineral rights legislation to the same extent, probably due to internal political economy factors whereby private domestic vested interests have contested for and acquired the ownership stake often in partnership with transnational corporations and have then proceeded to adopt the TNC objective of maximizing the extraction and expatriation of rents and not channel the rents towards deepening internal productive capacity.

Subsequently, Botswana has further leveraged this ownership position to carry out increasingly domestic cutting, polishing, and marketing of diamonds; implementing a coherent beneficiation policy coordinated by the Diamond Hub; investment in the Diamond Industrial Park; and monitoring mechanisms.

Other countries have not had the advantage of the prolonged rent stability offered by diamonds, as they are dependent on cyclical commodities like copper, gold, and platinum. However, policy instruments such as sovereign wealth/stabilization funds can address such cyclicity.

In conclusion, and particularly in the case of Zambia and Zimbabwe, there is significant scale of demand for goods and services from mining to provide the basis for the development and growth of competitive domestic supply industries. Both countries have existing or latent

productive capacity, based on the legacy of past industrial development and their respective NSIs. In addition, the domestic manufacturing interests are increasingly organized and attempting to influence policy. This provides the foundation for the potential success of resource-based industrialization policies and strategies.

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## Appendix 1: List of respondents

Institution	Respondent details
<b>Botswana</b>	
Botswana Diamond Manufacturers Association (BDMA)	Kfir Teichman MD of Diacore, Chairperson of BDMA
Botswana Innovation Hub (BIH)	Dr Budzanani Tacheba Director
Botswana Institute for Technology Research and Innovation (BITRI)	Prof Nelson Torto CEO
Botswana Institute of Engineering (BIE) University of Botswana Faculty of Engineering & Technology	Eng. Oagile Kanyeto Dean of Faculty and BIE Chairman
Ministry of Trade and Industry (MTI)	Jamah S. Mudarikiriegopane Policy Officer
Tokafala (De Beers, Anglo American)	Ineke van der Weijden Programme Director
<b>South Africa</b>	
Department of Trade and Industry	Tapiwa Samanga Chief Director for Mineral Processing and Construction  Tshepiso Kadiaka Manager: Mineral beneficiation sector
Mintek	Dr Marian Lydall Head, Market Development
South Africa Capital Equipment Export Council (SACEEC)	Sybil Rhomberg MD
South African Minerals to Metals Research Institute (SAMMRI)	Dr Victor Ross Executive committee member (ex-chairman)
Chamber of Mines	Stella Carthy Head: Skills Development
Wits Centre for Mechanised Mining Systems	Declan Vogt Director
<b>Zambia</b>	
Association of Consulting Engineering of Zambia (ACEZ)	Charles M. Haanyika MD Utilink Ltd, ACEZ Chairman
Copperbelt University School of Natural Resources	Felix Calaba Senior Lecturer
Copperbelt University School of Business	Humphrey Fandamu Head of Department
Copperbelt University School of Mines and Mineral Sciences	Dr Peter Chileshe Postgraduate Coordinator and Senior Lecturer
Engineering Institute of Zambia	Eng. Newton Zulu Deputy Registrar
Ministry of Commerce, Trade and Industry Domestic Trade Department	John Mulungoti Director – Domestic Trade Department
Ministry of Commerce, Trade and Industry Industry Department	Aaron Mutale Principal Economist
Ministry of Education, Science, Vocational Training and Early Education	Dr Patrick Kona Nkanza Permanent Secretary (Science and Vocational Training)
Technical and Vocational Training Authority (TEVETA)	Catherine M. Kanyensha Director Development  Kennedy Bowa Manager Curriculum Development
University of Zambia School of Mines	Dr Osbert Sikazwe Dean
University of Zambia School of Engineering	Prof. Mundia Muya Dean
Zambia Development Agency (ZDA)	Mukula Makasa Director – Enterprise Development
Zambia Manufacturers Association (ZAM)	Maybin Nsupila CEO

<b>Zimbabwe</b>	
Confederation of Zimbabwe Industries (CZI)	Sifelani Jabangwe Committee member
Engineering Council of Zimbabwe	Eng Farai Mavhiya-Bhiza Membership Committee
Institute of Mining Research (IMR)	Lyman Mlambo Chairman and Mineral Economist
Ministry of Economic Planning and Investment Promotion	Dr D Sibanda Permanent Secretary
National Manpower Advisory Council of Zimbabwe (NAMACO) Counsel, ZACE, ECZ	Eng. Peter Mutsinya Microhold Mining (Pvt) Limited, Group CEO
Scientific and Industrial Research and Development Centre	Philemon Kwaramba, Director, Business Operations Unit
SRK Consulting	Wonder Mutematska Mining Consultant
University of Zimbabwe Department of Mining and Metallurgical Engineering	Tulani W. Mukarati Lecturer
Zimbabwe Institute of Engineers	Wilson Banda Membership and training officer
Zimbabwe Institute of Engineers	Dr S Diarra CEO
<b>Regional Institution</b>	<b>Respondent details</b>
SADC Education Desk	Lomthandazo Mavimbela Senior programme manager for education training
SADC Industrial Development Desk	Alisoa Vololoniaina Senior Programme Officer, Industrial Productive Competitiveness
SADC Science and Technology Desk	Anneline Morgan Senior Programme Officer
Southern African Institute of Mining and Metallurgy (SAIMM)	Malcolm Walker Regional development manager