

# **Analysis of Success Factors for Overseas Markets (for zinc)**

**Report produced to comply with completion of Phase 1.4 of the Sector Partnership of the South African Zinc Development Initiative.**

**Rob White, May 2002.**

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## EXECUTIVE SUMMARY

The South African market for zinc has showed low or zero growth over an extended period. It is clear that zinc consumption is related to economic growth and this is clearly demonstrated when comparisons are made with world growth figures. The first user consumption patterns in South Africa mirror that of other developing zinc markets with a disproportionate consumption percentage being taken by the galvanizing industry. In the transport market sector, market penetration in South Africa is particularly weak. This sector is largely served by the galvanizing and die-casting industries and, as mentioned in the Sector Analysis Report, the latter sector appears weak.

Structural issues in South Africa such as poor industry co-operation, the need to survive, a 9 to 5 mentality in many small companies, low skills availability, and an undemanding consumer (no doubt reflecting overall poverty levels) have meant that few companies have become world-class. Thus, there has been an emphasis on commodity exports whilst government has focused upon technology. Unfortunately, this has left the manufacturing base weakened. This has been recognised recently by government and new initiatives are under review.

Looking at the market for metals in South Africa, it is clear that the country, whilst displaying relative consumption rates for key metals similar to developed nations, is still in the developing country phase. Taking this further, it appears as if overall development may be considered to be similar to that in Latin America. Therefore, IZA interventions that are working in Latin America may well yield results in the local market. Despite poor GDP growth figures, Latin American countries such as Brazil and Mexico show significant growth rates for zinc consumption. Although different at first glance, despite the recent contraction in the economy, Russia was in a similar position to that of the other developing nations in Latin America. Thus, interventions in Russia that are now in progress to effect reinvestment may also be worthy of analysis.

The IZA marketing programmes work through Market Development Committees. There are three such committees focusing upon Continuous Galvanizing, General Galvanizing and Die-casting. In Continuous Galvanizing focus has been upon two market sectors, auto and construction. In the first sector success has been particularly satisfying and there is a move worldwide towards the use of Continuous Galvanizing for “body in white” parts. The auto manufacturing industry in South Africa is particularly well developed and, although all specifications come from overseas, local industry stands to gain from the IZA initiatives providing that world-class input product is available. General Galvanizing initiatives have focused upon promotion, technology transfer and training. In developing regions the single most important market is that of electricity transmission. This has been widely successful in South Africa also but significant opportunities exist in sub-Saharan Africa. Although the General Galvanizing market in South Africa has grown, it is clear that this has been small in terms of potential. In the developed USA, for example, the market has grown by 60% over the past decade. There is also a move to more “upmarket” products such as street furniture. Focusing upon developing nations similar to South Africa, concerns are expressed regarding delivery and overall poor confidence in the industry. Although in South Africa the Sector Analysis Report showed that market share was

moving away from painting towards galvanizing, fabricator concerns with the industry persist. A brief economic analysis of industry structure (costs and competition) shows no anomalies in the South African General Galvanizing industry. IZA technology transfer programmes and training in particular are needed (for both galvanizer and user). The Die-casting industry in South Africa requires major intervention. In developing nations the IZA has identified lack of technology and service issues as major impediments to development. These have been addressed through the production of training material and programmes to foster partnerships. These can be emulated locally.

Finally, there is an overall lack of awareness of zinc by the general public. Whilst it would be unwise to develop a broad promotion campaign, a promotion programme referring back to the IZASA as a service centre and promotion programmes focusing upon specific projects should be developed. The IZA has numerous publications and other material to assist in this process.

## 1. INTRODUCTION

The focus of this report is on the Demand side of the zinc market. Supply side analysis is available from many sources (e.g. Std Bank, Metal Bulletin, etc.)

The IZA has identified the three most important market development segments as, general galvanizing, continuous galvanizing and zinc die-casting. Different regions present different opportunities and require different methods of targeting market potential.

In general galvanizing, the Building and Construction and the Street and Outdoor furniture sectors have been identified as offering the greatest growth opportunities. In Europe focus has been on the development of information brochures after carrying out a needs analysis of the fabrication market. The US focus is on the development of the galvanized steel pole market as replacement for alternative systems. This marketing effort has also been tailored to raise per capita consumption of zinc to developed world values.

The market development programme for continuously galvanized steel sheet (congalv) has largely been a partnership with the steel industry. Focus has been on developing the use of congalv in building (roofing and steel framing) and the auto industry. In the former area much effort has been put into the provision of technical support information and the transfer of this to regions currently showing low intensity of use. Much information gathering has focused upon the atmospheric mapping of regions to enable prediction of product performance. Environmental aspects of zinc usage are becoming more prominent in the IZA activities.

Both the above market development programmes are targeting specific industries such as the automotive market. Lightweight high strength steel is providing good opportunities for zinc coatings in ameliorating the corrosion risk. ILZRO technical support, through the galvanized auto body partnership, is providing valuable insight in the need deliverables required of the galvanizing industry to meet this opportunity.

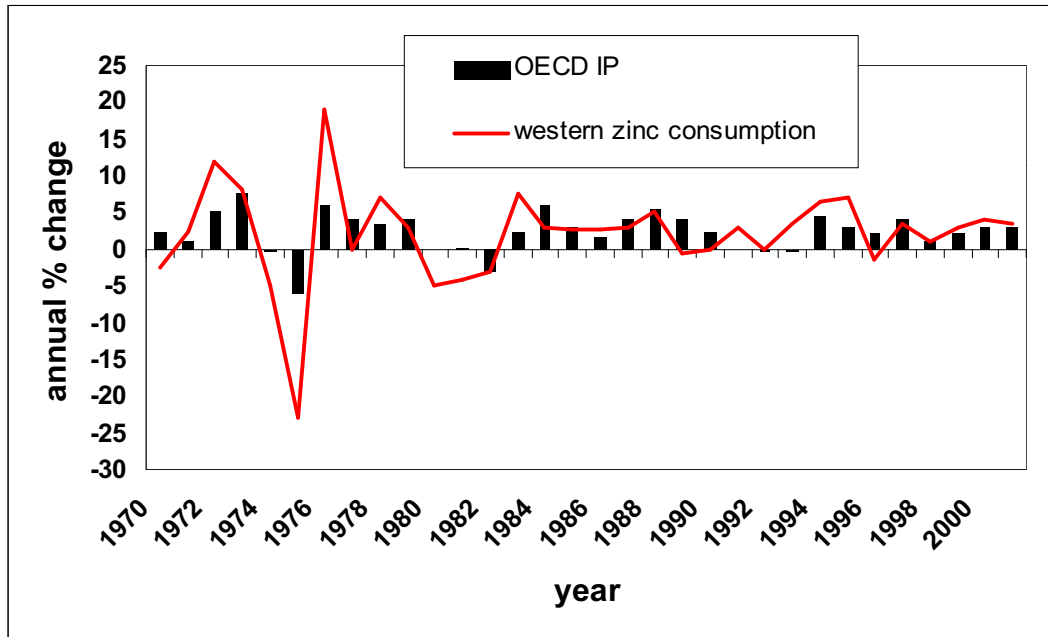
The market development programme targeting Die Casting has focused upon the provision of in-depth technical support for the die casting industry. Again ILZRO is providing valuable research data on new generation zinc die-castings. Incidentally, the CSIR is involved with this programme.

In all the above focus areas, World Committees have been set up to ensure that information is globally transferable. The primary objective of the IZA Market Development programme is to raise the global consumption of zinc by 120 000 tonnes per annum, over and above natural growth due to economic expansion.

## 2. WORLD-WIDE CONSUMPTION PATTERNS

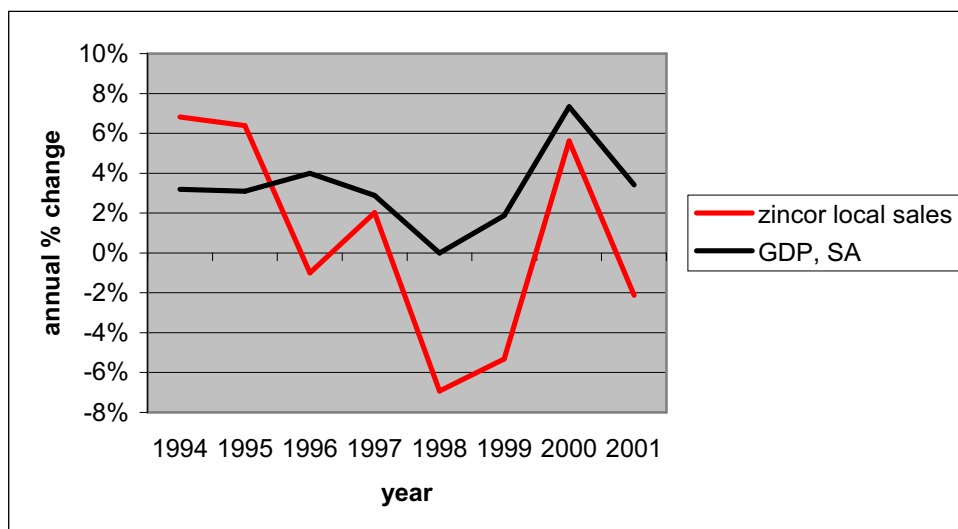
### 2.1 General Regional/Country zinc consumption patterns

In general, zinc consumption has been shown to be related to economic growth. This is clearly demonstrated by reference to **Figure 1** showing consumption and economic growth (as measured by industrial production) since 1970.



**Figure 1. Zinc Consumption & Economic Growth** (source Standard Bank).

A similar picture emerges for the demand for zinc in South Africa (**Figure 2**).

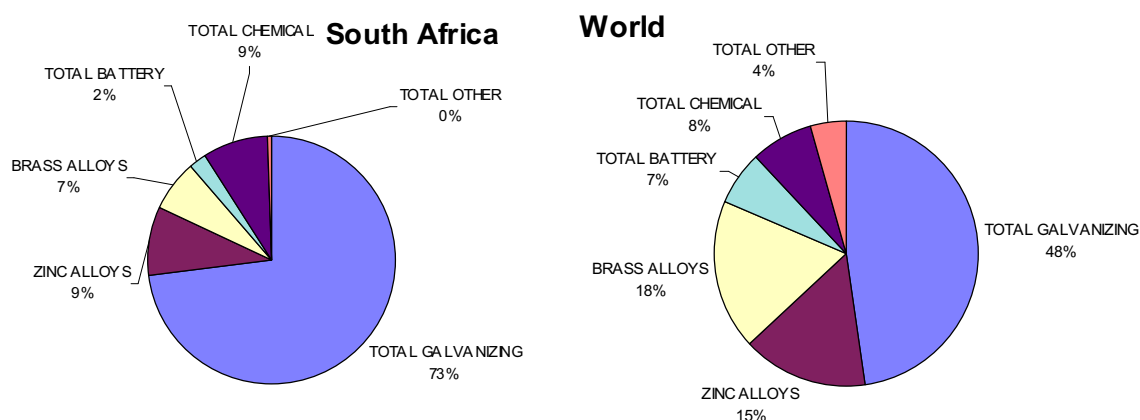


**Figure 2. Zinc Consumption and Economic Growth in South Africa.**

According to the press release by the ILZSG (October 2001), it is anticipated that although usage of refined zinc metal will decrease in 2001 by 0.7% globally and by

3.1% in the West, an increase is anticipated of 1.8% and 1.3% respectively for 2002. Regionally, the fall in 2001 will be greatest in the USA (mainly in the construction and auto sectors). With increased Chinese consumption Asian growth will be of the order of 2% in 2002.

First user market demand (South Africa and globally) is shown in **Figure 3**.



**Figure 3. First user zinc demand percentages for South Africa versus World Average (year 2000)**

In general, it has been noted (Roskill, 2001) that the smaller the market, the higher the percentage consumption accounted for by galvanizing. Italy and China are the only markets worldwide where galvanizing is not the largest national market. Italy is dominated by the brass and bronze market, China by the semis market. As can be seen from the 2000 consumption figures, South Africa fits in with the description of being a small (underdeveloped?) market with over 80% of local zinc consumption in the galvanizing market.

Another observation is that, typically 32% of galvanizing is used in general galvanizing rather than sheet, strip, wire, pipe and tube. Local comparison with these norms is shown in **Table 1**.

**Table 1. First use of galvanizing – South Africa versus world norms**

Galvanized usage	World (Roskill, 2001)		South Africa	
	Mill tonnes	%	tonnes	%
Sheet & strip	1 755.7	60	44 077	58
Wire	94.8	3.25	9 197	12
Pipe & Tube	120.3	4.25	1 707	2
Unspecified	950.2	32.5	21 228	28
Total	2 921		76 209	

It is clear from this that the overall market (i.e. including exports) for galvanized products is similar in South Africa to those globally.



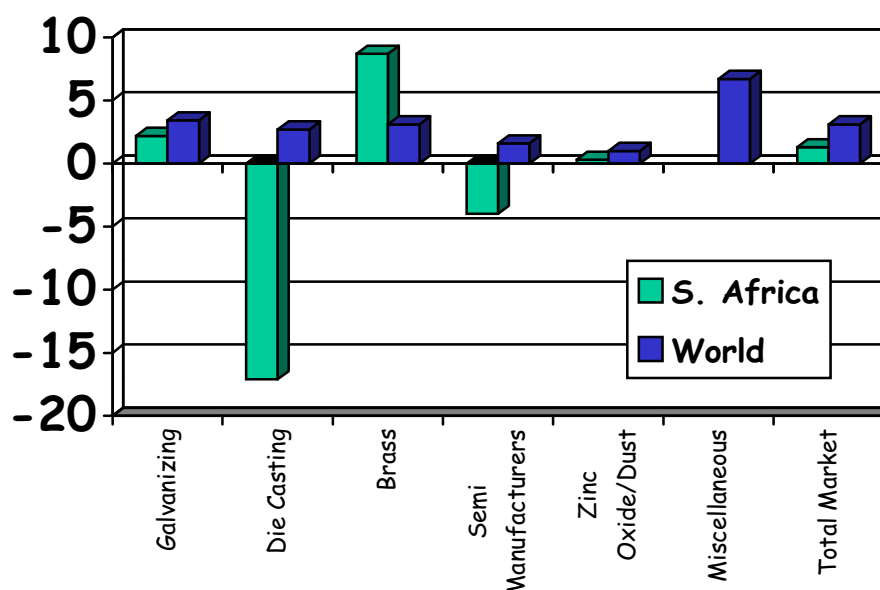
Roskill reported predictions in growth in demand early in 2001. These predictions predate the events of September 11<sup>th</sup> 2001 but, over the longer term, should still prove as accurate as possible. These are shown in **Table 2**.

**Table 2. Predicted growth rates of zinc demand.**

Market	Av growth 93/98	1998 (Mt)	Av growth 98/05	2005 (Mt)
Galvanizing	3.02	3.53	3.75	4.56
Brass / Bronze	4.67	1.48	3	1.82
Zinc alloys	3.36	1.18	2	1.35
Chemicals	4.17	0.76	4	1
Semis	2.25	0.73	3.5	0.93
Dust / Powder	0.96	0.06	1	0.07
Other	5.26	0.3	4	0.4
<b>Total</b>	<b>3.41</b>	<b>8.05</b>	<b>3.36</b>	<b>10.14</b>

(source Roskill. *The Economics of Zinc*, 7<sup>th</sup> Edition. Jan 2001)

Growth rates during 93/98 are shown graphically in **Figure 4**. This information alone led to the development of the Initiative in South Africa.

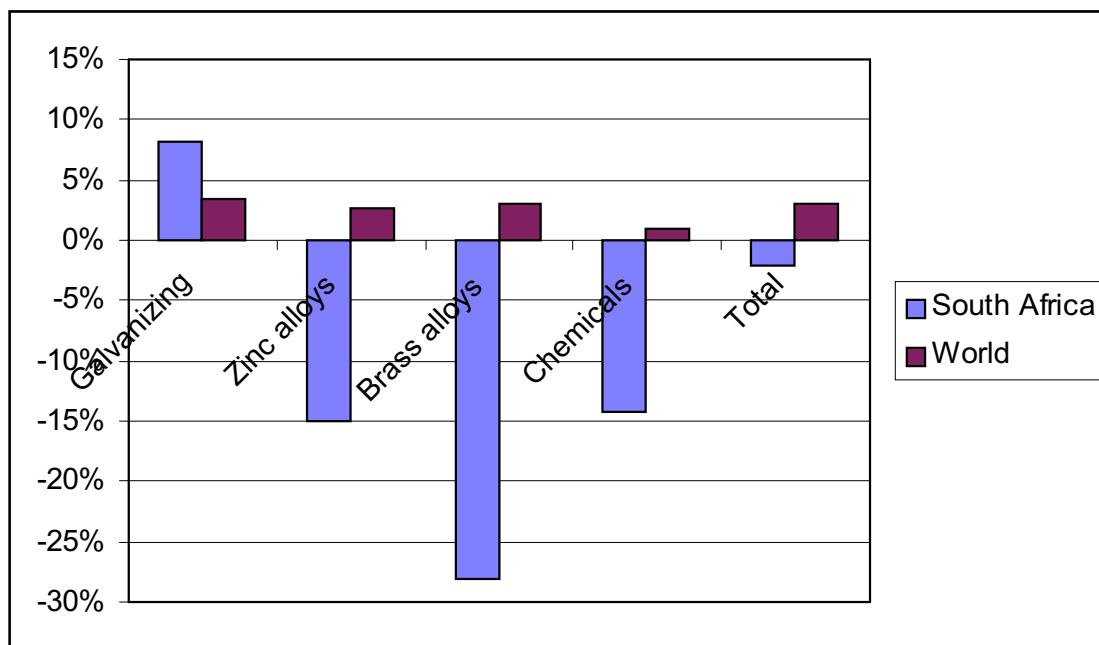


**Figure 4. Comparison of trend growths 1993 to 1998, South Africa versus the world (source ILZSG & IZA)**

Although at first glance, it appears as if the South African consumption patterns have bucked the trend, the large proportion of zinc used in galvanizing represents the largest lost opportunity. Galvanizing growth based upon these figures would indicate that there should have been a 50% increase in the actual tonnage (i.e. an additional 3000tpa). The die-casting tonnage has dropped 900 tpa over a 5-year period.

End use consumption figures have been notoriously unreliable in the past. However, an initiative between the ILZSG and IZA-Europe is intended to improve the current “best guess” scenario. Currently figures are obtained via country statistics gathered on

a primary supply basis. Unfortunately this makes comparison difficult. However, it appears that in South Africa the consumption of galvanizing has in fact increased over a 5-year period. Comparison of the revised South Africa zinc consumption statistics does, however, show an even more parlous state of the non-galvanizing industry (Figure 5).



**Figure 5. First user demand changes in South Africa (1995-2000) and the world (1993-1998 (source IZA)).**

There has been a shift in world zinc consumption towards galvanizing and away from brass and alloys. A 1997 survey carried out by Brook, Hunt and Outokumpu showed the end uses for zinc to be as shown in Table 3. For comparison purposes, information supplied by the first user base provides some guidelines to use in South Africa.

**Table 3. Final demand for zinc.**

Market Sector	World (Roskill, 2001)	South Africa
Building & Construction	48%	49%*
Transport/Autos	23%	12%
Industrial & Commercial machinery	10%	3%
Consumer durables (incl. batteries)	10%	12%
Public Infrastructure	9%	24%

\* includes agriculture

An over reliance upon the building and construction sectors makes prices prone to cyclical downturns. Whilst there may be an over reliance upon the use of coated sheet in the auto sector, consensus in the industry is that there are still tonnage opportunities available. However, notwithstanding this, it is clear that other sectors could provide opportunities for future growth.

Some benchmarking estimates are provided in **Table 4** regarding intensity of zinc usage per sector.

**Table 4. Some estimated zinc consumption benchmarks for various regions**

Market sector	OECD average	USA	Europe	Australia	South Africa
Auto <sup>1</sup> (zinc use per car) (1996)	9 kg	USA 15 kg			2 kg
Die-casting <sup>2</sup>	4.31%	1.23%	2.44%		-18%
Construction (continuous sheet)		>50% of cold rolled	>50% of cold rolled		>25% of cold rolled
General Galvanizing		10% of LP steel	25% of steel LP	10% of steel LP	11% of steel LP <sup>3</sup>

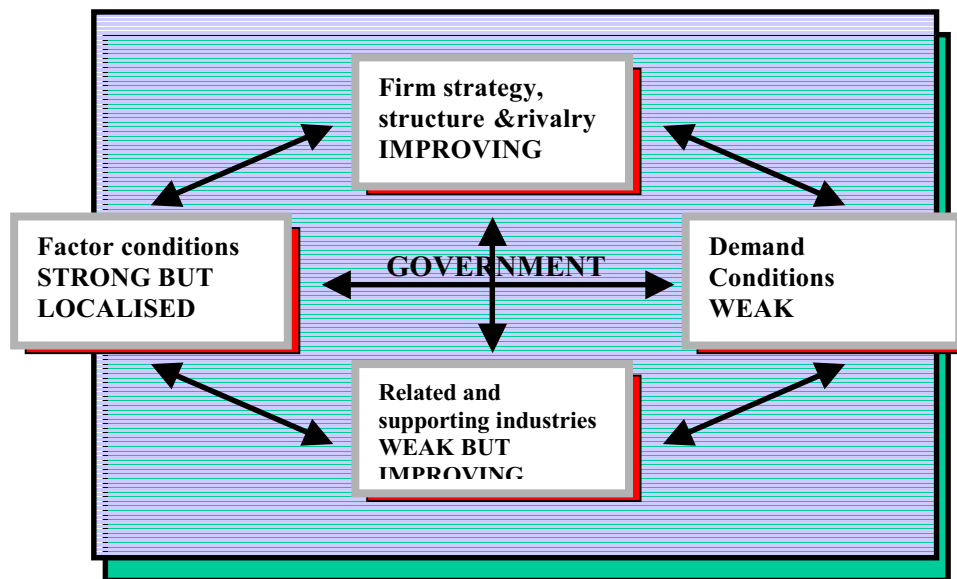
1. includes coatings, die-castings and tyres
2. growth rates over the last 5 years (source IZA & this study)
3. based upon profile sales to mining and construction (527467 + 76002 = 603469 tonnes) & 25% of work = long products).

In order to identify opportunities in the South African market, the above benchmarking figures provide some basis for determining under utilisation in local intensity of zinc usage.

## 2.2 Regional/Country factors affecting zinc consumption

### 2.2.1 South Africa

It is first pertinent to analyse the competitive situation of South Africa versus other countries. This analysis will be based upon the Porter Diamond model as this method has been extensively used within the South African framework. This is shown in **Figure 6** with comments on the South African performance.



**Figure 6. Basic competitive model with South Africa summary (after Porter)**

The South African National Diamond has been reviewed by the Monitor Company (1994) and updated by various consulting companies (Blueprint Consulting 1997, IDC 1997). In essence the description below summarises other studies together with relevant discussions with participants in this survey.

Firm strategy, structure and rivalry briefly describe the national methods of company creation, management, philosophy and inter-company rivalry. Past surveys have focused on time snapshots without addressing changes occurring. No one system is right for all nations. Past comments on the local tradition of conflict rather than co-operation within and between companies offer no road map to the future.

- Corporate governance is improving although there is some way to go
- Industry co-operation is improving although there is room for better trust
- The exposure to world markets, whilst traumatic has compelled companies to innovate. However, the small domestic market in many instances has led to some failures
- Reliance on government expenditure has forced a refocus by many companies
- There is still, unfortunately, reliance upon a commodity mentality leading to emphasis on cost cutting rather than spending on innovation.
- There is still too much concentration of industry in South Africa. Therefore competition is often bought out, rather than innovation development. However, the world trend of “new companies” entering markets is occurring. This encompasses manufacturing, trading and services.
- Too many SMME’s have a 9 to 5 mentality with capital utilisation being poor. This part of the diamond is showing improvement off a weak base.

Factor conditions, put simply, define the productivity of the nation (unit of output per unit of labour or capital) and the surrounding infrastructure. The inheritance of the past has resulted in a large unskilled labour pool. In addition, the focus on primary industry has not encouraged skills development. The cost of capital, whilst high, was ameliorated by the Mining House bank philosophy where local funding was available.

- Labour skills are now a focus area although there is still disagreement between government and industry as how to manage the process. Also, the major contributors to GDP are suffering, under-capacity utilisation is more due to demand than skills limitations (see Sector Analysis report). This observation in no way nullifies the need to improve skills within South Africa.
- The cost of capital is regarded as too high by many businesses. However, there is still a preponderance of companies not working full shifts and, therefore, lowering capital costs by improving utilisation.
- Electricity costs in South Africa are still cheap in world terms and do contribute to industrial competitiveness.
- Overall productivity is improving in South Africa. (see Sector Analysis Report)
- The financial sector in South Africa is strong, well developed and coherent.
- Basic infrastructure is good and where new infrastructure is needed it can be developed easily. Infrastructure delivery to the overall population is still patchy, but it is questionable whether this impacts upon major business decision-making. However, it does impede SMME creation and development.

This part of the diamond is showing improvement in geographic spread.

The state of related and support industries are a key factor in providing a platform for competitiveness. Numerous suppliers are busy transforming and this has created stress further along the value adding chain.

- Primary and secondary suppliers use import price parity to local customers. In some instances this can impact upon input material prices affecting overall competitiveness of particular industries.
- Concentration of industry in Gauteng does favour local competition amongst suppliers. Opportunism has created competitive supply by allowing more widespread sourcing from alternative overseas suppliers. However, without innovation this will weaken the local supplier base.
- Although a good deal of machinery and equipment is imported, the cluster initiative in this sector is improving local supply. Indeed, the export initiatives here are developing a globally competitive supply industry in some areas. However, for this to be more widespread, cost of labour needs to go up concomitant with a drop in the cost of capital.
- Cluster analysis, where acted upon, has resulted in whole industry upliftment and improved competitiveness.

Although still regarded as weak, this area is showing improvements as the results of working together are becoming apparent.

Fastidious demand and high demand is a key factor in downstream development of local industries.

- Historic isolation and protection fostered little incentive for companies to be innovative other than in certain strategic areas. Centres of excellence in supply exist but, quality demand rather than necessity is required.
- Demand for various products is weak, fragmented and small. This leads to an import is best mentality.
- Companies mistake low cost for poor quality, e.g. where low cost products are required for the Africa market, high tech logistics systems are required to create sensible delivery. This requires that the supplier has the competency to accommodate “best practice” throughout the company or a just good enough mentality is created.

Demand is weak. Whilst it can be argued that this is due to the small size of the market, small businesses start by supplying small demand.

All the above factors work together in a regulatory framework provided by government. Almost all the discussions with business leaders indicated that the regulatory framework was not sufficiently supportive. Government’s task, as cited by economists, is the creation of an environment in which companies can gain competitive advantage. Whilst opting to carry this out by indirect involvement, government involvement is required early in the development process (Porter). The following areas were common in discussion

- Criticism was made that government was creating a regulatory framework but development and implementation was poor. If fully applied, this would improve overall industry-by-industry competitiveness by ensuring that required standards (governance, health, safety and environmental) were enforced precluding sub-standard entrants or operators impacting on industry dynamics. This

will also promote even playing field rivalry and “world class” performance.

- Credit was given to allow large corporations to expand into overseas markets to drive economies of scale and force adoption of “best practice”.
- Criticism was made of the different time frames between government and industry. Industry needs to survive in the short term and grow in the long term. All government interventions tend to be long term in industry’s view.
- Individual company to government interaction was considered difficult and tortuous. Cluster operation improves this but some companies feel that they are away from the ear of government. In turn government feels that too often liaison with industry is a platform for a “mutual moaning session”.
- Government was and is a large important customer.
- Current tariff systems and investment rules were considered complex and generally unfavourable for new local investment. Low internal rates of return were stated as impeding investment when compared to other developing nations (such as Poland).

Government delivery, rather than stated intention, was viewed as not conducive to providing an incentive for investment. In terms of OECD precepts, the competitive assistance afforded by government should be:

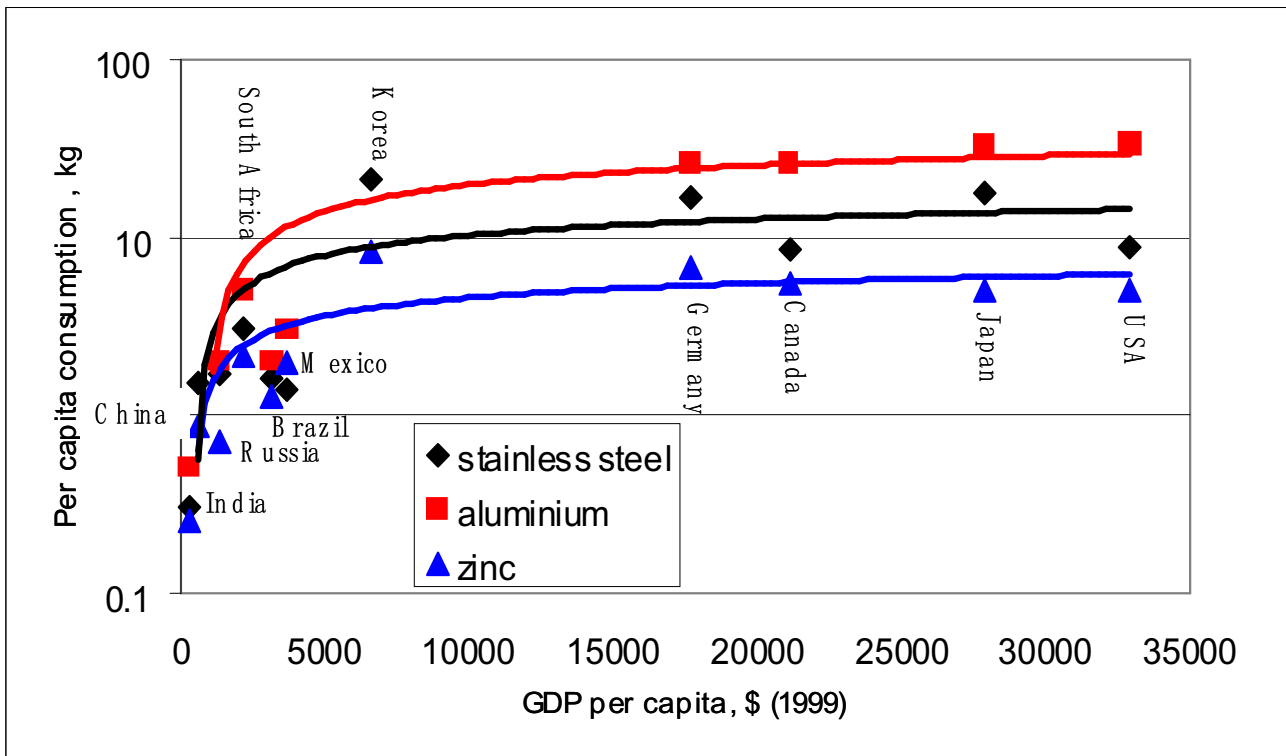
- Creation of an environment that embraces change
- The preservation of macro-economic stability, e.g. inflation.
- The encouragement of commercial openness, e.g. reduce barriers to competition.

This analysis will be used to compare South Africa as a zinc consumer to other nations to look for similarities in other national structures. Where similarities exist and the IZA has had successful interventions, these have a good chance of success locally. The analysis will be kept simple as direct country IZA intervention is limited and, therefore, only general country similarities are relevant. A major impact upon the economy of South Africa is demand. This is shown in the capacity utilisation of plant and its relation to lack of demand rather than other factors.

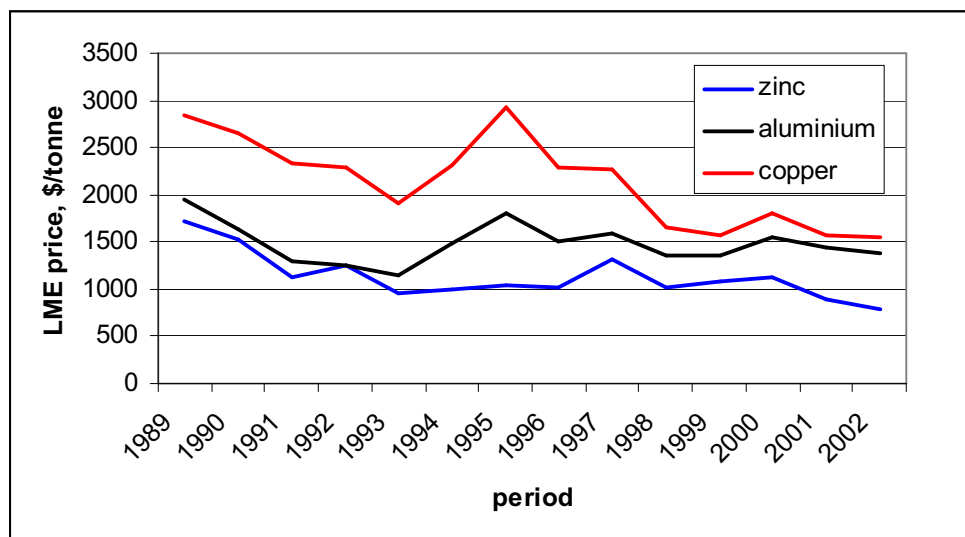
### 2.2.2 Diamonds of similarity

Analysis of data on various metals and their consumption indicates that there is a rapid growth potential realisable as the economy grows (measured as GDP per capita). At some point, growth tapers off with growth in consumption being more related to the contribution the material makes to the economic, environmental and cultural values of a nation. This growth region requires a close match between market development initiatives and the values of a nation. **Figure 7** shows the per capita consumption values for aluminium, stainless steel and zinc. Logarithmic trend lines are plotted to indicate likely peak per capita consumption figures. It should be noted that successful trading countries such as Germany and Korea generally lie above the trend line. Although simplified, this analysis indicates that South Africa should be able to achieve a consumption value of 5 kg per head. This would translate into an overall zinc consumption figure of 250 000 tpa. However, the key requirement for this

growth is an overall growth in the economy. Observation of **Figure 7** also indicates that the metals situation in South Africa appears to be close to that of Mexico. Therefore, any IZA interventions in Mexico that have shown promise could reasonably be assumed to have success locally.



**Figure 7. Per capita consumption of aluminium, stainless steel and zinc for various countries (source – Aluminium Statistical Review, Heinz Pariser, Kumba Resources).**



**Figure 8. Price movements for aluminium, copper and zinc (source I-Net).**

Aluminium competes with zinc in the area of die-casting. Also, copper is added to zinc for the brass industry. **Figure 8** shows the relative price changes, over time, of the three metals. The cyclical nature of the prices is clear, but there are no counter



price movements. The price of aluminium would need to be over 2½ times that of zinc to make zinc die-castings competitive on a weight for weight basis. It is clear that this has never been the case and this fact alone represents the reason for the largest shift towards aluminium from zinc. This issue and the consequences for the zinc die-casting industry are discussed in detail in the die casting section of the Sector Analysis Report.

To identify countries with similar economic profiles the following are compared:

1. Zinc consumption per capita (to see target achievable)
2. GDP (to measure national wealth)
3. GDP per capita (to determine wealth available)
4. Productivity (to determine factor development)

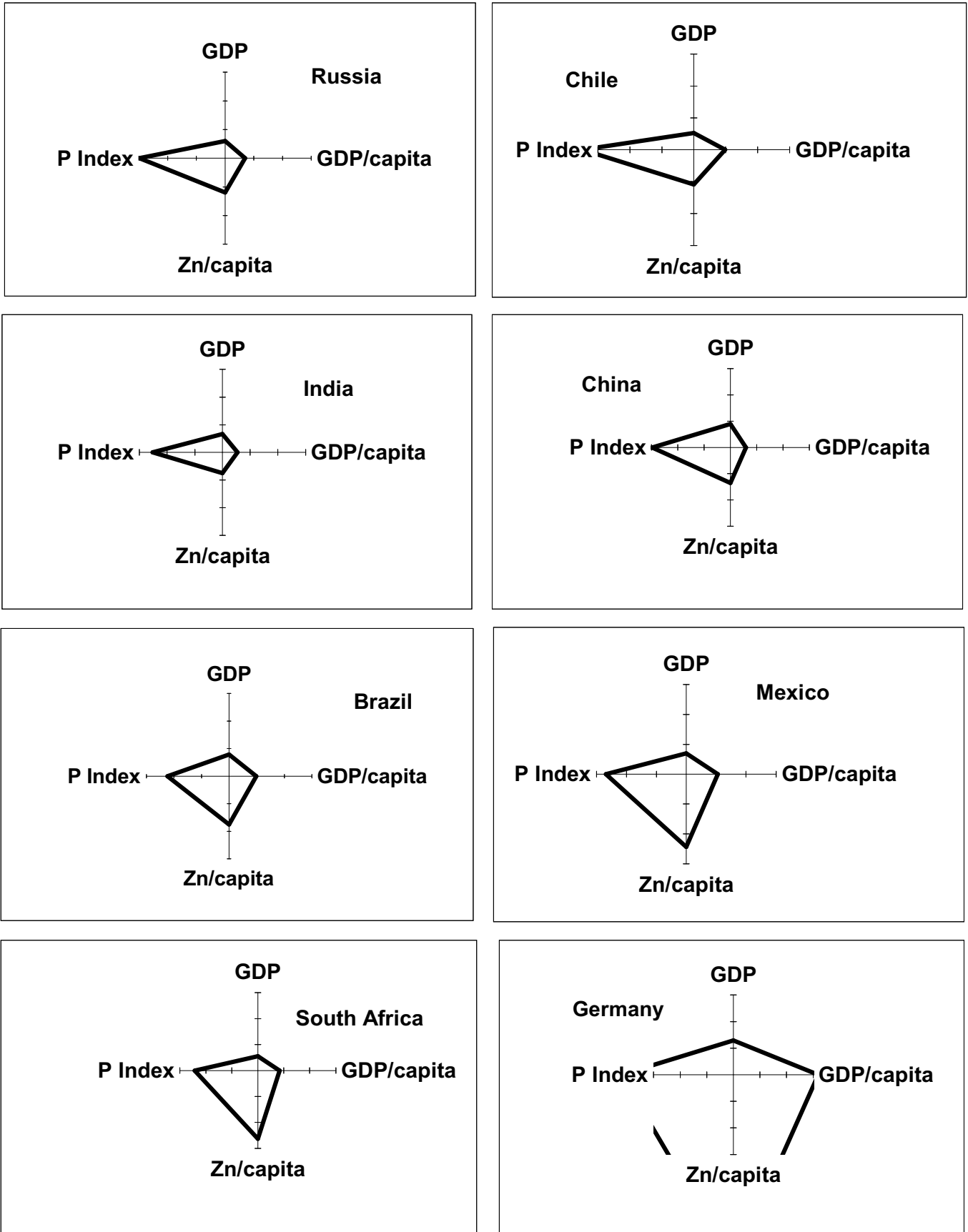
This information was normalised by taking the values for the USA as 100 on all counts. Using the same scales the profiles are shown in **Figure 9**.

The following observations can be made:

1. It is difficult to see major similarities between developed countries such as Germany and the developing world.
2. Per capita consumption patterns for Mexico and South Africa are similar.
3. Chile, China, India and Russia, show similar development patterns.

From this analysis it appears as if China and India still have to reach the development of Brazil, Mexico and South Africa. More relevant to this study is the observation that, in general, market development interventions that have worked in Brazil and Mexico could well work in South Africa and visa versa. Clearly, unique circumstances such as the NAFTA agreement in Mexico and the minerals industry in South Africa need to be taken into account during any specific comparison.





**Figure 9. Economic profile comparisons for various countries.**

### 3. SUCCESSFUL MARKET INTERVENTIONS

#### 3.1 Comparison of developing countries

From the above analysis, it is clear that successful interventions in developing countries should well work in South Africa. Before referencing this material a final comparison should be made between growth rates (economy and zinc demand) of the identified countries and South Africa. This is shown in **Table 5**. Mexico has been able to grow (both in terms of the economy and zinc consumption) at double the South African rate over the past few years due to large amounts of foreign direct investment, primarily from its neighbour. More strikingly, Brazil, which has suffered lower economic growth rates than South Africa, has nevertheless, shown good growth rates in zinc consumption.

**Table 5. Growth rates in zinc consumption for selected countries (zinc usage and GDP).**

Country	GDP % change 95/96 <sup>1</sup>	% change in zinc demand 95/96 <sup>2</sup>	GDP % change 99/00 <sup>1</sup>	% change in zinc demand 99/00 <sup>2</sup>
Brazil	2.7%	16%	0.8%	5.6%
India	7%	6%	6.5%	6%
Mexico	5.2%	41%	3.8%	8.5%
Russia	-3.4	-8%	5.4%	19.4%
South Africa	4.2%	0%	1.9%	-4.4%

1. Source World Bank

2. Source ILZSG (note values are based upon country returns from primary producers)

As a result of the above analysis reference will be made to the current activities of the IZA in Mexico (and Latin America in general), India and Russia. The Latin American countries have diamonds of similarity to South Africa. China, India and Russia appear to be less well developed but certain interventions made in these countries could also have impact locally. Russia, in particular is worthy of consideration as GDP, GDP per capita and zinc consumption 10+ years ago would have produced a diamond similar to that in South Africa.

#### 3.2 Latin America

##### 3.2.1 Introduction

Three major IZA thrusts are underway in Latin America. One is regional with focus on Columbia, Peru and Venezuela; the others have been designed to address market development in Brazil and Mexico.

The Latin American project (MD 19) has as its chief objective the growth of refined zinc consumption in the region from 100kt/yr to 120kt/yr by 2004. Activity has focused upon the establishment of galvanizing associations to co-ordinate the dissemination of information translated from the IZA information pool (Fact Files, Zinc in infrastructure, Zinc Cast, etc.). Participation in seminars and organising the same, dissemination of recently acquired atmospheric corrosion information and promotion of die-casting are key focus areas for 2002.

The Mexican project (MD 10) has as its chief objective the growth of refined zinc consumption in the region from 178kt/yr to 216kt/yr by 2006. This programme, developed from a market survey in 1996, is well focused in that initial assistance was given to the establishment of a galvanizers association and institute of foundry men. Further activities now operate in partnership with these bodies and a Die Casting centre has been established. Focus for 2002 is on seminars to disseminate information.

The Brazilian project (MD 35) aims to increase the market by 8% from the current level of 185kt/yr. Market analysis shows that the zinc off-take is similar to that in South Africa. In Brazil, galvanizing accounts for 70% of the zinc demand. Activity is focused upon the development of a galvanizers group and promotion via IZA publications and activities at tertiary institutions.

### **3.2.2 Die-Casting**

The proximity of Mexico to the US combined with low labour rates has spawned intensive industrial development. This has resulted in the development of a competitive die-casting industry where raw material price is considered the key component of competitiveness. The industry is similar to South Africa comprising numerous small jobbing operations supplying into a secondary assembly market. End users in this market are looking for cheap durable good looks in zinc castings. Recommendations from a user perception survey were that more focus should be brought to bear upon quality issues (using new developments such as thinner castings) and partnerships with end users. In addition, the lack of industry co-operation between the die-casters is viewed as being partly responsible for the ease of plastics substitution. A key focus requirement was to improve supplier performance and new application awareness. As in South Africa, specifications for many users (such as auto) are drafted elsewhere. So if the quality requirements are not met, the product/unit is simply imported.

### **3.2.3 Corrosion Information**

The production of atmospheric corrosion information has been a trend worldwide. Often laid upon the back of environmental studies to determine pollution climates, a number of initiatives have been carried out such as the Latin America Ibero Atmospheric Corrosion Study. This has produced corrosion maps for many Latin American countries and is being leveraged by the various galvanizing associations.

## **3.3 India**

### **3.3.1 Introduction**

The IZA is in the process of supporting the development of the zinc industry in India. Focus has been in two areas, viz. galvanizing and die-casting. In the former area, activity has focused upon awareness campaigns to influence specifiers and government. Galvanizing is by far the biggest market for zinc in India taking 100 000 tonnes; dry batteries take 25 000 tonnes (a higher proportion than other countries) and die-casting takes about 10 000 tonnes.

### **3.3.2 Die Casting**

The die casting industry in India has been the focus of two studies (ILZDA and ILZSG). Structural economics resulted in a high proportion of castings being of aluminium. Therefore, with the opening of the economy, the die-casting industry doesn't have the equipment to maximise the production of zinc die-castings. A major development programme is in place, which should be monitored to see if any transfer of the model adopted would bring benefits into the South African market place. Large application areas are in auto locks, carburettors, zippers, gas regulators and electrical fittings. However, some of these markets are unique to India. Such examples include the fact that a large demand area is for carburettors but this is largely confined to the 2 and 3 wheeler markets. LPG is used widely by households in India (versus paraffin in South Africa).

### **3.3.3 Galvanizing**

There are estimated to be some 250 galvanizers in India with the top 80 having a capacity of 450 000 tpa of steel. Much of the tonnages go into infrastructural development projects – power transmission, communications and railway electrification. Clearly, these markets are, to a large extent, already developed in South Africa (this is confirmed through reference to the development diamond above). Therefore, whilst there are unlikely to be models that are applicable to the local scene, the activity in India will clearly be mirrored in southern Africa as development occurs.

## **3.4 Russia**

### **3.4.1 Introduction**

The IZA initiative for Russia is carried out as Project MD 26. Zinc consumption in Russia has decreased from 426 000 tonnes in 1985 to 172 000 tonnes in 1999. This drop occurred in all market segments with the exception of continuously galvanized steel sheet. A development centre has been established (Non-Commercial Partnership Zinc). Initial IZA activities included the support of the establishment of this body (through the training and development of personnel and the translation of the “Fact Files”) and carrying out a seminar on zinc.

The Russian zinc market has undergone severe structural changes over the past 15 years. Product production, with the exception of the alloys business (brass, zinc and semis) has remained relatively stable but exports have had to take up capacity. Local consumption reduced from 2.74 to 076 kg per capita over the period 1990 to 1995. The alloy business has had little investment in new equipment and combined with lower local demand, volumes have made much of this industry internationally uncompetitive. This mirrors the South African situation. Russia had low electricity and labour rates, a similar scenario to that prevalent in South Africa. Finally, similarly to South Africa, the market changes have resulted in the percentage share allocated to galvanizing having risen from 29% in 1985 to 52% by 1996.

In addition, specific information has been gathered on the potential for the Russian zinc market. This indicates that, as a result of improvements in the economic climate

of the country, together with substantial foreign direct investment, substantial growth is likely.

### **3.4.2 Die-Casting**

Due to low investment in equipment in the past, the IZA initiative to support the Russian die-casting industry has centred upon installation of equipment and training of personnel. This has been done in partnership with companies and other bodies with specific goals in terms of reduced metal consumption and increase in overall productivity. There has also been recognition of the increased preference for the high (8%) aluminium zinc alloys in the auto industry. These permit greater use of thin wall design, etc. This particular initiative provides opportunities for emulation of the “modus operandi” in South Africa and use of technology for thin wall die-castings was an observation made in the Sector Report.

### **3.4.3 Galvanizing**

The galvanizing industry is undergoing technology changes (in conjunction with steel producers) to provide galvanized sheet into the local growing auto market and provide internationally acceptable product into the building and construction market.

The auto industry in Russia has the advantage over that in South Africa in that, although many Joint Ventures have been established with companies such as Renault and Opel, there exists locally owned companies. Therefore, decision-making is local enabling a closer relationship between automaker and supplier. In contrast, in South Africa despite the presence of a diverse auto industry, all the manufacturers are foreign owned and therefore decisions are made elsewhere. Thus, the Russian initiative would have limited application locally.

In the building and construction sector, unlike Russia, the diversity of the distributor product range in South Africa in products such as roofing indicates that technologically acceptable product is available locally at competitive prices.

Infrastructure rebuild programmes offer market opportunities in Russia as in South Africa and southern Africa in general. The Russian initiative relies heavily upon promotion to the relevant target specifiers.

### **3.5 Die-casting – General Comments**

The comments that clearly emerge from the market and perception surveys for the zinc die-casting industry worldwide are that there are essentially two stages of development. The first represents that of the developing world (including the Far East) where the major focus is on price. In the developed world the industry is countering the threat from alternative materials such as engineering plastics and aluminium by either the adoption of new technologies (thin wall castings) or the development of new markets (such as auto-under bonnet components). High growth areas are not in auto but hardware and home appliances especially where close tolerances are required. Traditional zinc auto applications often move to aluminium. Overall, the auto industry appears to be designing zinc alloys out based upon cost and weight. In most countries, die-casters use aluminium as well as zinc in their facilities.

Plastics, in turn, often eventually replace aluminium. However, new zinc die-cast applications in auto (such as components requiring damping, vibration resistance and temperature stability – especially compared to plastics) continue to appear. In most countries growth in business is due more to improving business climate or increased market share than new markets

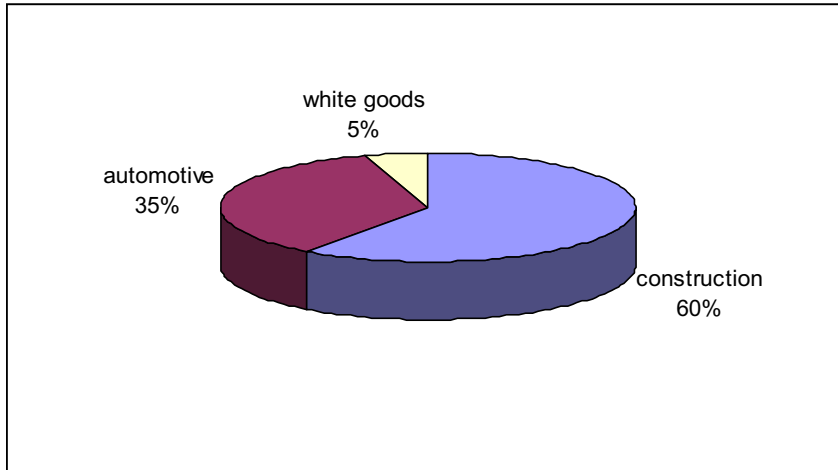
Worldwide, a lack of novel applications is noted but poor marketing appears to be a key issue. Clearly, this mirrors the poor coherence of the industry grouping as in South Africa. There is a need to raise the perception of the die-casting industry. Studies show that the zinc industry itself will have to communicate with the end users on developments rather than leave it to the die casters. Also, there is a need to improve the performance of the industry overall (both technically and professionally). Technical information should be delivered to the end-users. For this the CSIR work must be leveraged. Also, in many applications, combinations of materials are used (such as plastic covering a die-cast gear knob) and liaison with other material suppliers could prove beneficial. Certainly, a strategic alliance with the die-casting industry would prove beneficial. Poor supplier service is a key reason for end user material substitution. This can only be countered by establishing an industry grouping.

Where the market is developing there appears to be a temptation for end users to install their own facilities to “save costs”. This, unfortunately, can result in a monopoly psyche, which eventually leads to material substitution as end user focus is merely on price. Success seems to be, rather, via partnerships where the link between die-caster and finisher is such that each maintains cost effectiveness, precluding substitution. This model could provide lessons for the South African Die-Casting market. In addition, where the die-caster is pro-active and involved with the end user (even if a formal relationship does not exist) there are design opportunities that can be used to retain and regain market share back to zinc. Also, sectors with short product life cycles, such as autos and appliances, are keen to look at new material opportunities.

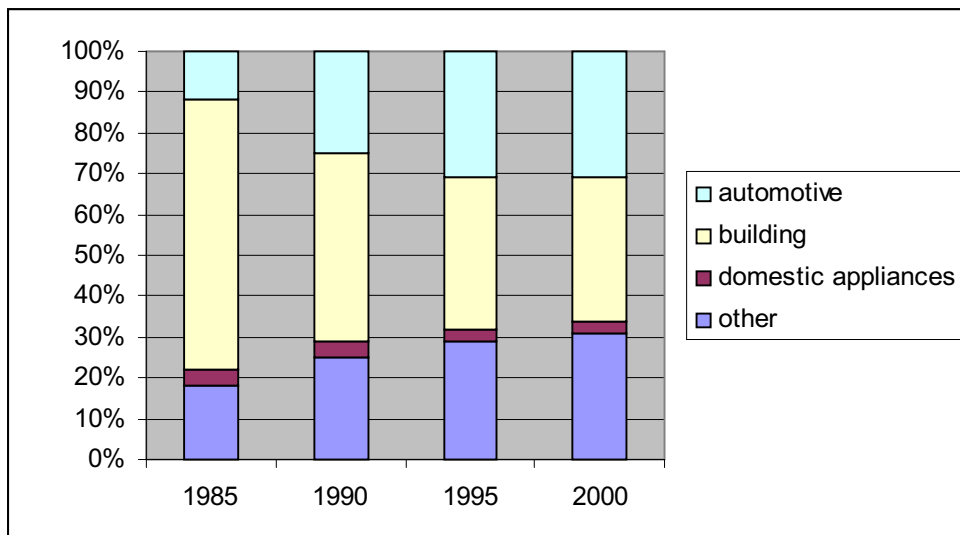
An approach to consider is that adopted by the IZA – targeting the top 20% die-casters supplying 80% of the market and forming supplier groups. Performance benchmarking should be carried out, seminars held with specifiers and customers to stimulate new ideas and applications.

### **3.6 Continuous Galvanizing – General Comments**

The overall current Western World use of continuous zinc coated steel is shown in **Figure 10**. Reference to **Figure 11**, shows the decline in importance of the building sector when compared to the auto sector.



**Figure 10. Western world use of coated sheet** (source ILZSG).



**Figure 11. The EU market for galvanized sheet** (source ILZSG).

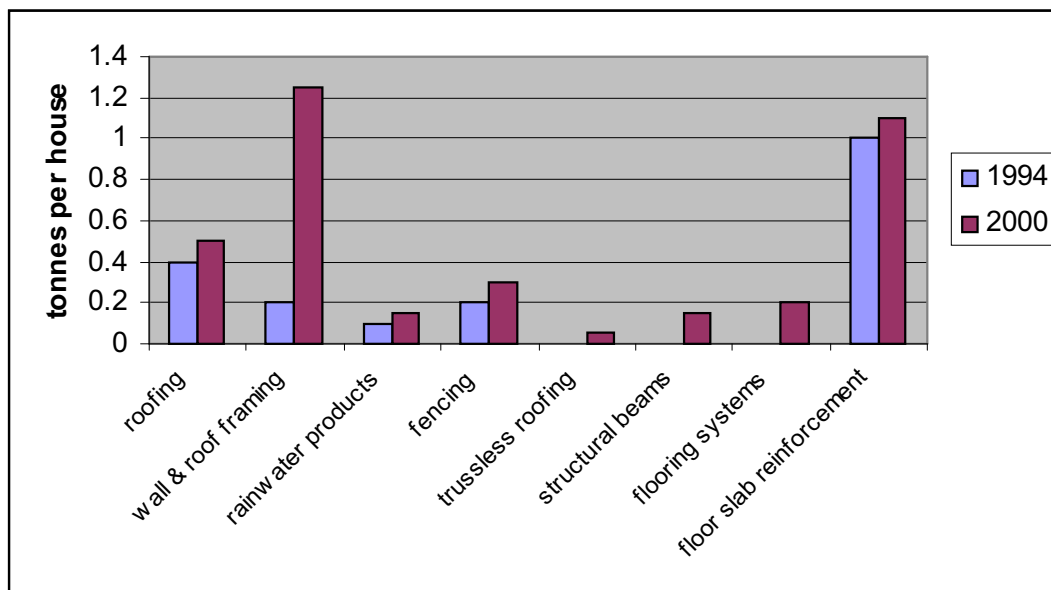
In the description of die-casting in the Sector Report the requirement for the industry to reach Q1 status for supply into the auto industry was described. This quality requirement is an output of the General Auto Partnership in the USA. The steel and zinc industry bodies are active in this partnership, one of the key outputs having been the retention of steel for body-in-white components – generally in either electro- or hot dip galvanized form. In fact there is a trend towards continuous hot dip galvanized steel with a concomitant greater consumption of zinc. Thus, clearly the need to meet user requirements cannot be overemphasised.

Other IZA activity has primarily been in the area of the production of information, either via the web or in paper form. The GalVInfo Centre, a technical zinc coated steel sheet information centre, is co-sponsored by ILZRO and the North American steel industry. The main focus of the IZA has been, via partnerships, looking at the use of galvanized product in light steel structures.



The move to steel framing from wood is growing in momentum in both the USA and Australia. However, in both countries, a history of framing in building construction has been prevalent. South Africa, not unlike Europe, has traditionally used brick and tile construction. Notwithstanding this, there have been repeated moves to develop a local lightweight roofing forum in South Africa. The roofing systems are framed (generally in wood in South Africa) and could provide a departure point for the move to steel. The SAISC has shown some interest in being home to information in this area but, to date, the reception has been lukewarm. A significant amount of information is available overseas. Active use of this would be required to have market impact.

Some six main product areas are driving demand in construction; viz. galvanized structural steel, roofs, facades, flashings, gutters and rainwater systems. Although in the developed world construction (especially housing starts) is tied to GDP growth, in the developing world this link is looser due to housing backlogs. Levels of home ownership are growing and this is providing opportunities for zinc. In the USA, where framing is the norm, a shift to pre-galvanized products would represent an increase in zinc consumption of 25% or 330 000 tonnes per year! Key constraints in general acceptance include the need for off-site pre-fabrication and the greater builder skills requirement, which increases site costs. However, overall, the costs of using steel are identical to those for wood with the added, and increasingly recognised, advantage of the overall recyclability of steel. A major programme is underway in the US to educate and develop steel builder availability and competence. This is beginning to show effect. A similar initiative in Australia is also leading to increased acceptance of steel framing as shown in **Figure 12**.



**Figure 12. Tonnes of steel per Australian house** (source ILZSG).

In the Far East, although the use of traditional materials (including palm!) persists, there is a growing recognition of the superiority of steel, particularly in regions that are subject to tropical storms.



### 3.7 General Galvanizing – General Comments

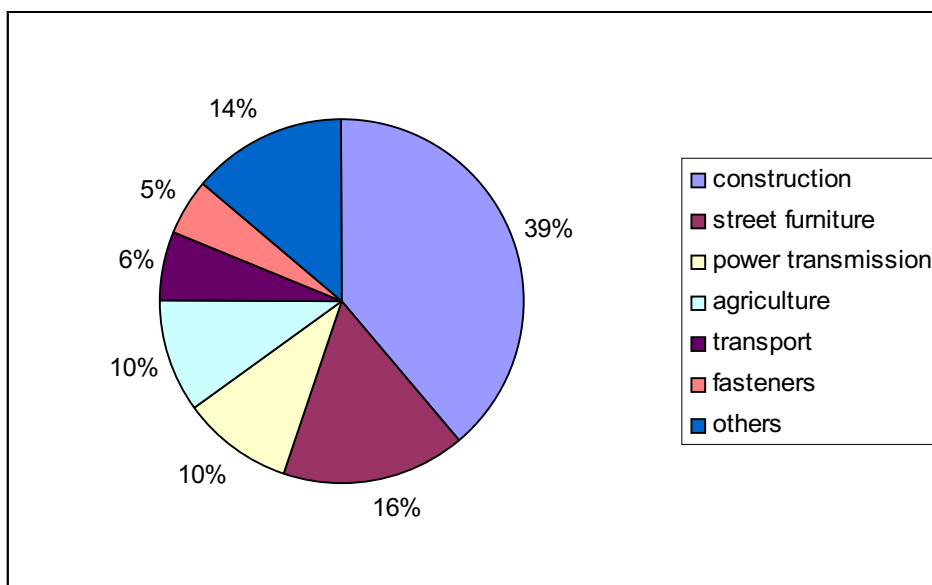
Studies show that 48% of zinc is consumed in construction with another 9 percent in public infrastructure. These sectors represent 4 million tonnes per year of zinc consumption and are the most important markets for general galvanizing. In the USA, general galvanizing has grown by 60% over the last decade. Therefore, as mentioned above, although general galvanizing in South Africa has been one of the few growth areas in recent years, the growth rate has lagged behind that of even the developed world. It is, therefore, worth looking at the current status in the developed world.

In the EU, as a developed market, the consumption of general galvanizing per end use sector is shown in **Figure 13**. Construction is the largest sector but, collectively, street furniture and power transmission account for 25% of general galvanizing activity. If agricultural infrastructure (farm gates, fencing, glass houses, etc.) is added to this, the total rises to 36%. Construction applications include:

- Galvanized steel lintels (80% of the EU market for lintels)
- Fire escapes
- Vent and service ducts
- Brackets and fixings
- Support steelwork
- Window and door frames

Safety concerns are driving growth in the security fencing, street lighting and road crash barrier markets.

A number of high profile applications in the developed world have assisted in the overall market penetration of general galvanizing. These include the tennis court for the Sidney Olympic Games, the Eden project in the UK and the Channel Tunnel.



**Figure 13. The EU market for General Galvanizing** (source ILZSG).

In developing countries, such as those with diamonds similar to South Africa, issues other than pure marketing arise. Surveys indicate that where there is an awareness of general galvanizing, restraints to growth are quality standards, service and price. Also,

perhaps a lack of awareness is more “a lack of confidence”. The IZA has developed a “market development kit” for galvanizers. Interestingly, some time ago, the need for this locally was identified. Internationally, a number of “Fact Files” and other documentation have been produced. These should be made available locally. However, the HDGASA has produced numerous technical productions, some of which are duplications of what is available internationally. Similarly, where knowledge of galvanizing is poor, a need for the development of a knowledge base for galvanizers has been identified internationally. This has also been identified as a need locally.

Looking at IZA initiatives in the developing world (where incidentally, it is felt that opportunities for significant growth exist) the major focus has been on transfer of technology of galvanizing. Also, it is felt that some of the plants in these countries would not be able to operate were the more stringent environmental requirements of the developed world applied. This situation mirrors that of some of the galvanizing companies in South Africa. This is being addressed partly through the DANCED initiative by the HDGASA. Another observation from the IZA work is that initial markets occur in infrastructural development such as electricity transmission. This situation has already been passed in South Africa, although southern Africa offers opportunities.

In the US, a targeted market development programme is underway looking at specific markets such as the use of galvanized rebar in bridge decks. Whilst the design of bridge decks differs from continent to continent, there could well be some potential transfer of methodology. Indeed, seminars focusing upon design specifics have proved useful. A project currently in abeyance is a Life Cycle Costing model for general galvanizing. In the author’s experience, this sort of information, whilst useful, tends to have impact only if first cost comparisons are close. The market development process in South Africa is such that duplication of the effort in the USA, Europe and Australia (i.e. that of focusing upon specific markets) is likely to bring benefit to the South African initiative. The USA is currently experiencing growth rates in general galvanizing of 6 – 7% per annum. Particular market development projects, which could be applicable in South Africa, are aimed at the rebar and utility pole markets.

In summary, the general galvanizing industry in South Africa is a strange combination. Environmental controls result in small operations being established which do not meet either the generally accepted technical norms or environmental norms of the developed world. However, because these companies operate side by side with the more developed companies, prices are always under threat due to “unfair” competition. This is being addressed, albeit slowly. The market for general galvanizing is fairly sophisticated, although the neighbouring markets surrounding the country offer infrastructural opportunities. This dualism needs to be recognised and a programme to address the developed and developing markets needs to be determined.

In assessing the overall competitiveness of this industry, two issues require consideration, viz. the comparative costs against other coating systems and the relative costs to the galvanizer. The former are addressed regularly via various bodies. The latest available comparisons are shown in **Table 6** for Australia (1999), USA (1995) and South Africa (2002). Although not directly comparable, it is clear that locally the ratio of general galvanizing to a comparable organic coating system

(inorganic zinc + epoxy + polyurethane) is 1:1.3. This is based upon a system totally painted at the point of fabrication. The cost advantages of using general galvanizing are clear. However, there appears to be a high discrepancy between the relative ratios. To some degree, the time frame impacts upon these values and highlights the need for regular benchmarking to lever cost advantages. For example, in South Africa, heavy-duty coating prices have risen 40% over the last 12 months.

**Table 6. Cost comparison between general galvanizing and heavy-duty coating in Australia and South Africa**

HDG	General Galvanizing	Heavy Duty Coating	Ratio
Australia <sup>1</sup>	\$16.00/m <sup>2</sup>	\$46.64/m <sup>2</sup>	1:2.8
USA <sup>2</sup>	\$1.21	\$2.074	1:1.7
South Africa <sup>3</sup>	R64.4/m <sup>2</sup>	R81.75/m <sup>2</sup>	1:1.3

1. based upon 25m<sup>2</sup>/tonne

2. material sizes not available

3. based upon 30m<sup>2</sup>/tonne

The cost profiles for a few selected areas are shown in **Table 7**. It is clear that, as expected, the material and labour components for South Africa indicate that galvanizing can be done more competitively than the developed nations.

**Table 7. Cost profiles for general galvanizing for various countries.**

Country	Material	Labour	Overheads, finance, profit
China	50%	15%	35%
South Africa	45%	25%	30%
UK	33%	33%	33%
<b>Australia</b>			

### 3.8 IZA Toolkit

From the above analysis, the IZA interventions appear to fall into five broad areas:

1. Production and dissemination of technical and promotional literature.
2. Production and dissemination of training materials
3. Fostering industry partnerships to increase capacity and competency of certain zinc conversion industries
4. Forming partnerships with industry groups that have similar interests and goals for market development
5. Identification and sponsoring of research and development to promote new applications for zinc.

From these activities a number of products (or models) can be used in the local market (the tool-kit). Products range from seminar presentation kits to training tools and should be made available to local industry to avoid local duplication of effort. The production of education and training material for the die-casting industry is of particular relevance in the South African marketplace.

From a development of business perspective, the partnering programmes have worked well. These range from working with the American Iron and Steel Institute on the promotion of steel utility poles to common industry forums on die-casting and business partnerships between the zinc producers and developing industries such as is occurring in Russia.

#### 4. CONCLUSIONS AND RECOMMENDATIONS.

Clearly, this international comparison has concentrated upon general galvanizing, continuous galvanizing and die-casting. This has largely been due to the fact that the IZA has World Committees addressing each industry individually. However, with the move towards Sustainable Development programmes, other markets such as the Chemicals market need to be brought into the system. This market, which also drives the Pharmaceuticals business, provides an opportunity to raise visibility on the essentiality of zinc and should be leveraged in South Africa as part of the Promotion Programme.

Effort should be focused into specific projects and all role players must be coordinated (HDG, SAISC, etc) with measures of performance.

It is clear from the international comparisons that the South African zinc market is at a stage of development similar to that in Latin America. However, this is overlaid by a similarity to Russia, i.e. lack of investment in new technology. The South African situation has been the result of an extended period of economic isolation where access to export markets was limited. Clearly, from these comparisons, partnership development programmes need to be developed for specific first user markets emulating the Russian model of state and industry partnership.

The galvanizing market in South Africa, whilst highly developed, has been unable to fully participate in regional opportunities. On a project-by-project basis, key application areas require co-ordination and focus. Lightweight steel framing is particularly relevant in the Southern Africa context. Significant zinc tonnage could be used in this area. However, over the years, identification of an industry champion has proved difficult. In addition, there is still a lack of confidence in the industry. This could be addressed using IZA input and other initiatives currently being developed by the HDGASA.

Public awareness of zinc, its ubiquity and essentiality, is low in South Africa. The IZA has developed an industry awareness campaign that has extended into educational facilities. This can be copied and localised for relevance.

Finally, the die-casting industry in South Africa requires major intervention if it is to survive and become world-competitive. This would require a partnership with other industry bodies, materials suppliers and possibly government. Whilst not directly transferable (and confidential in some cases) the intervention programme in Russia could be used as a pointer to revitalise this industry.