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Resource-based industrialisation in Southern Africa: Domestic policies, corporate strategies and regional dynamics

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ABSTRACT

This article analyses policies and strategies adopted by Botswana, Zambia and Zimbabwe in order to develop linkage industries from the mineral sector. Whilst Southern Africa has a strongly integrated regional value chain for equipment and services related to mining, linkage development strategies in the three countries under examination have been formulated within narrow domestic frameworks. The evidence suggests that the success or failure of a resource-based industrialisation approach is country and sector specific, requiring the deployment of different and appropriately tailored policy instruments. Our research uncovered important cross-country variations in terms of opportunities created by specific mineral commodities, ambition and scope of industrial and linkage development strategies, and institutional capabilities to ensure enforcement and coherence with other policies.

KEYWORDS

Mineral linkages; industrial development; mineral value chains; Southern Africa; resource-based industrialisation

JEL CLASSIFICATION



L5; L6; O1; O25

1. Introduction

The economies of Botswana, Zambia and Zimbabwe are dependent on exports from well-established mineral commodity sectors. This article looks at the policies and strategies adopted to leverage mineral resources to foster upstream and downstream linkage industries and support upgrading of technological capabilities.¹

Whilst the Sub-saharan Africa (SSA) record of resource-based industrialisation 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 policy interventions effective in providing incentives to industry, catalysing investment in education and indigenous technological capabilities, and accessing foreign capital and know how.

The literature on technological capabilities suggests that in developing economies, skills development, rather than research and development (R&D), provides the foundation to

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¹This article draws heavily on Fessehaie et al. (2016).

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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.

The research uncovered important cross-country variations in terms of: the breadth and depth of technological complexity of existing industrial sectors; opportunities created by specific mineral commodities; the ambition and scope of industrial and linkage development strategies; and 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 research is based on a review of key policy and industry documents and interview data collected in 2015 and 2016 in Botswana, South Africa, Zambia and Zimbabwe.

The article is organised as follows. Section 2 consists of the literature review. Sections 3–5 discuss the case studies of Zambia, Zimbabwe and Botswana. Section 7 concludes.

2. Literature review

The relationship between natural resource endowment and industrialisation has historically been viewed with some scepticism (Prebisch, 1950; Sachs and Warner, 1995, 1997; Auty, 2001). Sachs and Warner (1995, 1997) identified Dutch Disease as the main growth-reducing factor affecting resource-rich economies. However, subsequent studies argued that the success or failure of resource-based industrialisation rests on a more complex set of factors such as capital market imperfections, human capital and weak knowledge systems (Gylfason, 2001; De Ferranti et al., 2002; Stijns, 2005).

The roles of human capital and knowledge systems in particular are consistent with economic history research focused on Scandinavia, Australia and the USA (David and Wright, 1997; Wright and Czelusta, 2007). Sweden, Finland and Norway industrialised through the development of industrial activity around their respective cereal, timber, fish, oil and iron ore resources (Blomström and Kokko, 2007; Andersen, 2012). Domestic knowledge clusters evolved, consisting of networks of private sector-led research institutes, universities and firms, and public investment in industry-oriented skills formation, with aligned public procurement policies. These initially adopted foreign technologies subsequently adapted these and finally innovated beyond them. Examples of backward integration include Norway's Statoil and oil-related capital equipment industries. The best example of lateral migration is Nokia's successful move from pulp and paper milling into cellular technology.

The USA also developed through resource-based industrialisation around iron ore, coal, lead, nickel, zinc, antimony, copper and oil, facilitated by an accommodating legal environment, investment in infrastructure of public knowledge such as the US Geological Survey and education in mining, minerals and metallurgy (Wright and Czelusta, 2007; Andersen, 2012).² Although heavily dependent on resource extraction, Australia undertook massive investment in engineering education, training and R&D where mining R&D accounted for 20% of total R&D in 1995/96 (Wright and Czelusta, 2007). Today Australia is a world leader in mining software systems, home to global mining exploration

²By 1917 the USA had over 7500 mining engineers in the country.

ventures and an important global supplier of high-tech services and equipment to meet the demand for safer and cleaner mineral extraction and beneficiation processes.

The literature review indicates that opportunities for the development of downstream, upstream and lateral industries are clearly country and sector specific (Andersen, 2012; Morris et al., 2012; Morris and Fessehaie, 2014). Investment in domestic technological capabilities, education and training, especially engineering and vocational skills, strong public-private partnerships and alignment of different policy tools, including industrial and mineral policies, as well as the respective countries' policy frameworks and institutional capabilities emerge as recurrent factors. 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).³

Successful implementation of such programmes is difficult and more countries have failed than have succeeded (Morris and Fessehaie, 2014; Rodrik, 2014; Ramdoo, 2015). 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 development strategies in SSA is limited, however, especially with regard to recent experiences and different approaches adopted by countries since the commodities boom.⁴

3. Mining linkage development across the Southern African region

Trade analysis reveals significant regional integration across the mineral and mineral processing value chain with Botswana, Namibia, Democratic Republic of Congo (DRC) and Zimbabwe importing most of their capital equipment from South Africa (Table 1).

However, it appears that such regional integration may be unravelling, as evidenced by the decline of South Africa's market share of Zambia's capital equipment imports between 2004 and 2014 (Table 2). That this took place during a period of huge Foreign direct investment (FDI) inflows into Zambia's mining sector should be of concern to regional policy-makers.⁵

On the other hand, the annual expenditure on mining capital equipment within the nexus of inland countries Zambia, Zimbabwe and DRC demonstrates the potential for significant-scale economy production activities. The policies pursued by individual countries for linkage industries have largely failed to take into account these regional dynamics.

Linkage development from the mining sector has been high on the agenda of each country examined in this article. Linkage development can take multiple forms: fiscal linkages, consumption linkages, horizontal linkages (capabilities and investment benefitting non-extractive sectors) and upstream and downstream linkages (Morris et al., 2012). Each of these channels can potentially contribute to industrialisation by providing revenues for service and physical infrastructure development, creating demand for manufactured goods

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

⁴A recent contribution in this area has been the Making the Most of Commodities Programme (Morris et al., 2012).

⁵See http://www.miningweekly.com/article/copperbelt-capital-equipment-supply-must-be-mutually-beneficial-to-ensure-sustainability-argues-researcher-2016-02-12/rep_id:3650. Accessed January 2017.

Table 1. South African capital equipment market share.

Country	Average (2012–14), R billion	South Africa (%)
Zambia	5.6	37
Namibia	4.7	63
Botswana	4.3	73
Mozambique	4.1	42
DRC	3.5	48
Zimbabwe	3.4	57
Angola	1.0	13
Tanzania	0.9	9
Swaziland	0.8	83
Malawi	0.6	25

Source: Trade map average is from 2013 to 2015.

and fostering productive capabilities linked to mining and beyond. The opportunities to develop such linkages are commodity and country specific, but upstream linkages present a ‘low hanging fruit’ compared with downstream linkages (Morris et al., 2012). There are two-fold reasons for this: first, upstream linkages are diversified in terms of entry barriers, capital and skills intensity and technological intensity, and hence offer opportunities for a broad range of local industries. In contexts of low supplier capabilities, there are services and goods that require low levels of skills, technology and capital, which can be competitively supplied locally. On the contrary, mineral beneficiation requires large lump-sum investment, foreign technologies and highly skilled personnel – scarce factors in most African countries. Second, many countries in Africa have some level of existing capabilities that can be leveraged for upstream linkage development. In the case studies, Zambia and Zimbabwe’s mining sectors offer the scale and scope of economies for specific categories of manufacturing activities, especially if one takes a regional perspective.

The opportunities for mineral beneficiation are more constrained due to limited scale, capital intensity, cost of capital and distance to markets. In these cases, detailed feasibility studies are required which are beyond the scope of this article. Botswana represents an exception, due to the combination of high market share in global diamond output, and state ownership in production (50% in Debswana). The success of the diamond beneficiation policy hinged significantly on these two factors. Another set of determining variables in the success of linkage development strategies relates to policy design, implementation and monitoring, which are discussed in the following sections.

4. Resource-based industrialisation potential in Zambia

Following the 1969 nationalisation of mining assets, upstream and downstream linkage development became a critical component of Zambia’s industrialisation strategy (Fessehaie, 2012). These policies succeeded in developing manufacturing firms, and a skilled local workforce

Table 2. Mining capital equipment, South Africa’s market shares in Zambia 2004–14.

Product cluster	South Africa’s market share in Zambia		Change 2014 (%)	2004–14 (%)
	2004 (%)			
Mineral processing equipment	60.2		26.7	–33.4
Off-road special vehicles	72.9		54.3	–18.6
Conveyor systems and others	58.2		52.3	–5.9
Pumps and valves	72.9		58.1	–14.8

Source: Fessehaie (2015).

produced by an extensive technical and vocational education system sponsored by the mining sector. The breaking up and privatisation of mining assets, which were sold to foreign multinationals, coincided with the structural adjustment programme which led to a radical policy shift on mining upstream linkages. Trade liberalisation, the end of preferential mining procurement policies and the withdrawal from any comprehensive approach to industrial policy exposed the local manufacturing sector to competition. At the same time, local firms were not supported in adjusting to the new economic landscape (Fessehaie, 2012; Fessehaie and Morris, 2013). This took place in difficult economic circumstances characterised by low commodity prices and macroeconomic instability. Additionally, local firms saw the erosion of scale economies required to sustain local manufacturing, scale economies once supported by supplying the state-owned mining company as a sole entity.

As a result of these developments, the local mining content is now low. 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 only 5% (or US\$87 million) represented locally manufactured goods (International Council on Mining and Metals, 2014). Research findings point to the following factors impeding the supply of mining inputs from domestic manufacturers:

- Mining firms' procurement strategies, including practices of outsourcing procurement of an entire category of supplies (e.g. health and safety equipment) to solution providers who procure directly from global suppliers.
- Information asymmetry: mining house procurement lack knowledge of what is locally available.
- Domestic manufacturer's weak entrepreneurship skills: potential suppliers do not know how to access procurement opportunities by the mining sector.
- High cost of finance for working and investment capital.
- Low technological capabilities and weak quality assurance mechanisms.

4.1. Policy framework

The various components of Zambia's policy framework are not consistent in targeting resource-based industrialisation. The national Vision 2030 (Government of the Republic of Zambia, 2006) and the Sixth National Development Plan 2011–15 (Government of the Republic of Zambia, 2011) target increased mining value addition through special economic zones and FDI, among others. While the 2008 Commercial, Trade and Industrial Policy does not refer to either copper beneficiation or local content (Government of the Republic of Zambia, 2008), the 2012 Strategy for the Engineering Manufacturing Sector targets copper fabrication (Government of the Republic of Zambia, 2012a) and the 2012 Cabinet Strategy Paper on Industrialisation and Job Creation (Government of the Republic of Zambia, 2012b) aims to enforce Section 13 of the Mines and Minerals Development Act (Government of the Republic of Zambia, 2013) on local content.⁶ However at the time of fieldwork, none of these policies and strategies had been implemented, reflecting structural challenges in terms of resources, institutional capabilities and political will. This is

⁶The Mines and Mineral Development Policy (2013) aims to address the issue of local content.

exacerbated by poor engagement by industry, which has generally not participated in government-led sectoral initiatives to design interventions for critical sectors.

Key stakeholders argue that the policy objectives are not clear enough, that they lack coherence and coordination and that there is poor implementation capability. Recent policies have aimed to promote indigenous ownership, through the Citizen Economic Empowerment Commission Act, but this had little impact on local value addition. Moreover, the government has not leveraged its 10–15% shareholding in individual mining companies to monitor and enforce agreements on local content.

An illustrative example of policy incoherence is the divergence between the ministry responsible for industry, which wants mandatory local content provisions, and the Zambia Development Agency responsible for FDI, which regards local content measures as blunt instruments and favours a gradual, targeted approach to localisation, coupled with support for manufacturers. Moreover, the Zambia Development Agency is charged with FDI promotion through Multi-Facility Economic Zones. These create incentives for foreign firms which are not always consistent with a localisation agenda, for example through duty-free import incentives. At the same time, Zambia's national import tariff system discourages local assembly with duties on inputs and components, and often zero-rated imports of assembled equipment. Finally, industrial policies do not provide incentives for local manufacturers to upgrade their technological capabilities and skills.

4.2. Industry strategies in promoting local content

The main policy instrument used to support downstream beneficiation has been FDI promotion, through granting fiscal and non-fiscal incentives to foreign investors. Chinese investors responded by building an industrial park in Chambishi (Copperbelt Province) in 2007.⁷ The investment targets copper semi-fabricates manufacturing, but interviews with the Ministry of Commerce, Trade and Industry 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.

Although the corporate procurement strategies of private mining companies varied, they have increasingly relied on direct imports and sourcing from a large network of local agents and subsidiaries, exacerbated by strong political connections on company boards and large importing agents. Procurement managers are assessed on the basis of total cost of procurement and not on local sourcing, hence they are not incentivised to invest in local supplier development. Chinese and Indian mining companies have generally been reluctant to engage in formal or informal mechanisms of local supplier development.⁸

In response to the contradictory policy initiatives, the Zambia Association of Manufacturers has taken a leading role in driving the local content agenda, with little support from the government, through the Zambia Mining Local Content Initiative. The Chamber of

⁷Non-Ferrous China Africa (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, an investment worth US\$800 million, inclusive of the Chambishi Copper Smelter, acid plants as well as a copper semi-fabricates manufacturing plant.

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

Mines is participating so as to be seen to be contributing to localisation to avert mandatory requirements from being adopted by government. The main activities of the Local Content Initiative revolve around Business-to-Business activities. In addition the Zambia Association of Manufacturers, with support from the UK international cooperation agency, is screening local suppliers with the intention of subsequently providing business development services.

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 the industry side, part of the reason for opposing the levy has been concern about the ability of the government to collect and spend the levies appropriately. This resulted in the setting up of the Zambia Mining Skills and Education Trust at the end of 2014. All of the major mining companies (except Chinese-owned Chambishi) have joined the initiative, under the Chamber of Mines. The Zambia Mining Skills and Education Trust was expected to become operational by the end of 2015, with strategies in place and, more importantly, financing.

4.3. Conclusions

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. 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 a 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 organisations within the Ministry of Commerce, Trade and Industry, the Ministry of Mines and Mineral Development and the Zambia Development Agency have or are developing separate approaches to local content measures which create policy uncertainty.

As a result of weak policy frameworks, and possibly to avert mandatory regulations, the private sector has taken the lead, with domestic manufacturing interests setting up a local content programme, and mining houses setting up a skills development fund. However, it is unlikely that private-sector initiatives will be able to address the structural constraints to manufacturing competitiveness. The latter requires a comprehensive approach, with effective and coordinated public interventions to address access to finance, engineering, technical and vocational skills and infrastructure development.

5. Resource-based industrialisation in Zimbabwe

Zimbabwe's industrial development evolved around its mining sector, with significant diversification taking place since the 1920s (Jourdan et al., 2012). Except for platinum and gold, most of Zimbabwe's copper, iron ore and ferrochrome mineral output used to be locally processed (Hawkins, 2009). The manufacturing sector production capabilities encompassed ball mills, conveyors, rail and rolling stock, pumps, headgear, ventilation ducting, electrical equipment mining chemicals and explosives (Jourdan et al., 2012). During the 1980s and 1990s, the education system produced most of the technical, engineering and managerial skills required by the mining and manufacturing sectors.

The economic crisis in the early 2000s eroded these capabilities. Real gross domestic product cumulatively declined by over 50% between 2000 and 2008. Manufacturing capacity utilisation declined from approximately 80% in 2000 to 10% in 2008 (MEPIP, 2011; Government of Zimbabwe, 2013), and capacity utilisation in the engineering and metals sector has declined from 36.7% in 2012 to 27.7% in 2013 (ZEPARU, 2014). Some firms shifted from manufacturing to distribution while some international Original equipment manufacturers (OEMs) sold their subsidiaries to local investors. Large segments of foundry, metal fabrication and heavy machinery sectors closed down after 2000 and have been unable to fully resurrect pre-crisis capabilities after 2012.

The Zimbabwe Chamber of Mines estimates that more than half of the industry's skilled personnel emigrated from the country since 2007, negatively affecting the mining industry, supplier firms as well as teaching and technology institutions (Hawkins, 2009). This is reflected by the extent of brain drain and the performance of national research and teaching institutes such as the Institute of Mining Research and the Scientific and Industrial Research and Development Centre.

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, underpinning the battered but still diversified manufacturing and engineering sectors which recorded a slight recovery in capacity utilisation to 44% in 2012 (World Bank, 2014).

The apparent latent potential for further resource-based industrial recovery is hampered by a number of supply-side constraints, including access to finance to replace obsolete machinery, high input costs, volatile financial environment, unstable power and water supply, licensing and permits, unpredictable fiscal regulations, political instability, corruption and crime (Davies et al., 2012; Jourdan et al., 2012; World Bank, 2014; ZEPARU, 2014).

5.1. Policy framework and implementation

A number of policy components could potentially impact on linkages between the mining and manufacturing sector. Zimbabwe's Mid-Term Plan 2011–15 prioritises employment creation and equitable growth through, among others, indigenisation and beneficiation (forward linkages).⁹ Although the machinery and equipment sector is targeted for investment promotion, no reference is made to the sector's backward linkages to mining. Equally, local content issues are not included in the most recent documents, the Zimbabwe Agenda for Sustainable Socio-Economic Transformation 2013–18,¹⁰ and the Industrial Development Policy 2012–16.¹¹

However, coordinated implementation of industrial and trade policies has been very weak, and there is no support to upgrade firm competitiveness and technological competencies. Overall, the government has focused on mineral beneficiation and indigenisation rather than local content issues. Until recently, there appears to have been a disconnect with mineral policies, regulated by the 2005 Mines and Minerals Act which does not

⁹See Fessehaie and Morris (2013).

¹⁰This intervention, however, is not included in the Value Addition and Beneficiation Cluster Matrix (Government of Zimbabwe, 2013:103–13).

¹¹The objectives of Government of Zimbabwe's (2012) Industrial Development Policy 2012–16 are: contribution of manufacturing to gross domestic product of 30% by 2015, 50% of total exports by 2015, capacity utilisation of 80% by 2016.

include very strong provisions on local content.¹² Policy-makers have for a number of years delayed the finalisation of a Minerals Policy which links resource extraction rights, royalties and mineral taxation with backward, forward, spatial linkage development obligations.¹³ During the last part of 2015, however, under pressure from organised business, local content had begun to feature on the political agenda.

Current mineral beneficiation and value addition levels are very low, reflected by 90% of Zimbabwe's minerals being exported in raw or semi-processed form (ZEPARU, 2014). Recently, concerns over tax avoidance are leading policy-makers to consider beneficiation as a mechanism to introduce transparency in the sector so as to force mining companies to declare output values.

5.2. Industry strategies

Of US \$800 million spent during annual operations (excluding capital expenditure) on materials and consumables by the mining sector in 2012, Kwesu (2015) estimated around US \$400 million was locally sourced. The largest inputs included electric power (\$80 million), iron and steel products (\$50 million), distribution (\$50 million) and non-electrical machinery and equipment (\$40 million). These figures, however, do not reflect the extent of local value addition taking place: these goods and services are largely sourced from local distributors rather than producers, hence with little value added content.

It appears that there is a latent potential to resurrect past capabilities around crushing equipment, engineering services, mill balls, other foundry products, liners and chemicals, wire rod products (ropes, chains and slings) and castings (mantles, bowls, mill liners, locomotive wagons, frames, slagpots, ladles) (ZEPARU, 2014; Confederation of Zimbabwe Industries interviews). However, mining companies view local supplies as of high cost, unreliable, of poor quality, with poor back-up services and requiring upfront payment. Manufacturers attribute these constraints to high domestic operating costs and unreliable input markets. Firms involved in mineral extraction are of the view that local content obligations should not be imposed until infrastructural bottlenecks and high domestic manufacturing costs are addressed. This view seems to also be adopted by the Ministry of Economic Planning and Investment Promotion.

The Confederation of Zimbabwe Industries is lobbying government for increased industry-specific trade protection for limited duration. While the agro-processing sector has been targeted, it appears to be a collection of ad hoc interventions possibly driven by the relative power of different domestic vested interests in specific industries, rather than a structured strategy to revitalise local manufacturing.

5.3. Conclusions

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

¹²The 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 utilised in the development. Bullet point (xii) of paragraph (e) of sub-section 3 of section 158.

¹³Other mining-related policy measures include a draft mining exploration bill, rebuilding the national geological survey units to ensure government has leverage in negotiating mining rights, and support for small-scale mining sector.

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 which 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. A once very diversified and competitive mining inputs cluster has been eroded. The highest priority today lies in rebuilding linkages between the mining companies and the local manufacturing basis.

In the high-level power struggle over mining rights and revenues, local content issues have been relatively marginalised. The decline of the National System of Innovation (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. Resource-based industrialisation in Botswana

6.1. Policy framework and implementation

Botswana's economy has historically been dependent on diamond extraction, although mining has declined from 56% of gross domestic product in 1990 to 33% in 2014. In 1996, Botswana adopted the long-term Vision 2016, targeting economic diversification. Sectoral strategies were later identified through the Economic Diversification Drive 2011–16 (Government of Botswana, 2011). Subsequent National Development Plans for 2003–09 and 2009–16 established six hubs, namely Diamond, Health, Education, Agriculture, Innovation and Transport (Government of Botswana, 2008), with associated institutional support measures for implementation.

In earlier decades, Botswana's government leveraged its unique position as the world's largest and highest-quality gem diamond producer by establishing a strategic relationship with De Beers in a 50%–50% government–De Beers joint venture called Debswana. In renegotiating Debswana's mining licence renewal in 2005, the Botswana government leveraged its 50% position in Debswana, effectively forcing De Beers to support diamond beneficiation¹⁴ by physically relocating its global sorting and valuing operation from London

¹⁴More recently, there have been also initiatives to develop local suppliers. Launched in 2014, the Chamber of Mines' Business Development Forum represents the mining industry's objectives to develop local suppliers whilst creating efficiency and cost savings for the mining companies. The Chamber also coordinates purchasing power to support local companies and attracts FDI from foreign OEMs (Botswana Chamber of Mines, 2014). Tokafala, established in 2013 and funded by Anglo American De Beers and Debswana, is the leading private programme which supports enterprise development.

to Botswana and by actively encouraging domestic marketing, polishing and cutting activities (Mbayi, 2011). Unlike most other commodities, De Beers exerts significant market power on domestic and global production of gem diamonds, as well as global marketing and distribution channels.

Botswana's beneficiation policy has been 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. In 2013, Botswana's polished diamond exports totalled US\$759 million and employment increased from 2200 workers in 2008 to 3750 in 2013. Skills transfer has been a key element of the beneficiation strategy because cutting and polishing is skills intensive. Botswana has actively used its work permit regulations to maximise the development of domestic cutting and polishing skills, acquired mainly through on-the-job and in-house training.

However, a global glut in the diamond market precipitated a significant decline in cutting and polishing activities in 2015, resulting in the closure of a number of firms in Botswana and 500 job losses against a total workforce of 3750 (Grynberg, 2015; Mining Weekly, 2015, 9 June). 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 the rough production stage and the cutting and polishing stage.

Policy has focused on leveraging linkages and diversifying out of resource dependence, although some inconsistencies have emerged recently. Most recently, the 2014 New Industrial Development Policy acknowledged factors impeding diversification as ineffective coordination and implementation of industrial policy initiatives, low firm technological capabilities, inadequate infrastructure and mismatch of industry skills (Government of Botswana, 2014). At the institutional level, there is significant level of fragmentation with the Ministry of Minerals, Energy and Water Resources 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.

The 2008 Botswana Excellence Strategy represents the government intention to move Botswana towards a knowledge economy. Until now, innovation was hampered by a number of factors. Interviews highlighted that the main gaps in the development of a dynamic NSI consist of insufficient R&D funding, poor commercialisation and weak management skills of start-up firms. Two key institutions have been created to implement the national innovation strategy: the Botswana Institute for Technology Research and Innovation, to coordinate and undertake basic research and to identify, absorb and innovate technologies; and the Botswana Innovation Hub, with a mandate to attract FDI in innovation-driven economic activities, develop a science and technology park, and support commercialisation of innovation and intellectual property protection of domestic innovators.

6.2. Conclusions

Botswana's beneficiation policy has been characterised 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% stake upstream in Debswana, and the institutional capability to mobilise 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. It is nevertheless too early to assess whether the diamond processing industry is sustainable beyond the depletion of diamonds, given that processing industries in other countries are more cost competitive (India) or more sophisticated (Belgium).

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.

In a bid to diversify the economy away from diamonds and taking into account the structural challenges facing a strategy aiming for large-scale industrialisation, 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. Conclusions

This article has analysed the design, implementation and effectiveness of mineral linkage development strategies in Botswana, Zambia and Zimbabwe.

The countries have well-established mining sectors, which have enabled the growth and deepening of human capital, institutional competences, the NSI and, in some cases, upstream industries related to mining. In all of these contexts, policies have played a critical role in opening up (or closing down) opportunities for resourced-based industrialisation. This happened in Botswana in 2005, in Zambia in the 1970s and in Zimbabwe in the late 1960s–70s. In Botswana, the 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 Zambia Consolidated Copper Mines (ZCCM) and some large manufacturers was also key. In Botswana, no polish and cutting industry was set up until the government promoted beneficiation; and in Zambia, the mining inputs cluster declined when the government withdrew drastically from any form of industrial policy.

Our analysis suggests 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. The article also demonstrates that the success or failure of a resource-based industrialisation approach is country and sector specific, requiring the deployment of different and appropriately tailored policy instruments. Furthermore, the shaping of resource-based industrialisation 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.

The analysis of trends in regional trade points to an integrated regional value chain, in which South Africa plays a supply-hub role for the rest of the region. This position, however, is threatened by significant and growing imports of capital goods from outside the region. Realising the respective country's latent productive potential will require greater coordination and integration of national mining and industrial policies in alignment with the corporate strategies of domestic and transnational firms operating across the region. Yet, at the moment, every country is designing its upstream linkage policies within narrow domestic frameworks.

In Zambia and Zimbabwe, there is 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 and global interest groups. It would appear that in Zambia and Zimbabwe the domestic manufacturing interests are not sufficiently organised or powerful enough to influence national policy-makers and/or policy implementers.

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, which has prioritised mineral beneficiation. Other countries have not had the advantage of prolonged diamond rent stability and have been unable to leverage mineral rights legislation to the same extent. At the same time, other countries have larger demand size and economies of scale to justify more ambitious upstream linkage development policies.

In conclusion, the regional market offers, for selected goods and services, sufficient scale to drive the development of competitive domestic supply industries. A recent study estimates the inputs market for the Southern Africa Development Community region – with mining projects worth US\$50 billion – to be as high as the European and Chinese markets together (Jourdan, 2015). Both countries have existing or latent productive capacity, based on the legacy of past industrial development and their respective NSIs. These opportunities cannot be pursued in isolation from the region, however, but should rather be tapped into through cooperation and coordination with other regional partners.

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