REPORT R54/2006

AN ANALYSIS OF THE IMPACT OF A THIRD PLAYER ON SOUTH AFRICA'S MANGANESE INDUSTRY 2006

DIRECTORATE: MINERAL ECONOMICS

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DIRECTORATE: MINERAL ECONOMICS

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. Introduction

Prior to 1994, the previous governments ensured that only an exclusive minority of the South African population prospered and thrived on wealth generated by the exploitation of an exceptionally rich mineral endowment to the exclusion of the black majority. The situation changed with the introduction of new legislation, the Mineral and Petroleum Resources Development Act (2002) and its accompanying Broad-Based Socio-Economic Empowerment Charter. This new legislation aims to achieve the optimum exploitation and utilization of these resources for the benefit of all South Africans. In addition, because a few predominantly white-owned companies have long dominated the ownership of the industry, the new legislation seeks to redress these imbalances.

Because the ferrous minerals sector generally exhibits the same characteristics as the mining industry itself it has therefore not escaped restructuring. Of particular interest in this report is the South African manganese industry, which is dominated by two major players. The report seeks to analyse critically the possible impact the introduction of a third player could have on the domestic industry. Questions asked are: could a new entrant acquire and grow market share? What is the most likely outcome of the entry of a third significant producer? What would be the consequences for the South African economy if the current status quo were to be disrupted? What would the socio-economic effects be? Would Historically Disadvantaged South Africans (HDSAs) benefit or suffer harmful consequences as a result of such an arrangement?

The ecologically sound exploitation of all materials, including manganese, depends on an ability to demonstrate their contribution to sustainable development. Sustainability is a three dimensional reality: **physical, social and economic.** This means ferrous metals should be produced to satisfy the requirements of society at all levels and at the same time not damage the environment.

In this report the behaviour of price, tonnage and competitive dynamics in the manganese ore and ferroalloy industry is investigated to highlight how they could be influenced by the factors of supply and demand.

The manganese industry is completely subservient to the fortunes of steel manufacturing where over 90 percent of manganese produced is consumed while its contribution per ton of steel is less than 0.1 percent. This demand is therefore completely inelastic and finely balanced in terms of supply and demand.

With this in mind and the possibility of declining demand over which the suppliers have no control, competitor dynamics are delicately balanced between competition for market share and the need to achieve shareholder value growth and re-investment in the industry. This balance can be observed in the outward stability of the industry structure, but as historic events highlight, the existing balance is easily disturbed leading to sustained periods of poor returns as is evidenced by many other commodities.

Increased production and supply, from either a new entrant or any of the existing producers could represent such a potential disturbance. This event combined with the price cuts necessary in order to sell the increased output, together with the competitive responses of other producers trying to retain or regain market share, could all result in predictable and destabilising consequences.

The initial growth in job creation resulting from the introduction of a new entrant may at a later stage be negated by job losses due to retrenchments implemented by established players as they revise their production downwards in order to accommodate the new entrant in an attempt to maintain sustainable ore prices. Alternatively, the resultant price war may lead to weakening of the viability of some operations leading to job losses, which may be very detrimental to the long-term sustainability of local communities. This in turn may translate to less revenue for both the provincial and national governments as a combination of lower tonnages and prices result in less revenue for the industry. Such a situation may not be helpful in terms of shareholder value growth and maintaining the efficiency and the global competitiveness of the sector.

A question to be asked therefore is: what can the government do to promote increased participation of HDSAs without jeopardising the sector's global competitiveness? In terms of minima/maxima, at what point would increased production lead to such undesirable outcomes?

This question cannot be precisely answered as a complex web of actions, reactions and counter-actions among the many competitors make it difficult to predict a particular outcome. Only the direction of expected behaviour – instability can be predicted and this may lead to the Prisoner's Dilemma as ultimately no winners appear to emerge from among the competitors except steel producers benefiting from lower manganese input costs.

This is essentially an exported benefit as most of these consumers of the commodity are based offshore. What is certain is that the final result of all the above is a rapid fall in the profitability of domestic producers without any benefit accruing to local and national governments as this translates to lower tax revenues being collected from these producers.

2. The Kalahari Manganese Field

More than 80 percent of the known world resources of manganese are located in South Africa in the Northern Cape Province. The manganese deposits of the Northern Cape occur in a zone extending northwards over a distance of 150km, from south of Postmasburg to the Wessels and Black Rock Mines north of Hotazel. These may be divided into two fields (Fig 1.1):

- The southern Sishen/Postmasburg Manganese Field which contains predominantly ferruginous manganese ore
- The northern Kalahari Manganese Field, which is the more extensive and contains South Africa's major deposits of metallurgical ore.

The Kalahari Manganese Field (KMF) is by far the largest of the fields, occupying an area of 425 square kilometres (41 km long and 5 to 20 km wide). It stretches from Mamatwan Mine in the south to the Wessels Mine in the north and is the largest single manganese depository in the world.

Younger sediments generally overlie the economically mineable ore in the Kalahari Field. Surface outcrops occur at Black Rock Mine and at Mamatwan in the south where the overburden is minimal.

In addition to the main deposit of the Kalahari, small deposits of manganese are scattered across an area extending from Krugersdorp in the North-West Province to Botswana. These formed through the weathering of dolomites of the Malmani Subgroup of the Tranvaal Sequence.

2.1 The Geology and Mineralogy of the Northern Cape Deposits

Where fully developed, three manganese enriched horizons are found in the Hotazel formation. These manganese ore bodies are known as lower (5-45m), middle(1-3m) and upper(5m) manganese ore bodies. The KMF contains only the lower and upper ore bodies while the middle ore horizon is missing. It is further divided into a southern portion (generally referred to as the Mamatwan/Gloria type and a northern part which is called the Wessels/Nchwaning type

Ninety seven percent (97%) of all the manganese resources in the KMF is of the Mamatwan type which has a relatively low combined Fe and Mn content of 40% to 44%(38% Mn and 4.3% Fe) .The ore bodies at Gloria and Mamatwan also contain carbonates with the Fe/Mn ratio decreasing down dip. Furthermore, the grade of the ore body, its width and Fe/Mn ratio rapidly decrease away from the western sub-outcrop. The western margin remains relatively unexplored compared to the eastern margin which has been well explored. These ores have an advantage of being self fluxing in furnaces and also upgradeable by sintering. They are used as blends for alloy production in the form of sinter.

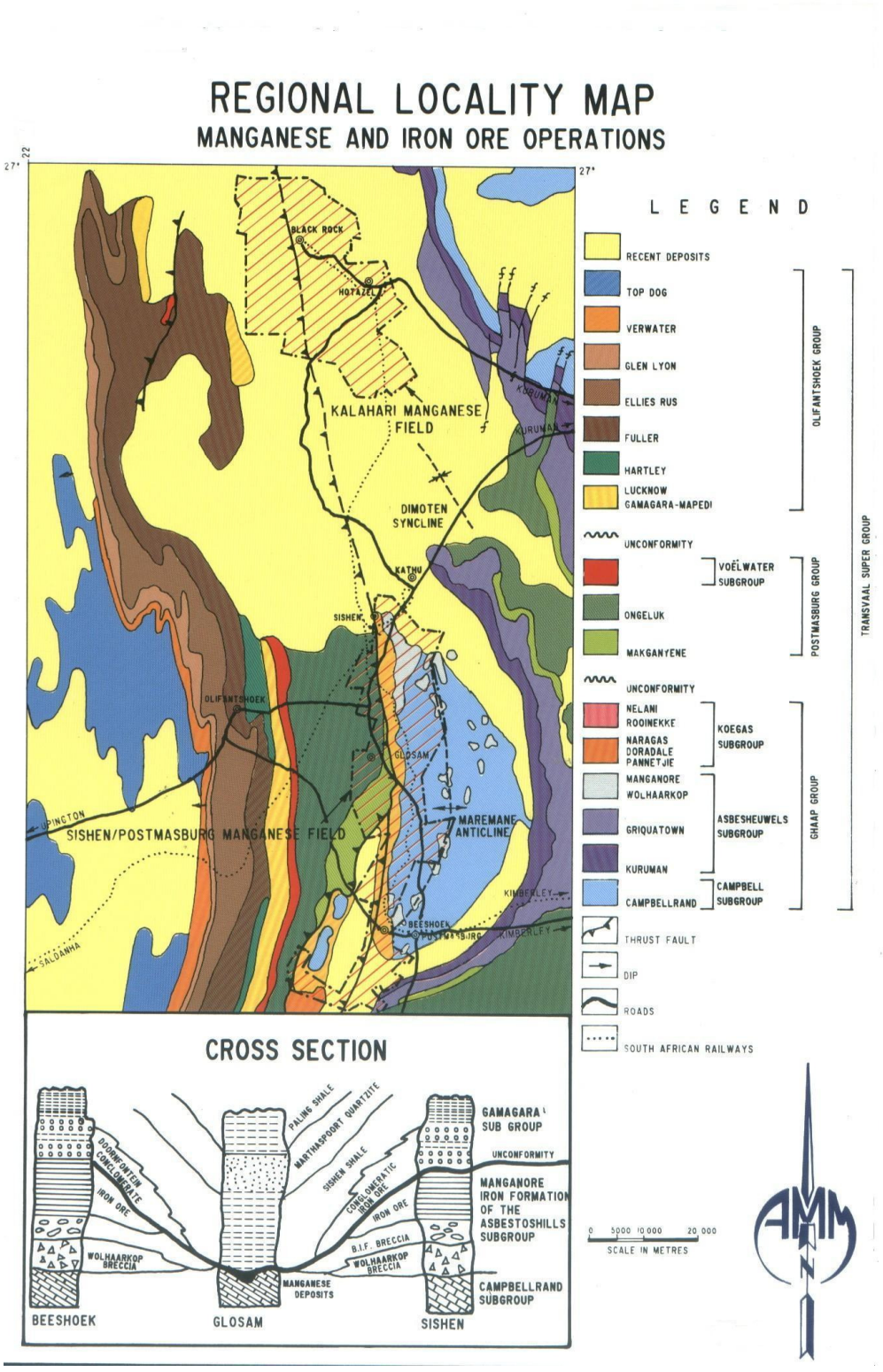

REGIONAL LOCALITY MAP
MANGANESE AND IRON ORE OPERATIONS
27° 22
27°
BLACK ROCK
HOTAZEL
KALAHARI MANGANESE FIELD
KURUMAN
DIMOTEN SYNCLINE
KATHU
SISHEN
OLIFANTSHOEK
GLOSAM
UPINGTON
SISHEN/POSTMASBURG MANGANESE FIELD
MAREMANE ANTICLINE
KIMBERLEY
BEESHOEK
POSTMASBURG
SALDANHA
LEGEND
RECENT DEPOSITS
TOP DOG
VERWATER
GLEN LYON
ELLIES RUS
FULLER
HARTLEY
LUCKNOW
GAMAGARA-MAPEDI
OLIFANTSHOEK GROUP
UNCONFORMITY
VOËLWATER SUBGROUP
ONGELUK
MAKGANYENE
POSTMASBURG GROUP
UNCONFORMITY
NELANI
ROOINEKKE
NARAGAS
DORADALE
PANNETJIE
KOEGAS SUBGROUP
MANGANORE
WOLHAARKOP
GRIQUATOWN
ASBESHEUWELS SUBGROUP
KURUMAN
CAMPBELL SUBGROUP
CAMPBELLRAND
GHAAP GROUP
TRANSVAAL SUPER GROUP
THRUST FAULT
DIP
ROADS
SOUTH AFRICAN RAILWAYS
0 5000 10000 20000
SCALE IN METRES
CROSS SECTION
DOORNFONTEIN CONGLOMERATE
IRON ORE
WOLHAARKOP BRECCIA
PALING SHALE
MARTHASPOORT QUARTZITE
SISHEN SHALE
CONGLOMERATIC IRON ORE
IRON ORE
B.I.F. BRECCIA
WOLHAARKOP BRECCIA
MANGANESE DEPOSITS
GAMAGARA SUB GROUP
UNCONFORMITY
MANGANORE IRON FORMATION OF THE ASBESTOSHILLS SUBGROUP
CAMPBELLRAND SUBGROUP
BEESHOEK
GLOSAM
SISHEN

Fig 1.1

The balance of the ore (3%) is of the higher grade Wessels/Nchwaning type with Mn grades ranging from 44 to above 50 percent at Nchwaning and 44-65% at Wessels. These ores have a low phosphorus and silica content and have only been found along the northwest margin of the basin where intense faulting, thrusting and associated hydrothermal activity have removed carbonates and silica thereby upgrading the ore.

The Manganese ores of the KMF are characterized by their low phosphorus content, which makes them a suitable feedstock for the steel industry. Almost the whole Basin is covered by the recent deposits of the Kalahari Formation.

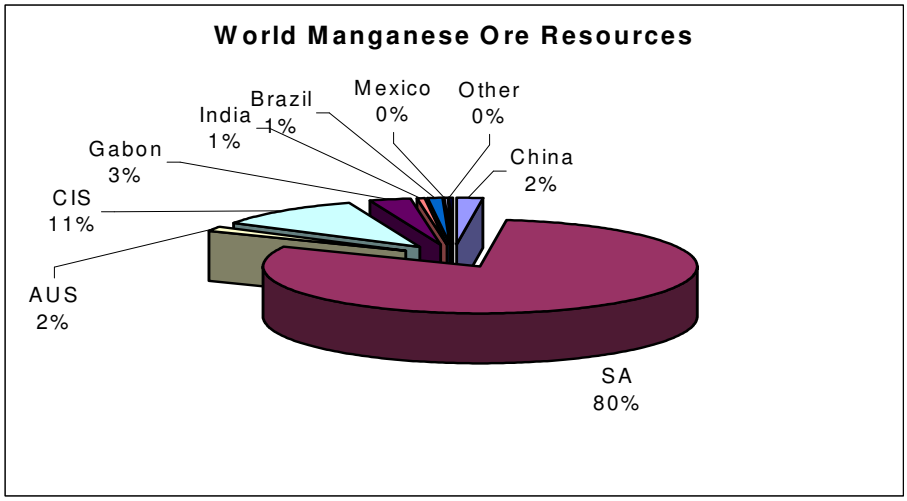
The only manganese outcrop is at Black Rock. However,in the south east around Mamatwan the manganese is near surface, allowing this area to be mined by opencast methods whereas elsewhere the ore has to be accessed from underground. Nevertheless mining in this area depends on a large capital investment in infrastructure, beneficiation plant and sintering facilities.

It is very unlikely that any unknown sizeable unexploited deposits of the Wessels type occur near surface, anything remaining is probably small and at depths amenable to only underground mining. Mining of such deposits could prove costly and probably uneconomic.

It is clear from the geological characteristics that the size of a sustainable operation established by a third player will be limited by an opencastable ore of the low-grade Mamatwan type, or alternatively from available tonnage occurring at a currently economically unexploitable depth below surface for the higher grade Wessels/ Nchwaning type of deposit. In both cases a large capital investment in infrastructure, beneficiation plant and sintering plant, would be required. The location of target markets and how the product will be transported to these markets may also impose further constraints on the viability of such a project.

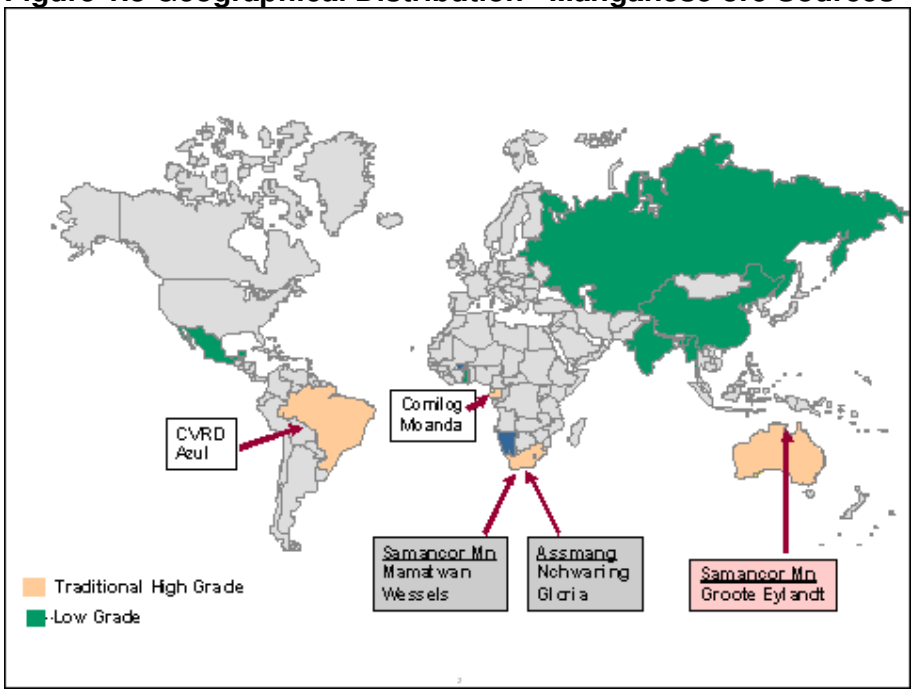
3. Manganese Ore Markets

Figure 1.2: World manganese ore resources



3.1 World Supply of Manganese Ore

Figure 1.3 Geographical Distribution –Manganese ore Sources



South Africa, with 80 percent of the world resources, is the world's largest producer and second largest exporter of manganese ore (Table 1.1).

Manganese is one of the most abundant elements yet it is exploited from only a limited number of high-grade ore deposits. These major deposits are found in South Africa, Gabon, Australia and Brazil (Fig 1.3). There are however other low grade smaller deposits, which are mined in China and the Commonwealth of Independent States (CIS). The key cost discriminators among producers are the location of the operation, local labour costs and the depth of the deposit below surface.

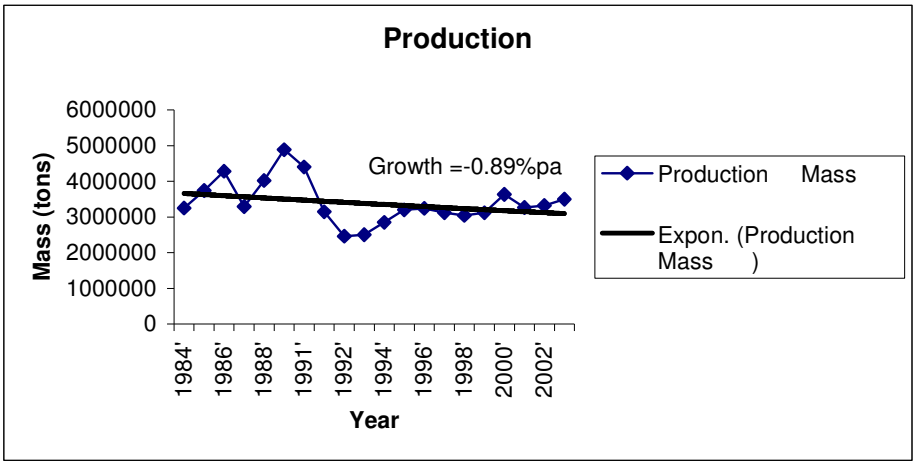
The ease of access to low and medium grade deposits means that in times of higher demand and prices, new entrants are able to enter the market thus adding to the supply chain and limiting the returns available to existing producers. The ease with which new entrants enter the market in times of higher demand and prices and their reluctance to exit it when these two variables are lower, tends to depress prices further thus driving the profits of all competitors below acceptable levels.

In its 2003 manganese industry review, the International Manganese Institute (IMnI) reported that industry consolidation marked by mergers and acquisitions had resulted in fewer and integrated producers, with increased market share for the consolidated or surviving company, as most ore producers are also involved in downstream beneficiation of the product. Increased steel production particularly in China, led to higher demand for manganese ore and its alloys. Notwithstanding this trend, a persistent downward pressure on manganese ore and alloy demand and prices has been maintained as steel makers improved efficiencies and cut costs.

TABLE 1.1 - World Manganese Resources, Mine Production and Exports, 2004

COUNTRY	RESOURCES			PRODUCTION			EXPORTS		
	Mt	%	Rank	kt	%	Rank	kt	%	Rank
Australia	75	1.5	5	3 481	11.8	2	2 827	21.6	1
Brazil	56	1.1	6	2 676	9.0	5	1 534	11.7	4
China	100	2.0	4	3 420	11.5	4			
CIS	560	11.2	2	3 450	11.6	3	1 125	8.6	6
Gabon	150	3.0	3	2 460	8.3	6	2 212	16.9	3
Ghana	*	*		92	0.3	9	1 520	11.6	5
India	36	0.7	7	2 035	6.9	7	338	2.6	7
Iran	*	*		89	0.3	10			
Mexico	9	0.2	8	233	0.8	8			
South Africa	4 000	80.0	1	4 280	14.4	1	2 420	18.5	2
Other	14	0.3		7 128	25.7		1 143	8.5	
Total	5 000	100		29 347	100		13 119	100	

Figure 1.4: South Africa's Production of Manganese Ore, 1984-2004



Although South African production of manganese ore has been dropping at an average rate of 0.89 percent per annum (Fig 1.4) despite growing demand for the product on the back of higher crude steel production, the last ten years have seen a steady rise in ore production. The reason for this average decline over twenty years is that South African producers have not always found it economic to exploit rising demand due to its distance from the markets despite the existing excess production capacity to do so. Competitors, located closer to the markets have therefore traditionally had a competitive advantage over local producers. Thus, given the fact that local producers, although well established as global players with well oiled marketing machinery, are currently facing the prospect of continually dwindling market share due to a variety of factors, how will a new, inexperienced player handle such a situation? Will its solution be to partner up with some established industry player and thus lose independence? Will its strategy be lower prices, which may trigger retaliatory action from other role-players? Some of the answers to these questions will be formulated towards the end of this analysis.

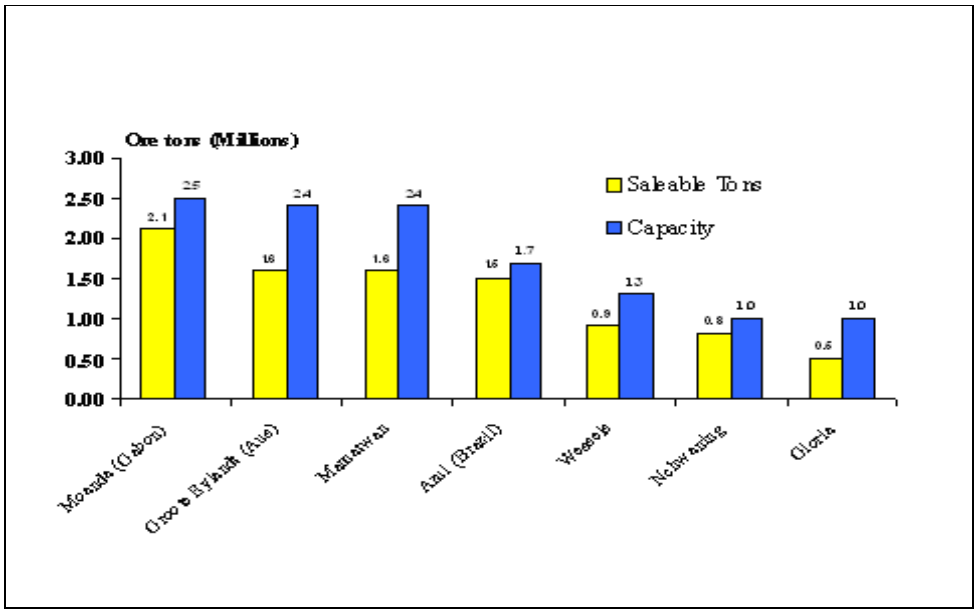
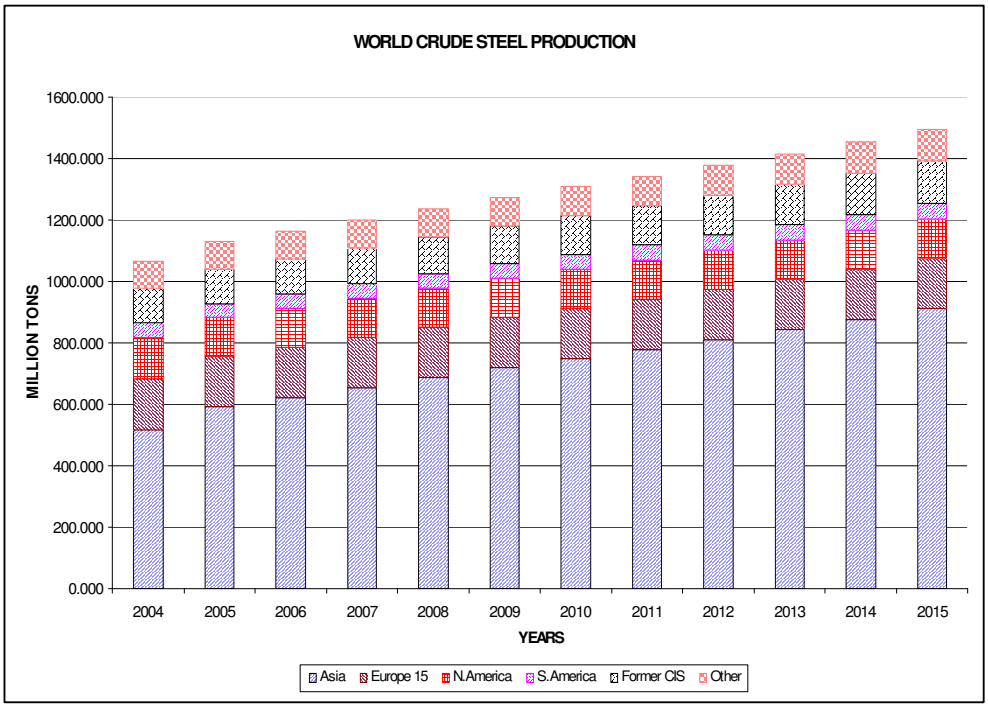


Figure 1.5: Estimates of Production and Capacity

3.2 Demand for Manganese Ore

The only significant driver of demand for manganese is the steel industry. Steel manufacturing accounts for some 97 percent of demand.

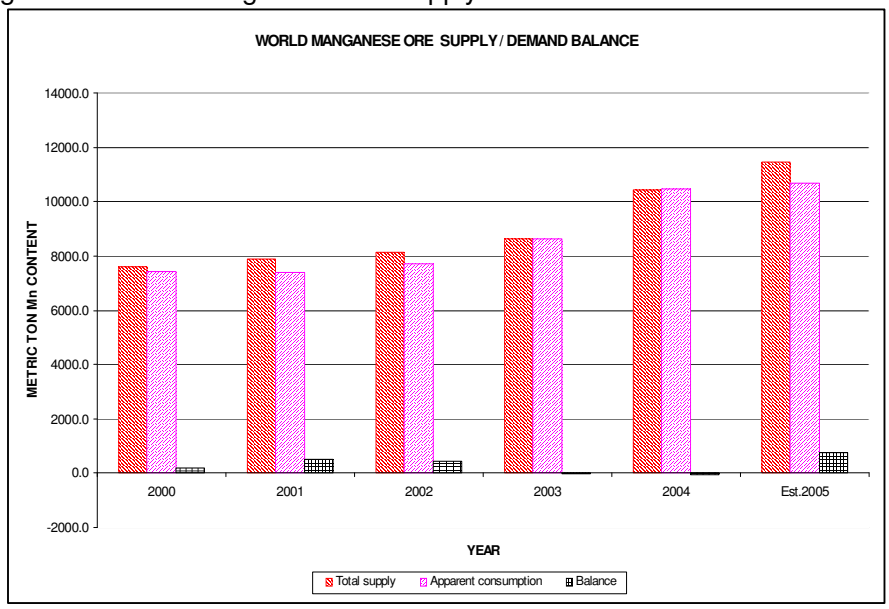
Figure 1.6 World Crude Steel Production



Source:AME Mineral Economics Forecast for the period to 2010

About 94 percent is consumed in the form of manganese alloy while 3 percent is taken up as electrolytic manganese as a desulphurisation agent and also as an alloying element that increases hardness and toughness of the finished steel product. The remaining 3 percent is used in a number of other small applications such as, batteries, electronic components, animal feed and aluminium alloying.

Figure 1.7 World Manganese Ore Supply/Demand Balance



Source:IMnI

In August 2000,the Monitor Group projected growth for crude steel production at 1.2 percent per annum. However, the actual growth achieved was considerably higher coming on the back of unexpected significant growth in China and the projected growth until 2015 has since been adjusted upward. Asia, including China growing at a rate of 4% per annum is expected to account for most of this growth while in the rest of the world steel production is anticipated to be flat at approximately 1 percent per annum (Figure 1.6).

During 2004 consumption of manganese ore increased significantly due to higher crude steel production (which exceeded the 1 billion ton mark) but such demand was matched by increased manganese supply from manganese producers utilizing excess production capacity (Fig 1.5) to meet this higher demand. Furthermore, to meet future expected consumption rates, a number of expansions and new mining ventures are also currently under construction.

A comparison of Fig1.6 with Fig 1.7 clearly reveals that world manganese ore production grows in line with crude steel production. Any changes in the crude steel production graph will also be reflected by similar changes in the manganese ore production profile. Until recently producers have been able to meet new demand without having to expand. Nevertheless, it is expected that demand for manganese will diminish as steel producers

improve efficiencies in an attempt to minimize input costs. This will lead to intense competition as producers attempt to maintain their share of an ever-diminishing market.

3.3 What effect will a new entrant have on the supply/demand balance?

The answer to this is not simple as it depends on a complex web of factors involving price, viability and issues of competition. As demand for manganese is derived mainly from steel production, the impact of a new entrant will also depend on economic and steel production cycles. If the timing is such that it coincides with rising trend in steel production and hence increasing demand for manganese, the potential adverse impacts on the supply/demand balance may be minimal to almost nothing. However if the demand is high and sustained so as to absorb almost all or all the extra production, it may result in more positive consequences enabling some share of the global market to be captured by the new player.

Notwithstanding the above argument, the introduction of a new player will invariably result in higher output of manganese as well as higher capacity, which would increase the amount of manganese available to the market. If the demand is constant and the market is in a state of equilibrium such an increase would eventually cause supply to eclipse demand provided that the other manganese producers maintain their share of the supply market. However, if other producers respond by cutting production in order to accommodate the extra tonnages made available in order to avoid downward pressure on prices, the equilibrium state might be maintained. Such an ideal situation however, is rarely conceived as possible as each producer has contracts to honour and therefore cannot just cut production without facing legal consequences unless a sizeable portion of their production is destined for the spot market.

The most probable outcome of a new entrant is that it would likely upset the supply demand balance. This assumes that the new production will be sold as manganese ore, however, if the ore is beneficiated into manganese alloys, the impact on manganese ore supply/demand balance may be minimal or zero.

Since available manganese resource outstrips long-term demand, the challenge for the industry is more one of managing the precarious supply/demand balance of manganese in the market to ensure viability and value rather than that of availability.

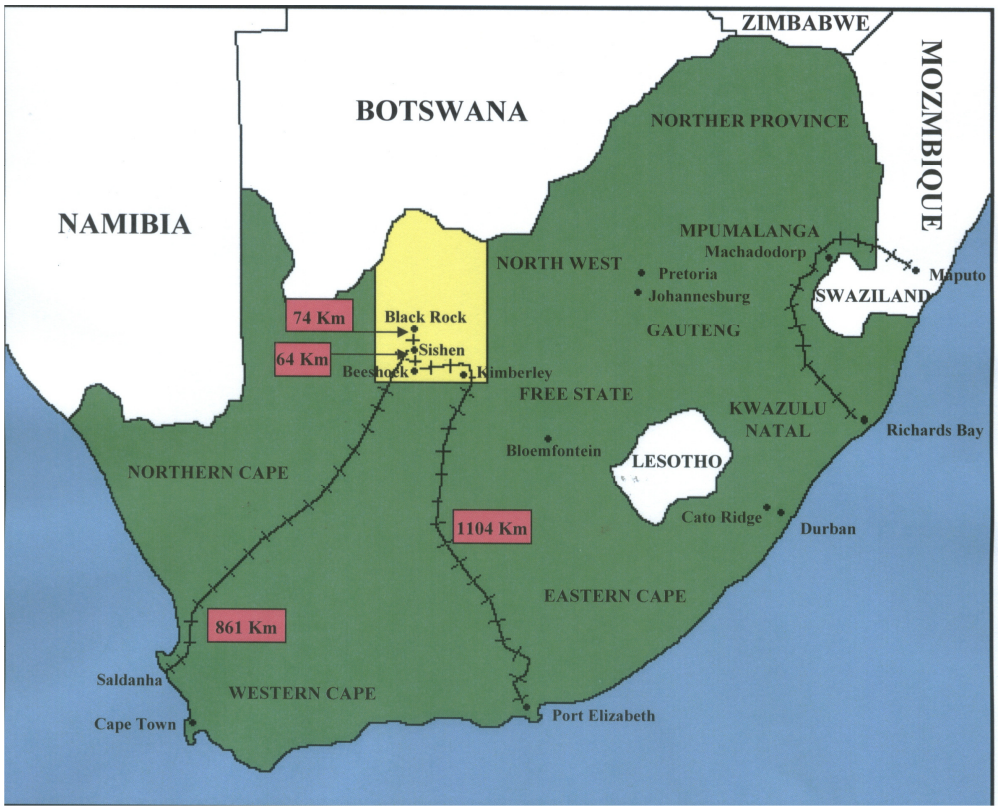
4. Transportation of Ore from the Kalahari Manganese Field

Manganese ore mined in the Hotazel area of the Northern Cape is transported by rail to a bulk minerals handling terminal at Port Elizabeth, a distance of more than 1 100 kilometres (Fig 1.8). The mechanical plant at the terminal has been in operation for over 40 years and is now considered to be antiquated. Discussions are currently being held on removing the bulk minerals terminal from Port Elizabeth and relocating it at the new Port

of Ngqura by 2008. A decision could also be made on adding an export facility for iron ore exports, which would improve the economic feasibility of the project and allow exporters an alternative route to the Orex-Saldanha line.

Another option would be to use the port of Saldanha for manganese exports as well but such alternative could have negative consequences for a facility designed only for the handling of iron ore, and as such the introduction of manganese ore would increase the likelihood of contamination between the two ores. Furthermore, various studies have confirmed Port Elizabeth as the only viable harbour through which to export manganese. Currently, the current producers largely utilize the rail and port capacity at Port Elizabeth, which stands at 2.5 Mt, and 3.2 Mt per annum, respectively.

Figure 1.8 South African Export Facilities



The long and short of it is that unless the current producers reduce their export tonnage to accommodate the new player, assuming that most of its new production will also be exported, additional demands will be put on the already fully utilized rail and port facilities. To eliminate this logistical constraint, massive capital investments in port and rail infrastructure would be needed. It is possible to upgrade these facilities to 4.2 Mt per annum but this would require additional track capacity (power supply or building new train crossing loops) plus additional wagons and locomotives. In order

to realize this requirement an investment of more than R250m would be needed for upgrading and a further R250m for replacing the harbour facility, which is nearing the end of its life. (Theart et al, 2003)

Despite the refurbishment mentioned above, it appears the scope for increasing tonnage significantly is limited without the significant capital expenditure alluded to by Theart et al, (2003). In line with this, it is anticipated that the Dry Bulk Terminal will move to Port of Ngqura between 2011 and 2013, in order to sustain port capability and increase capacity. Its capacity could be 5 Mt per annum.

Given that the current producers are expected to fund more than 80 percent of the investment in port and rail infrastructure, if a new player is admitted, the existing companies may be reluctant to contribute to the necessary investment. However, if the state is willing to fund the increase in port and rail capacity itself so as to accommodate the new player, the impact on rail and port capability and capacity could be minimized. Alternatively, Transnet could ask the new company to contribute to the investment in proportion to the volume it expects to export. However, this may impose too heavy a financial burden on the new player.

But would this be a fair and reasonable expectation to expect of the new player? Would the playing field be levelled so as to ensure fair competition? Did the current players also fund investments in rail and port facilities at the beginning of their operations, as it now seems expected of a new player? It seems that the authorities might have to consider all these concerns in order to arrive at a decision that fits all requirements while achieving its macro-economic goals.

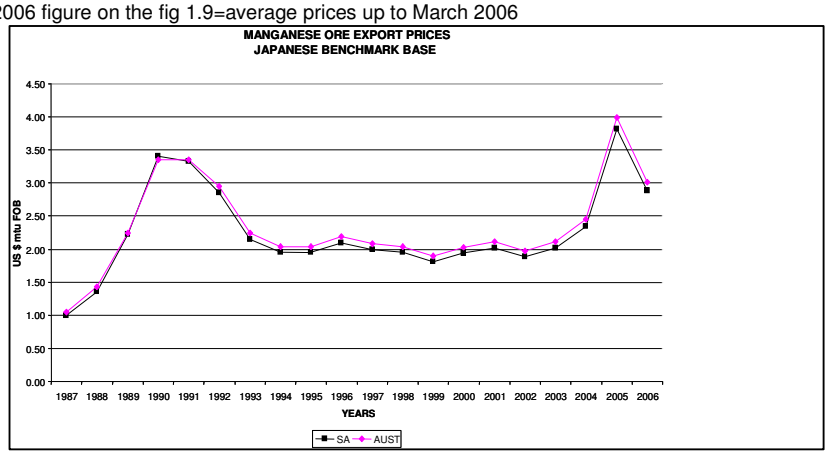
5. Prices

5.1 International Prices

Figure 1.9 shows the full impact of higher demand on manganese ore prices due to increased global crude steel production. An upward movement in prices from the long-term average of about $2 USD /Mn unit (“mtu”), Free on Board (FOB) to about $4 USD/mtu occurred in 1989/91 and again in 2004/2005. However prices have since moved back towards the long-term average of below $3/mtu FOB. Note should be taken of the fact that actual realized prices in China are generally lower than the Japanese benchmark equivalent due to Chinese flexibility in using different manganese ore grades which are reliant more on “spot” (short term) sales than long term contracts.

Figure 1.9: Manganese ore export prices, Japan benchmark prices (FOB)

Source: IMnI
2006 figure on the fig 1.9=average prices up to March 2006

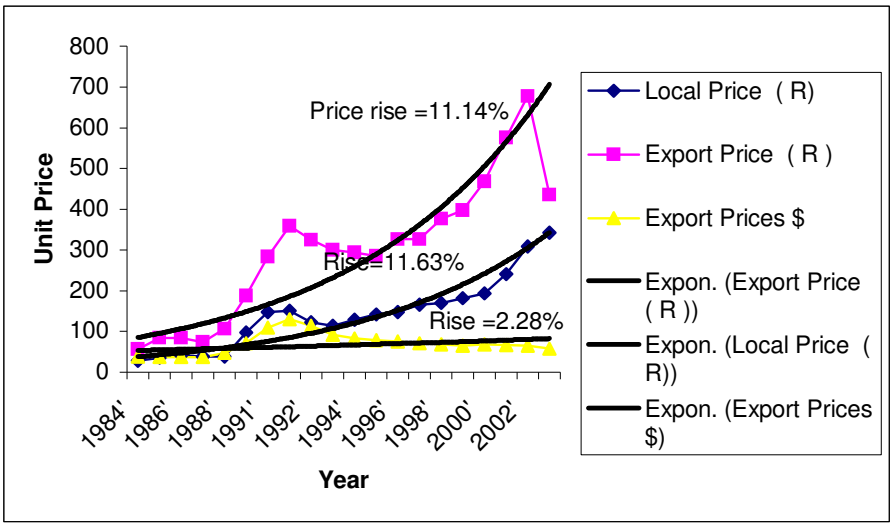


The average annual Japanese benchmark manganese ore price in Fig 1.9 is thus tightly constrained by demand for the product. Currently, if more ore were to be made available to the market, prices could deteriorate further as available manganese ore would tempt consumers to exert pressure on producers to lower their prices. Such a move initiated by any of the producers could result in further downward pressure on prices, which would be exacerbated as other producers follow suit in an attempt to recapture or maintain their market share.

5.2 Local Unit Values

Because of sustained Rand/dollar depreciation for over a decade, Fig 1.10 shows that annual average manganese ore unit values have risen significantly, in rand terms from 1984-2004. The average annual export unit value increased at a rate of 11.1 percent per annum throughout this period while the local unit values climbed some 11.6 percent per annum. In contrast, dollar prices have moved up by only 2.3 percent per annum. Since 2001, the strengthening of the local currency has eroded these gains thus limiting the long-term competitive advantage that local exporters have derived from a weak currency. Moreover, if dollar prices themselves were discounted to reflect the effects of inflation, the net effect would be even lower growth for the period.

Figure 1.10: Manganese ore unit value growth rates, 1984-2003



6. Access to the manganese ore market

Unless the intention is to beneficiate most or all of the ore mined, the new entrant will most probably have to compete with current players for a share of both export and local markets. In order to capture even some share of these markets, the new entrant might have to market his product in such a way as to convince the established consumers of ore why they aught to give their business to a new, inexperienced player who could turn out to be not as reliable as the tried and tested manganese ore suppliers. Reducing prices can be a consequence of excessive supply or a marketing strategy implemented by the new entrant. The current players keen to recapture market share lost as a consequence of lowered prices and/or maintain their market share may follow suit by dropping their prices to consumers by a similar margin. This may escalate into full-blown price war during which producers would most likely lose control of previously stable prices. This downward pressure on prices may put pressure on profit abilities, which may adversely affect the returns on investment and thus the viability of operations.

Despite the above scenarios, should the new entrant undertake a thorough market study to establish how best to fit in with the sensitive manganese ore market before proceeding with investment, all may not be that gloomy. Furthermore if the entrant can secure some share of the alloy market and thus improve the value of the product before exporting, the results may be quite different from what is predicted above. In combination with capturing a supply of the ore for further beneficiation, the entrant may do well to secure commitments from some of the global downstream processors to relocate their alloy production plants to South Africa based on a promise of a captive ore supply at lower costs. The domestic economy would benefit from such an investor through local job creation and utilization of local skill and/ or development of such skills as might be deemed necessary.

7. Competitiveness of South Africa's Manganese Industry

South African operations fall close to or in the higher quartile of the manganese industry cost curve. Those producers falling in the first quartile have a competitive advantage.

This is due primarily to the nature of deposits, the stripping ratios, and the need for processing and significantly higher transport costs. Since the international manganese industry is extremely competitive and new competitors are at liberty to enter and exit the industry as they please or displease, such a move only makes sense if such entrants are able to compete and operate profitably given the cyclicity of commodity prices.

Because Assmang and Samancor have rights to the best available reserves and are exploiting them economically, a new entrant could find it difficult to compete with the required economies of scale. Furthermore, it might not be able to achieve cheaper rail tariffs than those currently enjoyed by the two major local producers, if it is able to receive rail and port allocations at all. The cash cost of a new entrant would thus be significantly higher which would make the operation unviable as soon as any further downward pressure is put on prices. Added to this is the need to redeem the capital outlay necessary for a new mine, the fact that operating costs have gone up significantly (20-40%) during the last few years due to a boom in the industry, shortages of equipment and in mining professionals and contractors. Moreover, there is the problem of the vast low-grade manganese deposits currently being exploited in China to feed the current high demand due to accelerated growth in Chinese steel manufacturing.

While there might be room for selective mining of the high grade smaller deposits, provided that overheads are kept low, there may be a need to do this in co-operation with current players. However, if the new entrant chooses to mine independently of current players and therefore in competition with them, the impact on their competitive behaviour cannot be predicted with certainty as only the direction of expected behaviour- instability- can be predicted.

7.1 The Structure of the International Manganese Industry

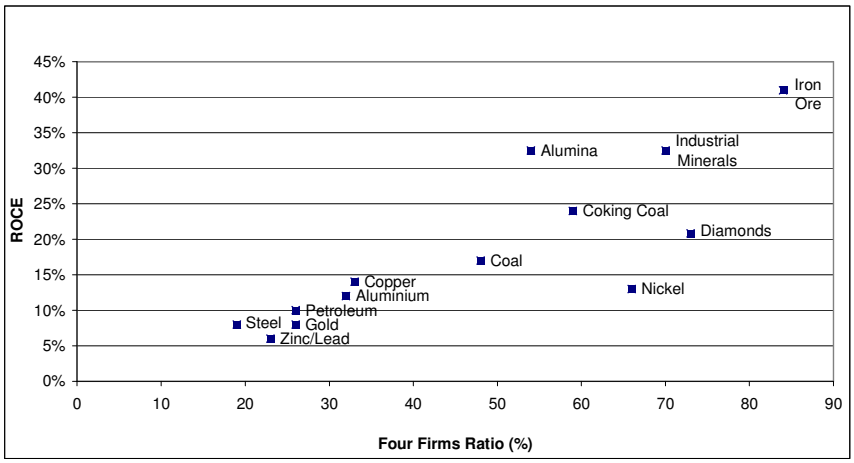
According to the International Manganese Institute (IMnI 2003), the international manganese industry is well consolidated with three producers accounting for about 50 percent of world manganese ore production and 48 percent of the alloy production. The top producers are Samancor, CVRD and Assmang. The reasons for such a high degree of consolidation are:

- The world's high-grade ores are geographically concentrated and largely held by the major producers (Fig 1.3),
- Capital costs to develop high volume low grade deposits are high, and the same goes for transport infrastructure to deliver the ore to the international markets,

- Manganese ore production costs are extremely sensitive to rail and freight costs and thus geographic location, as is the case with most bulk commodities.
- Long lead times to develop new mines are due mostly to the infrastructure requirements

Such a high degree of consolidation together with the market discipline exhibited by the major producers has resulted in reasonable returns on capital employed (ROCE). There seems to be a clear correlation between the degree of consolidation in the market and the returns on capital employed (Fig 1.11). However, the strong trend towards consolidation in the steel industry as well will put it in a better position to bargain with prices with the main manganese ore producers, which could pose a threat to their endeavour to achieve consistent and reasonable returns.

Fig. 1.11- Industry consolidation and commodity market returns



Source: Salomon Smith Barney, December 2001

The manganese industry is a cyclical one leading to cyclical price trends. Price booms tend not to last long and are followed by a period of declining or consistently low prices. ***A measure of a mining operation's true robustness is its ability to survive these, sometimes extended, periods in the trough of the price cycle.***

7.2 Upstream/Downstream Diversification

Currently major manganese ore producers such as: Samancor, CVRD and Assmang are also producers of manganese alloys. The currently tight market conditions and the prices for manganese have also led to a push by consumers/ importing countries to diversify their operations and to invest in mines producing raw materials for their steel plants. Sometimes these investments are made in marginal operations (e.g. China) and this leads to increased supply to the market. Furthermore, transfer pricing could be a problem, to the detriment of the host country.

According to the IMnI review of 2003, demand for manganese alloys has been growing steadily and is expected to continue growing until 2008 yet prices have decreased steadily since 1990 as a result of consolidation in

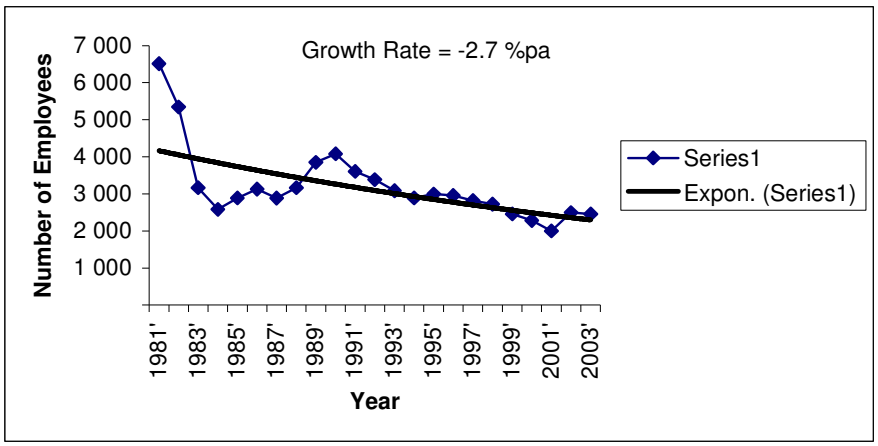
the market and intense competition. Therefore, if the new entrant were to link up with major international consumer interested in upstream diversification, and it were able to convince such a partner to relocate its alloy producing plant to South Africa, this would minimize the likelihood of transfer pricing and exploit such a partner's dominant position in terms of experience and economies of scale.

8. Employment in the Manganese Ore Industry

In 2003, some 4280 Kt of manganese ore was produced in South Africa with a total workforce of 2460 people (Fig 1.12). This equates to 1740 t per worker in the manganese mining industry. By increasing manganese ore production in South Africa, it is thus possible to create about 580 jobs per million tons of output, although a greenfields mine would probably create more jobs than a brownfields expansion. Based on the above estimates a 4 Mt mine would create about 2300 jobs. In addition to these, there is a possibility of jobs created by downstream value addition activities like the production of alloys. The number of people absorbed by the industry through the new entrant might not be that significant in reducing the current national unemployment rate, but taking into account that each employee supports on average a family of 7, the number of new people benefiting from such an operation becomes more significant. Furthermore, supply of services and procurement needs of the new mine could bring additional benefits for the province and the national economy, let alone the extra revenue that may be generated by SARS in terms of tax collection.

However, these advantages must be weighed against the number of jobs that could be lost from the established operations as the new entrant brings new supplies to an already oversupplied market resulting in lower prices for the commodity, an ensuing struggle for market share and price wars at worst. In such a case the South African economy could come out as the big loser.

Figure 1.12 SA's Manganese ore mine employment growth rate, 1984-2003



South Africa's manganese mines have been shedding jobs at 2.7 percent per annum (Fig 1.13). In tandem with this trend, manganese ore production declined by 0.9 percent per annum over the same period. Increasing manganese alloy production has compensated for the decline in ore output. Although employment figures for the alloy industry are not available, one can assume that the industry has created employment through downstream beneficiation. In addition, more revenue has been generated, translating into more revenue for the government, in a form of taxes. With all this in mind, the question to be asked is- why can't South Africa simply increase alloy production, as has been the case with other countries like China.

9. Why can't South Africa increase its alloy production capacity?

In 2004 manganese alloy prices almost tripled, aided by very strong demand, the closure of a major FeMn alloy plant in France and reduced exports from China because of power shortages, logistical constraints and

excessive demand in the Chinese domestic economy. Several marginal production plants outside China were restarted and made profits during this period on the back of the higher prices. The re-opening of these old facilities might have created an impression that the alloy industry had expanded when in reality it was only re-utilizing old production facilities. Many of these operations subsequently ceased production due to downward pressure on alloy prices in global markets. South African producers are reported not to have created any additional capacity during this period.

But what would have been the impact of additional capacity? Would it have been beneficial or harmful? The answer to this depends not only on South African market dynamics but also the international markets as such capacity may be utilized to produce more alloys which might have to be sold locally or exported. As the market for the product is limited, South Africa's distance from the markets as well as its position on the industry's cost curve might negate any attempt to capture some of this competitive global market. Alternatively, should such a producer offer its product at lower prices, this approach may backfire on the producer. However, if the pessimistic view fails, additional production of alloys is likely to be more beneficial than harmful provided that the new producer is able to capture the emerging Asian markets on a sustainable basis.

10. What Drives Manganese Alloy Growth in China versus South Africa?

Despite its large manganese resources, South Africa is no longer in a very favourable competitive position to produce ferro-alloys as its high-grade ore is expensive to mine from underground and most of the mines are remote from ports and alloy production plants. Moreover, high capital costs and expensive coke further undermine its global competitiveness. While South Africa is distant from the main centres of demand for manganese products, China enjoys the advantage of low capital costs, cheap local manganese ore, inexpensive labour, cheap coke and proximity to the markets.

China has a huge captive market for alloys in that it accounted for 30 percent of the world crude steel production in 2005 (350 Mt) consuming 4.2 Mt of Mn alloys, that is 38 percent of the total world alloy consumption. China's crude steel production is expected to surmount 450 Mt per annum over the next five years with a probable concomitant rise in Mn alloy consumption. Moreover, the Chinese government has a policy that seeks self-sufficiency in alloys and other products and there is a huge installed and underutilized capacity estimated at about 22 Mt, fifty percent of which is idle. Much of this capacity is made up of small furnaces, with an in-built flexibility which enables them to switch to different products (FeCr, Fesi, Si Metal) as and when market conditions dictate. An additional alloy expansion in South Africa would have to compete with Chinese alloys both in China and in other markets.

China imported about 4.5 Mt of manganese ore in 2004/2005 of which between 8 to 11 percent was from South Africa. Although the above does not rule out the possibility of any new greenfield expansions in either ore or alloys or both, such expansion would have to occur close to where there is significant crude steel production growth with lower development and operating costs, competitive power and where strong growth in crude steel production is forecast (Asia), to give it a fair chance of success.

The introduction of a new manganese ore producer may prove detrimental to the industry in the long run as more players will have to compete for limited available infrastructure. Transport costs and freight rates (from port to customer) could go up as demand for these services increases and without the possibility of any immediate expansion and upgrading of these services the logistical constraints on rail and port facilities could worsen. All the above factors may be to the disadvantage of a new manganese ore and alloy producer in South Africa and could impact negatively on the sustainability of all the existing producers. However, if the new entrant could link up with a consumer interested in upstream diversification and convinces such a partner to relocate its alloy production plant to South Africa maximum benefit could be derived. The temptation of transfer pricing could also be avoided.

11. Conclusion

Due to the overwhelming dependency of manganese on steel manufacturing, the factors, which negatively affect the steel industry, will invariably exert downward pressure on manganese prices. Should a new player enter the market, and the growth in availability of manganese is greater than the underlying growth trend in steel fabrication, manganese ore prices may decline faster than would have been the case if the status quo were maintained. One of the key variables that may have a significant impact on the possible outcome however, is the reaction of other suppliers. Since the international manganese industry is highly concentrated, any action by South African producers to increase the supply of manganese ore or alloy is most likely to result in some reaction from other international producers. Depending on the initial action by South African producers, this retaliatory action may take one of the following forms

- Voluntary Restraint Agreements- the industry would try to limit the impact of the new supply or capacity in the market in a responsible way. This would range from reducing supply by equal amounts so as to maintain the supply levels prior to the new capacity development (OPEC style), to asking the country responsible for the new capacity to limit overall country supply to international markets at levels prior to the new capacity development.
- Anti-dumping: The international industry may want to make a case that South African producers are supplying the product at lower prices than in South Africa. This would be the case if a new producer offers lower prices to capture market share.
- Open Market Aggression-In this case any new industry player would have to tackle the international market directly to gain market share. If lowering prices is used as a means to gain market share and the industry follows suit, the margins for existing players would be reduced. More ore would have to be supplied for revenue to at least equal the amounts previously generated. The outcome of open market aggression therefore, could result in lower prices and lower margins.
- On external trade -The value of exports may increase marginally initially but since the investment may require imports, the value of which would be of capital nature, increase in imports might outstrip the increase in exports and thus lead to a weakening of the trade account.
- On government finance -The revenue the government derives from individual and company taxes may increase and this improvement

in income may lead to a decline in the deficit. A new entrant may therefore result in an improved fiscal position for the country assuming the best-case scenario.

- Socio-economic Impact-The GDP of the country may improve marginally. This means the economy will be larger if a new player is allowed to develop the Kalahari Manganese Field (KMF) than would have been the case if no development took place. A development of the manganese will therefore contribute to economic growth of both the region and the nation. Again this assumes the best-case scenario and only positive outcomes.

The exact impact of the introduction of a third player into the South African manganese ore producing industry cannot be predicted with certainty as only the direction of the expected behaviour can be predicted. If the best case scenario is assumed the economy can only benefit from increasing the number of competitors whereas instability is the most likely outcome, if the worst case scenario is assumed

Finally, the high capital costs associated with the establishment of mining infrastructure and the possibility of restricted margins due to logistical constraints cannot be overstated.

RECOMMENDATIONS

- Any new entrant must be encouraged to undertake at least the same level of beneficiation as the current producers to maximize the socio-economic benefits that local communities can derive from the exploitation of their resources.
- If the new entrant were to link up with an international consumer, it may be wise to convince such a partner to relocate its alloy production plant to South Africa to ensure maximal value extraction and to avoid the temptation of transfer pricing.
- In order to accommodate the new entrant the rail and port facilities need to be more efficient
- The regional electricity supply capacity may also need to be more efficient to satisfy the additional needs arising out of new mining operations as well as beneficiation plant

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