

The Potential of the 'Chrome Chain' for South Africa

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This paper examines South Africa's position in the 'Chrome Chain' – the four stages of chromium processing from the mining of the ore to the manufacture of products using stainless steel. It then outlines the way in which South Africa could improve its position, concluding that a combined commitment by the government, organized industry, and organized labour could achieve this.

Introduction

I wish to share some ideas with you about the potential of the Chrome Chain for South Africa. As a country, we have many needs, like employment opportunities, export income, wealth creation, and increased State revenue to meet the increasing demands on government expenditure, to name a few. What can a concerted and co-ordinated effort of all stakeholders achieve towards fulfilling some or all of these needs in the 'Chrome Chain'?

The Chrome Chain

The concept of the Chrome Chain is based on four stages of beneficiation starting with material containing chromium. Each stage after the first represents the product of an industrial process that beneficiates or transforms the output of a previous stage into a new product. The products of the four stages are as follows:

Stage 1	Raw materials
Stage 2	Beneficiated materials
Stage 3	Material-type products
Stage 4	Manufactured-type products (or complex manufactures).

The industries representing the four stages of the Chrome Chain are as follows:

Stage 1	Mining of chromium ore
Stage 2	Production of ferroalloys (also chrome chemicals and refractories)
Stage 3	Production of stainless steel
Stage 4	Production of manufactured products using stainless steel.

The output of the Stage 3 industry can be in the form of plates, sheets, sections, tubes, wire, rods, or castings – in fact, any product that is primarily made of stainless steel, and that has not gone through an individual transformation phase as a unit or had any other material added to it. The output of the Stage 4 industries would include fabrications, flanges, holloware, sinks, cutlery, catering and kitchenware, exhausts, and fasteners, etc. These are regarded as complex manufactured products.

South Africa's Portion

The world production and value of the output for each stage (in 1988 values) is estimated as follows:

	Output, Mt	Value, \$ x 10 ⁶
Stage 1	11,2	440
Stage 2	2,7	3 270
Stage 3	10,3	29 600
Stage 4	≈8	66 500.

The South African portion of this output of each stage in the Chrome Chain in 1988 was the following:

Stage 1	37,5%
Stage 2	36,5%
Stage 3	1,0%
Stage 4	0,05%.

It can be seen that, while South Africa is a significant player in world terms in the production of chromium ore and the production of ferrochromium, it is not significant in the last two stages. The reason for the high portion in Stage 1 is the very large reserves of chromium ore in South Africa – about 75 per cent of the known reserves worldwide. Not only this, but the ore is relatively easy to mine. The high portion of world ferrochromium production can be attributed to two reasons: the acceptance by the stainless-steel industry of charge chrome with its lower chromium content and the input cost support via the electricity price, which has enabled the South African ferroalloy industry to be the lowest-cost producer in the world. Unfortunately, the high cost of capital has stunted the growth of the industry in recent years, particularly since the removal of the price support for the electricity input.

The total value of the output from the four stages in South Africa in 1988 was estimated at about R3,7 billion, of which approximately R1,8 billion, almost 50 per cent, was exported. The number of people employed in the four stages is estimated at 25 300, the largest employment figures being 13 000 in Stage 4. The South African position is summed up by Table I.

If we look at the wealth-creating opportunity of each stage, we find that there is a significantly larger amount of

wealth to be made if the chromium is beneficiated into stainless-steel products than if exported as chromium ore or as ferrochromium. When the value per tonne of chromium is used as a basis, because chromium is the material endowed to our country, the approximate sales value per tonne for each stage is as follows:

Stage 1	R568
Stage 2	R2 338
Stage 3	R49 246
Stage 4	R113 700.

TABLE I
THE CHROME CHAIN IN SOUTH AFRICA

Stage	Sales R x 10 ⁶	Exports R x 10 ⁶	Employment no.
1	375	209	5 880
2	1 217	1 102	4 573
3	700	368	1 785
4	1 400	93	13 064
Total	3 692	1 772	25 302

South Africa's Future

So, how can the growth and development of the Chrome Chain contribute to the future South Africa? The industries in the pipeline should have a vision of what could be possible through to the year 2000. This could be based on the following concepts.

The future demand for chromite will be driven by the local demand for chromium production, and exports will increase only marginally. This is on the assumption that no developments are made overseas in the use of the local UG-2 fines, which would result in large exports of a particularly low-cost source of chromium.

In the ferrochromium industry during this period, all the present planned expansions will be implemented, which, with productivity improvements, would bring the ferrochromium capacity up to 1,4 Mt per annum. This is on the assumption that South African producers retain their position as the lowest-cost producers in the world. At this level of production, the South African producers will retain their current share of world production.

The major thrust will be in the growth of the production of stainless steel from its present output of 107 kt per annum to 876 kt per annum by 2000. To achieve this, most of the output will supply international markets. However, this will need to be done in partnership with various international players in the stainless-steel industry. At present, South Africa exports a greater share of its stainless-steel output than any other nation (approximately 60 per cent is exported, versus the overseas norm of about 20 per cent). This creates a vulnerability to the international market, and hence the need for co-operation arrangements of some sort.

The world stainless-steel market is expected to grow from 10,3 Mt in 1988 to 14,8 Mt in the year 2000. Thus, of the increase in the world market of 4,5 Mt, South Africa would supply 17 per cent.

It is expected that, during this decade, significant strides will be made in the process development of direct stainless steel, and this process will be most advantageous where all

the raw materials are available together and the process can be carried out in one continuous operation. This would be a major potential advantage for South Africa since nickel, iron ore, and coal are available together with chromium.

The local market for stainless steel is not expected to grow by the same amount as the output, but it is in the interest of the South African stainless-steel manufacturer to encourage its growth since prices for stainless steel on the local market are better than those on export markets. The producer of stainless steel will need to continue pushing and promoting the material downstream to the manufactured-products industry.

With the support of the stainless-steel producer, the local consumption of stainless steel is expected to increase from the present 73,2 to 172 kt per annum. The major growth would come from the export of manufactured articles such as tubes and pipes, heavy fabrications and tank containers, castings, sinks, and holloware.

However, the thrust of the manufactured-products industry will need to be in two directions: the first to fulfil the needs of the first world, the traditional applications of a special high-performance material; the second to fulfil the needs of the third world, where markets can be created through the application of different business and design concepts.

History in this country has shown that this thrust is not going to come sufficiently from the manufactured-products industry itself. The growth in the consumption of stainless steel has been limited, and the growth in exports even more restricted to a few success stories. The drive is going to have to come from the stainless-steel manufacturers. They are going to have to push the manufacturers into greater use of the material and the export of products. This is called the pipeline 'push' strategy.

What is the situation in South Africa regarding the consumption of stainless steel? It is estimated that the consumption of stainless steel in the Organization for Economic Cooperation and Development (OECD) countries was on average 9 kg per capita, with a maximum of 13,6 kg per capita in Japan and a minimum of 1,8 kg per capita in Greece. The consumption in South Africa in 1988 was 2,1 kg per capita – more than in Greece, but less than in the next-lowest consumer in the OECD, Portugal, which is 2,4 kg per capita. However, most of the stainless steel consumed in South Africa was by the industrial-based portion of the population, which was consuming at the rate of about 7,3 kg per capita – higher than the average for the USA or the UK – while the remainder of the population was consuming almost nothing.

To convert the potential into business reality, it will be necessary to continue to develop the first-world portion of South African consumption to the level of Japan or Taiwan, based on a high portion of exports, to about 16,0 kg per capita, which is double the present level. This would add another 75 kt per annum to the local consumption, at the same time bringing the third-world element into consuming stainless steel at the rate of 1 kg per capita. This would add another 25 kt per annum.

Action to be Taken

What is being done about this? The pipeline 'push' strategy means that the stainless-steel producer must motivate the developments. To do this requires working in both areas. In

the developed section, it is offering special discounts on stainless steel, which, together with the government's Government Export Incentive Scheme (GEIS), export incentive, gives the local industry manufacturing stainless-steel products about the cheapest stainless steel in the world for exports. Business development and support for the design-and-application push are part of the efforts of the producer. For developing the third world, the producer has established a community-level programme for manufacturing cutlery and pots and pans, which are designed to be low cost and suitable for third-world markets but still retaining the quality value of stainless steel. The target is to sell a set of cutlery and pots to every family in the country. The export potential of the products, and even of the project concept itself, is very high.

On the assumption that these initiatives are successful, what is the potential result for the country? Employment in the companies in the pipeline could grow from the present 25 300 to 54 000 and the exports from R1,8 to R8,0 billion, while new investment in the Chain would need to be R7 billion – all in 1988 terms (Table II). The largest increase in employment would be in the Stage 4 industries from 13 000 to 32 000, and the export earning would be greatest in Stage 3, growing from R368 million to R5,3 billion.

This is the vision of potential. Now the challenge is to put it together and get the action. To do this, there must be a coming-together, not only of the government and organized industry, but also of organized labour. It must be a common vision based on common values and objectives

and, in this way, the Chrome Chain could show the way for the rest of South Africa and the world. I believe we have the potential; now we need to see the combined commitment through to its fulfilment.

TABLE II
POTENTIAL FOR SOUTH AFRICA

Stage	1988	2000
Production		
1	4,1 Mt	5,5 Mt
2	1,0 Mt	1,4 Mt
3	107 kt	876,6 kt
4	73,2 kt	172,15 kt
Employment potential		
1	5 880	7 698
2	4 573	6 740
3	1 785	7 247
4	13 064	32 341
Total	25 302	54 026
Export potential (in 1988 R's)		
1	209 m	265 m
2	1 102 m	1 632 m
3	368 m	5 281 m
4	93 m	757 m
Total	R1 772 m	R7 935 m

