



## **Industrial Development Think Tank (IDTT)**

### **Structural transformation along metals, machinery and equipment value chain – developing capabilities in the metals and machinery segments**

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18 May 2018

A collaboration between the Department of Trade and Industry, CCRED, and the SARChI Chair in Industrial Development



This paper forms part of a series of studies on the challenges of industrialisation undertaken by the Industrial Development Think Tank (IDTT). Established in 2017, the IDTT is supported by the Department of Trade and Industry (the dti) and is housed in the Centre for Competition, Regulation and Economic Development (CCRED) in partnership with the SARChI Chair in Industrial Development at the University of Johannesburg. The studies review trends of (de)industrialisation and assess the potential for structural transformation to drive growth, industrialisation and development in different sectors in South Africa.

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## **Executive summary**

The trajectory of South Africa's post-war industrial development has centered on the mining, metals and energy value chain, which has historically been characterised by very strong intra-sectoral relationships. The mining and basic metals industries were beneficiaries of favourable electricity tariffs, investment and logistics support aimed at promoting its competitiveness. Subsequently, the post-apartheid state has grappled with how to engage with the main companies (such as ArcelorMittal), including in responding to global developments. At the same time, there have been confusing signals and measures from different government departments and other public institutions. While the upstream industries received substantial subsidisation, there has been limited assistance for the downstream industries despite the importance of the basic metals and downstream industries in fabrication and machinery and equipment as the heart of the industrial base in South Africa.

The study assessed the status of structural transformation along the metals, machinery and equipment value chain from the 1990s to the present day, encompassing the global commodity price cycles of the 1990s, the 2002-2008 economic boom in South Africa and the 2008 financial crisis. Structural transformation relates to changing the sectoral composition of the economy by increasing the proportion of higher productivity activities and high value adding services (Nübler, 2014). Through such changes, industrialised economies have achieved technological advancements and improved productivity, leading to employment creation with higher income and more diverse industries.

A comprehensive set of productive capabilities would need to be in place to facilitate the shift from low productivity to higher productive activities in each sector (sectoral deepening) and across sectors. Such capabilities include technology, infrastructure, capital, skills as well as policies that facilitate structural transformation (e.g. trade, investment, research and development and exchange rate policies). For example, trade policy that supports exporting allows firms to engage (or compete) with other companies, can prompt firms to increase productivity to remain relevant. Technology transfer between countries, even though the interaction between domestic innovation capabilities and imported technology is complex, provides opportunities for technological spill overs that local firms can benefit from (Nübler, 2014). Access to appropriately qualified and trained labour force is an issue that South Africa has been grappling with since 1994 (Daniels, 2007). Though strides have been made to boost the level of skilled labour, this remains inadequate to meet the industry's needs. How these variables interact is key in addressing structural transformation along the metals, machinery and equipment value chain.

## **Value chain and industry structure**

The metals, machinery and equipment value chain has undergone structural transformation, though at different levels, even within each segment. The level of structural transformation needs to be understood within the context of the ownership and concentration of each level.

The upstream industry is mainly privately-owned by foreign-based companies. Over the years the leading companies – Arcelor Mittal South Africa, Columbus Steel and Highveld – have shifted their focus to achieve the respective global company's objectives of maximising profit and shareholder value, objectives which are not aligned with South Africa's developmental objectives. In 1990 the main firms in the sector were Iscor/ArcelorMittal, Highveld Steel, Scaw, Columbus Stainless and scrap processors producing long and flat

steel products mainly for construction sector. Since then there has been a shift from domestic institutional ownership to foreign ownership, partly arising from conglomerate unbundling and Iscor unbundling with assets being absorbed by TNCs during the post 2000 global steel sector consolidation.

The competitiveness and viability of upstream steel firms have been impeded by the form that conglomerate unbundling has taken whereby the shareholder's focus has been diffused by multiple diverse strategic and corporate restructuring issues, the central one being short-term profit growth. In Anglo American plc's case, the objective of reducing exposure to the South African economy was a further impediment in that capital expenditure on ageing plant and equipment would have been minimised.

The experience that both Scaw and Highveld Steel were subjected to from 1998 onwards have impeded both firms from realising their potential. Initially, Anglo plc invested in diversifying Scaw globally through acquisition, resulting in London-controlled Scaw becoming one of the global leaders in steel grinding media, but the post-2008 downturn resulted in the shareholder asset-stripping the company before exiting completely. Similarly, Highveld Steel, the third largest global producer of vanadium, was disposed of in 2007 to Russian-owned Evraz plc. After steel and vanadium prices fell after 2008, Evraz, the second largest global producer, initially sold a minority share to a black-owned consortium and subsequently in 2015 put the firm into business rescue. The result of eliminating South African supply has led to rising global vanadium prices and profits for Evraz.

Similarly, Iscor management and institutional shareholders also adopted a short-term profit-maximising approach to maximise the sum of parts of the unbundled Iscor with a disproportionate quantum of balance sheet debt being allocated to the steel company rather than the Kumba Resource mining company. It was only through the intervention of the dti and IDC that Iscor Steel emerged with a low-cost evergreen iron ore supply agreement as well as a manageable level of debt.

But as at 2017, the main structural change is that the ownership and control of the upstream sector is more concentrated than it has ever been by ArcelorMittal, with the likelihood that this could increase further as Highveld and Scaw are dismembered and as the state implements what appear to be very generous support measures for the upstream sector.

Labour productivity of the dominant steel producing firm substantially increased during the 1990s driven by the rationalisation strategies. With the exception of diversification into stainless steel, the upstream sectors have largely reduced the steel product range supplied to the machinery sectors.

As far as the downstream sectors are concerned, there appears to have been a consolidation of the metal cast producers in light of the challenges that companies are facing. While there are some firms that are performing well and are well integrated with OEMs, it appears as though foundries are closing down precipitously as a result of local and international pressures.

Productivity in the foundry industry has increased chiefly because employment declined at a faster rate than output. Between 2015 and 2016, overall output declined, though an increase was recorded in the most recent years – aluminium production has suffered the most. Ferrous production seems to be increasing, while non-ferrous production had declined rapidly, indicating a reduction in diversification. This reduction is also noted with the fall in the number and type of foundries.

The companies in the machinery and equipment sector are mainly private owned, with a significant proportion of the companies being multinational companies. There are differing levels of concentration between general and specialised machinery and equipment. The specialised machinery industry is highly concentrated with a few companies commanding significant proportion of market share, different from general machinery and equipment where there are numerous small and medium sized companies. In the machinery and equipment sector, MNCs also use South Africa as a conduit into the rest of the Africa.

The upstream steel sector has been receiving substantial government support to meet stakeholder profit expectations and anti-competitive outcomes have thus far been raised in the basic iron and steel industry. Such behaviour has had the effect of undermining the performance of the downstream industries. The scrap metal cartel in effect raised prices for foundries, and the excessive prices raised costs for the downstream industries.

As a result, the policy objective of changing the structure of rent allocation in the value chain to pass the benefits of low cost resource-based iron ore inputs and low-cost steel production structures to downstream steel users has not been achieved. The seemingly overly-generous 3 year agreement between AMSA and the Competition Commission attempts to achieve this. Even though it is perhaps too early to assess whether the recent agreement will result in any change in market pricing structure and behaviour, monitoring whether the remedies are being implemented accordingly will be key.

### **Industry and trade performance data**

The metals, machinery and equipment value has recorded growth in output over the time period under analysis, mainly driven by movements of the commodity prices. In other words, during periods where the commodity price cycle was on the rise, a commensurate growth was seen in the output for all for subsectors. Despite the growth in output, there are notable differences in employment trends among the industries.

The investments which took place in the early 1990s for the basic iron and steel industries, resulted in a more capital-intensive upstream industry which consequently shed many jobs. At the same time, the labour intensive metals, machinery and equipment sectors have in fact grown employment, even during periods when output was depressed. With regards to investment, machinery and equipment is the only sector that appears to have grown investment between 2011 and 2013, which could be attributed to investments in mining, development of energy and water sectors in SADC.

Trade performance of the metals, machinery and equipment value chain has shown to be very closely linked to the exchange rate movements. The appreciation of the rand in the 2000s, during the commodity boom, rendered South African products less competitive than international products. As a result, the highly tradeable fabricated metals, machinery and equipment were exposed to high import penetration. The excess demand in the local industry was thus met by imports, despite the growth in output and exports between 2002 and 2008. Since 2008, the rand has been depreciating, and this has coincided with the improvement of the fabricated metals, machinery and equipment sectors.

The basic iron and steel industries are a net exporter along with the main non-ferrous industries such as copper, nickel and aluminium. The upstream industries export more into Asia, Europe and the USA. Between 2002 and 2008, we also notice the growth of exports in these industries. This growth may be attributed to the rise in commodity prices and not actually an increase in tonnage.

For the fabricated metals, machinery and equipment, there is a growing importance for Africa as a trading partner. The trade balance for both machinery and equipment and metal cast products worsened between 2002 and 2008 during the commodity boom, highlighting significant losses in employment and output growth. Nonetheless, the machinery and equipment sector has remained quite resilient, showing signs of improved trade balance in the last decade or so. The downstream industries are also becoming more integrated into global value chains given their tradability.

The performance of the downstream industry has been suboptimal despite their contribution to employment. The foundry and machinery and equipment sectors are facing declining demand for their products, as demand is being increasingly met through imports. The decline of the downstream industry and increasing import penetration emphasises the need to address the factors that have hampered the growth and development of the downstream industries.

### **Key issues along the value chain**

#### *Domestic and regional demand*

While procurement policies are aimed at driving localisation, poor implementation and weak monitoring and evaluation processes have resulted in local firms losing orders, requisite for achieving economies of scale. This is partly attributed to the lack of support from state owned companies and municipalities – the largest procurers and demand drivers – under the National Industrial Participation Programme, the Preferential Procurement Policy Framework Act, and even the Competitive Supplier Development Programme. Evidence shows that government entities are violating industrial policy objectives and are employing different tactics to avoid procuring locally (through exemptions), and are resorting to imports. The weak implementation of the policy is exacerbated by the fact that the appointed verification agency does not have funds to undertake verification. Loopholes in the calculation of local content have also undermined the intended consequences of local procurement. However, there seems to be a drive at the dti to improve the implementation of the policy.

In 2011, government, the private industry (through Business Leadership South Africa) business and labour as well as community representatives signed a Local Procurement Accord aimed at creating 5 million new jobs by 2020. Government committed to leverage public procurement, establish standards for measurement and verification of local content and accelerate infrastructure investment. Business through Business Leadership South Africa (BLSA) committed to progressively increase the levels of local procurement by its 84 members by establishing a baseline, developing strategies and targets and reporting on annual basis. Subsequently, the BLSA commissioned a study which delivered two reports in 2012. However, it does not appear that BLSA took the process any further than disseminating the reports to their members.

Poor local demand, and high import penetration have tremendously affected local firms. The weakening of capabilities in the foundry industry have also meant that some component manufacturers have resorted to importing standard components. This has the effect of worsening the competitiveness of the downstream industries.

The ambitions to drive local procurement, accompanied by the high levels of import penetration means that local firms need to explore other markets. As such that most firms have resorted to entering the export market, particularly SADC. Even here South African firms are losing market share due to decline in competitiveness, change in ownership of

mines and lack of access to export finance. Export-finance is vital for supporting and facilitating trade, especially when competing with other foreign companies that have access to this facility.

The upstream sector has managed to maintain international competitiveness due to the incentive (GEIS until 1997) that assisted in the penetration of export markets and by market access secured by various trade policy negotiations. Import penetration at the upstream level has occurred among steel grades that the local companies do not manufacture, as such import penetration has had little, if any impact on their demand.

#### *Input costs*

Access to competitively priced inputs – electricity, raw materials and labour – determines the competitiveness of the value chain. This is particularly important for foundries and machinery and equipment that have strong backward linkages with the upstream industry. Furthermore, the foundry industry has strong forward linkages with the machinery and equipment, such that the performance of the foundry sector relates to the production of certain machinery and equipment.

The cost and supply structure of electricity is structurally biased towards high voltage customers compared to low voltage customers. While energy intensive upstream industries source energy directly from Eskom (at a lower tariff), downstream industries either access electricity from Eskom or municipalities depending on the manufacturing plants' location. There is strong evidence to suggest that companies supplied by Eskom directly pay lower tariffs for electricity compared to municipalities. Even among municipalities, there are different pricing structures. Municipalities charge higher electricity rates (difference of about 29%) than Eskom because for municipalities, electricity is an important source of revenue. The price differentials not only affect how local firms compete amongst themselves, but also how they compete in the international market.

The weak policy implementation of the MPRDA, with regards to beneficiating ore in South Africa, has affected the upstream industry, following the loss of primary steel sector to its cost-based supply link with the iron ore sector in 2008, an event in which the Department of Mineral Resources appears to have fully supported. Poor policy implementation of the Price Preference System has resulted in leakage (exporting) of scrap material. Even though local foundries are given first choice when procuring scrap material, scrap merchants are finding ways to export the scrap and earn higher profit. As a result, local foundries either have access to poor quality scrap or have to purchase scrap at exorbitant prices. In order to circumvent this, an export tax on scrap could be ideal, though this would need to be differentiated between ferrous and non-ferrous scrap.

For the machinery and equipment sector, the protection enjoyed by the upstream industry coupled with the poor performance of the intermediate foundry industry is a double-whammy. The current and envisaged protection on the steel industry will increase the costs for local manufacturing, further hampering their competitiveness. The challenges in the foundry industry have led to firms importing cast components, which is suboptimal.

The evidence presented in our research suggests that annual real wages increases for workers in the metals industry (at least since 2010/11) have been relatively modest. That said, the productivity of labour in South Africa has, at best, stagnated over the past 10 years.

In the absence of research on the severity of industry-specific strikes it is difficult to make any strong conclusions regarding the impact of strike action on the industry. As with all small

business, there is a case to be made for exempting some companies in particular from the MEIBC wage agreements.

#### *Access to finance*

It is evident that investment by the IDC and the dti has been more focused on the upstream sectors, and this occurred without reciprocal assistance for the downstream industries. Furthermore, the investments upstream have not benefited the downstream industry. Government does realise this imbalance, and appear to be making more concerted efforts to improve the competitiveness of the downstream sectors.

#### *Productive capabilities*

Investment in R&D and technology and access to adequately trained employees are important to maintain competitiveness. At present there appears to be a stark difference between and within the different groupings in the metals value chain.

The upstream industries benefited from access to investment, which allowed them to adopt advanced technologies. For the downstream industries, the narrative is more varied. Though certain foundries have been able to adopt new technologies to improve competitiveness, a bulk of the industries are still employing old obsolete technologies. There is need to work within the existing institutions to localise and improve technology and develop the processes and for foundries to industrialise products.<sup>1</sup>

The mining machinery and equipment sector is resuscitating the industry, with COMRO coming back on board along with participation from tertiary institutions and DST. On a more general level, access to funding is key so that firms can advance technologies to become more productive and produce sophisticated products.

Access to highly trained skills remains a struggle, despite government's efforts via the TVET and SETAs. In the foundry and machinery and equipment industries there is strong will by the industry to address the failure, evidenced by the different initiatives.

In order to develop and grow industry capabilities, there is need for public and private sector partnerships. While some (if not most) firms have a short term horizon, there is need for government to develop systems of innovation to coordinate skills and technology requirements at present and in the future. Even within government, it is important for different departments – DST, DHET, IDC and the dti – to collectively address building productive capabilities.

#### *Policies and regulation*

The Department of Mineral Resources gazetted the Mineral Resources and Petroleum Development Act (MPRDA) Draft Amendment Bill 2012 on 27 December 2012. Amendments to Section 26 empowered the Minister of DMR to (i) determine the percentage per mineral commodity and the price in respect of such percentage, in a production cycle, as may be required for local beneficiation, (ii) impose that every producer shall offer to local beneficiators a certain percentage as prescribed, and (iii) provide consent for the export of designated minerals subject to conditions the Minister may determine. The intention was to align minerals policy with industrial policy relating to beneficiation and to transfer part of South Africa's mineral rents to secure a competitive advantage for the manufacturing sector.

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<sup>1</sup> <https://www.thedti.gov.za/parliament/2015/NFTN.pdf>

Applied to iron ore mineral right holders, it would mean that a portion of the exported ore would need to be made available at a developmental price to steel manufacturers.

However, it is not clear whether any mineral policy-related instruments will be brought to bear to support industrial policy in the future since the DME/DMR have not only failed to utilise the existing beneficiation policy instrument in support of industrial policy since the inception of the MPRDA but they seemingly allowed ICT to steal AMSA's 2001 IDC-funded cost-plus ore advantage in 2009.

More recently, the revised draft mining charter was released in June 2017 by the Department of Mineral Resources. It has added a level of uncertainty, and has been faced with some resistance. At the moment it is under review, in consultation with the Chamber of Mines. It will be important for the dti and the EDD to ensure that strong local content criteria are included such that they are not overwhelmed by BEE criteria, as has been the practice over the past two decades.

There is need to address the contentious clauses pertaining to the black ownership component and the sourcing of local goods and services as this has a direct impact on the level of investment made by firms in the industry. Furthermore, the longer the policy discussions go on for, the lower the confidence in South Africa as an investment destination. This was also echoed in the 2016 Fraser Institute Survey of mining companies, which ranked South Africa 91 out of 104 in terms of "*uncertainty concerning the administration, interpretation, and enforcement of existing regulations*" (The World Bank, 2017).

#### *Low levels of transformation*

Since the implementation of B-BBEE in 1998, transformation has been minimal by any reasonable standard. At the foundry and machinery and equipment sectors, transformation has been slow for various reasons. In the case of foundries, for example, less than 10% of businesses are black-owned while very few companies in the valve and mineral processing sectors are BEE compliant according to estimates provided industry stakeholders.<sup>2</sup> Furthermore, a number of companies are family-owned and there is perhaps a "natural" reluctance on the part of the owner to cede control, despite the benefits that significant or majority black ownership would bring. There is also a tendency for owners of family-run businesses, especially in bad times, to overestimate the value of their companies based on past performance rather than current value or future short-term profitability, further putting the brakes on deals that could be made.

In the machinery and equipment sectors the main driver of black economic empowerment appears to be skills development and enterprise development. With regards to enterprise development, some machinery and equipment manufacturers are developing black industrialists through incubation programmes, where a business develops two or three black owned businesses to supply a particular component. The existing businesses support the black industrialist by providing facilities, supporting quality control or guarantee the purchase of orders as a guarantee (see box 5). The incubation programme assists with the development of black businesses and as such will be vital in changing ownership in the machinery and equipment industry, if implemented in a sustainable manner.

The poor performance of the downstream industries do not make them a lucrative investment target for partnering or acquisition by black entrepreneurs. This is mainly due to

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<sup>2</sup> Based on insights from in-depth interviews with industry stakeholders

low profitability and low capacity utilisation linked to low demand. In the case of foundries, capacity utilisation rates are so low that investing in a foundry, which would typically require significant investment in plant and machinery, is simply not attractive. Even in the capital equipment sector, returns on investment in the current climate are below those that might be achieved in investing in other areas of the economy. The situation is compounded by a limited pool of potential investors who would not only provide capital and strengthen compliance, but would also meaningfully participate in the day-to-day running of the business (findings from in-depth interviews).

The level of transformation in South Africa still has a way to go. In order to achieve transformation, the Black Industrial Programme recognises the need for access to finance and orders. Furthermore, there is also a strong need to develop expertise and business-related skills. Skills transfer will ensure that the black equity holders understand the structure of the company and the industry, while business skills will help them develop long-term strategies that will yield positive results for the business and the economy.

### **Policy, political economy and way forward**

The lack of structural transformation in the MME value chain has been against the backdrop of fragmentation of policy, which – on balance – has provided support and incentives to the upstream sector to the detriment of downstream sectors, together with a lack of support for downstream sectors in an economy which liberalised and has increasingly internationalised, opening it up to substantial competition.

Upstream sector competitiveness has been underpinned by large scale investment in the 1990s to upgrade plant and equipment, supported by investment incentives and IDC-funded co-investment (Section 4.3.1). However, this advantage has been eroded in the last decade, with upstream firms facing financial difficulties in 2016 and 2017 arising from what appears to be a profit maximising/asset stripping approach during the commodity super-cycle. Much of the 1990s investment support was conditional on the recipient firm committing to supply downstream firms with competitively priced metal inputs. However, this did not happen due to a combination of inadequate management of the compliance system as well as upstream firms active resistance.

While investment incentives have also been offered to downstream sectors, these have not resulted in any significant industry-wide structural change for several reasons. Many downstream firms emerged with weak balance sheets during the conglomerate unbundling of the 1990s and were unable to modernise quickly enough (Section 2.2).

There is a ***need for policy coherence and implementation to benefit downstream producers***, aligning policy and licencing regulations (particularly mineral resource-related) with industrial policy and local manufacturing objectives. This includes finalising the mining charter and providing certainty for firms in the mineral processing sector as the changes in ownership and local content has a direct impact on the investment and/or relocation decisions by firms. Importantly too, the PPS needs to be replaced with a time-bound, manageable system that works (i.e., that limits the scope for abuse and provides quality scrap to foundries at a developmental price).

Policy needs to learn from past mistakes. The South African steel industry has been impacted by three global steel commodity price cycles since the 1990s, which witnessed a historic low around 2001, 2008 and again in 2015. During the 2001 crisis, policy makers entered into an agreement (Grand bargain I) with LNM-Ispat (subsequently renamed Mittal

Steel SA and later becoming ArcelorMittal SA or AMSA), allowing them to acquire a majority stake in Iscor subject to agreement to pass on the benefit of (IDC-financed) cost-plus iron ore to downstream steel users through an agreed developmental steel price.

Mittal Steel SA effectively violated the agreement through protracted negotiations with the dti which were never concluded during which it benefited from the state-funded cost-plus iron ore agreement and rocketing steel prices.

Between 2012 and 2016, global steel export prices dropped to 10-year lows after which global steel prices turned upward. To support the upstream sector, government struck a Grand Bargain II with AMSA whereby AMSA committed to adopt a production cost-based formula plus a reasonable capped margin in exchange for settlement of unresolved competition-related matters, increased tariff protection and a policy directive that only South Africa steel be utilised in publicly-funded infrastructure projects. It appears that policy makers are repeating the error of 2001 since the agreement favours AMSA because, as in 2001, steel prices turned upward in 2016, AMSA is now effectively a monopoly as its main domestic competitors are in or close to bankruptcy and the agreement is only binding to 2022.

**Figure 1: Global Steel price - Hot Rolled Coil (US\$/ton) - 2000 to 2017**



Source: [www.steelbenchmarker.com/files/history.pdf](http://www.steelbenchmarker.com/files/history.pdf)

At a global level, ArcelorMittal's corporate strategy has been to consolidate its position in the face of declining steel prices which turned upward in 2016. During the 2008-2016 downturn, it successfully managed to retain full control of its South African subsidiary while clearing its potential competition-related liabilities at an effective discount. Future profits are underpinned by secured tariff protection for its local production until at least 2021 with corresponding projected rising global steel prices. With its major domestic market competitors either actually (Highveld) or technically (Scaw) bankrupt, AMSA is cherry-picking the latter's assets and positioning itself to absolutely dominate the domestic market. Viewed in this light, its steel output decrease by 0.4mt (6.4mt to 6.2mt - 2016) and its declared 1H2017 loss of R2 223 million is likely to be reversed relatively quickly if global steel prices continue to rise on the back of USA, EU and China market recovery.

The value chain, particularly the more **concentrated upstream segment** has demonstrated propensity to collude on prices and market sharing. Of note is the ArcelorMittal abuse of dominance case over much of the period under review. There is a need for **effective competition policy that disciplines conduct**. In August 2016, an agreement was struck which also involved the settlement of all pending Competition Commission issues, as detailed in Section 2.3, and this included the long steel cartel, the scrap metal cartel, the flat steel cartel, wire rod price discrimination, and an investigation into excessive pricing. As per the agreement, AMSA committed to pay a penalty of R300m per annum over 5 years starting in 2016. Monitoring of the agreement is key. More broadly, the amendments to the Competition Act, led by EDD will hopefully ensure that iron ore price concessions are passed onto the downstream industry.

**Domestic demand is a key driver of growth of the value chain**, which is dependent on demand from state-owned infrastructure and logistics companies, local government (pumps and valves), mining companies (mineral processing and material handling equipment), and private companies in the construction, engineering, petrochemical, and aerospace sectors. (Section 4.1) Our research reveals a **failure of both public and private sector initiatives to increase domestic procurement** from this value chain. State procurement policies have been (at best) fragmented, poorly implemented and weakly monitored and evaluated. At worst, state entities have actively evaded their responsibilities to increase local content. (Section 4.1). Given the MME value chain's important backward linkages with mining, a further impediment to increasing domestic procurement lies with the failure of mineral resource policy makers to leverage the state's ownership of mineral rights in favour of increased beneficiation and increased procurement of domestic manufactures by mining licence-holders (Section 4.6).

State-owned companies are a key source of demand. Any policy aimed at arresting the decline of the downstream metal industry, should prioritise import penetration and the lack of state support companies in adhering to **local procurement policies**. Without resuscitating demand for locally manufactured products, any other industrial policy intervention focused on skills, investment or technology will, at best, make a marginal difference to the industry as a whole. The current structure of procurement at state owned companies and the municipalities encourage buyers/procuring officers to purchase equipment and supplies based on cost and not local content threshold. There is an urgent need to consider carefully and revise where necessary the incentives facing buyers in the context of how the performance of SOCs in particular is measured.

Procurement practices in SOCs and local municipalities must be (re)aligned with designation and the overarching priority of structural transformation of the economy. This includes **centralising and/or coordinating procurement** for common products, particularly consumables, in order to provide firms with scale to achieve economies of scale.

In addition, interventions must develop workable solutions to improve the effectiveness of current local content policy. These would include making it much more difficult for bidders of government procurement contracts to receive exemptions and ensuring that there is a credible threat of sanction in the case of non-adherence, but these require investment in improving verification capabilities of SABS. As such, the capacity and funding process for verification needs to be clarified.

There is an urgent need to **improve the competitiveness of downstream firms and to re-establish the link with OEMS**. The competitiveness of the energy-intensive segments of

the value chain has been adversely impacted by steeply rising electricity costs (Section 4.2.1). Firms that are supplied by municipalities rather than by Eskom are disadvantaged further because electricity is an important revenue generator for local government and also because of the relatively poor and unreliable state of municipal electricity distribution infrastructure.

In addition to energy costs, high material input costs have also undermined competitiveness (Section 4.2.2) particularly for the intermediate foundry industry. The high costs are partly due to import parity pricing practices of upstream firms and also due to the high export prices targeted by scrap metal merchants.

To complement demand resuscitation initiatives, policy interventions must also focus on making the downstream sectors more competitive. For foundries, this includes lowering the price of non-ferrous scrap, investment upgrading and reducing the cost of electricity. For capital equipment, there is an urgent need to provide a competitive and responsive aimed at boosting competitiveness.

As far as **improving access to finance** is concerned, there is a need for a “foundry recapitalisation programme” that recognises the need for investment in new machinery and technology in foundries that do not qualify for support from the “IDC Downstream Steel Industry Competitiveness Fund” (i.e., that do not meet the investment criteria of the Fund). Apart from the foundry characteristics mentioned above, other conditionalities should be limited as much as possible.

Even though the capital equipment sector is sensitive to changes in commodity prices, there are other mechanisms that the government can implement to encourage investment and innovation. One of these is providing **access to export finance**. Export-finance is necessary when firms enter the export market, as other countries are already providing favourable export-finance to their companies, reducing the attractiveness of South African firms. This therefore also speaks to **regional integration** initiatives.

Increasing competitiveness requires **reducing the cost of electricity** and the variance between electricity supplied by municipalities and electricity supplied directly by Eskom. For example, the dti could work with NERSA and the metropolitan municipalities to develop an explicit “foundry friendly” tariff applicable to all foundries regardless of where they are located that reduces electricity costs for foundries to, or near to, Eskom levels. However this may be difficult to achieve given the constitutional and local government financing issues relating to electricity distribution industry.

There is a need to **close the gap between the needs of OEMs and producers** through supplier development, and industry/government/academia working together to build technical competencies, including skills training.

Industry capabilities to increase investment in research and development and through skills development could be more appropriately focused through a range of **cluster initiatives**, and piggy-backing on existing industry-led initiatives such as the South African Mineral Processing Cluster, the Valves and Actuators Manufacturing Cluster as well as the Casting, Forging and Machining Cluster. The 1998 cluster initiatives did not get traction within the MME value chain due to the considerable flux that individual firm managers were under as their parent conglomerate implemented their unbundling strategies. In many cases, industrial corporate leadership of the time were mainly interested in securing the required supportive

rents that were required from the state and were not prepared or (in some cases) not capable of effecting other critical parts of the proposed strategies.

A top priority must therefore be committed long-term support for machinery and equipment clusters which are grounded in partnerships at the local level, between firms and with local institutions engaged in training, research and testing and certification. Should firms be able to pool resources to address common problems, this will drive research and development, technology spill overs and productivity enhancements. There are industry-led cluster initiatives that are underway that the government can leverage off.

## 1 Introduction

The trajectory of South Africa's post-war industrial development has centered on the mining, metals and energy value chain, which has historically been characterised by very strong intra-sectoral relationships. The mining and basic metals industries were beneficiaries of favourable electricity tariffs, investment and logistics support aimed at promoting its competitiveness. Subsequently, the post-apartheid state has grappled with how to engage with the main companies (such as ArcelorMittal), including in responding to global developments. At the same time, there have been confusing signals and measures from different departments and public institutions. While the upstream industries received substantial subsidisation, there has been limited assistance for the downstream industries despite the importance of the basic metals and downstream industries in fabrication and machinery and equipment as the heart of the industrial base in South Africa.

This study's primary research question is to assess the status of structural transformation along the metals, machinery and equipment value chain. Structural transformation is covered extensively in the overview paper of the study and relates to changing the sectoral composition of the economy by increasing the proportion of higher productivity activities and high value adding services (Nübler, 2014). Through such changes, industrialised economies have achieved technological advancements and improved productivity, leading to employment creation with higher income and more diverse industries.

The practice of upgrading entails advancing processes, products and functions. Process upgrading involves improving the production process by re-organising production systems. Product upgrading occurs when firms introduces new technology, thereby moving into higher and more sophisticated product lines. Functional upgrading is the process of moving into higher-skills content functions (Humphrey & Schmitz, 2002). This implies that for the metals, machinery and equipment value chain, structural transformation would take the form of the production of higher value added diverse products along the value chain, through improvements in production processes, incorporating different and new technology, thereby increasing the demand for highly skilled labour.

A comprehensive set of productive capabilities would need to be in place to facilitate the shift from low productivity to higher productive activities in each sector and across sectors. Such capabilities include technology, infrastructure, capital, skills as well as policies that facilitate the transformation (e.g. trade, investment, research and development and exchange rate policies). For example, trade policy that supports exporting allows firms to engage (or compete) with other companies and therefore be prompted to improve productivity in order to remain relevant. Even though the interaction between domestic innovation capabilities and imported technology is complex, there are technological spill overs that local firms can benefit from (Nübler, 2014). How these variables interact is key in addressing structural transformation.

Research, engineering and design are necessary in not only improving productivity, but also in technological advancements and product development. Understanding the role of clusters in technological advancements and spill-overs is key. More recent studies stress the importance of industrial ecosystems where the product space revolves around productive organisations, public institutions, intermediaries and demand-side actors. These agents work together to diversify the industry and develop innovative strategies aimed at renewing and

stimulating industries. Diversification in this instance may be triggered by similarities, complementarities or recombination of capabilities (Andreoni, 2018).

The gains to be made from adopting and adapting technology partially depend on the available skill set. Access to appropriately qualified and trained labour force is an issue that South Africa has been grappling with since 1994 (Daniels, 2007). Though strides have been made to boost the level of skilled labour, this remains inadequate to meet the industry's needs. Consequently, this may limit the ability to attract and absorb technology, which further retards economic development (Humphrey and Schmitz, 2002). As technology and innovation advance, there is increasing demand for more educated and skilled labour, while the demand for less educated and lower skilled labour diminishes. As this occurs, the engagement between industrial policy, skills and tertiary institutions and the industry becomes pertinent to ensure the development of human capital to suit the changing demands (Daniels, 2007). Poor engagement of these policies, lack of complementary capabilities and failure to catch up to emerging technology may thwart structural transformation (Andreoni, 2018).

### **Methodology**

This study examines the period from the 1990s to the present day, encompassing the global commodity price cycles of the 1990s, the 2002-2008 economic boom in South Africa and the 2008 financial crisis.

The sub-sectors to be reviewed along the metals, machinery and equipment value chain are highlighted in Table 1. In addition to these sectors, our study also considers linkages to the upstream and downstream which stretch beyond these sectors as such to energy, mining, and to procurement, technology services, skills etc.

Over the past three decades, the sectors within these value chains have been intensively researched, although the studies have tended to be compartmentalised. Our methodology combines detailed empirical analysis of the overall value chain trends with an extensive literature review and selected interviews.

**Table 1: Upstream and downstream sections to be analysed**

<b>Segment</b>	<b>SIC</b>	<b>Description</b>	<b>HS code</b>
Upstream	351	Manufacture of basic iron and steel	72
	352	Manufacture of basic precious and non-ferrous metals	74-81
Middle stream	353	Casting of metals	73-74
	354	Manufacture of structural metal products, tanks, reservoirs and steam generators	73
	355	Manufacture of other fabricated metal products; metalwork service activities	73
Downstream	356	Manufacture of general purpose machinery	84
	357	Manufacture of special purpose machinery	84
	358	Manufacture of household appliances	84
	359	Manufacture of office, accounting and computing machinery	84

*Source: Statistics South Africa*

Tradeoffs have been necessary, given the breadth and depth of study and we have justified the selection of product groupings/sub-sectors for more intensive analysis in the respective sections below.

## **Research design**

Our study employs a triangulation methodology where secondary literature will be verified from primary research and available data sources.

Primary research entails gathering information from relevant stakeholders using questionnaire based interviews (list of interviewees in Annexure 1). The respective interviews were used as a basis to gain deeper understanding of the nature of investment, the impact of policy on business decisions and performance, the status of research and development, and how the interaction of industrial policy instruments impact business performance. Where necessary, firm-level case studies were also used for illustrative purposes.

Secondary data involves investigating performance data from Quantec and trade data from Trade Map. Review of policies and previous studies will also be used to track performance over time.

The general questions include:

1. What is the structure and state of the value chain?
2. What have been the corporate strategies and investments among lead firms? What is the state and impact of ownership, control and market power?
  - Why has the massive restructuring and investment not resulted in a more competitive industry?
  - What is the impact of Mittal steel pricing policy?
3. What are the main challenges to structural transformation?
  - Was there was sufficient financial, technical and skill development support for achieving sub-sector policy restructuring objectives?
4. Have policy measures been effective including development finance (IDC), investment policy conditionalities (e.g. 37e), competition policy, trade policy, energy (electricity pricing) and MPRDA
  - What is the current state of cluster development?
  - What have been the impact of SOE procurement policies and practices?
  - What are the costs of state fragmentation and lack of effective coordination with other government departments?

Section 2 maps out the value chain under analysis, providing rationale for the selection. It also frames the industry structure by discussing the concentration of ownership and, corporate strategies and the competitive outcomes that have arisen. Section 2 also analyses the state of structural transformation at each level of the value chain, and the implications thereof for the entire value chain. Section 3 outlines the observed trends in output changes, investment and the recent substantial increases in both imports and exports of intermediate and finished metal products and machinery. Section 4 draws out the key issues affecting structural transformation along the value chain. Sections 5 draws out the conclusions and turns to the future, drawing on previous sections to trace the form and extent of structural transformation across the value chain since 1990, identifying the current structural impediments to the growth of the value chain, particularly the downstream segments and what further structural change might be required to maximise national development outcomes.

## 2 Metals, machinery and equipment value chain

### 2.1 Understanding the value chain

Figure 1 (on the next page) depicts a simplified value chain for metals, machinery and equipment, divided into five stages.

**Stage 1 and 2** depict the upstream activities. Iron ore, chrome, manganese and other related mining activities feed into both basic ferrous and non-ferrous production and directly into the foundry industry via the production and supply of ferrochrome, ferromanganese, and pig iron, a by-product of titanium mining, and a major input in the production of ferrous components for the automotive industry and in production of cast-iron and ductile iron castings more generally.

Basic ferrous and non-ferrous production refers to the capital and energy intensive processes involved in smelting mined ore. Basic ferrous production is dominated by steel mills and mini steel mills while basic non-ferrous production includes secondary smelters, extruders, and rolling mills.

Also depicted in Stage 1 is the scrap recycling industry, which supplies scrap steel for upstream steel production, aluminium scrap to secondary aluminium smelters, extruders and rolling mills, and ferrous and non-ferrous scrap to the foundry industry. In addition to aluminium scrap, non-ferrous foundries producing aluminium cast components use aluminium ingots supplied by the secondary aluminium smelters.

For the purposes of this study, electricity is depicted as a simple two-stage process (generation and supply). Stage 1 high energy users are supplied directly by Eskom while high energy users in Stage 2 are supplied either by Eskom or the local municipality in which they are located.

**Stage 3** depicts the key “mid-stream” activities, i.e., the manufacture of structural, treated and fabricated metal products as well as foundry products. These include products that have undergone cutting, bending, machining, forging and assembling processes that are supplied to downstream original equipment manufacturers, assemblers, and sub-assemblers at Stage 4. Examples of fabricated metal products include cutlery and hand tools, boilers and tanks, architectural and structural metals and cast products.

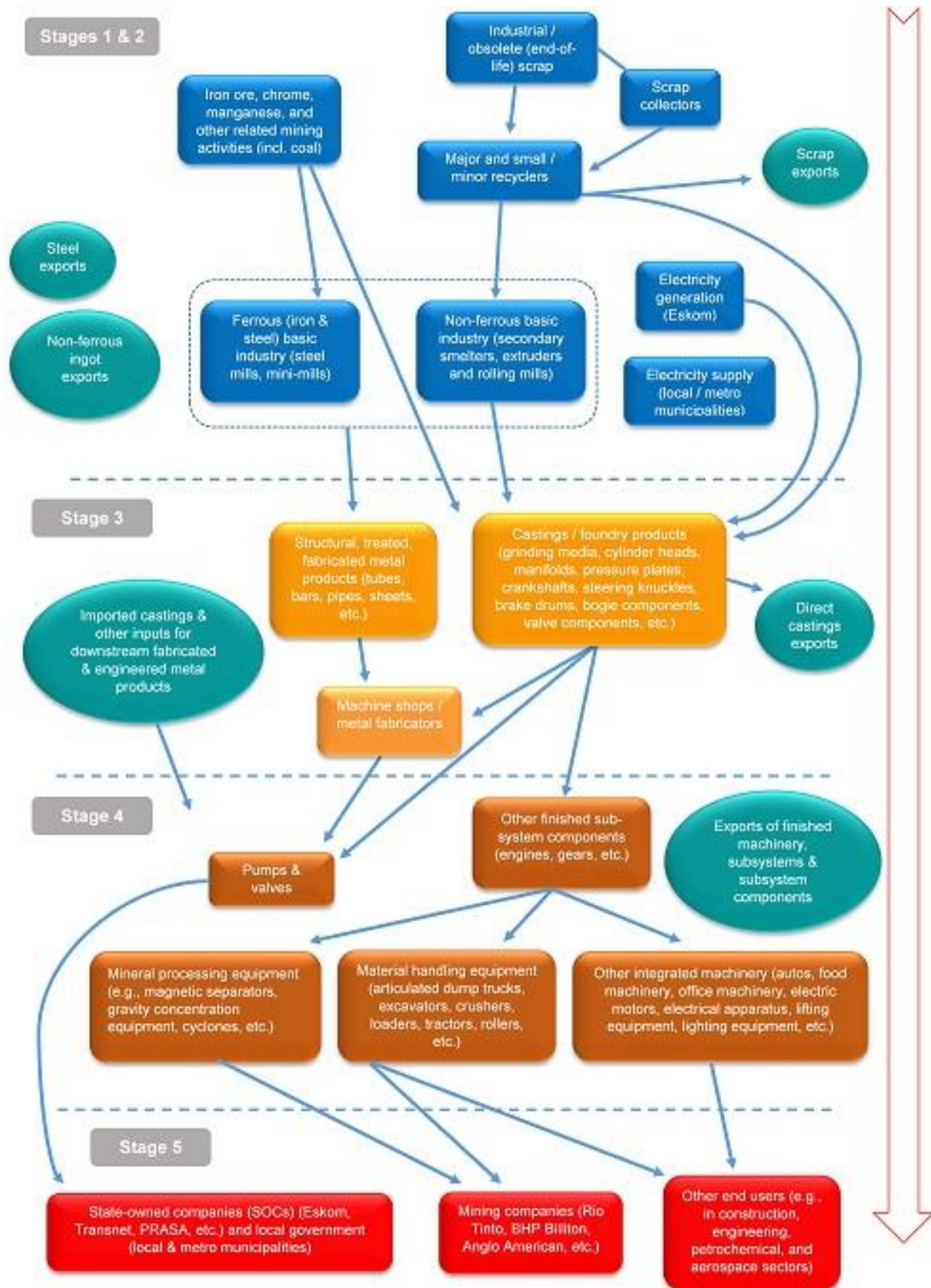
Also depicted in Stage 3 are direct exports of castings – although the majority of castings are exported indirectly in finished machinery exports – and imported castings and other inputs for downstream fabricated and engineered metal products.

**Stage 4** depicts the downstream assembly and original equipment manufacturing activities in the value chain. This includes the OEMs of integrated subsystems and systems and the assemblers and sub-assemblers of subsystem components. It also depicts the export of finished complex machinery (integrated systems), subsystems and subsystem components. For the sake of simplification, autos is included under “other integrated machinery.” In the analysis, reference is made to pumps and valves and mining equipment/earthmoving and material handling equipment. Pumps and valves are widely supplied into a range of more complex manufactured mineral, industrial and infrastructure systems domestically and in the region.

**Stage 5** represents the “end user” stage of the value chain. Products manufactured in Stage 4 of the value chain are primarily sold to state-owned companies and local government (pumps and valves), mining companies (mineral processing and material handling

equipment), and private companies in the construction, engineering, petrochemical, and aerospace sectors.

**Figure 2: Metals and machinery value chain**

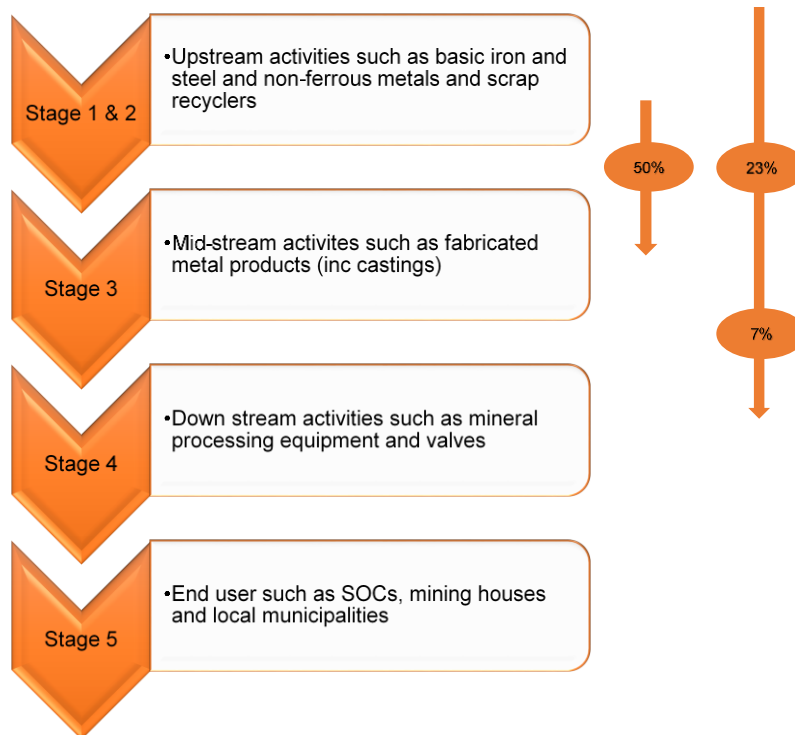


Source: Authors' representation

### Value chain linkages

Following from the value chain in the previous section, below is a simplified version that will be used to explain the backward and forward linkages along the value chain (Figure 2).

**Figure 3: Linkages – Metals, machinery and equipment value chain**



Source: Authors' representation and Quantec data

With regards to input linkages, 60% of the intermediate inputs in basic iron and steel (Stage 2) are from the coal mining and other mining.<sup>3</sup> The intermediate outputs of basic iron and steel are then utilised within the sector (8%) and in other sectors, mainly metal products (34%), machinery and equipment (16%), transport equipment (17%) and construction (10%)

While metal products (Stage 3) draws 50% of intermediate inputs from the upstream sector, the linkage between metal products and machinery and equipment (Stage 4) is quite weak (7%). The link with fabricated metal products (i.e. cast metals) is quite key and may not be well represented in the input-output analysis as this is based on value.

The machinery and equipment sector has stronger backward linkages with the upstream sectors, where it sources 23% of its intermediate inputs such as basic iron and steel. This serves to show that 30% of the machinery and equipment industry are sourced between stages 1 and 2. Machinery and equipment has a strong internal linkage as 22% of the inputs are sourced from within (sub-system components).

<sup>3</sup> Other mining includes: extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying; mining of iron ore; mining of non-ferrous metal ores, except gold and uranium; stone quarrying, clay and sand-pits; mining of diamonds (including alluvial diamonds); mining of chemical and fertilizer minerals; extraction and evaporation of salt; mining of precious and semi-precious stones, except diamonds; asbestos; other minerals and materials n.e.c; and service activities incidental to mining of minerals.

The competitiveness of machinery and equipment is dependent on upstream linkages as well as links with tertiary services. The downstream sector has strong forward linkages with wholesale, retail and trade (14%) and business services (12%). Due to lack of disaggregated data, the business services subsector could not be disaggregated any further as it includes various services, *inter alia*, rental of machinery and equipment, real estate activities, computer and related services and research and development.

There are also a number of closely-related horizontal linkages with activities/sectors such as electronic components and control systems, sensors and mechatronic solutions which cut across different equipment segments and which are critical to competitiveness, value addition, innovation, upgrading and firm-level capabilities. These were not investigated during the current phase of the study due to time constraints but are key areas for further research.

Even though mining only sources 6% of their intermediate inputs from machinery and equipment, 18% of machinery and equipment output goes to mining. The rest of the intermediate output goes to intra-industry (20%), various tertiary services (19%) and petroleum, chemicals, rubber and plastic (5%). This highlights the importance of the mining sector for the downstream industry as a source of demand. The other sources of demand are agriculture, forestry and mining, petroleum, chemicals, rubber and plastic; electricity, construction and finance. State procurement of machinery through utility departments and through SOCs like Eskom and Transnet therefore constitutes important sources of demand.

Machinery and equipment, includes a range of equipment that serve specific industries, though there may be scope for lateral migration. Valves for example can be used in the mining as well as utilities industries.

Detailed input and output linkages can be studied in Annexure 2.

## **2.2 Mapping the industry structure**

This section draws out the main changes in ownership and consolidation that have occurred along the value chain, and highlights some of the anticompetitive conduct that has arisen following these structural adjustments.

### **2.2.1 Internationalisation of the upstream companies**

Steel production facilities in most developed and developing countries enjoyed substantial subsidies up until the 1990s, after which the level of support diminished, although domestic markets continue to be protected at various times during successive economic boom-bust price cycles. This resulted in substantial steel production overcapacity, in turn contributing to the consolidation of steel production and reduction in the number of primary steel producers in EU, USA and other western markets.

With the exception of Asian economies, there has also been a shift from national ownership of steel production to transnational ownership with transnational companies (TNCs) increasingly domiciling themselves in low tax jurisdictions.

The locus of global steel production has shifted away from developed economies to developing ones, with China registering the greatest capacity expansion since around 2000. The reduction in China's growth rate since 2008 led to a flood of Chinese steel exports, further pressuring steel prices, increasing the drive for production cost efficiency and productivity, driving competitors out of business and fuelling further ownership consolidation.

Resulting from these global market pressures, South Africa's major national primary steel manufacturing firms (Iscor, Columbus Stainless and Highveld) have been absorbed by global steel TNCs since the early 2000s and their operations have since been directed to serve the respective global corporation's profit objectives and, in the case of ArcelorMittal, in opposition to national industrial objectives.

ArcelorMittal South Africa (AMSA - Formerly Iscor) is the main carbon steel primary producer together with Highveld Steel and Vanadium (HS&V), utilising iron ore as the main feedstock. Stainless steel is produced by the Acerinox Columbus Stainless mill.

Mini-mills using scrap steel as feedstock include Scaw metals, Cape Gate/Davsteel, Agni-Steels, SA Steelworks/SA Metal (Cape Town), Fortune Metaliks SA, Unica Iron & Steel, Pro-Roof/SA Rolling Mills and SA Metal. Stand-alone rolling and coating mills include Duferco (utilising finished steel from the adjacent AMSA Saldanha steel plant) and the Safal Steelworks at Cato Ridge. Tubes and pipes are produced by the Hall Longmore, Robor and AMSA Vereeniging mills.

We discuss some of the major changes in the sector below, with the exception of mini-mills. Our study has not investigated this strand of the value chain which is less linked to machinery manufacture and which is driven by the overall level of gross domestic fixed investment (GDFI), a large proportion of which is associated with the construction of buildings.

#### *Iscor-ArcelorMittal*

The global steel price drop after 1998 resulted in financial loss and led to the Iscor Board decision in 2000 to unbundle the company and partner with an international steel company to upgrade technology and secure export market access, in recognition of the consolidation underway in the industry.

Iscor unbundled into Iscor Steel and Kumba Resources in July 2001. In February 2002, the Competition Commission approved the merger of Iscor Steel with Saldanha Steel on two conditions. First, that Iscor does not place any restrictions on Duferco in relation to the sale of its products. Second that Duferco not be restricted to sourcing HRC solely from Iscor/Saldanha Steel. Iscor then chose UK-based LNM Steel as a strategic equity partner, entering into a 3-year Business Assistance Agreement (BAA).<sup>4</sup> With its technical problems at Saldanha resolved by 2002, Iscor posted its highest profit in 2003 of R2.5b. LNM raised its shareholding to 47% through a partial offer to minority shareholders in late 2002 and took 50.01% control of Iscor in 2004 when profit reached R4.5b. By this time, the domestic market was growing, recording a 22% increase in steel sales and the rand strengthened in 2004 by 17%, raising domestic steel profitability.

During this period, Mittal led the global steel industry consolidation merging with the USA's International Steel Group (ISG) in 2004 and listing on the New York Stock Exchange as the largest global steel company in the world. This was followed by the merger with Arcelor in 2006. Further expansion plans announced in 2004 were not realised as the company moved

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<sup>4</sup> LNM would earn up to 10% of Iscor's issued shares if it assisted in realising annual real cost savings over the 3-year BAA of between R350m and R700m. LNM were also required to invest at least US\$75 million in the purchase of Iscor shares on the open market by March 2003. With the upturn in global steel prices, Iscor profitability recovered rapidly such that LNM was able to acquire 30.74% of Iscor's shares by the end of 2002.

to rationalise its merged ISG and Arcelor global assets and the plans were abandoned after the 2008 global crisis.

Policymakers allowed LNM-Ispat to acquire a majority stake in Iscor in 2003 but made approval conditional on agreement to pass the benefit of cost-plus iron ore on to domestic users through an appropriate price formula. However, the detail was not agreed to and the renamed Mittal Steel SA effectively reneged on the agreement with subsequent protracted negotiations breaking down. Policymakers sought to use competition policy to support aggrieved downstream steel users. An excessive pricing prosecution between 2004 and 2007 resulted in a Competition Tribunal fine of R692m, which was subsequently overturned by the Competition Appeal Court. We discuss this in further detail below.

The post-2008 collapse of iron ore and steel commodity prices to a 12 year low in 2016 impacted on the domestic upstream steel sector. Evraz Highveld was also affected by the drop in commodity prices. AMSA was also adversely impacted by the loss of its 6.5 million tonnes iron ore cost-plus 3% agreement with Kumba in 2009.

### *Highveld Steel & Vanadium*

Highveld Steel came about as a result of the unbundling of Anglo American in South Africa as part of Anglo American Corporation's unbundling strategy.<sup>5</sup> Highveld steel and Anglo American Industrial Corporation became separate companies in this unbundling.<sup>6</sup> Furthermore, between 2006 and 2007, the Highveld Steel and Vanadium Corporation (Highveld) was sold to Russia's Evraz Steel as part of the Anglo American plc disposal of South African assets. The Competition Commission however imposed some conditions on the purchase.

In 2008, with profit peaking at R3 693 million, Evraz sold the Vanchem Vanadium operations, a 35% share of the Mapochs Mine that supplied ore fines to Vanchem and its 50% shareholding in South Africa Japan Vanadium (SAJV) to Swiss-domiciled Duferco, fulfilling the conditions imposed by the South African and European Competition Commissions in approving the Highveld purchase. It also unsuccessfully attempted to buy out the minority shareholders and delist Highveld from the Johannesburg Stock Exchange (JSE).

In 2014, Evraz sold 34% of Evraz Highveld to a black-owned Macrovest 147 (Pty) Ltd consortium headed by Barend Peterson, while retaining a controlling 51% share.

Evraz Highveld's profits fluctuated in line with global steel prices between 2008 and 2012. The declining global steel prices after 2012 and possibly the demise of the steel cartel following Competition Commission actions, led to the company sustaining substantial losses such that it went into business rescue in 2015. As at October 2017, the business rescue practitioners have adopted a plan to dismember and sell off the company's assets on a piecemeal basis. Agreement has been reached with ArcelorMittal to acquire the heavy

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<sup>5</sup> In addition to Scaw metals, Anglo American Industrial Corporation (AMIC) also owned a 52% share of Highveld Steel, 75% of Haggie (steel rope manufacture) and, through 67%-owned LTA Construction, operated Steeldale Reinforcing & Engineering Industries (reinforcing steel manufacture). By 1998, the Anglo American Corporation had restructured its assets in preparation for its shift offshore to London as a plc company. AMIC, Haggie and other firms were delisted and the steel-related shareholdings were housed under the Anglo Ferrous Metals division including: Samancor (40%); Columbus Stainless Steel (38%); Highveld Steel (73%); Scaw Metals (100%); Haggie (100%); Steeldale Reinforcing (housed with LTA under the Anglo Industries division).

<sup>6</sup> For a more detailed account see Zalk (2017).

structural steel mill. It is not clear whether the Competition Commission has placed any conditions on this acquisition.

### *Scaw Metals*

The Scaw Metals Group was a wholly-owned division of the Anglo American Industrial Corporation (AMIC) during the 1990s. In 2002, Scaw acquired PWB Chain in Australia and in 2006 it bought AltaSteel Canada a leading North American producer of steel grinding media, complementing Scaw's South African grinding media capacity. Anglo American corporatised Scaw in 2007 and sold a 21% share to a black-owned consortium and placed 5% in an employee share ownership scheme. Domestic acquisitions continued in 2008 with Ozz Industries (renamed Scaw Eclipse Foundries) and Leo Scrap in 2009.

Following the 2008 financial crisis, Anglo American announced its intention to dispose of Scaw in 2009. In 2011 Moly-Cop and AltaSteel were sold to Australia's Onesteel and in 2012, Anglo American completed its unbundling and divestment of 74% of Scaw to the IDC. In 2009, Anglo American plc earmarked Scaw Metals as non-core and announced its intention to dispose of the asset. This began with the stripping out and sale of assets Moly-Cop and Alta Steel to Australia's Onesteel in December 2010 for \$932m. In November 2012, Anglo American plc sold its 74% share in Scaw Metals to the IDC for R3 400m on a debt-free and cash-free basis. Scaw's empowerment shareholders retained their shareholding.

Scaw Metals posted a profit in 2012 but its losses have increased dramatically since then. On top of this, the IDC has provided substantial capital support to the Scaw balance sheet through an interest-free R3 500m debt restructuring package in 2014, a R1 800m preference share purchase in 2015 followed by a R181m purchase and a R300m revolving credit facility in 2016. It would appear that Scaw Metals is now substantially dependent on the IDC's balance sheet for survival with private financial sector liabilities being replaced by IDC debt.

The IDC's plan for Scaw is to dismember and sell stakes in the company's operating units to strategic industry partners. The rolled products and wire rod products assets, which employ more than half of Scaw's 3 500 workers have been sold to Scaw's black shareholder, Barnes Southern Palace Group (BSP). The transaction is awaiting Competition Commission approval and the IDC expected to complete the sale transactions for Scaw's grinding media business and its cast products business by the end of 2017.

It is interesting to compare the trajectory of Scaw with that of Australia's Onesteel (Box 1). Had Scaw adopted a similar strategy to OneSteel, it could today have been the dominant the global grinding media giant. This was not possible due to the lack of a committed majority shareholder that asset-stripped the firm before the IDC acquired it. Sadly, it is quite likely that Liberty-Onesteel (owned by UK-based Sanjeev Gupta - probably no relation to the South African citizens of similar name) will be the beneficiary of IDC's current drive to secure an equity partner for Scaw's grinding media assets. Should this arise, the Competition Commission will need to carefully assess the merits of the transaction because recent research has revealed that Scaw's market position in domestic and SADC grinding media markets has been eroded recently by imported grinding media (Fessehaie, et al., 2016).

### *Mini-mills*

In the 1990s, the Scaw, Cisco and Cape Gate were the main scrap-based mini-mills, producing a variety of long and flat steel products, mainly to the downstream construction sector. The main structural changes have occurred since the 2008 global crisis. Cisco was liquidated in 2010 and since 2013 there have been new investments in several mini-mills

with total smelting capacity of around 0.5mt per annum. These investments have been supported by the IDC and around half of these are foreign owned (India, Pakistan).

**Box 1: Onesteel (Australia) strategy**

In 2000, BHP Billiton divested its steel division, which was renamed Onesteel. The company was the largest steel product producer in Australia, producing 1.7mt of steel from its own iron ore mines in an integrated steelworks in Whyalla as well as a scrap mini-mill in Sydney. OneSteel processed this into long products including structural steel, pipe and tube, rails, reinforcing steel, rod, bar and wire. In contrast, Scaw Metals was about half the size, producing 750 000 tons of steel and products.

In 2011, Onesteel announced its intention to use its newly acquired Moly-Cop and AltaSteel Australian, Latin American and USA plants to evolve into the world's largest producer of steel balls and rods used in the ore grinding mills of gold and copper mines.

The subsequent collapse in commodity prices coupled with debt-fuelled global expansion strategies led to the company's bankruptcy in 2015 and its acquisition by private equity firm GFG Alliance. Onesteel's assets have since been separated into Simec Mining and Liberty-Onesteel.

## ***Structural transformation***

### *Changes in productivity*

The greatest gains in labour and capital productivity of South Africa's primary steel sector took place in the 1990s though the rationalisation of Iscor's Newcastle, Pretoria, Vereeniging and Vanderbijlpark facilities and the investment in the modern Saldanha Steel plant.

Between 1993 and 2000, Iscor attempted to improve its internal efficiencies by adopting a McKinsey-developed strategy of drastic cost reduction through rationalising product lines and reducing headcount by 30 000 between 1993 and 2000. Iscor's product facility rationalisation closed 2.7 million tons/annum of inefficient production capacity at various sites.

As a result the benchmarked costs of Iscor's Newcastle and Vanderbijlpark mills were reduced to the lowest quartile in global rankings. Also, after initial start-up problems, the Saldanha Steel investment using latest technologies also ranked in the lower quartiles. It is not clear what the global cost position of each of the three ArcelorMittal facilities are currently, but the 2016 price-capped settlement agreement should give policymakers a clearer insight into this.

In contrast, Highveld and Scaw did not improve competitiveness and structurally moved in the opposite direction to Iscor, as evidenced by their bankruptcy after 2015. We note though that electricity forms a larger part of their production costs, so this could have been an important contributing factor in addition to the asset-stripping approach of the conglomerate parent, as discussed earlier.

### *Diversification and complexity*

Faced with global pressures, South Africa's steel production sector diversified in the 1990s to produce stainless steel. Primary steel production since the 1990s witnessed a decrease in the number of different grades of steel produced, reduced from 309 to 119 at Newcastle and from 190 to 117 at Vanderbijlpark by 1997, and reduced further to 54 and 57 grades respectively in 1999.

Stainless steel production started at Southern Cross Steel in 1968. It expanded in 1991 after Highveld Steel (Anglo American Corporation) bought the company (then renamed Middelburg Steel & Alloys) from conglomerate Barlow Rand. Highveld then expanded production through a joint venture named Columbus Stainless with Samancor and the IDC. Originally, Samancor had been pursuing its own stainless steel project at a coastal location, with associated rolling facilities in Taiwan, to overcome sanctions and the opportunity to buy Barlow's stake in Middleburg Steel and Alloys changed this and Samancor became a partner in Columbus.

Iscor attempted to diversify production towards higher value stainless steel in 1994 using existing strengths in ferrochrome production. It converted the Pretoria Works to stainless steel slab production using modern Corex and coticast technologies and it converted the Durban Works into the Microsteel export-oriented mini-mill producing stainless steel billet. Iscor also bought Dorbyl's 60% share of the TOSA seamless tube JV, integrating this with its Vereeniging Works.

By 1996 South Africa had become the world's 5th largest exporter of stainless steel.

However, Iscor's strategy failed and the Pretoria plant was mothballed in the first quarter of 1997, less than two years after start-up and subsequently closed. The Iscor Microsteel mini-mill in Durban was mothballed in mid-1998 and has also closed, leaving Columbus as the only remaining stainless steel producer.

The main reasons for the failure of Iscor's diversification strategy were that it entered a very competitive stainless steel slab market just as export prices collapsed and its cost structure was burdened with high logistics cost for ore transport from Sishen to Pretoria, as well as high costs for imported nickel. A 1998 dti-commissioned study by the Heinz Pariser industry consultants suggested that the industry adopt a clearly segmented product market strategy based on imported stainless steel scrap using South Africa's geographic position to arbitrage scrap trade passing the Cape. However government attempts to secure the support of industry players were unsuccessful at a time when it was already exposed to substantial IDC-supported debt for the Columbus JV and Saldanha Steel.

In conclusion, it would appear that Columbus Steel represents a successful outcome of a 1990s policy and corporate strategy objective to diversify into higher value stainless steel production.

### **2.2.2 Thinning out of the foundry sector**

Economic isolation during the 1970s and 1980s resulted in a foundry industry that was not short of work. It also resulted in an industry that became somewhat complacent because of the protection which isolation afforded. As sanctions began to bite and the rate of disinvestment increased, the South African foundry industry supplied an ever-larger and more diverse share of the market. This diversity encouraged the development of versatile production capabilities, with the development of particularly strong capabilities in the production of support products for the mining sector. However, these diversified production capabilities were built up within an extremely protected environment with no real incentive to invest or innovate.

In the foundry sector, the most successful foundries are close to the OEMs that they serve, with whom they have established strong relationships with. Examples of these foundries include Atlantis Foundries, Autocast, Naledi Ihlanganiso and Auto Industrial Group. Two foundries, Atlantis and Auto Industrial Group, benefited from foreign ownership post-1994,

but only Atlantis is currently foreign owned. Naledi Inhlanganiso foundry is the only one of the “Big Four” foundries that is 100% black-owned. All four foundries have their origins in apartheid South Africa and, and for some time focused exclusively on supplying the automotive industry, with the possible exception of Naledi that is more reliant on SOCs (see profiles of the big four in annexure 4).

It is likely that the local value addition requirements of the Motor Industry Development Programme (MIDP) (now called the Automotive Production and Development Programme (APDP)) incentivised OEMs to establish relationships with domestic foundries. Conversely, the ferrous foundries relationships with machinery OEMs have weakened over the period under review partly due to the consolidation and globalisation of machinery OEMs who have no incentive to develop a domestic supplier base.

#### *Institutional framework and industry support*

The foundry industry is supported by the South African Institute of Foundrymen (the SAIF), the National Foundry Technology Network (the NFTN) and tertiary institutions – the Vaal University of Technology (VUT) and the University of Johannesburg.

Established in 2008, the NFTN is a dti initiative hosted by the Council for Scientific and Industrial Research (CSIR). The NFTN manages, coordinates and facilitates transformation and development of the casting industry sub-segment through focused interventions designed to enable local foundries to become globally competitive. In addition to the interventions described above, the NFTN is currently helping the industry to adopt lean manufacturing principles. The NFTN has been under the stewardship of the Technology Localisation Implementation Unit (TLIU) (at the Department of Science and Technology) since 2015/6.

The SAIF was formed in 1964 and registered as a non-for-gain organisation in 2009. The SAIF is staffed by two full-time employees and its ability to assist the industry in terms of improving its production capabilities in any significant way is limited. The SAIF has also experienced something of a funding crisis recently and now receives around 80% of its funding from the NFTN, which is in turn funded by the dti. Not only is the SAIF majority funded by government but the funding it receives from the NFTN is ring-fenced for certain activities (i.e., SAIF spending is effectively determined by NFTN). This places its traditional role as independent industry lobbyist in jeopardy.

The Metal Casting Technology Station (MCTS) established in 2010 is an initiative of the Department of Science and Technology (DST), and is managed through the Technology Innovation Agency (TIA). The MCTS is hosted in the Research and Innovation division of the University of Johannesburg. The MCTS focuses on the casting of ferrous and non-ferrous metals; sand technology; metallurgical testing and failure analysis; additive manufacturing and mechanical alloy of ultrahard materials. The station’s primary mandates are technology transfer and capacity building.<sup>7</sup>

The Vaal University of Technology houses the advanced manufacturing precinct (AMP) to promote additive manufacturing development and develop scarce skills, research, innovation and technology transfer in South Africa. The AMP was established in 2014 driven by the VUT’s Technology Transfer and Innovation (TTI) Directorate. While the AMP focuses on the

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<sup>7</sup> <http://www.foundries.org.za/wp-content/uploads/2015/06/MCTS-UJ-Colloquium-2015.pdf> and <http://www.engineeringnews.co.za/article/metal-casting-technology-station-provides-added-value-for-industry-2017-03-10>

manufacturing industry as a whole, the initiative also enabled the university's TTI Directorate, and Technology Demonstration Centre, in collaboration with the Metallurgical Engineering Department, to support the foundry industry.

The foundry industry has over time developed a system of innovation capable of driving technology advancements and lean manufacturing, with links to universities, science councils and the industry.

### **Structural transformation**

While specialisation took place, the firms were slow to respond to a growing set of persistent “post-liberalisation” challenges in the early 2000s. Buoyed by the MIDP and the benefits it promised to the industry, these challenges were not addressed at the industry-level with the urgency they required. In 2004, two tiers of firms began to emerge: (1) first tier firms – perhaps led by a more entrepreneurial owner/manager – that embarked on a process of modernisation, improved technological capabilities, and innovative capacity; and (2) second tier firms that were, by and large, failing to meet the challenge posed by a more competitive environment and were responding to it chiefly through a variety of cost minimisation strategies.

“Pockets of excellence” are evident in the foundry industry today yet there are some sub-groupings that are in decline, which is borne out by both the poor export performance of the industry since 2013 and the decline in production since 2003 (see below). Based on interviews with key respondents, it appears that the first tier of foundries has contracted and that the division between the first tier and second tier foundries has blurred.

### *Diversity and complexity*

In 2003, estimated annual foundry production was over half a million tons. Of this, ferrous (iron, steel and stainless steel) production constituted roughly 83% of total production. Non-ferrous production (aluminium, copper, brass and zinc) made up the difference, with aluminium comprising 13% of total production (Table 2).

**Table 2: Estimated Annual Foundry Production (tons)**

	2003		2013		2015/16		% change, 03-13	% change, 03-15	% change, 13-15/16
	Quant.	%	Quant.	%	Quant.	%			
Aluminium	66 000	13%	22 000	6%	24 000	6%	-67%	-64%	9%
Copper-based	15 000	3%	9 100	2%	7 000	2%	-39%	-53%	-23%
Zinc	3 000	1%	900	0%	500	0%	-70%	-83%	-44%
Iron:	295 000	59%	230 500	61%	308 200	72%	-22%	4%	34%
<i>Grey iron</i>	110 000	22%	155 000	41%	145 000	34%	41%	32%	-6%
<i>Ductile iron</i>	100 000	20%	47 000	13%	41 200	10%	-53%	-59%	-12%
<i>Other cast iron</i>	85 000	17%	28 500	8%	122 000	28%	-66%	44%	328%
Steel	123 000	24%	106 000	28%	85 000	20%	-14%	-31%	-20%
Stainless steel	4 000	1%	6 500	2%	5 600	1%	63%	40%	-14%
	<b>506 000</b>	<b>100%</b>	<b>375 000</b>	<b>100%</b>	<b>430 300</b>	<b>100%</b>	<b>-26%</b>	<b>-15%</b>	<b>15%</b>

*Source: SAIF (2015, 2017); own calculations*

In 2015/16, total production had fallen by 15% from over half a million tons in 2003 to close to 430 000 tons. Ferrous production now constitutes over 90% of total production, reflecting

a large decline in non-ferrous production. Between 2003 and 2015/16, aluminium production fell by 64% although production has increased slightly by 9% since 2013.

Within ferrous production, there was an overall increase in iron production of 34% between 2013 and 2015/16. Steel production has fallen by 31%, most precipitously since 2013. The production of “other cast iron” increased significantly from 28,500 tons in 2013 to over 120,000 tons in 2015/16.

Other cast iron over this period increased by over 300%. It should also be noted that the export performance of the industry has fallen consistently since 2013 at a time when production has started to recover (Table 2).

Between 2008 and 2016, there has been a 38% fall in the number of foundries – from 265 in 2007 to 165 in 2016 (Table 3). Despite the high decline in the number of foundries, there has been a decline in output of only 15% over the same time period, which may suggest a consolidation of the sector (NFTN, 2015). Some of the latest foundries to close their doors include foundries that have made significant investments in capital equipment and accreditation such as Steloy Castings. The foundries that closed include Eclipse West Plant, part of the Scaw Metals Group, which had closed in 2010 and resulted in 500 lost jobs. The same year Eclipse East Plant partially closed its plant. Steloy Castings closed down after 30 years of business. This occurred after the company had invested millions in the latest equipment and technology to secure lucrative railway industry contracts for the localisation projects. This included being accredited with the Iris standard, the international rail industry standard. The company accumulated significant debt, including from the IDC, and overcommitted itself and was eventually liquidated.

**Table 3: Industry structure by foundry type**

	2003		2007		2016		% change, 03-07	% change, 07-16
	No.	%	No.	%	No.	%		
Ferrous (iron & steel)	110	41%	110	42%	79	48%	0%	-28%
Non-ferrous sand, gravity, low pressure casters	117	43%	119	45%	56	34%	2%	-53%
High pressure die casters	36	13%	32	12%	26	16%	-11%	-19%
Investment casting	7	3%	4	2%	4	2%	-43%	0%
	<b>270</b>	<b>100%</b>	<b>265</b>	<b>100%</b>	<b>165</b>	<b>100%</b>	<b>-2%</b>	<b>-38%</b>

*Source: SAIF (2015, 2017); own calculations*

Today, roughly half of all foundries in South Africa are exclusively ferrous foundries. The number of non-ferrous sand, gravity and low pressure foundries have declined by 52% since 2003. The number of ferrous foundries and high pressure foundries have both declined by 28% since 2003.

Foundry closures have inevitably resulted in job losses, with direct employment declining by 6 000 between 2003 and 2016, though the decline can be attributed to the spike in closure post 2007. According to the NFTN’s presentation to the Parliamentary Portfolio Committee on Trade & Industry in 2015, 1 080 jobs were lost between 2010 and 2014/15, 850 of which were in 2014/15. Rather than automation through investment in new technology in the industry, the fall in employment is almost certainly a result of the industry’s poor performance and fall in competitiveness, compounded by the impact of the 2008 financial crisis and/or rapidly escalating electricity prices since 2007.

Diversification into new products for different markets may also entail the use of different metals and metal alloys, increasing the risk of contamination and compromising the quality and standard of existing product lines. In short, diversification has become an essential component of the South African foundry's survival strategy, but not necessarily good for the maintenance of production capabilities.

Compared to 2003, the main markets served by the SA foundry industry remain mining (32% in 2017). There are important linkages between the machinery and equipment sector and the upstream and foundry sectors.

#### *Changes in productivity*

Labour productivity in the foundry industry (measured as gross output per worker – i.e., annual production divided by total number of direct employees) increased from approximately 34 tons per worker per year in 2003 to 48 tons per worker per year in 2015. This represents a 42% increase in labour productivity over the period due to a fall in output from just over 500,000 to 430,000 and a decrease in employment from roughly 15,000 to 9,000 workers.

Measuring output as revenue using 2003 prices, productivity changes of 42% increase is much higher than Rankin's (2016) estimate of the increase in labour productivity for fabricated metal products between 2003 and 2010 of only 8%. It is worth noting that an 8% increase in productivity is at the lower end of industry labour productivity increases within the manufacturing sector as estimated by Rankin. For manufacturing as a whole, labour productivity increased 29% between 2003 and 2010.

For the foundry industry, increases in labour productivity are more than likely driven by shifts to foundries with higher labour productivity levels from lower productivity foundries instead of foundry workers themselves actually becoming more productive. Interestingly, the "big four" foundries – Atlantis Foundries, Autocast, Naledi Inhlanganiso Foundry, and the Auto Industrial Group foundries (Auto Industrial Foundry and Isando Foundry) – account for the lion's share of recent investment in the industry, suggesting that productivity increases could partly be due to the adoption of more advanced technology embodied in foundry machinery and equipment by those companies

### **2.2.3 A diversified machinery and equipment Industry**

In the early 2000s, the boom in the South African construction and mining sector led to increased demand for machinery and equipment. Concurrently, the boom in commodity prices increased the demand for mining capital equipment. This resulted in entry and growth of local production facilities, mostly driven by international original equipment manufacturers (OEMs) that established local operations (mainly assembly plants) or distribution centres (Body, 2005).

Machinery and equipment encompasses machines that are used in agriculture, mining, building and construction, processing (agro-processing, chemicals and motor manufacturing) and utilities (such as Eskom and Transnet), split between specialised and general purpose machinery and equipment. Among these sub-groupings, there is scope for machinery to be used across sectors, for example, compacting machines used in mining can also be used in construction, quarries and road construction. In South Africa, the largest segment is mining equipment, which accounts for approximately 80% of the capital equipment markets due to the demand in mining activities.

#### *Firms in the industry*

Of the 25 firms in the metals, machinery and equipment sector listed on the Johannesburg Stock Exchange (JSE), ten are investing holding companies with diversified interests and two are distributors and manufacturing firms that also import some products. Between 2011 and 2016, there has been an increase in consolidation, mainly driven by the prevailing economic conditions that stifled profitability (Bell, et al., 2017). Furthermore, the strict requirements attached to designation have also propelled this consolidation.

Since 2005, there has been anecdotal evidence to show that the specialised machinery and equipment segment is highly concentrated. Due to limitations in data, the high concentration levels can be exemplified by the concentration in the earthmoving equipment sector. Between 2005 and 2008, only five companies controlled close to 95% of the market share in open cast mining services (Table 4).<sup>8</sup>

**Table 4: Opencast mining companies**

2005		2008	
Company	Market share (%)	Company	Market share (%)
Barloworld	40	Barloworld	45
Komatsu	25-30	Komatsu	20
Liebherr	12-15	Hitachi	10
Bell	<10	Liebherr	10
TFM	<10	Terex Africa	10
Others (Volvo, CRM, JLB)	±3	Others	5
Total market share	100	Total market share	100
HHI	2 578	HHI	2 750

Source: (Body, 2005) and (Henderson, 2008)

Following the construction boom in the mid-2000, there was entry of smaller companies in sectors where barriers to entry were low, such as truck bodies. Nonetheless, the high concentration levels have persisted.

Despite the high concentration at the original equipment manufacturer level, there appears to be lower concentration at the component manufacturer level due to the fact that component suppliers manufacture a diverse range of products, to the OEM's specifications. Data for the general purpose machinery and equipment segment recorded in 2008 and 2017 shows that the sector is highly competitive – with low levels of concentration according to Statistics South Africa. The industry is comprised of a large number of small and medium sized firms, with few large firms. This means that the small and medium sized business are able to compete for business in the local market. For example, in 2014 there were approximately 120 pump companies, with the large firms including Grundfos, KSB, Sulzer, Weir Minerals and Watson.

The high concentration of certain segments of the value chain renders it prone to collusive conduct, which has the effect of raising prices and allocating quantity. To date, there are no records of anticompetitive conduct in this sector. The Competition Commission of South Africa recommended that the merger between Humulani Marketing and construction equipment company High Power Equipment (HPE) be approved with conditions. This was recommended on the basis that the companies were present in similar industries for dump

<sup>8</sup> Market concentration ratios in excess of 1 800 according to the Herfindahl-Hirschman Index (HHI), are considered highly concentrated.

trucks, and information exchange occurred via the industry association, CONMESA, and would therefore be conducive for collusive conduct. Nonetheless, the Competition Tribunal of South Africa approved the merger with no conditions citing no potential collusive conduct.

#### *Internationalisation and consolidation*

The industry has also felt the brunt of the declining economy and the high levels of import penetration. Alongside this, has been an increase in consolidation in the industry. For example, in 2014 AVK, a Danish company acquired a majority stake in Premier Valves, a South African company. In January 2016 Atlas Copco, manufacturer and provider of compressors, vacuum solutions and air treatment systems, completed its acquisition of Varisco, an Italian pump manufacturer with a global sales network. Both the specialised and general purpose machinery and equipment industries include importers; with some manufacturers also importing certain products.

International OEMs also located in South Africa are a conduit into the African market, particularly around 2008 when the establishment of new mines in Zambia resulted in increased demand for capital equipment. In the later years, i.e. post-2012, we note an increase in OEMs entering the regional market more purposively following the decline in economic activity in South Africa. This also coincided with increased demand in the global market, following the upswing in commodity prices.

The slow growth of local South Africa companies have been to some extent stifled by the stiff competition local firms face from international firms and distributors, given that local firms account for 1-2% of the global market share. The international companies include New Holland, Bobcat, Terex, Kawasaki, Hyundai, Atlas Copco and Harvester.

The period between 2002 and 2008 posed a great opportunity to develop local capabilities given the construction and mining boom, but this opportunity appears to have been missed. The high tradability of the sector, and the low tariff duties (90% of capital equipment are duty-free) implies that customers can easily import products. The sector is highly exposed to the currency, such that the decision on purchase of capital equipment is sensitive to the valuation of the currency.

#### *Institutional framework and industry support*

The South African Equipment Export Council (SACEEC) houses five clusters in the machinery and equipment industry – The Valves Manufacturers of South Africa (VAMCOSA); South African Mineral Processing Equipment Cluster (SAMPEC); the Solar Water Heating Manufacturers Cluster of South Africa (SWH-MANCOSA); the Capital Equipment Rolling Stock Cluster (CEROST); and the South African Shaft Sinking, Equipment and Services Supply Group (SASSES). Joining these clusters and the export council is open to firms that manufacture capital equipment, provide finance to local companies, design/manage capital projects that incorporate locally manufactured capital equipment, supply member companies and are engaged in exporting, at a fee (Table 5). The South Africa Pumps Cluster also exists, outside of the SACEEC umbrella.

**Table 5: SACEEC and cluster subgrouping joining and subscription fees, exc VAT**

Per annum turnover (R million)	Joining fee (ZAR)	Annual subscription/ Pro rata (ZAR)
<25	4 215	3 600
<50	6 150	5 300
<100	8 430	7 200
>500	11 240	10 600
Clusters	Annual subscriptions/ Pro rata	
SAMPEC Future Expenses Contribution	3 000	
SWH-MANCOSA	3 000	
VAMCOSA	18 000	
SASSES	3 000	
CEROST	To be confirmed	

Source: SACEEC, 2017.

In order to become a member of SACEEC, the joining fees and annual subscriptions are determined by the size of the firm (based on annual turnover), i.e. larger firms pay a higher joining fee compares to small firms. Cluster memberships also attracts separate annual fees, irrespective of the size of the company. While the joining fees and the annual contribution are not prohibitive, there is need to understand the low levels of participation by other firms. For example, SAMPEC only represents 10% of the industry, while VAMCOSA represents 20 manufacturers.

For historical reasons, firms in the capital equipment cluster appear to be highly concentrated in Gauteng, particularly Ekurhuleni (Kaplan, 2011). Most mining activity takes place in Gauteng and the neighbouring provinces – North-West, Limpopo, Free State and Mpumalanga. The geographical proximity of the machinery and equipment grouping is key when designing cluster interventions, which are instrumental in addressing common challenges that firms are facing. Steel manufacturing, a key input, is also located in the Vaal Triangle, which further reinforces the potential spill overs from clustering (Bekker, 2017).

### **Structural transformation**

Machinery and equipment performance over time, is nuanced with some firms building resilience during depressed periods, while others exit the industry. The 2004 study that assessed the performance of the manufacturing sector in Ekurhuleni (and is indicative of the industry overall) highlighted that between 1998 and 1999 the industry reduced activity evidenced by lower value addition, which resulted in significant job losses. This was partly due to high cost of inputs such as steel that were charged at import parity price, despite South Africa being a net exporter. Another reason followed that after liberalisation, import penetration increased posing greater rivalry against local firms. In response to this, some firms improved quality, design and delivery time, while others closed down as they were unable to compete (Phele, et al., 2004). At the macro-economic level, the government's drive to reduce the government deficit and increase interest rates to curb inflation meant that demand for products was low and cost of borrowing for investment was high (Machaka & Roberts, 2006).

Structural transformation at the machinery and equipment level has been nuanced. Specialised machinery and equipment have been more versatile to serve their markets,

while the general machinery and equipment has been adversely impacted by high import penetration.

Mineral processing equipment OEMs have diversified their products and markets in an attempt to increase sales, yet this has been occurring against the backdrop of a steady decline in performance. There is a varied picture depending on the company size and sector-orientation (that is, the mineral a particular company is processing) according to the industry association, SAMPEC. While the large companies are able to tailor mineral processing equipment to the mineral, smaller companies lack this ability. Smaller companies tend to specialise on the processing of one mineral, and are not as agile as large companies.

Unfortunately, there is limited drive for the mineral processing companies to migrate laterally i.e., branching out of mineral processing into other industries such as water treatment. This is mainly because the investment climate is not conducive to take risks, yet this is poses as an opportunity for the industry in terms of looking for new and potentially more profitable opportunities outside the mineral processing industry. Industry representatives also indicated that the low penchant to migrate laterally can also be explained by a reluctance by companies to explore other opportunities.

Among firms that manufacture machinery and equipment for the rail industry, firms have upgraded their manufacturing processes, mainly through investment in machinery, skills, quality controls and new products. Advancements in organisation and management techniques, advances in research and development and product innovation is still on-going, with some more established companies having made more headway in this area (Crompton, et al., 2016).

While data on the product ranges, complexity and sophistication is limited for the overall industry, there is evidence to suggest two points. Firstly, diversification is taking place for certain groupings, with specialisation occurring. Secondly, there are untapped opportunities as well as constraints that are inhibiting further structural transformation in the machinery and equipment sector.

### **2.3 Competition and collusion**

Anticompetitive conduct has been prosecuted at the more concentrated upstream segment, with companies colluding on prices and market allocation. Of note is the ArcelorMittal abuse of dominance case in the 2000s. In August 2016, an agreement was reached with AMSA under which all pending Competition Commission cases were settled. This section outlines the cases in more detail.

#### *The long steel cartel*

The Commission started an investigation in 2008 and charged AMSA, CISCO, Scaw and Cape Gate for price fixing and market allocation of long and flat steel using commercially sensitive information collated by industry association, the South African Iron and Steel Institute (SAISI) and the South African Reinforced Concrete Engineers' Association. These practices took place over a prolonged period with discovered evidence of specific market sharing agreements for major projects including the construction of the Hillside aluminium smelter (1996-1999), Mozal I aluminium smelter (1998-2000), Mozal II (2000-2003) and the

Coega Harbour (2002-2009).<sup>9</sup> Scaw gave evidence and was granted leniency. AMSA admitted to the charges under the 2016 settlement.

It is important to note that the price raising effect of higher collusive structural steel prices is mirrored by collusion in the construction sector which, collectively would have had a substantial cost-raising impact on the economy as a whole.

#### *The scrap metal cartel*

The Commission initiated an investigation in 2009 and in 2013, charged scrap users – AMSA, Highveld, Cape Gate, CISCO and Columbus Stainless Steel – with forming a collusive buyers' cartel to fix the purchase prices of scrap metal between 1998 and 2008 using a standard formula and that the seller scrap merchants colluded with AMSA, Columbus Steel, Cape Gate and Scaw in this regard. AMSA admitted to the charges under the 2016 settlement.

#### *The flat steel cartel*

The Commission initiated an investigation in 2008 and in 2012 charged Highveld and AMSA for price fixing and market allocation between 1999 and 2009 using commercially sensitive sales volume information collated by the South African Iron & Steel Institute industry association. AMSA admitted to the alleged conduct under the 2016 settlement but contested that this contravened the Competition Act.

#### *Wire rod price discrimination*

A complaint by Barnes Fencing Industries<sup>10</sup>, F&G Quality Tubes and Dunrose Trading (57) was investigated in 2003, with the Commission charging AMSA in 2007 for differentiating discounts between low carbon wire rod customers between 2000 and 2003. A further investigation into AMSA continuing this practice between 2004 and 2006 also led to charges being issued in 2012. AMSA admitted to the alleged conduct under the 2016 settlement but contested that this contravened the Competition Act.

#### *Excessive pricing*

Between 2011 and 2016, the Commission was investigating the dti's complaint that AMSA was charging excessive prices for its flat steel products by using an inappropriate reference price basket of high priced steel producing countries between 2009 and 2011, and omitting South Korea, India and China whose operating costs were closer to those of AMSA. AMSA denied this but, in terms of the 2016 settlement, agreed to change its pricing practice.

The overall settlement resulted in AMSA committing to pay a penalty of R1 500m, at R300m per annum over 5 years from 2016.

#### *Agreed remedies*

- Pricing remedy for flat steel products prohibiting AMSA to earn an earnings before interest and tax (EBIT) margin greater than 10% for products sold in South Africa for 12 months, corresponding to AMSA's financial year. Any deviation from the EBIT may not exceed 15% for 3 consecutive months.

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<sup>9</sup> Competition Tribunal (2016) P.9: [http://www.comptrib.co.za/cases/consent-order/retrieve\\_case/2163](http://www.comptrib.co.za/cases/consent-order/retrieve_case/2163)

<sup>10</sup> Barnes Fencing also entered into a joint-venture with Group 5 in 2007, setting up a scrap-based reinforcing bar plant at Spartan, Gauteng [http://www.g5.co.za/bus\\_manufacturing.php](http://www.g5.co.za/bus_manufacturing.php)

- AMSA should invest in capital expenditure of R4.6 billion over five years, subject to affordability and feasibility. The capex plan, and any changes thereto, must be submitted to the Competition Commission.
- The company must continue to offer strategic and export rebates to ensure that the local industry remains competitive, as long as the conditions are in accordance with the Competition Act.
- AMSA's participation in industry association needs to be reviewed to ascertain that commercially sensitive information that may facilitate collusion is not shared.

#### *Initial assessment of the agreement*

The agreement is not dissimilar to the original cap and collar system that protected Sasol's synthetic fuel production facilities during low crude oil prices in the 1980s and 1990s and its implications were fully understood by the then AMSA CEO who stated that investors would "have to value us almost like a utility". The Sasol agreement was not effectively monitored and was undermined by tacit renegotiation between subsequent policy custodians and Sasol.

The agreement is monitored by the ITAC Steel Committee whose membership consists of ITAC Commissioners, AMSA, downstream steel industry associations and the dti invited observer representative (Chief Directorate: Primary Minerals Processing and Construction). The Committee meets quarterly, having first met in June 2016, focusing on government's tariff commitments and monitors AMSA's commitments regarding: (i) jobs, (ii) investment, (iii) pricing basket and (iv) production.

Two quarterly reports have been tabled and according to the dti, ArcelorMittal has complied substantially with the agreement, falling short of the cumulative investment target of R1.4b at R1b. In terms of pricing, AMSA have been aligning prices to the agreed basket since early 2016.

It is reported that the downstream participants are not very happy but they agree that AMSA is complying although there are trust issues.

## **2.4 Conclusions**

The upstream industry is mainly private owned, by foreign based companies. Over the years the leading companies – AMSA, Columbus Steel and Highveld – have shifted their focus to achieve the global companies' objectives of maximising profit and shareholder value, and are not aligned with South Africa's developmental objectives.

In 1990 the main firms in the sector are (were) Iscor/ArcelorMittal, Highveld Steel, Scaw, Columbus Stainless and scrap processors producing long and flat steel products mainly for construction sector. Since then there has been a shift from domestic institutional ownership to foreign ownership, partly arising from conglomerate unbundling and Iscor unbundling with assets being absorbed by TNCs during the post 2000 global steel sector consolidation.

The competitiveness and viability of upstream steel firms have been impeded by the form that conglomerate unbundling has taken whereby the shareholder's focus has been diffused by multiple diverse strategic and corporate restructuring issues such that net result is a fixation on realising short-term profit gains from assets. In Anglo American plc's case, the objective of reducing exposure to the South African economy was a further impediment in that capital expenditure on ageing plant and equipment would have been minimised.

The experience that both Scaw and Highveld Steel were subjected to from 1998 onwards have impeded both firms from realising their potential. Initially, Anglo plc invested in diversifying Scaw globally through acquisition, resulting in London-controlled Scaw becoming one of the global leaders in steel grinding media, but the post-2008 downturn resulted in the shareholder asset-stripping the company before exiting completely. Similarly, Highveld Steel, the third largest global producer of vanadium, was disposed of in 2007 to Russian-owned Evraz plc. After steel and vanadium prices fell after 2008, Evraz, the second largest global producer, initially sold a minority share to a black-owned consortium and subsequently in 2015 put the firm into business rescue. The result of eliminating South African supply has led to rising global vanadium prices and profits for Evraz.

Similarly, Iscor management and institutional shareholders also adopted a short-term profit-maximising approach to maximise the sum of parts of the unbundled Iscor with a disproportionate quantum of balance sheet debt being allocated to the steel company rather than the Kumba Resource mining company. It was only through the intervention of the dti and IDC that Iscor Steel emerged with a low-cost evergreen iron ore supply agreement as well as a manageable level of debt.

But as at 2017, the main structural change is that the ownership and control of the upstream sector is more concentrated than it has ever been by ArcelorMittal, with the likelihood that this could increase further as Highveld and Scaw are dismembered and as the state implements what appear to be very generous support measures for the upstream sector.

Labour productivity of the dominant steel producing firm substantially increased during the 1990s driven by the rationalisation strategies. With the exception of diversification into stainless steel, the upstream sectors have largely reduced the steel product range supplied to the machinery sectors.

As far as the downstream sectors are concerned, there appears to have been a consolidation of the metal cast producers in light of the challenges that companies are facing. While there are some firms that are performing well (i.e. the “big four” foundries) and are well integrated with OEMs, it appears as though foundries are closing down precipitously as a result of local and international pressures.

Productivity in the foundry industry has increased chiefly because employment declined at a faster rate than output. Between 2015 and 2016, overall output declined, though an increase was recorded in the most recent years – aluminium production has suffered the most. Ferrous production seems to be increasing, while non-ferrous production had declined rapidly, indicating a reduction in diversification. This reduction is also noted with the fall in the number and type of foundries.

The companies in the machinery and equipment sector are mainly private owned, with a significant proportion of the companies being multinational companies. There are differing levels of concentration between general and specialised machinery and equipment. The specialised machinery industry is highly concentrated with a few companies commanding significant proportion of market share, different from general machinery and equipment where there are numerous small and medium sized companies. In the machinery and equipment sector, MNCs also use South Africa as a conduit into the rest of the Africa.

The upstream steel sector has been receiving substantial government support to meet stakeholder profit expectations and anti-competitive outcomes have thus far been raised in the basic iron and steel industry. Such behaviour has had the effect of undermining the

performance of the downstream industries. The scrap metal cartel in effect raised prices for foundries, and the excessive prices raised costs for the downstream industries.

As a result, the policy objective of changing the structure of rent allocation in the value chain to pass the benefits of low cost resource-based iron ore inputs and low-cost steel production structures to downstream steel users has not been achieved. The 3 year agreement between AMSA and the Competition Commission attempts to achieve this. Even though it is perhaps too early to assess whether the recent agreement will result in any change in market pricing structure and behaviour, monitoring whether the remedies are being implemented accordingly will be key.

### **3 Analysis of industry performance and trade data**

Now that a detailed description of the value chain has been undertaken, it is important to provide the overview of the value chain's performance. Trade data is analysed, with an aim to identify the sectors/products driving the performance of the value chain.

Since 2003, a substantially larger gap in total dollar-based output has opened up between the upstream sectors and the downstream sectors. While the downstream industry has struggled to transform structurally, the degree of success varies by sector.

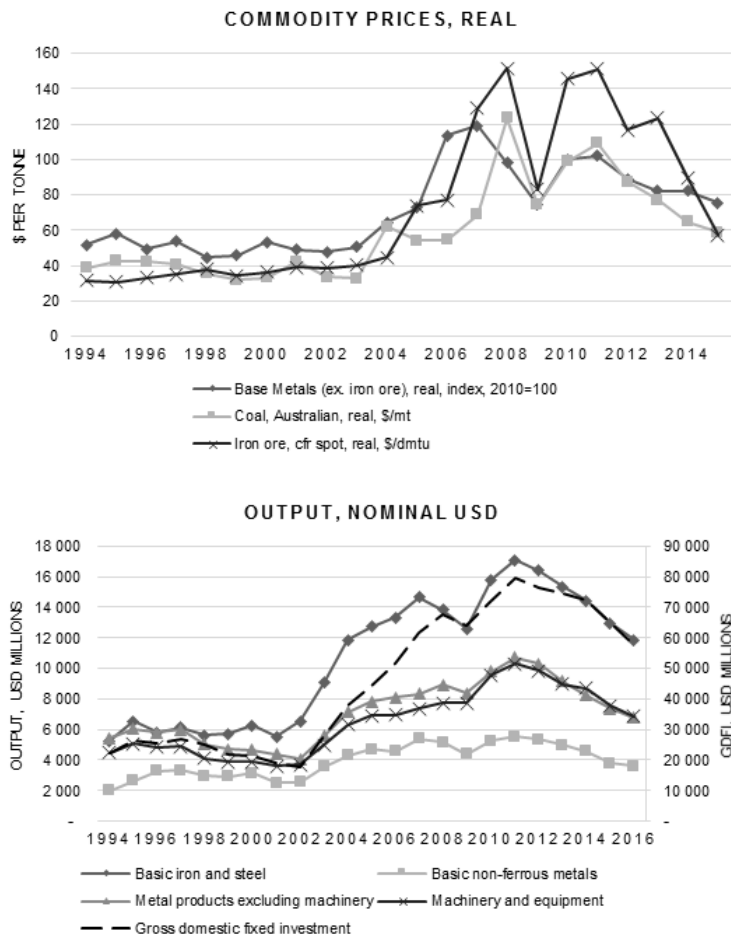
#### **3.1 Industry performance**

The performance of the metals, machinery and equipment value chain responds to and correlates with changes in iron ore and coal commodity prices. An increase in commodity prices results in higher mining output and increased demand for machinery and equipment, particularly mining equipment as mentioned earlier (Fessehaie, 2014 and Figure 3).

Commodity prices dropped between 1998 and 2001 after which they rose sharply, with a commensurate increase in output for basic iron and steel, basic non-ferrous metals, machinery and equipment and metal products. The steep increase in the output for basic iron and steel should be treated with caution as it may be partially as a result of the increase in commodity prices, and not necessarily a growth in output. During 1998-2001, public sector infrastructure expenditure accelerated, further inducing output from all segments of the value chain.

Prices and output rose to peak in 2008, recovering in 2010 but dropping thereafter.

**Figure 4: Commodity prices and output, 1994-2016**



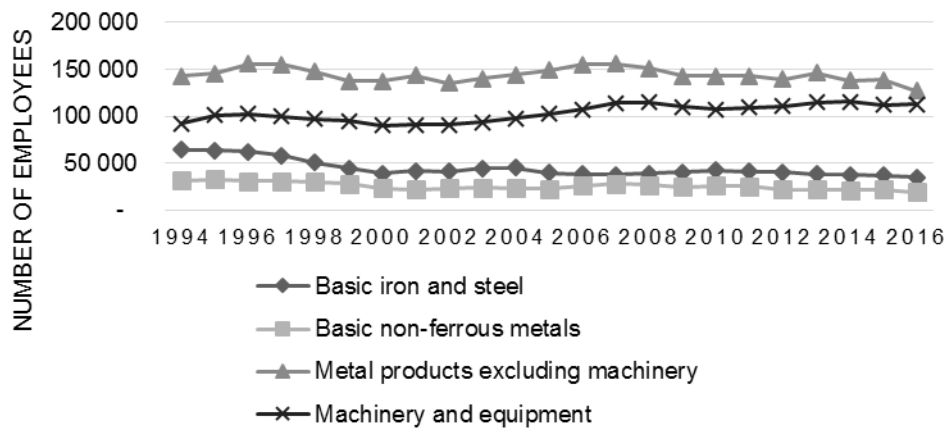
Source: Quantec and World Bank Databank: Commodity Prices

Note: US dollar has been used in the analysis because of the stability of the currency and that commodity prices are global and have a direct impact on output and demand.

Between 1994 and 2001 there were substantial employment losses in the upstream basic iron and steel sub-sector, declining at a compounded annual rate of 2.7% from 64 750 to 35 322 employees (Figure 4). This occurred while output remained stable, only increasing from 2002. This reflects the twin effects of Iscor’s 1990s rationalisation and modernisation of existing plants as well as the huge investment in the modern Saldanha Steel plant, discussed earlier.

Throughout the period 1990 to 2016, the metal products and machinery and equipment sectors have maintained the largest shares of employment, contributing 127 467 and 112 835 respectively out of a total 295 000 in 2016. Furthermore, the machinery and equipment sector has experienced the most positive employment growth during the period under analysis. Post 2008, while the other three sectors declined machinery and equipment grew employment from 110 289 in 2009 to 112 835 in 2016 (Figure 4).

**Figure 5: Number of employees, 1994-2016**



Source: Quantec

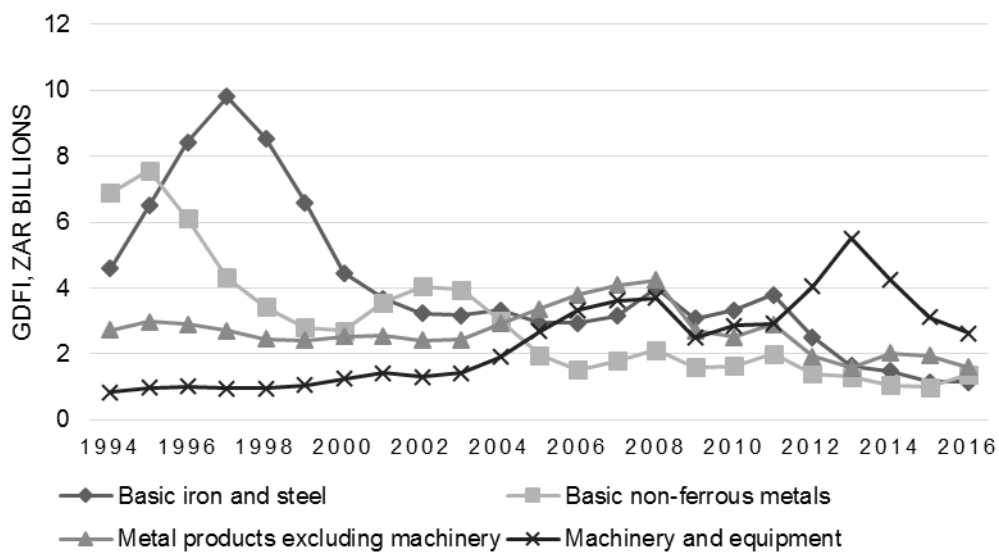
### 3.2 Investment patterns

Significant investments were made in the basic iron and steel sector (Saldanha Steel and Columbus Stainless) in the early 1990s and in the non-ferrous metals sector (Alusaf and Hillside smelters in the early 2000s).

Investment in the aluminium smelters increased sharply from the early 1990s until 1995, on the back of favourable electricity tariffs, peaking at R7.6 billion in 1995. Post-1995 investments declined precipitously, despite the slight increase between 2000 and 2002. Investment in the basic iron and steel sectors has also tapered off (Figure 5).

In the mid- and downstream sectors, investment was stable and on the rise until the 2000s, likely linked to the commodity boom. Machinery and equipment grew between 2010 and 2012, possibly on the back of investments in mining, development of energy and water sectors in SADC, and the dti designation of certain machinery and equipment items. Metal products declined sharply from R4.2 billion in 2008 to R1.6 billion in 2016.

**Figure 6: Gross domestic fixed investment, constant 2010-prices**



Source: Quantec

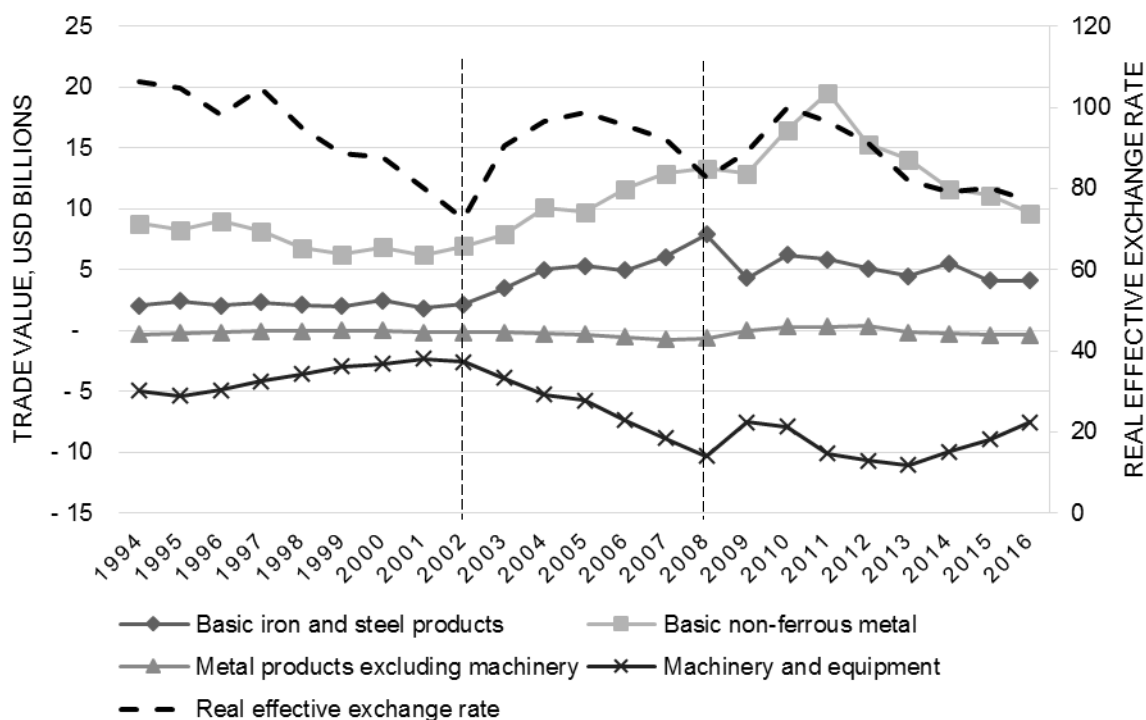
Since 2013, investment in all sub-sectors has declined and this could be attributed to declining commodity prices, weak business confidence and low levels of profitability in the country (National Treasury, 2017) and (Bosiu, et al., 2017).

### 3.3 Trade performance

Trade data is more disaggregated and allows for more detailed assessment of product performance, despite the challenges inherent in trade data (such as the accuracy of product classification and uncaptured illicit trade flows). It should be noted that from 2010 South African trade data was captured separately from Southern African Customs Union (Botswana, Lesotho, Namibia and Swaziland), which would explain the spike in trade movements in 2010.

The increase in commodities price in the early 2000s had inflationary pressures on general prices in South Africa. To avert inflation, the South African Reserve Bank, in line with inflation targeting, increased the interest rates in an attempt to stabilise inflation. Together with the resource earnings, the portfolio inflows resulted in the appreciation of the rand, thus making exports less competitive in terms of Rand prices versus international currencies. The impact of this is less evident in the basic iron and steel and basic non-ferrous products as the increase in commodity prices had a positive impact on the value of exports. However, the machinery and equipment sector was adversely impacted by the currency appreciation, compounded by the fact that a larger proportion of growing local demand from mining and infrastructure was met by imports (Figure 6).

**Figure 7: Trade balances, nominal USD millions**



Source: Trade Map

Basic non-ferrous and basic iron and steel industries have the largest positive trade balance, which accelerated during the commodity boom after 2001. Conversely, the labour absorbing machinery and equipment sector shows an increasing deficit between 2002 and 2008, with the negative balance narrowing since 2013 when the Rand weakened. Between 2002 and 2008, the trade deficit for machinery and equipment went from \$2 billion to \$10 billion, a loss

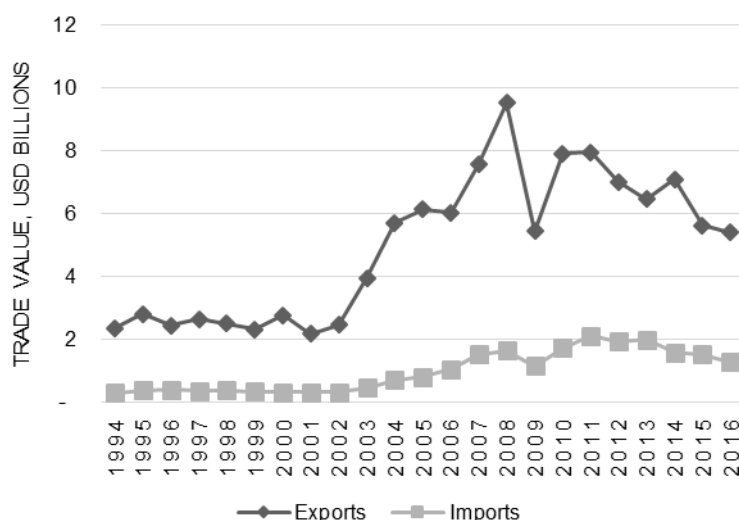
of \$8 billion, which is equivalent to the sectors output in that year, employing close to 100 000. The intermediate metal products sub-sector (which covers a very diverse group of products) has demonstrated an overall relative neutral trade balance throughout the period.

The response of the machinery and equipment sector's trade balance to changes in the exchange rate is influenced by the fact that machinery and equipment is highly traded. Import penetration and export-output ratio were both in excess of 90% in 2016. These ratios are different from basic iron and steel that had an import penetration of 20% and an export-output ratio of 63% in 2016. The low import penetration may be attributed to the protectionist policies in the upstream sector.

### **Basic iron and steel industries**

South Africa is a net exporter of basic iron and steel, with a trade balance in excess of \$2 billion in 1994 growing to \$4.2 billion by 2016 (Figure 7). Most of the iron and steel products (ferro-alloys, flat-rolled products, ferrous waste and scrap and pig iron) are traded in the Asian, European and American markets. Ferro-alloys are mainly exported to China, USA and Korea, flat-rolled products of stainless steel to Malaysia and Italy. Ferrous waste and scrap are exported to India and Pakistan, while pig iron is destined for USA, Netherlands and Italy. Exports to the SADC region consist mainly of flat rolled products of iron or non-alloy steel used in various industries including automotive, mining, construction and capital equipment.

**Figure 8: Iron and steel exports and imports, nominal USD**



Source: Trade Map

### **Basic non-ferrous industries**

Basic non-ferrous products consist of non-iron based metal products such copper, nickel, aluminium and zinc. The main product groupings are copper, nickel and aluminium. South Africa is a net exporter of these products, with both exports and imports declining in the last three years (Table 6). Nickel and articles thereof is an exception with imports growing by 154% over the same time period.

The compounded annual growth rate of exports declined between 2014 and 2016. This may be explained by South Africa losing competitiveness or the decline in demand for non-ferrous metals, and in South Africa's case the former seems true.

**Table 6: Basic non-ferrous exports and imports analysis, nominal USD**

HS code		2016 '000	2014-16 CAGR	Top countries, 2016
Copper & articles thereof	Exports	537 233	3%	China (29%), Korea (19%), Belgium (5%), Netherlands (4%) & India (4%)
	Imports	398 296	-5%	Zambia (21%), DRC (21%), UAE (10%) & Belgium (10%)
Nickel & articles thereof	Exports	300 052	-17%	China (46%), Japan (14%), Italy (7%), USA (7%) & India (6%)
	Imports	192 755	154%	Zimbabwe (80%), Australia (8%) & Brazil (6%)
Aluminium & articles thereof	Exports	1 511 898	-11%	USA (17%), Switzerland (11%), Japan (10%), Thailand (8%) & Turkey (6%)
	Imports	559 603	0%	China (29%), Germany (10%), Brazil (7%) & Mozambique (6%)

Source: Trade Map, own calculations

All of the primary steel producing firms have been export oriented to different degrees since the 1990s. Since 1990, Iscor (now ArcelorMittal) has been the main exporter of primary steel. It formalised its single channel export marketing system through the creation of Macsteel in 1998 and this structure has not changed even after Iscor absorption into ArcelorMittal.

Highveld Steel's primary export has been vanadium, with steel produced as a by-product.

Scrap metal is the other large-scale export. The only structural change since the 1990s has been the consolidation of domestic scrap merchants through which exports are channelled.

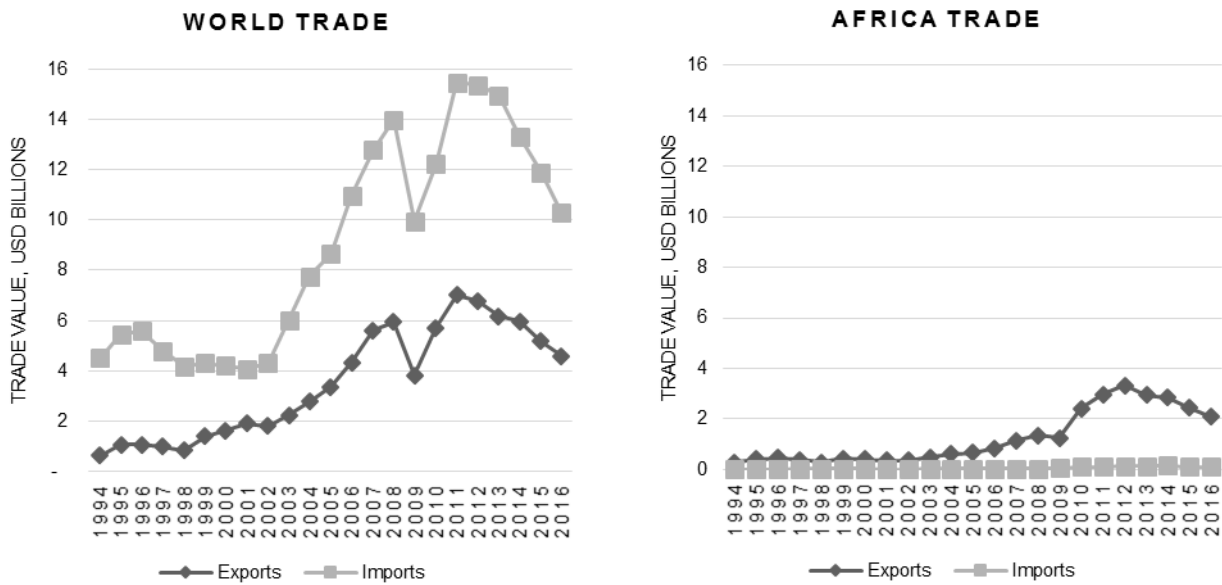
The structural bias of state sector investment in rail and port infrastructure and Transnet's freight pricing structure has historically benefited export bulk commodity freight customers (i.e. minerals iron ore and coal), a bias which has continued since the 1990s. This has acted to increase the cost structure of downstream steel utilising sectors which are more dependent on container freight.

### ***Machinery and equipment***

The machinery and equipment sector is a net importer, but closer look at African trade reveals that South Africa is in fact a net exporter in Africa, with the proportion of trade increasing sharply between 2010 and 2014, following which it has been gradually declining. The SADC market is becoming increasingly important, with Namibia, Zambia, Botswana, Zimbabwe and Mozambique commanding a significant proportion of total exports (Figure 8).

Products with trade surpluses in the world market i.e. internationally competitive include centrifuges; machinery for sorting, screening, separating and so on; parts suitable for use solely or principally with internal combustion piston engine of heading; spark-ignition reciprocating or rotary internal combustion piston engine and machines for cleaning, sorting or grading seed, grain or dried leguminous vegetables; machinery. Though some products have a negative trade balance in the world market, they have positive trade balances in the regional market. The top exports to SADC mainly include machinery and equipment that is used in the mining industry.

**Figure 9: Machinery and equipment exports and imports, nominal USD**



Source:

SARS/Quantec

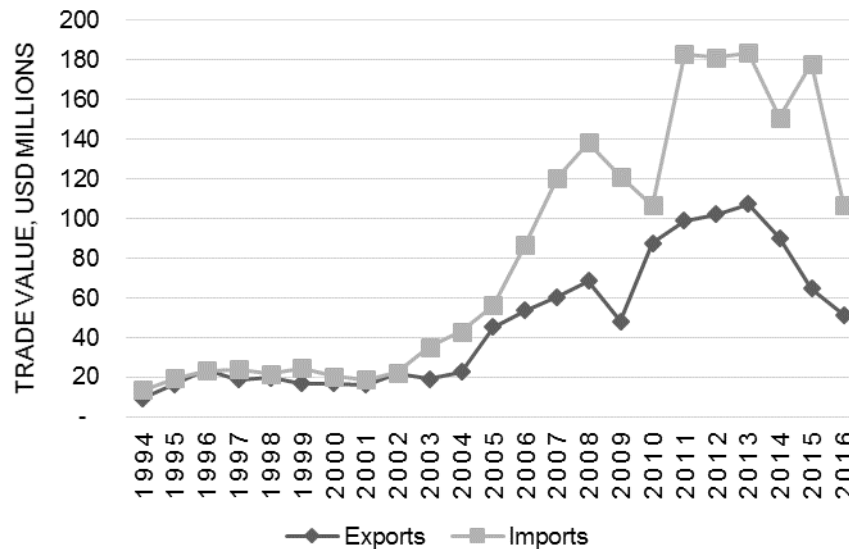
The machinery and equipment trade flows include components, which are also used in the auto sector, especially centrifuges and combustion engines, where catalytic converters fall under. This is evident in just 6% of these exports going to SADC, since exports are mainly to auto OEMs around the world (as a result of industrial policy interventions in the auto sector). The SADC trade performance of the machinery sector appears more remarkable if the auto-related machinery imports and exports were stripped out of the data, highlighting the competitiveness of South Africa’s machinery and equipment sector.

*Metal cast products*

Cast products are indirectly imported into the region through machinery and equipment, therefore their performance of metal cast products is closely linked to that of the local machinery and equipment industry.

For most years between 1994 and 2002, there was a slight trade deficit in castings (i.e., net exports over the period were marginally negative). Since 2002, both imports and exports have increased although imports have generally outpaced exports resulting in a widening trade deficit in castings albeit with some periods of exception (Figure 9).

**Figure 10: Cast products exports and imports, nominal USD**



Source: Quantec

Between 2002 and 2008 demand for cast products increased corresponding to the upswing in global commodity prices and a consequent rise in demand for mineral processing and material handling equipment. Exports reached \$68 million in 2008 after growing from \$22 million in 2002, imports grew from the same base though at a faster rate reaching \$138 million by 2008. These growth rates indicated that there was excess demand for castings in South Africa, and imports were meeting the difference.

In the last four years we notice a decline in both imports and exports of cast products. Between 2013 and 2014 the trade deficit narrowed further – this time the result of a steeper decline in imports compared to exports. The decline in imports and exports in the years 2014-16 are also observed in the trade of machinery and equipment.

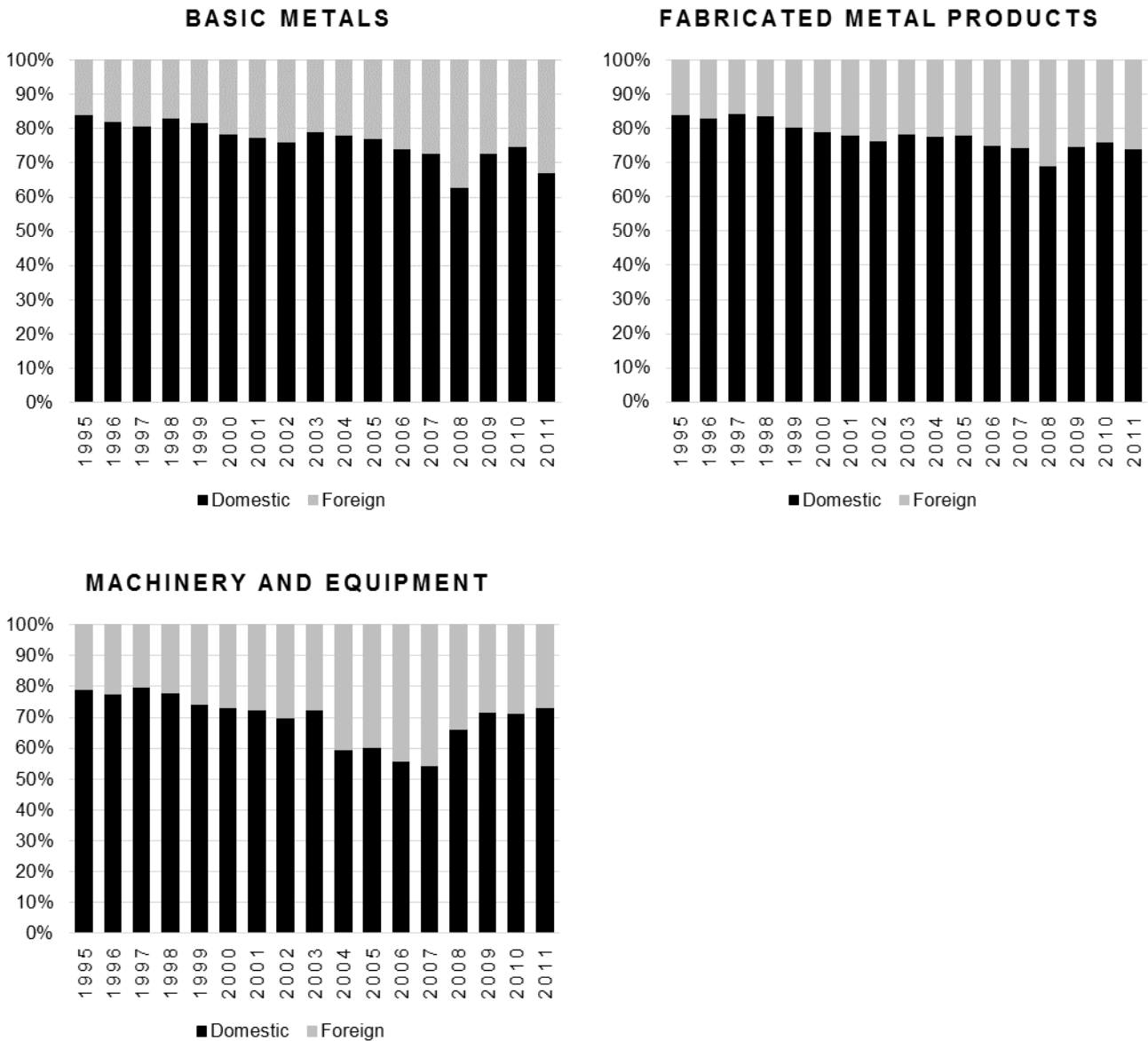
**Integration into global value chains**

While these trade flows represents gross exports and imports, trade in value added shows the value added in exported products, either undertaken in the domestic or foreign market thereby showing the level of integration into the global value chains.

For all three groupings – basic metals (ferrous and non-ferrous metals), fabricated metal products and machinery and equipment – trade in value added has increased over time. The strongest growth occurred between 2002 and 2008 when both domestic and foreign value added were increasing (Figure 10).

For the basic metals, South Africa’s domestic value added content in exports has been declining steadily, from 85% in 1998 to under 70% by 2011. The same decline has been recorded in the fabricated metal products and machinery equipment. Foreign share increased by 16% and 11% in fabricated metal products and machinery and equipment respectively between 1995 and 2011. The growth in foreign share shows an increase of South Africa’s integration into the global value chains and a decrease in local content share.

Figure 11: Trade in value added



Source: OECD

The higher foreign share in trade value in machinery and equipment shows a higher integration than basic metals, reinforcing the high tradeability of the downstream sectors.

### 3.4 Conclusion

All four industries have recorded growth in output over the time period under analysis, with strong correlation with the commodity prices. In other words, during periods where the commodity price cycle was on the rise, a commensurate growth was seen in the output for all for subsectors. Despite the growth in output, there are notable differences in employment trends among the industries.

The investments which took place in the early 1990s for the basic iron and steel industries, resulted in a more capital-intensive upstream industry which consequently shed many jobs. At the same time, the labour intensive metals, machinery and equipment sectors have in fact

grown employment, even during periods when output was depressed. With regards to investment, machinery and equipment is the only sector that appears to have grown investment between 2011 and 2013, which could be attributed to investments in mining, development of energy and water sectors in SADC.

Trade performance of the metals, machinery and equipment value chain has shown to be very closely linked to the exchange rate movements. The appreciation of the rand in the 2000s, during the commodity boom, rendered South African products less competitive than international products. As a result, the highly tradeable fabricated metals, machinery and equipment were exposed to high import penetration. The excess demand in the local industry was thus met by imports, despite the growth in output and exports between 2002 and 2008. Since 2008, the rand has been depreciating, and this has coincided with the improvement of the fabricated metals, machinery and equipment sectors.

The basic iron and steel industries are a net exporter along with the main non-ferrous industries such as copper, nickel and aluminium. The upstream industries export more into Asia, Europe and the USA. Between 2002 and 2008, we also notice the growth of exports in these industries. This growth may be attributed to the rise in commodity prices and not actually an increase in tonnage.

For the fabricated metals, machinery and equipment, there is a growing importance for Africa as a trading partner. The trade balance for both machinery and equipment and metal cast products worsened between 2002 and 2008 during the commodity boom, highlighting significant losses in employment and output growth. Nonetheless, the machinery and equipment sector has remained quite resilient, showing signs of improved trade balance in the last decade or so. The downstream industries are also becoming more integrated into global value chains given their tradeability.

The performance of the downstream industry has been suboptimal despite their contribution to employment. The foundry and machinery and equipment sectors are facing declining demand for their products, as demand is being increasingly met through imports. The decline of the downstream industry and increasing import penetration emphasises the need to address the factors that have hampered the growth and development of the downstream industries.

#### **4 Key issues along the value chain**

Diversification and growth of the value chain has been hampered by a number of factors. The erosion of capabilities, has not only been hampered by generally low demand, but the low levels of investment and poor coordination and implementation of policies in the downstream have also contributed to the sector's declining competitiveness. As will be shown below, the most recent policy intervention – local content designation – has been poorly enforced by the dti thereby limiting the potential gains from such industrial policy interventions. The new mining charter added a level of uncertainty in an already unstable political climate. The changes to the MPRDA have also affected performance.

High input costs (steel and electricity), quality and cost of cast products, high import penetration of components and standard parts and the lack of artisanal and engineering skills have also contributed to poor levels of structural transformation. The volatility and value of the exchange rate and the rise in interest rates, which both affect revenue and level of investment, have adversely affected the industry.

While cluster initiatives are important for addressing common industry constraints, there has been limited government support (despite the existence of the dti's cluster development initiative) and industry has initiated the processes of establishing sub-sector clusters. In a value chain where manufacturers compete on cost, innovation and quality of products, these factors have also adversely impacted the rate of innovation and technology development to enhance productivity (Fessehaie, 2015).

In the next subsections, we look at the key issues along the value chain, and the interlinkages. While there is commonality in factors constraining growth and structural transformation, there are also subsector-specific challenges, which stresses the point that interventions should be cognisant of industry characteristics.

#### **4.1 Demand**

Local firms struggle to achieve economies of scale due to the small size of the domestic market and its distance from major international markets. The small domestic market and South Africa's geographical position relative to the major markets of North America and Europe make economies of scale within the industry very difficult to achieve. For example, the recent PRASA contract awarded to Gibela to build 600 passenger trains over the next 10 years equates to only 360 coaches per year, which by most standards is a low-volume order. That said, scale can be overcome in various ways, of which exports are one option.

An obvious consequence of the decline in demand is loss in competitiveness, as it becomes more difficult to keep costs low and manufacture good quality products.

##### **4.1.1 State not supporting the local industry**

Local content policy has in many countries been used as an industrial policy instrument, with the objectives of achieving local industrial development, socio-economic transformation and the empowerment of small business enterprises, cooperatives, and rural and township enterprises.

The dti has consistently sought to leverage state procurement as an instrument of industrial policy through the National Industrial Participation Program (NIPP) in the 1990s to the more direct designation of certain products in the recent period. The NIPP instrument was blunted by the Public Enterprises Department around 2006 when it adopted the Competitive Supplier Development Program (CSDP) which, according to recent analyses, has not been very effective. The Preferential Procurement Policy Framework Act (PPPFA) allows the dti to designate a minimum local content threshold for products that can be manufactured locally. The PPPFA Regulation works in tandem with the CSDP, for products that are designated.

Section 8 (i.e. local production and content) of the Preferential Procurement Policy Framework Act (PPPFA) Regulations 2017 allows the dti, in consultation with the National Treasury, to designate sectors and stipulate the minimum local content threshold in accordance. A significant number of the products that have been designated thus far are in the fabricated metal products and machinery and equipment, excluding electrical machinery and equipment, sectors (Table 9).

The previous PPPFA was fraught with various loopholes, which the PPPFA Regulations 2017 attempts to address. Clause 14 (previously clause 13) now allows the disqualification of contractors that submit fraudulent B-BBEE status, fails to deliver on the contract, submits false information regarding local production, or any other matter regulated in the 2017 PPPFA. In this case the procuring entity can disqualify the tenderer, terminate the contract in full or partially, or claim for damages. The National Treasury upon review of rebuttal

submissions can blacklist a tenderer for not more than 10 years and publish this information on its official website's list of restricted suppliers.

The prequalification criteria allows the procuring entity to support tenderers in line with the transformation policy. This would include suppliers with minimum B-BBEE status levels, exempt micro-enterprises ("EMEs") or qualifying small enterprises ("QSEs"), and/or tenderers that will sub-contract at least 30% of the contract value to EMEs or QSEs with at least 51% ownership by black people, including those with disabilities and those living in rural or underdeveloped areas or townships, black youth, black women, black military veterans or co-operatives owned by black people. The prequalification must be included in the tender documents by the procuring entity. This provision implies that a procuring authority can set aside contracts for tenderers that meet its specified pre-qualification criteria, which was not allowed in the 2011 regulations.

For contracts, exceeding R30 million the procuring entity may also insert a requirement for the supplier to subcontract 30% of the tender to suppliers meeting similar statuses as the ones for the prequalification criteria. The subcontracting should be in consent with the organ of state and the suppliers have to be registered on the National Treasury supplier database.

The 2011 regulations allowed the cancellation of orders if (i) the circumstances have changed and there is no longer need for the goods, services or works requested; (ii) funds are not adequate to cover the total cost and/or (iii) none of the tenders were acceptable. The PPPFA Regulations 2017 added a fourth clause, which permits the tender to be cancelled if there is material irregularity in the tender process.

There are close to 700 state owned enterprises in South Africa, ranging from companies to constitutional organisations. Among the companies are 140 SOCs that utilise the same products, such as valves that are utilised in electricity, water and petroleum (Crompton, et al., 2016). Currently, there appears to be little, if any, support from the state-owned companies (SOCs) and municipalities with regards to leveraging public procurement to build local capabilities, despite the Competitive Supplier Development Plan and the NIPP. The local spend by SOCs plays a pivotal role in building local capabilities. While SOCs do have contracts with local firms, poor levels of institutional coordination have not consolidated procurement so that scale economies can be achieved (Crompton, et al., 2016).

In order to understand the implementation of the designation programme, this section will make reference, where necessary, to valves products and actuators, due to its key backward linkage with the foundry industry.

### ***(Mis)Calculating the minimum local content threshold***

Valves and actuators were designated in 2014 at a minimum threshold level of 70% by the dti and the instruction note (now called circulars) lists the different types of valves and actuators designated. When a government entity procures, the minimum local content threshold of 70% should be stipulated on the bidding documents. The local content formula is:

$$\text{Local Content} = \left(1 - \frac{x}{y}\right) \times 100, \text{ where: } x = \text{imported content (by value)} \text{ and } y = \text{tender price.}$$

Imported content refers to any parts or materials that were procured outside South Africa, regardless of the products stage on the value chain. Transportation and duty related costs are also included in the import content calculation. The remaining content is considered to be local content. This encompasses products that were locally manufactured or assembled

and services provided locally. Simply put, local content is calculated as the selling price less the imported content value (customs declaration value). The procuring entity should award the tender based on the supplier committing to meeting the designation i.e. the minimum local content requirements.

The initial instruction note for valves and actuators in 2014 instruction note was ambiguous and not explicit on how to achieve local content, and this created inconsistencies in how bidders (mainly importers) calculated local content. According to the SABS classification, local manufacturing also encompassed assembly and packaging. As a result, this created an incentive to import valves, assemble, or package locally, and inflate the tender price to achieve the requisite minimum local content, despite the little local value addition.

Under such circumstances the valves industry alluded to the fact that some importers submit fraudulent bid documents to win tenders. After submitting false information, the company then imports the valves required and supply the OEM, after having added a mark-up. The valves industry engaged with the dti to revise the instruction note to include the use of locally sourced materials and elaborating that value addition encompasses local drilling, machining, coating, assembly and testing.

The following additions were made to the instruction note in 2016 in an attempt to tighten the designation requirements:

- *The minimum 70% local content in the case of each individual valve, manual actuator and pneumatic actuator designed must be made of the following:*
  - *A combination of the use of locally produced and certified castings, forgings and/or fabrications and;*
  - *Verifiable manufacturing activities that shall include as a minimum machining, drilling, coating, assembling and testing of the valves in question.*
- *The averaging out of local content either across any number of valve manual actuator and pneumatic actuator combinations, or locally made and imported valves/other items is not allowed.*
- *Each individual valve, manual actuator (gearbox) or pneumatic actuator id subject to a minimum local content threshold of 70%.*

### **Exemptions**

The industry noted that since designation of valves in 2014, a significant value of the tenders have been awarded to distributors as opposed to manufacturers as per the PPPFA. For example, one company noted that out of the tenders it could bid for, the company has lost R80 million worth of valves. According to one key respondent, Eskom annually purchases butterfly and check valves worth R15 million, however none of this is procured from local manufacturers. Even though the general consensus is that valves in South Africa are of better quality, the procurement officers would rather base their decision making on price and quality. This is made possible through exemptions – section 4.1.2 in the 2017 revised PPPFA states that exemption can be granted from minimum local content thresholds for various reasons.

Exemptions may be granted on the basis that: (i) it is not economically viable to manufacture the product locally given the required volumes; (ii) there is insufficient capacity in the industry at the time of procurement to deliver the product; (iii) for technical specification or (iv) tight delivery schedules. Evidence appears to suggest that SOCs have repeatedly been granted exemptions, approved by the dti, on these bases. For example, Eskom's exemptions have

commonly been approved by the dti on the basis of lead time. Transnet has also received exemptions on the back of technical specifications. While lack of capacity and technical specifications are “plausible” reasons to be granted exemptions, time-based exemptions should not be granted since SOCs have budget plans and should be able to anticipate demand. Limiting time-based exemptions for one will allow SOCs to plan such that the industry will have enough lead time.

Granting exemptions on specifications has been identified as a contentious issue. Interviews with the industry indicated that SOC procurement officers continuously purchase from the suppliers they have a relationship with as opposed to considering local manufacturers. SOCs have put forward technical arguments or quasi-technical arguments to rationalise importing. For example, the engineering department can say that it has designed its system around a particular (imported) valve, such that it would be costly to switch the valve as this may affect the operating system. Furthermore, in terms of repair and services, the procuring entity will also import parts and services from a specific OEM further disadvantaging the local industry. The local industry has tried without success to engage with municipalities and SOCs to design similar products and replace imports.

### **Verification**

In 2012, the dti nominated The South African Bureau of Standards (SABS) as the verification agency, which was approved by the National Treasury. Presentations by the SABS indicated that in July 2013, the local content verification office was established and capacitated following which the first verification certificate was issued in November 2014 (SABS, 2016). The verification process is an intricate 14-stage process that requires access to adequate resources (Figure 11).

At the moment, interviews seem to suggest that SABS is outsourcing verification to financial auditors at an exorbitant fee. Verification is conducted on a case-by-case basis and it is unclear who pays for the verification, as this process is not funded by the fiscus and the PPPFA is silent on who pays for the verification. This is evidenced in the 1 064 locomotive procurement by Transnet, where it is not clear whether SABS or Transnet (or OEMs) should pay for the verification of the R50 billion procurement, and as a result, no verification had been conducted to the end of 2016 (Crompton, et al., 2016).

According to VAMCOSA, in addition to the ambiguity with regards to who pays for local content, it appears as though SABS is not well-equipped to manage the verification flow. Once the public entity awards the tender and the scope of work is submitted to SABS, SABS tends to struggle to provide a quotation before the tender deadline. In some cases, the cost of verification is more than the value of the order (e.g. of order value of R300 000, SABS would quote R500 000 for verification, a cost that the supplier has to borne).

The delay in verification may be attributed to the fact that according to legislation, SABS is supposed to verify every order. In the event that 160 state-owned companies are placing thousands of orders for valves every year valued from a few thousand rand to millions of rand, SABS is meant to audit each one.

What is apparent is that when drafting policies of this nature, there needs to be buy-in from procurement officers and procurement managers at SOCs, municipalities and any other relevant government entity. Furthermore, while it is difficult for suppliers to support localisation requirements and remain competitive, the companies that support localisation

programmes and manage to meet the targets and remain competitive are not getting the support that they should from government and state-owned entities,

**Figure 12: Local content verification process flow**



Source: SABS, 2016

#### 4.1.2 Procurement Accord

In 2011, government, organised business and labour as well as community representatives signed a Local Procurement Accord aimed at creating 5 million new jobs by 2020. Government committed to leverage public procurement, establish standards for measurement and verification of local content and accelerate infrastructure investment. Business through Business Leadership South Africa (BLSA) committed to progressively increase the levels of local procurement by its 84 members by establishing a baseline, developing strategies and targets and reporting on annual basis. Subsequently, the BLSA commissioned a study which delivered two reports in 2012. However, it does not appear that BLSA took the process any further than disseminating the reports to their members.

#### 4.1.3 Auto and mining OEMs providing limited support to foundries

Based on interviews with key respondents, OEMs have persistently failed to support the local foundry industry. To put it another way, it appears that OEMs in the automotive and capital equipment sectors are “decoupling” from the local supplier base to such an extent that a 2016 report on the South African automotive sector from a foundry perspective makes the following observation: “*without re-establishing the supply of automotive castings to the OEMs as part of their global sourcing strategy, the foundry industry will continue on its downward spiral*” (AFSA, SAIF and MCTS, 2016).

The majority of South African foundries are Tier 4 suppliers to the OEMs. As such, the linkages between the foundries and the OEMs are typically very weak. Some supplier development is occurring in the automotive industry level but it is limited to a very small group of top tier auto foundries that have built strong relationships with Tier 2 suppliers supplying the OEMs. Historically, the vast majority of OEMs have limited their supplier development to Tier 2 firms. As competitive pressures have intensified and the difference in

the quality of more “commodified” castings between South African foundries and their international competitors has narrowed, the premium OEMs are willing to pay for locally produced castings has been compressed.

The issue is complex and one cannot simply blame the OEM for the current predicament. OEMs deal with those suppliers closest to them in the value chain and, by and large, develop them to supply a particular component of an integrated system. In the case of foundries, the casting is often just one component (or sub-component) of the subsystem. OEMs may appreciate the significance of the casting but they will assume that foundries are fully familiar with the standards and specifications the OEMs require of the component and of the system or subsystem of which it is a part of.

The issue is complicated by a reluctance on the part of local OEMs to divulge technical specification and standards. Confidentiality agreements are in place for good reason but it leads to a situation in which the foundry industry is increasingly unaware of the latest standards and specifications. In addition, many of the subsystems are imported and therefore contain imported castings, which represents a lost opportunity for the local foundry industry to manufacture the components themselves. As it becomes easier to import the entire subsystem, South African foundries will become “locked out” of the supply chain and risk falling further behind their global competitors.

The problem described above is compounded by designation policy. Put another way, the low order volume experienced by the foundry industry is also a consequence of the procurement practices of state-owned companies (SOCs) and municipalities that often wilfully disregard government’s own local content policy.

Beyond protecting industry and making it more difficult (costly) to import castings that can be produced locally, there is a clear need for industry, government and academia to work together to build the technical competencies required to understand the latest standards and specifications in each area of production (rail, auto, mining, etc.) in which local casting capabilities still exist. In this respect, the role of the CSIR and the universities in understanding the international standards and the application engineering required to convert those standards into a product that meets OEM specifications is absolutely critical. The vast majority of foundries neither have the time nor money to invest in this process.

#### **4.1.4 Exporting markets**

Increasing the overall level of demand through exports has been a cornerstone of industrial and trade policy since the early 1990s.

However, post-apartheid policy makers moved for the early termination of the wasteful General Export Incentive Scheme (GEIS) and for its replacement with a range of supply-side support programmes for firms, including human resource development and investment support for technology upgrading. Terminating GEIS was a stated policy objective because analysis revealed it to be poorly targeted, benefiting mainly upstream firms and sectors that would have exported even without the incentive. Contractual obligations and aggressive opposition from beneficiary sectors delayed the termination. GEIS ran from 1992 until its premature termination in 1997 and had absorbed a total of R21 billion, of which Iscor received R875m.

Exports were subsequently promoted by the Export Marketing and Investment Assistance (EMIA) programme and by the Credit Guarantee Insurance Corporation. Additional instruments were also implemented such as the Export Marketing and Investment

Assistance (dti); Capital Projects Feasibility Programme (dti); Sector Specific Assistance Scheme; The Industrial Development Corporation (IDC); The Export Credit Insurance Corporation; Credit Guarantee Insurance Corporation; Customs and Excise duty refunds; VAT Export Incentive Scheme (SARS). A significant number of the exporting capital equipment firms are using the Export Credit Insurance Corporation (ECIC).

Exports were also indirectly promoted by reshaping of post-1994 trade policy. The main components of this over the period under review included the renegotiation of the SACU agreement, the evolution of the SADC trade agreement, the negotiation of the EU Free Trade Agreement, the Mercosur agreement, the engagement with the USA on AGOA and, more recently, the engagements with China on trade issues.

### *Export finance*

One of the main requirements to be able to compete in the export market is access to export finance. Local OEMs continue to emphasise the importance of export finance and the terms thereof as historical data shows that South African firms are offered less favourable finance terms than other international companies, where export-import banks are present. The need for an export-import bank was stressed by the industry (refer to Box 2). The ECIC is a state-owned export credit agency that provides risk insurance against political and commercial risk, and falls short of exporting companies' requirements.

Different from political and commercial risk insurance, an export-import bank (Exim Bank) has a more dynamic role of supporting and facilitating trade. For example, The Export–Import Bank of India, established by the government offers different financial solutions such as buyer's credit, pre- and post-shipment credit and investment finance (including working capital, equity investment and company acquisitions) (Government of India, 2017). The Export–Import Bank of China, owned and funded by the government, supports China's trade, investment and international cooperation. The Chinese Exim Bank also offers similar products to those offered by the Indian one, and acknowledges the key role of export finance in facilitating export finance (Government of China, 2017).

Lack of export finance is most likely to impact new entrants into the export market, who do not have access to alternative forms of finance, when payment of orders is delayed. In these current conditions where the local market is suppressed and firms are looking onto the region, access to export finance is crucial. Furthermore, access to finance also increases incentives for companies to increase technology related investments and adopt and adapt technology to meet the needs of a specific location (Kaplan, 2011).

### **Box 2: Bell Equipment**

Bell equipment (Bell) is a South Africa owned company in the transport equipment sector, specialising in the manufacture of dump trucks, graders and loaders, and operating in 60 countries. The company has a staff complement of 3 400 employees and annual turnover of approximately \$7 billion, of which 60% of the sales are in fact exports. Over the past ten years, the rise in the company's annual turnover has been coupled with an increase in their staff complement – from 1 800 to 3 400.

Bell undertakes product development, manufacturing and assembly as well as aftermarket sales and repairs and maintenance locally. Even though the company has locations abroad, 75% of their products are manufactured locally. Approximately R200 million per annum is spent on research and development and engineering services on new product developments. Bell also undertakes in-house training and development. All three – investment, local manufacture and skills development – assist towards structural transformation.

The main inputs, excluding labour and value addition (which ranges between 18-24% depending on the product), in the manufacture of an articulated dump truck (ADT) are tyres, engines, drivetrain components, hydraulics, fabricated steel products and composite fibre products. Over time, it appears as though the capabilities to manufacture some of these components locally are eroding. Bell previously engaged with ArcelorMittal to manufacture a certain steel grade, but this was not achieved – the quality requirements were not met. As a result, Bell imports steel from Sweden, Germany and Belgium, at a 12% tariff duty. In addition to the 12% tariff duty on steel, Bell also incurs a 15% non-recoverable duty on imports of tyres, even though there are no capabilities to manufacture the tyres locally.

Bell's competitor's – for example, Komatsu, Caterpillar, Volvo and Hitachi – that import ADTs into South Africa are not faced with any tariff duties since there is zero-duty on built up machines. Subsequently, these companies are able to manufacture abroad and import built up machines into the country at a lower cost than Bell Equipment, despite low local value addition. This implies that before Bell has even started to manufacture, a proportion of their raw materials (steel and tyres) are relatively 27% more expensive than their competitors in South Africa.

Bell's competitive advantage is further undermined in the region (Namibia, Swaziland, Zimbabwe, Zambia and DRC), where unlike other earth moving manufacturer, Bell does not have access to export-import finance. Currently, South Africa does not have an export-import bank. The best alternative locally is the Export Credit Insurance Corporation (ECIC), which does not offer similar financial terms as those offered by other export-import banks. In the last ten years, Bell has applied for two ECIC solutions, however, not only were the process and the terms were not favourable, it took approximately 18 months to conclude the deal, whereas in Europe equivalent solutions can be processed within three weeks. Despite Bell's efforts to engage government to access some form of rebate or incentive, response has been slow and limited.

Consequently, Bell has decided to relocate one of their assembling plant of light duty range of truck from Richards Bay to Germany, where it is easier and cheaper to source steel. For South Africa, this indicates loss in value addition, investment, employment and revenue. Despite this, Bell will expand the remaining business in Richards Bay to manufacture a light duty range of trucks for construction and mining.

#### **4.1.5 Import penetration**

A major structural change has been to increase the imported share of steel inputs into downstream industries. This is partly linked to the Iscor's 1990s reduction of production

grades, coupled with ArcelorMittal's further rationalising the way it served the domestic market, by balancing African production with imports from other plants in order to maximise profits. As a result, the rationalisation had a negative impact on the downstream's competitiveness given the protection on the industry (refer to the Bell Equipment Box 2).

At the downstream level, import penetration occurred via local companies (both manufacturers and distributors) that are increasingly importing standard products and components. This is also occurring at the high-end level, where companies are importing special machinery and equipment. A case in point would be the high import penetration that is occurring in pumps and valves and rail rolling stock industries, despite the localisation strategies discussed earlier.

If private companies are importing more of certain products and components, it effectively means that demand for local cast components is declining and substantial benefits to be gained from the manufacturing benefits (value addition, employment creation, etc.) are foregone.

The valves industry has experienced a surge of imports (mainly from India and China) due to the high price of South African valves. The tariff codes under section 84.81 lists the different types of valves and the duty they would attract if imported as well as the rate of duty by region. Since there is an influx of imports from China, these would be under the general region tariff code. Under the general region, the average duty for valves is 15%, which means should a company or individual import a pressure-reducing valve, check valve, safety or relief valve or ball valves, this would attract a duty of 15%. However, there are duty lines called "other" (8484.10.90, 8481.40.90, 8481.80.90 and 8481.90.90) where imports from the general region would not attract a duty, and this is where the challenge arises.

What the industry has reported to be occurring is that because the South African Revenue Services (SARS) officials are not well versed with the different types of valves, often importers will misclassify a valve and import it under other. Due to the scale of production in India and China, the production of valves is cheaper, such that if an individual is able to import under other this may imply that an already cheaper butterfly valve will land in South Africa 15% cheaper than it ought to be. To address this, VAMCOSA is working with SARS and will be training officials on how to differentiate between different types of valves and linking them with HS code, from November 2017. VAMCOSA is also offering their services to SARS in instances where the officials are not sure if the type of valve is designated or not (refer to next section for the list of designated valves).

#### **4.1.6 Conclusions**

While procurement policies are aimed at driving localisation, poor implementation and weak monitoring and evaluation processes have resulted in local firms losing orders, requisite for achieving economies of scale. This is partly attributed to the lack of support from state owned companies and municipalities – the largest procurers and demand drivers. Evidence shows that government entities are employing different tactics to avoid procuring locally (through exemptions), and are resorting to imports. The weak implementation of the policy is exacerbated by the fact that the appointed verification agency does not have funds to undertake verification. Loopholes in the calculation of local content have also undermined the intended consequences of local procurement. However, there seems to be drive at the dti to improve the implementation of the policy.

Machinery and equipment companies are importing standard components and parts as well as cast components. This has the effect of worsening the competitiveness of the downstream industries, on the back of poorly implemented policies.

In an attempt to increase production machinery and equipment firms are exploring the export markets. SADC is the main region firms are targeting, but even here South African companies are losing market share due to decline in competitiveness, and lack of access to export finance. Export-finance is vital for supporting and facilitating trade, especially when competing with other foreign companies that have access to this facility. In contrast, the upstream industry is already export-oriented and has been privy to incentives (GEIS until 1997 and trade negotiations) that assisted in the penetration of export markets.

The upstream industry has faced increased importation of steel grades which they are currently not manufacturing, and therefore has little, if any impact on their competitiveness. The downstream industry on the other hand has faced high levels of import penetration.

The impact of low order volumes is also evident in the machinery and equipment sector, where there is high import penetration of components and standard parts. Local procurement, particularly public procurement is not stimulating demand in the local industry thereby undermining the competitiveness of local manufacturers. There are companies that have capabilities among certain products and are advocating for the designation of these products. Designation is dependent on the level of local capabilities.

## **4.2 Input costs**

Energy costs are more pronounced in industries that are energy-intensive. Raw material pricing is also important as this, along with labour costs can constitute a large proportion of a product's manufacturing cost. These will be discussed in this section.

### **4.2.1 High and disproportional energy costs**

Arising from excess generation capacity, South Africa enjoyed competitively priced electricity between 1990 and 2006 after which electricity prices have been rising rapidly. Although still relatively low in global terms, electricity-intensive manufacturing sectors including steel smelters and foundries have been adversely impacted with many unable to adjust to the changing cost structure. Over the next decade the supply structure will inevitably shift from low cost electricity from amortised generation plant to higher cost reflective tariffs from new generation capacity.

A further impediment relates to the structure of electricity distribution and pricing to end users with both Eskom and municipalities supplying industrial customers. There is a structural bias in cost and supply structure of electricity between high voltage customers (upstream steel sector - supplied directly by Eskom) and low voltage customers (mainly downstream users - supplied by municipalities).

Municipal customers are disadvantaged firstly because municipal electricity prices are not set on the basis of cost of supply but are used as a source of revenue intertwined with the system of local government financing. Secondly, structural underinvestment in electricity distribution infrastructure (approximately R80b in 2017), largely in the municipalities, has resulted in increasingly unreliable electricity supply mainly to downstream sectors.

The foundry industry is used to illustrate the impact of different cost structures on the competitiveness of firms. Foundries facing higher energy costs will either pass the cost down to customers or will internally absorb the cost, which are choices the firms can ill afford.

Should the cost be passed down to the customer, this will have a direct impact on the competitiveness of the machinery and equipment sector, which are already subject to the electricity price differentials. The foundry industry is a relatively high energy user, with energy costs constituting up to 25% of the total costs of operating a foundry, since furnaces are typically electric (Herbest, 2012). This is particularly the case for ferrous foundries because iron and steel have higher melting points than non-ferrous metals. Foundries normally experience a spike in energy costs in the winter months but not in the consumption; most often consumption drops slightly as foundries attempt to mitigate the higher winter tariffs.

The vast majority of foundries (over 80% according to a recent CSIR survey) obtain their electricity from municipalities. The remaining foundries obtain their electricity directly from Eskom. Numerous key respondents noted that foundries that obtained their electricity from their municipality were paying significantly more than foundries that received their electricity directly from Eskom. There are also variations in the cost of electricity between municipalities. It should also be noted that there is no regulatory framework in place to enable high-energy users to switch from a municipal supplier to Eskom.

Regardless of the supplier, the cost of electricity is essentially determined by an energy consumption charge based on kilowatt hours (kWh) and a demand charge based on kilovolt amps (kVA). The maximum kVA drawn in any half hour interval during a specific period of time is your maximum demand (kVa) for that period. Before the onset of the Eskom energy crisis in 2008, the main determinant of the cost of electricity was the energy charge. Since 2008, however, municipalities have increased their maximum demand charges significantly (and well above the rate of inflation) as a key feature of their demand response programmes.

Different municipalities calculate the demand charge differently. In the case of Ekurhuleni, in which over half of all foundries in South Africa are located, the demand charge for a given month is determined by the maximum demand for that month (i.e., the highest kVA drawn that month) as well as the maximum demand for the previous 12 months. In contrast, Eskom's demand charge is based on the maximum demand for the month in question and installed capacity (regardless of whether it is used). The relevant tariff structures for foundries located in Eskom and Ekurhuleni are presented in Annexure 5: Table 13.

The Ekurhuleni municipally utilises time-of-use tariff structures applicable to consumption to shift load. The peak period rate is significantly higher than the standard and off peak rate, and in the winter months the difference is even more significant: for example, for a small foundry, the peak consumption rate is R1.3801/kWh in the summer months and R3.7108/kWh in the winter months (an increase of 168%).

The Eskom NIGHTSAVE tariff utilises a time-of-use tariff structure on maximum demand, with a zero charge during the off peak periods, and a seasonal charge in the peak periods. It is specifically designed to shift energy consumption to the nightshift period. The combined maximum demand rates are R70.33/MVA in summer months, compared to a significantly increased rate of R244.48/MVA in winter months (an increase of 248%). These differences between summer and winter rates, and the fact that annual increases occur in July, in the middle of the winter period, contribute enormously to the annual cost of electricity and add materially to the competitive pressures.

Foundry Concepts, a private consulting company focusing on improving the competitiveness of the foundry industry, with assistance from the University of Johannesburg's Process, Energy and Environment Technology Station, supported this study in calculating the total

electricity costs per kilogram sold for a hypothetical medium-to-large sized foundry for a given energy consumption for both the Ekurhuleni Tariff D and the Eskom NIGHTSAVE tariff. The same exercise was repeated for a hypothetical small-sized foundry (Annexure 5: Table 14).

Based on Foundry Concept's model (Table 7), the difference in base case electricity costs per kilogram sold for a hypothetical medium to large-sized foundry supplied by Eskom and the same foundry supplied by Ekurhuleni is 29% (column F in the table comparing Eskom and Ekurhuleni Night Save below), or roughly 4% of total annual turnover (column J) (Table 8). For a small-sized foundry, the difference in total electricity costs between Eskom and Ekurhuleni falls to 19% or 2% of total annual turnover.

In cases where installed capacity is much higher than maximum demand, the difference in total electricity costs per kilogram sold falls from 29% to 17%.<sup>11</sup> The example highlights the cost of electricity in cases where there is a significant divergence between maximum demand and installed capacity. Having more capacity than you currently need may provide a cushion when orders pick up and may also enhance the value of your business when it comes to selling it on, but these future and uncertain benefits must be weighed up against the actual costs of paying for that unutilised capacity now. It is not clear that foundries who receive their electricity directly from Eskom are making these calculations.

Whether foundries receive their electricity directly from Eskom or not, significant savings can be achieved if medium-to-large sized foundries are able to optimise their maximum demand (scenario 2), i.e., avoid spikes in MVA over any given period. It is easier for more specialised foundries with a smaller product range to optimise their maximum demand requirements due to the similar metal demand per hour during the production month, as opposed to foundries with a larger, more diverse product range where the output per hour varies vastly.

In our example, foundries that are able to optimise their maximum demand would reduce their maximum demand charge per kilogram sold from 80c to 65c (or by approximately 19%) under the Ekurhuleni tariff and from 68c to 57c (approximately 16%) under the Eskom tariff. For a medium to large-sized foundry in Ekurhuleni, this would represent a saving of almost R2 million on their annual electricity charge.

Improvements in melting efficiency and additional shifts are other ways in which savings can be realised. The energy required to melt one tonne of metal is influenced by the type of equipment and the condition of the equipment, the quality and density of the scrap metal as well as the operational practices of the foundry. In the example above, the saving accruing to a large foundry by reducing the energy required to melt one tonne of metal from 1450kWh to 1100kWh (scenario 3) is clearly illustrated. Total electricity cost per kilogram sold falls from R3.27/kg sold to R2.52/kg sold (a decrease of just under 23%). The impact of asset utilisation – operating two shifts, for example – is also clearly demonstrated in the example, highlighting once again the importance of unlocking additional volumes for foundries.

In summary, it is important to notice how low market volumes affect the energy cost and contribute to the un-competitiveness of the foundry industry. It is not only the maximum

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<sup>11</sup> In our example, the base case difference of 29% assumes a maximum demand of 8 Mega Volt Amp (MVA) and an installed capacity of 8 MVA. The difference of 17% assumes a maximum demand of 8 MVA and an installed capacity of 42 MVA.

demand costs when foundries operate below their installed capacity that matter, but also the variance in demand due to the varying energy requirements of a diverse product range.

*Implications for the value chain*

Accessing electricity from the municipalities rather than Eskom creates an uneven playing field for downstream industries, worsening the competitiveness of companies that are supplied by municipalities. While, there are no regulatory frameworks that mandate Eskom and municipalities to set similar tariffs, the fact that municipalities consider electricity as a source of income provides an incentive for municipalities to add a margin.

There are other avenues that companies can employ to reduce cost – more shifts, higher volumes, etc – however, these are subject to the demand for local products.

**Key to Table 7 Hypotheticals**

*A = Scenario*

*B = Consumption cost / kg sold*

*C = Maximum demand / kg sold*

*D = Administrative cost / kg sold*

*E = Total electricity cost / kg sold*

*F = % Difference between Eskom and Ekurhuleni*

*G = Tons sold*

*H = Difference*

*I = Average turnover*

*J = Savings as a percentage of sales*

**Table 7: Comparisons in electricity tariffs and output Hypotheticals, by foundry size**

	Ekurhuleni D					Eskom NIGHTSAVE								
	A	B	C	D	E	B	C	D	E	F	G	H	I	J
<b>Large Foundry (Installed capacity = 8 MVA; selling price = R25/kg)</b>														
Base case	1	2.46	0.80	0.01	3.27	1.64	0.68	0.01	2.32	29%	12 859	12 098 564	321 480 000	4%
Reduce max demand	2	2.46	0.65	0.01	3.12	1.64	0.57	0.01	2.21	29%	12 859	11 588 399	321 480 000	4%
Increase efficiency (kWh / ton melted)	3	1.87	0.65	0.01	2.52	1.24	0.57	0.01	1.82	28%	12 859	9 038 924	321 480 000	3%
Improve yield	4	1.59	0.55	0.01	2.15	1.06	0.48	0.01	1.55	28%	15 115	9 038 924	377 880 000	2%
Additional shifts (3 shifts)	5	1.59	0.37	0.00	1.96	1.06	0.32	0.00	1.38	29%	22 673	13 045 242	566 820 000	2%
<b>Small Foundry (Installed capacity = 1 MVA; selling price = R45/kg)</b>														
Base case (day time)	1s	2.91	1.86	0.08	4.85	1.81	1.98	0.13	3.93	19%	733	678 522	32 994 000	2%
Increase efficiency (day time)	2s	2.21	1.86	0.08	4.15	1.38	1.98	0.13	3.49	16%	733	484 371	32 994 000	1%
2 Shifts	3s	2.21	0.93	0.04	3.18	1.38	0.99	0.07	2.43	23%	1 466	1 094 561	65 988 000	2%
Night shift; reduce connection V	4s	2.21	1.86	0.08	4.15	1.38	0.68	0.13	2.19	47%	733	1 438 203	32 994 000	4%
<b>Costing at real capacity installed</b>														
<b>Large Foundry (Installed capacity = 42 MVA; selling price = R25/kg)</b>														
Base case	1	2.46	0.80	0.01	3.27	1.64	1.07	0.01	2.71	17%	12 859	7 092 404	321 480 000	2%
Reduce max demand	2	2.46	0.65	0.01	3.12	1.64	0.96	0.01	2.60	16%	12 859	6 582 239	321 480 000	2%
Increase efficiency (kWh / ton melted)	3	1.87	0.65	0.01	2.52	1.24	0.96	0.01	2.21	12%	12 859	4 032 764	321 480 000	1%
Improve yield	4	1.59	0.55	0.01	2.15	1.06	0.82	0.01	1.88	12%	15 115	4 032 764	377 880 000	1%
Additional shifts	5	1.59	0.37	0.00	1.96	1.06	0.54	0.00	1.60	18%	22 673	8 039 082	566 820 000	1%
<b>Small Foundry (Installed capacity = 1 MVA; selling price = R45/kg)</b>														
Base case (day time)	1s	2.91	1.86	0.08	4.85	1.81	2.34	0.13	4.28	12%	733	417 042	32 994 000	1%
Increase Efficiency (day time)	2s	2.21	1.86	0.08	4.15	1.38	2.34	0.13	3.85	7%	733	222 891	32 994 000	1%
2 Shifts	3s	2.21	0.93	0.04	3.18	1.38	1.17	0.07	2.61	18%	1 466	833 081	65 988 000	1%
Night Shift; reduce connection V	4s	2.21	1.86	0.08	4.15	1.38	0.68	0.13	2.19	47%	733	1 438 203	32 994 000	4%

Source: Foundry Concept, 2017

## **4.2.2 Access to competitively priced primary metal, scrap and foundry output**

### ***Implementation of mineral rights***

Mineral rights were effectively nationalised in the early 2000s, through the Mineral and Petroleum Resources Development Act (MPRDA). Mineral rights regulations contained enabling instruments, which could have obliged applicants for mineral extraction rights to commit to beneficiating a portion of the extracted ores.

To date, the DMR has never invoked these enabling instruments in the steel or in any mineral value chain for that matter. In fact, it appears that the DMR has actively implemented South Africa's mineral resource policy so as to undermine industrial policy relating to the steel value chain.

In 2001, the dti and IDC intervened in the unbundling of Iscor to ensure that Iscor Steel (subsequently AMSA) would have access to iron ore in perpetuity on a favourable cost-plus basis. In 2008, AMSA mineral rights were awarded by the DMR to Imperial Crown Trading, an unknown entity, under questionable circumstances thereby unravelling a very costly structural feature of an earlier steel value chain industrial policy.

Since then, the DMR has been mandated to amend the MPRDA so as to leverage mineral rights to support downstream users.

### ***Scrap metal pricing and the Price Preference System***

Government introduced the Price Preference System (PPS) policy guideline in 2013, which was ensued by a trade policy directive in May 2015 that became known as the Price Preference System (PPS). The PPS gives the International Trade Administration Commission (ITAC) power to bar exports of both ferrous and non-ferrous scrap metal unless the metal is first offered to domestic purchasers at a 20% discount to the prevailing International London Metals Exchange price. The discount was subsequently differentiated, with some scrap metal's discount increased to up to 30% in a 2014 amendment to the directive.<sup>12</sup> ITAC will only approve an export permit if domestic users have not taken up the offer to purchase the scrap after 15 working days.

According to the directive, all export permit applications must be accompanied by a confirmation of the type, quality and quantity of the scrap to be exported and information on when and where such scrap may be inspected by prospective buyers. The PPS was limited to 5 years, after which it would be reviewed to determine whether it should be terminated or extended for a further period of time, "with or without amendment."

#### *Is the PPS working?*

The industry stakeholders identifying the pricing and supply of quality scrap metal as one of the most significant issue affecting competitiveness. South African scrap merchants are export oriented, which creates sustained local shortages of high quality aluminium scrap.

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<sup>12</sup> Discounted prices are published monthly by ITAC in a "Price Preference Summary" for aluminium scrap, copper scrap, scrap brass and bronze, exotic metals, zinc scrap, lead scrap, magnesium scrap, tin scrap, tungsten scrap, steel scrap, and stainless steel scrap.

Furthermore, scrap merchants charge secondary aluminium smelters supplying ingots to the domestic foundry industry the “best export price”, that is, the export parity price.

It should be noted that a large part of the attraction to scrap merchants of exporting scrap is that grading and sorting is done by the importer. Scrap merchants do not have to expend time and energy (and therefore cost) engaging in these activities yet they receive an international price for their scrap.

Increased global demand coupled with distortions in key global markets and the concomitant increase in the export of aluminium scrap resulted in an increase in the price of aluminium scrap in South Africa by 60% in 2003. Thin margins in the secondary aluminium industry and long-term supply contracts with the South African automotive industry meant that the South African foundry industry bore the brunt of the price increase.

It became apparent that the system, while well-intentioned, was fundamentally flawed.

Key respondents stated that the PPS was not working, though different explanations were posed. In other words, the PPS is not making it any less attractive to export scrap and therefore improve both the quantity and quality of scrap available to local mills and foundries than before its introduction. According to one key respondent, foundries have given up trying to get PPS prices. Instead, they deal with merchants with whom they have good relationships with and buy above the PPS discounted price in order to at least source good quality scrap.

On the rare occasions when scrap is offered at the PPS price, the transaction is conditional upon the consumer incurring the cost of delivery. Depending on the tonnage and distance this may result in a significant cost that a foundry or mini-mill can ill afford. Another key factor limiting the success of the PPS is the lack of enforcement capacity in ITAC.

In response the Economic Development Department (EDD) proposed amendments to the PPS in December 2015. These included proposed new requirements for more detailed documentation to be submitted to ITAC before export permits are granted, a ban on cash payments for scrap to make the money-trail easier to trace, and the requirement that all scrap metal be exported only through the Port Elizabeth harbour so as to monitor and control the process to a greater degree (Sher & Subban, 2016).

*Would an export tax on scrap metal improve the situation?*

From interviews with key stakeholders, it is clear that the current system is not working and should be scrapped. Whether the PPS should be replaced by an export tax is debateable. An export tax is more manageable and should in principle provide more effective protection for downstream beneficiation industries.

There is evidence to support that an export tax would achieve better results for the local industry based on an economic impact assessment carried out for ITAC by Genesis Analytics in 2017. An export tax would be applied to all scrap metal and not just to certain grades of scrap, circumventing the possibility of “mis-declaring” scrap. Furthermore, given the limited capacity at ITAC, an export tax is easier to monitor. Previous studies (Roberts, 2006 and Conningarth Economists, 2013) also found that export bans, quotas or an export tax were prudent mechanisms to develop capabilities in the local industry and maximise the beneficiation of scrap metal.

However, the downside of an export tax is that it makes some lower grades of scrap metal virtually unfeasible for the scrap merchants to collect given their margins, which potentially would create a significant environmental issue. There is also doubt regarding whether an export tax on both ferrous and non-ferrous is necessary.

There is strong evidence to suggest that there is no excess demand for ferrous scrap in South Africa, therefore the only issue with respect to ferrous scrap is the determination of a developmental price for downstream users.

However, what is evident, according to key informants, is excess demand for aluminium scrap and therefore an export duty on aluminium scrap is potentially warranted. Because non-ferrous foundries only buy ingots from secondary smelters (and not the scrap from merchants), an export tax on aluminium scrap would need to be accompanied by a similar tax on ingots to prevent merchants from starting their own smelting operations to produce ingots for the export market. Apparently this is already happening in an effort to evade the PPS. Therefore, in order for an export tax on aluminium scrap to be effective, it would need to be accompanied by a similar tax on aluminium ingots.

While the impact of an export tax on employment in the scrap industry should be given due consideration, an export tax on aluminium scrap would limit the extent of any negative employment effects, especially if it is combined with incentives for scrap merchants to limit their exports, such as an income tax rebate.

Fundamentally, as the PPS has aptly demonstrated, no system foisted upon industry in the absence of a negotiated, industry-driven solution will work. Some might say that giving the scrap merchants a voice at the table is disruptive but an industry-driven solution was imminent before government first introduced the PPS policy guideline in 2013. According to an article published by Sher and Subban (2016), industry players such as the Metal Recyclers Association of South Africa, the South African Institute of Foundrymen, and Business Unity South Africa among others, were engaged in discussions around a way forward for the industry. It is unclear why this process was ignored by government and the EDD in particular (Slater, 2016). It is hoped that a future settlement does not make the same mistake.

### ***Access to competitively priced cast and steel products***

The loss in competitiveness in the foundry industry, is driving machinery and equipment firms to import cast components. Machinery and equipment companies in the industry are struggling to secure competitively priced castings locally, with firms resorting to imports. Additionally, there appears to be a perception that the quality of local castings is deteriorating. While larger, more complex castings are increasingly difficult to obtain locally, imports are not necessarily of better quality and the lead time is a challenge. This affects the competitiveness of firms that use cast components thus affecting their efficiency.

With steel, the case is slightly different. The steel industry is protected such that the price of importing steel is the same as procuring locally, if not higher. Firms import steel grades that are not locally manufactured, even at a premium. Furthermore, collusion conduct by the upstream steel producers has had a direct effect of raising prices. As mentioned in the earlier section, it appears as though poor management of the AMSA deal may result in the perpetuation of higher prices for the downstream industry.

Access to steel and cast metals shall be discussed in turn below.

*Importance of steel pricing to downstream development*

Steel is a key input in the manufacture of general purpose, mining and food machinery, comprising of at least 20% of direct inputs and 23% of indirect inputs (Table 8).

**Table 8: Proportion of direct and in-direct steel inputs in metals, machinery and equipment**

Sub-sector	% Direct inputs	% Direct + indirect inputs
General machinery	19.3%	24.9%
Mining machinery	18.8%	24.4%
Food machinery	18.4%	23.4%

Source: DTI, 2010

In a study by the dti, the reduction of steel prices will likely increase output and/or increase employment (Table 9). The study was carried out in 2010, following the commodity and construction booms, when demand for machinery and equipment were high. Nonetheless, these estimates, which can be adjusted down, stand to reason that lower steel prices will have a positive effect on the downstream industry.

**Table 9: Effects on employment and output of lower steel prices**

% reduction in the domestic price of steel	% of firms that would increase output by > 10%	% of firms that would increase employment by >10%
10% lower steel prices	43.5%	21.8%
20% lower steel prices	67.7%	44.9%
30% lower steel prices	80.9%	56.7%

Source, DTI 2010

Various studies also corroborate that the price of steel in South Africa has had adverse effects on the downstream industry. In addition to the high cost of steel, the quality of steel is also a challenge. For example, Bell Equipment (see section 6.1) was unable to secure high grade steel for the articulated dump truck tip, thereby resorting to imports. Despite the inability of local companies to manufacture this steel grade, Bell Equipment has to pay a duty of 20% on all imports, thereby increasing the cost of inputs and undermining competitiveness.

*Consequences of protecting the upstream industry*

A danger is emerging that the collective 22% impact of upstream tariff (10%) and safeguard duty (12%<sup>13</sup>) will be cost raising to downstream users.

In 2015, the cold-rolling firms Duferco and Safal vigorously opposed the imposition of a 10% duty on hot-rolled coil which constituted around 75% of their input costs, although they had

<sup>13</sup> The tariff will be in place for three years from 2019 and is proposed to fall from 12% in the first year, to 10% in the second year and 8% in the third. Available here: [http://www.engineeringnews.co.za/article/bell-laments-import-duties-on-steel-tyres-kamaz-assembly-could-start-in-2019-2018-04-19/rep\\_id:4136](http://www.engineeringnews.co.za/article/bell-laments-import-duties-on-steel-tyres-kamaz-assembly-could-start-in-2019-2018-04-19/rep_id:4136)

earlier supported the imposition of a 10% duty on coated galvanised steel sheets, aluminium zinc coated steel sheets and painted and plastic coated steel sheets (Creamer, 2015).

As at October 2017, the move to impose safeguard duties on hot-rolled coil is not supported by downstream steel users. The South African Institute of Steel Construction (SAISC) argue that excessive protection on upstream could make domestically manufactured finished steel products uncompetitive, resulting in increased downstream imports and triggering a call for further protection of downstream sectors (Moolan, 2017).

### **4.2.3 The cost of labour**

This section looks at the cost of labour in the downstream metal industry, due to the labour absorptiveness of machinery and equipment, and considers the impact of recent wage increases and the wage setting process itself. It also considers the issue of labour disputes and whether they are as severe as industry stakeholders make them out to be.

#### *Wage setting*

Institutionalised wage setting in South Africa mostly happens in two ways. The first is sectoral determinations, where the Minister of Labour sets minimum wages in sectors where it is difficult for workers to organise such as farm workers, domestic workers, etc. The second are bargaining councils, which cover collective bargaining at a sectoral level and are formed by representatives of businesses and workers in a specific sector. If a bargaining council represents the majority of workers and employers within a sector, then agreements reached by that council can be extended to all participants in the sector, irrespective of whether they were party to such agreements, although a formal exemption can be applied for and granted by the Minister of Labour.

The Metal and Engineering Industries Bargaining Council (MEIBC) is the relevant body responsible for the determination of wage rates. On the 23rd of August 2017, a settlement agreement for the period 1 July 2017 to 30 June 2020 was signed by Steel and Engineering Industries Federation of Southern Africa, Metal and Electrical Workers Unions of South Africa, National Union of Metalworkers of South Africa, South African Equity Workers Association, Solidarity, and UWASA at the MEIBC offices. The table below presents general wage rates agreed for different categories of workers in the metal and engineering industry in 2010/11 and 2017/1, the latest settlement (Table 10).

Average annual increases in nominal wage rates between 2010/11 and 2017/18 range from 9.20% for Category A workers to 11.82% for Category H workers (Table 10). Category A represents highly skilled workers while Category H represents less skilled workers. Annual consumer inflation between 2010 and 2016 averaged 5.39% representing an average real increase in wage rates (difference from per annum rates) of between 3.81% and 6.43% during that time.

**Table 10: MEIBC wage rates (2010/11-2017/18)**

Category (Rate)	2010/2011	2017/2018	% increase	p.a
A	R45.35	R74.55	64.39%	9.20%
AA(6)	42.95	71.1	65.54%	9.36%
AA(start)	40.73	67.89	66.68%	9.53%
AB	38.58	64.85	68.09%	9.73%
B	36.58	62.04	69.60%	9.94%
C	34.93	59.78	71.14%	10.16%
D	33.94	58.57	72.57%	10.37%
DD	31.21	54.32	74.05%	10.58%
DDD	29.59	51.98	75.67%	10.81%
E	28.03	49.67	77.20%	11.03%
F	26.62	47.59	78.78%	11.25%
G	25.17	45.43	80.49%	11.50%
H	23.85	43.59	82.77%	11.82%

Source: Metals and Engineering Industries Bargaining Council ([www.meibc.co.za/](http://www.meibc.co.za/))

Edwards, Rankin and Stijns (2014) use firm-level data to investigate the impact of bargaining council coverage on firm survival when faced with increased imports in the sector. Between 2005 and 2008 data shows that small firms in sectors covered by bargaining councils, and which face increasing imports, are more likely to exit than similar firms in non-BC sectors or larger firms in the same sectors. Minimum wages set in bargaining councils are a bigger constraint for smaller, more labour-intensive firms, particularly if they were not party to these agreements. A possible explanation is that these firms cannot adjust wages, or tie wages to productivity, due to the BC agreements, and if they cannot become more capital intensive, have to exit.

Magruder (2012) is the only empirical study on bargaining councils in South Africa which shows a causal relationship between wages and employment levels. Using data from the 2003 Labour Force Survey (LFS) he finds that industries that have an agreement in a particular magisterial district in a given year have about 8–13% lower employment and 10–21% higher wages than the same industry in uncovered neighbouring magisterial districts. Firm sizes are also impacted, with 7–16% fewer employees in small firms and 7–15% fewer entrepreneurs, while there are smaller and insignificant effects on large firms and single employee firms. The Magruder and the Edwards et al results both fit with the concerns raised by Moll in 1996 and Black and Rankin in 1998.<sup>14</sup>

<sup>14</sup> Quantifying the size of the impact of the wage bargaining process is difficult since it involves constructing a counter-factual where the changes in the wage setting outcomes did not have an impact. In the causal research this is done by constructing an external control group of similar workers (such as the two Borat et al papers), by exploiting the intensity of changes in the 'treatment' (such as Dinkelman and Ranchod, or Garbers), or by exploiting regional variation in the policy (such as Magruder, 2012). In all cases, these are partial equilibrium analyses, they assume that changes affect

## ***Labour disputes***

Despite the prominent coverage of industrial disputes in the media there is very little analysis of how these influence employment and firm-level outcomes. This probably happens for two reasons: (1) strike data is not readily available in the standard LFS/QLFS datasets; and (2) industrial disputes are likely to be endogenous, in that the relationship between employment and industrial action may run in both directions, so researchers need to use an instrumental variable or other identification strategy.

Evidence as to whether South Africa is an outlier in the realm of the size and length of industrial action is ambiguous. Borhat and Tseng (2014) in a blog post report data from the International Labour Organization's (ILO) Laborsta database to determine whether South Africa really is an economy with many strikes. They find that in terms of days not worked per 1 000 general workers that South Africa ranks fifth (in the period 1999-2008) with 206 days lost on average. However, they argue that this measure is not very good since it covers only a small group of countries and these countries differ in their definition of formal employment and the age range they include. Instead, they look at two alternate measures: the depth of strikes, measured as working days lost per strikers' working days per annum; and strikers' intensity, the number of strikers per 1,000 employed workers. These measures are also available for a larger group of countries. Borhat and Tseng (2014) find that, on average, South Africa does not differ much from other countries. However, they do caution that this data may mask differences across sectors. From this data, South Africa does not seem atypical in terms of strikes.

### **4.2.4 Conclusions**

Access to competitively priced inputs – raw materials, electricity and labour – determines the competitiveness of the value chain. This is particularly important for foundries and machinery and equipment that have strong backward linkages with the upstream industry.

Cost and supply structure of electricity is structurally biased towards high voltage customers compared to low voltage customers. While energy intensive upstream industries source energy directly from Eskom (at a lower tariff), downstream industries either access electricity from Eskom or municipalities depending on the manufacturing plants' location. There is strong evidence to suggest that companies supplied by Eskom directly pay lower tariffs for electricity compared to municipalities. Even among municipalities, there are different pricing structures. Municipalities charge higher electricity rates (difference of about 29%) than Eskom because for municipalities, electricity is revenue generating. The price differentials not only affect how local firms compete amongst themselves, but also how they compete in the international market.

The weak policy implementation of the MPRDA, with regards to beneficiating ore in South Africa, has affected the upstream industry, following the loss of primary steel sector to its cost-based supply link with the iron ore sector in 2008.

Poor policy implementation of the Price Preference System has resulted in leakage (exporting) of scrap material. Even though local foundries are given first choice when

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only the sector where the policy is implemented, and are short-term in nature, due to the availability of data or because over time the counterfactual may no longer be valid.

procuring scrap material, scrap merchants are finding ways to export the scrap and earn higher profit. As a result, local foundries either have access to poor quality scrap or have to purchase scrap at exorbitant prices. In order to circumvent this, an export tax on scrap could be ideal, though this would need to be differentiated between ferrous and non-ferrous scrap.

For the machinery and equipment sector, the protection and subsidised electricity for the upstream industry and the poor performance of the foundry industry is a double-whammy. The current and envisaged protection on the steel industry will increase the costs for local manufacturing, further hampering their competitiveness. The challenges in the foundry industry have led to firms importing cast components, which is suboptimal.

The evidence presented above suggests that annual real wages increases for workers in the metals industry (at least since 2010/11) have been relatively modest. That said, the productivity of labour in South Africa has, at best, stagnated over the past 10 years, suggesting that increases in the wage rate are disassociated from changes in productivity.

In the absence of research on the severity of industry-specific strikes it is difficult to make any strong conclusions regarding the impact of strike action on the industry. As with all small business, there is a case to be made for exempting some companies in particular from the MEIBC wage agreements.

### **4.3 Access to funding for investment**

Up until the early 1990s, South Africa's industrial growth had evolved around its natural mineral resource base (mainly gold) and associated energy- and capital-intensive processing of ferrous and non-ferrous metal ores with immense resources being expended on the requisite electricity generation and transmission system as well as on associated bulk export rail and port infrastructure. Investment programmes were mainly driven by the dti and IDC, as outlined in the discussion below.

Significant local and foreign investment was poured into the mining industry, while the rise in income was mainly used to finance consumer spending and less so on productive capacity. This resulted in the erosion of capabilities in the capital equipment sector between 2002 and 2008 hence limiting the scope for structural transformation.

#### ***Investment incentives for the upstream industries***

Investment programmes were offered, particularly for export-oriented production through the IDC's Global Player Fund, a tax holiday programme, and an accelerated depreciation allowance tax incentive scheme under section 37e of the Income Tax Act. These programmes supported the capital-intensive upstream sectors.

Corporate strategies responded to the policy framework and substantial investment took place, the largest of which was the Saldanha Steel project (Box 3). The 37e accelerated depreciation allowance and benefited investments in basic iron and steel and basic non-ferrous metals (Table 11).

**Table 11: 37e Accelerated tax depreciation scheme beneficiaries - Metal sectors**

	<b>Project</b>	<b>Date</b>
Basic Iron & Steel	Columbus Stainless Steel	1993
	Iscor Saldanha	1995
Non-Ferrous Metal	National Manganese ferrochrome	1994
	Manganese Metal Corporation	1994
	Goudini Ferrochrome	1995
	Alusaf Aluminium (Hillside 1)	1993
	Namakwa Sands Ilmenite	1995

*Source: Harmony vs Iscor (2006) - Witness Statement Z. Rustomjee*

The value of the 37e benefit is not clear but was estimated to be the equivalent of as much as 5.8% of the selling price of steel into the USA market during 1999-2000 (Roberts & Rustomjee, 2009).

Countering the adverse impact of import parity pricing by upstream intermediate goods producers was an important policy objective. Recipients of the 37e benefit were contractually obliged to practice export-parity pricing in the domestic market. In hindsight, it appears that this obligation had minimal effect in its intended objective of lowering the input costs of downstream, labour-intensive domestic manufacturers. Saldanha Steel's production was exported in its entirety through the Iscor JV Macsteel, effectively circumventing the obligation.<sup>15</sup>

The IDC Global Player scheme offered concessionary finance for export oriented projects, including the following metals sector projects: Saldanha Steel (50% equity share plus loans), Columbus Stainless Steel, Gencor (Alusaf - Hillside I), Gencor (Hillside II) and Mozal.

The dti also established a Strategic Investment Programme (SIP) between 2002 and 2004 with an estimated value of R3 billion, from which Iscor (Mittal) received a R300m investment allowance benefit in 2004 for its proposed ferro-alloy coke plant in Newcastle.

The bulk of the benefits of these programmes have been absorbed in more capital- and energy-intensive investment projects in the ferrous and non-ferrous metals and chemicals sectors.

A further instrument was the leverage that policymakers had through substantial IDC loan exposure and shareholding stakes particularly in the upstream basic iron and steel and the non-ferrous metals sub-sectors.

In order to assist in the further development of the steel industry, in 1993 the IDC, in partnership with several financial institutions and Iscor, conceived of creating Saldanha as an exporting steel mill. Equity ownership split as 50% each between the IDC and Iscor. This costly investment did not benefit downstream users and further indebted the government (Box 3 on next page).

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<sup>15</sup> Ferrochrome was largely exported with domestic consumption being a small proportion of the input costs of the country's handful of steel manufacturers. Aluminium billets produced from Hillside were also largely exported as was the ilmenite and rutile output from Namakwa Sands.

### Box 3: The Saldanha Project

The Saldanha project was approved by government in 1995 and commenced production in 1998.

Saldanha did not initially prove to be a profitable mill, as it faced unexpected technical difficulties in applying new technology, which were only resolved after 2001. There was an attempt at integrating untested technologies (Corex, Midrex and Conticast), which was unsuccessful. The project was delayed by more than a year due to environmental objection, which also led to the appointment of the Steyn Commission. At the same time there were associated cost escalations and global oversupply facilitated by massive production subsidies in target USA and EU markets. Subsequently, export market prices collapsed for three years following commencement of production in 1999 and the main export markets instituted anti-dumping policies.

Saldanha only came on stream during a severe and sustained slump in international steel prices.

By 2001 Saldanha Steel had acquired a debt of R5.8 billion consisting of foreign loans (R3.3 billion), South African Banks (R1.5 billion) and IDC through project loan (R1.0 billion). The IDC came close to shutting Saldanha down in the face of continued low steel prices and Saldanha's failure to operate to its full potential, but did not. The shareholders faced three options which were analysed in terms of net present cost. Firstly, to invest R11.5 billion to continue operations assuming the then steel market price outlook; secondly to mothball the plant at a cost of R10.5 billion, or lastly liquidate at a cost of R12 billion.

As shareholders, Iscor and IDC were also liable for the full Saldanha Steel debt position of R5.5 billion as well as contract cancellation costs of approximately R7 billion.

After intense negotiations, IDC and Iscor struck an agreement, together with the major financial institutions involved in the Saldanha project to reverse Saldanha back into Iscor, together with the refinancing of Saldanha's debt. At the time, the IDC was also a shareholder in Iscor.

Iscor and IDC each agreed to absorb R3 billion of the debt. Iscor then launched a rights issue for R1.67 billion to bring down its Saldanha (subsidiary) debt, while the IDC recorded an impairment loss of R2.6 billion in its interim results.

At the same time, Iscor split into two corporations: Kumba (mining) and Iscor (steel making).

In addition to writing off debt, in order to ensure the viability of Iscor going forward, at the time of the unbundling, Iscor and Kumba entered into a long-term agreement. Kumba would supply Iscor 6.25mt per annum of iron ore on a cost-plus 3% basis (and export parity pricing for any additional purchases), which was generally below ruling market prices. The agreed price for the ore was determined on the advice of the IDC's advisors and was expressly intended to ensure that Iscor would be a viable steel maker over the long term. In fact, the price was aimed at ensuring that Iscor would be placed amongst the first quartile of producers world-wide. The press release announcing the transaction stated that "*The retention by Iscor of the ownership of the rights to 6.25 mtpa of iron ore from Sishen is expected to ensure Iscor's viability as a stand-alone entity and to position it advantageously to meet any future volatility in the global steel markets.*"

From IDC and Government's policy perspective, this advantage was intended to benefit not only Iscor shareholders, but to also benefit the downstream steel using sectors.

No major investment in upstream steel production was made between 2000 and 2012. Since 2014, the IDC has supported investment in around 5 new mini-mills mainly producing structural steel products for the construction sector.

Although the recent investments in mini-mills by domestic and foreign owners appear to reflect the success of scrap export policy to increase the processing of domestic steel scrap, it is not clear whether it reflects a structural change and whether it is sustainable.

From the early 2000s, a number of primary steel plant projects have been mooted. These have been driven by individual project promoters but have also been an important component of policy, based on assessments of South Africa's comparative advantage in steel production.

Such projects have also been driven by a desire of policymakers to increase domestic market competition especially during price spikes and during difficult negotiations with AMSA over the developmental pricing of steel.

For example, the IMBS Phalaborwa project was proposed in the mid-2000s but was deferred following 2008 commodity price collapse. It envisaged a new direct reduction iron plant under a joint venture between the Phalaborwa Mining Co (Palamin, part of the Rio Tinto group), the IDC and project promoters Iron Mineral Beneficiation Services (IMBS) with an initial capacity of 50 000 tpa.

It would appear that the falling steel prices between 2012 and 2015 scuttled the greenfield project plans and also resulted in the IDC carrying large and growing losses from its Scaw investment.

### ***Low levels of investment in the downstream industries***

Downstream sectors have been supported by the dti's Regional Industrial Development Programme (RIDP) which was replaced in 1996 by the Small and Medium Manufacturing Development Programme (SMMDP), the Small and Medium Enterprise Development Programme (SMEDP), the Manufacturing Competitiveness Enhancement Programme (MCEP) and the Cluster Development Programme (CDP)<sup>16</sup>.

The MCEP is a support scheme valued at R1 billion aimed at incentivising manufacturing firms to raise competitiveness and retain jobs. It has two facilities. The production incentive programme is managed by the dti, while the industrial financing loan is managed by the IDC. The production incentive programmes objectives are for upgrading and expansion, cleaner production and resource efficiency, increasing market access, feasibility studies and improving cluster competitiveness. In March 2014, the dti tightened the deadlines to ensure that the programme benefited the SMMEs, the intended recipients.<sup>17</sup>

The quantum of funding towards the downstream sectors is relatively small compared to the investments upstream as depicted in the data supplied by the IDC on gross and net approval of funds as well as disbursements in 2017 (Figure 12). This is mainly because upstream industries are more capital intensive compared to the downstream industry. Nonetheless, in the last five years there has been a notable increase in funding towards the downstream sectors.

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<sup>16</sup> The Cluster Development Programme will be closed off and reviewed end of March 2018, however, clusters under the programme will continue to receive funding.

<sup>17</sup> <https://www.idc.co.za/home/idc-products/special-schemes/manufacturing-competitiveness-enhancement-programme.html>

The IDC has established supplementary funding pools for the downstream industries through the Downstream Steel Industry Competitiveness Fund, an interest rate subsidy. Furthermore, between 2017 and 2021, IDC aims to leverage off their balance sheet and inject close to R100 billion into the economy. The IDC will receive R95 million from EDD as grant funding over a three-year period. The funding is aimed at improving the competitiveness of qualifying firms through modernising plants; expanding existing capacity, as working capital; or even assisting companies to achieve appropriate industry certification for quality and environmental standards.

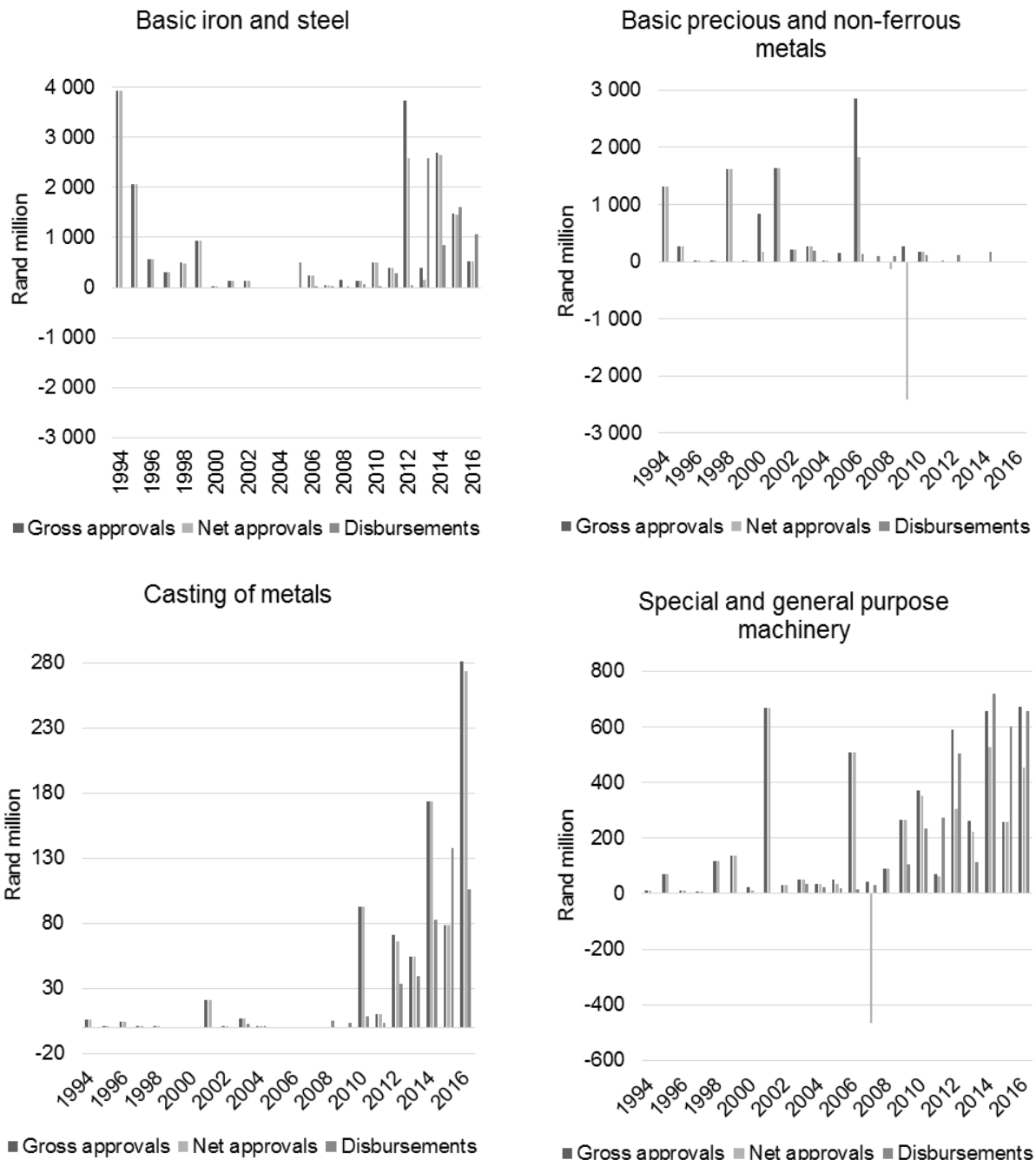
**Figure 13: Funding disbursements and approval, 1994-2016 in R million**

*Source: Industrial Development Corporation, 2017*

BEE companies, whether or not they are manufacturing, find it easier to access funding relative to companies that are creating jobs and adding value in SA.

**Conclusions**

It is evident that investment by the IDC and the dti has been more focused on the upstream



sectors, and this occurred without reciprocal assistance for the downstream industries. Furthermore, the investments upstream have not benefitted the downstream industry. Government does realise this imbalance, and appear to be making more concerted efforts to improve the competitiveness of the downstream sectors.

#### **4.4 Resuscitation of productive capabilities**

Productive capabilities are important for the advancement of the local industry and ultimately for industrialisation (The Department of Trade and Industry, 2007). As technology and innovation advance, there is an increasing demand for more educated and skilled labour. As such, there is need for cohesion between the industrial policy and skills institutions in the short-term. In the long-term, strong linkages between tertiary institutions and industry also ensure competitive advantage in geographic-specific industrial clusters.

Advancements in technology and innovation domestically foster a conducive environment for industrialisation. In the initial stages of industrialisation, technology is imported as this involves lower costs and thereafter is adopted and adapted to suit local conditions. As the domestic industry grows, the public and private sector invest more in technology and domestic research and development and build indigenous technology. Even though indigenous technologies are likely the most difficult to realise, they are potentially the most rewarding (Anderson, 2012).

##### **4.4.1 Research development and technology**

While expenditure on research and development in South Africa is high relative to other Sub-Saharan African countries, if compared to peer countries, South Africa expenditure is low. In 2007 South Africa spent 0.75% of GDP on R&D and increased to 0.88% in 2007, but has since fallen to 0.72% in 2013 (latest available figures). These figures are lower than upper and middle income countries that recorded R&D as a percentage of GDP at 1.5% and 1.7% respectively (World Development Indicators). A disaggregated assessment reveals that South Africa invests more in other sectors such as mining and mining related industries, where it has developed high value patents. The cluster of mining technology patents in South Africa are at the same level as US patents, and higher than those of the same cluster in Canada (Kaplan, 2011).

Along the metals, machinery and equipment value chain there are different levels of technological prowess. The upstream industries benefitted from investment support programmes, and were able to invest in cutting-edge technology. On the other hand, most of the sub-industries in the downstream industries have mainly relied on profits to advance technology and as a result, have not been able to invest in technological improvements. Bearing this in mind, long-term technological upgrading is key for developing a national system of innovation in the metals, machinery and equipment value chain and requires concerted government-led efforts.

##### ***Upstream technological advancements***

The upstream sector firms had access to investment support programmes, which they used to finance leading-edge technologies. Within the basic non-ferrous metals sector, the 1990s and early 2000 investments in aluminium smelting (Alusaf/Hillside/Mozal) incorporated the most energy-efficient technologies available at the time and as environmental regulations

tightened and energy costs increased, the older technology plants (Alusaf Bayside) were closed down.

Similarly for the basic iron and steel sector, the massive investment in Saldanha Steel took on considerable technological risk in incorporating and integrating the latest smelting and ultra-thin continuous casting technologies. The project was approved in 1993 as a 50:50 joint venture between Iscor and the IDC but only commenced production in 1999. The transaction was delayed by a year after objections were lodged with the Competition Board.

### ***Foundries lagging behind?***

The main production processes are sand casting, die casting and investment casting (small complex casts), and of these sand casting (basic) is the most widely used in South Africa. The South African Institute of Foundrymen (the SAIF), the National Foundry Technology Network (the NFTN) and tertiary institutions – the Vaal University of Technology (VUT) and the University of Johannesburg are all employing different tools to advance technology in the industry, but there seems to be some level of complacency.

The production processes involve different sets of technologies at the melting, shaping and finishing stages. Often the finishing, which is machining, bending, cutting and so on, is undertaken at the machine shop and is outside the scope of most foundries. Therefore, the main technologies are melting and shaping technologies, and they tend to be interdependent. In the event that there is a different shaping technology, the melting technologies may need to be adapted. Melting technologies depend on the source of energy, depending on the material being melted. For aluminium gas is mostly used because it melts at lower temperatures and is cheaper. Other metals do use electricity, though some companies are moving towards incorporating green energy.

Front end engineering technologies are generic (such as tooling development, reverse engineering and simulation models) and are available in many industries. Material handling technologies involve moving products between different stages of production to minimise contamination, time delay and waste. Process control technologies ensures temperature, shop-floor and sand properties control for traceability, and also links to other industries. Supply chain technologies are generic technologies used in various industries. The technology depends on the product properties (metal type and product complexity), production volume, pricing and investment cost.

In the early 2000s, funding for new technology was established under the National Research and Development Strategy to encourage downstream value addition and employment creation. The Advanced Manufacturing Technology Strategy (AMTS) and the Integrated Manufacturing strategy (IMS) emphasised the need to develop production capabilities and that downstream firms and public institutions should work to achieve output growth and employment (Phele, et al., 2004).

### ***Challenges to technology advancements***

There has been very little greenfield investment in technology in the foundry industry, with a significant number of the foundries still reliant on old technologies. While foundries were previously designed to meet mass productions, the volumes have since thinned out (SA production is less than 5% of global casting production). The volumes cannot meet the

current installed production technology, which therefore limits the returns on investment. Additionally, there are low levels of technology sharing between local foundries and foreign OEMs, with OEMs not advising foundries on the technologies (and skills) required in the manufacture of their products.

A significant number of the firms in the industry are focusing on certain products, as a way of optimising their production process. For example, firms that supply the automotive sector (such as Atlantis) benefitted from positive externalities generated by the MIDP.<sup>18</sup> However, in the last few years even these foundries are struggling with volumes.

The shaping and the material handling technologies in South Africa are weak.

Material handling requires investment in new layouts for the plants to ensure a new lean flow of material. At present, foundries (with the exception of Auto Industrial) are using the old layouts. Shaping technologies require an efficient production process, and the underlying challenge is by product waste material such as sand in sand casting. This requires a recycling or reusing process. 3D printing, a shaping technologies, is being developed at VUT following its investment in 3D printing and rids the process of waste material. At the moment 3D printing is slow and is used for complex products, but could pick up quickly.

There is need to adopt new technology that is specifically suited for diversified (different metal ranges) smaller order volumes. There is scope to adapt the old technology to meet these new requirements, however there has been slow uptake in the industry, despite recent technological advancements. Rapid prototyping (RP) technologies, a class of technologies that can automatically construct physical models from Computer Aided Design (CAD), exist in which solid models in plastic, paper or powder metals are generated. These technologies reduce the design time to produce casting prototypes significantly (Nyembwe, 2007).

### ***Deteriorating R&D in machinery and equipment***

For local small businesses in the machinery and equipment sector, the level of innovation has been compounded by the lack of sufficient capital and limited platforms for small businesses to present business cases to secure funding. While government is addressing the access of small businesses to capital (through the Department of Small Business Development), there is need to integrate research and development across academic institutions, private companies, government departments, and any other agency that can propel the development of technology. This will also assist in address the shortage of skilled labour, particularly in highly skilled sectors such as ICT and engineering (The World Bank, 2017).

The mining industry had a strong national system of innovation that intertwined the mining houses, suppliers, universities, research centres and technical schools, where the Chamber of Mines Research Organisation (COMRO) drove the innovation efforts (Fessehaie, 2015). However, in 2007, COMRO's research capacity was drastically reduced, which minimised their ability to undertake long-term ground breaking technology and rather focused on short-term development (Kaplan, 2011).

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<sup>18</sup> Meeting minutes with SAIF, 2017.

At an industry level, there are multi-national corporations in South Africa leading research, development and innovation in the industry. Multotech, an original equipment manufacturer focusing on mineral processing equipment (screening media, samplers, spirals and cyclones), is a large firm, with a workforce of approximately 1800 employees and a turnover in excess of R2 billion per annum. 20% of its revenue is invested in skills development as well as research and development to improve products, processes and equipment. Multotech has many R&D centres and has also established connections with universities including University of Pretoria, University of Johannesburg, Stellenbosch University and the University of Cape Town. The company's technology is advanced as it uses latest technologies, including 3D printers.

While Multotech has embarked on technology and innovation alone, the lack of a collaborative effort (national system of innovation) has resulted in the reduction of R&D and innovation activities across the sector. Consequently, South Africa lagging behind rival countries such as India, which are becoming more competitive than South Africa. In the last ten years, South Africa has decreased its market share in capital equipment in Zambia from 70% to 40%. This decline is further explained by other issues such as access to export finance and slowness to adopt to local content policies in Zambia.

To resuscitate innovation in the mining industry, the Chamber of Mines Research Organisation (COMRO) is being reopened under the Council for Scientific and Industrial Research (CSIR), at the Mining Precinct. The Department of Science and Technology contributed seed funding valued at R17million towards the initial research to develop business cases for localisation (Creamer, 2016). Even though the primary focus is on mining operations rather than mineral processing, the Mining Precinct will assist in the development of upstream capital goods for the mining industry. In the short-term, the Mining Precinct is focused on improving underground machinery for narrow-reef and hard-rock applications. In the medium-term this would align with the development of machinery and techniques for deep-level mines that operate all the time (Slater, 2016).

SAMPEC, the industry cluster, does not have any concrete plans to reinvigorate R&D in the sector yet but they are engaging in the post Mining Phakisa<sup>19</sup> supply development preparation process, which does look at investment and technological development within the industry. SAMPEC is also housed at the Mining Precinct along with the Mining Equipment Manufacturers South Africa (MEMSA). MEMSA is working with the mining research and development (R&D) hub and local mining companies to evaluate the stock of current equipment versus future order quantities to develop a better understanding of the possibilities related to future mining equipment (Slater, 2016). MEMSA programmes include marketing, networking & information, localisation, transformation, skills development and manufacturing excellence.<sup>20</sup>

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19 The Mining Phakisa was a South African government initiative led by the Presidency based on a “*quick, fast results*” methodology developed initially in Malaysia that brings together all stakeholders in the industry into a “lab” with the aim of identifying constraints and developing a shared vision and growth strategy for the long-term development and transformation of the sector.

20 <https://memsa.org.za/>

In other industries, such as pumps and valves, there has been some level of interaction with the DST. RGR has worked with the Technology Localisation Implementation Unit (TLIU) an initiative of the DST that is hosted and incubated by the CSIR, to assist in increasing the productivity.

#### **4.4.2 Training and skills**

Contrary to popular belief, the private-sector in South Africa has not carried its load with regard to skills training. Historically, the majority of the country's artisans and technicians were trained by public agencies and state-owned enterprises – such as Eskom, Iscor, South African Railways and Harbours, the Department of Public Works and the defence force. The government entities received training incentives that mandated required them to train beyond their own needs (Mukora, 2008). Even so, the numbers trained were always inadequate to meet the skills needs of the economy and the resultant gap was filled by state-sponsored immigration from Europe.

After 2001, the dual effect of ending the state-sponsored immigration ended, and privatising some of the state-owned enterprises resulted in the reduction of state-supported training. Consequently, South Africa experienced a skills crisis, which has persisted over time for a number of reasons. Historically unaccustomed to train to meet even their immediate skills requirements, South African companies have been slow to respond to the resulting skills crisis. To alleviate the skills crisis and develop the local capabilities, government developed skills training programmes such the Technical Vocational Education and Training (TVET) colleges and the Skills Education Training Authorities (SETAs). Despite these efforts, it appears as though the TVET and SETA initiatives are fraught with a number of challenges.

The overwhelming majority of students at public Technical Vocational Education and Training (TVET) colleges are in programmes that require no workplace experience and do not lead to a specific occupational qualification. This has been a serious and constant obstacle to quality in South Africa's public TVET system, and to the employability of its graduates.

Public TVET colleges are not dependent in any way upon industry for their income and have, therefore, generally become unresponsive to offers from industry to collaborate on work-based learning (a notable exception to this is the Gauteng Foundry Training Centre).

Since the establishment of Skills Education Training Authorities (SETAs) by the Department of Labour in 2001, their outputs, outcomes and impact have been found wanting by almost every independent piece of research on the subject. The SETAs are funded by the skills development levy (SDL). The SDL is applicable to employers whose total salaries exceed R500 000 per annum. The employer pays a levy of 1% of the total amount paid in salaries (including overtime payments, leave pay, bonuses, commissions and lump sum payments).<sup>21</sup>

In March 2011 of a Ministerial Task Team was established to investigate and appraise SETA performance. Its final report, published a year later, found numerous challenges with the programme (DHET, 2012). The SETAs' mandate was too broad, not clearly defined, and constantly shifting. Even so, many SETAs engaged in activities outside their mandate. Planning was based on inadequate information and was therefore unreliable; most SETAs

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<sup>21</sup> <http://www.sars.gov.za/TaxTypes/SDL/Pages/default.aspx>

had little planning capacity. The quality of most programmes was dubious and most SETAs had concentrated on inappropriate or useless training (e.g. at too low a level or of too short a duration), especially for employed persons. Governance and accountability systems were weak and there was evidence of gross negligence and weak financial accountability and oversight in many SETAs. Administrative systems were unnecessarily complicated and bureaucratic

Since apprenticeship programmes must be registered by a SETA, the issues outlined around SETA performance have constrained the growth and expansion of apprenticeships. Despite these challenges, collaborative initiatives between government and industry to address the dearth of skilled apprentices appears to be on the rise.

Between 2011/12 and 2014/15, the number of annual apprentice registrations increased from 21 540 to 28 302 while annual completions increased from 12 129 to 14 270 (Table 13).

**Table 12: Apprentice registrations and completions (2011/12-2014/15)**

	Total		Manufacturing, engineering & related services			
	Registrations	Completions	Registrations	%	Completions	%
2011-2012	21,540	12,129	5,168	23.99	4,192	34.56
2012-2013	23,594	11,614	5,449	23.09	2,949	25.39
2013-2014	27,069	17,427	6,229	23.01	5,220	29.95
2014-2015	28,302	14,270	5,547	19.59	3,037	21.28

*Source: Duncan (2017), MERSETA QMR data (2017)*

While the number of apprentice registrations and completions for manufacturing, engineering and related services industries also increased over the same period, they have fallen as a percentage of total registrations and completions from 23.99% and 34.56% respectively in 2011-2012 to 19.59% and 21.28% respectively in 2014-2015.

It is clear that much more needs to be done to train more apprentices overall but also to increase the percentage of apprentice registrations and completions within the manufacturing sector.

While not comprehensive, the following sub-sections provide an overview of the key training initiatives in each industry.

### ***Training requisite skills in the foundry sector***

During the 1990's, the Western Cape branch of the SAIF developed and implemented a modular training programme for industry workers in the region. From interviews and visits to foundries located in the Western Cape in 2004, it was clear that the programme had galvanised local industry and provided an enabling environment for processes of deliberation, knowledge-sharing, and technology transfer between firms. In 2010, the SAIF, with financial assistance from the NFTN, expanded the programme and rolled it out on a national basis.

The main objectives of the enhanced training programme were to:

1. Coordinate the development of national qualifications for NQF Levels 2-4
2. Provide efficient, effective and affordable means of training to the foundry industry workforce, as well as new entrants and students

### 3. Create a pool of industrially competent trainers

Since its establishment in 2010, a total of 2,227 workers in the foundry industry have been enrolled in the programme.

The programme is taught by industry representatives and academics. The 2016/2017 programme will be offered to foundry workers in Gauteng, KZN, and the Western Cape and will include modules in casting and method design, cores and core making, fettling and shot blasting, melting and metallurgy, moulding and sand, productivity and production planning, quality control, and supervisory skills.

The NFTN also supports the New Generation Foundry Forum (NFGF), a programme launched in 2013 to equip and develop the next generation of foundry leaders by exposing them to new technologies and design processes that are being applied globally. The NFGF also facilitates collaborative problem solving techniques by providing a platform for participants to network and engage with each other to address the challenges faced within the industry.

In 2014, the Gauteng Foundry Training Centre was opened at the Kwa-Thema campus of the Ekurhuleni East TVET College (EEC). The centre is a joint initiative between the Gauteng Department of Economic Development (GDED) and the NFTN. The centre offers training for Patternmakers, Melters and Moulders, and is accredited by the Quality Council for Trades and Occupations (QCTO) as a Decentralised Trade Test Centre.

The Metal Casting Technology Station (MCTS) supports and assists foundries with skills development, training, troubleshooting, and technology transfer in metal casting. The MCTS has been instrumental in working with UJ's Department of Engineering and Metallurgy to introduce a master's course in foundry technology which is being offered in 2018 (Liedtke, 2017).

Finally, the Research Innovation in Foundry Technology (RIFT) programme, established in 2011 and funded by the Department of Science and Technology, provided eight postgraduate students the opportunity to complete their degrees overseas.

#### ***Industry led initiatives in machinery and equipment***

The disconnection between the training provided by TVET and SETA programmes, and the industry requirements has resulted in some industry participants (VAMCOSA, SAMPEC, and SWH-MANCOSA) deferring to SACEEC to lead the training, with their support and guidance.

SACEEC recently established a "School of Excellence" (the School) in collaboration with the National Tooling Initiative Program (NTIP) to increase the number of artisans entering the industry and to prepare them for the challenges and opportunities associated with the introduction of new technologies and increasing automation in the workplace.

The School offers a 3-year modular programme for trainee apprentices entering the industry. According to SACEEC Chairman and CEO, Eric Bruggemans, learners enrolled in the School programme are not classified as apprentices under the Labour Relations Act (see section 6.2). The minimum entry requirement is 60% in English, Maths, Science and Technical Drawing. Every learner is fully supported and provided with accommodation, meals, and guaranteed employment at the end of the course.

The programme provides a blend of technical and business-oriented courses. Once qualified, the graduate can then proceed to become a Master Artisan. The programme is currently being accredited by MERSETA and SACEEC is looking to roll out the programme nationally.

To help boost the grades of learners to meet the minimum entry requirements into the School and to increase learner interest in careers as artisans in the capital equipment manufacturing sector, SACEEC has partnered with the Gauteng Growth and Development Agency (GGDA) to implement the SACEEC Schools Programme (SSP) at four technical high schools in Ekurhuleni.<sup>22</sup> In addition, SACEEC has designed a one-year bridging programme for learners who have already matriculated and who neither meet the School's entry requirements nor received the benefit of the SSP while at school.

SACEEC is also involved in formalising the recognition of experience of existing employees who do not have any formal qualifications.

#### **4.4.3 Conclusions**

Investment in R&D and technology and access to adequately trained employees are important to maintain competitiveness. At present there appears to be a stark difference between and within the different groupings in the metals value chain.

The upstream industries benefited from access to investment, which allowed them to adopt advanced technologies. For the downstream industries, the narrative is more varied. Though certain foundries have been able to adopt new technologies to improve competitiveness, a bulk of the industries are still employing old obsolete technologies. There is need to work within the existing institutions to localise and improve technology and develop the processes and for foundries to industrialise products.<sup>23</sup>

The mining machinery and equipment sector is resuscitating the industry, with COMRO coming back on board along with participation from tertiary institutions and DST. On a more general level, access to funding is key so that firms can advance technologies to become more productive and produce sophisticated products.

Access to highly trained skills remains a struggle, despite government's efforts via the TVET and SETAs. In the foundry and machinery and equipment industries there is strong will by the industry to address the failure, evidenced by the different initiatives.

In order to develop and grow industry capabilities, there is need for public and private sector partnerships. While some (if not most) firms have a short term horizon, there is need for government to develop systems of innovation to coordinate skills and technology requirements at present and in the future. Even within government, it is important for different departments – DST, DHET, IDC and the dti – to collectively address building productive capabilities.

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<sup>22</sup> Rhodesfield Technical High School in Kempton Park, Hans Moore High School in Benoni, Springs Technical High School, and Fumana Comprehensive School in Katlehong.

<sup>23</sup> <https://www.thedti.gov.za/parliament/2015/NFTN.pdf>

#### 4.5 Clustering initiatives not taking off?

The dti's policy towards the downstream steel utilising sectors was developed through policy research that was carried out between 1994 and 1997 on how to grow the downstream metals value chain sectors. Detailed and comprehensive studies that were funded by policy makers in partnership with industry associations and the respective sector trade unions included:<sup>24</sup>

1. Automotive Body Pressing Mini-Cluster, January 1997
2. Structural Steel Mini-Cluster, Industry Analysis, January 1997
3. Wire and Wire Products Mini-Cluster, February 1997
4. Cluster Initiative of the Association of Steel Tube and Pipe Manufacturers of South Africa, September 1997
5. Stainless steel cookware Micro-cluster, November 1997
6. The South African Downstream Carbon Steel Industry – Bulk Transportation Microcluster, December 1997
7. Automotive Body Pressing Mini-Cluster, January 1997

It was intended that these collaborative processes cascade into tripartite cluster-type structures for implementation. However, the implementation phase for these strategies were partly dashed by the downturn that followed the Asian and Russian crises after 1998. The strategies also did not gain traction due to the considerable flux that individual firm managers were under as their parent conglomerate implemented their unbundling strategies.<sup>25</sup>

In many cases, industrial corporate leadership of the time were mainly interested in securing the supportive rents that were required from the state and were not prepared or (in some cases) not capable of effecting other critical parts of the proposed strategies.

#### ***Industry setting the agenda***

An initiative in 2004 to establish a foundry cluster within Ekurhuleni did not bear any fruit and foundries remained unable (or unwilling) to collaborate effectively for much of the decade that followed. There is, however, a gradual recognition amongst industry players, perhaps brought on by the severity of the crisis within the industry, that a clustering is required to address the key challenges facing the industry (refer to the box below).

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<sup>24</sup> See IDC (1997a) to IDC (1997i) for more detail

<sup>25</sup> (See Zalk, 2017) for detail on how this impacted on the destruction of Dorbyl, the country's largest steel utilising engineering conglomerate at the time)

**Box 4: Recapitalise South Africa Cluster Programme**

The Recapitalise South Africa Cluster Programme is a private sector initiative supporting “a demand-driven revitalisation of manufacturing capacity in South Africa. The funding for the cluster will focus on the Cluster Development Programme<sup>26</sup> and Strategic Partnership Programme<sup>27</sup> incentives. The cluster members will also contribute through paying membership fees.

The RSA Cluster has established 3 non-profit namely the Electro Technical Industry Cluster, Rail Manufacturers Cluster and the Casting, forging and machining. The RSA Cluster Programme has applied to the dti for grant funding under the CDP for these clusters y.

Other clusters are also envisaged under the programme in the following sectors:

- Batch Assemblers and sub-components
- Fabrication
- Construction and structural steel
- Electrical components and cables
- Electronics and instruments
- Fabrications
- Pipe manufacturing and bending
- Business process services

All clusters in the cluster programme have their own constitution and codes of good practice and ethics. The programme also provides for the establishment of regional and local sub-clusters within the broader framework. Companies can join more than one cluster if they wish and the participation fee for each cluster is calculated based on the member’s annual turnover for the previous financial year.

The Casting, Forging and Machining Cluster, under the Recapitalise South Africa Programme, met for the second time in October 2017. Further cluster meetings are planned for November 2017 and February 2018. The cluster will be looking to develop a railcar project plan for local and export markets, which will include working with Transnet and other OEMs to understand rail bogie requirements. In addition, the cluster is looking to establish task teams on electricity and import replacement.

Different from the Recapitalise South Africa Programme, six of the clusters in the machinery and equipment sector developed through the South African Capital Equipment Export Council, based on member’s subscription fees (see section 2.2.3). These clusters are VAMCOSA (valves), SAMPEC (mineral processing), SWH-MANCOSA (solar water heaters), CEROST (rolling stock) and SASSES (shaft sinking). There is an additional cluster that does not fall under SACEEC’s umbrella, which is The South African Pumps Cluster (SAPC). The

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<sup>26</sup> The Cluster Development Programme (CDP) is an incentive programme that aims to promote industrialisation, sustainable economic growth and job creation needs of South Africa through cluster development and industrial parks.

<sup>27</sup> The Strategic Partnership Programme, a sub-programme of the Enterprise Investment Programme (EIP), is to encourage large private sector enterprises in partnership with government to support, nurture and develop SMEs within the partner’s supply chain or sector in order to be manufacturers of goods and suppliers of services in a sustainable manner.

SAPC aims to market local manufacture to state-owned enterprises (SOEs) and access the proposed capital spend of SOEs to grow local manufacture, create jobs, improve skills, and develop strong local companies that are competitive in export markets.

At present, clustering in the capital equipment subsectors is more advanced. While all organisations refer to themselves as clusters, each one in reality sits somewhere between a fully-fledged cluster and an industry association. Porter, 2000 defines clusters as “groups of companies and institutions co-located in a specific geographic region and linked by interdependencies in providing a related group of products and/or services.” Clusters are a natural manifestation of the specialised knowledge, skills, infrastructure, and supporting industries in enhancing productivity as the key determinant of sustaining high levels of prosperity in a location. A combination of supplier relations, common labour markets, rivalry, technological spill-overs, and learning effects affect the economic environment that companies face in clusters (Porter, 2000).

SAMPEC, for example, is a nascent cluster, very much at the start of the clustering process. While they are engaging heavily in the post Mining Phakisa supply development preparation process, more work is needed to convince companies to join SAMPEC as opposed to Mining Equipment Manufacturers of South Africa (MEMSA), which is a cluster of 16 mining equipment manufacturers that has coalesced around some very specific issues. The mineral processing industry is more diverse and therefore it is more challenging to settle on one or two clear value propositions that would benefit all the players in the industry. SAMPEC is currently not receiving any funding from the dti, even under the Cluster Development Programme. The initial thrust of the cluster is to address concerns around market access; R&D and innovation; skills and technical capabilities development; and value chain optimisation. These are complimentary pillars, designed to work in parallel to address the key challenges facing the industry, and to capitalise on the many opportunities that exist for its development. The ability of the cluster to deliver on all pillars may be constrained by funding – the cluster is charging its members R3 000 per annum.<sup>28</sup>

In contrast, VAMCOSA is a more established cluster. VAMCOSA (and MEMSA) members pay a much higher membership fee (up to R30 000/year) and therefore there is much greater interest among members to participate and make sure they are getting value for money. Like MEMSA, VAMCOSA is an “easier sell” given that the product range is not as diverse as mineral processing equipment. Therefore the challenges faced by valve companies are likely to be shared. The main objectives of VAMCOSA are to (i) promote localisation, (ii) promote export of locally manufactured valves and actuators, (iii) promote transformation and (iv) create a respected quality marque, which entails continually improving collective technology through research and development and working closely with the National Foundry Technology Network and the local foundry industry.

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<sup>28</sup> SAMPEC is considering its value proposition very carefully. They are relocating to the CSIR mining precinct based in Melville, Johannesburg, which is establishing itself as the “brains trust” for the mining industry in SA. The SAIMM (the Southern African Institute of Mining and Metallurgy) is also looking to move into the precinct. The Southern African Coal Processing Society, a forum established in 1967 to exchange ideas and to advance the use and processing of coal, has already moved into the precinct.

## **4.6 Amendments to Mining and Mineral Policies**

### **4.6.1 The Mineral Resources and Petroleum Development Act Draft Bill**

The Department of Mineral Resources gazetted the Mineral Resources and Petroleum Development Act (MPRDA) Draft Amendment Bill 2012 on 27 December 2012. Amendments to Section 26 empowered the Minister of DMR to:

- Determine the percentage per mineral commodity and the price in respect of such percentage, in a production cycle, as may be required for local beneficiation
- Impose that every producer shall offer to local beneficiators a certain percentage as prescribed.
- Provide consent for the export of designated minerals subject to conditions the Minister may determine

The intention was to align minerals policy with industrial policy relating to beneficiation and to transfer part of South Africa's mineral rents to secure a competitive advantage for the manufacturing sector.

Applied to iron ore mineral right holders, it would mean that a portion of the exported ore would need to be made available at a developmental price to steel manufacturers.

However, it is not clear whether any mineral policy-related instruments will be brought to bear to support industrial policy in the future since the DME/DMR have not only failed to utilise the existing beneficiation policy instrument in support of industrial policy since the inception of the MPRDA but they seemingly allowed ICT to steal AMSA's 2001 IDC-funded cost-plus ore advantage in 2009.

As at November 2017, the MPRDA Amendment Bill of 2012 is still to be finalised and enacted.

### **4.6.2 Empowerment Charter for the South African Mining and Minerals Industry**

A key finding in the study by Fessehaie, 2015, which was an input into the Mining Phakisa, was that with regards to local content procurement, mining houses were more concerned with ensuring that their suppliers were BEE compliant (i.e. ownership of 26%), regardless of whether they were manufacturers or distributors. Given the mining sector's procurement and contribution towards employment creation and industrial development, this is an important impediment to downstream firms producing mining inputs.

In June 2017 the revised draft mining charter was released by the Department of Mineral Resources. The revised Charter requires a mining license holder to have a B-BBEE ownership of 30% (up from 26%) and to achieve a minimum of 70% of total mining goods procurement on South African Manufactured Goods (defined as goods where at least 60% of the value added during the assembly and/or manufacturing of the product is realised within South Africa). In parallel, mining license holders must procure locally 70% of mining goods and 80% of services from BEE compliant entities (up from 40%), among other changes. The new charter is faced with opposition and at the moment is under review, in consultation with the Chamber of Mines. It will be important for the dti to ensure that strong local content criteria are included such that they are not overwhelmed by BEE criteria, as has been the practice over the past two decades.

Similar to other designated sectors, the mineral processing equipment sector comprises firms that manufacture locally and those that import for distribution. The challenge is that a significant number of companies in the mineral processing industry are importing fabricated products, while a few of the larger firms (such as Weir) manufacture locally. As a result, achieving the required 70% local content will be challenging for some firms.

Furthermore, equipment requires inputs such as natural rubber and certain kinds of polyurethane that have to be imported as they cannot be sourced locally. For inputs which could be produced locally over time such as polyurethane there is a question about whether local suppliers could produce the volume required at a competitive cost. In addition to this, products such as crushers that are not made locally (due to scale) are imported.

SAMPEC does note that it is unlikely that the industry will achieve 70% local content in every product category after three years as stipulated in the mining charter. Currently the downstream suppliers are not competitive vis-à-vis international suppliers, such that meeting local content will be at a high cost for firms in the mineral processing industry.

There is need to address the contentious clauses in the new mining charter as this has a direct impact on the level of investment made by firms in the industry. Furthermore, the longer the policy discussions go on for, the lower the confidence in South Africa as an investment destination. This was also echoed in the 2016 Fraser Institute Survey of mining companies, which ranked South Africa 91 out of 104 in terms of “*uncertainty concerning the administration, interpretation, and enforcement of existing regulations*” (The World Bank, 2017).

#### **4.7 Political economy and transformation in metals sector**

Structural transformation is an important lever to not only diversify the industrial profile of the economy, but can also be leveraged off to develop a more inclusive economy that will increase participation of the majority.

The high levels of concentration, ownership and control in the South African economy are also evident in the metals, machinery and equipment value chain as already discussed in section 2.2. The upstream industries are comprised of a few transnational corporations (with AMSA effectively being positioned to be a monopoly in the basic iron and steel industry). Foundries are mainly family owned, with some of the larger foundries having been established in the 1970s by private companies. While generalised machinery and equipment has more diversified companies, the specialised machinery and equipment segment remains highly concentrated (see section 2.2).

The main policy instrument that has been employed to build a more inclusive economy is the broad-based black economic empowerment (B-BBEE) policy. B-BBEE policy objectives encompass direct empowerment (ownership and management control), human resources empowerment (employment equity and skills development) and indirect empowerment (preferential procurement, enterprise development and socio-economic development). Companies have adopted different approaches to meeting transformation requirements and the extent of which has tended to depend on whether government is an important customer. Ownership and supplier and enterprise development have become more important following the implementation of the 2015 B-BBEE Codes of Good Practice. Both categories account for 40 points out of an available 105. Companies that have at least 100 points are

considered level one contributors, while those that have fewer points are between level 2 and level 8 contributors.

The policy has also been embedded into various policy levers such as investment and procurement programmes. For example, the preferential procurement (PPPFA Regulations 2017, see section 4.1) makes provision for 30% of contracts for designated products should be awarded to companies that are B-BBEE compliant. The 2017 draft mining charter (see section 4.6) also requires licence holders to have B-BBEE ownership of 30%.

Despite the presence of these policies, the current structure of the South African economy excludes participation of the majority of the population, which is mainly black (Roberts, 2016).

The Black Industrialist Programme, facilitated by the dti, makes a concerted effort to develop black industrialists through access to finance for working capital, investment grants and export support as well as access to markets and contracts.<sup>29</sup> Potential receipts of the funding apply to the dti, who then screen the applications and award the funding to industrialists in selected sectors, including designated sectors for localisation. Consequently, the success of the programme is varied according to industry interviews undertaken in 2016.

### ***Implementing transformation***

Since the implementation of B-BBEE in 1998, transformation has been minimal by any reasonable standard. At the foundry and machinery and equipment sectors, transformation has been slow for various reasons. In the case of foundries, for example, less than 10% of businesses are black-owned while very few companies in the valve mineral processing sectors are BEE compliant according to estimates provided industry stakeholders.<sup>30</sup>

In the foundry sector, a number of companies are family-owned and there is perhaps a “natural” reluctance on the part of the owner to cede control, despite the benefits that significant or majority black ownership would bring. There is also a tendency for owners of family-run businesses, especially in bad times, to overestimate the value of their companies based on past performance rather than current value or future short-term profitability, further putting the brakes on deals that could be made.

In the machinery and equipment sectors the main driver of black economic empowerment appears to be skills development and enterprise development. With regards to enterprise development, some machinery and equipment manufacturers are developing black industrialists through incubation programmes, where a business develops two or three black owned businesses to supply a particular component. The existing businesses support the black industrialist by providing facilities, supporting quality control or guarantee the purchase of orders as a guarantee (see box 5). The incubation programme assists with the development of black businesses and as such will be vital in changing ownership in the machinery and equipment industry, if implemented in a sustainable manner.

The poor performance of the downstream industries do not make them a lucrative investment for partnering or acquisition by black entrepreneurs. This is mainly due to low profitability and low capacity utilisation linked to low demand. . In the case of foundries,

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<sup>29</sup> [http://www.dti.gov.za/economic\\_empowerment/docs/Purpose\\_BIP.pdf](http://www.dti.gov.za/economic_empowerment/docs/Purpose_BIP.pdf)

<sup>30</sup> Based on insights from in-depth interviews with industry stakeholders

capacity utilisation rates are so low that investing in a foundry, which would typically require significant investment in plant and machinery, is simply not attractive. Even in the capital equipment sector, returns on investment in the current climate are below those that might be achieved in investing in other areas of the economy. The situation is compounded by a limited pool of potential investors who would not only provide capital and strengthen compliance, but would also meaningfully participate in the day-to-day running of the business (findings from in-depth interviews).

**Box 5: Promoting transformation in the Gauteng manufacturing industry**

The Gauteng Growth and Development Agency (GGDA) entered into a partnership with the South African Capital Equipment Export Council (SACEEC). The main thrust of the partnerships is to increase market access opportunities for the industry; increase firm-level competitiveness of manufacturing clusters; support and enhance the R&D and innovation capabilities of the industry and to support economic transformation in the industry.

In order to achieve the pillars pertaining to building capabilities in the industry and driving transformation, SACEEC's members are upgrading and integrating existing and emerging black-owned, predominantly township-based companies into the formal manufacturing sector in Gauteng.

So far, SACEEC has identified 40 companies and is conducting a gap analysis of each one. The owners will then be placed in a mentorship programme where they will be taught core business skills over an 18-week period. Each business owner will then be assigned to a SACEEC member who will meet him once a week or once every two weeks for one-to-one mentoring.

*Source: SACEEC website and key respondent interview*

In cases where direct sales to government entities are minimal, companies that already have a high B-BBEE rating are preferring to expand their export markets rather than attempt to meet the criteria of what is perceived to be an increasingly stringent transformation agenda. Other companies that are more reliant on business from state contracts, are finding alternative routes to meeting the SOCs procurement policies. A case in point is the growth of B-BBEE compliant middlemen who act as intermediaries between white-owned companies and state entities. This detracts from the owner's ability to maximise their business operations and invest. The manner in which companies achieve B-BBEE compliance in terms of ownership and control is appears to be undermining the objectives of increasing productive participation of the majority in the economy, only benefitting a few. Furthermore, such deals undermine participation in the economy as they are profit-driven and not development-oriented. Subsequently, this has a direct impact on local firm's international competitiveness relative to companies in other countries that may not have to meet these requirements.

The level of transformation in South Africa still has a way to go. In order to achieve transformation, the Black Industrial Programme recognises the need for access to finance and orders. Furthermore, there is also a strong need to develop expertise and business-related skills. Skills transfer will ensure that the black equity holders understand the structure of the company and the industry, while business skills will help them develop long-term strategies that will yield positive results for the business and the economy.

Our research also suggests that the growth and employment potential of some white-owned firms with competitive capabilities that operate in segments of the machinery and equipment sectors is being constrained by their inability to access state-funding and orders because they are not B-BBEE compliant. Small and medium sized family-owner/operator businesses have very specific sociologies and dynamics which militate against "outsider" involvement, irrespective of whether they are black or white family owned. These complexities seem to be recognised by some industry associations and we are aware that some preliminary discussions have taken place between SEIFSA, SAMPEC and the Small Business Institute (Formerly the Afrikaner Handelsinstituut - AHI) which may initially centre on firm-level surveys to assess the nature and scale of the problems and then develop programmes to address these. Such initiatives should be actively supported and it does suggest that there is a need for a facilitation-type initiative around this issue which policymakers should support.

## **5 Conclusions and recommendations**

This paper analysed the evolution of South Africa's metals, machinery and equipment (MME) value chain over the past three decades showing the strengths and weaknesses of its internal linkages and the chain's strong relationship with other sectors (Section 2). It has further considered the level of transformation in the sector (Section 3), and sought to understand outcomes through an analysis of key issues along the value chain (Section 4).

### **Structural transformation**

In performance terms (Section 3), the upstream sectors have retained their globally competitive capabilities through substantial investment, organisational restructuring, retrenchments and product rationalisation. In contrast, the performance of the downstream foundry and machinery sectors has declined, reflected by increased import penetration and a loss of production capabilities over the past three decades. However, the strong growth in machinery exports into the SADC region suggests considerable future growth potential.

Notable upstream structural change includes increased labour productivity, product rationalisation and increased market dominance by ArcelorMittal (Section 3.4.1). In the intermediate foundry sector there has been a large reduction in the number of foundries and in foundry output since 2008, with substantial import penetration (Section 2.2.2).

The single biggest development challenge is growing the diversified machinery and equipment sector. Growth in this sector creates employment, including in related services such as in engineering and design. There has been rationalisation of the machinery and equipment sector over the past two decades and a loss of some capabilities. However, there are core capabilities and export competitiveness in the mining capital equipment and mineral processing equipment sub-sectors (Section 2.2.3). The sector has thus developed islands of capabilities rather than clustering of capabilities in the sector.

### **Policy, political economy and way forward**

The lack of structural transformation in the MME value chain has been against the backdrop of fragmentation of policy, which – on balance – has provided support and incentives to the upstream sector to the detriment of downstream sectors, together with a lack of support for

downstream sectors in an economy which liberalised and has increasingly internationalised, opening it up to substantial competition.

Upstream sector competitiveness has been underpinned by large scale investment in the 1990s to upgrade plant and equipment, supported by investment incentives and IDC-funded co-investment (Section 4.3.1). However, this advantage has been eroded in the last decade, with upstream firms facing financial difficulties in 2016 and 2017 arising from what appears to be a profit maximising/asset stripping approach during the commodity super-cycle. Much of the 1990s investment support was conditional on the recipient firm committing to supply downstream firms with competitively priced metal inputs. However, this did not happen due to a combination of inadequate management of the compliance system as well as upstream firms active resistance.

While investment incentives have also been offered to downstream sectors, these have not resulted in any significant industry-wide structural change for several reasons. Many downstream firms emerged with weak balance sheets during the conglomerate unbundling of the 1990s and were unable to modernise quickly enough (Section 2.2).

There is a ***need for policy coherence and implementation to benefit downstream producers***, aligning policy and licencing regulations (particularly mineral resource-related) with industrial policy and local manufacturing objectives. This includes finalising the mining charter and providing certainty for firms in the mineral processing sector as the changes in ownership and local content has a direct impact on the investment and/or relocation decisions by firms. Importantly too, the PPS needs to be replaced with a time-bound, manageable system that works (i.e., that limits the scope for abuse and provides quality scrap to foundries at a developmental price).

Policy needs to learn from past mistakes. The South African steel industry has been impacted by three global steel commodity price cycles since the 1990s, which witnessed a historic low around 2001, 2008 and again in 2015. During the 2001 crisis, policy makers entered into an agreement (Grand bargain I) with LNM-Ispat (subsequently renamed Mittal Steel SA and later becoming ArcelorMittal SA or AMSA), allowing them to acquire a majority stake in Iscor subject to agreement to pass on the benefit of (IDC-financed) cost-plus iron ore to downstream steel users through an agreed developmental steel price.

Mittal Steel SA effectively violated the agreement through protracted negotiations with the dti which were never concluded during which it benefited from the state-funded cost-plus iron ore agreement and rocketing steel prices.

Between 2012 and 2016, global steel export prices dropped to 10-year lows after which global steel prices turned upward. To support the upstream sector, government struck a Grand Bargain II with AMSA whereby AMSA committed to adopt a production cost-based formula plus a reasonable capped margin in exchange for settlement of unresolved competition-related matters, increased tariff protection and a policy directive that only South Africa steel be utilised in publicly-funded infrastructure projects. It appears that policy makers are repeating the error of 2001 since the agreement favours AMSA because, as in 2001, steel prices turned upward in 2016, AMSA is now effectively a monopoly as its main domestic competitors are in or close to bankruptcy and the agreement is only binding to 2022.

**Figure 14: Global Steel price - Hot Rolled Coil (US\$/ton) - 2000 to 2017**



Source: [www.steelbenchmarker.com/files/history.pdf](http://www.steelbenchmarker.com/files/history.pdf)

At a global level, ArcelorMittal's corporate strategy has been to consolidate its position in the face of declining steel prices which turned upward in 2016. During the 2008-2016 downturn, it successfully managed to retain full control of its South African subsidiary while clearing its potential competition-related liabilities at an effective discount. Future profits are underpinned by secured tariff protection for its local production until at least 2021 with corresponding projected rising global steel prices. With its major domestic market competitors either actually (Highveld) or technically (Scaw) bankrupt, AMSA is cherry-picking the latter's assets and positioning itself to absolutely dominate the domestic market. Viewed in this light, its steel output decrease by 0.4mt (6.4mt to 6.2mt - 2016) and its declared 1H2017 loss of R2 223 million is likely to be reversed relatively quickly if global steel prices continue to rise on the back of USA, EU and China market recovery.

The value chain, particularly the more **concentrated upstream segment** has demonstrated propensity to collude on prices and market sharing. Of note is the ArcelorMittal abuse of dominance case over much of the period under review. There is a need for **effective competition policy that disciplines conduct**. In August 2016, an agreement was struck which also involved the settlement of all pending Competition Commission issues, as detailed in Section 2.3, and this included the long steel cartel, the scrap metal cartel, the flat steel cartel, wire rod price discrimination, and an investigation into excessive pricing. As per the agreement, AMSA committed to pay a penalty of R300m per annum over 5 years starting in 2016. Monitoring of the agreement is key. More broadly, the amendments to the Competition Act, led by EDD will hopefully ensure that iron ore price concessions are passed onto the downstream industry.

**Domestic demand is a key driver of growth of the value chain**, which is dependent on demand from state-owned infrastructure and logistics companies, local government (pumps and valves), mining companies (mineral processing and material handling equipment), and

private companies in the construction, engineering, petrochemical, and aerospace sectors. (Section 4.1) Our research reveals a **failure of both public and private sector initiatives to increase domestic procurement** from this value chain. State procurement policies have been (at best) fragmented, poorly implemented and weakly monitored and evaluated. At worst, state entities have actively evaded their responsibilities to increase local content. (Section 4.1). Given the MME value chain's important backward linkages with mining, a further impediment to increasing domestic procurement lies with the failure of mineral resource policy makers to leverage the state's ownership of mineral rights in favour of increased beneficiation and increased procurement of domestic manufactures by mining licence-holders (Section 4.6).

State-owned companies are a key source of demand. Any policy aimed at arresting the decline of the downstream metal industry, should prioritise import penetration and the lack of state support companies in adhering to **local procurement policies**. Without resuscitating demand for locally manufactured products, any other industrial policy intervention focused on skills, investment or technology will, at best, make a marginal difference to the industry as a whole. The current structure of procurement at state owned companies and the municipalities encourage buyers/procuring officers to purchase equipment and supplies based on cost and not local content threshold. There is an urgent need to consider carefully and revise where necessary the incentives facing buyers in the context of how the performance of SOCs in particular is measured.

Procurement practices in SOCs and local municipalities must be (re)aligned with designation and the overarching priority of structural transformation of the economy. This includes **centralising and/or coordinating procurement** for common products, particularly consumables, in order to provide firms with scale to achieve economies of scale.

In addition, interventions must develop workable solutions to improve the effectiveness of current local content policy. These would include making it much more difficult for bidders of government procurement contracts to receive exemptions and ensuring that there is a credible threat of sanction in the case of non-adherence, but these require investment in improving verification capabilities of SABS. As such, the capacity and funding process for verification needs to be clarified.

There is an urgent need to **improve the competitiveness of downstream firms and to re-establish the link with OEMS**. The competitiveness of the energy-intensive segments of the value chain has been adversely impacted by steeply rising electricity costs (Section 4.2.1). Firms that are supplied by municipalities rather than by Eskom are disadvantaged further because electricity is an important revenue generator for local government and also because of the relatively poor and unreliable state of municipal electricity distribution infrastructure.

In addition to energy costs, high material input costs have also undermined competitiveness (Section 4.2.2) particularly for the intermediate foundry industry. The high costs are partly due to import parity pricing practices of upstream firms and also due to the high export prices targeted by scrap metal merchants.

To complement demand resuscitation initiatives, policy interventions must also focus on making the downstream sectors more competitive. For foundries, this includes lowering the

price of non-ferrous scrap, investment upgrading and reducing the cost of electricity. For capital equipment, there is an urgent need to provide a competitive and responsive aimed at boosting competitiveness.

As far as **improving access to finance** is concerned, there is a need for a “foundry recapitalisation programme” that recognises the need for investment in new machinery and technology in foundries that do not qualify for support from the “IDC Downstream Steel Industry Competitiveness Fund” (i.e., that do not meet the investment criteria of the Fund). Apart from the foundry characteristics mentioned above, other conditionalities should be limited as much as possible.

Even though the capital equipment sector is sensitive to changes in commodity prices, there are other mechanisms that the government can implement to encourage investment and innovation. One of these is providing **access to export finance**. Export-finance is necessary when firms enter the export market, as other countries are already providing favourable export-finance to their companies, reducing the attractiveness of South African firms. This therefore also speaks to **regional integration** initiatives.

Increasing competitiveness requires **reducing the cost of electricity** and the variance between electricity supplied by municipalities and electricity supplied directly by Eskom. For example, the dti could work with NERSA and the metropolitan municipalities to develop an explicit “foundry friendly” tariff applicable to all foundries regardless of where they are located that reduces electricity costs for foundries to, or near to, Eskom levels. However this may be difficult to achieve given the constitutional and local government financing issues relating to electricity distribution industry.

There is a need to **close the gap between the needs of OEMs and producers** through supplier development, and industry/government/academia working together to build technical competencies, including skills training.

Industry capabilities to increase investment in research and development and through skills development could be more appropriately focused through a range of **cluster initiatives**, and piggy-backing on existing industry-led initiatives such as the South African Mineral Processing Cluster, the Valves and Actuators Manufacturing Cluster as well as the Casting, Forging and Machining Cluster. The 1998 cluster initiatives did not get traction within the MME value chain due to the considerable flux that individual firm managers were under as their parent conglomerate implemented their unbundling strategies. In many cases, industrial corporate leadership of the time were mainly interested in securing the required supportive rents that were required from the state and were not prepared or (in some cases) not capable of effecting other critical parts of the proposed strategies.

A top priority must therefore be committed long-term support for machinery and equipment clusters which are grounded in partnerships at the local level, between firms and with local institutions engaged in training, research and testing and certification. Should firms be able to pool resources to address common problems, this will drive research and development, technology spill overs and productivity enhancements. There are industry-led cluster initiatives that are underway that the government can leverage off.

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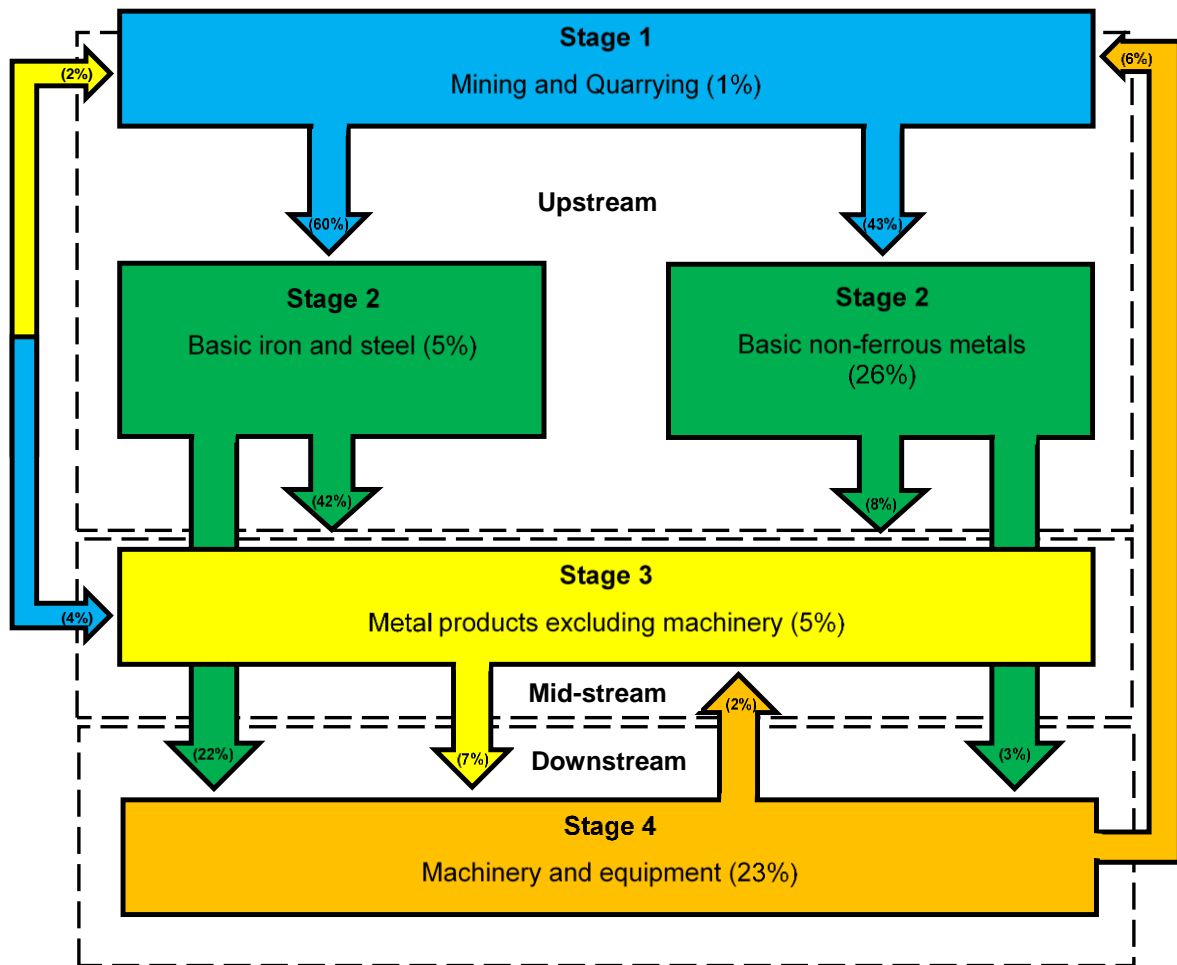
## Annexures

### Annexure 1: Interview schedule

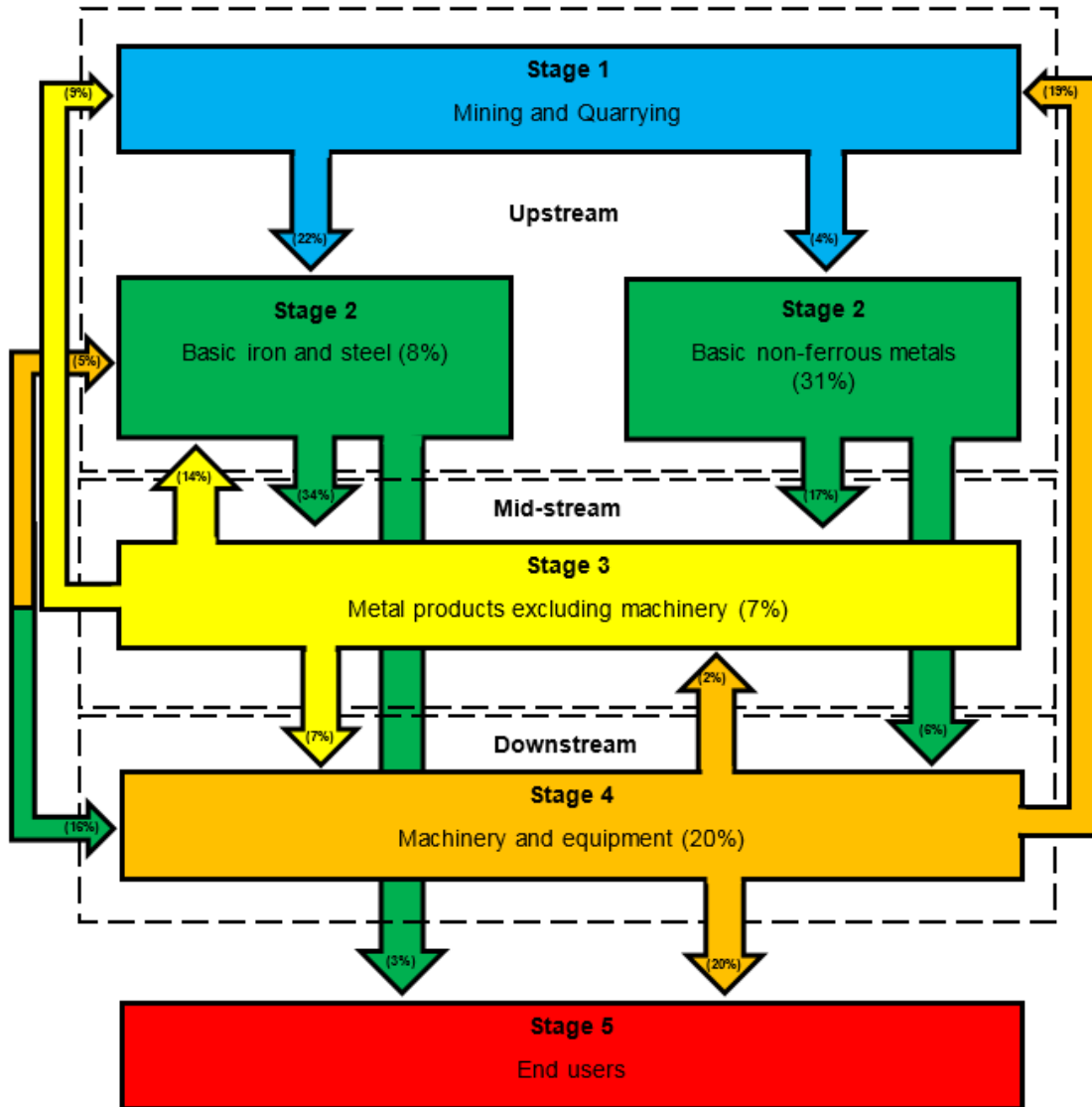
Stakeholder	Institution/individual interviewed
Government	Industrial Development, Department of Trade and Industry
	Metals Value Chain, Industrial Development Corporation
	merSETA
Industry representative	Steel and Engineering Institute in South Africa
	South African Capital Equipment Export Council
	South African Mineral Processing Cluster
	Valves and Actuators Manufacturers Cluster of South Africa
	South African Institute of Foundrymen
	National Foundry Technology Network
Downstream	Weir Minerals
	Bell Equipment
	Premier Valves
	RGR Technologies
	Naledi Inhlanganiso
Other	Sandy Lowitt
	Steve Jardine

Annexure 2: Intermediate input and output linkages

Intermediate Input Linkages



## Intermediate Output Linkages





**Annexure 3: Carbon Steel production in South Africa - Key firms**

Company	Plant	Metal capacity (1000 tons/a)	Products <sup>31</sup>
ArcelorMittal SA (AMSA)	Newcastle works	2800	Long products
ArcelorMittal SA (AMSA)	Vanderbijlpark Works	4440	Flat products
ArcelorMittal SA (AMSA)	Vereening Works (special steel)	370	Long products
ArcelorMittal SA (AMSA)	Sadhanha works	1200	Flat products
Duferco Steel Processing Ltd	Saldanha Bay		
Highveld Steel & Vanadium HS&V (Evraz Group)	Witbank	1000	Long products
Columbus Stainless (Acerinox Group)	Middelburg Mpumalanga	1000	
Scaw Metals	Dinwiddie, Germiston	600	Long products
Hall Longmore	Wadeville, Germiston & Duncanville, Vereening		
Robor (Pty) Ltd	Gauteng		
Davsteel, Division of Cape Gate(Pty)Ltd	Vanderbijlpark	485	
Davsteel, Division of Cape Gate(Pty)Ltd	Zonderwater	40	
Agni-Steels	Coega Industrial Development Zone	100	Long products
Safal Steelworks (SA Metal Group)	Cato Ridge		
SA Steelworks (SA Metal Group)	Cape Town	100	
Veer Steel Mills (Pty) Ltd / India Steel (Pty) Ltd	Alberton	144	Long products
Fortune Metaliks SA	Nigel	60	Long products
Unica Iron & Steel	Babelegi	40	Long products
Pro-Roof/SA Steel Rolling Mills	Vereening	220	Long products
Dunswart Steel	Benoni	150	
Cape Town Iron & Steel Works (Cisco)	Cape Town	280	
Microsteel (Pty) Ltd (Stainless steel) (Mothballed 1998)	Kwazulu Natal	100	

Source: Jourdan, P. (2017), OECD (2013), Research during this project

<sup>31</sup> Long steel products are mainly used in the construction industry, whilst flat steel products are used in the automotive, armament, mining, construction and capital equipment industries among others. Flat products means the primary flat carbon steel products produced in coil or sheet form at steel mills, primarily hot rolled coil, cold rolled coil, hot rolled plate, hot dit galvanized coil and pre-painted coil. Long products include blooms, billets, forgings, structural sections, round bar in lengths, grinding balls/bars, flat - roof sheets and railway sleepers.

## **Annexure 4: Profiles of the “Big Four Foundries**

### *Atlantis Foundries*

Atlantis Diesel Engines was established in 1979 by the South African government and licensed to manufacture Mercedes Benz and Perkins diesel engines for the commercial and agricultural markets and for military vehicles such as the Ratel IFV, Buffel, Casspir and SAMIL Trucks. In 1983, the Ferroform Foundry Group built a foundry, which was later sold to the Murray and Roberts Foundries Group. In 1985, the foundry was purchased from the Murray & Roberts Group and incorporated into ADE. In 1999, ADE was acquired by DaimlerChrysler and became known as Atlantis Foundries. In 2013, Atlantis incorporated robotics within the production process to improve output capacity and product quality and commenced with plant upgrades and next-generation product implementation programs. In 2015, Atlantis Foundries was sold by Daimler AG (Mercedes-Benz South Africa) to Neue Halberg-Guss GmbH, a German foundry group whose core business is engine block casting. Atlantis Foundries has continued to produce heavy-duty castings for Daimler Trucks as part of a seven-year supply agreement.

### *Autocast*

Founded in 1973, Autocast specialises in the supply of aluminium and iron castings to the local and international automotive industry. In 2013, following significant investment in melting capacity, moulding lines and heat treatment technology, Autocast started production of high chrome grinding media in Port Elizabeth and Brits. In 2014, Autocast was purchased by the IEP Group (Investec Equity Partners), a South African investment holding company, as an IEP Portfolio Company. In addition to its ferrous, non-ferrous and mining divisions, Autocast also offers tooling design and manufacture, casting simulation and advanced metrology services to both external clients and its internal divisions.

### *Naledi Inhlanganiso Foundry*

Naledi Inhlanganiso Foundry (NI-Foundry) was previously known as Guestro Casting and Machining, a division of Dorbyl Ltd. In 2013, and in partnership with the IDC, the Naledi Inhlanganiso Group, a 100% black-owned company focused on iron and steel manufacturing for the rail, mining, energy and automotive market sectors, purchased the majority of the shares in the previously JSE-listed Dorbyl Ltd of which Guestro Casting and Machining was the last remaining manufacturing operation. In July 2014 the company was formally delisted and the consortium embarked on a significant investment programme in new capital equipment and facilities. Historically the foundry supplied the auto market and specialised in the production of brake drums. Recently, however, the company was awarded a five-year contract to supply grinding balls to Eskom, which entailed additional investment, including a new pouring system that effectively separates the ferrous and non-ferrous metal streams.

### *Auto Industrial Group (Auto Industrial Foundry and Isando Foundry)*

In 1970, the Auto Industrial Group began supplying the automotive industry as Auto Industrial Machining. Today, the company is best known for its machining and assembly, ductile and grey iron castings and hot steel forgings of components such as brake discs and drums, steering knuckles, wheel carriers, flywheels, wheel hubs and pinions. In 1988, the company acquired its first foundry, Auto Industrial Foundry. In 2009, the company acquired a second foundry plant, Isando Foundry. The company has had various owners and partners during the course of its history. These included ZF Lemfoerder and Brembo with ZF being the owner since 2006. In 2013, ZF Friedrichshafen AG, the holding company of ZF, decided to realign its business and sell its South African subsidiary. Local private equity investment company, Trinitas Private Equity, purchased a 70% stake in the Auto Industrial Group with the remaining 30% of the business sitting in the hands of a management equity pool. The Auto Industrial Group has spent over R50 million in the last two to three years on new equipment and systems for the two foundries. Further investment in an automatic moulding line is being planned depending on whether the company

wins future projects from the OEMs and the government commits to an extension of the Automotive Production and Development Programme (APDP) beyond 2020.

#### Annexure 5: Foundry Electricity Calculations

**Table 13: Ekurhuleni and Eskom electricity charges comparison**

<b>Ekurhuleni Tariff D &gt; 1MVA</b>				
	<b>Small foundry</b>		<b>Large foundry</b>	
	<b>1 Jul 2017 - 1 Jun 2018</b>		<b>1 Jul 2017 - 1 Jun 2018</b>	
	<b>Summer</b>	<b>Winter</b>	<b>Summer</b>	<b>Winter</b>
<b>Maximum Demand Charges</b>				
Maximum Demand Charge (highest in month)	60.92	60.92	56.42	56.42
Network Access Charge (highest, rolling 12 months)	36.55	33.83	33.83	33.83
<b>Consumption Charges (kWh)</b>				
Peak Usage	1.3801	3.7108	1.2782	3.4367
Standard Usage	0.9054	1.303	0.8392	1.206
Off Peak Usage	0.714	0.7856	0.661	0.7277
<b>Administrative Charges</b>				
Fixed Charge	2486.65	2486.65	3736.76	3736.76

Source: Ekurhuleni Tariffs, click [here](#).

<b>Eskom NIGHTSAVE</b>					
		<b>Small foundry</b>		<b>Large foundry</b>	
		<b>1 Jul 2017 - 1 Jun 2018</b>		<b>1 Jul 2017 - 1 Jun 2018</b>	
		<b>Summer</b>	<b>Winter</b>	<b>Summer</b>	<b>Winter</b>
<b>LOAD CHARGES (kVA)</b>					
<b>Related to Installed Capacity</b>					
TX Network Capacity Charge	>500	7.28	7.28	7.09	7.09
Network Capacity Charge	≤ 300km, > 500V & < 66kV	14.51	14.51	5.18	5.18
<b>Max Demand used in Peak Period (kVA)</b>					
Network Demand Charge (Peak)	≤ 300km, > 500V & < 66kV	27.52	27.52	9.6	9.6
Energy Demand Charge (Peak)	≤ 300km, > 500V & < 66kV	28.3	202.45	27.27	195.08
<b>Total charges related to Maximum Demand (kVA)</b>		70.330	244.480	42.050	209.860
<b>CONSUMPTION CHARGES (kWh)</b>					
Energy Charge(usage)	≤ 300km, > 500V & < 66kV	0.508	0.651	0.502	0.6442
Ancillary Charge		0.004	0.004	0.003	0.003

Affordability Subsidy Charge		0.0287	0.0287	0.0287	0.0287
Electrification and Rural Subsidy		0.071	0.071	0.071	0.071
Environmental Levy Charge					
<b>Total charges related to Consumption (kWh)</b>		0.611	0.754	0.605	0.747
<b>ADMINISTRATIVE CHARGES</b>					
Admin Charge/Day		81.870	81.870	81.870	81.870
Service Charge/ day		181.660	181.66	181.660	181.66
<b>Total Administration Charges</b>		263.530	263.530	263.530	263.530

Source: Eskom, Click [here](#)

**Table 14: Electricity consumption comparison, by foundry size**

<b>Medium-to-large sized foundry</b>					
	<b>Scenario 1</b>	<b>Scenario 2</b>	<b>Scenario 3</b>	<b>Scenario 4</b>	<b>Scenario 5</b>
Tons / hour	8	8	8	8	8
Maximum demand (MVA)	8	6.5	6.5	6.5	6.5
Efficiency	75%	75%	75%	75%	75%
Working days per year	235	235	235	235	235
Shift pattern	2	2	2	2	3
% Melting Losses	3	3	3	3	3
% Rejects	10	10	10	5	5
% Running System Returns	30	30	30	25	25
Total tons melted	22,560	22,560	22,560	22,560	33,840
Target kWh/ton melted <sup>1</sup>	1,450	1,450	1,100	1,100	1,100
Avg Max Demand (kVA)	6	6	6	6	6

<b>Small foundry</b>				
	<b>Scenario 1S</b>	<b>Scenario 2S</b>	<b>Scenario 3S</b>	<b>Scenario 4S<sup>1</sup></b>
Tons / hour	1	1	1	1
Maximum demand (MVA)	1	1	1	1
Efficiency	75%	75%	75%	75%
Working days per year	235	235	235	235
Shift pattern	1	1	2	1
Total tons melted	1,410	1,410	2,820	1,410
Target kWh/ton melted <sup>2</sup>	1,450	1,100	1,100	1,100
Avg Max Demand (kVA)	0.75	0.75	0.75	0.75

Source: Foundry Concept, 2017

<sup>1</sup>Scenario 4S is based on melting at night while Scenario 2S is based on melting during the day.

<sup>2</sup> Target kWh / ton melted refers to the energy required to melt one ton of metal. The figure used in the base case (scenario 1) is comparable to Russia and higher than most European foundries.