The South African sugar industry

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The sugar industry was established in Natal in the mid-nineteenth century. By the 1980s, South Africa produced c. 2 million metric tons of sugar per annum and, directly or indirectly, the industry supported almost one million people. Exports, which amounted for almost half the sugar produced in the 1970s, declined during the 1980s and low prices together with American and Canadian sanctions have forced the industry to consider alternative uses for sugar cane.

KEY WORDS: South Africa, agriculture, sugar cane, sugar, ethanol.

SUGAR IN SOUTH AFRICA is produced from sugar cane, which is grown in three main areas: Natal, the Pongola valley (near the borders of Natal and the Transvaal) and in the Eastern Transvaal Lowveld from the vicinity of Nelspruit in the west to Komatipoort in the east (Fig. 1). During the period 1980/85 an average of about 2 million tons of sugar was produced per annum, of which approximately one-third was exported.

Climatic requirements
Although different varieties of sugar cane have different climatic tolerance levels, in general terms the production of commercial sugar cane is restricted to areas that are normally frost-free throughout the year and in which average temperatures above 20°C occur during the growing season (Bengston and van Rooyen, 1964; Leong and Morgan, 1973). In addition, annual precipitation in excess of 1000 millimetres is necessary if the cane is to be produced without artificial irrigation. Consequently only limited areas of South Africa are suited to the natural production of cane: essentially coastal Natal and the adjacent area of Transkei. At Pongola, all cane is irrigated at an average rate of about 800 millimetres per hectare per annum, to compensate for the low rainfall (618 mm average annual rainfall). The cane produced in the eastern Transvaal region is also irrigated and could not otherwise be produced (SASYB, 1984/5).

The location and development of the Industry
The South African sugar industry began in Natal. Between 1847–51 attempts were made to establish small plantations of 8–200 hectares to grow tropical crops within a few kilometres of the coast, especially north of Durban (Christopher, 1977). Coffee, cotton, tobacco, indigo and arrowroot, as well as sugar cane, were cultivated, but the latter crop proved of greatest commercial success (Richardson, 1986). E. Morewood, who farmed at Compensation, near Durban, planted sugar cane imported from Mauritius in 1847 (Osborn, 1964). In 1852 he was the first to sell molasses (a product of sugar cane) in Natal. Three years later, in 1855, the first public sale of 'colonial sugar' was held in Durban (SASYB, 1984/5).

By 1860 about 4953 hectares in Natal, mostly on the North Coast, were planted with cane and 23 sugar mills were in operation. After 1860 the industry changed in character due to the investment of London capital, the introduction of indentured workers from India (who provided a reliable labour force, unlike the Zulus, who, having been largely confined to native reserves (Holden, 1855), would only work spasmodically), and the use of new strains of sugar cane. In 1880 some 7328 hectares were under cane and 70 mills were in operation. Sugar exports were worth £215 000. By 1910 the industry had been reorganized and only 25 mills remained in use, although 23 658 hectares of land were under cane. Individual planters and millers had mainly been replaced by large milling companies that owned and operated their own estates, such as Tongaat Estates, Hulett, and Reynolds Brothers (Christopher, 1977).

In 1905 certain coastal areas of Zululand, the region north of the Tugela River which now forms part of Natal, were made available by the government for White settlement. Because large estates had become politically unpopular in Natal by that date, the government devised a scheme whereby land would be occupied by settler planters, although those who leased their land had to sell sugar cane to milling companies or forfeit their holdings. By 1910 almost 80 940 hectares in Zululand had been divided into farms that averaged 353 hectares and had been settled. Northern Zululand proved too difficult to develop for sugar cane, and government attempts to establish rubber plantations near the Mozambique border also failed (Christopher, 1971, 1983). The Umfolozi flats, which are subject to devastating floods, are still considered to be not fully
Fig. 1. Sugar cane producing areas in South Africa and temperature limitations to sugar cane production in Natal
Sources: Macvicar (1973) and Bates (1979)
developed, although cane production began there in 1910 (SASYB, 1984/5). The largest sugar mill in South Africa, Felixton II is located in Zululand and can crush up to 3.3 million tons of cane per annum (Grafton, 1982/3). This mill, opened in 1984/5, has been designed so that it can be expanded to crush almost 5 million tons, which indicates the potential future importance of Zululand as a cane-growing area. In the crushing season of 1987/8, Felixton II crushed just over 2.5 million tons of cane, and was the third largest sugar mill in the world (ZO, 1988).

At Pongola, on the border of Natal and the Transvaal, a government irrigation settlement comprising 159 plots with a total cane area of 6189 hectares was established with a mill that was opened in 1954 (SASJ, 1979a). Water for irrigation is provided either by Government built gravity canals or by direct pumping from the Pongola or Mkuze Rivers (SASYB, 1984/5). By 1985, in addition to the settlement farms and the South African Sugar Association experimental farm, 33 private growers also supplied cane to the mill. The total area under cane at Pongola in 1984/5 was 11 000 hectares. Over the five-year period, 1980/1 to 1984/5 an annual average of 859 241 tons of cane was produced in the area and crushed at the Pongola mill.

In the Eastern Transvaal the Transvalse Suikerkorporasie Beperk was established in 1965, and the mill came into operation at Malelane at the beginning of the 1966/7 season. By 1984/5 an area of 19 165 hectares was under cane, of which 3965 hectares was divided between three estates belonging to the Suikerkorporasie. The water used to irrigate the cane is drawn principally from the Crocodile, Komati and Lomati rivers and their tributaries (SASYB, 1984/5). Between 1980/1 and 1984/5 an annual average of 1.5 million tons of cane was produced in the area and crushed at Malelane.

**Market growth**

The rapid growth of the market for sugar after the Second World War, both internationally and within South Africa, provided a tremendous stimulus to production, which increased from 430 703 tons in 1946/7 to 2.37 million tons in 1984/5 (the most recent year for which statistics are publicly available: Fig. 2). The domestic market consumption of sugar in the year 1959/60, for example, was 655 837 tons. Ten years later it had increased to 790 471 tons, while in 1973/4 it exceeded one million tons. By 1983/4 domestic demand had almost doubled from the 1959/60 figures, reaching 1 225 190 tons. Much of this growth was accounted for by the industrial market, which bought about 135 000 tons in 1959, over 190 000 tons in 1969, more than 270 000 tons in 1979 and about 345 000 tons in 1984.

In the year 1983/4 over 35 per cent of the sugar-consumed by industry was used in the manufacture of minerals (i.e. drinks) and over 20 per cent was used in the manufacture of sweets (SASYB, 1983/4). The increased domestic demand for sugar was the result of both population increase (from 15.9 million in 1960 to 21.7 million in 1970 and about 29 million in 1980; South Africa, 1985) and increasing purchasing power among all sections of the population. Export demand was also vibrant, especially during the 1950s, but in the next two decades a glut of sugar developed on the world market. As a result, in an attempt to control prices, in 1978 the International Sugar Agreement came into force. Under this agreement, countries were allocated export quotas, which, in the case of South Africa, initially amounted to 835 083 tons (SASYB, 1984/5). The effect of quota restrictions was to severely curtail sugar exports from South Africa. In 1977/8, before quotas were introduced, the country exported 1.1 million tons of sugar. In 1978/9, following the introduction of quotas, 824 323 tons were exported. By 1984/5 exports had been reduced to 754 283 tons.

The export markets for South African sugar have changed considerably since the 1970s, as Table 1 indicates. Japan remains the main export market at the time of writing (1989), although it bought less than half as much sugar in 1984/5 as it did in 1977/8. The Canadian and American markets had also diminished seriously and were to be further reduced: in 1986 'sanctions legislation in the USA and Canada... has led to the immediate direct loss of markets for over 130 000 tons of sugar and a threat of further future market losses' (Chance, 1987). By 1984/5 the United Kingdom, Portugal and Lebanon had apparently ceased to purchase South African sugar, but the Republic of Korea had more than tripled its purchase and Israel had become an important market. By 1983/4 the Republic of Korea had replaced Canada as the second largest importer of South African sugar, buying 194 000 tons compared with 128 000 tons sold to Canada (Daily News, 1988a).

**TABLE 1**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year: 1977/8</th>
<th>Year: 1984/5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>641 827</td>
<td>310 951</td>
</tr>
<tr>
<td>Canada</td>
<td>258 353</td>
<td>175 536</td>
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<tr>
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<td>3090</td>
<td>5845</td>
</tr>
<tr>
<td>Total</td>
<td>1 100 461</td>
<td>754 283</td>
</tr>
</tbody>
</table>

Sources: SASYB, 1977/8 and 1984/5
Fig. 2. Sugar production 1918/9 to 1984/5. Generalized precipitation figures for 1960 to 1985 are also shown, thereby indicating the effects of drought on sugar production, especially in 1965/6, 1970/71, 1980/81 and 1983/4

Source: The South African sugar year books, annual volumes.

Virtually all South African sugar exports are handled by the South African Sugar Terminal, which is located in Durban. The terminal was opened in 1965 and by 1985 it had a storage capacity of 520,000 tons. In 1984/5 over 670,000 tons of sugar were delivered to the terminal by road and rail from 15 sugar mills, as well as almost 58,000 tons by rail from Swaziland. Bulk cargoes totalling 663,732 tons were loaded into 45 ships and 10,000 tons of raw sugar were also bagged and shipped. Over 30,000 tons of refined sugar in one-ton bags were delivered into ships bound for Israel (SASYB, 1984/5).

In 1965 the sugar industry commissioned its first ship designed for the transport of sugar in bulk. By 1979 four such ships were in operation. All but one of the 86 voyages undertaken by these carriers from 1965 until the end of February 1979 were to Japan (SASYB, 1979b).

Increase in area under sugar cane and in sugar production

As a consequence of the increased post-war demand for sugar the area under sugar cane and the area harvested for milling increased rapidly between 1960/1 and 1984/5 (Fig. 3). In the former season just over 250,000 hectares were planted with cane. By 1984/5 the area had increased to over 400,000 hectares. The harvested area, during this period, increased from a little over 100,000 hectares to almost 280,000 hectares, which yielded over 22 million tons of cane for crushing at the mills, producing 2.37 millions tons of sugar (SASYB, 1984/5).

By 1970 South Africa was the eighth most important cane-sugar producing country in the world, after Cuba (8.5 million tons), Brazil (5.6 million tons), India (4.7 million tons), Mexico (2.9 million tons), Australia (2.6 million tons), USA and mainland China (2.4 million tons each; Yamane, 1975). Nevertheless, South Africa is subject to droughts which have adverse effects on the growth of sugar cane and consequently lead to reductions in sugar output. As Fig. 2 shows, there is a statistical time lag of about one year between drought conditions and a decline in sugar production. The drought of 1983, for example, was reflected in a reduction in the tonnage of cane harvested from 19.3 million tons in 1982/3 to 13.4 million tons in 1983/4.

In April 1989 the government approved a series of constructive expansion and deregulation proposals for the industry (Dewey, 1989) and in August 1989 decided to approve in principle the production of ethanol fuel from sugar (Daily Dispatch, 1989). An ethanol refinery, costing R120 million to build, will be erected 'probably at Richards Bay'. The effect of these decisions will be to allow growers to expand the area...
under sugar cane by over 30,000 hectares and to produce 'in excess of 1 million extra tons of cane'. According to Chance (1989a) the following 'additional caneland hectares' may be brought into production: Zululand 11,500 hectares; North Coast 6,000 hectares; South Coast 6,000 hectares; Kangwane (adjacent to the Eastern Transvaal canefields) 3,500 hectares; Midlands 2,300 hectares; Pongola 2,000 hectares. Chance (1989b) believes that 'this expansion will create over 13,000 new jobs' and 'will also have strategic benefits in stabilising the population on the Mozambique border'. Much of the expansion will be undertaken by Black farmers. The key to expansion is the production of ethanol, since domestic competition from artificial and alternative sweeteners and the unreliable nature of the export market necessitate an alternative use for sugar cane.

Ethanol
Since the late 1970s the South African sugar industry has investigated the feasibility of establishing an ethanol refinery. Ethanol can be produced from sugar cane and used as a supplement for petrol and diesel. Saunders argued in 1979 that if South Africa diverted its sugar and molasses exports to the production of ethanol it could provide 'about 7.5 per cent of the automotive fuel demand under present conditions'. The loss of the North American market for South African sugar in 1986 spurred the sugar industry to plan 'the erection of a large ethanol production facility at Richards Bay to utilize nearly 200,000 tons of export sugar and 150,000 tons of export molasses to produce about 150 million litres of ethanol annually. This volume of ethanol would... provide for the fuel blending needs of... Natal'. In October 1987 it was stated that 'given the support of government and the cooperation of the fuel companies, the sugar industry can, within two years, have an ethanol facility in production and thus be able to overcome the most pressing sugar marketing problems posed by ill-conceived sanctions' (Chance, 1987). An experimental pilot plant for ethanol production, capable of producing 80 litres per day, was opened at Oribi Flats, near Port Shepstone on the Natal South Coast, in September 1988 (Daily News, 1988b; Dewey, 1988). The proposed Richards Bay plant may well be in production before the end of 1992.

Sugar mills
Sugar millers continue to rationalize their operations and in 1984/5 only 17 mills were in production, 10 of which crushed an average of over one million tons per annum in the period 1980/1 to 1984/5 (Fig. 4). Only three mills crushed less than half a million tons. South Africa's newest and largest sugar mill, Felixton II, 'is located only about three kilometres off the centre of its
cane-supply area so average transport costs will be minimized' (Grafton, 1982/3). Transport costs form a major item in sugar production, especially since about nine tons of cane are needed for the production of one ton of sugar. Most cane is transported by road to the mills in specialized trailers hauled by tractors or lorries, necessitating all-weather roads.

In addition to sugar other commodities, such as a variety of syrups, animal foodstuffs and chemicals, are produced from sugar cane. The Illawo Mill on the Natal South Coast, for example, specializes in syrup products. A chemical plant adjacent to the Sezela Mill, also on the South Coast, produces furfural, furfural alcohol and diacetyl from bagasse, which is a fibrous waste product of sugar milling. Vinegar and carbon dioxide are also produced (SASYB, 1984/5). Bagasse fibre can also be used in the manufacture of paper (as at a mill in Stanger), soft board, and as fuel in mills such as Felixton II (Grafton, 1982/3). 'Kalori 300', which is a dried molasses powder, is sold as animal feed, as is molasses itself. Bulk storage depots have been established for such animal feeds at locations that include Kokstad and Estcourt. Ethanol manufacture 'also produces as a residue a nutrient used for cattle feed and fertilizer', both commodities will be produced at the proposed installation at Richards Bay 'as soon as markets have been established' (Chance, 1989b).

Sugar cane producers

By 1985 sugar cane was produced by about 23 000 growers, of whom '21 000 are peasant farmers producing less than 1000 tons of cane per annum' (van der Pol, 1985). In 1984/5 White farmers sold slightly more than 15 million tons to the mills, whereas Black, Indian and Mangete farmers sold about 2.7 million tons. (The Mangete are descendants of a nineteenth-century White settler named John Dunne, who had numerous Zulu wives, and who lived on the north bank of the lower reaches of the Tugela River.) The contribution of non-White growers has increased in importance from a negligible amount in the 1940s (when Zulu farmers sold less than 10 000 tons in 1949/50), to exceed 1.5 million tons in 1976/7 and 2 million tons in 1981/2 (SASYB, 1984/5).

Cane production by small (i.e. non-White) growers was stimulated, in 1974, by the establishment of the Small Cane Growers' Financial Aid Fund. By the end of the 1984/5 harvest a total of 15 940 loans worth over R23 million had been made since the inception of the scheme (SASYB, 1984/5). In addition, agricultural advisory services were in operation by the 1970s. Nevertheless, non-White, and especially Black growers, face many difficulties.

The traditional tribal African land tenure system, in which land is not owned by the individual who farms it, leads to the division of farms into small, uneconomic units, producing little income. Consequently, farmers have to supplement their farming incomes by other employment. Zulu (1987), in a study of Black sugar cane farmers at Nseleni, near Richards Bay in Zululand, found that the majority of farms were under 10 hectares. Furthermore, 95 per cent of the cane lands were not fenced, although most farmers kept livestock. The farmers relied largely on herd boys to keep animals off the cane, not always successfully. Although most of the farmers were literate, only a quarter had attended secondary school, so that they were limited in their receptivity for new ideas, opportunities and methods. Because of the small size of the farms and the limited income they produced, only four per cent of the farmers whom Zulu interviewed, owned tractors: the remainder relied on contractors to plough their land.

In a study of two KwaZulu communities in the Midlands region Cobbert (1984) encountered similar problems to those listed by Zulu (1987). The traditional African land tenure system appears to be a major obstacle to the development of commercial farming. 'Nine out of ten homestead heads cultivating sugarcane supported the concept of individual land ownership'. Cobbert also discovered that the production of sugar cane reduced the area devoted to traditional food crops, resulting in an 'increased tendency to purchase basic foodstuffs which could result in lower calorie intakes and increasing indebtedness to rural traders'. He concluded that 'the cultivation of crops, particularly beans, potatoes and sweet potatoes, could provide higher annual net returns to the smallholder than sugarcane', and recommended that 'when the smallholder possesses less than three to four hectares of arable land, he should be encouraged to cultivate traditional food crops ... rather than sugarcane'.

In spite of the problems identified by Cobbert (1984), Zulu (1987) and other workers, government decisions made in 1989 imply that an extra one million tons of sugar equivalent will be produced per year during the 1990s. This implies the annual delivery of an extra 9 million tons of cane to the factories, leading to an increase of one-third in South African production. Much of this cane will be produced by Black farmers, many of whom are smallholders.

The production of cane by White planters can be divided into two categories: company-owned estates, individual farmers. In 1984/5 the Tongaat-Hulett Group operated 19 estates on the Natal North Coast, in the vicinity of the Maitstone and Mount Edgecombe mills, with 21 867 hectares under cane. The estates were highly mechanized with 'a centralized pool of special heavy machinery for field layout and bull-dozing'. A specialized irrigation department provided maintenance and water supply services to the estates, and 4659 hectares of cane-land were irrigated, thereby producing about 117 000 tons of cane extra to that which would have been produced under natural (non-irrigated) conditions. The estates supplied about 40 per cent of the sugar cane crushed at the two mills. Hulett's Darnall Mill is also supplied with cane grown on company-
Fig. 4. Location of sugar mills and average annual tonnage of cane crushed over the period 1980/1 to 1984/5
Source: The South African sugar year books, annual volumes
owned estates. In 1984/5 the company had 10 078 hectares under cane in the Darnall region and each estate had a four-wheel-drive tractor and other mechanized equipment, although most of the weeding was done by hand. Another major company, C. G. Smith Sugar Limited, had 4108 hectares under cane near the Gledhow mill, 1242 hectares near the Noodsberg mill, 1343 hectares at Illovo, 2280 hectares at Powerscourt, 917 hectares at Eston, 9259 hectares at Sezela and 2160 hectares in the catchment of the Umzimkulu mill. Nevertheless, 91 per cent of the cane crushed at Umzimkulu in 1984/5 was supplied by private growers, of whom there were 194 White, 72 Indian and 63 African farmers (SASYB, 1984/5). Like the company estates, the farms of individual White producers are also highly mechanized, although they are normally smaller than the company estates. Individual growers, for historical reasons already listed, predominate in Zululand.

Conclusion
During the 1980s the South African sugar industry produced an annual average of just over 2 million tons of sugar, of which about one-third was exported. From 1986 onwards, exports have been subject to international sanctions. This creates serious problems, since 'some 25 000 farmers . . . are totally dependent on the sugar industry as their sole source of income' and the industry provides 'directly or indirectly for the support of around one million people in the most heavily populated rural area of the Republic' (Chance, 1987). By the end of 1987 an appreciable number of farms in Zululand, that formerly produced sugar cane, had been sold for afforestation in order to supply the long-term timber needs of the expanding paper industry at Richards Bay (Rypstra, 1988).

To counteract the effect of sanctions the sugar industry has turned its attention towards the use of sugar cane for various forms of home consumption. Nevertheless 'improved export prices' during the 1988/9 export season, if maintained throughout the 1989/90 season, are expected to enable the industry to repay its outstanding loans by the end of 1990 (Chance, 1989c). In the 1990s, with the production of increasing amounts of ethanol and other commodities that can be consumed within South Africa, the area under sugar cane appears destined to expand and an increase of almost 50 per cent is envisaged in the production of sugar or sugar equivalents. International sanctions and consequent import-substitutions may therefore prove beneficial to the industry.

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