

**THE SCOPE FOR BENEFICIATION OF MINERAL RESOURCES IN ZIMBABWE:
THE CASE OF CHROME AND PLATINUM**

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DRAFT

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EXECUTIVE SUMMARY

The Zimbabwe government has, over the past five years, been exploring possible methods of ensuring beneficiation of minerals, with policies targeting mostly platinum and chrome mining¹. This is intended to unlock the backward and forward linkages between the mining sector and the manufacturing sector as well as to create jobs. Measures to force beneficiation include a ban on the export of raw chrome that was introduced in 2011 as well as a 15% export tax that was imposed on platinum exports (both concentrates and matte) in January 2015. Both these policies have since been reversed, motivating the need for exploring whether beneficiation of minerals, as currently provided for by policy, is indeed feasible in Zimbabwe. This paper takes a case study approach, focusing on platinum and chrome, to extract any policy recommendations to ensure that beneficiation is properly contextualized within the country's socio-economic environment.

Chrome in Zimbabwe is mostly sold as ferrochrome, even though a significant portion is also exported as raw ores. About four major smelters, namely Zimbabwe Mining and Smelting Company; Maranatha; Zimbabwe Alloys; Riochrome, and Oliken in Kwekwe have been the main chrome smelting firms. However, there have been new entrants into the industry, which include some small-scale smelter installations exploiting Dyke ores. Afrochine Smelting (Pvt), a subsidiary of Tsingshan Iron and Steel Group of China, recently entered the market, with the entry mostly attributed to the ban on raw chrome that had starved the firm of raw materials in the international market.

Chrome output, which had been increasing following dollarization in 2009, started decreasing after 2011 when the ban on raw chrome was introduced. By 2015 when the ban was eventually lifted, chrome output had decreased by about 64.8% from its peak level in 2011. The period when the ban was in place also coincides with the closure of smelters, who ideally should not have been affected by the ban as they exported ferrochrome. This appears to suggest that the government policy did not help the smelting industry as intended.

Volumes of ferrochrome exports between 2010 and 2015 show that there was a dip in 2011 due to the policy shock, but exports were able to recover in 2013 and 2014 as the two new players started smelting. The ratio of the chrome ore and concentrates to ferrochrome exports, which was about 0.2 in 2010 (and zero between 2011 and 2015 due to the ban), did not recover despite the lifting of the ban, as it was only at 0.06 during the first quarter of 2016. The policy was thus able to increase ferrochrome exports relative to the ore, although it failed to stimulate the ferrochrome exports to significant levels.

Platinum mining in Zimbabwe is mostly done by three subsidiaries of South African firms, namely Zimplat, Unki and Mimosa, which are subsidiaries of Implats, Anglo Platinum and Impala Platinum respectively. Mimosa and Unki export platinum as concentrates while Zimplat exports as matte. Unlike in the chrome industry, the government is not content with the level of beneficiation at smelting level, and has given ultimatums for the mining firms to have a base metal refinery by 2017.

¹ In addition to gold, which is however less problematic as only a Government owned institution, Fidelity Printers and Refineries, has the sole mandate to export gold from Zimbabwe.

The platinum industry operated for about six months in 2015 while being subjected to an export tax of 15% which was later removed. Statistics show that there were no platinum exports in 2015 between May and December, with platinum exports only resuming in February 2016. The reaction by the platinum miners to the export tax was thus to stop platinum exports, which could also have helped in reversing the ban, as government was losing revenues from the export of platinum. Based on production values, platinum is second only to gold in Zimbabwe, but in terms of export revenues, platinum is a distant fifth after gold, nickel, diamonds and ferrochrome. This is also a source of the beneficiation pressure, as Government believes that there is currently little benefits from the export of the mineral relative to its value.

The study establishes that, as currently structured, Zimbabwe's beneficiation policy has generally failed to achieve results due to about six reasons:

- There is no overall coordinated policy to spur beneficiation. There is need for an industrial policy on beneficiation, which would be complimented by the minerals policy, as only an industrial policy can be cognisant of the attendant viability issues that need attention;
- There is need to make the platinum beneficiation industry an attractive industry for the players (carrot approach) compared to the current stick approach that appears to be blind to the investment requirements for beneficiation;
- There is need to enhance trust between the platinum mining firms and the government to dilute the current tension, which has seen policies which threaten the viability of the mining sector being passed. More cooperation between the mining firms and government would help produce a win-win situation to both parties;
- Government should also try to address the general policy bottlenecks that are currently affecting beneficiation. This includes access to critical infrastructure, reducing the cost drivers, clarity and flexibility of application of the indigenisation legislation to the beneficiation plant as well as fiscal incentives for reducing the return on investment period;
- The need for beneficiation should also be complimented by efforts to make sure that the beneficiated product would be able to get a market;
- The smelting capacity in the chrome industry is still too low for a ban on raw chrome. There is need for a phased strategy, where attracting more smelters into the industry should be the first step, followed by a gradual shift into refining. This also calls for some deliberate industrial policy strategies on smelting to make smelting attractive rather than forcing it through export bans.

1. INTRODUCTION

1.1 Background

Unprocessed minerals currently constitute the bulk of Zimbabwe's total export basket, despite a decline over the past years due to the falling international commodity prices, which has also affected mining sector profitability. Over the past five years, the Zimbabwe policy path in the mining sector has mostly been to explore methods in which the mining sector earnings from the export market could be cushioned against such fluctuations in international commodity prices. In addition, government is currently convinced that the backward and forward linkages between the mining sector and the manufacturing sector is very loose as minerals continue to be exported in semi-processed form, which also has a bearing on employment creation. The policy orientation of the government reflects a government that is convinced that there is potential for the mining sector to earn more revenues through beneficiation of minerals, which would also serve as a cushion against falling raw mineral prices. Such beneficiation of mineral products is also seen as an employment creation strategy, which augurs well with Government's resolution to create 2,265 million jobs between 2013 and 2018².

As a result, in January 2015, the Zimbabwe government imposed a 15% export tax on unbeneficiated platinum exports to force companies to process it locally. This move had been mooted for quite a while; in the 2014 National Budget Statement, the government indicated that it had given a two year window beginning 2013, for existing platinum producers to set up a platinum refinery plant in the country. The two year window was supposed to end in 2014, effectively implying that with effect from January 1 2015, unbeneficiated platinum exports would be subjected to an export tax as a way of enforcing beneficiation. However, this was later deferred, following extensive discussions between government and the mining companies. In announcing the 2015 National Budget Statement, this deferment was officially confirmed, with Government indicating that it was 'satisfied with the progress being made by the platinum producers to comply with the beneficiation policy', and given the resources needed to comply, the imposition of the export tax was being postponed and would only take effect after December 2016.

The introduction of the export tax in January 2015, therefore, came as a surprise, which government attributed to lack of cooperation among the platinum miners in indicating their beneficiation plans to government. It was only in July 2015 that the export tax was removed, after the platinum mines had come to an agreement with government that they would start the necessary processes towards setting up the beneficiation process. Zimplats, one of the three leading mining firms (a description of players in the platinum mining industry is done in section 5.2) for example, had committed that it would have a platinum refinery running by July 2016. In February, 2016, Zimplats however indicated that its refinery would no longer be commissioned in July 2016, as a result of viability challenges caused by low international platinum prices. This

² As reflected in ZANU PF 2013 Election Manifesto

is now expected to be in place in early 2017³. No such commitment has been publicly made by the other two platinum mining firms to date.

In 2011, the Government of Zimbabwe also introduced a ban on the export of raw chrome as a strategy to enhance beneficiation. Ferrochrome exports were, however, allowed as this was considered a significant value addition. The ban on export of raw chrome remained in force until June 2015, when it was removed. The removal of the ban was mainly pushed by calls by the small scale miners who used to earn a living from chrome mining but had abandoned the trade due to lack of demand for the raw chrome among the smelting firms. Further, the export earnings which were being derived from the raw chrome exports had been lost without being matched by any increase in earnings from smelted chrome.

It is within this context that this study is being undertaken. The study is an exploration of the feasibility of beneficiation in Zimbabwe as currently envisaged under the beneficiation policy. It takes a case study approach, focusing on platinum and chrome, to extract any policy recommendations aimed at ensuring that beneficiation is properly contextualized within the country's socio-economic environment.

1.2 Study objectives

The main objectives of the study include the following:

- to explore reasons for the current unsuccessful attempts by the government to have beneficiation in platinum and chrome;
- to explore whether the general operating environment in Zimbabwe is able to sustain mineral beneficiation;
- to suggest possible recommendations for enhancing beneficiation in Zimbabwe's mining sector, taking cognisance of the general operating environment.

1.3 Methodology

This study is mostly a qualitative research based on a review of literature on the various developments that have taken place in the mining industry over the past few years, with particular attention to the chrome and platinum minerals. This also includes a review of research that has been done in the two subsectors as well as the mining sector as a whole. The study also relied extensively on secondary data, especially published official data from the Zimbabwe Statistics Agency (ZIMSTAT) as well as from the Chamber of Mines (an independent association of the mining firms in Zimbabwe). Policy pronouncements governing beneficiation as well as recent developments with respect to beneficiation in the mining industry also provided input into this study. Thus the study is mostly desk based, with no formal interviews conducted with the players to gather their individual opinions as well as to ascertain the validity of some

³ 'Zimplats defers commissioning mothballed refinery to early 2017', Reuters, February 24, 2016 at website <http://af.reuters.com/article/commoditiesNews/idAFL8N163432>

conclusions drawn by the study based on available data⁴. The study is also a policy based study which does not go into the deep technical details on beneficiation and mining.

2. DEFINING BENEFICIATION OF MINERALS

To understand beneficiation, it is important to identify the distinct phases through which mining resources pass through (Figure 1). It is possible to export the mineral as ores, which would include a lot of unwanted material and therefore making the process costly relative to the value of the mineral. After the ore is extracted from the ground, the first line of processing leaves it in the form of concentrates. Many ores in Zimbabwe are exported as ores or concentrates, and these include iron, copper, nickel, lead, chromium, niobium, tantalum, vanadium and antimony. However, the concentrates can be further processed through smelting, to produce matte, which is a purified version of the concentrate and thus more valuable in terms of value per unit. The matte can be further purified using refinery plants to produce a refined version of the product, which can be easily utilized by the manufacturing industry to produce various products.

Figure 1: Typical stages for minerals



Source: PCTI (2014)

Depending on the policy thrust, there are different stages of Figure 1 which can be used to define beneficiation of minerals. Generally, there are different definitions of beneficiation in government policies, based on where it is felt that most of the feasible economic opportunities lie within the value chain. Beneficiation can thus be defined as the downstream transformative process which transforms a raw mineral into one or a succession of higher value products (Baissac et al, 2015, 2015). The South African Parliamentary Portfolio Committee on Trade and Industry defines beneficiation as the sum of local value added used in the exported product, capturing both backward and forward linkages (PCTI, 2014). Grynberg and Sekakela (2015), go further in coming up with a definition to distinguish the ‘processing’ of commodities from the ‘beneficiation’ of commodities. Where a mineral ore is simply processed prior to being passed on to user industries, that is, where raw materials are only ‘processed’ in a technologically related industry, is not regarded as beneficiation. Beneficiation would be the case where there is

⁴ Such engagements had not succeeded by the time the report was prepared, mostly due to the fact that this was an independent study which had not been commissioned by any institution to encourage compliance by the stakeholders

a process of transformation in which the processed commodity is converted into an entirely different product, generally in an unrelated manufacturing activity. Thus, using this line of argument, beneficiation would only occur at the final stage in Figure 1, with all the other stages being ‘processing’.

However, most policy thrusts by governments appear to accept some transformations within the stages prior to manufacturing to also qualify as beneficiation. This is important within the Zimbabwe context, where the whole process of beneficiation is tasked with the mining firms. If beneficiation can be at a stage where an entirely different product is developed, then the role of mining firms in beneficiation becomes debatable. For example, there are a lot of differences in terms of the technological requirements, expertise and inputs required at each of the different stages in Figure 1 prior to manufacturing. The process of producing concentrates might have different requirements, including expertise and know-how compared to refining (Grynberg and Sekakela (2015)). This also makes it important for policy to be clear as to who has to do the beneficiation; whether it is the mining firms, manufacturing firms or both.

The question of who has to do the beneficiation is typical from two perspectives. First, along the mineral value chain as shown in Figure 1, the resultant product might not be necessarily the same. Grynberg and Sekakela (2015) note that the World Customs Organization’s (WCO) Harmonized Commodity Description and Coding System (HS) classifies copper and nickel concentrate (HS 26) as mineral ores but matte (HS 74) is considered a manufactured product. Thus, a policy thrust on beneficiation can actually force mining firms to produce products that are actually products from manufacturing sector. Second, at investment, the mining firms may mostly ensure that they have mining and metallurgical skills, which are not enough for beneficiation as defined by the policy. Mining and manufacturing are thus clearly distinct industries, requiring different capital, skills and market configurations (Baissac *et al*, 2015), which policy need to take cognizance of. As the mining firm moves across the stages towards manufacturing, there is need to invest in other expertise different from those required to start operations.

3. WHY EMPHASIS ON BENEFICIATION?

The general thrust on beneficiation, which has also been adopted at the African continent level through the Africa Union’s Africa Mining Vision of 2009, is generally hinged on a number of anticipated benefits from beneficiation. Such benefits include the following:

Localising value chain benefits

The export of raw minerals generally implies that the exporting economies do not have the opportunity to enjoy all the value chain benefits associated with mining. Firms in the importing economies stand to gain as they add value and export final products to realise prices that are higher than the exporting economies. Thus, beneficiation would ensure that all such value chain gains are localised within the economy, thereby ensuring that downstream industries also grow and enjoy the profits which would otherwise have been enjoyed outside the national borders. As this happens, this would also create other multiplier effects benefits from increased income and expenditure which would also induce economic development.

Employment creation

Beneficiation of minerals is often pushed as a strategy for job creation, especially given that the mining industry is capital rather than labour intensive. Thus, beneficiation of raw minerals would foster the creation of downstream labour intensive industries which would use the mineral products as raw materials. Beneficiation would create backward and forward linkages which are interdependent compared to the situation where only the extraction industry is developing. Beneficiation has mostly found takers easily among policy makers due to this anticipation of job creation, which augurs well with promises made during election campaigns.

Economies of scale and expert development

The establishment of beneficiation facilities also eventually creates a local market for primary products which fosters economies of scale and incentivises mineral extraction. Given that beneficiation would be seeing the development of new industries outside the mining, this creates demand for high-skill and capital-intensive expertise which has to be inbuilt into the economy. Thus beneficiation is also expected to result in the development and growth of expert skills through technology transfer and learning (Matinde *et al*, 2014).

Cost savings from imports

Currently, economies export raw minerals but also import significant volumes of the final products that would have been developed using raw materials similar to what they export. Given the costs involved in both imports and exports, it is expected that once beneficiation is localised, the final products of the locally beneficiated products would be much cheaper than the imports. Thus, beneficiation at the final stages of the mineral value chain (involving manufactured products) is also a cost saver, as consumers have to face lower prices. If such cost savings are significant, they can also help boost spending for other unrelated commodities to the benefit of the economy.

Creation of economic hubs and development corridors

Successful beneficiation requires a lot of infrastructural investment as this places a lot of demand on energy, water and transport networks. Although such infrastructure would be established to facilitate beneficiation, once established it would serve to boost the existing economic hubs and development corridors which are independent of the beneficiation facilities themselves. This also creates further economic synergies where economic entities in other sectors such as agriculture can connect (Matinde *et al*, 2014).

Cushion against unstable commodity prices

Generally, the prices of raw minerals fluctuate more than the prices of the beneficiated products. Over the past few years, international commodity prices were generally falling, which has seen many mineral dependent countries suffering economic downturns. Beneficiation is also seen as a way of cushioning the economies against the falling prices of minerals. While the further downstream manufacturing industry would be expected to absorb a significant proportion of the beneficiated products, a significant amount would also be exported, which would also result in higher value than the raw minerals.

It is generally these factors that have made it easier for beneficiation calls to find takers, especially within the African context. The Zimbabwe government also subscribes to these anticipated benefits, which explains the recent push for beneficiation.

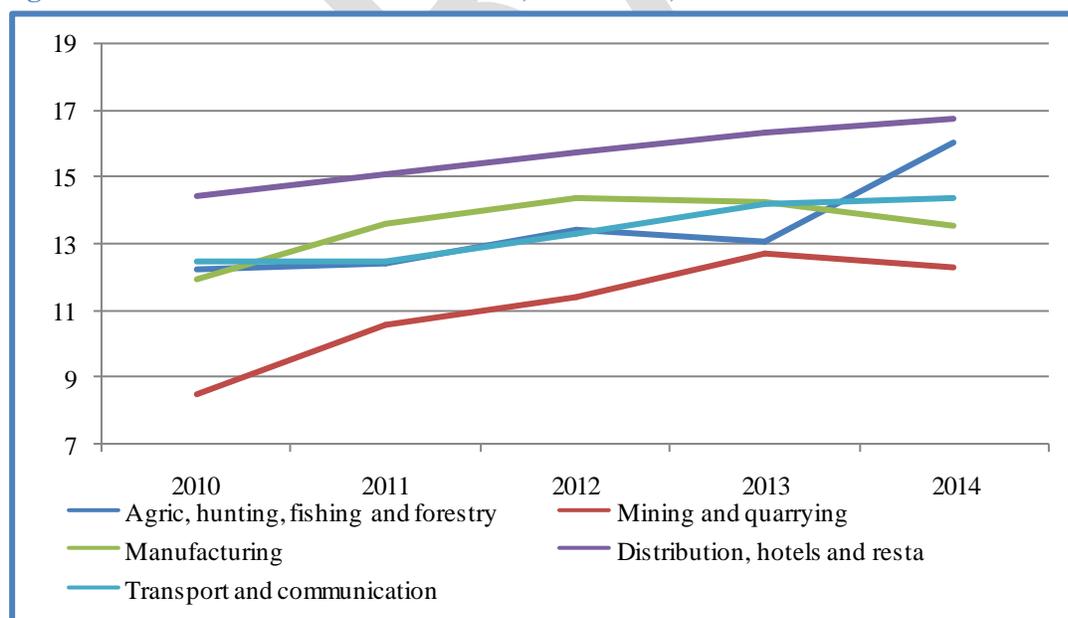
4. CURRENT STATE OF THE ZIMBABWE MINING INDUSTRY

The current state of the Zimbabwe mining sector can be assessed from four perspectives; contribution to national GDP; contribution to total exports; contribution to employment; and contribution to fiscal revenue.

4.1 Mining sector contribution to GDP

The contribution of the mining sector to real GDP has generally been on an upward trend since 2010, although there was a slight dip in the momentum in 2014 (Figure 2). Mining sector contribution to real GDP increased from about 8.5% in 2010 to about 12.3% in 2014. However, it is critical to note that the services sector, especially distribution, hotels and restaurants, is currently the leading driver of the country's GDP, having increased in contribution from about 14.5% in 2010 to about 16.8% in 2014. Similarly, the agriculture sector, manufacturing as well as transport and communication sectors are contributing more to real GDP than the mining industry. Thus the fact that policy focus on value addition in Zimbabwe appears to be more of a priority in the mining sector compared to other sectors is not because the sector is more important in real GDP contribution. This is mostly due to the finite nature of resources from the mining sector, where it is felt that the minerals could get used up before real benefit is felt in the economy.

Figure 2: Sector contribution to real GDP, Zimbabwe, 2010-2014

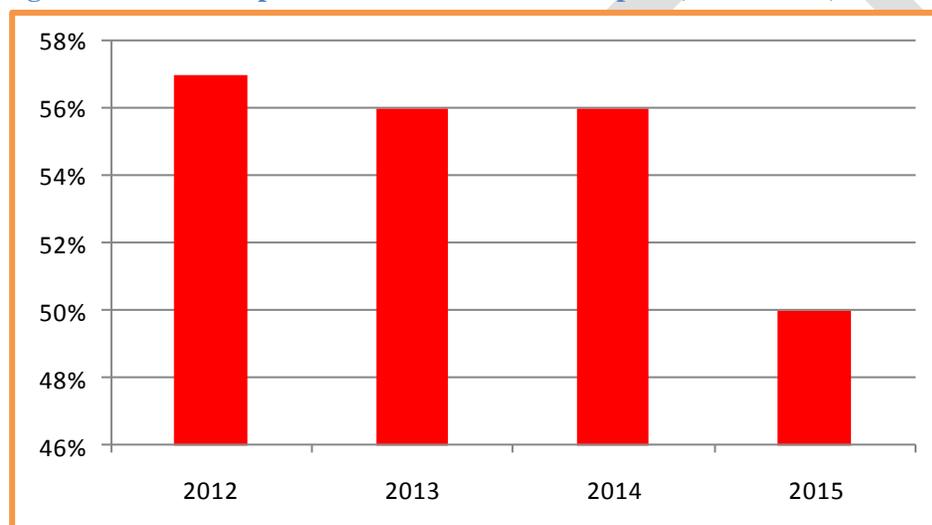


Source: Compiled from various ZIMSTAT quarterly digest of statistics reports

4.2 Contribution to total exports

Although the mining sector's contribution to real GDP is dwarfed by other non-mineral sectors, the same cannot be said with respect to the sector's importance in contribution to the country's total exports. Mineral exports constitute the bulk of Zimbabwe's exports, having contributed about 50% of total exports in 2015 (Figure 3). This is, however, a decline in total contribution to exports, as mining exports used to contribute about 56% of total exports in 2013 and 2014. The decline can be attributed to the continuous fall in mineral prices in the export markets. Gold (which is sold in refined form) constitute the bulk of mineral exports, having constituted about 23.3% of total exports in 2015, whilst diamonds (raw) and ferrochrome are the next at a distant 6.6% and 5.8% respectively. Most minerals continue to be exported as raw ore and concentrates, with such ores and concentrates constituting about 8.4% of total exports in 2015⁵. Thus the government stance on beneficiation appears to stem from such high export volumes of ores and concentrates.

Figure 3: Mineral exports contribution to total exports, Zimbabwe, 2012-2015



Source: Nu Times Innovations, 2015

4.3 Contribution to total fiscal revenue

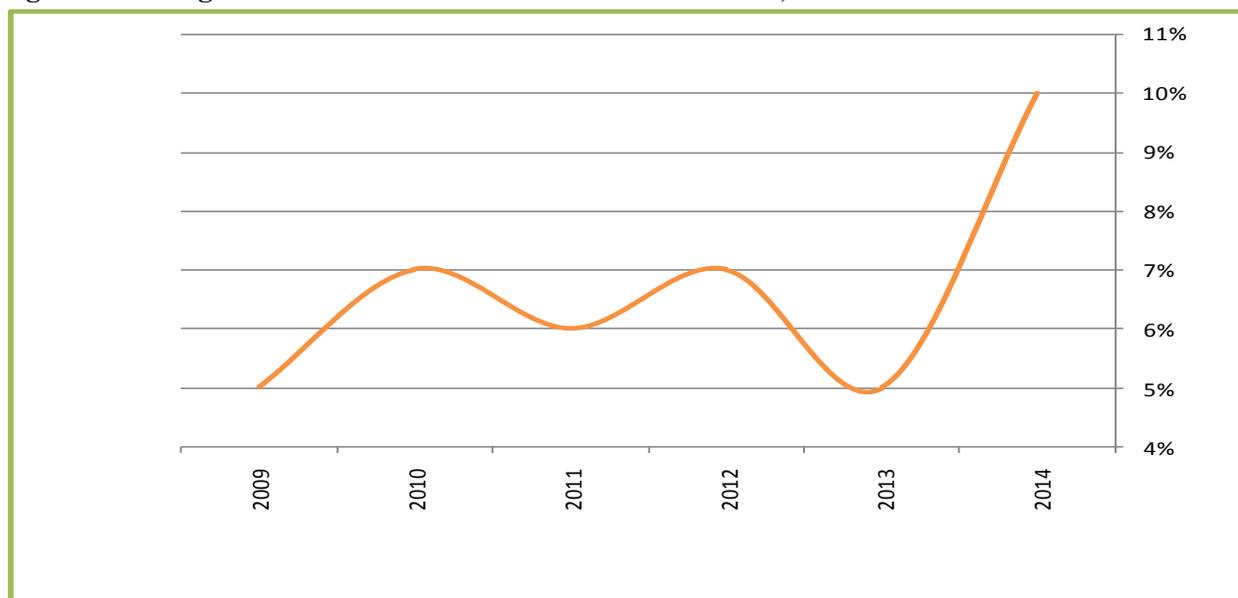
Total tax payments to government by the mining sector through royalties, taxes on income and profits, Value Added Taxes (VAT) and customs duties increased from about US\$50.61 million in 2009 to about US\$335.88 million in 2014. This saw the contribution of the mining sector tax revenue to total government revenue increasing as well from 5.4% in 2009 to 9.56% in 2014 (Figure 4). The increase in mining sector contribution generally shows that the rising tax payments from the mining sector was not being matched by a similar increase in non-mining sector contributions. This could also suggest that government has been concentrating more on tax measures in the sector relative to other sectors⁶. For example, statistics from the Ministry of Finance and Economic development show that royalties constitute the bulk of tax payments from the mining sector, constituting about 57% of total tax payments from the mining sector in 2014

⁵ Such ores and concentrates include iron, copper, nickel, lead, chromium, niobium, tantalum, vanadium and antimony

⁶ This could also have been attributable to expansion of the mining industry. However, there are no notable new investments on a large scale that could explain this rising trend in tax contribution during the review period.

and averaging about 53% of total mining tax payments between 2009 and 2014. However, the royalty rates have been constantly varied between 2009 and 2015. For platinum mining for example, between 2009 and 2015, royalties have been changed five times, having been increased over the years from 3% in 2009 until 10% in 2012 (Chigumira *et al*, 2015). This could also explain the increasing level of tax payments from the mining sector.

Figure 4: Mining Sector Contribution to Government Revenue, 2009-2014



Source: Ministry of Finance and Economic Development

4.4 Contribution to employment

On average, the mining sector accounts for about 2% of national employment and 9% of the non-agricultural employment (ZIMSTAT, 2016). These low rates of employment in the sector are as a result of the capital intensive nature of the sector that depends much on mining equipment and skilled workers. On average, employees in the mining sector used to earn US\$197.9 per worker per month in 2009 and this later rose to about US\$811 per worker per month in 2014 (Table 1). The compensation of employees accounted for 6.56% of the total earnings by the non-agricultural employment sector. Thus, for employment creation objectives, the mining sector as currently structured is not helping. This could also explain why beneficiation in the industry is being pushed as an employment creation objective.

Table 1: Employment in the Mining and Quarrying Sector

	Number Employees	Total earnings (USD)	Average Earnings per worker per month (USD)
2009	37,000	87,900,000	197.97
2010	39,500	231,200,000	487.76
2011	42,975	302,800,000	587.16
2012	42,975	355,300,000	688.97
2013	39,800	354,600,000	742.46
2014	39,200	381,500,000	811.01

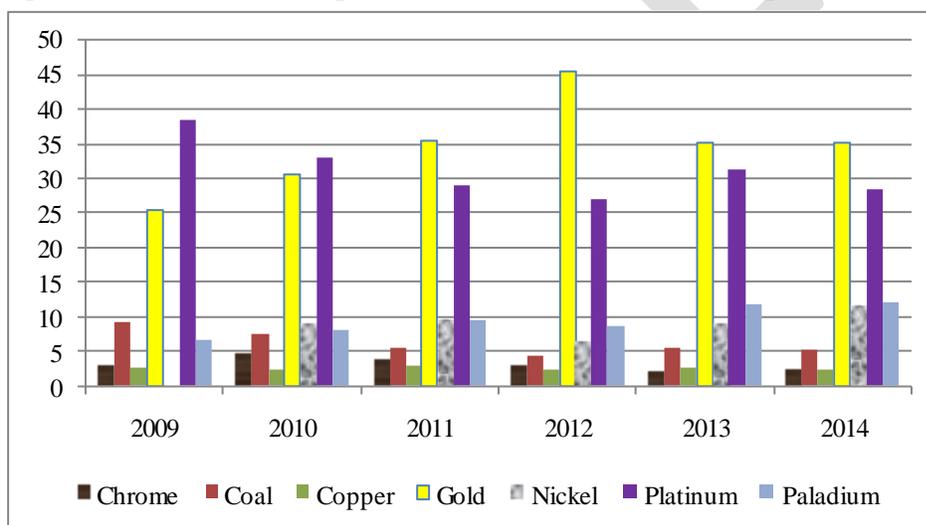
2015	37,500	371,300,000	825.11
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Source: ZIMSTAT Various Quarterly Digest of Statistics

4.5 Main minerals production trends and shares

The importance of the key minerals in Zimbabwe can also be reflected by the values of minerals produced over the years. Trends since 2009 reflect that the Zimbabwe economy has faced some transformation, where the dominance of platinum in production values in 2009 and 2010 has since been replaced by gold. This is due to the increase in production values of gold due to measures introduced to harness gold from small scale miners. Platinum production values have decreased from about 35.8% of the total value of minerals produced in 2009 to about 28.4% in 2014 (Figure 5). Total value of gold produced increased from about 25% of total minerals produced in 2009 to about 35% in 2014, although this peaked at about 45.4% in 2012. The value of chrome produced in the country has continued to be very low relative to other minerals, having slightly decreased from about 3% of total minerals produced in 2009 to about 2.3%, having peaked at 4.6% in 2010. Thus, the ban on raw chrome exports in 2011 also coincides with the year in which a decline in production values started.

Figure 5: Share of mineral production value to total minerals produced, Zimbabwe 2009-2014



Source: Compiled from ZIMSTAT Quarterly Digest of Statistics for the years 2011-2015

5. FOCUS INDUSTRY: ZIMBABWE CHROME AND PLATINUM MINING INDUSTRY

5.1 Chrome mining in Zimbabwe

Zimbabwe has traditionally been characterised by chrome smelters in addition to many firms that export raw chrome. Chrome in Zimbabwe is mostly sold as ferrochrome, as no refinery has been established in the country as yet. However, a significant portion is also exported as raw ores. The country's beneficiation thrust appears to be satisfied with ferrochrome production, as there has been no additional pressure imposed to the firms to undertake ferrochrome refining, as is the case with platinum.

Zimbabwe ferrochrome production has been traditionally dominated by five major smelters, namely Zimbabwe Mining and Smelting Company (Zimasco) Pvt Ltd in Kwekwe; Maranatha (Pvt Ltd) and Zimbabwe Alloys (Pvt Ltd) (ZimAlloys) in Gweru; Riochrome in Kadoma, and Oliken in Kwekwe (Matinde *et al*, 2014). However, there have been new entrants into the industry, which include some small-scale smelter installations exploiting Dyke ores, namely MonaChrome in Chegutu, CINA, Jin An Corp & Xinyu and Wel Mining all based in Gweru (Chitambira, Miso-Mbele and Gumbie, 2011). A recent entrant into the chrome industry is Afrochine Smelting (Pvt), a subsidiary of Tsingshan Iron and Steel Group of China. The firm is building a chrome smelter in Selous near Chegutu and the company commissioned its \$25 million smelting plant under phase one in 2014⁷.

Zimasco has been the traditional largest smelter in Zimbabwe followed by ZimAlloys. However, chrome mining and smelting in Zimbabwe has proved to be very challenging, as ZimAlloys has now been under judicial management since 2013. Zimasco also applied for judicial management to fight mounting debts at the end of 2015, although the application is still pending. Thus currently, although Zimbabwe's chromium industry comprises about 12 smelters (Nu Times Innovations, 2015), only three are operational; Zimasco (which has applied for judicial management), Afrochine and Xin Yu. This generally reflects the operational challenges that characterize the chrome smelting industry in Zimbabwe.

The chrome ore itself is mostly found in two distinct geological environments; the Great Dyke and the Greenstone belts. The largest deposits are contained in 11 narrow seams (stratiform) in the Great Dyke (approximately 550 km long and 11 km wide). Although the seams are narrow, averaging 10cm in thickness, they extend on both sides of the entire length of the Dyke. In addition to the seams, neighbouring rock formations contain disseminated chromite, which on weathering is concentrated into rich alluvial deposition on the flanks of the Dyke. Greenstone belt deposits occur as pods and pipes in some ultramafic rocks of the Shurugwi and Mashava Greenstone belts, and ultramafic bodies in the Limpopo Mobile Belt in Mberengwa district (Chitambira, Miso-Mbele and Gumbie, 2011).

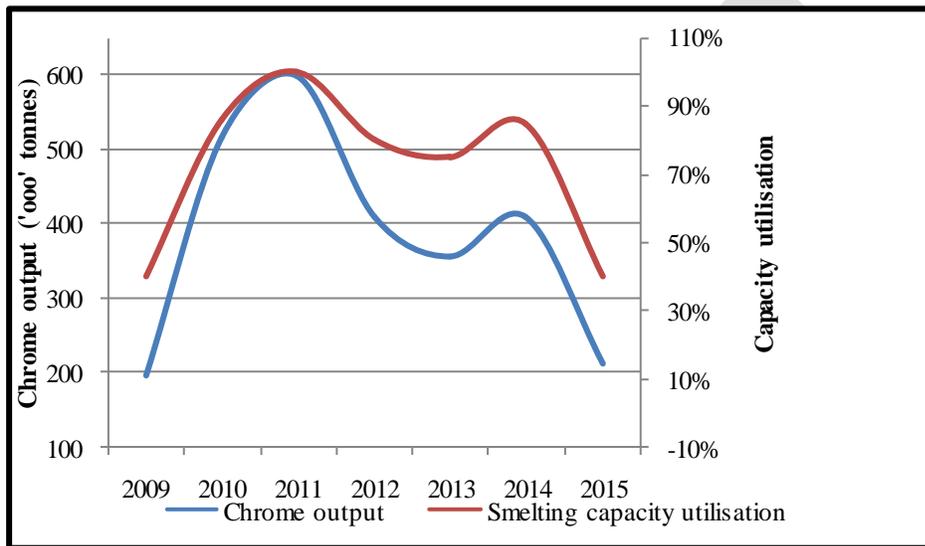
Most of the chromite claims on the Great Dyke are owned by Zimasco and ZimAlloys. For more than 15 years now, artisanal and small scale miners have been doing most of the mining on these claims under what are termed 'tribute' arrangements. The company provides mining and transportation equipment to the 'tributers', who sell their chromite at a price determined by the company.

Activity in the Zimbabwe chrome industry has generally slowed down, even though there have been some improvements since the lifting of the raw chrome export ban. There has been limited exploration in greenfield investment over the last 10 years (Nu Times Innovations, 2015). Chrome output increased following dollarization in 2009 and the increasing trend ended in 2011, where chrome output had increased by about 208.8% (Figure 6). However, after 2011, the decline in output began, which also coincides with the policy decision to ban raw chrome exports. By 2015 when the ban was eventually lifted, chrome output had decreased by about 64.8% from its peak level in 2011. Thus, a reduction in chrome output appears to be one of the immediate impacts of the policy tool to enhance beneficiation. The ban on raw chrome exports

⁷ Herald Business news at website <http://www.herald.co.zw/afrochine-courting-financiers/> accessed 12 May 2016

was also expected to enhance capacity utilisation, especially among the smelters, who would now have access to raw chrome in addition to chrome from their own claims. However, average capacity utilisation among chrome smelters, which had recovered significantly following dollarization, started plummeting since 2011. Although the ban would not be expected to affect the smelters who were not expected to rely on selling raw ore, the period of the ban imposition also coincides with the commencement of the decline in smelting capacity utilisation from 100% in 2011 to about 40% in 2015 (Nu Times Innovations, 2015). The capacity utilisation trends show that the period in which government was expecting to get more investment into smelting also coincides with the period in which operational challenges began to be manifested. This suggests that the government policy did not help the industry.

Figure 6: Chrome output and capacity utilisation for smelters, Zimbabwe, 2009-2015



Source: Nu Times Innovations, 2015

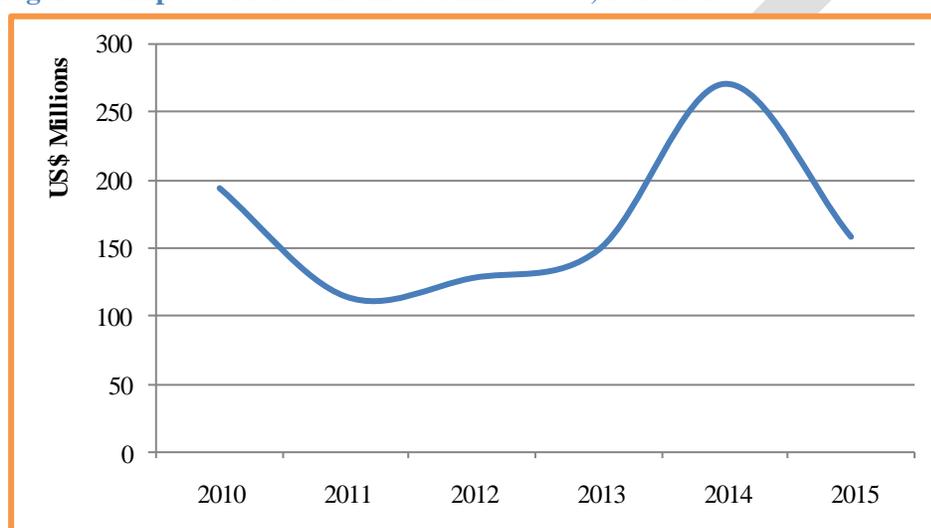
The chrome industry has now been a loss making industry for the past three years. The loss per tonne increased from about \$5 in 2013 to \$28 in 2014 before a slight improvement to \$26 a tonne on 2015 (Nu Times Innovations, 2015). There are various operational challenges that affect profitability. For example, chrome smelting requires huge and uninterrupted amounts of power and the period was characterized by acute power shortages which resulted in significant output losses. Most of the equipment in chrome smelting is outdated and inefficient, leading to high production costs at a time when respondents are facing difficulties in accessing capital finance.

The manifestation of cash flow challenges for the smelters after raw chrome exports ban could also be reflecting the general fears that the smelters were now active participants in the raw chrome exports market. The Government had always feared that given a choice, smelters could abandon the smelting for raw chrome exports, which is the reason for the policy imposition. The exacerbation of challenges for the smelters after the imposition of the ban appears to suggest that this could have been true.

There has been resurgence in chromite mining activities following the lifting of a 2011 ban on raw chromite exports. Small scale chromite miners had abandoned the trade, as the two

traditional buyers struggled while the new entrants could not buy the ore which they mined under tributary arrangements. The intention of government was however to enhance the export of ferrochrome through the increase in smelting activities. The entrance of Afrochine and Xin Yu thus complimented government objectives, as these are smelters. A look at the volumes of ferrochrome exports between 2010 and 2015 (Figure 7) actually show that there was a dip in 2011 due to the policy shock, but exports were able to recover in 2013 and 2014 as the two new players started smelting. However, there was a significant drop in ferrochrome exports in 2015 of about 41.6%, which is a very significant, generating fear that the recovery in exports has climaxed.

Figure 7: Export of ferrochrome for Zimbabwe, 2010-2015



The export of chrome ores and concentrates was stopped by the policy, as confirmed by the ratio of the chrome ore and concentrates to ferrochrome exports. The ratio fell from about 0.2 in 2010 to zero in 2012 to 2014. The lifting of the ban at the end of 2015 only saw limited exports of the raw chrome, as the ratio was only at 0.01. Thus, the policy was able to increase ferrochrome exports relative to the ore but failed to stimulate the ferrochrome exports to significant levels. During the first quarter of 2016, the ratio only increased marginally to 0.06. Thus, despite the lifting of the ban, the export of raw chrome is still on a low scale, which could be a positive development as far as the government preference is concerned.

The chrome industry is not a very important industry as far as contribution to total government revenue is concerned, even though it was targeted as a strategic industry for beneficiation. For example, revenue contribution by minerals show that the chrome industry contributed only 0.7% to total government revenue collected from the mining industry in 2014. However, it contributed 6.1% to total pay as you earn (PAYE) and 2.8% to total VAT collections as well as 3.5% to total withholding taxes collected from the mining industry⁸. Thus, the sector could have been chosen as an experiment, the justification being that if any negative effect were to arise from the decision, the impact in the economy would be minimal.

⁸ Statistics obtained from Ministry of Finance and Economic development on request

5.2 Platinum mining industry

Due to the absence of refining and further processing, platinum in Zimbabwe is exported as a group of metals. The Platinum-Group Metals (PGMs) comprises a group of six chemically similar elements; Ruthenium (Ru), Rhodium (Rh), Palladium (Pd), Osmium (Os), Iridium (Ir), and Platinum (Pt) (Matinde *et al*, 2014). Most of the PGMs minerals are found in the Great Dyke of Zimbabwe. Within the Great Dyke, four geological complexes are known to contain PGMs and base metal deposits, and these are the Wedza Complex (including Mimosa owned by Aquarius and Implats), the Selukwe Complex (including Unki owned by Anglo Platinum), the Hartley Geological Complex (including Hartley and Ngezi Platinum Mines owned by Zimplats) and the Musengezi Complex. The Hartley Geological complex is the largest of the PGM bearing complexes, containing 80% of the known PGM resources in Zimbabwe (Matinde *et al*, 2014). Currently, three mines are operational in Zimbabwe, namely, Zimplats, Mimosa and Unki. Zimplats is the leading player, with a share in total output of about 54%, followed by Mimosa (30%) and Unki (16%) (Nu Times Innovations, 2015).

There are distinct sequential phases through which the PGM passes through to qualify as having been beneficiated. The first is mineral processing (including crushing, milling and froth flotation) to obtain a composite concentrate containing PGMs and base metals, and tailings. The concentrate is subjected to drying (pre-treatment process), smelting in an electrical furnace, air-blowing in converters and removal of sulphur to obtain the converter matte and sulphuric acid. The matte is subjected to base metal refinery to separate nickel, copper, cobalt sulphate and sodium sulphate from the PGM concentrate which then undergoes precious metal refinery to separate all the PGMs (including gold) and silver (Chigumira *et al*, 2015).

Although none of the operators export ores, export activities for PGM firms in Zimbabwe are mostly confined to concentrates. This generally sums the business of Mimosa and Unki, who are mostly confined to concentration activities. However, Zimplats has gone a little further into smelting, and currently exports the PGMs as matte. Zimplats has four mines (Ngwarati, Rukodzi, Mupfuti and Bimha) which have the capacity to supply ore of about 6.2 million tons per year to its two concentrators situated at Ngezi and Selous Metallurgical Complex (with capacities of 4 million tons and 2.2 million tons respectively per annum). The concentrates are then fed into the smelter situated at the Selous Metallurgical Complex which produces matte at approximately $1450 \pm 100 \text{g/t}$ (Chigumira *et al*, 2015). All the three companies feed their parent companies, which are all South African. Zimplats exports matte to South Africa where base metal and then precious metal refinery would be done through facilities owned by its parent company, Implats. Both Unki and Mimosa exports their concentrates to South Africa for smelting and refinery through their parent companies Anglo Platinum and Impala Platinum respectively (Chigumira *et al*, 2015).

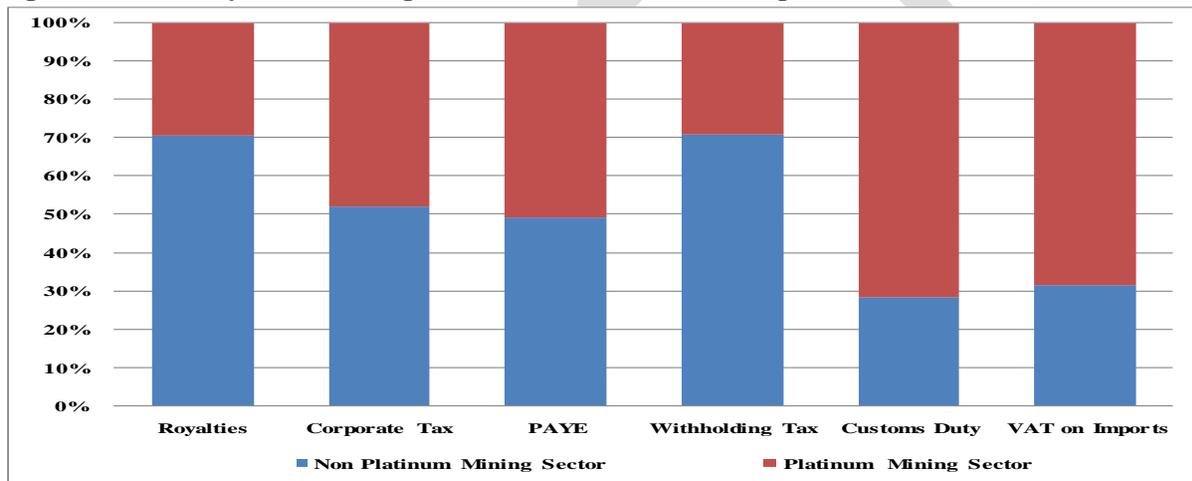
Unlike in the chrome industry, the government is not content with the level of beneficiation at smelting level. Zimplats is thus also regarded as not being engaged in beneficiation even though it is operating at the same level as chrome smelters who are not policy targets for beneficiation. In the platinum sector, policy seeks to ensure that base metal refineries are also built within the country in addition to the smelting plants. As part of the commitment towards establishment of a refinery, Zimplats had promised that it would commission its Base Metal Refinery plant by July 2016, where the matte would be further processed before being exported. However, this was later

postponed to early 2017, with the firm attributing the delay on a cash squeeze caused by low platinum prices⁹.

Generally, players in the PGM sector were operating at full capacity in 2015, even though they face cost pressures; the weighted average cost/ounce for the PGM increased from US\$1,517 in 2014 to \$1582 in 2015, with labour, royalty, supplies and power contributing more than 79% of production cost per ounce. Power shortages, as reflected by frequent power cuts, also compromise operations, leading to earnings declining by about 23% in 2015 compared to 2014 (Nu Times Innovations, 2015).

Relative to the whole mining sector, the PGM is very critical as far as contribution to government revenue is concerned. In 2014, it contributed 30% of royalties, 48% of corporate income tax, 51% of PAYE, 63% (import) customs duties, and 55% of VAT on imports, with an overall contribution of 36% of the mining sector contribution to total revenue (Figure 8).

Figure 8: Summary of the mining sector contribution towards government revenue, 2014



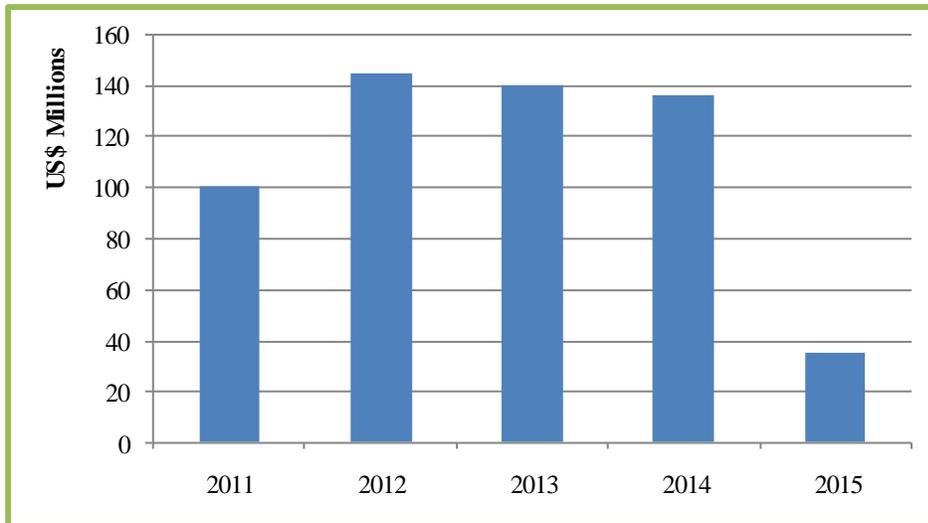
Source: Chigumira et al 2015

Platinum exports¹⁰ have generally been very subdued when compared to gold exports, as these peaked at about \$144.8 million in 2012 (Figure 9), which was about 4% of total exports. The year 2015 recorded the lowest export revenues from platinum exports, as only about \$35.5 million worth of exports, equivalent to only about 1.3% of total exports, were recorded.

Figure 9: Platinum exports for Zimbabwe, 2011-2015

⁹ Reuters, ‘Zimplats defers commissioning mothballed refinery to early 2017’ at website <http://af.reuters.com/article/zimbabweNews/idAFJ8N15K00L> accessed 01 April 2016

¹⁰ This generally refers to HS code 7110.



Source: ZIMSTAT

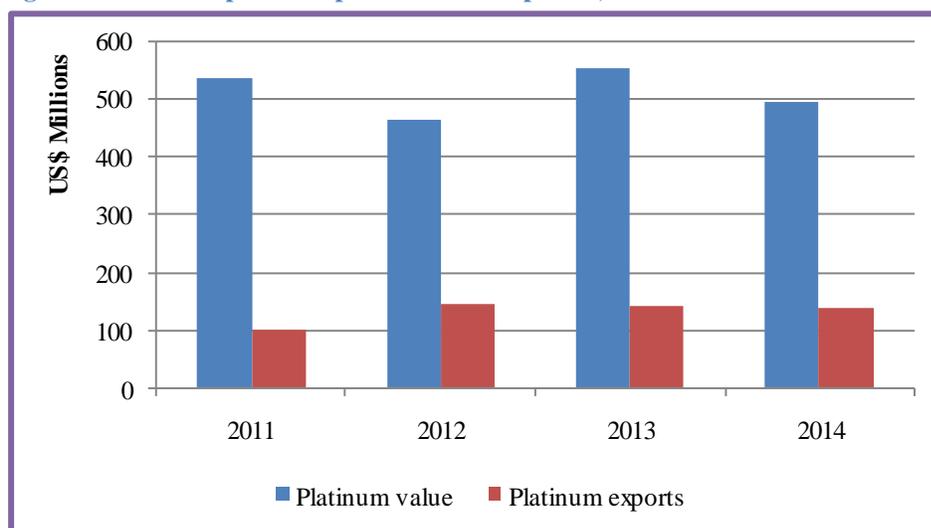
The platinum industry had operated for about six months in 2015 while being subjected to an export tax of 15% which was later removed. This could explain this reduction in total platinum exports for the year. For example, statistics show that there were no platinum exports in 2015 between May and December, unlike in 2014 when platinum was exported throughout the year. Platinum exports only resumed in February 2016, even though the export tax ban had been reversed in July 2015. This can be attributed to the fact that even though the government indicated that it was now removing the tax; the necessary legislation amendments were not quickly done. Thus, the Zimbabwe Revenue Authority (ZIMRA) could not stop imposing the tax without the relevant legislation modifications, especially through a Statutory Instrument (Chigumira *et al*, 2015). During the first quarter of 2016, platinum exports were only about 25.5% of the values recorded over the same period in 2015. This shows that the response among the platinum miners to the export tax had generally been to hold on to the mineral to avoid the export tax. Since there are three independent platinum mining firms, coordinated behaviour in the decision cannot be ruled out. The decision by the platinum miners to avoid exporting could also have helped in reversing the ban, as government was not getting any revenues from the export of platinum.

Beneficiation has also be suggested as a tool to enhance the value of platinum exports, which are currently very low in any given year compared to the production values that would have been recorded within the same year. This difference appears to suggest that platinum miners are generally keeping a significant amount of the mined platinum within the country, which would have seen a significant stockpile of the minerals. There is generally a fear¹¹ that transfer pricing issues could be helping dwarf the mining exports, as the Zimbabwe firms are simply transferring mineral output to their parent firms in South Africa. Since exports values are only recorded based on the actual receipts, selling of the products to parent companies could be denying the country a lot of potential revenue that would have arisen had this been sold to independent international buyers. This is difficult to dispute given the current situation where platinum is second only to

¹¹ These are just issues raised during informal discussion with the author by some stakeholders in the industry although it is yet to be officially raised with the mining firms.

gold in terms of value of minerals produced but when it comes to export revenues, platinum becomes a distant fifth after gold, nickel, diamonds and ferrochrome. Between 2011 and 2014, export revenues from platinum only constituted about 25.5% of the total production values that was recorded (Figure 10). Beneficiation can also result in direct linkages between Zimbabwean producers and the international market to clear this anomaly.

Figure 10: Value of platinum produced and exported, Zimbabwe 2011-2014



Source: *Quarterly Digest of Statistics (various) and exports database, ZIMSTAT*

6. ZIMBABWE'S BENEFICIATION POLICY THRUST

This generally forms the context through which Zimbabwe's beneficiation arena can be assessed. Zimbabwe has mostly tried to push for beneficiation through pronouncements in fiscal policy, which, as already seen, has been subjected to policy reversals following engagements with stakeholders. This has often seen stakeholders believing that Zimbabwe does not have a clear policy on beneficiation. While there is no comprehensive policy on beneficiation, the framework can be found scattered in various pieces of policy pronouncements and legislations, which makes it enforceable. The following thus could be identified as shaping the framework for beneficiation in Zimbabwe:

6.1 Mines and Minerals Act

The enforceability of Zimbabwe's beneficiation policy is generally hinged on the Mines and Minerals Act [Chapter 21:05]. Under section 159(3) (e) of the Act, any applicant for a special mining lease needs to furnish the mining commissioner with a marketing plan setting out proposals and a timetable for the beneficiation of the output of the proposed mine. Section 247 of the Act has provisions guiding the operations of 'beneficiation plants'. The Minister is empowered to declare some institutions as 'beneficiation plants', which could be a bank assay department, factory, refinery, smelter or treatment plant which is situated in Zimbabwe. Such a beneficiation plant would have a prescribed rate of rebate of royalty, which would apply only in respect to the mineral product treated at the approved beneficiation plant. The applicant should also specify the degree of beneficiation proposed to be carried out and the Minister is also empowered to withdraw the terms awarded if the approved beneficiation plant is not operated for

a given period or if the degree of beneficiation carried out is below what is specified in the application.

This generally implies that the Government actually has a legislative tool to use to enforce beneficiation of its raw materials. Thus, although the beneficiation policy is not clearly articulated and is being targeted on a piecemeal basis, there is a legal backing for government to force mining firms to do it, which would be tied to the mining lease.

6.2 Draft minerals policy

In general, beneficiation policy is expected to be articulated through a policy guiding the overall mining sector. However, the country is yet to finalise its Minerals Policy, which has been outstanding since the days of the inclusive government. Currently, a Draft Minerals Policy exists, which, even though the likelihood of being adopted in its current form is slim¹², generally reveals Government's current thrust on beneficiation. The Draft Minerals Policy acknowledges that minerals provide critical feedstocks for other job-creating sectors if the minerals are beneficiated into appropriate intermediate products. Products that are identified as suitable for beneficiation include iron/steel, polymers and base metals for manufacturing; nitrogenous and phosphatic fertilisers for agriculture; cement, steel and copper for infrastructure and fossil fuels for power. The Draft Minerals Policy appreciates that mineral beneficiation might require state facilitation for it to take place, mostly through incentives as well as disincentives such as a small export tax where beneficiation is clearly viable.

The Draft Minerals Policy also appreciates the need for studies to be undertaken to explore the potential for forward linkages in the ferrous, base and precious metal sectors, so that export taxes would be imposed on crude mineral exports where the next beneficiation step has been independently shown to be commercially viable. In addition, mining licenses for the export of crude ores, concentrates, alloys or minerals would only be given where beneficiation has been shown to be viable, otherwise the licenses would be given subject to the imposition of an export tax.

6.3 Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZimAsset)

The Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZimAsset) is the extant economic blueprint, expected to be the economic anchor during the period 2013 to 2018. ZimAsset has four strategic clusters, of which one of them is named 'Value Addition and Beneficiation'. The mining sector is identified under ZimAsset as the sector with potential to become the pillar for economic growth through value addition and beneficiation. As a result, one of the key success factors for ZimAsset is listed as the ability to have the mining sector being engaged in value addition and beneficiation.

This generally describes the policy thrust of Zimbabwe's beneficiation agenda. It can generally be described as very weak, as there are no clear policy strategies to make beneficiation a viable business initiative. This, together with the other critical issues for beneficiation to succeed in Zimbabwe, is discussed in the next section.

¹² It is not likely that the Draft Minerals Policy, which was anchored to the Medium Term Plan and not the current economic blueprint, ZimAsset, can be adopted.

7. CRITICAL ISSUES FOR ZIMBABWE'S BENEFICIATION SUCCESS

7.1 Beneficiation versus chrome beneficiation viability

The chrome industry is currently struggling with viability challenges. The ban on the export of raw chrome was expected to see increased activities among the smelters, but the same companies have already applied for liquidation. Thus, the beneficiation requirement, which was expected to revive the smelting industry, actually failed in the chrome industry as far as the traditional players are concerned. This generally suggest that policy needs to be also cognizant of the viability issues, especially the cost drivers that are making it difficult for existing firms to take advantage of policy pronouncements to increase production. The closure of the chrome smelting companies after the policy announcement generally shows that the hindrance to smelting was not the absence of policy but was simply a viability issue. However, this could also show that the firms were now departing from their core business of smelting but exporting raw minerals, which would justify the introduction of the ban.

To foster beneficiation in chrome industry, there is need for the policy instruments to also attend to the general cost of doing business for existing firms, while seeking to attract new investment. The old players have limited smelting capacity due to antiquated machinery and old technology, implying that only new entry is needed to be the backbone of the beneficiation policy. Thus, attracting investors into chrome smelting should be the priority as far as chrome beneficiation is concerned. However, investment attraction was not a central issue in the chrome beneficiation agenda as previously structured, appearing to suggest that government believed that starting a smelting business is easy within the current environment. This can be identified as the key flaw to the beneficiation thrust in the chrome industry.

This calls for a total refocus, where the task of beneficiation is not only placed on the current players but also new partners. All beneficiation costs had to be borne by the smelters, at a time when they were struggling to meet current obligations. Thus, a new policy thrust on beneficiation in the chrome industry is called for.

The ban on raw chrome export has been credited for the entrance of Afrochine, a smelting company which traditionally used to purchase raw chrome from Zimbabwe. The firm is also understood to be lobbying for more access to be ore, which has seen Government repossessing some of the mining claims from ZimAlloys and Zimasco to help facilitate throughput to Afrochine. Thus, given that the government is content with concentrates as far as chrome mining is concerned; the ban can be argued to have achieved some results. However, the entry of one player at a time when two big players are also exiting actually dilutes any positive impact that the entry might have in the industry. Policy measures for chrome smelting need to also help address operating environment issues which make the industry current less conducive. The entry of new players shows that there is scope for attracting more players if the policy is able to address some operational challenges which are discouraging smelting. Beneficiation should thus come after viability and not precede it.

7.2 Which policy thrust should drive beneficiation?

Zimbabwe's beneficiation thrust appears to be pushed by the availability of minerals. Thus, beneficiation is pushed mostly through mining sector policies. However, a country such as Japan

is well known for a successful beneficiation policy for copper when the country has largely no copper mines (Grynberg and Sekakela, 2015). The firms that undertake beneficiation in the form of smelting and refining in Japan have backward linkages to mining companies beyond the border in Asia and Latin America, which supply copper concentrate. Thus, beneficiation in Japan, and also China, was mostly spurred by trade and industrial policies as opposed to mining sector policies. Zinc beneficiation in Namibia was largely spurred by the industrial policy rather than the mining policy.

In China, subsidies and other forms of government assistance were also used to drive the beneficiation thrust forward. This brings a critical question within the Zimbabwe context. Is it within the competence of mining firms to engage in beneficiation, or this is a new industry altogether which require different competencies and technologies compared to what the mining sector currently possesses? This becomes more relevant now, where the investment that was done by the mining firms was done based on agreements which did not include beneficiation. Beneficiation thus can be seen as a new layer that is being introduced and the burden is being placed on the mining industry to ensure that it exists. The process requires the development of new skills for beneficiation as well as for the skill-intensive supplies industry which supply the beneficiation sector. This implies that the beneficiation thrust should be complemented by both industry and mining policies to ensure success.

There is need for the mining players to be play their part while other players in the downstream industries also make efforts to ensure that the beneficiation industry is established. Beneficiation should need to be seen as being slightly divorced from the mining industry for proper planning and incentives to be properly established. This is the benefit of driving the beneficiation agenda through industrial policies rather than mining policies. Entrusting the mining industry with the entire burden of driving the beneficiation agenda forward appears to be slightly too expectant. Once it is part of industrial and trade policy, then beneficiation would also be properly cognizant of the general factors that also affect industry performance in the country. The current industry and trade policies for Zimbabwe are actually trying to address such viability issues in other industry sectors, without focusing on beneficiation.

7.3 Mistrust between government and platinum mining firms

The beneficiation agenda in Zimbabwe also continues to be negatively affected by the unease relationship between the government and the platinum miners. For example, the justification for the imposition of the export tax was that the mining firms were not forthcoming to the government as far as presenting their beneficiation plans was concerned. In presenting the 2014 National Budget Statement, Government indicated that it was concerned by the lack of progress towards beneficiation, attributed to ‘the non-committal of platinum producers’. The Government indicated that Zimbabwe’s production capacity and the platinum mineral reserves are adequate to support investment on platinum beneficiation on a ‘sustainable and viable basis’. However, platinum mining companies believe that beneficiation should be preceded by a substantial increase in primary output that would meet the critical mass required for establishment of beneficiation facilities (Chigumira *et al*, 2015). Thus, the platinum mining firms currently believe that beneficiation is not viable under the current mining environment.

The general belief in government that more value and hence revenue accruing to government can be obtained through beneficiation also stems from the statistical variations, where platinum is the second after gold in terms of output value but fifth in terms of mineral export receipts. Such huge discrepancies are bound to create speculation, especially regarding transfer pricing and other methods by which the country could be prejudiced. Statistics appear to suggest that the country is deriving little from platinum exports relative to the value produced. There is need for more transparency on the operating environment, at least to the level understandable at policy level, to ensure that government and industry speak from the same context. The withholding of exports for almost a year as a response to the policy pronouncement also appears to suggest that the sector can survive outside exports for a long time. To government, this can imply that the sector has been operating so profitably that it could afford to survive for such a long time without exporting, at a time when the government was not getting much relative to other minerals.

7.4 Should it be the carrot or stick approach?

A critical issue towards fostering beneficiation is also whether the government should use a carrot or stick approach (Baissac *et al*, 2015). The government's decision to generally impose time limits on platinum miners as well as a ban on chrome exports appear to be motivated by a belief that platinum beneficiation is viable within the current environment. Thus, government has generally adopted a stick approach as compared to a carrot approach to foster beneficiation. However, given that beneficiation is not necessarily a mining activity but an activity which is somehow between mining and manufacturing, a better option could also have been using a carrot approach to foster beneficiation. Examples can be drawn within the region where the carrot approach was successfully used. In 1997 the government of Mozambique negotiated an agreement for the establishment of the Mozal Aluminium, an aluminium smelter owned by BHP-Billiton (66%), the South African Industrial Development Corporation (IDC, 20%), Mitsubishi (12%) and the government of Mozambique (2%). For the project to become attractive, the Government of Mozambique had to offer a number of concessions. These included a 50-year tax holiday, to see BHP paying only 1% turnover tax. In addition, the price of electricity was also dangled as a carrot, as Eskom received direct current electricity from Cahora Bassa Dam and then resold alternating current electricity to Mozal at only about \$0.02/kWh (Grynberg and Sekakela, 2015). This made investment into the beneficiation project worthwhile.

In order to spur zinc refinery in Namibia, it was mostly the industrial policy that was instrumental. Namibia now boasts of successful zinc refinery projects at Skorpion Mine and at Namzinc refinery in south-west Namibia. Government assistance can be credited for the success, as the refinery is one of the export processing zones (EPZ) facilities operating in Namibia, implying that it pays no company tax. The government also provided other forms of industrial support for the refinery's financing (Grynberg and Sekakela, 2015).

The stick approach similar to what is being proposed in Zimbabwe was used in Zambia. The government introduced a 15% export tax on copper concentrate through the 2008 national budget as an attempt to foster beneficiation. However, this export tax had to be lifted in October 2013 for one year after mining companies argued that refining capacities were inadequate in Zambia. By that time, the country had only partially succeeded with the beneficiation of copper to the stage of semi-fabricates by Metal Fabricators of Zambia. The main challenge was that copper

fabrication required other raw materials, many of which are not available in Zambia (Grynberg and Sekakela, 2015). This same outcome would also happen in Zimbabwe, where materials for beneficiation would also need to be complemented by imports. Thus, without targeted industrial policy measures, which address issues of taxation incentives, raw material access and other benefits, investment in beneficiation would face viability challenges even if policy forces refinery plants to be built.

There is need for investment incentives to also be announced to compliment the ultimatums, which would also see players outside the mining sector developing an interest to partner the mining firms in beneficiating the platinum. The government therefore needs to extend the same incentives that are often given for investment attraction in industry, including the envisaged special economic zones, to apply for beneficiation of minerals as well.

In addition to incentives designed to make beneficiation attractive, the government could also lessen the burden on the mining firms' fiscal requirements as a strategy to lure them into beneficiation. Currently, the mining sector is subjected to (i) multiplicity of revenue collecting agencies; (ii) multiplicity of legislative instruments governing the system; (iii) multiplicity of tax heads; (iv) the *in-rem* nature of the royalty regime (based on gross revenue rather than profit); (v) instability of the regime; (vi) high royalties (highest in the region); (vii) high fees and ground rentals; (viii) the additional profits tax on special mining leases; and (ix) limitations of carryover of tax losses to a maximum of six years, which militates against big expenditures (Chigumira *et al*, 2015). Making the environment more conducive by attending to these challenges within the same framework of beneficiation would also be seen as being accommodative by the mining sector.

7.5 General Investment challenges for beneficiation

Given that beneficiation in Zimbabwe would be a new venture divorced from the current mining equipment, it is affected by the general investment challenges that are currently affecting the country. Currently, the Indigenisation and Economic Empowerment Policy for the mining sector is such that even if all investment is done by the foreign private shareholder, the Government would be entitled to a 51% shareholding due to its contribution through the resource endowment. However, it is not clear whether this would also apply with respect to the investment in the beneficiation equipment. There is need for the same policy pronouncements that give ultimatums to also be clear as to the application of the indigenisation law with respect to beneficiation.

This clarity is particularly needed given the costly nature of the investments, which requires offshore borrowing to take off. It is estimated that a platinum refinery costs about US\$3 billion (Chigumira *et al*, 2015), which apparently cannot be internally raised by the mining companies. In addition, the Zimbabwe investment environment is also affected by absence of key enablers, which makes it difficult to attract investment. This includes availability of power, where the current environment is characterized by unscheduled power outages and load shedding. Given the current production projections and new entrance into the mining of platinum, it is estimated that the platinum sector will require an additional 115 MW of power in the next 5 to 10 years (Chigumira *et al*, 2015). Beneficiation would thus place huge demand on the electricity grid, which is currently struggling to meet demand. Thus, the timelines for beneficiation should also

be designed to coincide with the timeframes expected for significant investment into electricity generation.

Other investment that would be needed for successful beneficiation includes transport networks, as beneficiation operations would call for quick movement of raw materials. The transport sector is one of the hardest hit sectors because of underinvestment in repair and maintenance of the road network. The feeder roads are in poor state, which affects the speed access to markets and increase transaction costs. The rail track in Zimbabwe, owned and operated by the Government through the National Railways of Zimbabwe (NRZ), has an estimated capacity to move 18 million tonnes of goods per year (Parliament of Zimbabwe, 2012). However, a significant proportion of this capacity is no longer available. The NRZ network has cautions (speed restrictions) numbering up to 63 covering a distance of about 9% of the network. The automated centralised train control system has been decommissioned for the use of manual systems. In 2015, only 61 locomotives were available, when the peak requirement is about 75. Only 3542 wagons were available as about 1270 were out of service (NRZ, 2016). Thus, the railway, which could also have attracted a potential beneficiation investor, is currently in a sorry state. The beneficiation policy should also not be silent on issues to do with transport.

Beneficiation also demands a lot of water, at a time when service deliveries within the critical municipalities are pathetic. There is need to also position beneficiation within the context of the reforms to reduce water usage costs as well as its access.

Beneficiation is also a skill-intensive aspect of the mineral value chain at a time when the country has a shortage of skills within the local market. There is need for investment in skills, especially research and development skills required for initiating beneficiation, whereupon scientists and engineers in the diaspora would need to be re-attracted back. This also calls for investment in technology and training institutions to advance skills and technology necessary for beneficiation. This foundation should also be laid by policy simultaneously with the decision to force mining firms to engage in beneficiation.

7.6 Competitiveness of the beneficiated product

The central issue to underpin the success of beneficiation in Zimbabwe is the competitiveness of the beneficiated product. Given the current cost of doing business in Zimbabwe, there is also a risk that the production costs would be significantly higher than what is currently being faced by the South African producers who have been exporting to the international market. If beneficiation costs are significantly higher in Zimbabwe, the market for refined platinum would also be difficult to establish. The current cost drivers appear to suggest that this could be the case. The average cost of commercial electricity in Botswana, Mozambique, South Africa and Zambia is about 57% of what Zimbabwean businesses pay for electricity. On average, Zimbabwean firms borrowing costs (at an average of 28% in 2013) are twice to three times the levels observed in the region. Logistics professionals typically deal with 10 different government agencies in the clearance process, and about 42% of import shipments are subject to multiple physical inspections. Import tariff levels (inclusive of the introduced 25% import surtax) are about twice as high as the average of neighbouring countries, resulting in Zimbabwe businesses paying on average twice as many taxes for imported inputs (ZEPARU, 2014). Addressing these

challenges should also complement efforts towards ensuring that there is beneficiation in the platinum sector.

Competitiveness also becomes an issue with respect to markets. Currently, beneficiation is being fostered without a clear market study to indicate whether the beneficiated products will have a ready market. The Draft Minerals Policy had provided for market studies to precede beneficiation, on the realisation that beneficiation should be demonstrated to be viable first before it is forced by policy. The current mining firms have not invested in market studies beyond their current products, implying that the market for beneficiated products is yet to be explored. The reluctance of the mining firms to invest could also be due to market fears, as none of them has dealt in beneficiated products as yet.

Competitiveness fears also arise from concerns about whether the volumes of locally available PGM resources would be sufficient as feedstock into the beneficiation plant. Jourdan *et al* (2012) argue that there is enough feedstock for platinum refining in Zimbabwe, as a rough threshold for a basic platinum refinery to be viable is around 500,000 ounces per annum of PGMs, which had already been surpassed in 2011 when production was about 629,000 ounces. However, the volume of production cannot sustain three refineries if the three producers each decide to have a beneficiation plant. Thus, for optimum benefits, only one beneficiation plant would be needed. If Zimplats, which is already at an advanced stage in establishing a beneficiation plant is able to meet its 2017 timeline, then some mechanisms to have the other two platinum mining firms supply their ores to it have to be established.

8. CONCLUSION

As currently structured, Zimbabwe's beneficiation policy has generally failed to achieve results. This can be attributed to a number of reasons. First, there is no overall coordinated policy to spur beneficiation. This is problematic as the envisaged beneficiation industry, especially for platinum, does not necessarily fit within the general minerals policy as it embeds a lot of manufacturing industry elements. Thus, there is need for an industrial policy on beneficiation, which would be complimented by the minerals policy. Such a policy would be cognisant of the attendant viability issues that need attention, compared to the current beneficiation policy, which is mostly an ultimatum to the mining firms.

Second, there is need to make the platinum beneficiation industry an attractive industry for the players. Currently, the participating institution, Zimplats, is mostly being forced into it. Although the stick approach increases compliance possibilities, there is need for incentives to achieve the objectives even without any use of force. Efforts by Zimplats to initiate the establishment of a base metal refinery need to be commended rather than being condemned. There are more players entering platinum mining, which increases the availability of the ore in the near future. Thus, entry into beneficiation should be spurred by policy as an attractive investment that is beneficial to the investor as well, rather than as a forced decision by policy.

Third, there is need to enhance trust between the platinum mining firms and the government. This would help dilute tension, which would also prevent the passing on of some policies which threaten the viability of the mining sector. The lost revenue due to the decision to withhold

export in response to the export tax affected both the platinum miners and the government. Similarly, the lost revenue as raw chrome exports ceased also affected government's fiscal position. Thus, policies based on mistrust are not good for the growth of the industry.

Fourth, Zimplats has already undertaken a decision to set up a platinum refinery by early 2017. However, the operating environment continues to be a challenge for the firm, which also explains why the launch of the refinery had to be postponed. To compliment the initiative and to make it more likely for the investment to be realized, Government should also be seen to be addressing the policy bottlenecks that are currently affecting beneficiation. This includes access to critical infrastructure, clarity and flexibility of application of the indigenisation legislation to the beneficiation plant as well as fiscal incentives for reducing the return on investment period. In general, reducing the cost drivers for the beneficiation project through policy responses would also be a complimentary engagement by the government to help ensure beneficiation fruition.

Fifth, the stick approach being used by government appears to be based on the belief that once platinum is refined, access to global market is automatically assured. The Zimbabwe plant needs to be able to compete with the South African plants for access to markets. Given the current cost structures in Zimbabwe and an appreciating currency, this would be a challenge. The need for beneficiation should thus also be complimented by efforts to make access to markets easier by making the business competitive. The huge investment requirements for beneficiation are too risky for an activity that might fail to find a market.

Finally, the smelting capacity in the chrome industry is still too low for a ban on raw chrome. There is need for new investment in chrome smelting, as the current players are not likely to come out of judicial management to be in a position where they can adequately compete in the international market. There is need for a phased strategy, where attracting more smelters into the industry should be the first step, followed by a gradual shift into refining. Attracting smelters into the market would also call for some deliberate industrial policy strategies on smelting, with the underlying goal being to make smelting attractive rather than forcing it through export bans. The entry of Afrochine is a welcome development which needs to be complimented by similar strategies for other global players.

REFERENCES

- Baissac C, Maubrey F, van der Merwe JP and van Onselen J (2015), 'Zimbabwe's Beneficiation Policy Part 1: Understanding the drivers and objectives', *Eunomix Research*, September 2015
- Chitambira B, Miso-Mbele D and Gumbie M (2011), 'Ferrochromium Smelting In Zimbabwe', *Presentation to the Southern African Institute of Mining and Metallurgy*
- Grynberg R and Sekakela K (2015), 'Case Studies in Base Metal Processing and Beneficiation: Lessons from East Asia and the SADC Region', *SAIIA RESEARCH REPORT 21, South African Institute of International Affairs, December 2015*
- Jourdan, P, Chigumira, G, Kwesu, I and Chipumho, E (2012), 'Mining Sector Policy Study', *Zimbabwe Economic Policy Analysis and Research Unit*.
- Matinde E, Hollaway J, Masiya Trust and Mlambo L (2014), 'Beneficiation: Maximizing Value from the Mining Sector in Zimbabwe', *Paper prepared for the Chamber of Mines Beneficiation Conference, Victoria Falls, 27-28 February 2014*
- NRZ (2016), 'Industrial development Policy (IDP) 2012-2016: Appraisal in relation to NRZ', *paper presented during a workshop to review the implementation of the Industrial Development Policy, Bulawayo, 19 May 2016, National Railways of Zimbabwe*
- Nu Times Innovations (2015), 'State of the Mining Industry Survey Report 2015', *Study Commissioned by the Chamber of Mines, Zimbabwe, 2015*
- Parliament of Zimbabwe (2012), 'First Report of the Portfolio Committee on Transport and Infrastructural Development on the Operations of National Railways of Zimbabwe', *Presented to Parliament March 2012*
- PCTI (2014), 'Hearings on up and downstream mineral beneficiation', *Parliamentary Portfolio Committee on Trade and Industry, South Africa, PCTI/20140826/CoB/PJ/33*
- ZEPARU (2014), 'Cost Driver Analysis of the Zimbabwean Economy', *A Study Commissioned by the Ministry of Industry and Commerce, October 2014, Zimbabwe Economic Policy Analysis and Research Unit*
- ZEPARU (2015), 'Platinum Accelerated Growth Plan for Zimbabwe', *Paper prepared for the Chamber of Mines, Zimbabwe, Zimbabwe Economic Policy Analysis and Research Unit Zimbabwe Branch Conference, July 2011*
- ZIMSTAT (2016), 'Quarterly Digest of Statistics, Fourth Quarter 2015', *Zimbabwe Statistical Agency Quarterly Publications*