COMPETITIVENESS AND BENCHMARKING
IN THE WORLD SUGAR INDUSTRY

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I am particularly pleased to be able to join you all today at your 72nd Annual Congress, for both personal and professional reasons. The personal reason is that, although I worked for six years as a University lecturer not that far to the North of here, in Zambia and Congo (the former Zaire), this is my first visit to Durban, a city that I have heard so much about. The professional reason is that this is undoubtedly one of the two or three premier events in the world sugar technology calendar, and I am very flattered to be invited to speak today. I was unable to attend on the last occasion that I was invited, but am looking forward to hearing more about your industry's pioneering work on the use of cane diffusers, and to see some cane farms 'in the flesh', rather than having to rely on photos and films.

The topic that, in an unguarded moment, I chose to speak on is the competitiveness of your industry in relation to others, with a special sideways look at the impact of the recent Asian currency turmoil upon your rivals in South East Asia. This proved to be somewhat more complex than I had anticipated, if only because the troubles in Indonesia are not yet over, and this has entailed updating and re-computing my tables and diagrams right up until the date when I sent this paper to the Congress organisers. I hope that you will agree that the results are sufficiently important to justify the effort.

Why study production costs?

During the course of my presentation, I will focus upon two different aspects of competitiveness: that in terms of production costs, and competitiveness in terms of technical efficiency. At a Congress such as this, the emphasis is typically upon technical aspects, for obvious reasons. As an economist, however, I tend to start with production costs, since the real world is increasingly one in which high cost producers are put under pressure, while low cost producers tend to thrive. The sad decline of the Hawaiian cane industry, which has long achieved the highest levels of productivity (in terms of yields of sugar per hectare), and which also has the enviable ability to process cane throughout the year, demonstrates that technical excellence counts for very little if production costs are too high. Not even the protection of the US Sugar Program has been able to prevent the Hawaiian industry from contracting to a small proportion of its former size.

There is also a further reason for focusing upon production costs. This is because, as I will now try to demonstrate, production costs and world sugar prices are surprisingly closely related to one another. The conventional wisdom is that the world sugar market is a residual one, which is unrepresentative of the bulk of the trade in sugar, since only a minority of sugar is actually bought or sold at world prices. As a result, a relatively small swing in the world supply/demand balance has a large impact upon the world sugar price.

At any one time, this argument is valid. The world sugar price is more volatile than the price of any other major commodity; and the world market has often experienced periods in the past when world sugar prices were either ridiculously low, as in the mid-1980s, or ridiculously high, as in the mid-1970s. Nevertheless, it is very important to recognise that the sugar industry is not one that is short term in its horizons. In most countries, a cane farmer is effectively taking a five year view when planting cane, since the ratoons are an essential part of the economics of the planting decision. A mill owner has to take a much longer term view before investing. Therefore, both farmers and millers have to stand back a bit and look at the underlying trend in their selling prices, rather than base their decisions solely upon short term conditions (which will in any case have passed by the time their investment bears fruit).

In a sugar exporting country such as South Africa, any expansion in sugar output has to be exported, and an investment in additional production has to be justified in terms of its ability to earn a profit at export prices. In sugar importing countries, investors may hope to be able to benefit from government protection; but governments are becoming increasingly hard-headed. Indeed, they are forced to be by potential financing agencies, such as the World Bank. World sugar prices are being used more and more as a basis for decisions on whether to support new investments in sugar production. If governments discover that local production is expected to cost appreciably more than the alternative of importing sugar directly, new projects find it hard to secure official support.

For both these reasons, it seems logical to suppose that sugar production costs and world prices will be related to one another. Therefore, I have prepared my first two diagrams. In Figure 1, I depict the long run trend in world raw sugar prices.

I presume that the general shape of this diagram will be very familiar to you. The only point that I should highlight is that I have plotted the diagram in _real_ terms, and have adjusted for the effect of inflation. This emphasises the height of the peak in 1974, and also shows that the long run trend in world prices has been downwards. Real raw sugar prices on the world market have actually fallen at an average rate of 1,5% per annum since 1950, which implies that the South African

sugar industry must be able to reduce <u>real</u> production costs at this rate to keep pace with the long term decline in export revenues.
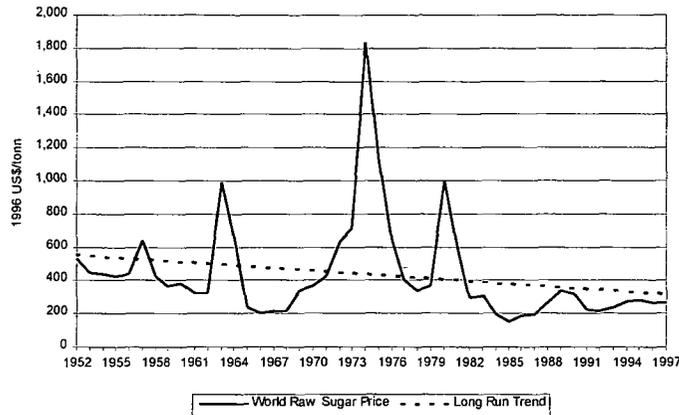

Figure 1. Long run trend in real world raw sugar prices.

I find Figure 2 particularly satisfying, in the light of my introductory remarks. In the diagram, there are three curves. One is the real world sugar price; another is the long run trend displayed in Figure 1. The only new curve is the solid black line, plotting the average real, ex-mill, costs of production of cane raw sugar world-wide, as estimated by the LMC for the crop years since 1979.
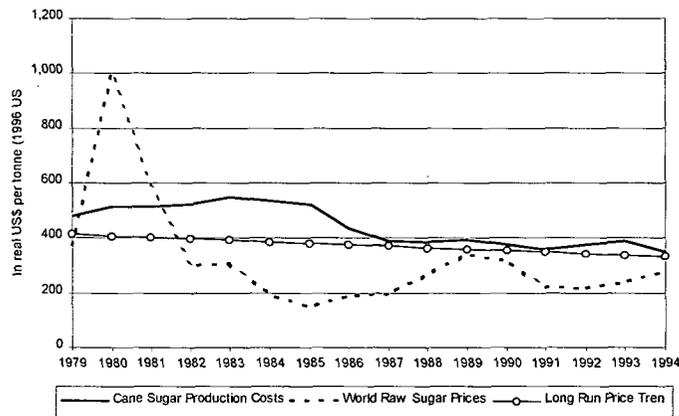

Figure 2. World cane sugar production costs and raw sugar prices.

It can be seen that, up until 1985, average cane sugar production costs were slightly above the long run trend in the world sugar price. The low world prices of that period had a sobering effect on producers. Several high cost factories closed, and many of those producers who stayed in business took active measures to reduce their costs. As a result, from 1986 onwards, average world cane sugar production costs have been remarkably close to the long term trend in world raw sugar prices.

This yields the following remarkable conclusion:

* The world raw sugar market behaves very like the theoretical image of a free market. On average, over time, the typical producer of raw sugar around the world just breaks even and manages to cover its full production costs at world prices.

* This means that a producer who has higher than average production costs will, over the price cycle, lose money at world prices. However, a producer whose costs are below the world average will, in the long run, be able to survive at world prices.

I find these powerful conclusions, but should acknowledge one point which will otherwise, I am sure, be raised during questions. This is that, as John Maynard Keynes said, "In the long run, we are all dead." In the real world, one has to be able to stay in business in the short term to be able to profit from long term price trends. That is why the issues of systems of sugar price supports and domestic marketing arrangements are so important to sugar industries around the world.

South African production cost competitiveness

Figure 3 is a comparison of the production costs of a number of leading cane sugar producing nations in the 1994-95 crop year. I have included the two largest Latin American producers, together with leading Asian producers, Australia, and also the main southern African exporters.

In the diagram, costs are expressed as a percentage of the world-wide cane sugar average, and the division of the total into field, factory and administration costs is distinguished.
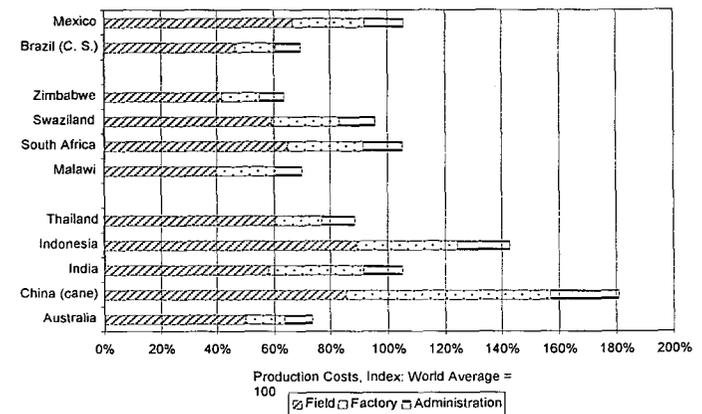

Figure 3. Sugar production costs, mid-1990s.

The year that I have used for the comparison was not flattering to the South African sugar industry, being hard hit by a drought which pushed costs just above the world average. Had that been representative of the underlying position, the industry would have faced a hard time in the long run. Fortunately, this was not the case, as Figure 4 reveals.

In Figure 4, I have contrasted the movements in the average costs of production of cane raws around the world with the situation in South Africa (the benchmark of 100 represents the long run trend in world sugar prices). I have also made an initial estimate of South African production costs for 1996-97, and added that to the diagram.

* It is evident that South African cost competitiveness suffered badly when there was a severe drought, which hit yields.

- Under normal conditions, the industry is able to produce cane raw sugar at a significant advantage over most other producers.

- Furthermore, South Africa is normally able to produce sugar at a cost that is below the long run trend in the world price.
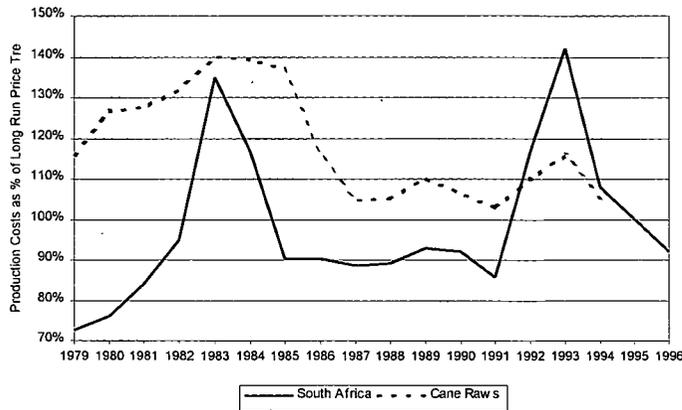

Figure 4. South African production costs *vis-à-vis* world cane sugar averages.

The impact of exchange rate changes

The cost competitiveness of South African producers depends on three main factors: the ability of the industry to boost its technical efficiency and take measures to reduce its production costs; the climate; and input prices. Input prices in turn depend on two main influences: the state of the local economy, and the exchange rate.

Figures 5 and 6 depict the behaviour of the *real* (inflation-adjusted) exchange rate between the Rand and the currencies of other sugar producing nations, taking 1979 as the starting point of 100. In interpreting these curves, it should be noted that a curve which rises from left to right implies that the currency of the country in question is rising in value against the Rand (once differences in national rates of inflation have been taken into account), and is becoming less competitive in the process. A falling curve means that the country is becoming more competitive *vis-à-vis* South Africa.

From the diagrams, it can be concluded that:

- South Africa has benefited considerably from exchange rate changes in its competition with Brazil, which has suffered a severe loss of competitiveness since the Plan Real stabilised the exchange rate.

- South Africa has neither gained nor lost much as a result of exchange rate swings against Australia.

- However, South Africa has lost considerable ground over the past decade against southern African neighbours and also against South and South East Asian economies. In the extreme case of the Indonesian Rupiah, the latest devaluations have left local input costs approximately five times more expensive in Rupiah terms than they were in the mid-1980s.
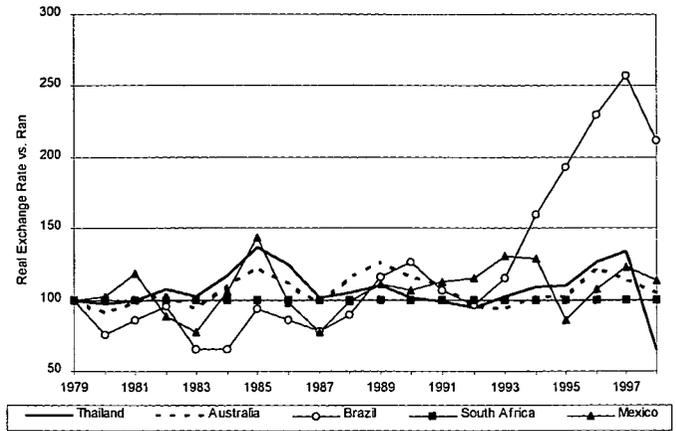

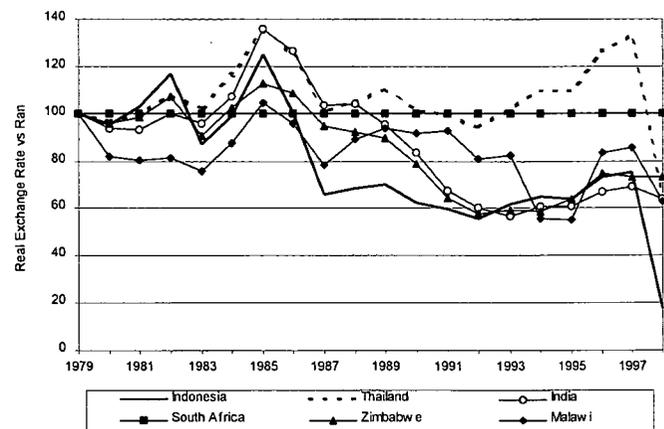**Figure 5.** Real exchange rates versus the Rand, 1979 to early 1998.

Figure 6. Real exchange rates versus the Rand, 1979 to early 1998.

Recent shifts in costs as a result of exchange rate movements

The latest strong swings in exchange rates have been too recent to be incorporated systematically into production cost estimates. After all, there are still many countries which have not actually completed their 1997-98 crop years. One of the advantages of the engineering cost approach that my colleagues adopt to the estimation of production costs, is that it permits simulation of the impact of events such as input price movements or changes in yields.

Figure 7 takes the average 1994-95 world-wide cane sugar production cost in US$ as 100, and then shows how different sugar producers' costs would have moved between 1994-95 and the first quarter of 1998, *assuming that (apart from South Africa) yields, etc. are unchanged, and that only exchange rates have altered.* For South Africa, we have incorporated the latest crop year performance into the estimates, and therefore shaken off the effect of the drought of four years ago.

The dramatic reductions in South East Asian production costs are the main feature of the diagram. Mexico, too, has benefited from its own devaluation. Among the other major producers, the net effect of currency movements has typically been a slight increase in costs: this has been true of Australia

and India, for example. Centre/South Brazil has experienced a larger rise in costs than the other countries, as a result of the major fluctuations in real exchange rates that are evident from Figure 5.

In general, we observe that:

- As a result of exchange rate changes, southern African production costs have lost ground to other regions.

- However, South African costs reflect the recovery in production, and have dramatically narrowed the gap with Swaziland.
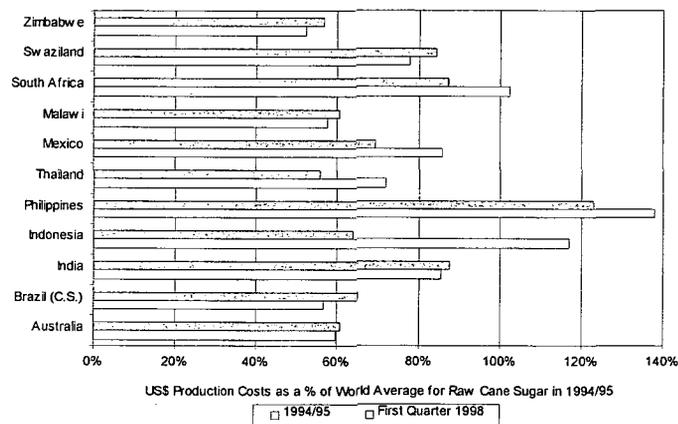

Figure 7. Production cost changes, 1994 to early 1998.

Another way in which to appreciate the impact of exchange rate changes is to compare production costs in Rand in 1994-95 and in early 1998, under the same assumptions as Figure 7, namely that (apart from South Africa) yields, etc. are unchanged, and that only exchange rates have altered. The outcome is displayed in Figure 8.
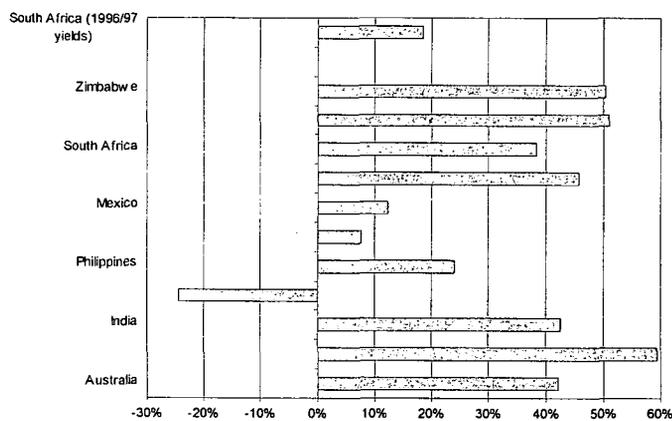

Figure 8. Change in production costs in Rand/ton, 1994 to early 1998.

Only Indonesia has recorded an actual decrease in production costs in Rand during this period. Outside South East Asia, most of the countries included in the diagram have cost increases in the region of 40%. This would have been true of South Africa, too, if it had not been for the recovery in yields.

- Where 1996-97 yields are taken into consideration, the cost performance in South Africa looks much more creditable. Between the two periods, we have estimated the rise in Rand production costs in this country at under 20%.

Don't be complacent!

The general impression to be drawn from the diagrams so far is probably fairly encouraging to South African producers. Nevertheless, a word of warning is appropriate. There are competitors for cane sugar which should not be under-estimated. In particular, HFCS (high fructose corn syrup) has greatly enhanced its competitiveness since it was launched on a commercial scale just over 20 years ago.

Figure 9 contrasts the trends in the real costs of production of first generation HFCS (with 42% fructose) and of cane sugar. Whereas real cane sugar costs fell by roughly 25% from 1979-80 to 1994-95, HFCS(42) production costs fell by almost twice this percentage, and HFCS now costs appreciably less than sugar to produce. Looking into the future, genetic engineering of maize will help rather than hinder the competitiveness of HFCS. Therefore, cane sugar producers cannot afford to rest on their laurels.
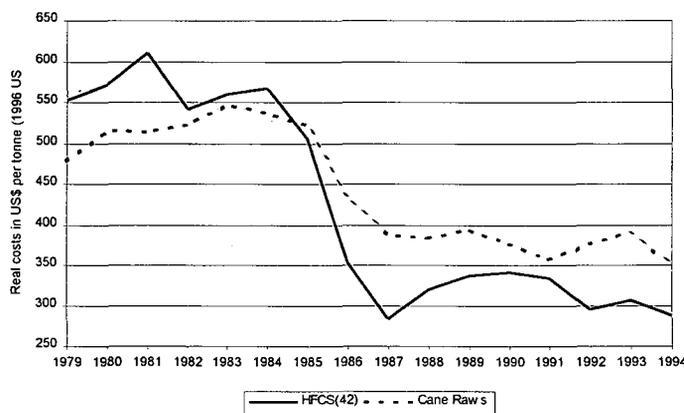

Figure 9. Contrast between world cane sugar and HFCS production costs.

Technical competitiveness — (a) in the field

Many of the determinants of cost competitiveness, notably exchange rates, are not under the control of sugar producers. Despite what I have said about the lessons to be learnt from the experience of Hawaii, where technical excellence could not overcome the impact of high input prices, one of the few aspects of production which is fully under the control of sugar producers is the technology that is applied.

The last few diagrams contrast your performance with that of some major counterparts. Figures 10 to 14 review three major aspects of technical competitiveness, based on average results during the first half of the 1990s. Figure 10 compares field performances, in terms of the actual average yields of sucrose in harvested cane. The values depicted in this diagram measure the sucrose content of the cane harvested *per hectare per year*, as measured at the mill gate, before crushing. In other words, it represents the sucrose delivered by the grower to the mill.

The data are presented not only per hectare, but also per year, because there are several instances (South Africa among them) in which cane is harvested at an average age of over 12 months, and this tends to increase the yields per harvested hectare, without necessarily implying an increase in the underlying productivity of the land.

The South African yields are not very special in relation to the other countries in the diagram. The star performers are the other southern African producers, due partly to irrigation. Australia is well ahead of the remaining countries, and South Africa is among five producers with yields of between six and eight tons of sucrose per hectare per annum. Unfortunately, South Africa lies at the bottom of this group, and only Thailand actually records a lower average yield over the period under review.
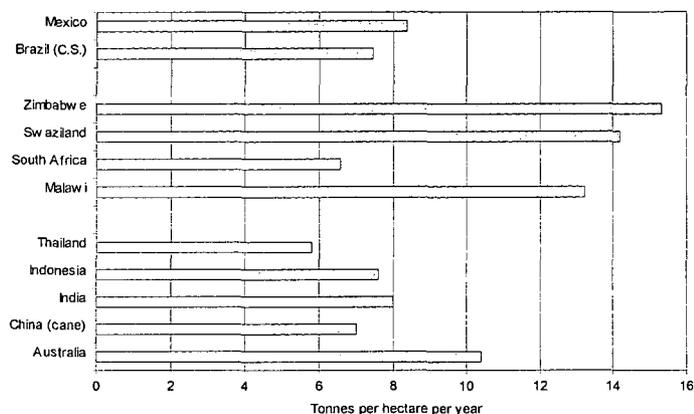

Figure 10. Sucrose yields in the early 1990s.

Technical competitiveness — (b) in the factory

Sucrose yields are largely the responsibility of growers, and Nature, too. Extracting sugar from cane is the province of sugar mills, and the performance of the same group of countries in overall factory recoveries may be gauged from Figure 11.
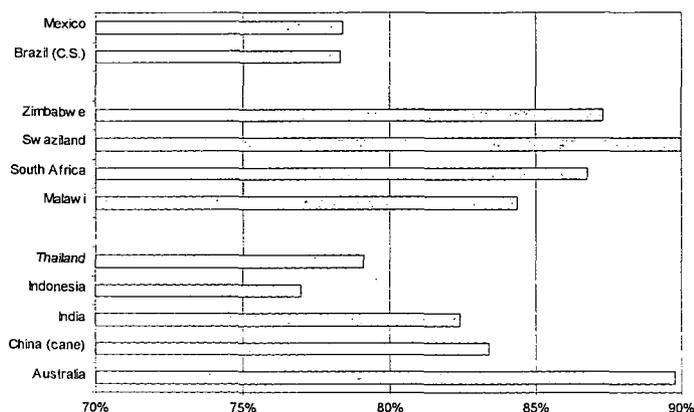

Figure 11. Factory sucrose recovery rates in the early 1990s.

Only four countries achieve overall recoveries of over 85%: Australia and Swaziland, both of which are very close to breaching the 90% mark, as well as South Africa and Zimbabwe. At the other extreme, four countries record overall

recoveries of less than 80%: Indonesia, Thailand, Mexico and Centre/South Brazil.

These figures testify to the success of diffusers, but need to be interpreted with a certain amount of care. In Brazil, as we shall see shortly, millers care little about maximising their recoveries; whatever sucrose does not get recovered in the sugar circuit goes, with molasses, to the alcohol circuit for fermentation into fuel ethanol. Thailand is different in that there is no intention to leave sucrose in the molasses, but the mixed juice purities in Thailand are low, and therefore mills have to work hard to attain even modest levels of recovery which would sound poor in South African conditions. If one adapts the figures to take account of juice purity and fibre content, then the reduced recovery rates in Thailand are actually quite creditable.

The constraints that are imposed by these technical factors are highlighted by Figures 12 and 13. The first of this pair shows the trade-off, in practice, between higher fibre content and higher sugar losses; but South Africa is outstanding in having the highest fibre content, and yet the lowest sucrose losses to bagasse. The second in the pair focuses upon boiling house losses. South Africa does less well in this respect, but Brazil is the remarkable result, tolerating very poor recoveries, for the reason mentioned in the previous paragraph. (Note that a possible bias in Figure 13 arises because, whereas some mills produce only raw sugar, others are integrated through to white sugar, which tends to increase reported boiling house losses.)
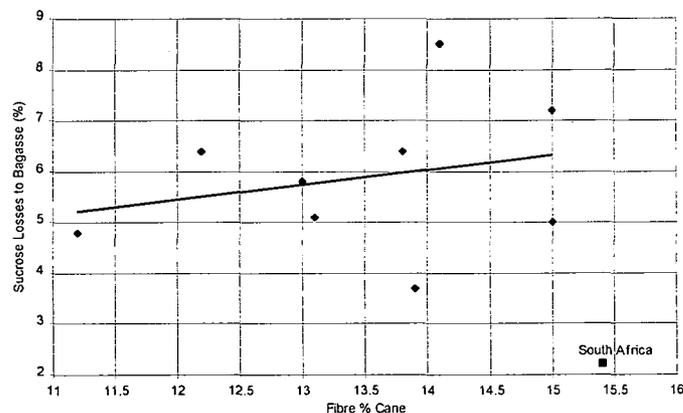

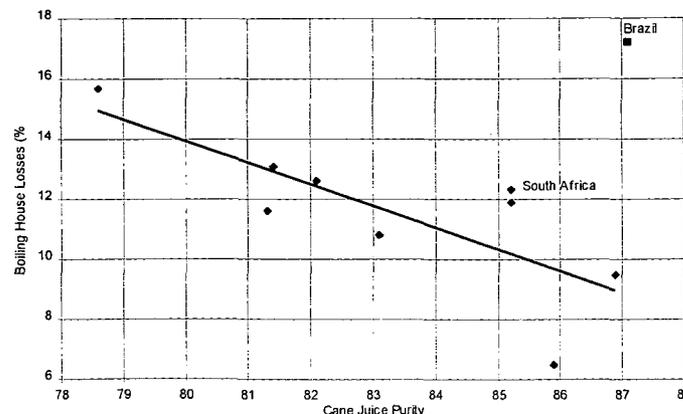**Figure 12.** Cane fibre content and sucrose losses to bagasse.

Figure 13. Cane juice purity and boiling house losses.

Technical competitiveness — (c) in capacity utilisation

The last of my graphs, Figure 14, relates to a different aspect of sugar industry efficiency, namely the extent to which costly capital investments in plant and equipment are utilised. The longer the campaign, the lower the unit capital costs, both in mills and in harvesting machinery. Therefore, I have prepared this picture, comparing factory utilisation rates, expressed in tons of sugar produced per ton of daily crushing capacity.
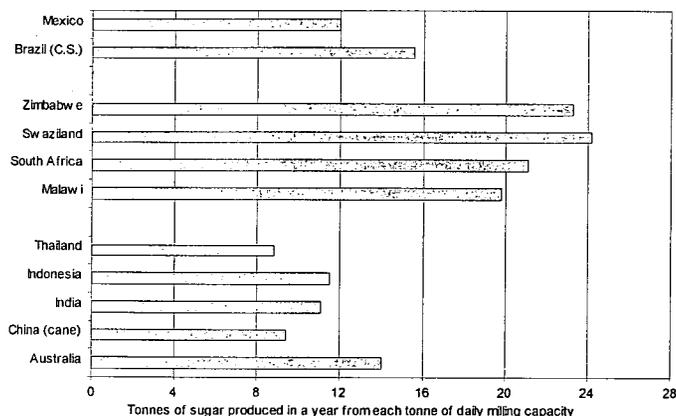

Figure 14. Factory capacity utilisation in the mid-1990s.

Southern Africa is the outstanding region from this point of view. In this part of the world, it is common to obtain twice as much sugar from a given capacity of mill than is obtained in other leading producing regions. Whereas, at one extreme, Thailand has averaged little over eight tons of sugar per ton of daily milling capacity, most of Southern Africa is able to exceed 20 tons.

The only producers who do significantly better than this region are those which are able to crush all year round, and which are mainly on the Equator. Colombia, Hawaii and Peru are all in this select band, and are able, where cane supplies are adequate, as in Colombia, to produce over 30 tons of sugar per ton of daily crush.

Where the climate rules out lengthy milling seasons, the only hope for processors is provided by Brazil's experience. Brazilian mills operate a relatively long crushing season, in relation to local conditions for cane farming. They are able to do so because they do not mind processing cane when the sucrose content is low. As long as total reducing sugars are reasonably high, they are prepared to tolerate what would otherwise seem to be excessively high losses to molasses, and use this production in ethanol distillation.

What do we conclude?

This quick tour of the world of cane sugar has demonstrated that economic and technical competitiveness are not necessarily synonymous with one another. By and large they coincide for Southern Africa. If one looks back at the last few diagrams, local producers fare well in the technical stakes,

and we know from the earlier part of the presentation that they also do well in the economic stakes.

Yet, there are industries like the Thai industry that has grown into one of the world's main exporters, despite the handicap of low agricultural yields, poor cane quality, mediocre factory recoveries and a short average milling season. This serves to demonstrate that some low technology/low input/low output industries (at least on the agricultural side) can be economically competitive.

There are several reasons for this paradox. Probably the most convincing is that low yielding cane land is typically unattractive for most other crops as well. Therefore, the 'opportunity cost' of that land is low, and the price at which farmers are willing to grow cane is correspondingly low. At the other extreme, very fertile, highly productive land acquires a market value that is eventually too high to sustain cane agriculture. This has happened in the Pearl River Delta near Hong Kong, in just the same way that it has occurred in the region of Bangkok, where market gardening and urbanisation have squeezed out sugarcane.

South Africa is fortunate in that cane areas are particularly well placed to grow cane, and that cane does not yet have many serious competitors as crops. Not only is cane attractive to farmers, but the long milling season and the efficiency of South African mills ensure that both sides of the industry play a full role in securing the future of a viable industry. However, notwithstanding these advantages, the sugar industry has slipped in the international competitiveness league; and the latest round of devaluations in Asia will reinforce competitive pressure.

Indonesia may not be in a state to profit from the boost that has suddenly been given to its cost competitiveness, but Thailand should soon be in a position to exploit its enhanced profitability, once the sugar industry's short term debt problems have been resolved.

Whether South Africa's sugar industry is under pressure as a result of devaluations by competitors, or from wage increases iwithin the industry, or through the need to keep pace with yield improvements elsewhere, it will be difficult to remain ahead of your rivals. The most important single lesson that I would draw from this review is that South Africa will have to be able to keep in the lower half of the international distribution of cane sugar production costs. If the industry can succeed in this objective, it will, in the long run, make profits from sugar production, even at world market prices.

To remain in the lower half of the international cost rankings, we have also seen that it is necessary to keep abreast of the long term reductions in the real price of sugar on the world market. This real rate of decrease has averaged 1,5% per annum over the past 45 to 50 years. Therefore, you have to set yourselves a target of lowering your real (inflation-adjusted) production costs of sugar by at least 1,5% each year.

That is not all. Your workers will undoubtedly hope to enjoy real pay rises as the economy develops. Maybe they expect real increases of the order of 3% per annum. If so, you have to be able to increase your underlying productivity by *more*

than 1,5% each year, to allow sufficient margin to pay higher wages. Probably, you need to aim for an overall productivity increase of at least 2,5 to 3,0% per annum to maintain your current position in the world industry.

This may seem a tall order, but it is actually what most of the world's leading sugar producers have been able to achieve since 1950. Better agricultural techniques, economies of scale in factories and in farming, improved mechanisation and automation, as well as better cane transport systems, all play their role in reducing your costs.

The challenge is to continue to exploit the potential for further improvements in these and other directions. To judge by the scale and the reputation of this Congress, you are clearly doing your best to rise to the challenge.

Thank you again for having invited me to join you this year.