A STUDY TO DETERMINE IF SMCL SHOULD CONTINUE REFINING SUGAR WITH RECOMMENDATIONS FOR THE FUTURE

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ABBREVIATIONS

ACP – African, Caribbean and Pacific countries

ACS– Association of Caribbean States

BSES – Bureau of Sugar Experiment Stations

CARICOM – Caribbean Community and Common Market

CCS – Commercial Cane Sugar

CIF - Cost, Insurance and Freight charges to be paid on goods purchased and shipped

CMO – Common Market Organization

COTED – Council for Trade and Economic Development

CPA – Cane Production Areas

CVD - Countervailing Duties

EBA – Everything But Arms

EU – European Union

ERS – Economic Research Service

FAO – Food and Agriculture Organization

GDP – Gross Domestic Product

HA – Hectares

IBGE - Brazilian Institute of Geography and Statistics

IFC – International Financial Corporation

ISEC – Indian Sugar Exim Corporation

ISO - International Sugar Organization

LDC – Least Developed Countries

MSN – Maximum Supply Needs

MT – Metric Tonnes

MTBE – Methyl Tert Butyl Ether

MTI – Ministry of Trade and Industry

OGL – Open General License

PDS – Public Distribution Systems

PAM - People's Action Movement

SIT – Sugar Industry Team

SP – Sugar Protocol

SPS – Special Preferential Sugar

SMCL – Sugar Manufacturing Company Limited

TPA – Tonnes Per Acre

US – United States

USDA – United States Department of Agriculture

USSR – Former Soviet Union

WTO – World Trade Organization

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Executive Summary

This paper examines the relative competitiveness of the local Sugar Manufacturing Company Ltd (SMCL), based on our analysis of the domestic, regional and international environments.

Upon reviewing the global environment, the long-term trend is for a global increase in sugar consumption, particularly from Mainland China, and some increase in global sugar supplies mainly from Brazil. Albeit that sugar remains one of the most protected and in certain instances distorted commodity markets, the analysis indicates a downward trend in the global price of sugar.

An examination of the recent changes in EU policy to reduce price support for raw sugar imported from ACP countries of which Trinidad and Tobago is a member state, indicates that total revenue from the export of raw sugar to the European market will decline by roughly US$7-12 million between 2006/07 and 2009/10. In terms of the regional market, Guyana, Jamaica, Trinidad and Tobago and Belize were the largest producers of raw and refined sugars in the CARICOM market, however recent information points to significant changes in the regional supply of sugar. While St. Kitts and Nevis have made a policy decision to leave the market, Guyana, Jamaica, Belize and Barbados remain committed to the production of sugarcane. In each case, the by-products of sugarcane has changed somewhat with attempts being made to diversify into ethanol, niche sugar-based products such as rum and branded sugar products, as well as co-generation.

In terms of international best practices for the production and refining of sugarcane, the segment of this study that deals with international producers namely Brazil, India and Australia identified five key common characteristics: (1) the availability of low cost raw materials, in this case both sugarcane and raw sugar, which is supported and leveraged by large and in other instances unlimited supplies of land, high levels of mechanization and an abundance of cheap labor, coupled with the development and use of bio-technology innovating high yielding varieties of cane; (2) the efficient coordination between sugarcane production and processing at the factory level; (3) the adoption of state of the art equipment at the factory and refinery levels, coupled with significant investments in infrastructure and research and development into sugar-based technologies and products; (4) diversification and marketing of new downstream sugar-based

products; (5) the adoption of clear policies at the national level to stimulate sugar production and trade, as well as, to enhance the competitiveness of definite stakeholders engaged in the sugar industry.

In the case of Trinidad and Tobago and SMCL in particular, a somewhat different picture emerges. According to 2005 data, sugar production employs directly and indirectly roughly 25,000 persons, contributing over 35 percent to Agriculture GDP and 0.54 percent to total GDP. In spite of sugar's contribution to Agriculture GDP, production of raw and refined sugars in Trinidad and Tobago during the period 2002 and 2005 has been on the decline. The study reveals that production of raw and refined sugars fell by 47 and 50 percent respectively during the period under review. Not surprising sugarcane production also fell significantly for this same period.

There are several factors contributing to the decline in sugar production. These include:

- The closure of Caroni 1975 Ltd, which resulted in a reduction in the amount of land available for sugarcane production.
- Farmers who remained in the industry reduced their level of reinvestment in the lands, and therefore yields per acre fell
- The industry continues to face problems of malicious cane fires, industrial action with limited extension services to support the work of farmers.

Additionally, raw sugar production fell on account of the following factors namely high levels of mechanical breakdown, strike action and shortages in human resources to maintain efficiency levels. In regards to the benefits provided by the sugar industry, one finds that SMCL and by extension the sugar industry offers a regular income and sustains the livelihood of farming and rural communities. With over 35,000 acres of land under cultivation at any one period of time, the industry also provides significant environmental benefits by reducing the potential for flooding, and the level of carbon monoxide in the environment. The industry also provides a secure source of raw material for many large and particularly small and medium-sized enterprises in the food and beverage sector, which employs roughly 4,000 workers and makes an average annual contribution of 36 percent to Manufacturing GDP.

In terms of finding a way forward based on the international, regional and domestic outlook,

three basic strategies were considered. The first strategy was to position SMCL as a junior regional leader by expanding the level of production of sugarcane and thereafter sugar. The second strategy considered was to niche and/or diversify SMCL operations into higher value added sugar-based products and non-sugarcane based agricultural products. The third strategy was to exit the industry by terminating the operations of SMCL.

To assess each option, a cost benefit analysis was conducted. In cognizance of the socioeconomic impact, this study further assessed these options using three criteria. An economic criterion based on relative competitiveness, value added benefits, and overall contribution of each option to the diversification of the economy. A social criterion based on contributions to rural development, poverty reduction, domestic food security and environmental protection. The third criterion is based on such factors as equity to stakeholders, feasibility in terms of executing the option, and risk minimization to the industry and wider community.

Based on these criteria, the final option chosen was Option 2 – To Niche and Diversify. This option ranked higher than the other two options in terms of social benefits with greater equity and probability of success. This option was also deemed to be competitive.

It must also be highlighted that any policy for SMCL requires a priori a final policy statement/decision to be made on the future of sugarcane production in Trinidad and Tobago, as this will guide stakeholders' (both foreign and local) investment decisions in the future. Secondly, any plan must address the core problems faced by the industry. These include the uncertainty associated with producing primarily a commodity-based product, poor support for farmers, outdated technology used by the industry, and a declining human resource base. One of the key challenges that must also be addressed will be changing the culture in the industry, which has been supported and/or protected in one form or the other for the greater part of the twentieth century. It should be noted however that this is not a problem unique to the sugar industry. For this reason privatization or joint venture programs with the appropriate partner, will also be key to assist in any transformation or change in the industry's environment.

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Background

On September 9th 2005, a meeting was held at the Ministry of Trade and Industry between manufacturers, representatives from the Sugar Manufacturing Company Limited (SMCL) and representatives from the Ministry of Trade and Industry. The issue at hand was the present shortage of sugar faced by major sugar consumers in the manufacturing sector.

After much discussion one of the key results of the meeting, apart from the approval by the Minister of Trade and Industry the Honorable Ken Valley for sugar manufacturers to import sugar, was the commissioning of a study to determine future alternatives for the SMCL refinery.

Objective of the project

The objective of this paper is twofold:

> **ASSESS THE COMPETITIVENESS OF SMCL, AND TO MAKE RECOMMENDATIONS FOR THE COMPANY'S FUTURE**

Outline of the project

To achieve this end, this study is divided into eight (8) sections. Section 1 provides a background and introduction for the project, while section 2 highlights recent trends in the international and regional industry. Section 3 provides an examination of best practices used by sugar producers internationally, and regionally. Section 4 provides an outlook for the sugar industry utilizing scenario analysis, a qualitative forecasting tool. Section 5 examines the current state of SMCL. Section 6 outlines key options for the development of the Company. Section 7 offers objective criteria for determining the best option. Section 8 details the preferred option, and section 9 concludes.

Methodology

The proposed methodology for this study is as follows:

Undertaking a Horizon Scan – A review of recent international, regional and domestic developments in the sugar industry in order to determine the key drivers of change that are likely to impact the structure and performance of SMCL.

Identifying the Criteria to Compete in Refining Sugar – In order to assess the competitiveness of SMCL an analysis would be conducted to identify (1) the leading cost-efficient sugar refiners in the global sugar market; (2) the conditions that enhance these refiners' competitiveness and (3) the practices that promote sustainable development of their sugar industries.

Assessing the present structure and performance of SMCL – This analysis entails identifying the components that constitute the present structure of this company, the real economic costs of existing operations and the targets to be achieved versus future projections. In addition, this analysis will also feature the current refining process; and the ongoing challenges encountered by SMCL.

Developing Future Scenarios for SMCL – Based on the above analyses, future scenarios for SMCL extending for a 10-15 year period will be inferred.

HORIZON SCAN

The International Environment

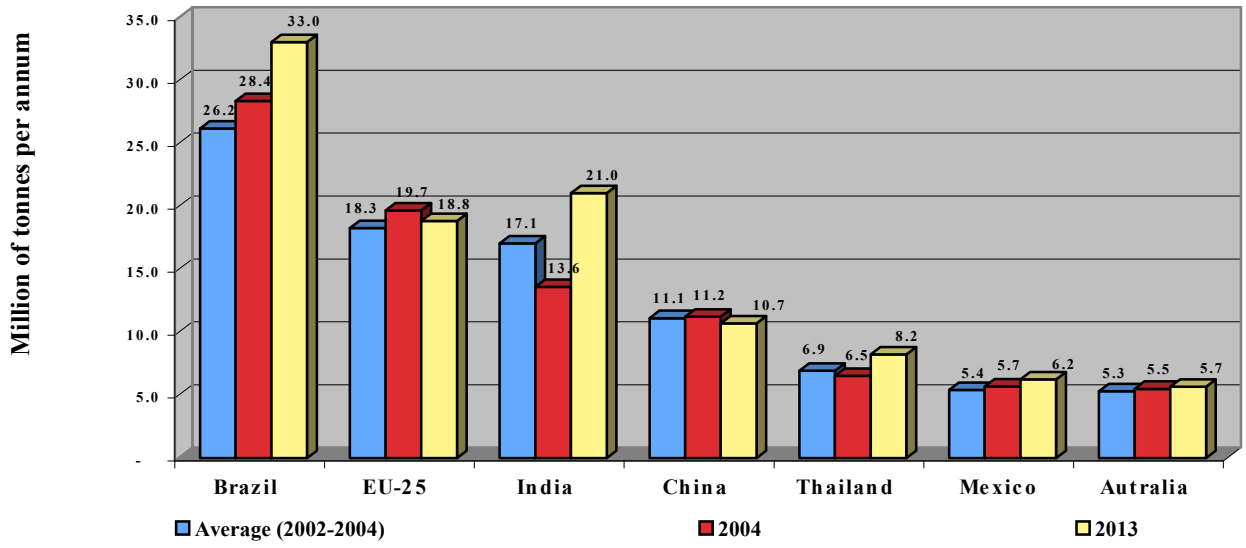
The world sugar market is characterized primarily by marginal growth in consumption, increasing supplies of raw and refined sugars from very large producers like Brazil and significant market distortions - sugar subsidies and trade barriers advocated by developed countries such as the US and certain member states of the EU. This section will examine recent trends in global supply and demand of sugar as well as recent changes in trade policies with implications for such domestic sugar producers as Trinidad and Tobago.

Global Production of Raw Sugar

In terms of supply, the leading sugar producers are situated in Brazil, the EU and India (see Chart 1). In 2004, world production of raw sugar increased marginally to 145.9 MT largely owing to record-breaking production levels in Brazil, which continues to benefit from rising sugar prices relative to the depreciation of its local currency the *Brazilian Real*. Production in other significant sugar producing nations such as Thailand and India declined marginally during the 2004-2005 season due to poor weather conditions. In spite of this, the evidence shows that this decline in sugar production did not significantly impact world supply.

Long-term forecasts for world sugar production indicate a significant increase over the medium term (2005 to 2013). This increase is expected to take place mainly in India and Brazil, two key countries with sufficient land space and human capital to significantly increase production. According to Graph 1, production in Brazil is expected to increase by 4.6 million tons or 26.1 percent between 2004 and 2013, while production in India is expected to increase by approximately 7 million tons over the same period. It should be noted that increases in production in India reflect a recovery from previous declines during the 2004 season.

Graph 1
Global Production of Raw Sugar, with forecasts to 2013

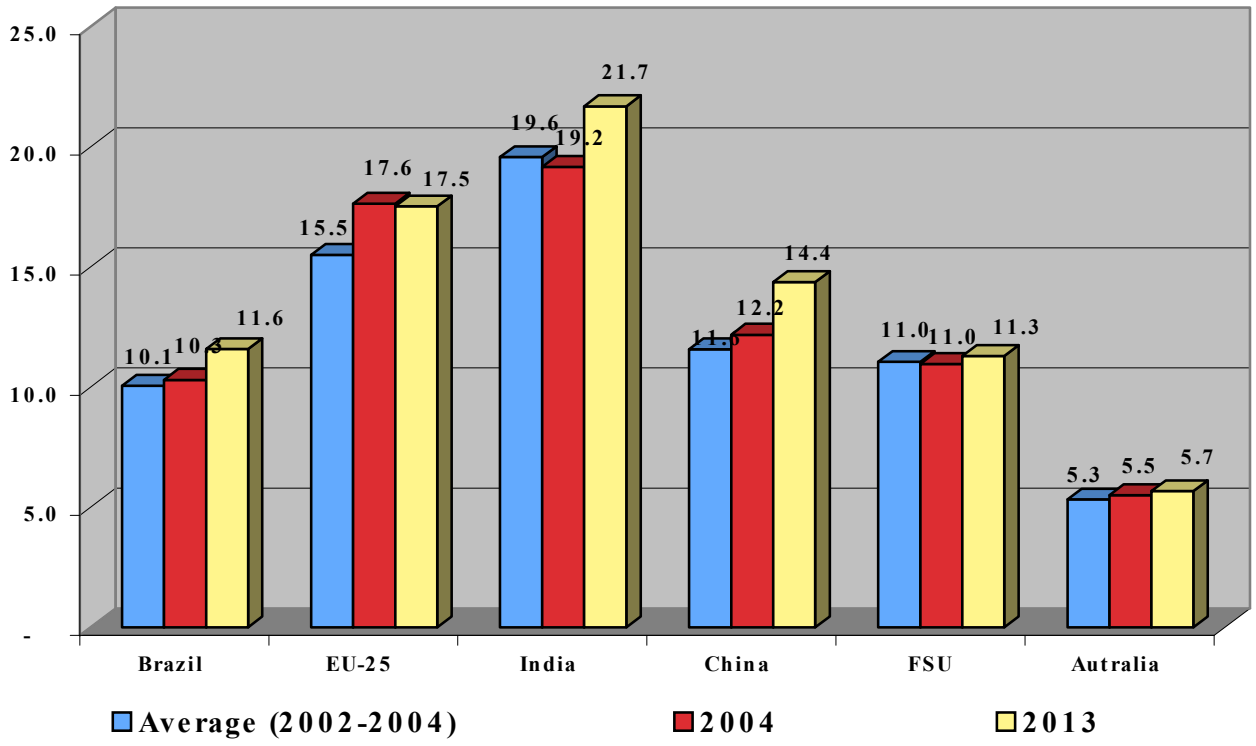


Global Consumption of Raw Sugar

During the 2004-2005 season, global sugar consumption was estimated at 148.4 MT. On a per capita basis, the most important consumers of sugar are Cuba and Australia each reporting a demand of 61 kg per capita and Brazil 50 kg per capita. Per capita sugar consumption was the lowest in China at 9 kg per capita for the 2004/2005 period because of the limited use of the product in that country.

Long-term forecasts suggest that world consumption of raw sugar is expected to increase at a relatively higher level than production levels, with the largest increases expected to occur in densely populated countries like China 2,191 MT and Brazil with 1,282 MT.

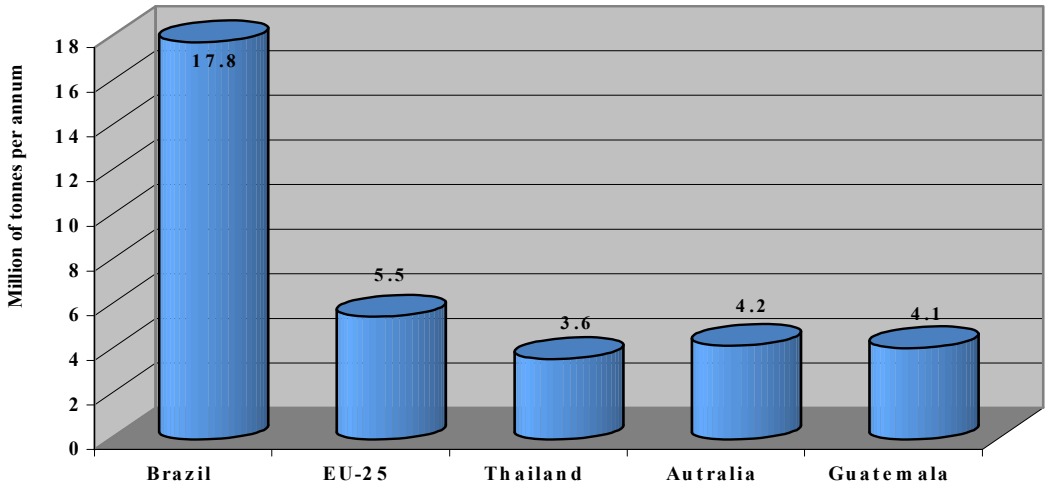
Graph 2
Global consumption of raw sugar with forecasts to 2013
(Mn Metric Tonnes)



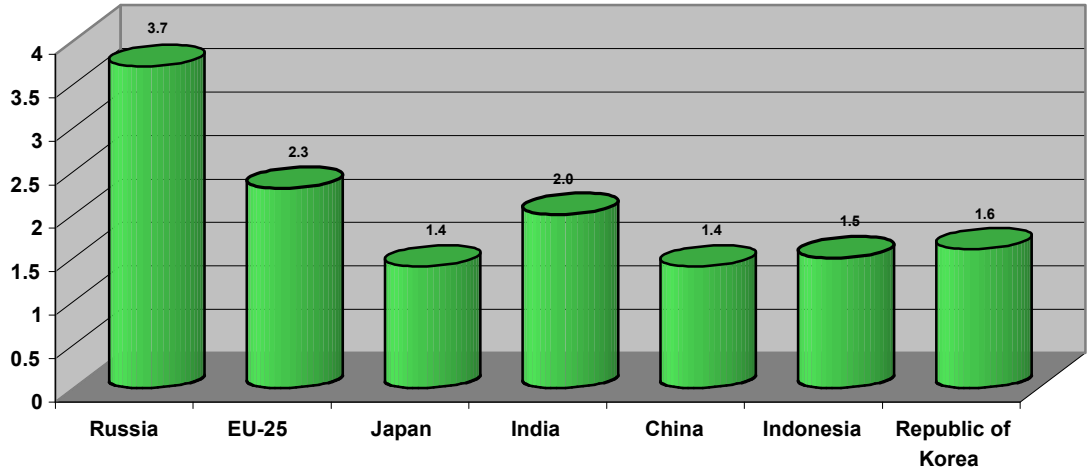
Exports and Imports

It should be noted that roughly 70 percent of world raw sugar production is consumed domestically, with the remainder traded on the world market. The major sugar exporting countries are Brazil, Thailand, Australia, the EU, and Cuba. These countries accounted for 85 percent of global exports for the period 2000 to 2004. Relatively few countries dominate world sugar exports. Imports however are less concentrated. Graph 4 indicates that the major importing countries include the Former Soviet Union (USSR), Indonesia, the United States, Japan, Korea, and Canada. Imports into these countries accounted for approximately 44 per cent of all sugar imports from 2000 to 2004. Under the Lomé Convention, the EU was required to import sugar under preferential terms from certain African, Caribbean, and Pacific countries.

Chart 3
Leading Exporters of Sugar (2004)



Graph 4
Leading Importers of sugar 2004-05



Policy and Trade Agreements

Recent Changes in the European Union (EU) Market and Policy

Perhaps one of the most important factors to affect the future of Trinidad and Tobago's refining industry will be changes in trade policy and price support from the European Union (See Appendix III for an Overview of the EU's Sugar Policy).

Key elements of recent changes in EU policy

On November 24, 2005, the EU announced key elements of its long awaited sugar reform. The main element of the reform entails a reduction in the guaranteed price for white sugar by 36 percent over four years. The price cut is staggered 20 percent in year one, 27.5 percent in year two, 35 percent in year three and 36 percent in year four. This price cut is important because it will lower the price offered for imported sugar from ACP countries, as well as reduce tariffs for imported sugar to the EU.

The plan also provides compensation to EU farmers for the reduction in white sugar prices, at an average of 64.2 percent based on the final price cut in white sugar of 36 percent in 2010/11, as well as, compensation for countries willing to give up their quotas as part of their exit strategy out of the sugar industry.

Other elements of the plan include:

- Abolition of the intervention system after a four-year phase-out period and the replacement of the intervention price by a reference price.

- Merging of Category A and B quotas into a single production quota.

- Introduction of a voluntary restructuring scheme lasting 4 years for EU sugar factories and isoglucose and insulin syrup producers, consisting of payment (which will decline by the second and third years) to encourage factory closure and renunciation of quota as well as to cope with the social and environmental impact of the restructuring process.

- Establishment of a diversification fund for member states where a quota is reduced by a minimum amount, and increased further if the quota is renounced.

- Introduction of a private storage system as a safety net in case market prices fall below the reference price.

The EU has also pledged an eight-year programme of assistance for ACP countries. The first tranche covers a total of €40 million.

Table 1 records the expected loss in revenue following the reduction in EU price support to key Caribbean countries. In the case of Trinidad and Tobago, if raw sugar production remains between 33,000 and 55,000 tonnes, cumulative revenue losses are estimated to be between US$7 to US$12 million.

Outlook on Prices

The Caribbean raw sugar price is usually considered to be the world market price for sugar. Except for years with high world market prices, there was a substantial wedge between the U.S. wholesale price of raw sugar and the world market price. Over the last decade, U.S. wholesale prices fluctuated between US$0.22 and US$0.29 per pound. World market prices ranged between US$0.06 per pound and US$0.13 per pound. **Both real Caribbean raw sugar prices and U.S. raw sugar import prices have experienced long-term downward trends.**

Table 1
Expected Loss in Revenue following EU Reduction in Price Support to Suppliers

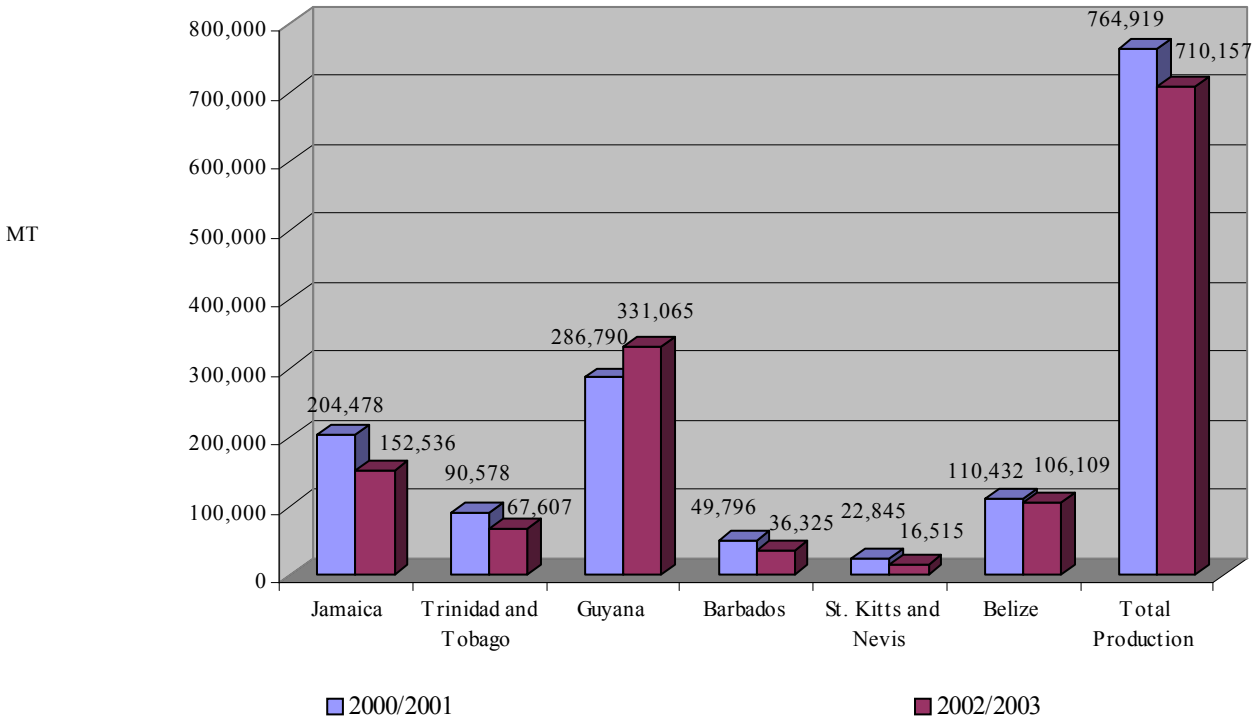
Items	2005	2006/07	2007/08	2008/09	2009/10	Total
Average Price of guaranteed price of EU sugar for 2005 (US$)	$624.36					
Price cuts		0.2	0.275	0.35	0.36	
Price reductions		$ 499.48	$452.66	$405.83	$399.59	
Production of raw sugar (Low Yield)	33,000	33,000	33,000	33,000	33,000	
Revenues	$20,603,720	$16,482,976	$14,937,697	$13,392,418	$13,186,381	
Expected loss in revenues		$ (4,120,744)	$(1,545,279)	$(1,545,279)	$(206,037)	$(7,417,339)
Production of raw sugar (High Yield)	55,000	55,000	55,000	55,000	55,000	
Revenues	$34,339,533	$27,471,626	$24,896,161	$22,320,696	$21,977,301	
		$(6,867,907)	$(2,575,465)	$(2,575,465)	$(343,395)	$(12,362,232)

The Regional Environment

In 2004, the regional production of sugar was estimated at 727,100 MT per annum. Research indicates that the largest sugar producers in the Caribbean are Guyana, Jamaica, Belize and Trinidad and Tobago (see Graph 5).

Graph 5

Annual Sugar Production in the Caribbean



Regional demand for refined sugar ranges between 180,000 and 200,000 MT. The largest sugar consuming countries in the Caribbean are Trinidad and Tobago and Jamaica.

The key markets for Caribbean raw sugar are the European Union and the United States.

Caribbean sugar producers will lose over 15 percent of their SPS entitlements to Least Developed Countries (LDC's) under the EBA (Everything But Arms) Agreement.

Recent Initiatives in the Regional Sugar Industry

Recent reports from Caribbean sugar producers note that several of them remain committed to the production of sugar. Their focus however is on developing the "sugarcane" product. This implies diversifying into as many by-products of the sugarcane value chain considered possible. Examples include bagasse, ethanol, and co-generation.

The objectives will be to:

1. Diversify into the "sugarcane" value chain, specifically for the production of:
    a. Ethanol
    b. Bagasse
    c. Co-generation where possible.
2. Increasing linkages with other industries as it becomes possible, examples include, tourism and hotels.
3. Create new cane varieties to yield greater fiber and sucrose content.
4. Increase efficiency in:
    a. Cane yields per hectare
    b. Improving sugar extraction processes
    c. Reducing mechanical downtime
5. Increasing refining capacity in key sugar producing countries to a minimum of 200,000 tonnes by 2006.
6. Developing global brands in brown sugar.

The Case of Barbados

The Barbados Sugar Industry contributes on average 1 percent to GDP and employs directly approximately 800 persons. There are approximately 23,000 acres utilized for the cultivation of sugarcane, producing approximately 38,000 tonnes of sugar in 2005, 3,800 tons more than in 2004. Barbados was one of the few countries in the Caribbean able to increase sugar production during the 2004/2005 season. The country earned about BDS$40 million from its sale of sugar to the European Union.

In spite of this, Barbados' sugar industry is one of the higher cost sugar producers in the Caribbean. Recent estimates indicate that the industry will stand to lose more than US$15

million over the four year during the period 2005/06 to 2009/10, when the price support by the European Union is reduced.

On account of these developments, the government of Barbados has unveiled plans to keep the Barbados sugar industry competitive mainly through the development of additional value added activities from the sugarcane plant.

Their plan hinges on the construction of a multipurpose facility costing US $150 million (see Appendix 4), which would facilitate the production of:

- 30 mega watts of electricity;
- 12,000 tonnes of refined sugar (for the domestic market);
- 10,000 tonnes of specialty sugar (for the export market);
- 5,000 tonnes of specialty sugar (for the local market); and
- 14 million litres of ethanol (for domestic and export market).

To support these initiatives, the Barbados Government proposed the following incentives:

- A capital injection of US$2 million to the BAMC to facilitate the various preinvestment activities
- A capital injection of US$32 million to bring an additional 8,000 acres of idle land back into production
- A capital injection of US$2 million to capitalise the Cane Replanting Incentive Scheme
- An annual amount of US$3 million will be used to provide incentives for the growing of fuel cane varieties
- An increment in payment to producers from BDS$80 to BDS$90. Approved varieties will receive a minimum payment of BDS$90

The West Indies Central Sugar Cane Breeding Station, which is also located in Barbados, has also developed a variety of cane specially suited to fuel electric power plants. The new “fuel cane” variety is 25-30 percent fiber (compared to 15 percent ordinarily realized with existing varieties), and it yields almost twice the burnable biomass per acre - about 50 tons. This new cane variety is expected to support the electricity-generating project, which would replace

roughly 13 percent of oil-fueled generation by 2008.

The Case of Jamaica, the Second Largest Sugar Producer in the Anglophone-Caribbean

Profile of the Jamaican Sugar Industry

Jamaica is the second largest sugar producer within CARICOM, producing roughly 2 million tonnes of sugarcane and approximately 184,000 tonnes of raw sugar during the 2003/2004 season, with an average tc/ts ratio of 11.

At its peak in 1996, Jamaica's sugar industry produced 239,192 tonnes of sugar.

Presently there are seven factories operating in Jamaica, with two estates privately owned. Over 4,200 hectares of land is dedicated to the production of sugarcane in Jamaica, with an expectation of increasing the acreage by 624 hectares under the Cane Farmers' Replanting Loan Programme.

On average the cost of production of the sugar cane plant in Jamaica is estimated between US$ 30 to US$38 per tonne.

Other Key Characteristics of the Jamaican Sugar Industry

The Jamaican Government has created a Sugar Industry Authority, whose main functions include:

- Monitoring
- Arbitration
- Research and development (with greater emphasis being placed on research to enhance production and productivity)
- Provision of extension services and technology transfer
- Advising on industry developments, trends and prices.

(See Appendix 3 for more information on the research conducted by the Sugar Industry Authority to develop new cane varieties.)

Recent Development in the Jamaican Sugar Industry

In October 2005, the government announced plans to resuscitate the Jamaican Sugar Industry. Their emphasis is on the production of raw sugar for domestic and export markets, molasses for rum manufacture, and ethanol as a substitute for methyl tert-butyl ether (MTBE) to be used in the local transportation sector. Presently the government has been courting partners from other major sugar producing countries namely Brazil and more recently Colombia. In the case of the former, a memorandum of understanding has already been signed to obtain technical assistance in the production of ethanol.

Some of the key challenges presently faced by Jamaican sugar farmers include:

- The shortage of sugarcane
- The high price of cane production
- Poor weather conditions
- Poor sugar recovery levels
- Inefficiency at the factory level (An average of 15% mechanical downtime at the factory).

Summary of Recent Developments at the International and Regional Levels and its Projected Impact on Caribbean Sugar Producers

- Increasing supply mainly from major sugar producers such as Brazil and India
- Increasing consumption mainly from China
- Reduction of price support from sponsor nations
- Increasing non-market support (technical assistance) from the EU for restructuring developing countries
- Shifting in global production of sugar to low cost regions
- Increasing trade of world refined sugar
- The need for greater efficiency at production, processing and in transportation.
- The need for a regional approach in the development of the industry
- The geopolitics of sugar remain that many countries continue to subsidize their farms and agriculture industries as required
- Lower long-term prices for sugar

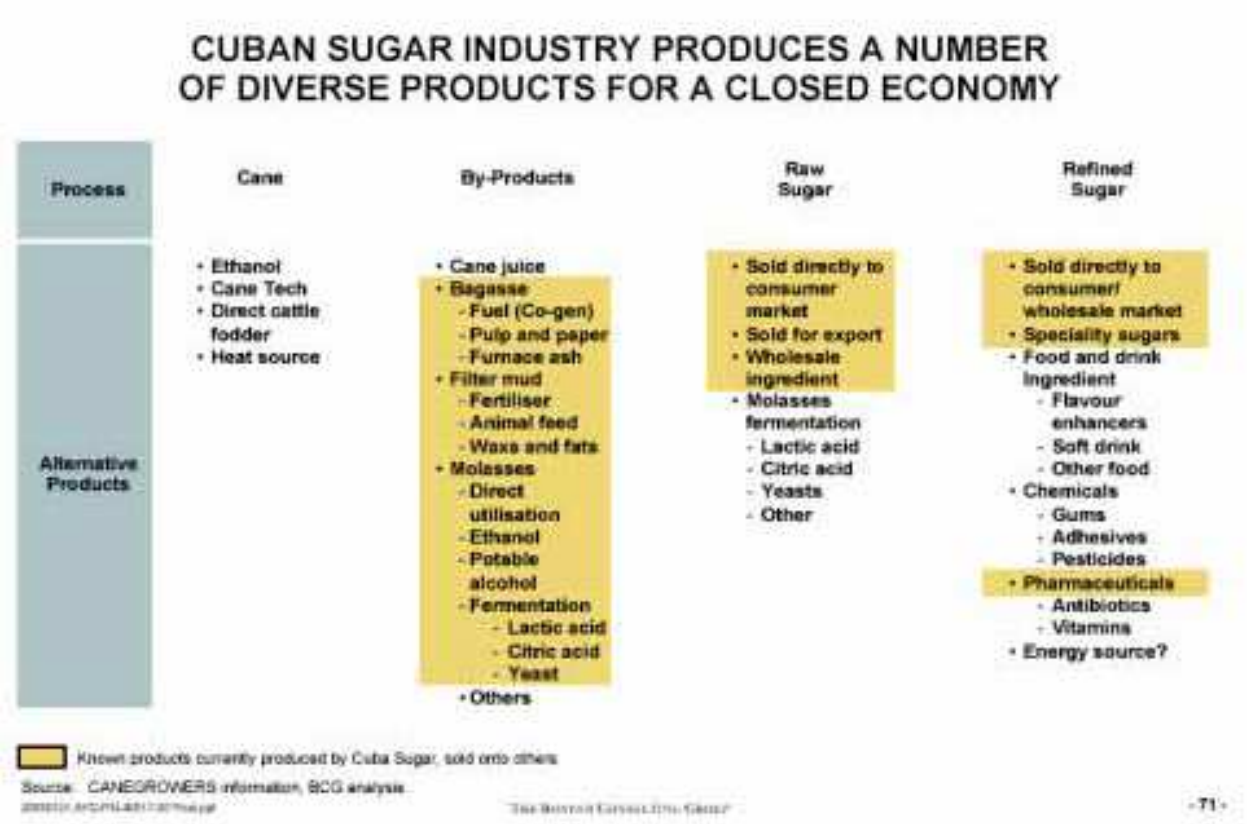
Best Practices Advocated by the Leading Producers and Refiners of Cane Sugar

The best practices advocated by the leading cost efficient sugar producers are built around three key areas: sugar production, refining and developing alternative value added products.

- Sugar Production
    a. Greater yields, as indicated in the yield per hectare through good farming practices, and strong support from agricultural extension services
    b. Modernization and mechanization at the harvesting level to lower harvesting costs
    c. Greater efficiency in transportation to mills
    d. Innovation - Development of high quality cane varieties in terms of sucrose and fiber content
    e. Effective organization of farmers and other key stakeholders through representation, technical and financial assistance
- Sugar Refining
    a. Mechanical reliability and processing efficiency at the factory level achieved through periodic technological upgrades
    b. Some technical performance measures include:
        i. Factory recovery rate
        ii. Sugar produced per ton
    c. Management, market development and technical research and development capability
- Development of alternative value added products produced from sugarcane include:
    a. Ethanol
    b. Bagasse
    c. Liquid Sugar
    d. Diet Sugar
    e. Co-generation.

(See Chart 1 for a list of by-products derived from sugar)

Chart 1


CUBAN SUGAR INDUSTRY PRODUCES A NUMBER OF DIVERSE PRODUCTS FOR A CLOSED ECONOMY
Process
Cane
By-Products
Raw Sugar
Refined Sugar
Alternative Products
• Ethanol
• Cane Tech
• Direct cattle fodder
• Heat source
• Cane juice
• Bagasse
- Fuel (Co-gen)
- Pulp and paper
- Furnace ash
• Filter mud
- Fertiliser
- Animal feed
- Waxs and fats
• Molasses
- Direct utilisation
- Ethanol
- Potable alcohol
- Fermentation
- Lactic acid
- Citric acid
- Yeast
• Others
• Sold directly to consumer market
• Sold for export
• Wholesale ingredient
• Molasses fermentation
- Lactic acid
- Citric acid
- Yeasts
- Other
• Sold directly to consumer/ wholesale market
• Speciality sugars
• Food and drink ingredient
- Flavour enhancers
- Soft drink
- Other food
• Chemicals
- Gums
- Adhesives
- Pesticides
• Pharmaceuticals
- Antibiotics
- Vitamins
• Energy source?
Known products currently produced by Cuba Sugar, sold onto others
Source: CANEGROWERS information, BCG analysis
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Criteria to Compete in a More Liberalized Global Trading Environment at the Refining Level

The purpose of this section is to identify the conditions considered necessary to be globally competitive at the refining level in a more liberalized global market. As observed, these conditions have gradually developed in some countries; in others, they have developed with surprising rapidity. Research indicates that the leading refiners in the global sugar market are primarily located in Brazil and Australia. The conditions enhancing their competitiveness in trade include:

1. A reduction in the cost of refining raw cane sugar
2. Availability and access to a steady supply of raw sugar
3 Refineries are modern and effectively managed giving rise to efficiency in production
4 Refiners produce and export a diverse number of sugar products
5 Well articulated political commitments to stimulate production and trade

1 REDUCTION IN THE COST OF REFINING CANE SUGAR

The main ingredient in the production of refined cane sugar is raw sugar. The cost[1] of this critical input significantly impacts the unit production cost of refined sugars. In a recent study dated August 2005, the Economic Research Service (ERS) of the United States Department of Agriculture (USDA) calculated the world average cost of raw cane sugar at 12 cents per pound. According to the USDA and LMC International, the cost of converting this raw cane sugar into a refined state is equal to 12.06 cents per pound. Comparing the world average cost of refined sugar against the costs incurred by individual producers suggests that at the world market level, the conversion of raw cane sugar to a refined state is actually less than 22 percent of the calculated unit costs of raw cane sugar currently being produced by one of the least competitive countries in the global sugar industry (See Graph 6 for an illustration).

Some analysts would argue that owing to domestic sugar policies (trade barriers and price support systems), the true economic cost of producing raw cane sugar becomes so distorted that a

[1] All costs are given in US currency

refined equivalent cannot be accurately calculated. Research shows that while this may hold true for some producers (an exception to this is Brazil), the range in unit costs of production for raw cane sugar among sugar producing countries is so significant that a clear distinction can be made between the most and the least cost competitive producers in the global sugar industry. Graph 6 illustrates not only the range in unit costs; moreover, the data intimates that the leading cost-competitive countries are operating at raw production costs that are significantly lower than the calculated world average unit cost.

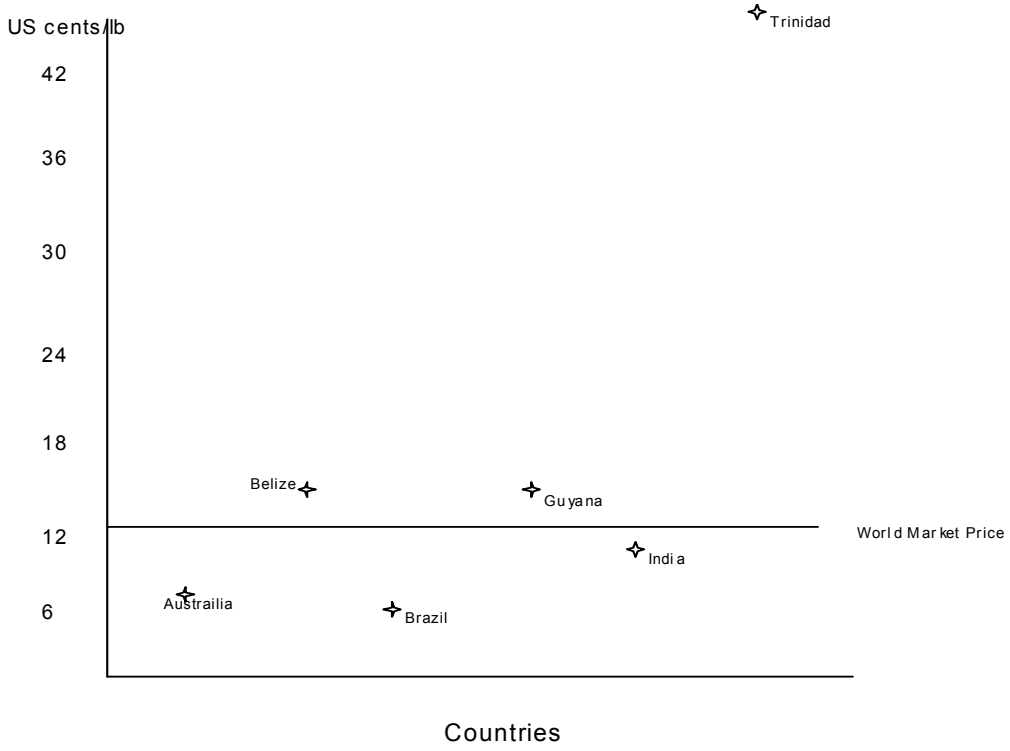
Brazil and more specifically, its Center/South region ranks as the number one cost-efficient producer of raw cane sugar currently processing this commodity at 5 to 5.5 cents per pound. As observed this current cost is a marked improvement for Brazil given that in 1997/98 to 2001/02; the average costs for raw cane sugar fluctuated between 7-8 cents per pound at the mills. Not far behind, Australia produces raw cane sugar at an estimated 6.5 cents per pound. India falls into third position producing a specific strain of raw cane sugar known as 'plantation white cane sugar[2] at 8 cents per pound. Plantation white is considered a natural alternative to refined sugar.

As previously mentioned, the range in unit costs is so significant that it is easy to identify who are the most and the least competitive producers and by extension refiners in the global sugar industry. Several studies have identified Trinidad and Tobago (T&T) as one of the least cost-efficient producers of sugar ranking twelfth amongst the sixteen ACP sugar producing states. In its raw form, T&T produces sugar at 56.40 cents per pound (this is the price cited in a 2005 study conducted by Kairi Consultants Limited). Calculating a refined equivalent proves to be somewhat challenging for unlike Brazil and Australia, Trinidad does not refine the raw sugar it produces; instead, this country imports raw sugar for refining purposes. The bulk of T&T's raw sugar is exported to meet EU quota requirements. On account of this arrangement, when calculating T&T's refining cost, additional variables must be considered. These include a substantial C.I.F price on imported sugar, cargo and handling costs, transportation costs to the warehouse as well as, to the refinery (see specimen of Trinidad's Refinery Production Cost Structure in Appendix I).

[2] Plantation white sugar is produced at the factory without remelting and refining processes. Instead, sulphur dioxide gas is injected into the extracted cane juice bleaching juice colorants which oxidize to form sulphate and sugar.

Graph 6

Unit Production Costs Versus the Average World Market Cost of Raw Cane Sugar



Sources: The unit cost for Trinidad and Tobago is taken from a 2005 study prepared by Kairi Consultants Ltd., the unit costs quoted for Australia, Belize, Brazil, Guyana and India are taken from a 2005 study entitled "Caribbean Options for the Treatment of Sugar in the Context of the Caribbean/EU Economic Partnership Agreement Negotiations." The world market price is taken from a USDA report.

2 AVAILABILITY & ACCESS TO A STEADY SUPPLY OF RAW SUGAR

Several studies show that the leading cost competitive refiners operate with easy access to a steady supply of raw cane sugar. While gaining access is important, the availability of raw sugar in large quantities for refining purposes is crucial if refineries are to meet their domestic and export commitments. A steady supply of raw sugar is made possible owing to the efficient coordination between sugar cane production (from planting to harvesting) and large-scale centrifugal processing conducted at the sugar mills. Likewise, the efficient operation of a centrifugal mill requires a steady supply of a large amount of sugar-cane overtime. The smooth and continuous flow of operations at the fields and in the mills is so important; to exemplify this, highlights are given of Brazil's sugar industry.

According to Graph 7, for more than a decade Brazil has been experiencing increases in sugarcane production. For the current crop year 2004/05 Brazil produced 28.2 million tonnes of

raw sugar and exported 17.8 million tonnes. Brazil has two distinct sugar producing regions – as previously mentioned the Center-South and the North-Northeast which allows two harvest periods. For the Center-South, cane harvesting begins in May and ends in November. In the North-Northeast, the harvest season runs from September to April. In essence, sugarcane production takes place in Brazil the whole year through. As with most cane varieties, when planted for the first time, sugarcane takes one year to one year and a half to be ready for harvesting. The same plantations can be harvested up to five (5) times with substantial investments being made in each cycle to maintain productivity. Over 80 percent of the cane harvested in Brazil is cut manually. Mechanization is advancing but at a slow pace on the flat fertile soils of the Center-South. Hilly terrain and poorer soils in the North-Northeast make mechanized harvesting impracticable. To facilitate large-scale operations, trucks work day and night transporting sugarcane from the fields directly to the mills.

In Brazil, there are at minimum 153 mills extracting raw sugar from the sugarcane stalks. Access is easy as mills are located within close proximity to the fields. These units are linked to each other via the installation of paved feeder roads. Milling machinery is modern and efficient with very minimal downtime experienced in operations. Milling is strictly a volumetric process and the volume of juice extracted depends on the quality of cane. Cane quality is a critical factor in determining the amount of sugar to be recovered from ground cane. If a cane is high in fiber and other matter, it becomes difficult to extract sugar. One study reports that Brazilian cane holds about seven (7) parts of juice to one (1) part of fiber. Therefore extraction of the sucrose content is relatively easy. Brazilian mills generally have a long production season operating from April to December. This situation enhances the ability of Brazilian mills to produce raw sugar at high output levels. By way of example, in the Center-South region the largest operating sugar mill is the 'Barra Grande' mill. With modifications, this mill has improved its operations grinding for the last season 3,500,000 tonnes of cane. From this tonnage, the Barra Grande produced 200,000 tons of sugar and 180,000 m^3 of alcohol.

Table 2 notes that Brazil has indeed increased its sugarcane production levels. Between 1990-2003, Brazilian sugarcane supplies rose by 48.44 percent. Average yields have also increased from 61.47 tonnes per hectare recorded in 1990 to 72.98 tonnes recorded in 2003. The North-Northeast accounts for less than 20 percent of Brazil's sugarcane production and 25-30 percent of sugar output. Meanwhile the Center-South region produces the remaining 75-80 percent of

sugarcane and 60-65 percent of raw sugar output. Albeit the Center-South is the larger producer of cane and raw sugar, it is the North-Northeast, which accounts for 70-75 percent of Brazil's sugar exports. Beyond this, raw sugar supplies are transported in most cases to refineries located within close proximity to the mills.

Table 2

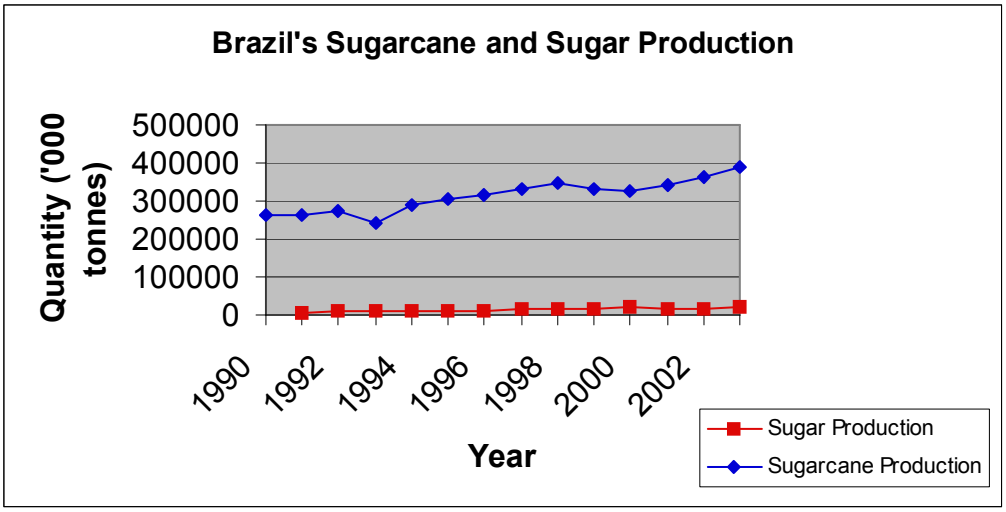
Total Sugarcane Production for the Five (5) Major Sugar Producing States in Brazil: São Paulo, Paraná, Alagoas, Minas Gerais and Pernambuco

Year	Sugarcane Production (' 000 tonnes)	Harvested Area (' 000 ha)	Average yield (kg/ha)
1990	262,674	4,273	61,479
1991	260,888	4,211	61,955
1992	271,475	4,203	64,597
1993	244,531	3,864	63,289
1994	292,102	4,345	67,223
1995	303,699	4,559	66,614
1996	317,106	4,750	66,755
1997	331,613	4,814	68,884
1998	345,255	4,986	69,247
1999	333,848	4,899	68,148
2000	326,121	4,805	67,878
2001	344,293	4,958	69,443
2002	364,391	5,158*	71,410*
2003	389,929	5,343	72,981

*Figures were averaged based on two different sources of data.

Original sources: IBGE – PAM (1990-2002) and LSPA (12/2003) combined with FAO website – fertilizer use of crop in Brazil. ANDA, 2003

Graph 7



Australia has experienced mixed results in sugarcane production. For the crop year 2004/05, Australia produced 5.3 million tonnes of raw sugar and exported around 80 percent of total production. Nonetheless, according to the data given in Table 3 and Graph 7, Australia's sugarcane production levels have fluctuated. Largely owing to seasonal factors, production levels for the year 2000 fell by 25 percent. This appears to be an isolated incident for in subsequent years, sugar production levels soared. Unlike Brazil, refineries access their needed supplies of raw sugar mainly from bulk sugar terminals[3] servicing particular mills.

Table 3

Sugar Statistics for Queensland: the Main Sugar Producing Region in Australia

Year	Area harvested for milling ('000 hectares)	Cane crushed ('000 tonnes)	Sugar Produced ('000 tonnes IPS)	Tonnes of cane per hectare harvested	Tonnes Cane per Tonne IPS sugar	Tonnes IPS sugar Hectare harvested	Commercial Cane Sugar (CCS)
1999	421.368	36945.37	5074.961	87.68	7.28	12.04	13.49
2000	424.350	28781.83	3794.263	67.83	7.59	8.94	13.46
2001	419.582	29843.90	4286.694	71.13	6.96	10.22	14.34
2002	416.468	35166.98	5133.047	84.44	6.85	12.33	14.29
2003	407.597	34111.59	4848.876	83.69	7.03	11.90	13.93
2004	396.555	34673.06	5050.06	87.44	6.87	12.73	14.20

Source: Australian Sugar Milling Council's Annual Report 20

[3] Bulk sugar terminals play a vital role in examining the quality of raw sugar. All raw sugar is sampled and analysed as part of a comprehensive quality assurance program both on arrival at the terminal and again, as it is loaded on ships destined for export or refineries.

Graph 8

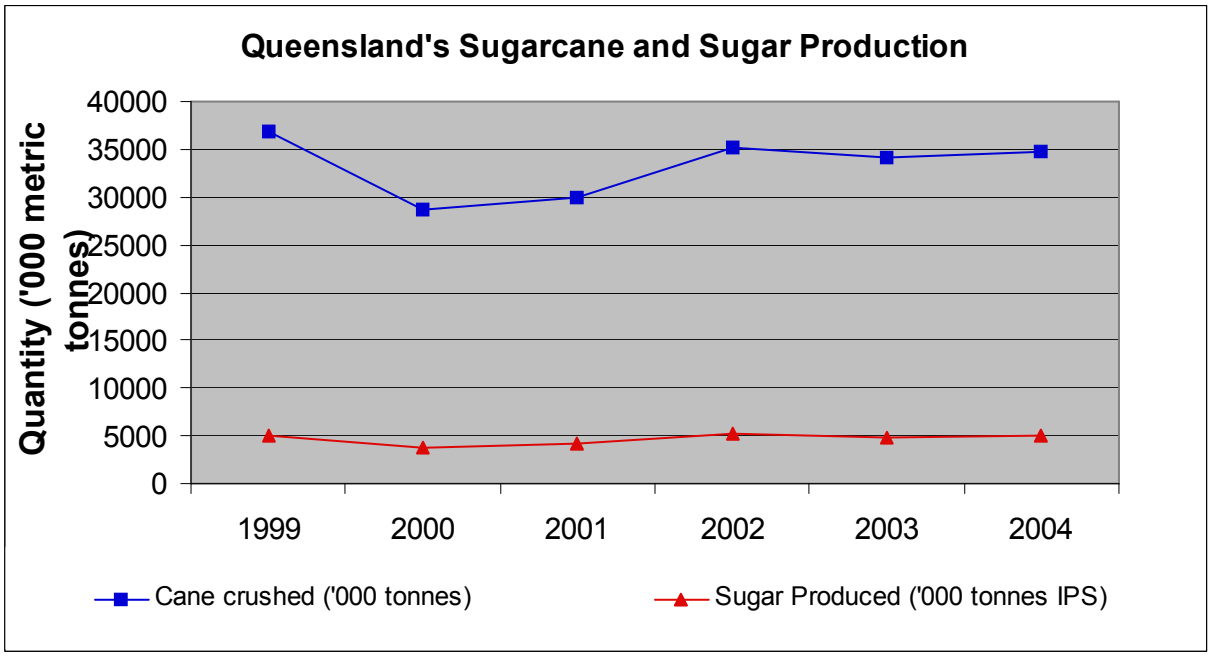


Table 4

India's Sugar Statistics

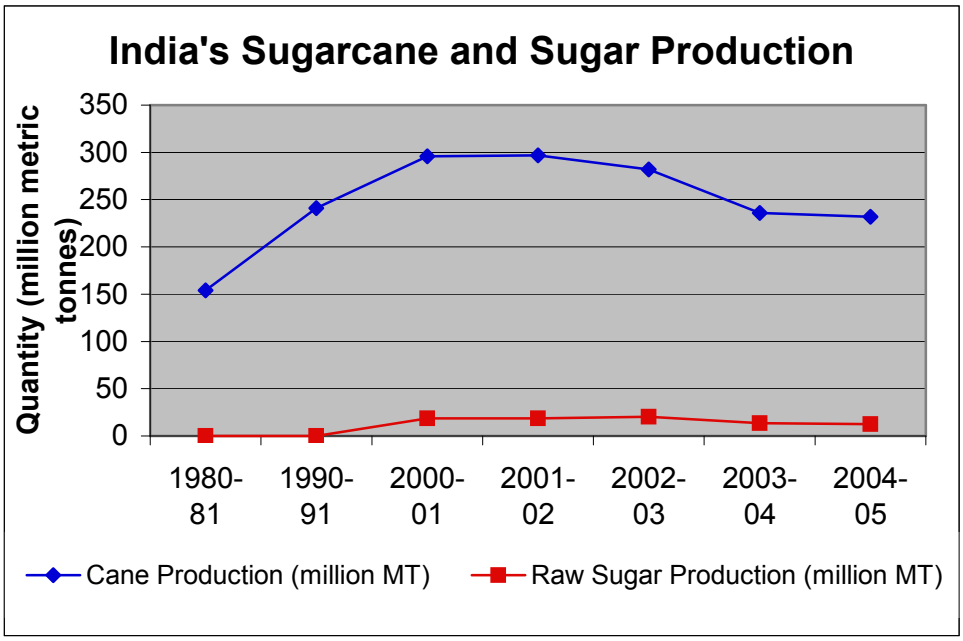
Year	Area under cane cultivation (Million hectares)	Cane Production (Million metric tonnes)	*Raw Sugar Production (Million Tonnes)
1980-81	2.67	154	N/A
1990-91	3.69	241	N/A
2000-01	4.32	296	18.51
2001-02	4.41	297	18.53
2002-03	4.36	282	20.15
2003-04	3.99	236	13.56
2004-05	4.20	232	12.46

Source: ISO Yearbook

* Raw Sugar Production Figures are sourced from the Indian Sugar Exim Corporation (ISEC)

India is a unique case. This country ranks as the second largest producer of raw sugar with production levels estimated at 12.46 million tonnes (see Table 4). Since 2002- 2005, cane production levels have fallen and this situation is depicted in Graph 9.

Graph 9



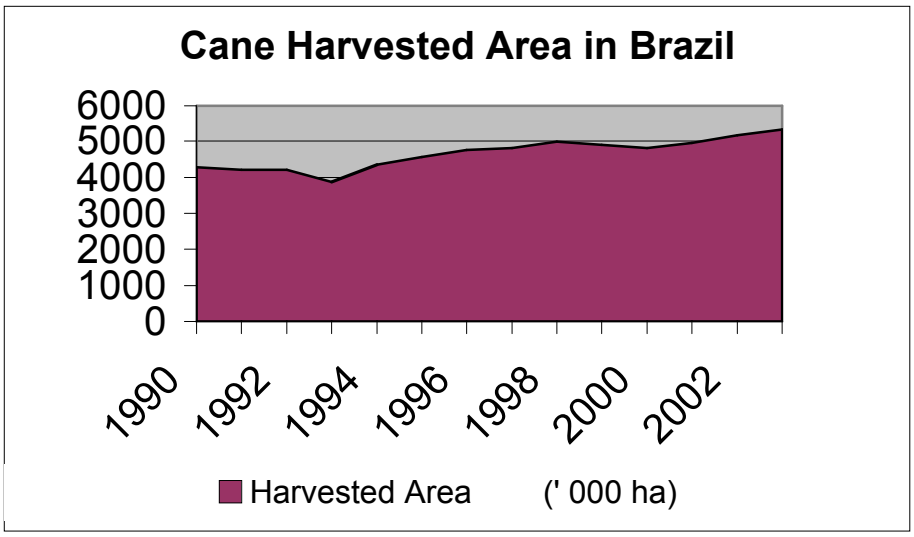
Unlike Brazil and Australia, India is not a leading exporter. In fact, this country consumes most of the raw sugar it produces. Raw sugar exports are very small and they are produced to meet specific export requirements to the EU and the USA. According to ISEC, the total quantity exported is around 18,500 metric tonnes per annum. Despite a decline in production levels due to seasonal factors, research indicates that India along with Brazil and Australia enjoy a comparative advantage in the production of raw cane sugar on account of several factors operating in their favour:

- An abundance of land available for sugar cane cultivation
- Access to an unlimited and relatively cheap supply of labour
- Economies of scale on very large estates
- The development and adoption of bio-technology - the diffusion of high yielding varieties of cane and related inputs
- Substantial investments in infrastructural support

2.1 LAND AVAILABILITY

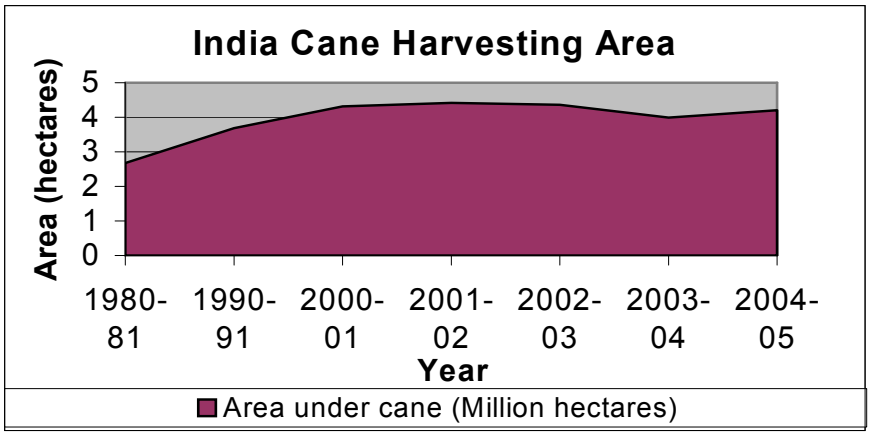
Characteristic of the leading producers of raw sugar is the abundance of land available for sugarcane cultivation. Brazil's Center-South region has some of the best cane growing lands in terms of soil, topography and climate. As a result, this region has some of the lowest production costs in the world. This natural competitive advantage is compounded by the very large size of cane farms, efficient farming practices, long harvest seasons and large and efficient mills. One study affirms that the land committed to sugarcane plantings particularly in the Center-South region offers the possibility of doubling its current acreage under cane cultivation. To date, there is no indication to suggest that Brazil's expansion will slow. According to Brazil's Ministry of Agriculture, approximately 320 million hectares of land has been earmarked as suitable for agricultural farming. Currently, 53 million hectares support agricultural activities. Out of this total, sugarcane growing accounts for only 5.6 million hectares (that is 11 times the geographical size of Trinidad) see Graph 10, less than 10 percent of the acreage under crop cultivation and still less than 2 percent of the total acreage deemed suitable for agricultural production.

Graph 10



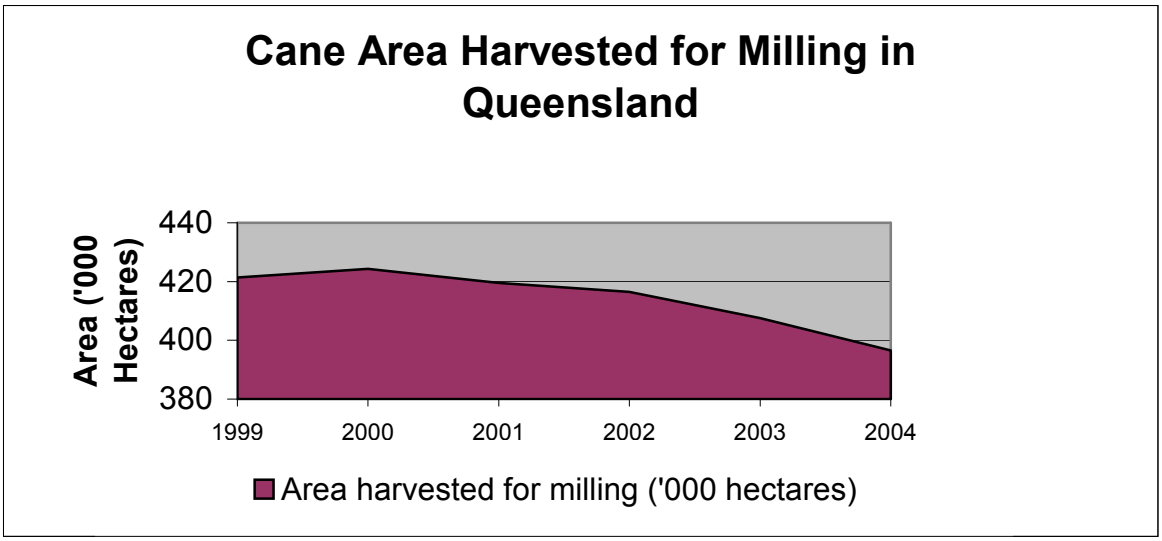
A similar setting exists in India whereby an estimated 171.6 million hectares of land is available for crop cultivation. Of this total, 141.1 million hectares is already committed to agricultural farming. Sugarcane plantings cultivated throughout rural India account for 4.2 million hectares, which is about 3 percent of the land already dedicated to agricultural activities and 2.45 percent of the total land coverage available for crop cultivation.

Graph 11



According to Graph 12, the amount of land committed to cane farming in Queensland, Australia has declined at a steady rate over the years. Today approximately 434,150 hectares of land are devoted to sugarcane growing in Australia, which comprises 396,555 hectares in Queensland (the main sugar cane producing belt in Australia), 34,295 hectares in New South Wales and about 3,300 hectares in Western Australia. Knowing exactly how much more land can be brought under cane cultivation has not been revealed to date. As noted in this study in comparison to Brazil and India, the tonnage of sugar recovered from cane in Australia has increased. Improved yields in this case have been achieved following the introduction of improved varieties of cane.

Graph 12



2.2 AN UNLIMITED SUPPLY OF CHEAP LABOUR

For most of the cost-competitive producers of raw sugar, the efficiency and low costs of sugar production find an explanation in the unlimited supply of cheap (and particularly in the case of Brazil exploited) labour. For all three leading competitors, the sugar industry is one of the leading generators of employment in rural districts. According to the Sao Paulo Sugarcane Agro-Industry Union, the sugarcane agro-industry employs 1 million Brazilians. Politically powerful families and or large cooperatives hire the majority of labourers for work in the fields. Supply of labour is unlimited because there are few economic alternatives to sugarcane farming in these cane-growing areas of Brazil. Accompanying this excess in supply is a high incidence of exploitation of workers. Several studies tell of the meagre earnings and the unsafe as well as, unhealthy environments cane cutters are coerced to work in. To drive home this point one study notes that 15 years ago in the sugar producing state of Sao Paulo, field workers were required to cut 4.5 tons of cane daily to earn a day's pay; at present no company hires workers reluctant to cut at least 9 to 10 tons of cane per day. In fact, this idea of adult exploitation extends itself to the exploitation of children. One study claims that 60,000 children aged 7-13 years are working in the cane fields in the northeastern states of Brazil. These children work for more than 44 hours a week. Child labour is frequently required to assist parents in reaching the tonnage needed to earn a day's salary. The work is extremely laborious and given the surmounting occupational and health hazards, the demographics illustrate that there are virtually no cane cutters over the age of 40 years in Brazil.

Current data on India's situation tells that while this country also shares some common characteristics with Brazil, theirs is a very different story. In other words, a significant number of rural Indians approximately 50 million sugarcane farmers and 2 million indirect workers are involved in the growing and processing of sugarcane. Of this known population, there is a mix of adults and children hired seasonally to work in the fields. Unlike Brazil where farms are primarily owned by large corporations and wealthy families, farms in India are the prized possessions of small peasant farmers. Many of these small-scale holders in turn hire migrant landless labourers to work their fields. A recent study conducted in the province of Maharashtra (India's largest sugar-producing state) reports that contracted small-scale farmers as well as their hired hands are heavily exploited. Small-scale farmers are drowning in debt owing to their continuous borrowing from moneylenders and the inadequate remunerations if any are received for their cut cane. At the end of an 18-month crop period, a farmer's net income is US$109 per

acre estimated at US$6.00 a month. This price paid to these growers is actually below the minimum wage established by the central government at US$15.1 per tonne of cane.

Most Australian sugarcane is grown on family-owned and operated farms. In Queensland alone, the raw sugar industry directly employs approximately 17,000 people in the growing, milling, storage, marketing and refining of raw sugar. Unlike Brazil and India, all sugarcane grown in Australia is harvested mechanically by self-propelled harvesting machines. Australia pioneered mechanical cane harvesters and achieved 100 percent conversion to mechanical harvesting in 1979. In areas of north Queensland and northern New South Wales where heavy rainfall frequently interferes with harvesting, special wet weather harvesting equipment has been developed including tracked harvesters and high flotation field transportation (haulouts).

2.3 ECONOMIES OF SCALE ON VERY LARGE ESTATES

In agriculture, there are only a few crops capable of generating sufficiently strong scale economies to justify the installation of the plantation system[1]. Several studies indicate that sugarcane is a classic case of a plantation crop that yields strong scale economies particularly at the mill processing and marketing phases. The sugar industry in Brazil is characterized by the coexistence of plantations, large estates (the latifundios) with several small farms (minifundios). Size in this case is indeed a relative term. In Brazil farms possessing less than 100 hectares are categorized as part of the minifundio system, and account for 14 percent of total sugarcane production. Large-scale operators unlike their small-scale counterparts have ready access to physical and financial capital, which affords them the opportunity to (1) purchase state of the art equipment to increase production and productivity levels (2) open up more fertile lands to cane cultivation (3) improve the soil content carried by non-fertile, marginal soils (4) purchase improved varieties of cane and related inputs that offer greater yields per acre (5) hire consultants to install all possible technological and operational advancements on their farms (6) improve the coordination between harvesting and processing. The harvesting and processing of sugarcane has to be well coordinated for the rate of sugar extraction decreases as the processing of cane is delayed. If cut cane is left unprocessed for more than 12 hours, biological decomposition sets in. When sugar is lost to fermentation, the sucrose content extracted from the cane is reduced.

[1] In this report, the term 'plantation' refers to large farms that can be operated by permanent and semi-permanent paid workers.

Management, like a machine is an indivisible input. The need for good management also gives rise to economies of scale. In Brazil, plantations owned by elite powerful families - the Omettos, the Junqueiras, the Balbos, the Zillos or the Biagi brothers operate in a very business-like manner under the direction of a single manager whose responsibility includes running both the farm and the factory. As observed, under this system, a manager normally has a greater capacity to increase sugar output levels at reduced unit costs when decisions regarding the tradeoffs between the costs of growing cane and the cost of processing it, the establishment of auxiliary facilities and the economic utilization of by-products to generate renewable energy resources are solely made by this centralized decision-making body.

In Australia the number of small-scale farms outweigh the number of large-scale farms nonetheless like Brazil, the bulk of sugarcane output comes from large-scale farm operations. Under a system of contract farming, both large-scale and small-scale growers are awarded contracts outlining the time and quota for cane delivery. While there are several arguments to support the efficiency of these small-scale farms versus their large-scale counterparts, small farms engaged in sugarcane cultivation though efficient are constrained in so far as they can only produce at output levels facilitated by their limited resources.

As previously mentioned, most Australian sugarcane farms large or small in size are family-owned and operated holdings. As in all agricultural industries Australia's family-owned farms continue to experience a progressive increase in their sizes. This increase has been achieved through a greater concentration of farm ownership and the progressive expansion of sugarcane growing areas. Increasing the size of family operated farms assists to achieve economies of capital and labour use thus promoting a low cost industry. In 1980 the average size of a cane farm was 49.8 hectares, by 1996 it was 70 hectares. Today the bulk of cane harvested is being produced by growers operating on farms with an estimated average size of 101 hectares. A recent study conducted by the Mackay Regional Advisory Group in Australia reports that out of a total of 1,170 cane growers, 42 percent were operating as small-scale growers harvesting no more than 5,000 tonnes of cane each season. Collectively their contribution amounted to no more than 19 percent of the total tonnage of cane harvested for the crop year 2004. The study further noted that the viability for small-scale growers to be solely reliant on sugarcane was unrealistic. At their scale of production, returns from cane alone are insufficient and inadequate in providing a return to the capital small-scale growers have invested in their farms. If they are to exist in the

industry, their continuance must be shored up with government and agribusiness assistance.

In India a similar setting arises whereby small-scale cane growers though under contract with sugar mill operators find themselves unsustainable in the sugar industry. Oftentimes, owing to limited access to credit, these growers become increasingly indebted to moneylenders in their respective regions. Several studies reveal that while some growers seek to exit the industry and diversify into other crops more suitable for cultivation on small plots, others who believe that sugarcane growing is an integral part of their survival have decided to remain in the industry and supplement their incomes with other farm and non-farm activities. Certainly the experiences of small-scale cane growers in Australia and India reiterate a very important point namely that in order to generate sufficient scale economies, sugarcane is one of those crops best suited for cultivation on large-scale plots of an estimated size no less than 100 hectares.

2.4 THE DEVELOPMENT AND ADOPTION OF BIOTECHNOLOGY

To support modern sugar industries countries like Brazil, Australia and India have made significant strides in science and technology, research and development focusing more specifically on the genetic sequencing of sugarcane. Via biotechnology, several characteristics are being inserted into sugarcane plant genetics enabling varieties to have a greater sucrose content, increased physical yields per acre, a greater resistance to pests and diseases, an improved adaptation to producer countries' climates and soils and more suitability for mechanical cutting processes. Brazil appears to be the pioneer in this regard with the Cane Genome Project, a collective effort initiated in 1999 by the Sao Paulo State Foundation for Research Support, the universities and the Technology Center of Copersucar (the largest sales cooperative in Brazil' sugar and alcohol industry). To date the results realised from this ongoing project are spectacular. The primary focus of the Cane Genome Project was to determine the sequence of about 50,000 genes. To date, 292,000 sequences have been decoded and 43,000 genes identified all for the sake of increasing per-hectare yields and improving the sucrose content[5]. The use of improved varieties has contributed to an increment in the productivity of cane grown. By way of example for the crop season 2002, the state of Sao Paulo, which is responsible for more than 60 percent of Brazilian sugarcane production, experienced yields

[5] The sucrose content also known as the percent sugar recovery or the CCS (Commercial Cane Sugar) is an estimate expressed as a percentage based on an empirical formula of pure sugar recoverable from cane.

averaging 80 tonnes per hectare in a five cut cycle. Two years later, productivity and sugar recovery levels grew with yields averaging 85 tonnes per hectare in a five-six cut cycle.

Like Brazil, for the past 69 years, India has been traveling down a similar path continuously developing new and improved varieties of sugarcane for cultivation. India has chains of research farms for developing high yielding varieties of cane. Some of the sugarcane institutes have been divided into sections that specifically deal with crop improvement (plant breeding, genetics and cytogenetics) while others deal with crop production (plant physiology, soil chemistry, fertility and microbiology, agricultural chemistry and agronomy) as well as, crop protection (plant pathology, agricultural entomology and nematology). In Maharashtra, the largest sugar producing state in India, sugarcane research is carried out mainly at Padegaon, near Neera in Pune District. According to one study, this research station has evolved thirteen (13) new varieties of sugarcane. As observed the yields per hectare and the sugar recovery vary from one variety to another. Upon analysing the raw data, these varieties yield between 106 and 159 metric tonnes of cane per hectare with CCS levels ranging between 12.3 and 14.2 percent.

In Australia, the Bureau of Sugar Experiment Stations (BSES) conducts extensive research and each season approves the varieties of sugarcane that can be planted and ratooned in each mill area. All potential new varieties of sugarcane are subjected to rigorous research and evaluation to ascertain: productivity potential, sugar content, resistance to the major pests and diseases, soil preferences, growing habits, suitability for milling and harvesting and effects on sugar quality. After ten (10) years of evaluation, a new variety of sugarcane is released for propagation and placed on an Approved Varieties List for farmers to grow. At present 70 different cane varieties are approved for growing in Australia. Advanced farming practices and new varieties of cane have enabled the Australian sugar industry to more than double its productivity. In the 1930s, the average yield of cane was 40 tonnes per hectare, which produced five tonnes of raw sugar. Today a hectare of land in Australia typically yields between 80 to 100 tonnes of cane from which 10-15 tonnes of raw sugar is produced (See Table 3). These findings are quite favourable when compared with the yields per hectare given for one of the least cost-efficient producers namely Trinidad and Tobago with an average yield of 15 tonnes of cane per acre reported for the crop year 2005.

2.5 SUBSTANTIAL INVESTMENTS IN INFRASTRUCTURAL SUPPORT

Whether operations are occurring in the fields, at the mills, in the bulk terminals, at the refineries or even at the experimental stations, Brazil and Australia's sugar industries have installed the necessary infrastructural support to perform efficiently. In Brazil, cut cane is transported from the fields to the mills and in raw sugar form on to the refineries via a network of roads feeding one operation into the other. In Australia, fields are connected to the mills via the railway system. In the latter's case, most raw sugar is then transported from the sugar mill to the bulk sugar terminal, which services that particular mill area either, by road, by Queensland Government railways, or mill-owned railway systems.

Research indicates that Brazil has more than 80 plantations servicing more than 153 sugar mills. The scope of operations is so great that satellites have been installed to monitor farm operations as well as, tractors at work in large fields working on an expanse more than 100 hectares in acreage. In addition, electronically controlled fertilizer machines and precision harvesters are also in full use. Australia's field operations do not require satellite monitoring, but rely on mechanical harvesters to cut cane. As previously mentioned, in 1979 Australia achieved 100 percent conversion to mechanical harvesting of cane. For both countries, rural electrification is present as work takes places during the day and at night.

In Brazil, raw sugar required for refining purposes is taken directly from the mill to the refinery. This is not the case in Australia whereby most raw sugar is transported from the sugar mill to the bulk sugar terminal, which services that particular mill area by road or rail. As noted, bulk terminals play a vital role in maintaining the industry's reputation as a supplier of a high quality of raw sugar. On arrival at the terminal, all raw sugar is sampled and analysed as part of a comprehensive quality assurance program. To minimize distribution costs, a computer in the terminal receive-control room identifies vehicles entering that station and processes information, which specifies the quality and quantity of raw cane sugar from each mill. The raw sugar is moved via a conveyor belt from the receiving station up to and along the apex of the storage shed where it is then dropped creating huge stacks of sugar. Different brands of raw sugar are selectively stored in each shed. This allows ships to load from particular stacks to meet the specific requirements of both domes as well export customers. When required for shipment, the raw sugar is fed by large front-end loaders through hoppers onto conveyor belts. The sugar is automatically weighed and sampled again. Ships then take the raw sugar to both domestic and

overseas customer refineries where it is usually unloaded by grabs onto conveyors for weighing at automatic weighers. At the refinery the raw sugar is then moved to bulk storage where it is held for refining.

The long coastline of Brazil has many seaports, which provide outlets for the supply of raw sugar to refineries and to export markets. To enhance its export capability, Brazil has improved its transportation and loading facilities. In 1999, four (4) automated sugar terminals began operating in the southern port of Santos, facilitating a smoother and a faster flow of Brazilian sugar exports reducing the overall operating costs for sugar exporters. Over the years some studies note that to reduce operating costs, some mills and refineries have strategically located themselves within closer proximity to sugarcane fields. Needless to say, costs are reduced if natural gas is not consumed but in its place renewable energy from the sugar efficiency chain is used. An example of this is the "Barra Grande" mill the largest sugar factory in Brazil. As indicated, the movement of cane from the field to this factory is a 24-hour operation made possible by rural electrification. Unlike Australia in Brazil the privatisation of various highways, port facilities and railroads exclusively committed to the sugar industry have improved Brazil's transportation and export infrastructure and resulted in reduced costs and shorter delivery times of sugar to refineries and world markets.

3. REFINERIES ARE MODERN AND EFFECTIVELY MANAGED GIVING RISE TO EFFICIENCY IN PRODUCTION

In the global sugar market, Brazil and Australia are the leading refiners processing raw sugar into a high quality food or ingredient for export. With regards to their structure, 'big business' owns and operates virtually all the sugar refineries in the Northeast, Center-South and Southern regions of Brazil. In 2005, the big four in the sugar and alcohol industry were: COSAN S.A. (owns 12 mills, 3 sugar refineries and one export terminal. All facilities are in the State of Sao Paulo with the exception of one small sugar refinery located in the southern State of Santa Catarina), COPERSUCAR (sales cooperative formed by an association of 29 Sao Paulo sugar mills, owns several refineries and one port terminal), CRYSTALSEV (sales company for 9 mills, owns an undisclosed number of refineries and together with Cargill of the U.S. owns and operates 3 port terminals), and lastly, NOVA AMERICA (a production and sales group which owns 2 sugar mills, a trading company, refineries and a port terminal). Not included in the group of four but also functioning on a relatively smaller scale is the company AGROVALE situated in

Bahia and the French cooperative group called Union SDA which in 2005 acquired two Brazilian sugar refineries UNIVALEM and GASA located in the northwest region of Brazil. According to a recent study, UNIVALEM sugar refinery has the capacity to process 8,000 tons of refined cane sugar per day. For the crop season 2004/05, this refinery produced 136,468 tons of refined sugar. GASA however can only process 4,500 tons of refined sugar per day.

On account of the "big four" being in fierce competition with each other, very specific information detailing performance costs, the factors contributing to technical and production efficiencies at the refining level continue to remain undisclosed to the public. Research however tells us that what these four companies have in common is the following:

- They operate on a very large scale utilizing cutting edge technologies;
- They are able to exploit synergies with other foreign companies gaining access to new nontraditional markets; and
- They have the capital and credibility to attract more capital for the sake of increasing their production capacities in the fields, at the mills and in the refineries. By way of example, the International Financial Corporation (IFC) an agency of the World Bank Group in March 2005 approved a US$30 million loan to assist COSAN S.A. in its efforts to increase production capacity

Unlike Brazil, Australia offers more information regarding its refineries. It currently has six sugar refineries located at Mackay, Bundaberg, Brisbane, Harwood, Melbourne and Perth. Altogether these plants have a refining capacity of about 1.3 million tonnes annually. Common to all six refineries is a fact previously mentioned in Section 1 namely that these operators source their most critical input - raw sugar not from imports but from local mills processing Australian grown sugar cane. Research also indicates that plants are strategically situated in some cases within cane-growing areas annexed to a sugar mill; in other cases, close to the markets they supply. By way of example, Australia's Racecourse Refinery in Mackay (with a refining capacity of 350,000 tonnes per year) sources its raw sugar input during the cane-crushing season directly from the adjacent raw sugar mill. In the non-crushing season, raw sugar is retrieved from its Bulk Sugar Terminal in MacKay. This decision to situate refining operations closest to mills and/or suppliers helps refineries minimize their operating costs -import expenses and/or freight

and distribution costs. Additionally, the use of the mills' waste products as a renewable fuel source substituting natural gas allows refineries not only to save on energy costs, but also to operate in an environmentally sustainable manner.

With regards to the modernization and upgrading of Australia's refineries, modifications remain an ongoing effort. To strengthen the competencies of the refineries, the production of refined sugar at Yarraville Refinery built in 1873 has now joined other refineries in automating all refining processes[6]. Automation helps minimize wastages, spillages and above all, facilitates the production of refined sugars in the right quantity at the right quality[7]. To reduce mechanical downtime, most refineries are now designed for continuous operation with only a few maintenance shutdowns each year. Accompanying the production process is the process of packaging. For most Australian refineries packaging of a wide range of refined sugars, crystal as well as, liquid sugars has improved. Packaging is deliberately designed to target a wider cross-section of consumers. By way of example, 1 and 2 kg packages are designed for households, 15 kg sacs for the food service industry and lastly 25 kg to 1 tonne bulk bags for industrial consumers. Beyond these components, the need for astute management in pulling together all factors to create a competitive and cost-efficient product(s) is important. The management behind Australia's refining capacity has a vision, and is fully equipped with the wherewithal to provide the necessary controls, guidance, leadership and initiatives required to keep its refineries modern and efficient.

4. DIVERSIFICATION OF REFINED SUGAR PRODUCT

To maintain their competitiveness, the leading sugar refiners have diversified their production line introducing a wider range of sugar products into their refinery processes. Refined sugar supplied to manufacturers is delivered in bulk (liquid or granulated). In crystal form it is packaged in 1, 2, 25 and 50 kg sacs. Quantities purchased depend on the end user. The list of refined sugar products manufactured in Brazil include: caster sugar, coffee sugar, golden Demerara sugar, Golden Syrup, Icing Sugar, Liquid Sugars, Sugar Cubes, Treacle, Manufacturers Sugar and White Graded Sugar to name a few. For a detailed description of each

[6] The actual production process is conventional comprising of affination, phosphatation, filtration, decolourisation, crystallization, centrifugal and lastly, drying

[7] To examine the quality of sugar produced, there are specific international parameters and specifications that must be met.: colour (not more than 2,000 ICU, Pol not less than 98.5 degrees, ash (maximum 0.3 %)inverts (maximum 0.4 %, indicator value (range of 3.5-4.5), supply of $_{CO2}$ (range of 8 – 10%)

refined sugar product (See a Listing in Appendix II). In addition to this expanded range, refineries are better able to attract a wider consumer base by producing and branding specialty types of sugar – *Native* and *Uniao* are two Brazilian brands of organic sugars. Unique also to Brazil is *amorfo* (a powdered colour sugar).

In India, the sugar range is packaged at the refinery to include double refined sugar cubes, breakfast sugar, pharmaceutical grade sugar, and sugar sachets which can be used by airlines, hospitals, hotels, restaurants and the pharmaceutical industry.

In the case of Australia, there exist a wide variety of refined sugar products for the consumer market. The list includes all the abovementioned sugars with the exception of CSR Smart, a popular brand, made with little sweetener for dieters and people who generally desire to lower calories. Australia's main export markets for this product include: Canada, Malaysia, South Korea and the USA.

5. POLITICAL COMMITMENTS TO STIMULATE PRODUCTION & TRADE

The need for a well-articulated political commitment is a necessary condition that serves to enhance the competitiveness of the leading cost-efficient producers of sugar. This entails the formulation of clear policies to stimulate domestic production and trade. As illustrated in the examples below, the role of the state can take different forms as will be seen in the case of Brazil whereby the central government acts as a facilitator, while in Australia and India, the state adopts a definite hand-on approach.

BRAZIL

Since the extinction in 1990 of the Sugar and Alcohol Institute,[8] (a research and development institution created by the Brazilian government), the heavy hand of the central government has been replaced by the invisible hand - the laws of the marketplace. In Brazil, the central government provides very limited direct support to sugar producers; the main driver stimulating production is the central government's ethanol mandate. The use of ethanol fuel to power cars

[8] Following the economic crisis of 1929, the government of the then Getulio Vargas created the IAA to control production and maintain prices at an adequate level. To achieve these ends, the IAA established a strict system of quotas, which were divided between the different production units. In other words, each mill could only produce a certain amount of sugar. With strict control over production and prices, the only way to maintain a lucrative business was to reduce costs and increase productivity.

and other machinery is what drives sugarcane production. Brazil's interest in ethanol dates back to the petroleum crisis of the 1970s. Petroleum deficiencies during that period forced Brazil to find an alternative source of fuel to avoid an economic slowdown. Brazil innovated and turned the biomass of sugarcane into ethanol as the alternative energy source for the economy. The production of cane sugar is in actual fact a residual from ethanol production. Several studies indicate that 50 percent of Brazil's sugarcane production particularly from the Center-South region is committed to the production of ethanol.

Even though the central government does not involve itself in decisions made at the farm and factory levels, it recognizes the economic importance of these institutions to rural communities. Bearing this in mind, the Brazilian government assigns certain quotas to some of the poorer rural regions. By way of example, Brazil's U.S. sugar import quota scheduled between 100,000 – 200,000 metric tonnes has been allocated to the poor Northeastern states of Brazil.

Beyond these features, Brazil's sugar plays an important role in the national diet of Brazilians. It ranks fifth amongst all sugar consuming countries with an annual consumption measured at 9.45 million tons or 50 kg of sugar per year per capita. As observed, while sugar for export is vital to the national economy, it has been secondary. The Brazilian government gives priority to the industry to ensure that production is sufficient to meet the needs of consumers in the domestic market.

At the international level, to promote trade, Brazil's central government in collaboration with Thailand and Australia (the Cairns Group) advocate economic liberalization of the sugar industry. Within recent times, this group has taken the necessary steps at the WTO to clamor for the removal of trade barriers in an attempt to create more economic space and opportunities for their own industries to develop and grow.

AUSTRALIA

In Australia, sugar is produced in three (3) states in the given proportions: Queensland – 94 percent, New South Wales – 5 percent and Western Australian – 1 percent. Unlike the latter two states, many aspects of Queensland sugar industry are regulated by state and central governments. In light of this fact; this section will unveil some of the salient political commitments made by the ruling governments to stimulate sugar production and trade. Since

1998/1999 Australian farmers and millers have endured falling world prices coupled with an appreciating currency and compounded by crop losses, which altogether have substantially reduced revenues causing significant hardship, commitment of reserves, and extended debt levels. Against this background, the Australian and Queensland Governments have agreed to deliver a substantial range of programs to assist the industry in effecting the changes needed to remain competitive in the global sugar market. The Australian Government's Sugar Industry Reform Program (SIRP 2004) estimated at $444.4 million and carded to run for five (5) years offers income support, exit grants and funding for regional adjustment. Segments of the program include:

- The disbursement of $146.1 million in the form of grants to sugar growers and sugar mills to sustain them through transitional phases of reform and restructuring
- $96.2 million over three (3) years for one-off, tax-free, re-establishment grants to encourage and support unviable growers and harvesters who wish to exit the industry
- $40.5 million over two (2) years for grants to encourage farmers electing to remain in the industry to improve farm productivity
- $23.3 million disbursed over four (4) years to assist eligible sugar farmers to access the Age or Service Pension without the existing gifting rules applying to the transfer of their farm to the next generation
- $15.2 million for business planning with $14 million extended over three (3) years to assist growers and harvesters in obtaining business planning advice estimated at $2,500 per recipient
- $7 million over three (3) years to assist the retraining and re-employment of growers deciding to exit the industry as well as, sugar workers who lost their jobs on account of the reform process
- $5 million over four (4) years for financial counseling and family support services for families in sugar growing regions.
- $7.6 million over four (4) years for the Department of Agriculture, Fisheries and Forestry to administer the Sugar Industry Reform Programme 2004

In addition to the Australian Government's Reform Program, the Queensland Government's program, which aims at securing a long-term viable future for the sugar industry focuses on three

(3) areas:

- The establishment of a $13 million Sugar Industry Change Management Program which aims to improve the adoption of sustainable sugar cane farming systems; build on environmentally sustainable sugar production, develop new business models for farm amalgamation, and provide accredited training to cane farmers, mill workers and other stakeholders in the industry.
- $10 million Sugar Industry Innovation Fund to assist participants to adopt innovative management systems and technologies, increase production of value-added products from sugar and develop more efficient delivery arrangements.
- $10 million Farm Consolidation Loan Scheme that offers loans with concessional interest rates and flexible repayment methods to growers.

In the context of their commitment to support and promote comprehensive reform and restructure, research indicates that both governments saw it necessary to remove legislative impediments that limit the competitive ability of the Australian sugar industry. In light of this, progressive amendments have been made to the Sugar Industry Act of 1999 and a new Act of 2004 was assented on May 6, 2004. Some of the amendments include:

- The removal of Cane Production Areas[2] (CPAs). In this way millers are not restricted to sourcing their cane from particular growers as well as, growers will not be restricted to supplying their cane to assigned millers. Instead the supply of cane to a sugar mill will be governed by supply contracts;

- The removal of Statutory Bargaining. As previously mentioned, the sugar industry was highly regulated by the state and central government. Under this new Act, growers will have greater freedoms to direct and control their own interests;

- Provisions for Exemptions from Vesting Sugar. Prior to the new Sugar Industry Reform Act 2004, the ownership of all sugar in Queensland, upon manufacture, was vested in Queensland Sugar Limited. A scheme for exemption from vesting is now being

[2] CPAs are in effect a license allowing a grower to grow cane and supply a particular mill (to which the grower has been assigned).

introduced. Exemptions will be granted for specific purposes for example, for use in the manufacture of alternative products such as ethanol and sugar exported in bags and not in bulk.

INDIA

In India, the production and distribution of sugar was tightly regulated up to 1998, where all new investments and expansions required a license from State Government. The Essential Commodities Act contains clauses for sugar and empowers government to control licensing, pricing, stocks and sale of raw sugar.

A dual marketing policy exists on sugar and sugarcane. One such policy is a levy system, where mills have to contribute a fixed percentage for the Public Distribution System (PDS) at a concessional price. The PDS is restricted to below poverty line households only (average half kg/person/month). Currently 10 percent and the 90 percent balance of sugar is regulated by monthly freesale release quotas assigned to each mill.

The existing export policy varies but is generally based under the Open General License (OGL). At present, the government subsidizes for freight Rs. 350/tonne (US$ 7.60/tonne), internal marketing Rs. 500/tonne (US$ 10.86/tonne), and has allowed Duty Exemption Pass Book benefits on sugar exports at 5 percent of the f.o.b. value of exports. The import duty on sugar has increased to 60 percent in 2000 and a countervailing duty (CVD) of RS. 850 (USD 18.46) per tonne on imported sugar still exist.

CONCLUSION

There are many factors which when working in a holistic manner enhance the competitiveness of refineries in the global sugar industry. That which is most obvious is the ability of cost-competitive manufacturers to produce refined sugars at relatively low costs. The scenarios experienced in Brazil and Australia suggest that this is possible if the cost of your most critical input, in this case raw sugar is kept at an all time low (close to or less than the world market price). In having to import raw sugar for refining purposes, additional costs are needlessly incurred thus making it difficult to compete.

Efficiency at the refining level, which often translates into meeting domestic and export

requirements, can only be accomplished if refineries enjoy access to a reliable supply of raw sugar. This is made possible through efficient coordination between sugarcane production and centrifugal processing carried out at the factory level. Access in countries like Brazil, India and Australia is made easy as field, factory and in some cases refineries are strategically located within close proximity to each other. The availability of a steady and moreover increased supply of raw sugar is supported by several low cost factors operating in these countries' favor. These include: the availability of land for increased cane cultivation, an unlimited supply of cheap labour, the development and adoption of bio-technology as well as, substantial investments in infrastructural support.

Sugarcane is one of a handful of crops that yields strong scale economies particularly at the processing and marketing phases. This crop is also more suitable for cultivation on large estates measuring at least 100 hectares in acreage. Plantation owners with ready access to physical and financial capital are in an opportune position to purchase state of the art equipment to increase production and productivity levels. Yields have risen due to the adoption of biotechnology - improved varieties of cane planted. Owners are also in a position to access far away firms to install all possible technological and operational advancements. Whatever the process, the sucrose content must be extracted in a timely manner.

To support field, factory and refinery operations, substantial investments are made in infrastructure. This includes not only the installation of paved feeder roads, rural electrification, drainage and irrigation, but equally important are the establishments of bulk terminals, port terminals, research and experimental stations, and as practised in Brazil, the installation of satellites to monitor farm operations in large fields.

Generally speaking, refinery operations in both Brazil and Australia are modern and effectively managed another factor giving rise to efficiency in production. To sustain a competitive edge, refineries have diversified their line of refined sugars to capture a wider cross-section of the population. In some cases, refineries have introduced the concept of branding their specialty sugars capturing very specific segments of the sugar market. Lastly and of equal importance, the formulation of clear political policies at the national level strengthens the commitment of stakeholders to participate more competitively in sugar production and trade.

OVERVIEW OF THE SUGAR MANUFACTURING COMPANY LIMITED (SMCL)

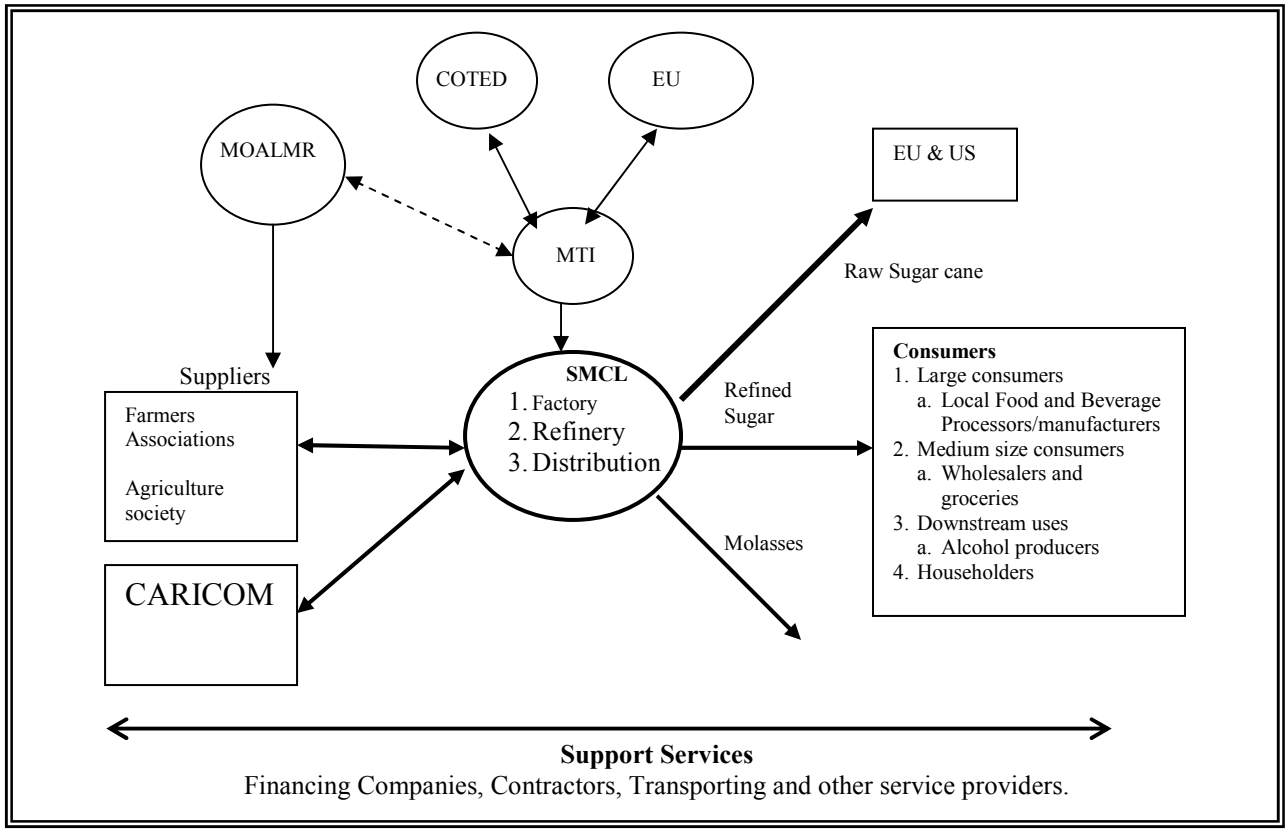
Background

State-owned enterprise SMCL was established by government during the restructuring of Caroni 1975 Limited in 2003. The objective was to have one sugar mill and a refinery plant operating to service the needs of the domestic sugar industry. The core economic activities SMCL was expected to be involved in included:

- Operations and maintenance of sugar factory, refinery and shipping terminal
- Production and sale of raw and refined sugars and molasses for the local manufacturing and consumer sectors
- Distribution and export of refined sugar to the external market

Chart 2

Structure of the Industry



At the time the company's vision was "*To build a strong, profitable, resilient, sustainable & world class company while creating the environment for greater private sector investment*". SMCL also wanted to increase their market share in the regional market.

SMCL argued that this vision could be achieved by:

- Attaining greater production efficiency
- Adopting better manufacturing best practices
- Ensuring greater financial responsibility
- Creating a brand identity for SMCL refined sugar
- Increasing customer satisfaction and increasing the local market share
- Increasing diversification into other higher value items, through intercropping.
- Finally, it was important to SMCL that cane farmers continue to obtain the support from government financially, as well as, through the provision of agriculture extension services
- Executives also agreed that the long-term strategy should be to divest a profitable refinery to the farmers and other private sector interest groups. They added that the development of the refinery could facilitate the development of new entrepreneurs, create new business opportunities and enhance domestic food security.

Performance and Operations of SMCL

Assessing the performance and contribution of SMCL will be based upon the key areas of SMCL's business. This includes the production of raw and refined sugar, distribution of manufactured and imported sugar, the financial performance and integrity of the organization, and socio-economic contribution to the economy which will include, the contribution of the company to employment, social, infrastructural and downstream activities.

Contribution of the Sugar Industry to Trinidad and Tobago

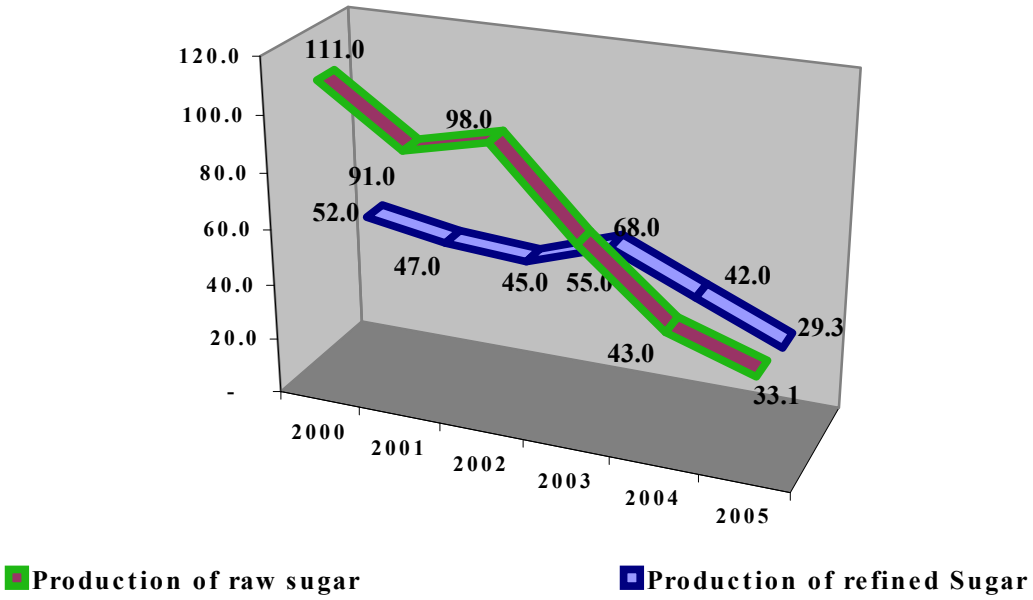
Overall the sugar industry is estimated to have contributed roughly 0.6 percent of GDP and 27 percent of Agriculture output in 2003, prior to the restructuring of Caroni (1975) Ltd. Today the sugar industry contributes roughly 0.3 percent of GDP and 35 percent of Agriculture output. Between 2003 and 2004 roughly 5,400 jobs were lost in the agricultural sector, also a direct

result of the sugar industry during this period.

Production and Exports

Over the last two years sugar production (raw and refined) in SMCL has been on a decline (see Chart 3). Recent statistics indicate that production of refined sugar declined by approximately 47 percent between 2002 and 2005. The production of raw sugar, which is exported annually to the United Kingdom, declined by over 50 percent over the same period. Annual refined sugar production is estimated at 33 MT in 2005.

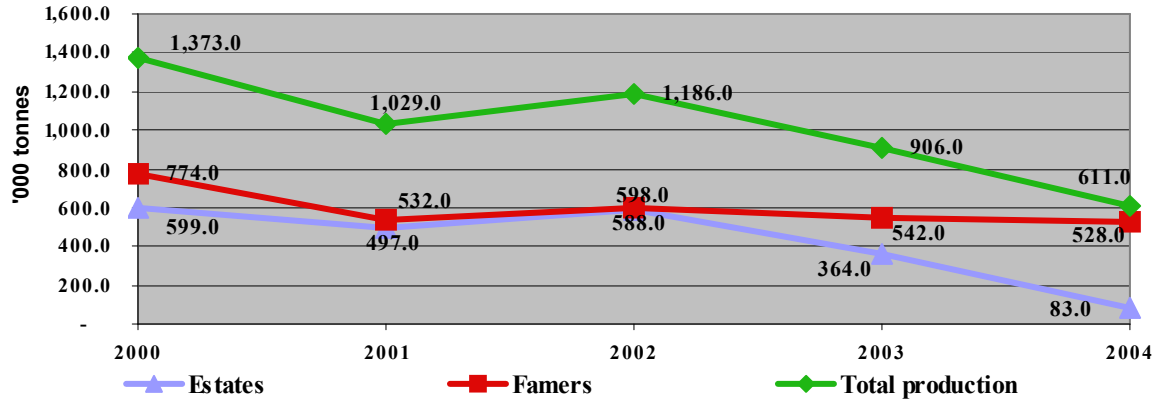
Graph 13
Production of Raw and Refined Sugars



Source: AES 2004, SMCL Strategic Plan, June 2005

One of the key factors for this decline has been the fall in cane sugar production domestically (See Graph 14).

Graph 14
Production of Sugarcane 2000-2004



The decline in sugar production stems primarily from the reduction in cane production during the period. Sugar cane production fell by over 20 percent between 2000 and 2004. This is further evidenced by the tonnes of Cane (Harvested) per Acre (TPA), which has fallen from 20.5 TPA in 2002 to 15.0 TPA in 2005. One of the key reasons has been the divestment in Caroni lands during this period, apart from reducing the acreage under cultivation; it has also placed a cloud of uncertainty among farmers in terms of the future prospect for the industry. Farmers are becoming increasingly hesitant to make significant new investments in equipment and/or take additional measures to increase productivity or lower costs in an industry with an uncertain future. Also important have been problems of work stoppages, poor weather conditions, cane fires, disease, and also limited agricultural extension services to cane farmers all of which have a significant impact on productivity and yields.

Efficiency at the Factory Level

On the factory side factors that affect production and efficiency at the harvesting level, such as work stoppages and falling yields will also have an impact on the productivity of factory operations. More importantly the quality of the cane, as indicated by the level of extraneous matter (trash), received in the cane and also the sucrose content of the cane itself will have a negative impact on factory production. Recent reports have indicated higher levels of extraneous matter, which may be a result of the challenges being faced by farmers in the harvesting sector.

Secondly, there has also been the high level of mechanical breakdowns within factory level as evidenced by a mechanical reliability level of 70-75 percent. This may be attributed to the fact that the factory has not been overhauled since 1992 and prior to that since 1975, these problems are further compounded by industrial and farmer related protests strike action as well as, a break down because of a fire in the mill.

In terms of formal efficiency measures for the factory, there are several benchmarks that are commonly used.

i. Amount of cane ground - Grinding rate (tonnes per hour)
ii. Level of extraction – Reduced Milling Extraction
iii. Bagasse Pol percent

Table 5

Efficiency at the Factory Level

		ACTUAL				
FACTORY EFFICIENCY PAREMETER	**EXPECTED (SINCE) 1998 (CROP)**	**2001**	**2002**	**2003**	**2004**	**2005**
1. Grinding Rate T.C.H.	320 - 350	253	271	227	233.37	269.89
2. Reduced Mill Extraction	96% (Min)	94.11	91.96	-	91.0	91.96
3. Bag Pol %	2.0	2.52	2.87	4.0	3.0	2.8
4. Final Baggase Moisture	48	50.36	50.98	52.55	52.15	51.85
5. Tonnes Cane Ground	-	523, 445	746,897	615,399	610,453	533,240

Source: SMCL Strategic Plan 2005-2009

Efficiency at the Refinery Level

Generally the refinery component is the more profitable area of SMCL operations. In 2004, refinery operations realized a before tax profit of TT$10.9 million. Refinery operations cater almost exclusively to the domestic market and mainly to industry consumers. Estimates of the cost of refining in SMCL is difficult to gather, the international benchmark for refining sugar is

estimated at US$0.16 per pound. Recent information from the Central Statistical Office indicates that on average sugar refining has a net negative value-added contribution to GDP.

Financial Performance

Cost and Efficiency

While recent statistics from SMCL are quoted below, a recent study by LMC & Oxford Policy Management on assessing the impact of preference erosion in sugar on developing countries indicated that Trinidad and Tobago was one of the highest cost producers on a full and cash cost[1] basis among the sample group of ACP countries (see Diagram 3.3).

Diagram 3.3: Future Cumulative Cost Curve, Cash Costs

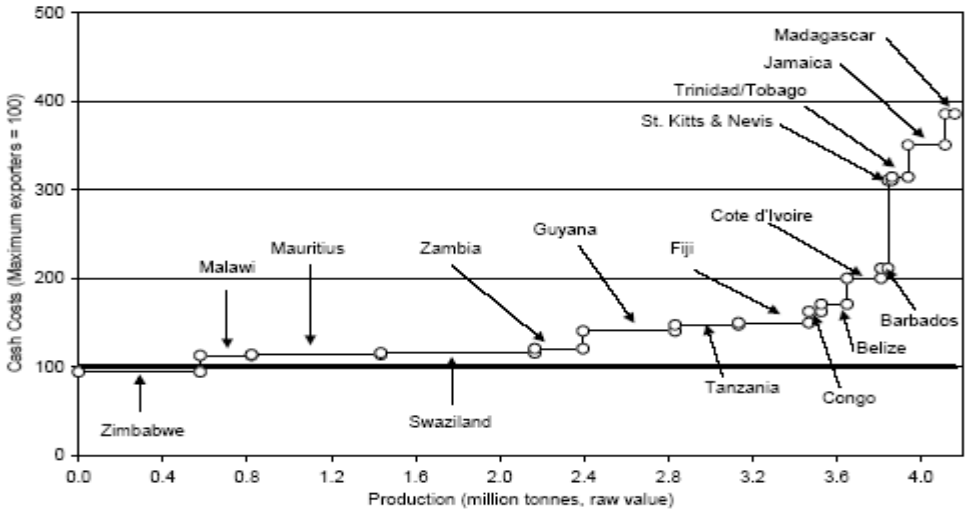
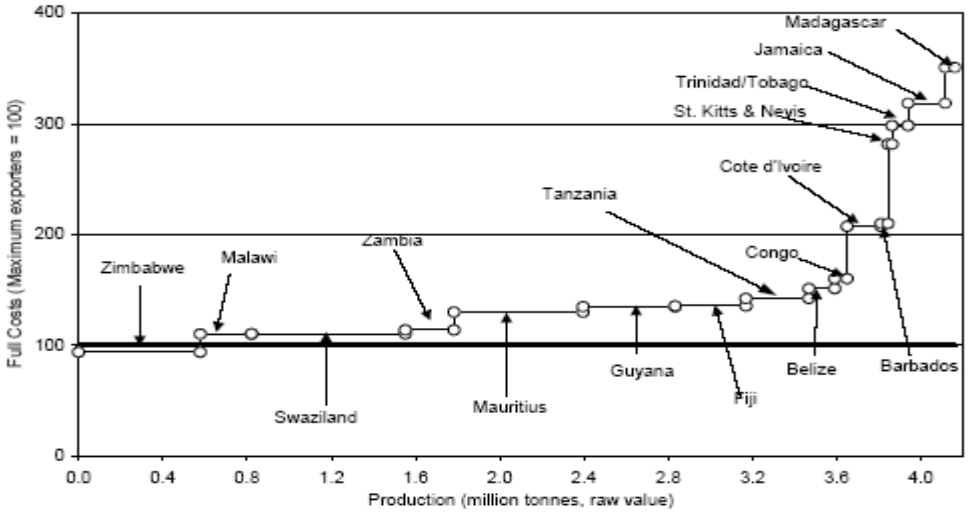


Diagram 3.4: Future Cumulative Cost Curve, Full Costs



Closer examination of manufacturing costs reveal that on average SMCL's cost of sales is estimated at 85.5 percent of total revenues with expenses estimated at 12.11 percent of total revenues (see Table 6), with an estimated net profit before 1.9 percent of revenue. Many of these costs may been structural, and may have existed at these levels before the creation of SMCL in 2003. From the figures submitted thus far, there is some indication of a reduction in costs between 2004 and 2005.

Table 6

Cost and Revenue Stream for SMCL

	2004[1]	2005	Average
Cost of Sales ($M)	251.8	237.4	***244.6***
(% of total Revenues)	87.4%	86.3%	***86.9%***
Total Expenses ($M)	36.88	29.65	***33.2***
(% of total Revenues)	12.8%	10.8%	***11.8%***
Total Revenues ($M)	288	275	***281.5***

Source: SMCL Financial Reports 2004 & 2005

Social Contribution of the Industry

Employment and Rural Development

As mentioned earlier there are over 25,000 people employed in the sugar industry. Many of these people are employed in the rural communities. There are approximately 3,500 farmers who supply sugarcane to SMCL. The majority of farmers (over 67 percent) supply less than 500 tonnes of cane per year, indicative of the relatively small scale of the majority of the farmers, located principally in rural communities. The communities with the largest amount of lands dedicated to cane farming are Esperanza, Reform/Williamsville, and Cedar Hill. These communities hold an estimated 65 percent or approximately 7,700 acres of total leased lands.

Diversification into New Products

The sugar manufacturing company is involved in the production of two key value added products. These are molasses and bagasse. Additionally, molasses is used for the production of rum, which continues to have established brands locally. In 2004 roughly 40 MT of molasses was sold, generating total revenues of $6.0 million dollars. Presently bagasse is burned, while molasses is sold to both domestic and foreign consumers.

Apart from this some of the sugar cane farmers are also involved in the production of other agricultural produce, such as hot peppers, which contribute to further value added in the agricultural sector.

Perhaps the largest downstream users of the refined sugar produced by SMCL are food and beverage manufacturers. This sector includes such global companies as S. M. Jaleel, Coca-Cola Trinidad and Tobago Limited, as well as, smaller businesses namely bakeries and processed food manufacturers.

Recent estimates on the performance of the Food and Beverage Manufacturing sector indicate that this sector contributes roughly 3 percent to Trinidad and Tobago's GDP. More importantly, the sector represents roughly 36.5 percent of total value added of the manufacturing sector, with over 9,000 persons employed in the sector. The sector also contributes over TT$1 billion to export revenues. This sector utilizes roughly 75 percent of the refined sugar produced by SMCL, and will undoubtedly need cheap and reliable sources of refined or liquid sugars in the medium to long term to sustain production and competitiveness.

Contribution to Infrastructural Development and the Environment

Presently there are over 35,000 acres of land under sugarcane cultivation concentrated in central and south Trinidad. These lands are a valuable source of irrigation and drainage as well as providing a source of livelihood and environmental protection towards many communities, which farm these lands.

Summary of Key Challenges faced by SMCL

International Challenges

- Greater challenges from international sugar producers to eliminate sugar subsidies.
- Removal of preferential trade agreements on the international market.
- Long-term downward trend in the price of sugar internationally.
- Increasing innovation, scale and competitiveness among key global sugar producers.

Domestic Challenges

Harvesting

- Low yields and quality cane caused by the following:
- Poor support for farmers in terms of agricultural extension services
- Inconsistent cane growing and agronomic practices
- Poor harvesting practices
- Risk of poor weather conditions
- Problems with malicious cane fires
- Limited scale with a larger number of smaller farmers
- Declining soil quality
- Fragmented farming communities and associations with limited technical and financial cooperation
- Inconsistent quality of sugarcane
- High cost of sugarcane locally

Processing (Milling and Refining)

- Low quality in cane in terms of the level of trash and sucrose content.
- Low mechanical reliability due to outdated and poor state of the equipment
- High production costs
- Inputs and manufacture
- Limited economies of scale and associated benefits
- Difficulties in managing costs
- Limited human resource pool available for maintaining efficiency
- Low efficiency levels

A Preliminary SWOT

1. **Strengths**
    - The land that SMCL utilizes
    - The knowledge in sugarcane production
    - Facilitation of rural infrastructural development
    - Strong domestic demand for sugar by manufacturers
    - The industry provides coverage and support to the environment

1. **Weaknesses**
    - High cost of raw material
    - Low efficiency levels at the production, factory and refinery levels

2. **Opportunities**
    - To establish a regional refinery in Trinidad and Tobago.
3. **Threats**
    - Competition from other global and regional refiners.

Recent Development in the Domestic Sugar Industry

New Alternatives being Developed In-House for SMCL

In 2004 SMCL began a strategic review with the objective of making SMCL more competitive by increasing this company's sugar refining capacity and output, as well as, diversifying into alternative products such as ethanol and bagasse.

The plan envisions an expansion of sugar cane production to 880,000 MT by 2008, with year round production of refined sugar through the importation of "raws" from Guyana. It is also expected that mill and refinery operations will be upgraded to increase efficiency and mechanical reliability.

The plan also makes recommendations to increase the acreage under sugarcane production, as well as, increased provision of technical assistance to farmers. Further investments in research and development in sugar cane varieties to increase cane yields and fibre content. It is also recommended that some consolidation among farmers associations occur to provide a unified front for farmers, more importantly these associations must increase the level of technical and financial cooperation to increase overall competitiveness of farm operations.

Creation of the Sugar Industry Team (SIT)

The SIT was created in 2003, after the closure of Caroni (1975) Ltd. The mandate of the team spearheaded by Mr. Wayne Inniss, is to develop alternatives for the domestic sugar industry. Thus far few alternatives have been developed, including the production of ethanol for the US

market as well as, the production of rum. However, to date none of these alternatives have been pursued. Additionally in the 2004-2005 budget, the Prime Minister announced plans to create a Sugar Industry Authority, with the mandate to provide technical assistance and support funding to farmers.

A Recent Study by Kairi Consultants commissioned by the EU

In October 2005, a study was commissioned by the European Union to assess the competitiveness of the sugar industry in Trinidad. The study was also expected to determine new opportunities for diversification as well as, assess the possible socio-economic impact resulting from exiting the industry or any other alternatives developed by the team. For each alternative developed whether industry transformation or diversification, an estimated total cost was given. It is envisioned that the information garnered from this report will guide EU funding and support for the development of the industry over the medium to long-term.

A first draft of the study was completed in December 2005, and the results outlined three main alternatives for the sugar industry. The first alternative developed was to exit the sugar industry in terms of production and milling. The second alternative emphasized the expansion and resuscitation of the sugar industry, while the third alternative was based on the partial diversification of the sugar industry. Of the three options suggested the team argued in favor of the third option with an estimated cost of $280.6 million. It should be mentioned that in all three options, it was assumed that SMCL refining operations should continue based on the importation of raw sugar for production to the local market.

Future Scenarios for the Industry

To determine future alternatives for SMCL, it is necessary to forecast the likely state of the industry in 5 to 7 years from now. The tool used is a scenario analysis, which not only identifies key drivers likely to shape the industry, but also predicts the changes and impacts those drivers will have on the industry.

Identification of Key Drivers

The following table highlights the key drivers (external and internal to the domestic sugar operations).

Key drivers for the Future of the Industry

Scenarios	Implications for SMCL
Best-case Scenario	
External Drivers	
Prices of raw and refined Sugar Prices remains relatively high averaging over the next 5 to 10 years	Incentive to remain in the production of sugar at least in the short term.
Supply and demand of sugar globally Continuing shift in production of sugar to ethanol production from Brazil	This will place further upward price pressure on the price of refined sugar.
Changes in Trade and Development Policy for the Caribbean EU continues to support the restructuring of all ACP sugar producing countries.	Continued support and technical assistance for the domestic sugar industry
World Energy Prices Energy prices remain relatively high over the medium term averaging US$56 per barrel due mainly to rising demand and tight supply levels.	Greater incentive to continue to produce ethanol, rather than sugar. Shipping costs will continue to increase.
Regional Drivers	
Developments in Sugar Production within Caricom No significant progress in establishing a regional refining centre in the Caribbean.	SMCL has more room to upgrade and reposition itself as a regional supplier of sugar.
The supply of raw sugar regionally remains reliable and secure at relatively cheap prices.	
Domestic Drivers	

Supply of Sugarcane by Farmers Sugar supply continues to increase with better and more consistent quality, as farmers remain in the production of sugarcane, and utilize better farming practices and with better support from the extension services and private sector associations.	The availability of sugarcane and raw sugar increases to meet the needs of SMCL.
Demand for Sugar Demand for cheap sugar continues to increase from the domestic industrial sector.	Increasing importance of the domestic market as well as, demand for low price sugar.
Base-line Scenario	
External Drivers	
Prices of Raw and Refined Sugars Price of refined sugar declines over the medium term	To attract and to remain in the sugar commodity market.
Supply and Demand of Sugar Globally Global production of sugar remains high however; there is an increasing shift in production of refined sugar to ethanol production in Brazil.	International sugar supplies remain tight.
Changes in International Trade and Development Policy towards the Caribbean EU continues to support the restructuring of ACP sugar producing countries; However, priority of support is based on the importance of the sugar industry to the national economies, and also based on evidence of need i.e. based on a structured plan to stay or move out of sugar production.	Trinidad and Tobago and by extension SMCL must have a priority on what to do to make a decision on the future of sugar production.
World Energy Prices World energy prices remain high over the medium term, resulting in higher fertilizer and transportation costs, but also high costs for ethanol.	Increasing incentives internationally to move into the production of ethanol.

Regional Drivers	
Developments in Sugar Production within Caricom There are new steps to establish a larger sugar manufacturing capacity in the Caribbean. **(Guyana and Jamaica already committed to remaining in sugar production).**	Increasing pressures for SMCL to remain competitive.
Domestic Drivers	
Supply of Sugarcane by Farmers Supply of sugarcane continues to decline as farmers continue to exit the industry and move into alternative crops and economic activities.	The availability of sugarcane and raw sugar increases to meet factory demands.
Demand for Sugar Domestically Demand for cheap sugar continues to increase from the domestic industrial sector	
Worst-Case Scenario	
External Drivers	
Prices of Raw and Refined Sugars Prices of refined and raw sugars fall significantly over the medium term.	
Supply and Demand of Sugar Globally Continuing increase in the production of refined sugar from Brazil.	
Changes in International Trade and Development Policy towards the Caribbean EU limits support to ACP sugar producing countries based on need and competitiveness.	
World Energy Prices World energy price falls over the medium term.	
Regional Drivers	

Developments in Sugar Production within Caricom A regional refining centre is established in the Caribbean.	
The supply of raw sugar from regional suppliers deteriorates.	
Domestic Drivers	
Supply of Sugarcane by Farmers Supply of sugarcane continues to decrease as majority of cane farmers exit industry, resulting in greater reliance on imported "raw" sugar for refining operations.	
Demand for Sugar Domestically Demand for cheap sugar continues to increase from the domestic industrial sector.	

Developing a Way Forward for SMCL

In mature commodity markets such as those for refined and raw sugars, which is characterized by a few large dominating, low cost producers, large-scale and (coupled with a strong domestic lobby movement and continued support from their governments), competitive alternatives remain limited. However, research by such authors such as Michael Porter indicates that in cases such as these, preferred options are usually based on price, product or include:

- **Leadership** – The firm invests in acquisitions and other market share building strategies to either maintain or dominate the market
- **Niche or diversification strategies** – The firm chooses a niche segment that is more price insensitive or competitive based on domestic advantages or global opportunities
- **Harvest** – Here the firm focuses on maximizing the cash returns on the company
- **Divest or Exit** – Where the company chooses to leave the market completely

From the above list and based on the nature of the domestic sugar industry, as well as, best practices among refiners internationally there are three options available to SMCL.

Alternative 1- Expand and diversify into other sugar cane based products (Junior regional leader)

Option	***Key elements***	***Action Items***	***Comments***
Expanded, diversified integrated strategy (An initiative currently planned by SMCL).	1. Increasing sugarcane production from 1,000,000 to 880,000 MT per annum, to be utilized primarily for sugar production.	1.1 Possible increase in the amount of land leased to cane farmers. 1.2 Increasing infrastructure for farmers, roads, electrification, irrigation and drainage. 1.3 Increase in research and development for new cane varieties with higher sucrose content. 1.4 Transfer of new cane varieties and associated technology to farmers, with adequate support from extension services. 1.5 Increase in training offered to farmers on good agronomic practices. 1.6 Increasing the number of agricultural extension officers. 1.7 Increasing transportation available to farmers. 1.8 New administrative costs to support additional supplies of cane. 1.9 Increase in fertilizer	

		subsidy 1.10 Increasing costs at weighting stations. 1.11 Higher froghopper control assistance.	
	2. Consolidation and restructuring of farmers and their associations.	2.1. Facilitating the exit of farmers who may want to leave the industry and reallocation of land to farmers who may want to remain. 2.2 Consultancy to consolidate and upgrade farmers association.	
	3. Upgrade of factory and refining equipment.	3.1 Consultancy to assess the expected factory processing levels, as well as, factory and refinery upgrades required to execute these estimates. 3.2 Funding for upgrade of refinery plant and equipment, as well as, staffing and training at the factory level.	
	4. Expansion in refinery operations to 70,000 MT per annum.	4.1 Importation of raws for 12 month refining	
	5. Exploring the possibility of diversification of operations into other value	5.1 Research into other alternative sugar based crops.	

	added sugarcane products a. Rum b. Ethanol c. Bagasse based products d. Liquid sugar e. Sugar or sugarcane based products.	5.2 Development of an internationally recognized Caribbean brand. 5.3 Allocating land and resources and technology or plant facilities for the development of targeted crops.	
	6. Privatize or engage in joint partnership with an international investor willing to develop production of sugar and sugar related products.		
	Positive Comments	***Negative Comments***	
	1. Continuing security of supply of sugar for manufacturers and householders.	1. Industry may continue in the production of a commodity in a mature market.	
	2. Continuing support for rural communities and farmers.	2. Lower revenues in the longer term from sugar production (value added in sugar production may be decreasing).	
	3. Greater scale to achieve competitiveness	3. May diminish capability to enter into alternative agriculture produce.	
	4. An enunciation of policy	4. Challenges with extension	

	toward the sugar industry.	services may continue to affect productivity on an expanded basis.	
	5. Enhanced possibility of diversification into other sugar cane based products.	5. Continuing to support farmers in a mature commodity market.	

Alternative 2 – Rationalization (Diversify and niche)

Option	***Key elements***	***Action Items***	Comments
Expanded, diversified integrate strategy (An initiative currently planned by SMCL).	1. Increasing sugarcane production to less than 880,000 MT per annum, to be utilized primarily for sugar production.	Possible increase in the amount of land leased to cane farmers. Increasing transportation available to farmers. A project to develop and implement new cane varieties among farmers. Increasing the number of agriculture extension officers. Increasing the number of training and development programmes to farmers both for sugar cane and new alternative products. New administrative costs to support additional supply of cane. - Increasing infrastructure for farmers, roads, irrigation, electrification and	

		drainage. - Increase in fertilizer subsidy. - Increasing costs at weighting stations. - Higher Froghopper control assistance. - Other technical assistance.	
	2. Consolidation and restructuring of farmers and their associations.	Facilitating the exit of farmers who may want to leave the industry and reallocation of land to farmers who may want to remain. 2.1 Consultancy to consolidate and upgrade farmers associations	
	3. Upgrade of factory and refining equipment.	3.1 Consultancy to access the expected factory processing levels, as well as factory and refinery upgrades and training and staffing requirements. 3.2 Funding for upgrade of refinery plant and equipment, as well as, staffing and training at the factory level.	
	4. Expansion in refinery operations to 70,000 MT per annum.	4.1 Importation of raws for 12 month refining	

	5. Exploring the possibility of diversification of operations into other value added sugar cane products • Rum • Ethanol • Bagasse based products • Ethanol • Liquid sugar • Sugar or sugar cane based products.	5.1 Research into other alternative sugar based crops. 5.2 Development of an internationally recognized Caribbean brand. 5.3 Allocating land and resources and technology or plant facilities for the development of targeted crops.	
	6. Diversification into new agro-based products.	6.1 Consultancy to determine the market opportunities and technical requirements to diversify into new agro-based products for exports and domestic consumption. 6.2 Assessing what is the best location and acreage of land for cane production versus other agricultural products\ 6.3 Consulting with farmers on the need, requirements and capability to enter into the production of new products.	

		6.4 Increasing technical assistance and extension services for developing new alternative products	
	7. Divestment and/or an international joint venturing with a partner to develop production of sugar and sugar related products.		
		8.1 Undertaking a demographic, profile, which will include, skills sets, age groups and standard of living of displaced workers. 8.2 Based on this information developing retraining and social support programmes for misplaced workers. 8.3 Establishment of a placement office for facilitating the redeployment of displaced workers	
	Positive Comments	***Negative Comments***	
	1. Continuing security of	1. Industry may continue in	

	supply of sugar for manufacturers and households.	the production of a commodity in a mature market.	
	2. Continuing support for rural communities and farmers.	2. Lower revenues in the longer term from sugar production (value added in sugar production may be decreasing).	
	3. Greater scale to achieve competitiveness	3. May diminish capability to enter into alternative agriculture produce.	
	4. An enunciation of policy toward the sugar industry.	4. Challenges with extension services may continue to affect productivity on an expanded basis.	
	5. Enhanced possibility of diversification into other sugar cane based products.	5. Continuing to support farmers in a mature commodity market.	

Alternative 3 –Closure of SMCL

Option	***Key elements***	***Action Items***	

Expanded, diversified integrated strategy (An initiative currently planned by SMCL).	1. Phased closure of milling and refining operation over a two to three year period.	Initiating the phased closure of SMCL, by payment of compensation to staff members, and developing alternatives for factory operations or space such as an agro-processing facility. Provision of exit training programmes for SMCL staff. Securing new supplies of refined sugar for local manufacturers Provision of exit training programmes for SMCL staff.	
	2. Exploring the possibility of diversification into other agro-based products.	2.1. Facilitating the exit of farmers who may want to leave the industry and reallocation of land to farmers who may want to remain. 2.2 Consultancy to consolidate and upgrade farmers association.	
	3. Exit of cane farmers from sugarcane production.	3.3 Consultancy to determine the market opportunities and technical requirements to diversify into new agro-based products for exports and domestic consumption and farmers interest.	
	4. Expansion in refinery	4.1 Importation of raws for 12	

	operations to 70,000 MT per annum.	month refining	
	5. Social support for the industry	5.1 Undertaking a demographic, profile, which will include, skills sets, age groups and standard of living of displaced workers. 5.2 Based on this information developing retraining and social support programmes for misplaced workers. 5.3 Establishment of a placement office for facilitating the redeployment of displaced workers.	
	Positive Comments	***Negative Comments***	
	1. Final policy on the future of the sugar industry i.e. Trinidad's exit from sugar cane production.	1. Loss in security of domestic sugar supply for manufacturers.	
	2. The ability to get into new high value added agro-based products quickly.	2. Significant likely decline in agriculture GDP and employment at least in the short term.	
		3. May diminish capability to enter into alternative	

		agriculture products as some farmers may opt out of farming totally.	
	4. An enunciation of policy toward the sugar industry.	4. Challenges with extension services may continue to affect productivity of the development of new agro-based products.	
	5. Enhanced possibility of diversification into other sugar cane based products.	5. Environmental impact in terms of flooding and higher CO2's may be a short term result.	

Setting Criteria for Decision-Making

From the viewpoint of the government of Trinidad and Tobago and more specifically the Ministry of Trade and Industry, any criteria developed to assist in determining an option should be based on the government's long-term objectives for agriculture and the country.

The following can therefore be considered key criteria upon which we can choose the best options for the SMCL

Economic criteria

- ***Competitiveness*** – Any option chosen must be geared to be competitive, not only in terms of profitability but in terms of sustainable competitive advantage. If not in the … at the very least in the medium to the longer-term.
- ***High value-added*** – Given the high costs for inputs, such as labor, it would be best to target economic activities that generate a "higher value added".
- Contributes to ***economic development and diversification of the economy.***

Social criteria

- ***Poverty reduction***, ***rural development***, ***domestic food security*** and ***environmental protection*** have been outlined as key development objectives for Trinidad and Tobago based on its Vision 2020 Plan.

Other

- Any option that is developed must be based on its ability to be ***feasible*** in terms of, implementation and achieving stated objectives and ***equitable*** to key stakeholders affected in the process.
- Finally, it is important that any plan chosen will **minimize the level of risk** for failure or alternatively the probability of any fallout to society whether through social displacement or adverse impact to society is well managed.

Decision Matrix

Criteria	Weight	Option 1		Option 2		Option 3	
		Rating (1-5)	Score	Rating (1-5)	Score	Rating (1-5)	Score
Economic	**1-5**						
Competitiveness	**3**	1	3	3	9	3	9
High value-added	**5**	1	5	4	20	4	20
Economic development and diversifications of the economy	**5**	2	10	5	25	5	25
Sub-total			***18***		***54***		***54***
Social	**1-5**						
Poverty reduction	**5**	2	10	4	20	4	20
Domestic food security	**5**	1	5	5	25	4	20
Rural development	**3**	4	12	4	12	5	15
Environmental protection	**4**	5	20	3	12	1	4
Sub-total			***47***		***69***		***59***
Other	**1-5**						
Feasible	**5**	4	20	3	15	3	15
Equitable	**3**	1	3	5	15	1	3
Risk Minimization	**5**	4	20	5	25	1	5
Sub-total			***43***		***55***		***23***
TOTALS			***108***		***178***		***136***

Final Recommendations and a Tentative Action Plan

Based on the results of the decision matrix we find that option 1 which is to remain in sugar refining and raw sugar production as a "junior regional producer" will likely provide higher social benefits and be easier to implement, with continued benefits to rural development and the environment. However, this option will also continue to focus resources in lower value added economic activity over the long-term, and place Trinidad in an industry that global and regional competitors have a significant and in some cases unmatched competitive advantage.

In terms of the third option, this option if carefully planned and successfully executed can diversify the economy, as well as, encourage higher value added activity over the medium-term. It can also contribute to higher domestic food security and poverty reduction. However, the project remains very high risk, particularly when one considers the history of agriculture in Trinidad and Tobago, and to some extent inequitable for some of the stakeholders who may want to remain in the industry.

In terms of the second option, while this option ranks ultimately the same with the third option in terms of competitiveness, it is likely to have higher social benefits in terms of the environment, given that some land will continue to remain in sugar production, as well as, remaining equitable for persons wishing to stay in the industry, with less room for social dislocation and a higher chance of success.

All told, this study recommends option 2 in terms of continued activity of SMCL. However the products that SMCL produces must be reconsidered, shifting from the sole production of refined and raw sugars to new branded and/or niche markets with the simultaneous development of new agricultural products.

Action Plan

Option	*Objectives*	*Action Items*	*Agency responsible*	*Budgeted Costs ('000)*	*Time frame (Years)*
Rationalization with increasing efficiency, with the possibilities of diversifying into other products	1. Maintaining production at a sustainable level to meet domestic demand and other economic activities (production of less than 880,000 MT per annum).	Possible increase in the amount of land leased to cane farmers. Increasing transportation available to farmers. A project to develop and implement new cane varieties among farmers.	SMCL, Estate Management Company & Ministry of Land, Agriculture, and Marine Resources.	To be determined	1-3
		Increasing the number of agricultural extension officers.	SIT, SMCL	$300	
		Increasing the number of training and development programmes for farmers both for sugar cane and new alternative products.	SIT	$1,000 $640	1-2
		New administrative costs to support additional supply of cane.	SIT & MALAMR SMCL		
		Increasing infrastructure: roads, irrigation, electrification and drainage for farmers.	SMCL	$23,000	1
		• Increase in fertilizer subsidy.	SMCL		
		• Increasing costs at weighting stations.	SIT		
		• Higher Froghopper	SIT		

		control assistance. 1.8 Other technical assistance.			
	3. Consolidation and restructuring of farmers and their associations.	Facilitating the exit of farmers who may want to leave the industry and reallocation of land to farmers who may want to remain. Consultancy to consolidate and upgrade farmers associations.	SIT, MALMR & SMCL SIT	$2,00-3,000 $100	1
	4. Rationalization of the price of sugarcane purchased from farmers.	Rational and staged increase in the price of sugar cane purchased from farmers.	SIT, Farmers & SMCL	N/A	
	5. Expansion and upgrade of factory equipment.	Consultancy to access the expected factory processing levels, as well as factory and refinery upgrades and training and staffing requirements. Funding for upgrade of refinery plant and equipment, as well as, staffing and training at the factory level.	SMCL SMCL & Ministry of Trade and Industry	$300 To be determined Quotes range from ($4.2 million to US$25)	1
	5. Exploring the possibility of diversifying operations into other value added products: • Ethanol	5.1 Consultancy to determine the market opportunities and technical requirements to diversify into other cane	SMCL	$300	1

	• Bagasse based products • Liquid sugar • Alcohol spirits • Branded sugar cane products.	based value-added products.			
	6. Diversification into new agro-based products.	Consultancy to determine the market opportunities and technical requirements to diversify into new agro-based products for exports and domestic consumption. Assessing what is the best location and acreage of land for cane production versus other agricultural products. Consulting with farmers on the need, requirements and capability to enter into the production of new products. Increasing technical assistance and extension services for developing new alternative products.	SMCL, MALMR Farmers & MTI EMC, SMCL MALMR SIT & Farmers SIT, MALMR, Farmers	$300	1
	7. Seeking an international joint venturing partner to develop production of sugar and sugar related products.				
	8. Social support for the industry	8.1 Undertaking a demographic, profile, which will include, skills sets, age groups and standard of living of displaced workers.	Ministry of Social Development		

		8.2 Based on this information developing retraining and social support programmes for misplaced workers. 8.3 Establishment of a placement office for facilitating the redeployment of displaced workers			

Conclusion

In determining the future for SMCL in the new century three key questions, must be answered:

- Should SMCL continue milling raw sugar?
- Should SMCL continue refining sugar?
- What should be done for the future of SMCL?

From the information gathered thus far what we have found was that SMCL as a whole is marginally profitable. In terms of the production of raw sugar, the company is not efficient. More importantly, in spite of the fact that all raw sugar is exported to European and US based markets, (thereby receiving a price premium), this segment of SMCL operations remains unprofitable. Secondly, and perhaps more importantly in the face of declining price support from the European Union, the future viability of this segment of their operation remains questionable.

In terms of refining activity, while estimates of cost of production for refining at SMCL remains difficult to come by, international benchmark for refining sugar is estimated at US$0.16 per pound. The refining component of SMCL remains the most profitable segment of its business and presently, all of SMCL refining activity utilizes raw sugar imported from regional suppliers.

In terms of other activities apart from sugar production, SMCL is presently involved in the production and sale of molasses. This product earns some revenue for the company, but is not fully developed as a significant income earner.

Most important are the reasons or causes for SMCL inefficiencies. From the study most of the key challenges can be summed into three key areas, structural, technical and cultural.

Structural challenges – In structural we mean fundamental challenges in the nature of the industry and the way it is organized, which make SMCL unprofitable. From the research, we found two key structural challenges. Those related to the market and secondly those related to the way the industry itself is organized.

Market

In terms of the nature of the sugar market – Sugar is a very mature commodity market as opposed to a niche or emerging market. Companies that currently operate in the sugar market compete via subsidies, achieving higher scale, reducing costs and by developing new products or market opportunities. Many of the international sugar producers are well advanced in these techniques and have a lot of intellectual "know-how" and experience in achieving competitiveness, as well as strong support and commitment from their respective governments. Unfortunately, SMCL and its predecessor Caroni 1975 Ltd. like many other regional sugar producers have not been able to achieve the same success in terms of competitiveness nor developed niches.

Another dimension of the market is the reduced support from European Union, which over the medium term will reduce the price premium, revenue and ultimately the profitability of SMCL and other ACP sugar producers in spite of technical changes that these countries may undergo over time.

Production

SMCL relies on domestic farmers to supply sugarcane, for the production of raw sugar, however the company does not directly manage or operate these farms. Secondly farmers on their own have limited support (within their own associations or from government) or incentive to increase productivity or the quality of the cane SMCL purchases. Thirdly, the price at which SMCL purchases sugarcane from farmers is high relative to other regional sugar producers and certainly international sugar producers.

Technical challenges

SMCL inherited their factory and plant operations from Caroni (1975) Ltd. For the factory in particular the last upgrade occurred in 1997, and prior to that, no upgrades have been carried out since its purchase from Taitt and Lye in 1975. Much of the equipment is outdated and the company faces considerable human resource and system challenges particularly at the technical level in maintaining mechanical reliability.

Cultural Challenges

One of the key challenges that SMCL will face is the change in paradigm from a state to private sector profit earning organization, leveraging increasingly on learning or innovation, this after a prolonged history of subsidies and state support.

Finally, it must also be highlighted that any change in policy to SMCL will affect or at the very least have implications for the wider sugar industry, its farmers and workers, the environment as well as the consumers, both industrial and household alike. Therefore any plan that is created must take cognizance of all parties involved and the impact on their livelihoods, and the need for change not only in technology and processes but also the way people think.

APPENDICES

Appendix 1

Specimen: Cost Structure for Production of Refined Sugar

	2004	2005
COST ITEM / COST AREA	Per metric tonne ($TT M)	Total ($TT M)
I. Raws at C.I.F price		
II. Cargo and Handling costs		
III. Transport to warehouse		
IV. Transport to the Refinery		

If country X is importing raw sugar to be refined, this additional table B must be included in calculating the overall cost of refining sugar.

Please note LMC International using raw data collected from USDA has a mathematical formula for converting raw to refined, according to their study, the cost of refining sugar is $5/8^{th}$ cents per pound plus the cost of raw sugar per pound.

	2004	2005
COSTS	Per metric tonne ($TT M)	Total ($TT M)
I. Total Labour		
II. Processing chemicals		
III. Packaging materials		
IV. Utilities		
V. Plant Maintenance		
VI. Admin. / Other/ Broker charges/ Security		
Subtotal		
I. Bank Charges II. Of Recovering Refined Sugar from Jets		
Total		
COST/ TONNE		

Appendix 2

Types of Sugars

Raw Sugar

Brown sugar	Also called Golden Yellow Sugar White moist granulated sugar blended with small quantities of pure sugar syrups selected for colour and taste Can also be produced from boiling refinery cane syrups until brown sugar crystals form Used in baked goods, meat glazes, and condiments Brown sugar retains some of the surface molasses syrup, which imparts a characteristic pleasurable flavor. Dark brown sugar has a deeper colour and stronger molasses flavor than light brown sugar. Lighter types are generally used in baking and making butterscotch, condiments and glazes. The rich, full flavor of dark brown sugar makes it good for gingerbread, mincemeat, baked beans, and other full flavoured foods.
Raw Sugar	In the form of dry, brown sugar crystals (the colour being due to the presence of impurities) obtained from the evaporation of clarified sugar cane juices
Gur	Traditional Indian sweetener, an unrefined lumpy brown sugar. It is a natural mixture of sugar and molasses. If pure clarified sugarcane juice is boiled, what is left as solid is gur (also called jaggery).
Khandsari	Less refined sugar, typically consumed by sweet makers in rural India
Plantation White Sugar	Also called mill white sugar is raw sugar whose coloured impurities have not been removed, but rather bleached white by exposure to sulfur dioxide. This is the most common form of sugar in sugarcane growing areas, but does not store or ship well; after a few weeks, its impurities tend to promote discoloration and clumping.

Refined Sugar

Castor sugar (or caster sugar)	Sugar with extremely fine grain size making it ideal for extra fine textured cakes and meringues, as well as for sweetening fruits and iced-drinks since it dissolves easily.
Invert sugar	Equimolar mixture of glucose & fructose in liquid form. It absorbs moisture very fast, is about 25% sweeter than normal sugar, is highly soluble in water and alcohol, and caramelizes fast.
Demerara sugar	Golden brown sugar crystals rolling with the rich aroma of tropical sugarcane molasses. Its distinctive flavor and crunchy texture makes it ideal for hot and cold beverages, sprinkling on cereals, or as a topping on cakes and cookies. Very moist granulated sugar having a heavy molasses coating Used as a specialty item for household baked goods and uses
Confectioners' Sugar	Similar to Coarse Sugar, it is a white granulated sugar having a very large crystal size Used as a decorative sugar
Icing Sugar	Also called Fondant Sugar and Fondant Icing Sugar Finely ground granulated sugar Contains not more than 5% starch or other anti-caking agent to prevent lumping Used in special glazes/icings for cakes and donuts
Liquid Sugar/ Liquid Sucrose	Granulated white sugar dissolved in water Used in beverages, jams, candy, ice cream, syrups, and cooked fondants (i.e. fudge) Used by food industry; not available for purchase by consumers Liquid sugar is ideal for products whose recipes first require sugar to be dissolved.
Amorfo	Powdered coloured sugar, type of refined sugar produced in Brazil
Coffee Sugar	Large grained, sparkling, brown-coloured crystals specially developed to bring out the true flavour of coffee beans
Golden Syrup	Also called refiners' syrup or refined sugar syrup. This is a table syrup containing sucrose and invert sugar (sucrose broken down into glucose and fructose)
Sugar Cubes	Sugar cubed after refinery process

Appendix 3

Overview of EU sugar policy

Generally, the EU has established a quota system for sugar production within the EU market. This quota is allocated among all EU states, which limit the supply of sugar to the EU market. Furthermore all sugar produced within the quota limit and sold on the EU market qualifies for a price support or "price intervention" which is essentially a subsidy for sugar production. It is normal for sugar to be produced in excess of the EU consumption and also the overall quota system. In the case of the former, suppliers are allowed to export the excess sugar with accompanying price support benefits, which act essentially as an export subsidy and has been an area of contention among non-EU sugar producers. Secondly, where sugar production and exports are in excess of quota limits and consumption, these are shipped under quota C, and as such do not qualify for export subsidies.

Other Elements of EU Sugar Policy

Import Tariffs – The price of refined sugar in the EU is usually 2 to 3 times the price on the world market. Therefore import tariffs and tariff rate quotas have been established to control the quantity and price of foreign sugar entering the EU market.

External Supply Agreements – In order to supplement the demand for imported raw sugar called the Maximum Supply Needs (MSN) by the EU refining industry, the EU has entered into several preferential supply agreements with non-EU countries. These include:

- DOM sugar – Raw sugar produced within the EU's domestic sugar production quotas, essentially by the French Overseas Departments

- Protocol Sugar – 1.3 million tones (white values) of raw sugar imported from the African, Caribbean and Pacific (ACP) countries under Sugar Protocol of the Lomé Convention, plus 10,000 tonnes of white sugar from India, both of which is imported duty free (Table 1 outlines sugar quotas and support prices for Caribbean countries).

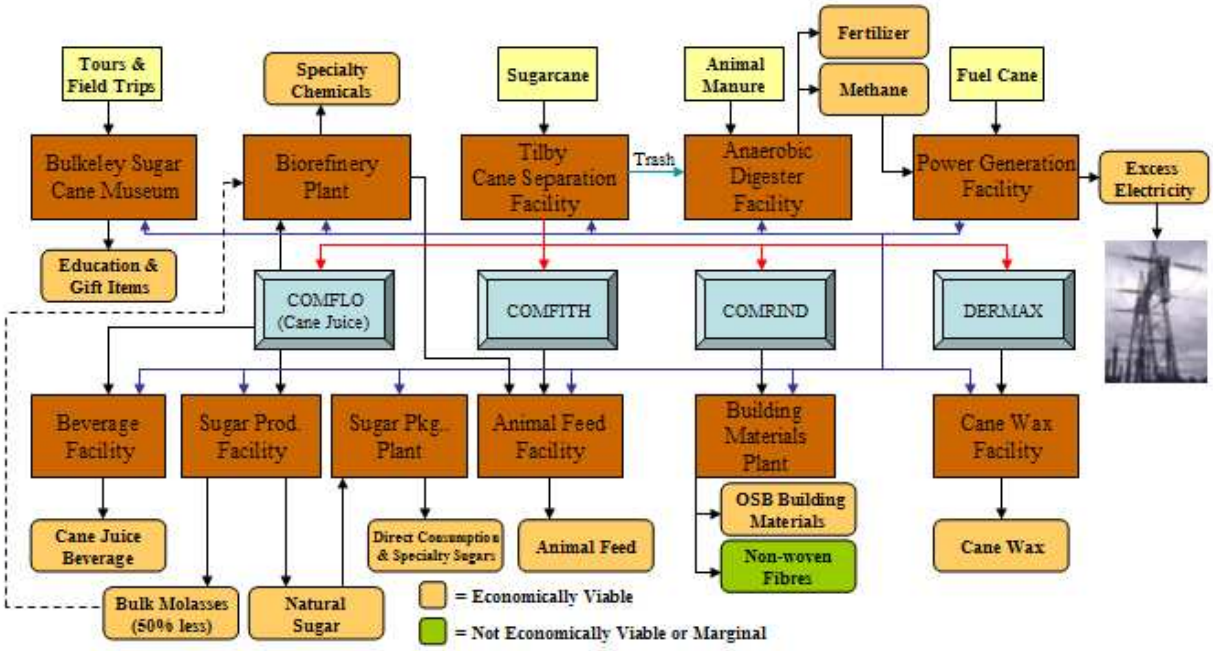
- MFN sugar- Finland's raw sugar import quota represents a WTO commitment that preceded Finland's accession to the EU.

- EBA Sugar – under the Everything But Arms initiative, Least Developed Countries (LDC's) are granted duty free access to the EU. It was agreed to introduce a tariff rate quota (TRQ) for raw sugar or white sugar equivalent, from 2001/02. This TRQ would be increased until unlimited duty free access is granted to LDC countries from 1st July 2009.

- SPS Sugar- If there is a deficit after these sources, an additional quantity of raw sugar can be imported under the "Special Preferential Sugar" SPS quota, which is allocated among the ACP countries, and India which holds a further 10,000 tonnes white sugar quota under the SPS scheme.

Appendix 4

Proposed Bulkeley Operation Diagram



Appendix 5

Types of Cane Varieties Developed for the Jamaican Sugar Industry

Table 6.2: Variety recommendations for harvesting periods and soil types

Cane-growing Area	Harvesting Period	Light Soils	Clay Loams	Clays
Westmoreland & Hanover	Early	BJ7355 BJ7465 BJ7015 BJ7314	BJ7452 BJ7015 BJ7355 J9501	BJ7465 BJ7452 BJ8252 BJ7355 BJ7015
	Middle	BJ7504 BJ7015 BJ7355 BJ8532 BJ8783	BJ7355 BJ7627 BJ7015 BJ7938 BJ82119	BJ7504 BJ7015 BJ7938 BJ82119 BJ7627
	Late	BJ7627	BJ7627 BJ82119	BJ82119 BJ7627
Irrigated Clarendon & St. Catherine Plain	Early	BJ7465 BJ7015 BJ7555 BJ7938 BJ82102 BJ7627 BJ7262	BJ7015 BJ7555 BJ7627 BJ82102 BJ7465 BJ8252 J9501	BJ7465 BJ8252 BJ7555 BJ82119 BJ82102 BJ8252 UCW5465 BJ7015
	Middle	BJ82119 BJ7548 BJ82102 BJ7355 BJ8532 BJ78100	BJ82119 BJ7548 BJ82102 BJ8534 BJ8783 BJ78100 BJ8252 J9501	BJ7504 BJ7627 BJ7548 BJ82102 BJ7355 BJ8252
	Late	BJ7627	BJ7627	BJ7627
Upper St. Catherine & Upper Clarendon	Early	BJ7355 BJ7015 BJ7465 BJ7314 BJ82156 BJ7627	BJ7355 BJ7015 BJ82156 BJ7314 BJ7627 BJ7504	BJ7355 BJ7465 BJ7015 BJ7314 BJ7627 BJ7504
	Middle	BJ7555 BJ7465 BJ82119 BJ7262 BJ82156 BJ8532	BJ7355 BJ7015 BJ82119 BJ7262 BJ82156 BJ8783 BJ8534 BJ8532 J9501	BJ7355 BJ7465 BJ82119 BJ82156
	Late	BJ7627	BJ7627	BJ7627
St. Thomas	Early	N/A	BJ7314 BJ7355 BJ7452 BJ82156 BJ7627 J9501	BJ7465 BJ7355 BJ7452 BJ7627 BJ7015
	Middle	BJ7355 BJ82119 BJ8207 BJ82156 BJ8532	BJ7627 BJ7355 BJ82119 BJ7627 BJ8783	BJ7627 BJ7355 BJ8207 BJ7015 BJ82119
	Late	BJ7627 BJ82119	BJ7627 BJ82119	BJ7627 BJ82119
Trelawny St. James & St. Ann	Early	BJ7465 BJ82119 BJ82156 BJ7504 BJ7465 BJ8252	BJ82156 BJ7015 BJ7504 BJ7465 BJ8252 BJ82102	BJ7465 BJ82156 BJ7504 BJ7465
	Middle	BJ82119 BJ7504 BJ82156	BJ7627 BJ82156 BJ82119	BJ7627 BJ7504 BJ82156 BJ7015
	Late	BJ7627	BJ7627	BJ7627 BJ7015
St. Elizabeth	Early	BJ7015 BJ7314 BJ82102 BJ7938 BJ7355	BJ7015 BJ82102 BJ7465 BJ7938	BJ7015 BJ82102 BJ7465 BJ7938
	Middle	BJ7262 BJ82119 BJ82102 BJ7465 BJ8252 BJ7627 BJ82156	BJ7627 BJ7465 BJ8252 BJ8532 BJ8534 BJ8783 J9501	BJ7627 BJ7465 BJ7938 BJ8252
	Late	BJ7465 BJ7627 BJ7314	BJ7627 BJ7465 BJ7314	BJ7465 BJ7627 BJ7314

BJ7627 BJ7465 BJ7627
BJ7314 BJ7314 BJ7314