



Key findings from case studies of mining capital equipment, infrastructure inputs and soy agro-processing in Southern Africa and implications for regional industrial development agenda

**RESEARCH REPORT SUBMITTED TO
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Abbreviations

| | |
|------------|--|
| BEE | Black Economic Empowerment |
| CAGR | Compound Annual Growth Rate |
| COMESA | Common Market for Eastern and Southern Africa |
| DRC | Democratic Republic of Congo |
| diti (the) | Department of Trade and Industry |
| ECIC | Export Credit and Insurance Company |
| EPCM | Engineering, Procurement, Construction, Management |
| FDI | Foreign Direct Investment |
| IDC | Industrial Development Corporation |
| IMF | International Monetary Fund |
| IPAP | Industrial Policy Action Plan |
| ISO | International Organization for Standardization |
| JV | Joint venture |
| LME | London Metal Exchange |
| NAMC | National Agricultural Marketing Council |
| OEM | Original Equipment Manufacturer |
| R&D | Research and Development |
| SACEEC | South Africa Capital Equipment Exports Council |
| SADC | Southern African Development Community |

1. Introduction

This document is a synthesis of the findings of three case studies on regional industrialisation, namely the mining capital equipment value chain in South Africa and Zambia; the soy value chain in South Africa, Zambia and Zimbabwe; and the construction value chain in Mozambique and South Africa. It also draws on workshop discussions and comments to highlight key policy implications and the way forward.

The three studies were chosen to assess the industrial development issues related to large mining investments, major infrastructure projects and investments in commercial agriculture for food products. These are the three main drivers of the high rates of growth observed across African countries since around the year 2000. The aim of this paper is to draw out and compare the main cross-cutting findings, and to initiate a discussion on future scope for regional cooperation in the area of industrial development. The studies were also targeted at better understanding the relationships between South African firms and industrial development and those in other countries in the Southern African region. In this paper we consider the imperative for South African policy to take a regional approach and the negative implications of a narrow framing of national interest.

Regional industrial development is understood from a broad perspective in which potential gains arise from shared production, market development, transfer of skills, technology and other assets/inputs, as the basis of linkage formation within and across value chains and industries. This addresses the need to look beyond the current focus on trade liberalisation as the foundation of regional economic integration.

Recent growth in demand and investment into production and processing across the three value chains under investigation reflects a shift in the behavior and nature of the markets. In the mining capital equipment and construction value chains, this is connected to the growth in mining activity and the global commodity price boom of the 2000s. In the soya value chain, this is driven by significant demand from the poultry industry and subsequent demand for animal feed, which in turn is responding to growing middle-class food consumption.

Firms in the region have responded to the booming demand from the mining, construction and poultry industries by devising national strategies to develop domestic markets and tap into neighboring markets. They have done so with varying degrees of success and ambition, and with a combination of trade and investment strategies. These firms have been supported by some government policies, though these have tended to be domestically focused and have not sufficiently addressed the regional dimension. In particular, policymaking has not yet grasped the potential for regional cooperation to bring win-win outcomes, through increased value addition and upgrading at the firm, value chain, and industry levels across national boundaries.

The lead firms in the different sectors are generally regional if not global in the scope of their operations. Some have invested in the region, contributing to the development of productive capabilities, job creation and linkage development (such as farmers and local sub-contractors). Nevertheless, the wider potential benefits from learning, scale and agglomeration economies outside the boundaries of private companies and their alliances are not being supported by a coherent regional policy approach. The issues raised by individual case studies range from the need for targeted policy to overcome specific market constraints (e.g. local skills shortages), the need for harmonisation

across policies (e.g. mining local content policies, duplication of policy objectives with regard to soybean processing capacity), and bilateral or possibly multilateral negotiation on tradeoffs across the countries involved. Further policy questions arise relating to identifying and implementing shared goals such as investments in transport infrastructure and regional industrial development objectives such as replacing imports from outside the region.

The paper starts in section 2 by setting out the background for the studies and the approach of the research. Sections 3 and 4 present the main findings from the case studies, highlighting the main dynamics, the role of the lead firms and the challenges to value chain upgrading within and across borders. Section 5 draws conclusions and Section 6 discusses the scope and imperative for regional integration.

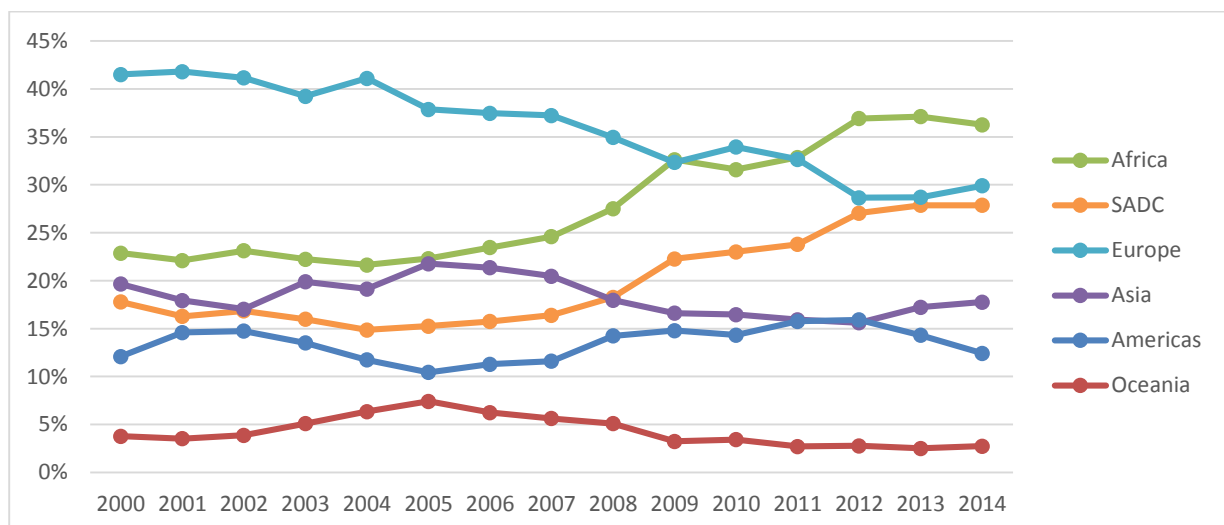
2. Background and approach

2.1 Background

The dramatic changes in the Southern African region, as indeed the continent, are reflected in South Africa’s export patterns. This also serves to highlight why South African policymakers, one of our target audiences for this paper, need to invest in policies which properly comprehend the regional dimensions of industrialisation, particularly in developing diversified industries. As two of the case studies cover Zambia, we also look at developments in imports and exports from this country’s perspective.

An analysis of destination markets for South Africa’s manufacturing sector in the 2000-2014 period highlights two striking changes: first a dramatic decline of Europe and, to a lesser extent, Asia (Figure 1). Europe’s share as a destination market fell by almost 12% in 2000-2014. Second, Africa’s growing importance, led by exports to the Southern African Development Community (SADC). SADC’s share of South Africa’s manufactured exports increased from 18% in 2000 to 28% in 2014.

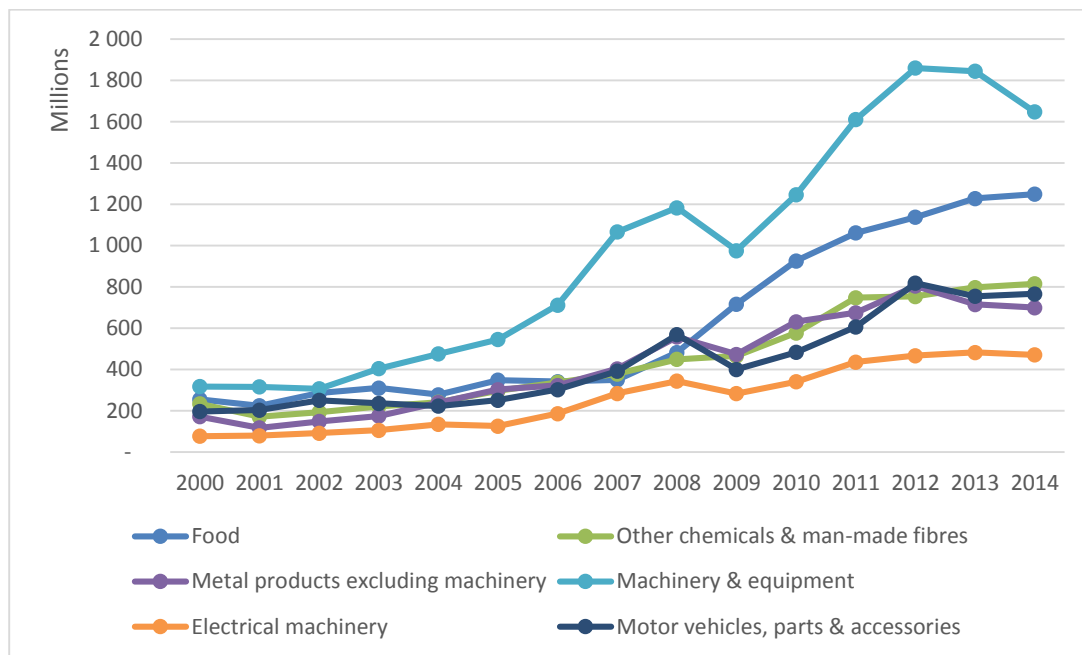
Figure 1: Destination market of South African manufactured exports (excluding basic chemicals and basic metals) (%)



Source: Quantec, retrieved from <http://www.quantec.co.za/> in June 2015

Figure 2 shows South Africa’s manufactured export composition to SADC (excluding fuels and basic metals). The top export product group since 2000 has been machinery and equipment, which grew by 12% compound annual growth rate (CAGR) between 2000 and 2014, and totalled US\$1.65 billion in 2014. These exports are closely associated with exports of metal products (10.6% CAGR). The bulk of metal and machinery regional exports are mining-related. Food products have been the second largest export product, growing by 12% CAGR in 2000-2014, and totalling US\$12.5 billion in 2014. These exports have followed the expansion of South African supermarket retailers in the region, which tap into their home market supply chain for a variety of processed foods and consumer goods. Chemicals, motor vehicles and electrical machinery exports have also been significant.

Figure 2: Composition of South Africa’s manufactured exports to SADC (US\$)

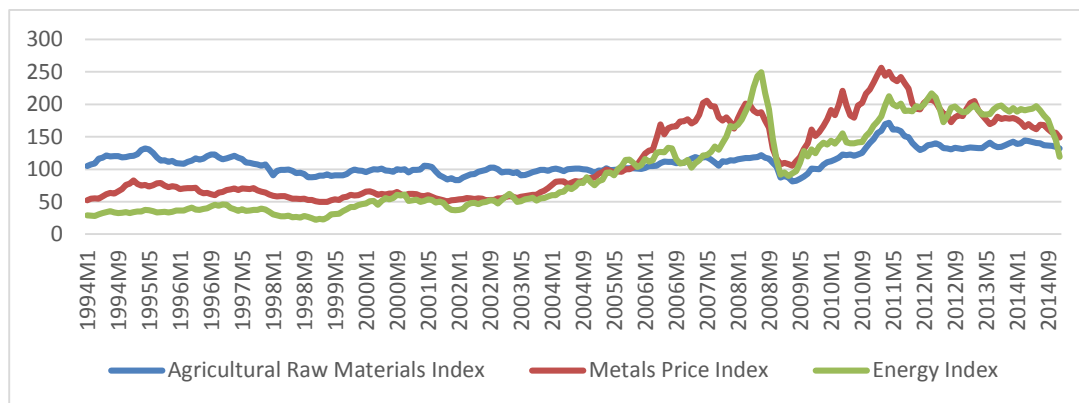


Source: Quantec, retrieved from <http://www.quantec.co.za/> in June 2015

Since the early 2000s, world markets for agricultural, mineral and energy commodities experienced a price boom (Figure 3). This has underlined major changes in the Southern Africa region, including attracting significant levels of inward foreign direct investment (FDI) targeting the natural resource sector. Commodity exports have underpinned high growth rates across almost all African countries both when compared with the previous three decades and relative to other regions of the world. The resource boom has led to major infrastructure investments necessary to transport minerals to ports for supply to export markets. The demand for construction services and inputs is an opportunity for building local and regional industrial capabilities.

The higher incomes in African countries have been coupled with rapid urbanisation which is changing the patterns of consumption. This includes growth in demand for processed foods which informs the soy study.

Figure 3: IMF Commodity Price Indexes, 1994-2014



Note: Index based on 2005 (average of 2005 = 100). Source: International Monetary Fund (IMF) Primary Commodity Price Data retrieved from www.imf.org/external/np/res/commod/index.aspx in July 2015

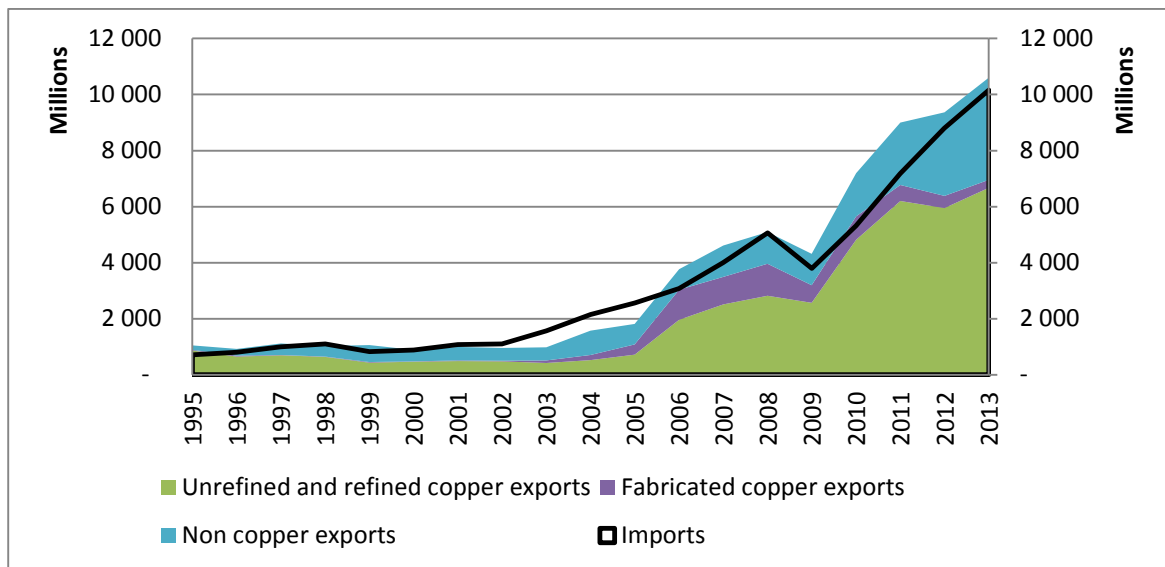
In the copper sector, London Metal Exchange (LME) spot prices surged from US\$1 779/t in 2003 to US\$7 132/t in 2007. Even after the 2008/2009 world commodity market downturn, world prices have not fallen below US\$7 000/t. The world copper market experienced the lowest price volatility and one of the highest price surges among hard commodities. In Zambia, this resulted in massive FDI flows to recapitalise mining assets and undertake greenfield projects. In Mozambique there have been massive foreign investments in a number of minerals, led by coal, including at Moatize in Tete province, the largest discovered yet unexploited reserve in the world.

Food prices also increased strongly from the mid-2000s over their long-term levels, albeit not by the proportions recorded in minerals and energy. However, the impact in African countries has been compounded by the local demand growth for processed foods from rising incomes and urbanisation. A key dimension is increased demand for meat, which in turn links to inputs to animal feed. Soya is one of the most important animal feed crops.

Inward FDI stock into Zambia trebled from 2000 to US\$14.3 billion in 2013, the lion's share of which has been absorbed by mining investment (Bank of Zambia, 2014). The bulk of mining investment was spent on capital and operational expenses. The supply chain to the Zambian Copperbelt therefore opens important market opportunities for regional suppliers for a range of capital equipment to extract, haul and process minerals, as well as spares, components and aftermarket sales. The latter are particularly important because, for some equipment categories, they represent many times the value of the initial purchase. For this reason, controlling aftermarket sales has become increasingly important in the strategy of regional and international Original Equipment Manufacturers (OEMs).

Less remarked on is the very substantial growth in Zambia's non-copper exports, albeit off a low base (Figure 4). By 2011, the value of non-copper exports exceeded total exports in 2005, in US\$ terms. These exports are largely made up of cement, tobacco, sugar and cereals, and are exported to regional and global markets. The regional market in particular has absorbed large exports of cement and cereals, and smaller, but fast-growing exports of animal fodder, milling products and iron and steel fabricated products. Rapid economic growth in Zambia has also obviously meant rapidly growing imports. These are of diversified products, including inputs for mining, and consumer goods being demanded by rapidly urbanising population with growing incomes.

Figure 4: Zambia's exports (copper and non-copper) and imports (US\$)

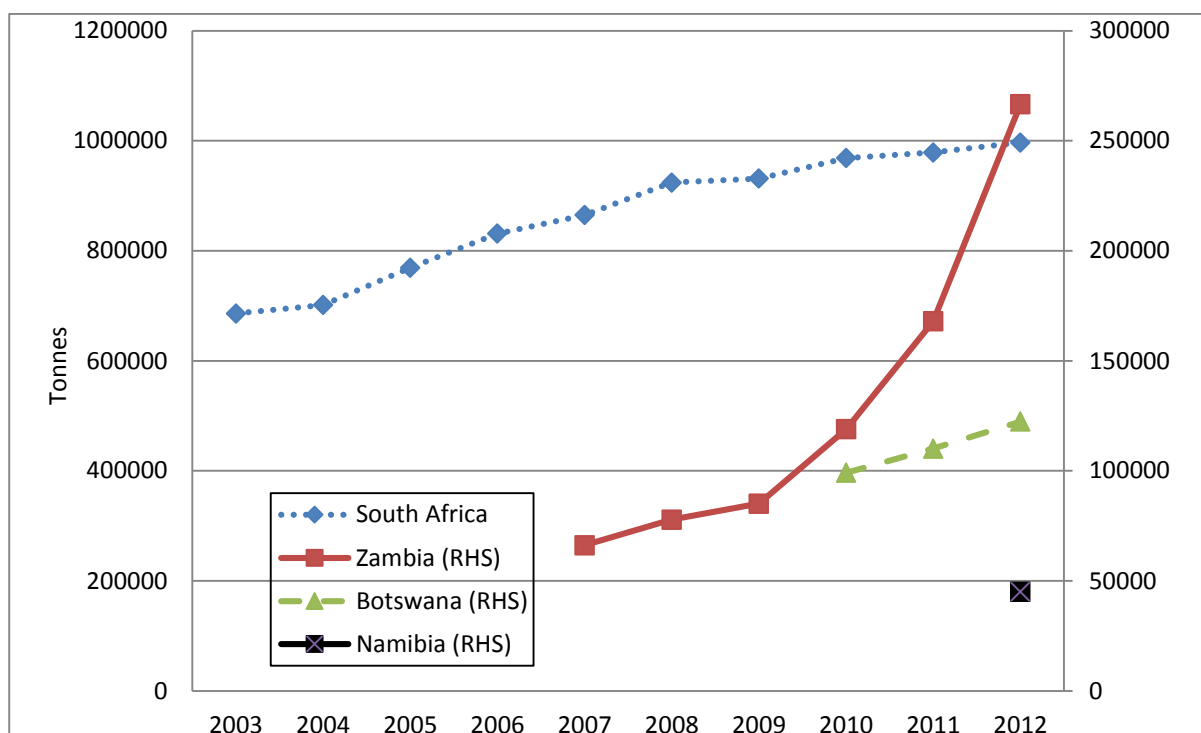


Source: UN Comtrade, retrieved from <http://comtrade.un.org/> in January 2015.

In comparison to Zambia, Mozambique's extractive industry is relatively young. Recent discoveries of large fields of coal and natural gas are turning the country into one of the world's most important coal exporters, and potentially the first liquified natural gas supplier in Sub-Saharan Africa (Ford, 2012). The key mining investment in Tete is Vale's Moatize coal mine. Vale committed to develop the rail and port infrastructure and to conduct pre-feasibility studies of setting up a 100 megawatt coal fired power station and other industrial projects (Perkins and Robbins, 2011). In 2008, Vale commenced construction work at Moatize, contracting the Brazilian companies Odebrecht and Camargo Correa to undertake construction and civil engineering work, which included the construction of one of the biggest coal handling preparation plants in the world with an annual capacity of 26 million tonnes (Perkins and Robbins, 2011).

The main driver of growth in the production and processing of soy has been the growth of the poultry industry driven by rising middle-class consumption (Figure 5). Soy along with maize constitutes a key ingredient in poultry feed (and other animal feed). Animal feed is estimated to account between 50% and 70% of poultry production costs (Bagopi et al, 2014). The South African and Zambian poultry and animal feed production industries are concentrated and, in many cases, vertically integrated with cross-border ownership. A notable example is South Africa's Rainbow Chicken joint venture with Zambeef in the Zambia chicken business. Growth in the Zambian production of poultry feed has been particularly marked.

Figure 5: Production of poultry feed in Botswana, Namibia, South Africa and Zambia (tonnes)

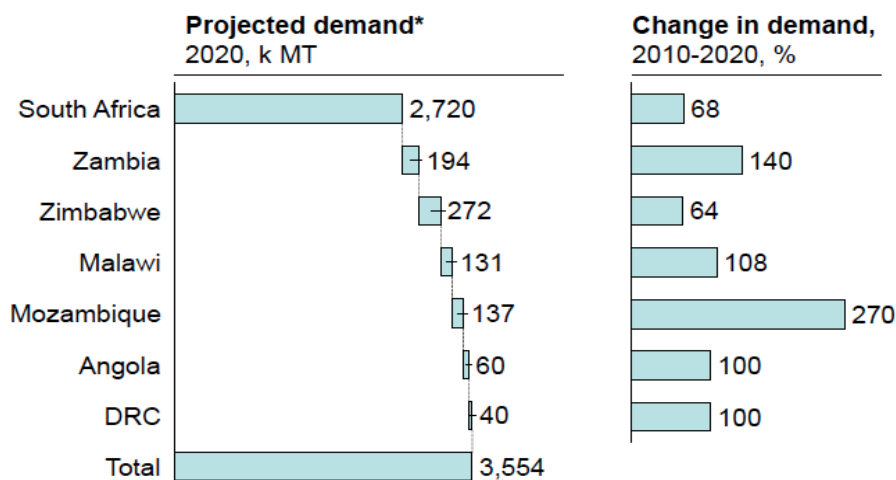


Note: Zambia figures represent the production by the top five producers of feed, Botswana Ministry of Agriculture and Namibia data derived from Namibia Poultry Industries, South Africa Animal Feed Manufacturers Association. Source: Bagopi et al (2014)

Soybean production has been growing around the world at rates above 4% per annum from 1990 to 2010 (NAMC, 2011). Total regional production was estimated by the National Agricultural Marketing Council, NAMC (2011) at 861mnt with South Africa capturing about 68% followed by Zambia and Zimbabwe as the next largest Southern African producers. In global terms this is marginal with US, Brazil and Argentina capturing over 80% of global production, estimated at 90 610mnt, 67 500mnt and 50 500mnt in 2010.

Moreover, despite growth in soybean production in Southern Africa the region continues to run a substantial deficit. The demand for soybean and soymeal in South Africa was estimated by Grain South Africa (sourcing data from the Bureau for Food and Agricultural Policy) to be at 1.63mnt for soybean and 1.3mnt for soybean meal in 2013-2014. In other words, regional production would need to more than double just to meet existing demand, while demand is itself growing rapidly. As Figure 6 shows, the projected demand from 2010-2020 presents a window of opportunity for the main Southern African producers to join forces and collectively increase soybean supply. This would be beneficial for the regional input and output markets linked to soy (fertiliser, inoculant and other inputs, but also animal feed, poultry), but also have important implications for consumption linkages, employment creation, and demand linkages into other sectors such as fast food, cosmetics, paint, and soy-based foods.

Figure 6 Soy demand projections



Source: Technoserve (2011, p.38)

Since 2010, investments in production and processing in Zambia have changed that country from a net importer to a net exporter, supplying neighbouring economies and able to compete with imports into the region from Argentina and Brazil. Zimbabwe has equally fertile land and existing but outdated agricultural infrastructure and is a net importer. Recent investments in South African soy processing aimed to create a demand-pull for increased soy production in the region. However, reluctance to be a commodity supplier to processors in South Africa has not led to significant growth in imports from Zambia to South Africa and the soil quality and ensuing production costs in South Africa render it a net importer from Latin America.

Developments in the copper industry in Zambia, construction sector in Mozambique, and poultry industry in the region have resulted in a surge in demand for inputs from the manufacturing (mining capital equipment, construction material), services (engineering firms) and agriculture (soybean and animal feed producers) sectors across the region. As will be discussed in the next sections, the supply response has varied across and within the three case studies, and also across the region.

2.2 Approach

The case studies examine processes of industrialisation across selected countries. Industrialisation is understood to comprise of multiple, interlinked sectors that form part of cumulative, self-reinforcing processes based on investment, development of productive capabilities, and economies of scale, scope and agglomeration.¹ Manufacturing activities are connected through multiple forms of linkages and positive externalities such as employment or consumption linkages, skills or technology transfer, or through up and downstream value chain integration (within or across border). Such linkages may potentially emerge in the form of shared production arrangements, movement of goods, labour, and other inputs, as well as transfer of skills, technology and knowledge.

The research focused on investigating each industry within and across national borders, with the view to exploring existing and potential regional linkages, policy impact and industry development. The approach employed across the three case studies drew on the value chain literature with a focus on exploring:

¹ See for example Kaldor (1953), Hirschman (1958), and more recently (1988) and Thirlwall (2000).

- The nature, drivers and challenges in production, processing and trading between firms to create domestic and regional value added;
- Scope for and the different forms of value chain development through production upgrading, transfer of skills/capabilities, resolution of bottlenecks, increased market access and nature of competition;
- The lead firms in the value chain, and drivers or obstacles to new entry and market growth; and,
- Existing policy influences and future policy needs.

The analysis focuses on firm level strategies, in particular with decisions around location, value addition, investment, financing, distribution, sourcing and buyer/supplier cooperation. The internationalisation strategies of South African firms become particularly important: their decisions to export, invest directly in various stages of the value chain (production, processing, distribution), pursue mergers and acquisitions, find local suppliers and invest in training have a direct impact on industrialisation processes in the region, and frame the policy space for government policies at domestic and regional level. While the political economy issues surrounding the three regional value chains were not the principal objective of this research programme, some important issues were considered. These include the ability of specific industries to lobby for protection and support, different levels of enforcement of local content policies across the countries, and land reform issues.

The analysis of firm-level strategies and opportunities for value chain upgrading is contextualised within global and regional value chain dynamics. In the mining equipment case study, regional inter-firm linkages between Zambia and South Africa are looked at in the context of international OEMs investing in South Africa to supply the regional mining industry and developing their own regional strategies for the Copperbelt. In the construction case study, the role played by giant mining multinationals and international financial institutions in shaping procurement strategies sets the framework within which South African and Mozambican firms find ways to participate in the value chain. The latter have to compete with global players in the construction industry from Brazil, China and Portugal. In the soybean value chain, the opportunities for Zambia to supply soybean and animal feed to the region are weighted against the insertion of South Africa, the largest regional market, into global value chains of soybean, soy cake and broiler meat (driven by Argentina and Brazil). The soy value chain investigation focuses primarily on exploring developments in the bean to animal feed segment. Important future growth opportunities are acknowledged in the development of the soy oil, soy derivatives (cosmetics, foods, pharmaceuticals) and biofuel.

These research questions were addressed through the collection of existing qualitative and quantitative evidence and insights from in-depth interviews with firms and institutions across countries. This process aimed to capture variation and similarities within and across national value chains and to identify key drivers and challenges relevant to both national and regional industry development.² The strengths and limitations of value chains concept as an analytical framework for regional industrial development informed the research.³ For example, the investigation was rooted in

² See UNECA / AU (2013) and Morris et al (2012) on the use of the value chain approach within debates of (resource-based or vertically-specialised) industrialisation; Maringwa (2009), McCarthy (2010) discuss regional development through trade.

³ For a critical review of global value chain concepts see Bair (2009), Selwyn (2011), Pegler et al (2011), Newman (2012), and Neilson (2014).

the interaction and transformation of firms as opposed to other groups of interests or agents. However, this was done with awareness that the global value chain dimensions of upgrading, market access and the role of lead firms did not preclude considerations for other important aspects of industrial development.⁴ In particular, issues of employment creation remain an important and under-researched path to regional industrial development through consumption and other employment-related linkages.

Drawing on a value chain linkages approach presents a number of advantages for this research. It provides an empirically grounded research approach that “draws on ideas emanating from sometimes quite disparate disciplinary roots and traditions” Neilson (2014, p.45). It also enables different forms of inter-firm relationships to be described, including the extent of vertical integration and different forms of coordination and governance by the lead firms across countries in the region, as well as multinationals. In light of the range of insightful qualitative findings, a full quantitative description of the governance and upgrading of each value chain was not attempted.

The studies are each located in sectors undergoing significant structural and market changes. As noted, these changes have been associated with shifts in world prices, major investments, and changes in demand. The studies examine how and to what extent supply and productive capacity has been able to respond, both within and across the national boundaries, and the role if any of development policies. Historical evidence and many case studies underline how targeted industrial policies and public intervention in general are often necessary conditions rather than optional ones for igniting and feeding industrialisation. The networks and linkages that characterise such joint action must be cultivated from within the industry and supported by appropriate market and government institutions (understood broadly to comprise of structures, rules, agents and associations) (McCormick, 1999).

It is important to highlight that, to the extent cross-cutting implications can be drawn, the studies were deliberately selected to drill into different areas. Each of the areas studied is significant in its own right. Two of the studies, capital equipment and soya processing, inquire into value chains with several stages of value adding, stretching in some cases across borders. These studies both illuminate issues across Zambia and South Africa, and Zimbabwe for the soya study. The third on infrastructure inputs examines a major project in Mozambique, with substantial international participation, and diverse products and services.

In the conclusions we reflect on the insights they provide for a programme that would take seriously the issues of policy and research for shared regional growth and integration. Each of the studies raises issues about leveraging from demand-side developments to stimulate industrialisation. They point to challenges of localisation and regionalisation of supply and provide a basis for examining the type of policy framework which is required.

⁴ For example Neilson (2014, p.59) draws attention to the structuralist development economic roots whereby industrialisation presents the space for state intervention along with a consideration of “needs beyond the supply chain management of firms”, and an appreciation of the “power dynamics embedded within modes of chain governance”.

3. Main findings

This section provides an overview of the findings from the studies the sectors' performance, the firms involved and policy responses to the demand growth in the three areas across the selected countries.

3.1 Mining capital equipment in South Africa and Zambia

South Africa has long been the hub of the regional mining inputs value chain in the region. According to South Africa Capital Equipment Exports Council (SACEEC) data, South Africa's exports of mining capital equipment increased from R10 billion in 2005 to R46.2 billion in 2014. Given that export flows can vary widely by year due to specific mining projects, Table 1 looks at export values cumulatively and as averages for the period 2012-2014. Zambia followed by the Democratic Republic of Congo (DRC), Mozambique, Zimbabwe and Namibia, are the largest export markets for South Africa's OEMs, accounting for an average 50% of South Africa's exports. South Africa is the largest source of mining capital equipment for the Copperbelt. Moreover, mining capital equipment OEMs look at the Zambian Copperbelt as a sub-regional supply centre for Central Africa. For example, one OEM is investing in its Kitwe presence to set up a bonded warehouse to hold goods for cross-border sales to the DRC. Apart from DRC, OEMs are based in Kitwe to supply Tanzania, Botswana, Malawi, and Congo-Brazzaville. The expansion into new markets is also supported by EPCM (engineering, procurement, construction, management) firms, which tap into the South African mining inputs cluster when designing and constructing new mines.

Table 1: Top 10 export markets for South Africa's mining capital equipment industry, 2012-2014 (R million and %)

| | Cumulative | Average | % world exports |
|------------|------------|---------|-----------------|
| World | 108 187 | 36 062 | |
| Zambia | 16 751 | 5 584 | 15.5% |
| DRC | 11 041 | 3 680 | 10.2% |
| Mozambique | 10 428 | 3 476 | 9.6% |
| Zimbabwe | 7 933 | 2 644 | 7.3% |
| Namibia | 6 791 | 2 264 | 6.3% |
| US | 4 880 | 1 627 | 4.5% |
| Botswana | 4 853 | 1 618 | 4.5% |
| Australia | 2 803 | 934 | 2.6% |
| Tanzania | 2 617 | 872 | 2.4% |
| Angola | 2 612 | 871 | 2.4% |
| Germany | 2 591 | 864 | 2.4% |

Source. SACEEC data (2015)

The case study focuses on four product clusters, for which South Africa's market share of Zambian imports over 2006-2013 ranged between 28% and 70% (Table 2). Mineral processing equipment has shown the highest growth rate in values: exports to Zambia have risen from US\$24.8 million to US\$84.5 million between 2006 and 2013. The aftermarket business accounted for three quarters of total sales to Zambia in 2013. Within the same period, South Africa's exports have grown for off-road special vehicles (from US\$64.5 million to US\$157.6 million), pumps and valves (from US\$34 million to US\$77.6 million), and conveyor systems (from US\$5.4 million to US\$17.6 million).

Table 2: South Africa's market share in Zambia for selected product clusters (%)

| Product Cluster | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Mineral Processing | 14.7% | 27.0% | 52.4% | 49.5% | 44.5% | 40.5% | 50.1% | 28.2% |
| Off-road special vehicles | 60.6% | 69.3% | 63.3% | 57.3% | 68.0% | 50.6% | 61.3% | 57.4% |
| Pumps and Valves | 79.6% | 79.0% | 72.0% | 79.0% | 79.4% | 73.3% | 65.8% | 58.0% |
| Conveyor systems | 68.5% | 65.2% | 65.4% | 63.3% | 66.3% | 59.2% | 60.8% | 70.0% |

Source: UN Comtrade database, retrieved from <http://comtrade.un.org> in July 2014.

South Africa-based capital equipment OEMs devised internationalisation strategies for the Copperbelt that are characterised by two patterns. First, there is a considerable amount of trial and error. Second, there is a progression from direct exports, to working with an agent or establishing a joint venture (JV), to establishing a subsidiary. The research points out that without adequate support from South Africa-based OEMs, local Zambian firms are likely to fail to meet their expectations due to low firm capabilities. In Zambia, however, many agents struggle to develop high trust relationships with their OEMs that would convince them to invest in training and stock holding.

Establishing a subsidiary allows OEMs to have complete control of their relationship with clients, and to ensure competitive aftermarket sales. Nevertheless this decision can be justified only by sufficient installed capacity at the mines. Smaller OEMs struggle to do so. It was estimated that it would cost R200 000 a month just for rent and employees (no equipment – with equipment it would be much more expensive) without a guarantee of securing orders. This is particularly risky for products that take time to sell such as off-road vehicles.

In terms of regional linkages, the case study found that subsidiaries in the Copperbelt are supported by South Africa-based OEMs in different ways: back-up services, training of local staff, joint marketing, and access to credit lines (Table 3). Training is mostly done in-house and in South Africa (Table 4). Zambia-based subsidiaries provide aftermarket services. Mostly, however, they would not provide the entire range of repair and maintenance services, and fall back on the South Africa-based OEM for complex services. Moreover, only a few OEMs have plans to upgrade and build local capabilities. The OEMs which entered the Copperbelt via agents, JVs, and direct exports provide very little support to upgrade local capabilities. They do not have aftermarket services, do not invest in training and are not planning to do so.

Table 3: Zambia-South Africa inter-firm linkages in mining equipment

| | Linkages | | | | | Local sub-contracting | | |
|--------------|-----------------|----------|--------|---------------------------|-----------------|-----------------------|------|-----|
| | Back up support | Training | Credit | Joint product development | Joint promotion | Yes | Some | No |
| Subsidiaries | 100% | 100% | 83% | 0% | 83% | 0% | 50% | 50% |
| Others | 33% | 17% | 0% | 0% | 17% | 0% | 17% | 83% |

Taking into account higher value added activities, manufacturing and research and development (R&D), regional linkages are weak even for the OEM subsidiaries. There is very little sub-contracting with only some small fabrication work, structural steel and lagging (Table 3). OEMs would increase local sub-contracting if it reduced transport costs and helped meet local content requirements. The local manufacturing base, however, is too uncompetitive, especially because the OEMs require ISO

certified suppliers or at least firms with good quality assurance systems. There is no joint product development and no R&D budget for the Zambian operations (Table 4).

Table 4: South Africa-based mining OEMs contribution to local knowledge intensification

| | Training for Zambian firms | | | | Innovation in Zambia | | |
|--------------|----------------------------|-----------------|--------|-----------------------------|----------------------|---------------------|---|
| | In-house | In South Africa | Abroad | Support to local institutes | R&D budget | Product development | Subsidiary/agent involved in OEM/mine collaboration |
| Subsidiaries | 100% | 100% | 50% | 17% | 0% | 17% | 17% |
| Others | 17% | 0% | 0% | 0% | 0% | 0% | 0% |

The supply response by Zambia has been weak. Following the privatisation and liberalisation process of the 1990s, Zambia's mining inputs clusters lost significant manufacturing capabilities, with deteriorating access to skilled labour, finance and government support. From the mid-2000s, as demand for capital equipment boomed, Zambian suppliers have been able to supply low-value added services, mainly as import agents, while international OEMs have expanded their base in the Copperbelt to capture growing sales and aftermarket opportunities. The main factors constraining local supplier upgrading are related to the cost of capital, a small pool of skilled labour, and weak firm capabilities in terms of management, quality control and innovation.

At regional level, the study identified two critical constraints. Firstly, regional suppliers faced conflicting local content policies in South Africa and Zambia. The South African Department of Trade and Industry's (the dti's) Export Credit and Insurance Company (ECIC) local content requirements for a South African exporter into Zambia clashed with increasingly stringent localisation requirements set by the Zambian government. It was noted that indeed South Africa's industrial policy targeted only the domestic market not the regional one. Reciprocal and harmonised incentives schemes within SADC would provide a better framework to promote regional investment and mutually beneficial outcomes.

Secondly, the DRC offered important market opportunities for Zambia-based suppliers and South Africa-based OEMs. However, export documentation and handling requirements to DRC were cumbersome. Moreover, the DRC was characterised by a highly risky business environment which raised costs and reduced efficiency. The role of the DRC in strengthening competitiveness in the regional value chain was critical.

3.2 Infrastructure inputs in South Africa and Mozambique

The case study focused on three major infrastructural projects being undertaken in Mozambique (Baloyi et al, 2013):

- 1) The rehabilitation and expansion of the existing 673-km-long Sena railway line, which connects the Moatize coalfields, in the western Tete province, to the Port of Beira. The estimated total cost of the project railway rehabilitation is \$2.27 billion.
- 2) Investment in the Port of Beira aimed at developing the terminal with a capacity of handling between 15-20 million tons a year. The port is estimated to cost US\$600 million. Construction of the port commenced in 2013 and is expected to be completed in 2015.

- 3) The Moatize-Nacala proposed railway line is part of the Nacala logistics corridor in the northern parts of Mozambique. The line will link Moatize through Malawi to the existing Northern corridor to the Port of Nacala. The project involves construction and rehabilitation of the rail line and construction of a new coal terminal. It is being carried out under contract from Vale Mozambique, and is expected to facilitate the transportation of 18 million tons of coal on completion and 4 million tonnes of Malawi's general freight per annum. The total cost for the whole project involving railway rehabilitation and port construction is estimated at US\$4.4 billion, broken down as US\$3.2 billion and US\$1.2 billion for rail and port respectively.

Compared to its regional supply hub role in the mining capital equipment value chain, South Africa's role in the regional construction value chain has been less clear-cut. Over the last five years, the South African construction value chain has been aggressively pursuing the regional market. Deterioration in the windfall margins after the 2010 World Cup, contraction of the economy and the slow implementation of government's infrastructure capital expenditure programme, are among the factors leading South African construction companies looking at the regional market. Moreover, multinationals from the UK, US and Australia have entered the regional market by acquiring South African engineering companies. A number of reasons, however, including limited manufacturing capabilities, erratic demand, and tough competition from construction companies originating from emerging economies and/or linked to the resource companies driving infrastructural investment, have led to only a handful of construction companies being able to enter Mozambique's construction value chain.

In terms of material inputs, South Africa supply capacity is largely limited to manufacturing lower value added products (such as concrete products, cement and fabricated steel products) and assembly, with some manufacturing of higher value added products (such as rail engineering equipment, signalling equipment and earth moving equipment). High-tech inputs, such as electronics, engines and hydraulics are imported, and manufacturing is limited to steel structures and components that form the body of the equipment. Part of the problem is that domestic and regional demand growth has historically not been strong and consistent enough to warrant investment in high value-added machinery equipment manufacturing.

While Zambian suppliers participate in the mining supply chain, but for low value-added activities, Mozambique's very weak supply base has largely been excluded from the supply chain altogether. The Mozambican local construction industry includes around 2 500 firms, which tend to be small-medium sized, domestic market focused, and reliant on government tenders. Local construction firms and suppliers are too small, lack experience and access to funding, among other constraints, and face competition from large multinationals. Key entry barriers to the Sena and Nacala rail projects include: weak track record for large projects, little expertise with international best practices in health and safety, lack of access to capital and reliance on internal financial resources. Mozambican Tier 2 inputs suppliers are very uncompetitive, therefore construction companies prefer to import directly or indirectly their supplies from South Africa, China, India and Pakistan. Inputs sourced locally include cement, concrete products, sands and aggregates.

For example, the main competition to South Africa in the Sena and Nacala lines construction projects originate from Portugal, and Brazil (Table 5). Tier 2 suppliers such as sleepers, rails, track fastening,

and ballast, include firms from Japan, UK, Italy and South Africa. Mozambican firms are largely excluded from these projects.

Table 5: Companies operating in construction of the Nacala and Sena lines

| Infrastructure construction and bridges | Home Country | Tiers |
|--|-------------------------------------|--------------|
| Aveng Lennings Railway Services | South Africa | 1 |
| Mota-Engil | Portugal | 1 |
| Samaque | Brazil | 1 |
| OAS | Brazil | 1 |
| Superstructure | | |
| Aveng Lennings Railway Services | South Africa | 1 |
| CR2OG | | 1 |
| Rails | | 1 |
| Nippon Steel | Japan | 2 |
| Sleepers and Culverts | | |
| Wegh | Italy | 2 |
| Infraset | South Africa | 2 |
| Signaling | | |
| Ivensys | United Kingdom | 2 |
| Oversight/Consulting engineering | | |
| SRK | South Africa | 1 |
| Worley Parsons | Australia (South African domiciled) | 1 |
| Diversion and realignment | | |
| CR2OG | | 1 |
| Bridges | | |
| Soares da Costa | Brazil | 1 |
| Sena Line - Rehabilitation Services | | |
| Mota-Engil | Portugal | 1 |
| Grinrod Rail (Subcontract) | South Africa | 2 |
| Visabeira | Portugal | 1 |

South Africa is also competing with new entrants. New entrants include two categories of firms: those facing declining markets in their home countries (Portugal, Spain) and those following their home countries' multinational investors (China, India, Brazil). New entrant Portuguese and Spanish firms follow an aggressive pricing strategy to enter the Mozambican market in order to cross subsidise the loss-making operations in their home countries. While they have been initially successful in entering the regional value chain, they have often run into cash problems and failed to complete projects. Portuguese firms tended to use their historical connections to Mozambique. South African multinational firms relied on their branches across the world drawing on contracts with global clients like Vale. Brazilian firms use their relationship with Vale while Chinese firms relied on government-to-government bilateral negotiations.

Strong supply chain competitiveness in terms of efficient coordination and input cost is critical in the construction sector, especially in Mozambique outside of Maputo where access to materials and

services is difficult and costly. Chinese firms outperform other firms because they are vertically integrated state-owned enterprises with access to cheap inputs from China, as well as good access to finance. South African based firms and Mozambican firms of Portuguese and Italian origin also fare well thanks to solid experience in operating in Mozambique. Indeed, some of these construction firms have invested in local manufacturing operations to lower transportation costs and increase supply reliability, especially for bulky materials. For example, the major manufacturing facilities for sleepers in Mozambique have been established by a South African based construction firm and by a joint venture between two Italian firms, one of which, CMC, is Mozambique's largest construction company. Locally owned Mozambican firms are less competitive in supply chain coordination because as they place orders from international suppliers, orders by larger more established firms are catered for first. The queuing system is particularly problematic for cement and machinery.

South African firms are often involved in training local labour to fill the skills gap. Tier 1 domiciled South African firms (that is, consulting engineers) have been found to facilitate the entry of Tier 2 South African suppliers (that is, track product producers and civil contractors). It is not uncommon for consulting engineers to recommend contractors and materials suppliers they have worked with in the past, especially those that they have worked with in the prefeasibility phase of the project.

3.3 The soybean value chain in Zambia, Zimbabwe and South Africa

In the soybean value chain, growing demand has highlighted regional differences in the volume and quality of production with South Africa leading the region in production volumes, but Zambia producing higher yields (NAMC 2010 estimates for commercial farmers in Zambia have yields of 2.6MT/ha, Zimbabwe at 1.8MT/ha and South Africa at 1.9 MT/ha) and presenting greater market, price-competition and production growth potential. Fieldwork interviews in Zambia, Zimbabwe and South Africa confirmed the views about the yield differences as well as quality of bean (with the exception of one processor). These were attributed to the better growing conditions including soil quality and availability of sufficient rain for irrigation. In addition to differences in yield and quality, prices varied with NAMC estimates and interviews suggesting Zambian production is most competitive in comparison to regional peers and global producers such as Argentina (with yields of 3.4MT/ha). Zambian production has until recently relied on large-scale commercial farms. However, recent increases in soy production within small-scale farming showcases the opportunities for scaling up production to supply the region, subject to overcoming significant production challenges faced by smallholder farmers. These include lower yields due to lack of appropriate input and information access, in many cases precluded by poor credit availability. South African producers and processors of soybean have advantages relative to local producers in Zimbabwe and Zambia through access to finance, transport, storage infrastructure, and both access to skills, technology and knowledge to enable high-end production (inoculants, fertilisers, seed variants, herbicides, pesticide farming techniques and technology such as for irrigation). South African firms dominate the input supply to Zambia and Zimbabwe. South Africa is also involved in Zambian poultry production. Yet there is little interest from South African firms to invest in soy production or processing in Zimbabwe or Zambia.

Production in South Africa, Zambia and Zimbabwe is also dominated by commercial farming (99%, 85% and 65% of production respectively). The increases in production in Zambia have, however, also been associated with smallholder farmers taking up soy production in response to the price incentive,

demand (from larger farmers, processors and other intermediaries) and as part of crop rotation through improved access to farming information/techniques.

Production has increased significantly in South Africa and Zambia, while it has declined in Zimbabwe since the introduction of the fast-track land reform programme. Zimbabwean soy production in 2014 was lower than in 1980 and Zimbabwe imports beans and meal from Zambia, Malawi, India and soy oil from South Africa. In South Africa, production in 2010 was almost four times higher than in 2000, through a combination of increased land planted and improved yields (Technoserve, 2011). In Zambia production increased by an even greater proportion, due to an increase in the land planted. In 2010, there was 311 000 hectares of soya in South Africa, 62 000 in Zambia and 67 000 in Zimbabwe.

Even bigger changes occurred from 2010 to 2014 in Zambia and South Africa. Production in Zambia trebled in the four years to 2013, while there has also been major growth in South Africa. Soybean production in Zambia increased from about 60 000t – 70 000t in 2010 to over 200 000t in 2013, while investments in crushing capacity ran ahead of production, standing at 400 000t per annum in 2014. Concomitantly, Zambia's broiler production almost trebled from 2009 to 2012 (Bagopi et al, 2014). Most importantly, Zambia has moved from being a net soybean importer to being a net exporter (US\$130 million in 2012). Other countries, and the region as a whole, have remained a net importer with the deficit being met largely by imports from Argentina of soybean and of soya cake.

The potential for increasing production in Zambia is high due to a combination of factors, primarily driven by a favourable price and desire to develop national animal feed production. Recent investments into the availability of (excess) processing capacity and transport infrastructure, diverse farming structures ranging from smallholder to large-scale farming, and the scope to export soy oil, a byproduct of soymeal processing, also contribute to the production growth although a number of production, coordination and information problems remain. Zimbabwe presents similar potential (in processing capacity, soil quality, and variety of farm structures) for scaling-up production, though Zimbabwe production growth at present is constrained by access to inputs, electricity, information, finance and tensions/uncertainty connected to questions of land reform and tenure. Though currently a net importer, Zimbabwe's central geographical position, taste and potential for market growth in soy oil, and cost- and yield-effective production and processing capacity suggest scope for development is substantial. The limited poultry, and soy production and processing investment from both domestic and foreign investors in Zambia and Zimbabwe presents both a challenge and an opportunity for regional development led by South Africa. Overcoming specific policy restrictions including the ban on GMO (genetically modified organisms) products in Zambia and Zimbabwe, export ban from Zambia, and desire to not be locked in the role of a commodity supplier to a South African processing hub also present important challenges for regional development.

Poultry is the world's fastest-growing livestock sector thanks to rising per capita income, urbanisation and population growth in developing countries. Lower-middle income developing countries have experienced the highest growth of poultry meat production. Estimates suggest demand for poultry globally by those on median incomes will more than double over the next three decades and it will shift from being mainly purchased from the live market to being sourced in as processed fresh and frozen chicken from supermarkets (Aho, 2013). Moreover, food service outlets are becoming

increasingly important for poultry meat products (chicken nuggets, chicken breast sandwiches, fried drumsticks) (Narrodd et al, 2007).

South Africa is the region's largest market in the poultry sector, consumption has grown from 19.7kg/per capita in 2000 to a projected 35kg/per capita in 2013 (DAFF, 2011). However, South Africa continues to have a poultry trade deficit of 15%-20% of demand, met largely from Brazil and Europe. Other regional markets are also fast growing, although from a lower basis, for example Zambia and Mozambique have seen 20% CAGR in 2005-2012 (Technoserve, 2011). The fact that, for example, Zambia's consumption is still at approximately 12kg/per capita shows the potential for further growth.

The major players in the Zambian poultry industry are large, vertically integrated entities with key operations in soy production, animal feed, breeding and/or broiler production. Most of them have South African parent companies or are in joint ventures. Zamchick (broiler) and Zamhatch (stock rearing, laying) are a joint venture of Zambeef, a London Stock Exchange-listed company, and South Africa's RCL Foods Limited (Rainbow). Tiger Chicks is the Zambian subsidiary of South Africa's Astral which has breeding operations and a hatchery. Tiger Animal Feeds is a key supplier of animal feed in Zambia. Country Bird Holdings (CBH) Zambian business (Ross Breeders Zambia) is the Zambian subsidiary of the South African poultry producer. It comprises a grandparent/parent breeding operation and stock feed mill. It also exports parent stock to neighbouring countries including Botswana, DRC, Malawi, Mozambique, Angola and Zimbabwe.⁵

South Africa, with the largest poultry production, has recently seen new investment into processing capacity through policy-led investment spearheaded by the Industrial Development Corporation (IDC). Though insufficient processing capacity was a bottleneck, and the investments have increased capacity, the overall desired increase in availability of soymeal for animal food has not been observed. This is linked to three factors. First, the processing capacity increases have not been completed as projected and for those investments in place, a period of learning (scaling-up processing) has delayed output growth. Second, soybean continues to compete against other oilseeds in both processing and storage. Third, processing into soymeal/cake produces a by-product of soy oil. Finding a market for soy oil remains one of the key areas in need of policy attention.⁶ All three countries researched have excess processing capacity; Zambia and Zimbabwe are also hindered by storage and transport issues as well as competition from imported oil.⁷

The high demand, price sensitivity and easy access to low-cost imports primarily from Argentina have not been altered by the increases in processing capacity in South Africa. This highlights two challenges: the insufficient scope for production increases in South Africa and the focus on developing national value chains when there is greater growth potential in developing the regional space (especially involving Zimbabwe and Zambia given their market and production growth potential). Investment has been primarily domestic in South Africa and Zambia with very little regional interaction other than some exports of oil, bean and meal by Zambia into Zimbabwe, and similarly small exports from South

⁵ Other companies are: Hybrid Poultry (breeding operations and a hatchery); Quantum Foods Zambia, a subsidiary of South African company Quantum Foods Limited (broiler and layer breeding, animal feed, table eggs).

⁶ Soy production and costs are calculated according to one bean being divided into an estimated of 18% soybean oil and 79% soybean meal (the remainder accounted for by husks, lecithin and waste) (NAMC, 2011).

⁷ Interviews conducted in Zambia suggested that palm oil imports originating from Indonesia land in Zambia through Kenya, benefiting from free trade agreements in the Common Market for Eastern and Southern Africa (COMESA) and SADC.

Africa into Zimbabwe. Cross-border investments have remained concentrated in the downstream animal feed and poultry production with co-ownership between large Zambian and South African players. There is some collaboration at the production and processing stages between Zambia and Zimbabwe. However, Zimbabwean production and processing volumes remain low and there is evidence of the desire to develop the domestic value chain separately from Zambian or South African counterparts.

The soybean production and processing markets remain largely separate between Zimbabwe, Zambia and South Africa despite acknowledgement of the scope for collective gain from pooling respective industrial strengths and awareness of the window of opportunity before the regional supply and demand is subject to non-regional influences. Minimal interaction is present in the exports of specific lines of soy oil from Zambia and South Africa to Zimbabwe. However, developing national animal feed and especially growth in poultry have resulted in perceptions that each nation could potentially export competitive produce to neighbouring countries, with reverse strategies seeking to become self-sufficient in soybean, cake and thus animal feed production. This perception of future competition can be seen in the focus to increase national processing capacity despite excess or existing capacity in the region, and prevents the conceptualising and developing of joint firm/industry strategies and national policies which could help develop shared and mutually beneficial regional production and demand.

The high concentration of the processing, the vertical integration of processing into production, trading and in some cases into poultry (Zamanita) indicate that the nature of competition in soy agro-processing is likely to continue the current narrow, sub-chain, and short-term focus that rests on existing comparative advantage, is unlikely to upgrade or expand market access in the traditional value chain sense, and is not addressing the potential for growth through the demand and price growth or the growing competition from imports outside the region. A number of additional opportunities for market development remain untapped as risk-averse processors and traders, constrained producers, and segmented policies contribute to the short-term and national industry focus at the expense of longer-term strategic development of collaboration. Opportunities in developing the soy oil market could begin by tapping into taste for soy oil in Malawi and Zimbabwe, developing joint biofuel production and policy strategies, and developing alternative markets for the use of soy to diversify away from animal feed-led demand.

4 Conclusions and implications for regional growth and development strategy

4.1 Lead firms and position of South Africa

One of the cross-cutting findings across the value chains is the perception around the role of South Africa as a dominant player, emerging hub, but also as a source of important production inputs such as skills, technology, networks and finance. In the mining capital equipment value chain, South Africa's long established mining sector, which has historically been characterised by intense miner-supplier linkages, and a dynamic National System of Innovation, has underpinned the development of an internationally competitive mining inputs cluster. Competing with international OEMs with access to

global suppliers and R&D centres, South African OEMs have managed to defend their markets by specialising, focusing on quality and total cost of ownership⁸, and, when domestic demand slowed down, by gradually moving into regional and global markets.

South Africa serves as a regional hub for both South African and international OEMs. In general, South African-based OEMs tend to be involved along the entire value chain, from R&D and product development to aftermarket sales. In comparison, international OEMs rely on R&D from their parent companies, and have global sourcing strategies, with only a small portion of their manufacturing operations being localised in the region. South African OEMs have moved into the region later than international OEMs, which tend to have a very established regional footprint. Smaller South African OEMs have struggled to establish a direct presence in the Copperbelt, for a number of reasons which include relatively high investment requirements and market uncertainty.

In contrast, in soya there is relatively little interaction between South Africa, Zambia and Zimbabwe except for South Africa sourcing bean (and some soymeal) imports from Zambia and select exports to Zimbabwe (especially of oil). However, the trade volumes are small and have not generated any changes in cross-border production or processing investment with the exception of substantial South African investment into poultry and animal feed in Zambia.

South Africa dominance emerges through its role as the largest regional source of FDI and through the on-going trade deficit within an environment of growing demand for soybean for animal feed. There is some debate within the animal feed industry about increasing imports from Zambia rather than continuing dependence on Argentina. According to Bagopi et al (2014), some South African poultry producers have raised concerns about the lower quality of Zambian soybeans in comparison to imported Argentina produce. Similar views emerged from South African traders and processors interviewed, with the exception of one respondent who in conjunction with researchers from the University of Pretoria were undertaking a blind comparison of bean quality. Zambian and Zimbabwean respondents interviewed noted concerns that South African producers and processors were seeking to support the development of higher value-added activities in South Africa. Increased intra-regional trade could be based on the existing comparative advantage, with Zambia and Zimbabwe remaining producers of unprocessed or semi-processed soybean and meal with the higher value segment of the soy processing and poultry chain captured by South African players. The investments by South African poultry firms into the emerging Zambian poultry and animal feed industry highlight the interest in capturing the higher-value segment. However, sustained and shared growth implies parallel growth of poultry and appropriate input markets in all the countries. One of the main channels for this would be to use the IDC public-private investment experiences to invest in Zambian and Zimbabwean production.

4.2 Challenges and bottlenecks

The research found a range of constraints to the entry and participation of regional firms in the national and regional value chains for capital equipment, construction and soy processing.

In the mining and construction value chains, Mozambican, Zambian and South African firms face varying entry barriers and competitiveness bottlenecks. Mozambican construction firms have low capabilities in experience, financial depth, access to skilled labour, and compliance with international standards. Moreover, compared to large domestic and foreign firms, they are disadvantaged in sourcing supplies, and bidding for mega infrastructure projects. South African construction firms are

⁸ Total cost of ownership is inclusive of capital, maintenance and operational expenses.

more competitive in this regard. Moreover, South Africa's manufacturing base is limited to lower value-added inputs.

Zambian suppliers face a multitude of cost-raising factors, including access to finance and cost and reliability of physical and service infrastructure. At the policy level, there are two crucial issues: high import duties on non SADC-originating inputs, which discourage local assembly; and government policy inconsistency. The international competitiveness of South African mining OEMs is hampered by a declining National System of Innovation at home, and for smaller OEMs, challenges in setting up a physical presence in the Copperbelt, which is nevertheless crucial to secure aftermarket businesses and compete with global players such as Sandvik and Atlas Copco.

In contrast to the other two case studies, the variation within the soy industry is between producers and processors, as well as across nations. At the soy production level, small-scale farmers in the three countries suffer from poor extension services. In Zimbabwe, there are specific problems associated with the aftermath of the land reform. At the processing level, there is excess capacity in all the countries and huge potential to grow production if the value chain can be efficiently managed. There are particular challenges related to finding a market for oil, especially in Zambia, competition with maize, and access to quality and low-cost inputs in South Africa. Unreliable and costly transport and electricity have raised processing costs across the region. Moreover, policy inconsistency and instability for the poultry sector in Zimbabwe has created uncertainty for processing firms.

4.3 Implications for regional growth and development strategy

Significant developments in the economies of Southern Africa in the past decade need to be understood in the context of regional developments and with reference to the global economy. The main drivers of the changes have been the higher prices of mineral and agricultural commodities, globally, and the major investments made in African countries associated with exploiting mineral resources and increasing commercial agriculture production.

These three studies illuminate the implications of the changes by focusing on crucial selected areas within and across countries. After drawing together observations from the studies, including the policies to support local content, we consider the scope for upgrading capabilities and industrial development in each area. We then assess the importance of regional integration and the implications for an agenda for broad-based industrial development across the region.

The investments in copper in mining in Zambia and the DRC Copperbelt have been associated with demand for capital equipment inputs. The position of the South African located (although often part of transnational corporate) mining inputs firms made them natural suppliers and value chains have developed from South Africa to Zambia. This underpins South Africa's largest manufacturing exports to SADC, of machinery and equipment (Figure 2), as well as in fabricated metal products.

The infrastructure investment in Moatize in Mozambique to exploit the huge coal reserves is among the very largest of such projects on the continent. As such, it is important in its own right as well as because of the issues it highlights. The study demonstrates the importance of the agendas of the financiers, the lead role played by the mining company in such major investments as well as the impact, or lack thereof, of conditionalities associated with local policies. While the project has had a very substantial impact on the local economy in the Tete region of Mozambique, to a large extent the opportunity to build capabilities in Mozambique in inputs and services has not been realised.

The developments in soya across Zambia, South Africa and Zimbabwe relate to a major input to animal feed and highlight the changes from agricultural production to agro-industry. In particular, Zambia

trebled soya production over four years to 2013, with linked investment in crushing capacity moving ahead of agricultural production, and moved to being a net exporter of soya related products including animal feed. The reduction in production costs means that soya and related products are becoming competitive when landed in Gauteng even after transport costs that remain equivalent to around one quarter of the landed price. This would require collaboration on transport from Zimbabwe, and for the Zambian government to allow exports to South Africa. With the Zambian domestic market needs not met and an export ban in place, a way forward would require South African private and public investments into Zambian and Zimbabwean production. Note that Mozambique has undergone similar linked investments although local demand growth has been so rapid that it remains a net importer (Smart and Hanlon, 2014). The most important question now is what steps are required for the region as a whole to realise its potential as a competitive producer and to move to being a net exporter?

The studies relate directly to the opportunities and challenges for industrial development and integration across the region. The changes observed have happened in spite of rather than because of any regionally articulated policies and vision. Indeed, countries have continued to pursue inconsistent and conflicting policies, even at times favouring interests external to the region over those of neighbouring countries. For example, South Africa's narrow local focus means it fails to recognise the shared potential from building strong regional value chains. In turn, other countries in the region are understandably reluctant to extend their policy priorities to bring in the capabilities that South African companies can offer. The role of South African construction companies in the Moatize coal transport infrastructure has included taking over projects after other companies have failed to deliver. In the soya study, each of the countries has sought to protect local producers rather than work together to lower costs across countries.

In mining and construction, capital equipment inputs and services, the policies have revolved around the design, implementation and monitoring of local content measures. In Mozambique, procurement strategies by the construction companies are strongly shaped (or constrained) by the project financing and the central role of the Brazilian mining company Vale. The World Bank and the European Investment Bank have been important donors in the infrastructure investments and their rules are oriented to compliance with international competitive bidding processes. Vale's procurement process for civil construction and engineering services is biased towards international firms, usually with previous work experience with Vale, such as Brazilian construction companies. While Vale considers local content for small supplies, as would be expected, procurement related to their construction projects is largely driven by price, logistics, quality and experience. Mozambique has designed some provisions concerning public procurement, which include preferential treatment for small and medium-sized enterprises, and training, holders of 'Mozambican Pride – Made in Mozambique' certificates, employment of Mozambican consultants and knowledge transfer. However, enforcement of preferential procurement provisions has been weak. In addition, the partnerships between firms in the region with strong capabilities (such as the leading South African construction firms), and smaller local firms that would ensure both the quality and experience together with the transfer of skills and knowledge, appear to be lacking.

Within the capital equipment sector, Zambia has a longer history of local content policies, which were first established in the 1970s during the nationalisation era and have continued, although barely implemented, with the bilateral Development Agreements in the 2000s. In 2008, the government approved new legislation for the mineral sector, including new provisions on local supply firms, of a best endeavour nature. In July 2012, the Chamber of Mines of Zambia and the Zambia Association of Manufacturers, working closely with government, mining companies, and other key stakeholders,

started the *Zambian Mining Local Content Initiative*, which was officially launched in May 2013. The study highlights the extent to which local capabilities need to consider regional and international linkages, as the firms manufacturing and supplying the equipment undertake a set of activities across countries.

South Africa has developed local content legislation focused not only on local content but also on empowering black-owned suppliers in the mining inputs and construction supply chains (as black economic empowerment, or BEE). Local content and BEE have, however, worked against each other when the black-owned suppliers were importers. The dti's Industrial Policy Action Plan (IPAP) and the evolution of the BEE framework have included specific provisions to boost local content and have sought to leverage industrialisation and the development of local supplier capabilities from the procurement policies of state-owned enterprises Transnet and Eskom. Government's local supply chain development procurement strategy has been effective in targeting Tier 1 suppliers, civil engineering, rail engineering and rail yard machines, and their Tier 2 suppliers, particularly in steel fabricated and component products where some capacity exists. Local content measures for mining are found in the Mining Charter. Initially devised in 2002 but marked by little progress, the Mining Charter was revised in 2010, with the amendment of the Broad-based Socio-Economic Empowerment Charter for the South African Mining and Minerals Industry. IPAP set as one of its objectives the development of a Mineral Value Chain Strategy, including mining inputs suppliers. The dti's ECIC required South African local content in the project to grant insurance coverage: the lower the level of local content, the lower the insurance cover provided by the ECIC.

The policy environment for soy agro-processing has at the same time been influenced by both general policies and those specifically targeting soy. The former include land reform and structural change resulting in 98% of output being produced by large commercial farmers. The latter include Zambia's export restriction on bean and soy cake exports, while Zimbabwe has blocked imports of processed products for some years. In South Africa there has been support for soya investments in the form of development finance. South Africa has import tariffs of 6% and 10% for bean and cake imports, with the exclusion of Zambia and Zimbabwe falling under the SADC free trade agreement and the bilateral agreement with Zimbabwe. As noted by firms that are vertically integrated from production to poultry (or to a lesser extent oil), a national policy scope is limited in conjunction with insufficient soya production in the region and specifically South Africa, excess processing capacity, and the challenges of competition from deep sea imports. While the dti under IPAP and separately the Department of Agriculture Forestry and Fisheries under the Agricultural Policy Action Plan have begun to investigate more direct forms of industry development and support such as seed variants and other research and development into production inputs, South Africa's agricultural constraints including water mean that it will remain a net importer of soya. Future growth requires that policy looks beyond the development of the national industries to explore potential areas for creating rather than relying on existing comparative advantage.

There are important lead firms in each study. In mining equipment the mining firms have increasingly handed over control to the main multinational OEMs and EPCM firms. These firms govern the value chains of components, assembly, design and installation and operation. In infrastructure, the large construction firms, which generally incorporate manufacturing of key inputs such as cast concrete products, run the projects including subcontracting and sourcing from smaller firms. The relationships they have with the main procurer are crucial. In soya it is the poultry producers with differing forms of integration with processors that govern the value chain. These firms are regional in the scope of their operations.

The studies point to potential steps to upgrade capabilities, overcome supply chain obstacles, and grow the industries across the countries (summarised in Table 6). In each case, there has been important growth and investment but scope exists for a stepwise improvement in competitiveness, capabilities and investment in local production. Successes to date have largely been when firms have played a lead role and in the absence of a coherent cross-country policy approach.

Table 6. Scope for future value chain and industry development

| | Capital equipment | Soy agro-processing | Construction infrastructure |
|--|--|--|--|
| Upgrading into higher value-added | Strong capabilities in South African located companies, however, dynamic competitiveness versus transnational corporations depends on R&D capability and budget. Zambian companies remain small players at the low value-added end, scope for upgrading capabilities to leverage agglomeration economies and linkages. | Soy quality in Zambia has improved to import levels. Increased processing capacity coordinated with soya growing and animal feed users underpinning rapid growth in Zambia (and reduction of competition with other oilseeds with dual processing plants). | South Africa and other multinational companies leveraging experience and skills from projects and subsidiaries in other parts of the world. Incorporation of Mozambican inputs into project completion is limited and requires cooperation to build skills, invest in local capacity, to realise local and regional preferences. |
| Regional supply/demand linkages | High levels of intra-regional trade, however, South African companies could benefit from better collaboration with local counterparts and support in establishing a regional presence. Regional linkage important for job creation and training | Large regional FDI. Zambia exports into neighbours (Botswana, DRC, Zimbabwe, Namibia). Exports to South Africa are small and only close to being competitive with Argentina. Collaboration and coordination only happening internally by companies. | Weak linkages and poor cross-country coordination if at all. Information about new projects or process of capturing business is not easily available. Limited interaction with regard to local procurement rules, and building regional shared vision, policy levers and support mechanisms. |
| Addressing supply-chain obstacles | Key challenges remain in availability of Zambian capital equipment products. Institutional collaboration (e.g. technical institutes, universities) in providing technical support, skills, testing, and development finance. | Need for trade and integration of value chain, through to poultry, supporting local poultry production close to urban centres with low-cost animal feed sourced from best producers. Planned strategy to change regional competitiveness, work towards consistency in standards, support measures, finance for investment in order to: first, deep sea import replacement and, second, net exports of animal feed, edible oils, and poultry. | Recognise benefits from regional preferences in inputs linked to investment in local capabilities, to realise economies of scale, agglomeration with proximity advantages in sourcing. Work towards consistency in procurement policies across countries. Leverage from development finance from regional and international institutions such as BRICS bank. |
| Areas requiring further development | Establish Zambia as hub for mining products and services for copper belt and central southern Africa. Greater cross-border collaboration could provide mutual benefits especially in aftersales and maintenance support. | Bi-lateral agreements and institutional partnerships to overcome conflict of each national industry focusing on own isolated development. Developing the soy oil and other soy derivative markets is crucial for the growth of soymeal production. Selective import protection by South Africa combined with investment into production increases in Zambia and Zimbabwe are important areas for further development. | Greater collaboration between Brazilian mining houses, South African and Mozambican suppliers to develop local and regional supply capacity. Concrete targets and monitoring. Agreements with development finance and international finance institutions. |

5. Scope and imperative for regional integration

The findings of the three case studies highlight the potential scope for deeper regional integration of the mining capital equipment, construction and soybean value chains with collective benefits along the chains across countries. Understanding “regional” as going beyond the interests of national value chains (or sub-sections), the significant production and investment responses detailed also highlight the gaps where firm-level responses have not fostered regional production, processing or demand.

In the mining capital equipment value chain, South African OEMs have developed extended linkages to the Copperbelt mining supply chain, exporting goods and services, forming partnerships with local agents with varying degree of exclusivity and investing in subsidiaries. These subsidiaries in particular have been strategically important in view of the growing importance of aftermarket sales, and the need to provide spares, and repair and maintenance services within short lead times. Aftermarket sales are likely to remain very important in future, as the mining companies’ procurement strategies, including increasingly the Chinese mines, focus on total cost of ownership. Efficient aftermarket services ensure low downtime and long lifetime of the machinery. Mining houses are also becoming increasingly reliant on turnkey solutions from their suppliers. As a result, systems design and management responsibilities have been progressively shifted onto OEMs that had until recently only supplied equipment. Again, this will increase pressure on the OEMs to have an established presence in the Copperbelt.

Zambian and South African suppliers are already using the Copperbelt as a basis to participate in the DRC mining supply chain. For example, in 2013, Zambia re-exports to the DRC totalled US\$126.5 million worth of machinery (HS 84) and US\$25.6 million of transport equipment for goods (HS8704). Machinery re-exports in particular have increased significantly during the last decade. OEMs find the DRC too risky to consider a solid market presence there. The DRC Copperbelt therefore offers an opportunity for economies of scale and increasing the value added content of companies’ activities in the Zambian Copperbelt, because they have a larger market to serve. In terms of services, this implies that South African OEMs can build the local capabilities to undertake high skills-intensive repair and maintenance operations, rather than flying in engineers from South Africa. Serving the DRC market, however, requires lowering barriers between South Africa, Zambia and the DRC including high transportation costs, and tariffs imposed by the DRC as a non-SADC Free Trade Area member. Zambia and South Africa should facilitate the establishment of bonded warehouses. The latter would allow South Africa-based OEMs to move larger stock of equipment and spares to the Zambian Copperbelt to supply the regional market. It would lower transport costs thanks to bulk transport, and shorten lead times in supplying clients in the sub-region.

A regional value chain strategy should provide incentives to South Africa-based OEMs to build their market presence in the Copperbelt. Elements of this strategy should include cluster initiatives in South Africa and in Zambia to address constraints to firm upgrading. It should also aim to establishing a regional approach to local content requirements which reduces conflicts in national local content incentives and support a win-win outcome. At the moment, South Africa dti’s ECIC local content requirements for a South African exporter into Zambia clash with increasingly stringent localisation requirements set by the Zambian government. South Africa’s industrial policy only targets the domestic market not the regional one, while reciprocal and harmonised incentives schemes would

provide a better framework to promote regional investment and mutually beneficial outcomes: OEMs would become more competitive in aftermarket services and lead times, and Zambia would benefit in terms of, among others, employment, skills development, knowledge transfer, and sub-contracting opportunities. On the Zambian side, this strategy requires that local content policies are part and parcel of a broader industrialisation strategy. Multiple stakeholders, in particular the mining companies and the OEMs, need to be involved. Employment localisation requirements need to be complemented by an aggressive skills development strategy through technical and vocation schools and apprenticeship programmes. Particular support should be given to manufacturing companies to become Tier 2 suppliers to the OEMs, even if for simple, low value added components and spares initially. In the longer term, regional cooperation could target cooperation in technology innovation and R&D and higher value-added activities in South Africa and the Copperbelt.

South Africa's role in Mozambique's construction value chain is less clear-cut. On the one hand, South African based construction firms, both domestic and multinational, are participating in the Sena and Nacala lines construction projects. South Africa nevertheless faces tough competition from local construction companies of Portuguese origin, and firms from Brazil. Moreover, there are new entrants, namely firms facing declining markets in their home countries (Portugal, Spain) and those following their home countries' multinational investors (China, India). South Africa can rely on strong networks, financial depth and well-established, effective supply chains, but these are not being fully drawn-on nor are they necessarily feeding back into manufacturing sector investment. Likewise, the participation of non-Mozambican suppliers or partners is not generating substantial market inclusion or upgrading of Mozambican enterprises.

The key problem for regional integration and capability development is that project financing shapes the procurement strategy. In the case of mining companies financed projects, procurement strategies tend to favour home countries' construction firms. The region should have a two-fold strategy to support increased regional linkages: first, Mozambique's public procurement for infrastructure projects could be used to leverage joint ventures between South African and local Mozambican firms. These should be structured in ways that contribute to deepen Mozambique's local capabilities. South African firms have the resources to develop their work force as they complement on the job training with vocational training and training at technical colleges in South Africa. These training efforts should be built on and made more sustainable, possibly building capacity of domestic training institutions as well. The second leverage is to increase regional infrastructure financing, through regional or South African finance institutions, to ensure that both local and regional firms are granted preferential market access.

The high price of key inputs also reflects the possibilities that exist in building strategic construction material manufacturing and retailing capabilities in Mozambique. The South African and Mozambican governments should engage on issues affecting the efficiency of South African businesses in Mozambique, for example temporary imports of equipment are zero-rated but if the project exceeds six months, they are subject to VAT (value-added tax). Other issues affecting South African firms relate to double taxation, repatriation of profits and difficult work permit procedures.

The soy agro-processing value chain highlights the potential that exists from regional coordination, to meet the substantial production and trade deficit which is mainly comprised of the sizable portion of

South Africa's direct demand for soy and soya cake being met by deep sea imports from Argentina and its indirect demand being met by poultry imports from Europe and South America. The ongoing urbanisation and rising urban incomes will continue to drive demand. Recent growth in Zambia has demonstrated the massive potential that exists. In a period of just three to four years investments have been made in improving the quality and lowering the costs of soya production, multiplying volumes and investing in processing capacity and moving from being a net importer to a net export position. This potential for continued expansion to lower the cost base of the entire region will be stunted in the absence of effective regional coordination. Intervention is required to support the development of the soy oil market, investments and transfer of know-how to overcome Zambian and Zimbabwean production constraints, and the development of reliable cross-border transport and storage patterns. There are also important links to biofuels and soy-food and other derivative market development. In addition, securing reliable electricity to reduce production costs is important to enable successful cost-competition against imports.

Across the three case studies, it is suggested that regional development needs support for horizontal capability development, an exploration of shared production challenges (for example, finance, technical support, standards, and transport infrastructure), and an exploration of the scope for leveraging various collective comparative advantages through more effective coordination along the value chains in inputs, technology, skills, project finance, proximity to market, and potential up-scaling of supply.

In essence, the 'Africa rising' narrative which has been based on superficial observations of growth based on minerals needs to be translated into a 'Made in Africa'⁹ vision and agenda, which these studies highlight can only be properly achieved through cross-country co-operation.

⁹ This borrows deliberately from Oqubay (2015) which emphasises the critical lessons of coordination and industrial policy and the iterative learning from their application at the sector level.

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