Growing the Sugar Industry in South Africa

Document 4: Evaluation of the Financial and Economic Viability and Macroeconomic Impact of the Sugar Industry

February 2013

The reporting on the outcome of the study consists of a number of technical reports and a final Management Report as listed below. This Report corresponds to the report **Document 4** below:

- Management Report: Lessons, Justifications and Challenges, Guidelines for Decision Making
- Document 1: Overview of the Sugar Industry: Contribution to Social and Economic Development and Contentious Issues.
- Document 2: Comparative Advantage Analysis of the Sugar Industry.
- Document 3: Legislative Environment of the Sugar Industry.
- **Document 4: Evaluation of the Viability of the Sugar Industry: A Cost Benefit Analysis and Macroeconomic Impact analysis.**
- Document 5: Investigation and Evaluation of Alternative Uses and Products: A Cost Benefit and Macroeconomic Impact Analysis.

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Executive Summary

The yield of the Sugar Industry in South Africa is under pressure due to decreasing margin caused by increasing costs and declining revenue in real terms and the fact that its market share in the South African Customs Union (SACU) is dwindling. As part of the broader study, 'Growing the Sugar Industry in South Africa: Lessons, Justifications and Challenges', it was decided that a comprehensive financial and economic Cost Benefit Analysis (CBA) as well as a Macro-economic Impact Study be undertaken covering both the historical period (1996-2010) as well as the projected period (2010-2030) to obtain an indication of the financial and economic viability of the Sugar Industry. This information will definitely shed light on the hypothesis that the Sugar Industry, due to its regulatory nature, yields unrealistic high profits. Further, it will also indicate to what extent the Sugar Industry's future profit situation will be affected and its impact on economic development and growth.

The objective of this report is to present the financial and economic analysis and the macro and socio-economic impacts that emanate from the capital investment in the Sugar Industry. The financial and economic impacts were calculated by means of a comprehensive Cost Benefit Analysis. The Cost Benefit Analysis calculates the so called micro impacts of the project. The macro and socio-economic impacts of the project were calculated by means of a macro-economic impact analysis. This analysis also includes the ripple effects that the Sugar Industry has on the South African economy through the buying of raw materials and the paying out of salaries and profits into the economy.

As already indicated, the project evaluation entails a historic and a future analysis. In the future analysis, a business as usual scenario was performed as well as scenarios in which the financial and economic impacts are investigated should the marketing regulations of the Sugar Industry be relaxed.

The benefits and costs for both the post and the pre-analysis are accounted for over a total period of 34 years. The analyses for both periods are done separately; for the historic period, the study is done from 1996 to 2010 and for the future it is done from 2010 to 2030.

The South African Sugar Industry has two distinct facets, namely; the sugarcane growers and the sugarcane millers. The millers were evaluated with and with-out value-add or by-products. Value-add products include molasses, bagasse, animal feed etc. The executive summary tables are all based on miller including by-products. For practical reasons the research was carried out separately for both the growers and for the millers, and the results were combined to give an overall set of results for the industry. The growers cost structure is based on commercial growers and is then extrapolated to all growers including small-scale growers. Similarly, for the growers the calculations were carried out separately for the different regional growers and the results then combined to give a total set of results for all the growers. The regional growers are as follows:

- Northern Irrigation;
- North Zululand;

- North Coast;
- Midlands; and
- South Coast.

The microeconomic analyses (CBA) as well as the macroeconomic analysis of this study are conducted in terms of an Ex-post and Ex-ante perspective.

Evaluation Criteria	Growers	Millers	Total Industry
NPV (R million)	-R 251	-R 422	-R 672
BCR	0.92	0.94	0.93
IRR	6%	6%	6%

Historic Economic CBA Results (with by-products) of the Sugar Industry (Economic Prices)

From the results Historical financial and economic analysis (Cost Benefit Analysis) shown in the table above, it is evident that on average and over the period 1996 to 2010, the Sugar Industry made some acceptable profits. However, the profits have been slowly eroded over this period due to the deterioration of the real income (inflation adjusted) and rising cost in real terms such as material real increases in energy costs. The combined impact of this and its debilitating impact on the high proportion of small-scale growers was that the North Coast region on average has even made noteworthy losses when compared to acceptable yield benchmarks as shown in the table below. The area under sugarcane for small-scale growers might be overstated which then overstates the relative lack of profitability of North Coast region.

Evaluation Criteria	Northern Irrigation	North Zululand	North Coast	Midlands	South Coast	Total
NPV (R million)	R 318	R 20	R -799	R 114	R 97	R -251
BCR	1.28	1.03	0.47	1.22	1.22	0.86
IRR	12%	8.48%	N/A	19%	14%	11%

Historic Regional Economic CBA Results (Economic Prices)

Note: The 11% average IRR is different from the 6% as per due to the North Coast results which are negative to the extent that an IRR cannot be calculated. The 1% is a manual calculation of an average IRR, while the 6% was calculated by the excel programme.

The macro-economic impact measured in 2010 as depicted in the table below very clearly shows the important and sizeable development effect that the Sugar Industry has on the KZN and Lowveld and also to an extent on the national economy, through its direct and secondary effects. The Sugar Industry is very labour intensive and creates jobs in areas of the province, which are extremely poverty stricken. It also lends itself as a starter industry for small emerging farmers due to the fact that it does not entail complex farming practices.

Main Component	RSA National				KwaZulu-Natal & Lowveld			
	GDP (R millions)		Employment (Numbers)		GDP (R millions)		Employment (Numbers)	
	Total	%	Total	%	Total	%	Total	%
Sugar Millers	2,475	43%	22,759	20%	1,707	42%	20,743	19%
Cane Farmers (Growers)	2,424	42%	85,921	76%	1,761	44%	83,793	78%
SASA Industry	896	15%	4,329	4%	552	14%	3,271	3%
Total	**5,795**	**100%**	**113,009**	**100%**	**4,020**	**100%**	**107,807**	**100%**

Macro-Economic Impact in 2010 Allocated to the Main Institutions Comprising the Sugar Industry (with by-products)

The financial and economic analysis (Ex-Ante Cost Benefit Analysis) portray that the Future prospects of the Sugar Industry, over the period 2010 to 2030, on average will make acceptable profits under the assumptions adopted. Profitability is not only noted on a national basis, but also on a regional basis. The future prospect is based on substantial recovery in sugarcane yields consistent with best farming practice and financially viable growers as well as recovery of sugar cane to supply to fill all mills to capacity. The international raw sugar price was assumed to rise from 19.35 c/lb in 2010 to 31.5 /clb in 2030 in nominal/current terms with an average nominal sugar price of 28.2 /clb (and a real average price of 23.5 /clb) over the period. The input costs were assumed to be constant in real terms over the future scenarios.

Evaluation Criteria	Growers	Millers	Total Industry
NPV (R million)	R 2,757	R 9,391	R 12,148
BCR	1.19	1.46	1.35
IRR	10%	19%	13%

Future Economic CBA Results (with by-products) for the Sugar Industry (Economic Prices)

Evaluation Criteria	Northern Irrigation	North Zululand	North Coast	Inlands	South Coast	Total
NPV (R million)	R 734	R 397	R 1,011	R 485	R 129	R 2,757
BCR	1.14	1.14	1.43	1.24	1.07	1.20
IRR	9%	9%	11%	10%	9%	10%

Future Regional Economic CBA Results (Economic Prices)

As far as the macro-economic impact is concerned it can be emphasized that the Sugar Industry will have a slightly more important impact in the future relative to the past. This will, however, be dependent on the stability of the world sugar price as well as the regulatory environment of the Sugar Industry. It is important to note that in some of the districts of KZN and Lowveld, the Sugar Industry is vital in terms of job creation and poverty alleviation.

	Historic Total Impact	Future/Business as usual Total Impact	Marginal Impact	% Change
Impact on GDP (R millions)	5,795	19,375	13,580	234%
Impact on Employment [numbers]:	113,009	156,943	43,934	39%

Historic Compared with Future/Business as Usual, Macro-Economic Impact of the Sugar Industry on the National Economy in terms of GDP and Employment (Constant 2010 prices)

Historically, the domestic price has always been greater than the export price. In 2010 specifically, the domestic price was 39% higher than the export price. Scenarios were developed to demonstrate the various impacts in case the marketing regulations which underpin the determination of the domestic price are relaxed. These scenarios entail:

- Domestic price equals import parity price.
- Domestic price equals sugar price on international commodity markets.
- Domestic price equals EU preferential export price.

From the alternative domestic price scenarios it is evident that the Sugar Industry will be negatively impacted on if market regulations are relaxed and the price of the domestic market declines steeply. This will have a profound negative impact on GDP and employment. The areas that experience high levels of poverty and unemployment in the KZN and Lowveld happen to be those where sugar production is most prominent. These areas will be further severely impacted by the loss of sugar production and related impact on employment if the market price environment tends towards an export and import parity price regimes.

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Acronyms

BCR	Benefit Cost Ratio
CBA	Cost Benefit Analysis
DBSA	Development Bank of Southern Africa
DPLG	Department of Provincial and Local Government
EU	European Union
IRR	Internal Rate of Return
KZN	KwaZulu-Natal
NPV	Net Present Value
RV	Recoverable Value
SACU	South African Customs Union
SAM	Social Accounting Matrix
SARB	South African Reserve Bank
SASA	South African Sugar Association
StatsSA	Statistics South Africa

1. BACKGROUND

The financial and economic yields of the sugar industry in South Africa are under pressure due to decreasing margin caused by increasing costs and declining revenue in real terms and the fact that its share in the export quantum of the South African Customs Union (SACU) is dwindling. This is directly related to South Africa being the only developing country excluded from preferential access to the markets of the European Union. Furthermore, due to the industry being subject to a measure of regulation there has always been conflicting views on how this affects its economic viability. One view is that because of this the sugar industry generates unrealistically high profits, whereas on the other hand there is a view that the industry is continually being put under undue pressure to attain satisfactory profit margins.

Consequently, as part of this study, it was proposed that a comprehensive financial and economic Cost Benefit Analysis (CBA) as well as a Macro-economic Impact Analysis be done for the sugar industry. The study incorporates the past few years as well as what the longer term future will hold for the financial and economic viability of the sugar industry. The results shed more light on the hypothesis that the sugar industry, due to the regulatory influences, yielded unrealistically high profits and how this will affect the profit situation in the future.

2. OBJECTIVE

The objective of this report is to provide the outcome of the financial and economic cost-benefit analyses and the macro and socio-economic impacts that emanate from capital investment in the sugar industry. The macro-economic and socio-economic impacts of the sugar industry are calculated with the use of an appropriate macro-economic impact model. These impacts will include the ripple effects that the sugar industry have on the total South African economy through, for example, the buying of raw materials and other inputs from supplying industries. In addition the economic stimulation through the payment of salaries and wages and earning of profits in industries directly and indirectly linked to the sugar industry is measured.

As indicated before, the above analyses will incorporate a historic period as well as a longer term projection into the future. In the future projection a “business as usual” scenario will be worked through as well as a number of scenarios where the marketing regulations/agreements of the sugar industry are relaxed.

3. PROJECT SCOPE

The study focus, as already indicated, will be on the Cost Benefit Analysis and the Macro-economic Impact analysis for the sugar industry.

The benefits and costs for investing in the sugar industry for both the historical and projection periods are accounted for over a total of 34 years. For comparison purposes the analyses are split in two, covering the historic and projection periods separately i.e. from 1996 to 2010 (14 years) and from 2010 to 2030 (20 years) respectively.

The South African sugar industry has two distinct institutional components namely; the sugar cane growers and the sugar cane millers. For practical reasons the growers and the millers were analysed separately, and the results were combined to give an overall set of results for the industry in total. The millers were evaluated with and with-out value-add or by-products. The executive summary tables are all based on miller operations including by-products. Similarly, for the growers the calculations were carried out separately for the different regional concentrations of growers and the results combined to give a set of results for all the growers in total. The growers cost structure is based on commercial growers and is then extrapolated to all growers including small-scale growers. The regional demarcations are as given below:

- Northern Irrigation.
- North Zululand.
- North Coast.
- Midlands.
- South Coast.

As already indicated in the previous section, in this study an analysis was also done of expected future nationwide economic impacts emanating from the sugar industry, in the event that current marketing constraints are relaxed. A number of other Scenarios were developed, including how the production of sugar in the respective regions, will be negatively impacted when final product prices are decreased substantially.

The CBA analysis clearly distinguishes between the cost and benefit streams pertaining to the sugar industry.

In the analysis, the costs inherent to the industry can be separated into two distinct components:

- Capital cost; and
- Operational cost.

Institutional division of capital cost is between:

- Growers capital cost; and
- Millers' capital cost.

Institutional division of operational cost is between:

- SASA's cost;
- Growers cost; and
- Millers cost.

The benefit stream generated by the sugar industry comprises the revenue received from sugar and molasses sales as some additional value added products at some mills.

4. METHODOLOGY

In the next two sub-sections the actual methodologies employed in conducting the analyses are described in brief. Firstly the CBA analysis and secondly the method underlying the economic impact analysis are explained.

4.1 Cost Benefit Analysis

International Standard Cost Benefit Analysis (CBA) practices are applied to evaluate both the financial and economic viability of the South African sugar industry, in historic as well as a future perspective.

The CBA approach provides a logical framework through which development projects or industries can be objectively evaluated in terms of stated financial and economic objectives and, as such, serves as an aid in strategic decision-making processes both in the private and public sectors. (A more detailed explanation of the CBA methodology can be found in Appendix B).

Financial CBA

The financial CBA is based on market and nominal prices. This refers to the relevant prices used in this calculation, which reflect the unit values actually visible in the market and those confronting the economic players as the actual unit sales values of commodities and services for sale in the market.

Economic CBA

Market prices often do not give a true reflection of the real measure of supply/demand discrepancies in the market. Whether pertaining to goods and services or production

resources, the underlying principles remain the same. This is usually caused by the intervention of outside forces such as government tax/subsidy policies and sometimes direct price regulation and world market distortions. Such policies usually lead to a misallocation of scarce resources due to "warped" price signals to investors and entrepreneurs.

To restore such a misrepresentation it is necessary to adjust nominal market prices for both inflation and the measure of outside interference. The resultant adjusted prices are then called "economic prices" reflecting the true scarcity of resources. These prices are then regarded as a true reflection of conditions in the market determining the real commercial viability of investments in such market driven projects or industries.

For the historic period, 1996 is the base year and the yearly values are reflected in 1996 prices. For the future period, 2010 is taken as the base year and the yearly values are reflected in 2010 prices.

The cost/benefit values in nominal and real terms for each year, for which the sugar industry is under review, are discounted with an appropriate discount rate to obtain present values.

The financial CBA is conducted in current prices (with the assumption that the SA inflation rate over the longer period will be less than 6%) and a real yield on capital of 5% giving a discount rate of 11.3%[1] per annum, reflecting the current cost of capital.

The economic CBA is done in constant prices and discounted by a social discount rate of 8% per annum [incorporating broader developmental objectives]. This is in line with the criteria outlined in the CBA Manual[2].

Using the above information for both the periods under review, various criteria can be calculated to illustrate the prospective financial and economic viability of the sugar industry under certain conditions. A first measure is to compare the stream of estimated costs with the estimated benefits of the capital invested in the sugar industry by means of a ratio (Benefit Cost Ratio). In order for a project to be considered financially and economically viable, this ratio must have a value greater than 1 indicating that benefits outweigh costs.

Other criteria that can be derived from the discounted cost/benefit streams over time and can also be used to judge the viability of the sugar industry are the Net Present Value (NPV) and Internal Rate of Return (IRR) ratios. A more detailed discussion of each of these criteria in

[1] The Financial Discount rate of 11.3% is based on an assumed yield rate of 5% per annum, and an assumed inflation rate of 6%. The following formula is used: ((1.05*1.06)-1=11.3%).

[2] A Manual for Cost Benefit Analysis in South Africa with specific reference to Water Resource Development, Second Edition (Updated and Revised), Conningarth Economists for the Water Research Commission, August 2007).

terms of viability indicators is included in the results section of each of the two CBA components addressed in 5.2.1 below.

Due to the dissimilarities of the cane producing sector and the milling sector, the CBA analyses was conducted for each one separately. The results were then combined to give an overall set of results for the sugar industry. For the historic CBA, the analysis was first done in current market prices, then real (inflation-adjusted) and economic prices. For the CBA based on future projected data, the analysis was first done in real (inflation-adjusted) prices then current and economic.

4.2 Macro-Economic Impact Analysis

4.2.1 Definitions and Objectives Underlying the Macro-economic Modeling Framework

The main purpose of this portion of the study is to estimate the impact of the Sugar Industry on the South African economy as well as on the economy of the KwaZulu-Natal (KZN) province and the Lowveld (Mpumalanga provincial economy). It is proposed that such impacts will be measured in terms of the contribution that the sugar industry is estimated to make towards the following macro-economic aggregates of the national and provincial economies:

- Gross Domestic Product (Economic Growth);
- Employment Creation split into;
  - Skilled Labourers;
  - Semi-Skilled Labourers; and
  - Unskilled Labourers.
- Capital Utilisation (Investment);
- Household Income (Poverty Alleviation in terms of Low Income Households);
- Fiscal Impacts; and
- Balance of Payments.

The macro-economic impact analysis was so structured to reflect the average annual production output over the total study period of 34 years. Furthermore, these macro-economic impacts also reflect the ultimate or total outcome, i.e. adding the direct and secondary linkages of the industry's impact on the economy.

4.2.2 Converting the Social Accounting Matrix into an Impact Model

The provincial SAMs compiled by Conningarth Economists were converted into user-friendly macro-economic impact models which can be used by each province to calculate the economic impact of "interventions" by way of programmes and projects on the economy of a relevant

province. The model makes use of Excel spreadsheets and is driven by a set of "Macros" which are used to eliminate the need to repeat the steps in a simple task over and over. For a specific project or say a policy intervention, the model provides the size of the macro-economic impacts, the values of which are then also used to calculate key economic performance or efficiency indicators at national and provincial government level. Such key macro-economic performance indicators can be produced for both the construction and operational phases of a specific project. It is also important to highlight the fact that the macro-economic impact model is robust enough to cater for varying degrees of input data qualities and availability. For instance, if the impacts are required at local government level, the model lends itself well to adjusting relevant provincial coefficients to realistically portray the situation at lower levels.

In layman's terms a Social Accounting Matrix (SAM) also represents a mathematical matrix depicting the linkages that exist in financial terms between all the major role players in the economy, i.e. business sectors, households and government. It is very similar to the Input/ Output Table in the sense that it also reflects the inter-sectoral linkages that are present in an economy. The development of the SAM also provides a logical framework within the context of the National Accounts in which the activities of especially households are accentuated and distinguished prominently. The households are indeed the basic economic unit where significant decisions are taken affecting economic variables, such as consumption expenditure and personal saving. By combining households into homogenic groups in the SAM, makes it possible to study how the economic welfare of these groups is affected by changes in the economy.

To sum up the SAM serves a dual purpose. Firstly, it is a reflection of the magnitude of economic and financial linkages that exist between the major stakeholders in an economy, and secondly, it can be converted into a powerful econometric tool that can be used to conduct various economic analyses such as calculating the impact of investment projects on various parts of the economy (A more detailed technical description of the SAM and its analytical attributes are provided in Appendix C).

By applying the general tenets of the general equilibrium economic model to the SAM structure, the so-called direct, indirect and induced effects (indirect and induced effects refer to the secondary effects) emanating from the various levels of value adding viz. at primary (including mining), manufacturing, commercial services levels etc. are quantified.

The direct impact that occurs, for example, in the Sugar Industry is measured through changes in production/turnover, payment of remuneration to employees and profit generation. The indirect impacts refer to impacts on industries that provide inputs to the Sugar Industry and other backward linkages. The induced effect or income effect refers to a further round of economic activity that takes place in the economy because of additional consumer spending as a result of the additional salaries and wages that occur throughout the economy. The impact analysis will be based on the standard economic aggregates. A brief overview of the definitions of each of these aggregates is given in Appendix D.

4.2.3 Data Sources and Assumptions

For purposes of the impact analysis Conningarth Economists compiled and updated the Social Accounting Matrixes (SAMs) for the South African and KZN economies, which formed the basis of the impact model *viz* a general equilibrium model. This model quantifies the direct and secondary impacts over time.

The compilation of the updated South African and KZN SAMs was part of a major initiative by the Development Bank of Southern Africa (DBSA), Department of Provincial and Local Government (DPLG), StatsSA, National Treasury and the South African Reserve Bank (SARB) to compile nine comparable provincial SAMs that have all been updated to 2006 prices and have been benchmarked with the new South African SAM of 2006. The KZN SAM was finalized in October 2009, and was overseen by an expert group of people from the KwaZulu-Natal Province, chaired by the KZN Office of the Premier.

The benchmarking exercise was necessary to ensure that all control totals add up to the National Account figures as reflected in the SARB Quarterly Bulletin – June 2008 and the relevant figures reflected in the Statistics South Africa (StatsSA) publications, especially P0144, which reflects the 2006 Supply and Use Matrix.

The Cost Benefit Analysis (CBA) that preceded the macro-economic impact analysis provided the bulk of information requirements for the macro-economic modelling system.

However, modeling the macro-economic impact of the construction and operational phases of the sugar industry requires additional detailed information regarding the two periods under consideration. When performing the CBA analysis and per definition the macro-economic impact analysis, the model requires information on the performance of the sugar industry such as income generated, operational cost and information regarding the course of investments in the sugar industry. The access to and quality of historic data and assumptions for purposes of projections into the future (business as usual scenario and relaxing the marketing regulations scenario) of the sugar industry are discussed in detail in Section 5 (historical data), Section 6 (assumptions on future prospects) and Section 7 (assumptions on relaxing the marketing regulations). Examples of the type of inputs the impact model require are given in Appendix E.

5. HISTORICAL FINANCIAL AND ECONOMIC CBA ANALYSES OF THE SUGAR INDUSTRY: 1996 - 2010

The following section describes the outcome of the financial and economic CBA analyses of the sugar industry stretching over the historical period 1996 to 2010. The assumptions dealing with each role player in the industry are explained, together with an explanation of data used and some technical assumptions made.

5.1 Assumptions Underlying the Historical Analysis: 1996 - 2010

As indicated earlier, the analysis was done in nominal prices (current prices) as well as in economic prices. The economic evaluation was done in constant 1996 prices (inflation-adjusted) and the market prices of certain inputs were adjusted to reflect the real economic costs of these inputs.

For purposes of the CBA the "consumption" of capital in the production process is based on the same principles as with Generally Accepted Accounting Practices (GAAP) although it is allocated in a different way. In the case of GAAP, depreciation of capital (use of capital) is written off as a cost item against income on a yearly basis over the lifespan of the project. In terms of the CBA approach, the up-front initial capital investment cost as well as additional capital expenditure throughout the whole period is included in total. However, at the end of the period analysed the residual value of the capital is written back as income (negative investment value). The results of these two concepts may differ but they both attempt to account for the amount of capital used during the production process.

However, in this study, the CBA method is regarded as more appropriate since it starts by taking into account the total cost of capital expenditure the moment it is incurred. This is important because in the case of the CBA time is of the essence because income and expenditure streams are discounted at a certain interest rate over time to obtain the present values of these streams. Thus, the longer it takes for the initial investment to generate income the more difficult it will become for the project to show a positive cost/benefit ratio. The initial capital investment figures, possible additional investments over time and the residual values for the cane growers and the millers for the historic period as well as for the future projections are unfortunately not readily available from official sources and therefore had to be estimated. The methods and assumptions used to do this are explained in the document where applicable.

The data sources used as well as the core assumptions regarding the figures pertaining to SASA, the sugar cane growers and millers used for the historic financial and economic CBA analyses are briefly discussed below.

5.1.1 SASA

5.1.1.1 Division of Proceeds

The total proceeds from the domestic sales and exports of sugar and molasses are sourced from SASA. From the total proceeds SASA deducts an industrial charge where after the net divisible proceeds are shared between millers and growers in terms of an agreed fixed ratio. The ratios[3] used since 1996 is as follows:

[3] Source: Cane Growers Report 2009/2010

Year	2006	2007	2008	2009	2010
Growers	63.77%	64.07%	64.07%	64.37%	64.37%
Millers	36.23%	35.93%	35.93%	35.63%	35.63%

Table 1: Division of Proceeds between Millers and Growers

The 2006 ratio was used in the calculations for the period from 1996 to 2006.

5.1.1.2 Income

SASA's income is assumed to be exactly equal to its expenditure as SASA is not a profit making entity. SASA's income per annum was estimated by Conningarth and the Producer Price Index (PPI) was used to deflate it from current prices to real prices.

5.1.1.3 Capital Cost

It is assumed that there is no significant capital expenditure for SASA; hence no capital expenditure was included in the study for SASA.

5.1.2 Sugar Cane Growers

5.1.2.1 Income

Presently the South African Sugar Industry uses the Recoverable Value (RV) cane payment system to pay farmers. Under the RV Cane Payment System growers have the incentive to maximize sucrose production, while at the same time minimizing levels of non-sucrose and fibre in their cane, thereby improving cane quality.

The RV price per ton was provided by SASA for the period under study, see table below.

Year	RV Price Per ton
1996	951*
1997	1036*
1998	1047*
1999	971*
2000	1105
2001	1352
2002	1369
2003	1357
2004	1297
2005	1390
2006	1702
2007	1702
2008	2011
2009	2248
2010	2572

Table 2: RV Price per ton (* based on sucrose price)

The RV system came into effect in 2000. The RV price between 1996 and 1999 is estimated by Conningarth using the sucrose price.

For each region, the RV price per ton was multiplied by the RV tons (RV tons estimated by Conningarth Economists) to give the income per hectare.

I.e. Income per hectare = RV Price per ton * RV tons

The income per hectare was multiplied by the total hectares harvested per season per region to give the total income for the growers on a regional basis. The national income is the sum of the regional incomes.

5.1.2.2 Capital Cost

Farmers' capital expenditure consists of:

- Machinery and equipment (tractors, implements, sheds, tools).
- Land

The capital stock of sugar cane growers of machinery and equipment per hectare in 2008/2009 was estimated by Conningarth for each grower region. To estimate the capital stock of machinery and equipment per region, the capital cost per hectare (2008 prices) was first converted to 1996 prices using the Agricultural Indices[4] for capital expenditure items. The 1996

[4] Source: Abstract of Agricultural Statistics 2011.

cost per hectare under cane was multiplied by the area under cane for each year of production in order to estimate the total annual capital requirement. The annual incremental capital cost was also estimated for each year. This implies that as the hectares under cane increased, then capital investment would also increase. Reductions in the area under cane did not, however, result in reduced capital cost as it is assumed that it is capacity that fluctuates rather than capital. Residual value was estimated at the end of the study period. The residual value for the historical analysis was used as the beginning capital expenditure for future analysis.

Due to the fact that the estimated capital cost is not new, half of the estimated capital cost was used for the historic period. The assumption was made on the basis that the sugar industry has long been in existence before 1996 and that the capital at that point is not new. Replacement of capital was accounted for by taking into account that the starting capital is second hand equipment. The exercise was done for each grower region, and the regional totals summed to give the national total.

Land cost estimates were benchmarked on the opportunity cost of growing sugarcane. Maize and other crops production were used as second best alternatives. The cost per hectare of alternative crop land[5] was multiplied by the total area under cane in for each year of production. The assumption was that as the area under cane decreases, the land could be used to produce an alternative crop. Residual value was also included at the end of the programming period, and the historical residual value was used as the beginning capital expenditure for future analysis. The PPI was used to estimate real prices. The estimated land costs by region per hectare are given in Table 3 (2010 prices).

[5] Source: Conningarth Calculations.

Region	Percentage	Weighted Price
Northern Irrigation		
Subtropical	70%	R 62,920
Maize	30%	R 6,472
Total	100%	R 69,392
North Zululand		
Citrus	65%	R 35,055
Maize	35%	R 4,530
Total	100%	R 39,586
North Coast		
Maize	100%	R 7,910
Total	100%	R 7,910
Midlands		
Dairy	10%	R 3,739
Maize	90%	R 11,649
Total	100%	R 15,388
South Coast		
Subtropical	30%	R 9,060
Maize	70%	R 5,537
Total	100%	R 14,597

Table 3: Land Cost (2010 prices) for Second Best Alternative Use per Hectare by Region

The choice of alternative crops included in the study was made on the basis of the relative ease with which a farmer can switch from sugarcane production to the other crops. Timber was not used as an alternative for the Midlands since it is believed that it would not be possible for the growers to get timber production permits as allocation of permits will be very difficult to attain because of the impact of water run-off. Even more so with regard to the totally different kind of land use, capital requirements as well as yield scenarios involved.

5.1.2.3 Operating Cost

Growers' operating costs estimates are based on the 2008/2009 costs per hectare under cane per grower region, provided by the growers. For the remaining years each region's operating costs in nominal terms are calculated by multiplying the costs per hectare under cane by the hectares under cane. To estimate the real operating costs per hectare for the remaining years of the period under investigation, the calculated operating expenditure per item per hectare was deflated to 1996 prices in accordance with the individual items of the farming requisites price index[6].

[6] Source: Abstract of Agricultural Statistics 2011.

5.1.3 Millers

5.1.3.1 Income

The miller's total income is made up of income from the Division of Proceeds (sugar income) as well as the income from value added products (by-products). The millers' income from the sale of sugar is based on the industry's notional sugar price deduced from the cane growers' RV price, making use of the figures in Table 2 as well as the millers' share according to Table 1. The Millers' income per ton is depicted in Table 4.

Year	Income per Ton
1996	602
1997	646
1998	630
1999	576
2000	683
2001	842
2002	847
2003	844
2004	807
2005	834
2006	1,033
2007	1,021
2008	1,205
2009	1,354
2010	1,549

Table 4: Millers' Share of Income

The income from value added products (by-products) is estimated at 19%[7] of the miller's share of proceeds per ton.

5.1.3.2 Capital Cost

The millers' cane crushing capital cost assumptions are benchmarked on a Sugar Development Project study conducted by Conningarth in 2005. The total millers' capital cost was estimated by using this study's capital cost per ton crushed and then multiplied by the total cane tonnages crushed per annum to estimate the capital stock figures per annum. The 2005 cost per ton was first deflated to 1996 prices using the PPI. The 1996 cost per ton was multiplied with total tons produced each year to get the capital requirement per annum. Then the incremental or change in capital stock was calculated from the annual capital requirement. The assumption was that as tons of cane crushed increased, then the capital requirement will also increase. This increase

[7] Source: Millers

will be to the point of the highest volume of cane crushed. Reductions in cane crushed, however, did not result in reduced capital cost as it is assumed that it is capacity that fluctuates rather than capital. Residual value was estimated at the end of the historical analysis, and that residual value was used as the beginning capital cost for future analysis. The refinery capital cost was also accounted for. Similar procedure used for capital cost for cane crushing was adopted. The refinery capital cost was provided by millers.

Both the initial millers' and growers' capital cost was based on depreciated average cost which is materially lower than replacement capital cost. Due to the fact that the estimated capital cost is not new, half of the capital cost was used for the historic period. The assumption was made on the basis that the sugar industry has long been in existence before 1996 and that the capital at that point is not new. Replacement of capital was accounted for by taking into account that the starting capital represents second hand equipment and subsequent replacements were made at the replacement cost of capital items.

5.1.3.3 Operating cost

Milling and refinery costs were estimated by Conningarth. The milling cost per ton was multiplied by the tons of sugar crushed.

The total refinery costs were based on the total tons of sugar refined.

The operating costs also include working capital which was estimated at 10% (lending rate) of total milling and refinery costs on a three month average.

In this section the results of the financial and economic analysis are discussed as well as the macro-economic impact analysis of the South African Sugar Industry for the period 1996 to 2010.

5.1.4 CBA Results

First, the financial and economic CBA results are discussed.

5.1.4.1 Financial CBA Results

Tables 5 and 6 reflect the summarized results of the Financial CBA for the total industry and the regional growers respectively. As previously discussed, the financial analysis is done in nominal terms (current prices) at a 6% South African inflation rate, and using a financial discount rate of 11.3% per annum. This long term discount rate is in line with the real interest rate of 5%.

The results are given in the tables below, with and without the Miller's by-products respectively. It is important to note the significant value add of by- products when interpreting the Millers' results. This is an important aspect to bear in mind when considering the milling section of the sugar industry.

Evaluation Criteria	Growers	Millers (with by-products)	Total Industry
NPV (R million)	R 706	R 520	R 1,227
BCR	1.31	1.07	1.1
IRR	14%	13%	14%

Table 5: Historic Financial CBA Results (with by-products) of the Sugar Industry (Nominal/Current Prices)

Evaluation Criteria	Growers	Millers (without by-products)	Total Industry
NPV (R million)	R 706	-R 1,786	-R 1,080
BCR	1.31	0.70	0.9
IRR	14%	5.4%	9%

Table 6: Historic Financial CBA Results (without by-products) of the Sugar Industry (Nominal/Current Prices)

The Net Present Value (NPV) of an investment indicates the net benefit (difference between benefits and costs) of a project discounted to present values. In order for a project to be considered viable, a positive NPV is required as this indicates that the overall benefits outweigh the overall costs of the project over time. The NPV's in the table above show that the net benefit accrued is positive for the total industry, with a net gain of over about R1.2 billion in nominal prices. Growers and Millers have NPV's of R706 million and R520 million respectively.

The net benefit excluding by-products is negative for the industry and the millers at over –R 1 billion and R1.7 billion respectively.

The Benefit Cost Ratio (BCR) is a ratio of the present value of benefits relative to the present value of costs. A project should only be considered viable if the BCR is greater than 1. The BCR of 1.1 in Table 5 for the total sugar industry indicates that for each Rand invested in the project there is an expected return of R1.1 for the industry. Both millers and growers also have a BCR greater than one, showing positive returns.

The Internal Rate of Return (IRR) is the discount rate at which the present values of both benefits and costs are equal. Projects should have and IRR greater than the discount rate to be considered viable. In this case the IRR is 14% for the industry, which is slightly higher than the 11.3% discount rate. The NPV, BCR and IRR all confirm that the evaluation of SASA to date renders positive results.

However, these results should not only be viewed at national level, but attention should also be paid to the regional outcomes shown in Table 7. Four of the grower regions (Northern

Irrigation, North Zululand, Midlands and South Coast) have exceeded the financial viability thresholds in the recent past. The same can, however, not be said of the North Coast region which has experienced negative NPV,s, BCR,s lower than 1 and IRR,s less than the discount rate over the historical period.

Evaluation Criteria	Northern Irrigation	North Zululand	North Coast	Midlands	South Coast	Total
NPV (R million)	R 895	R 306	R -937	R 225	R 218	R 706
BCR	2.21	1.89	-1.09	1.55	1.64	1.24
IRR	20%	17%	N/A	25%	20%	16%

Table 7: Historic Regional Financial CBA Results - Growers (Nominal Prices)

Note: The 16% average IRR (Table 7) is different from the 14% as per Table 5 due to the North Coast results which are negative to the extent that an IRR cannot be calculated. The 16% is a manual calculation of an average IRR, while the 14% was calculated by the excel programme.

The most probable explanation of why some regions made a loss over the historic period is the inability to cope with the long term decline in the margins in real terms and the RV price as well as the real long term rise in costs that the sugar cane growers were confronted with. The decline in the RV price per ton is depicted in Figure 1 below, where it is calculated that the real value declined by 2.4% per annum over the 14 year period.

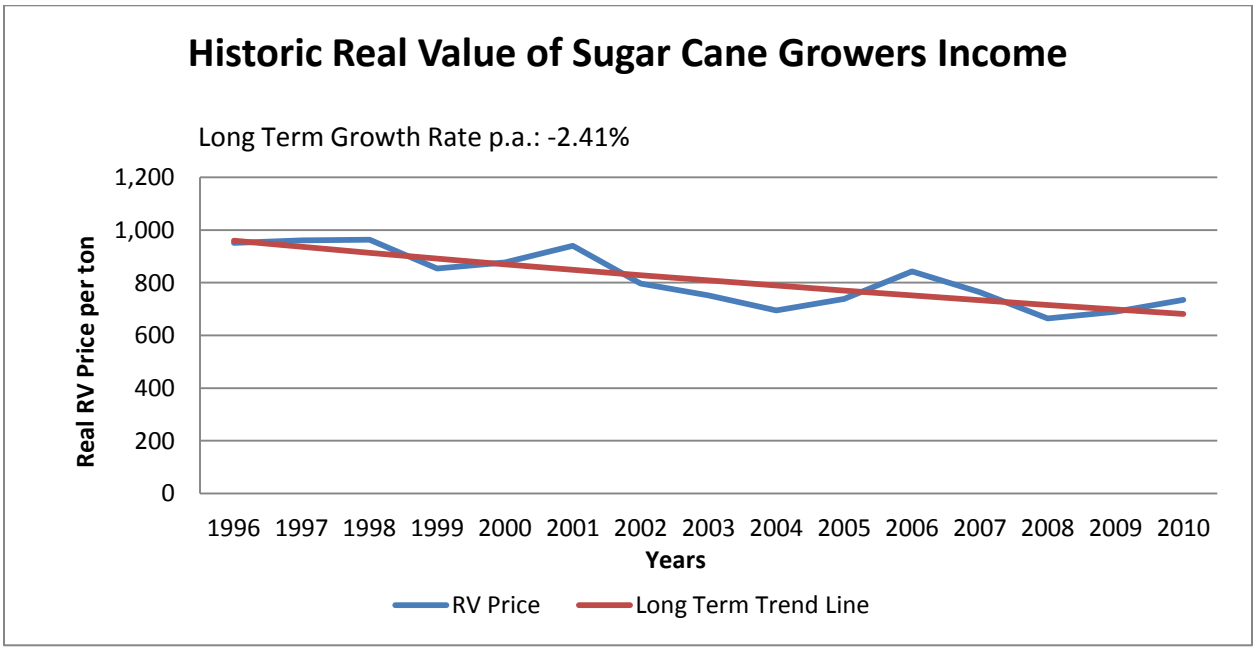

Figure 1: Historic RV Income for the Sugar Cane Growers – Real/Constant Prices (Inflation-adjusted)

Source: Conningarth Economists

The graph above shows that although the RV price was fluctuating over the period, the RV income trend was declining substantially as indicated by the trend line.

The figure below shows the relationship between intermediate costs, total costs and the RV price paid to farmers expressed in terms of indices. The figure shows that up to 2001 the RV price was in line with the two cost items. The gap started opening up to 2011, in 2010 it appears as if a recovery period in the RV price is emerging, but not yet sufficient to cover the gap.

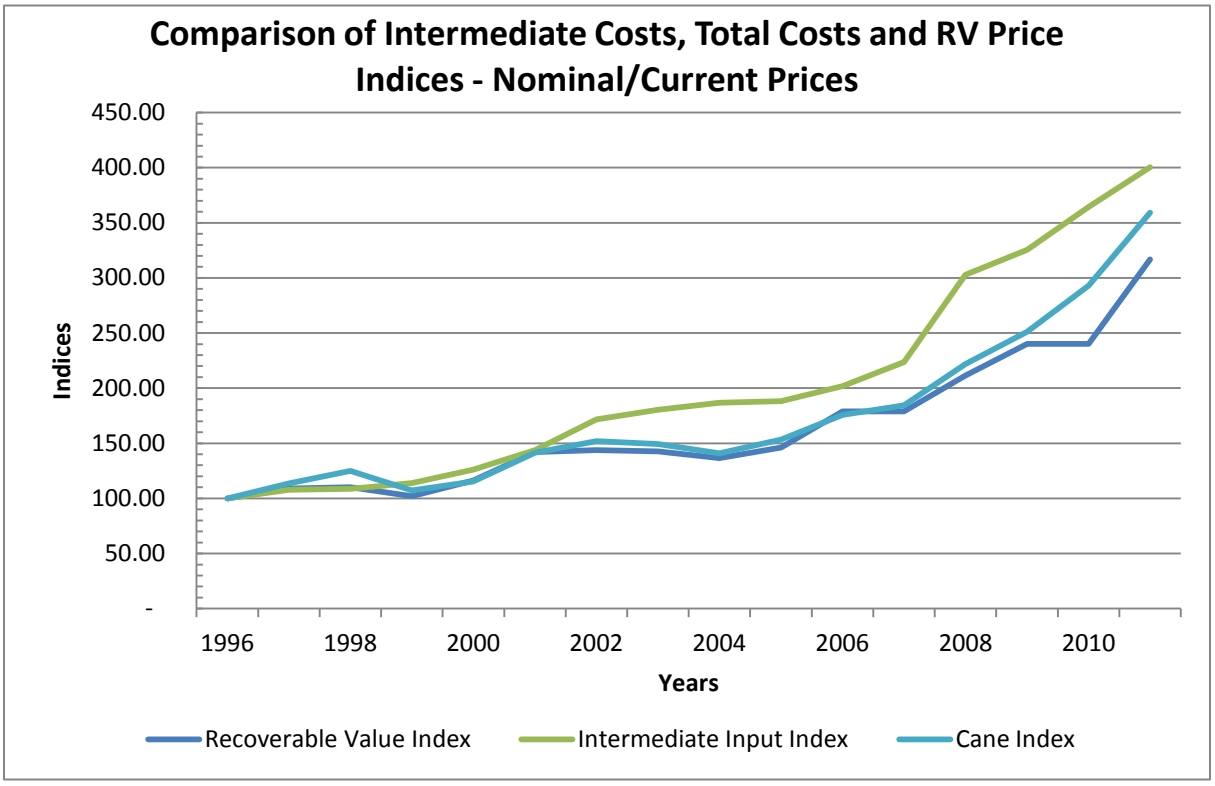

Figure 2: Comparison of the Intermediate Costs, Total Costs and the RV Price Indices Over The Period – Nominal/Current Prices[8]

For the full financial CBA results refer to Appendix A.

The combined impact of this widening gap between intermediate costs and the RV price and the drought situation had a debilitating impact on a high proportion of small-scale growers in the North Coast region. On average it was not only the low prices but also the noteworthy

[8] Source: Conningarth Economists

losses in yields because of the drought that contributed to the large number of small scale farmers leaving the industry.

5.1.4.2 Economic CBA Results

The economic CBA is conducted in economic values of costs and benefits. This was done by adjusting the constant 1996 prices with appropriate relative price indices to obtain economic/shadow prices. These prices, also referred to as shadow prices are used in order to reflect the real cost of using scarce economic resources in the production process, as discussed in the methodology section above. Shadow prices adjustment factors used for both millers and growers were derived from the eThekwini SAM and are given below.

Tables 8 and 9 below show the economic CBA results for the total industry and the regions respectively.

Evaluation Criteria	Growers	Millers (with by-products)	Total Industry
NPV (R million)	-R 251	-R 422	-R 672
BCR	0.92	0.94	0.93
IRR	6%	6%	6%

Table 8: Historic Economic CBA Results (with by-products) of the Sugar Industry (Economic Prices)

Evaluation Criteria	Northern Irrigation	North Zululand	North Coast	Midlands	South Coast	Total
NPV (R million)	R 318	R 20	R -799	R 114	R 97	R -251
BCR	1.28	1.03	0.47	1.22	1.22	0.86
IRR	12%	8.48%	N/A	19%	14%	11%

Table 9: Historic Regional Economic CBA Results (Economic Prices)

In economic terms there was a net loss of R 672 million for the total industry, as shown by Table 8. The BCR of 0.93 indicates that for every R1 invested in the project, there was a negative return of R0.93for the industry. The IRR of 6% was below the discount rate of 8%.

This shows that in economic prices the industry was not making profits. This shows that in economic prices the industry was not making profits during this period and was probably not reinvesting new capital, rather digesting capital. The low return on capital was not encouraging reinvestmentHowever, as with the financial results, the North Coast region showed a deficit of R799. The BCRs is also below one and the IRR below the discount rate.

For the full economic CBA results, refer to appendix A.

5.1.5 Macro-Economic Impact Results on South African and the KZN and Lowveld Economies

As mentioned in section 4.2 above, the macro-economic impacts emanating from the sugar industry in South Africa have been measured in terms of a number of standard macro-economic performance indicators. A Macroeconomic model based on the Social Accounting Matrix of South Africa was constructed for this purpose. The tables below show the macro-economic impacts on the Gross Domestic Product, Capital Utilisation, Employment, Income Distribution, the Fiscal Impact and the Balance of Payments for South Africa as well as for the KZN and Lowveld regions. The impact analysis also covers the historic period from 1996 to 2010. For practical purposes it was decided to use 2010 as the base year of the impact analysis. In practice it required that the data inputs obtained from the CBA analyses had to be converted from 1996 prices to 2010 prices. In Table 10 and 11 the results of the macro-economic impact exercise are given for 2010 (in 2010 prices) for the South African economy, and the combined KZN and the Lowveld economies respectively.

No.	Macro-Economic Aggregates	Direct Impact	Indirect Impact	Induced Impact	Total Impact
1	**Impact on GDP (R millions)**	2,191	1,316	2,287	5,795
2	**Impact on Capital Formation (R millions)**	8,953	2,481	4,230	15,664
3	**Impact on Employment [numbers]:**	93,990	7,356	11,663	113,009
3.1	Impact on Skilled employment [numbers]	4,941	1,483	3,167	9,591
3.2	impact on Semi-skilled employment [numbers]	63,412	4,102	6,023	73,537
3.3	impact on Unskilled employment [numbers]	25,636	1,772	2,473	29,881
4	**Impact on Households (R millions):**				3,759
4.1	Low Income Households (R millions)				683
4.2	Medium Income Households (R millions)				810
4.3	High Income Households (R millions)				2,266
5	**Fiscal Impact (R millions):**				1,685
5.1	National Government (R millions)				1,557
5.2	Provincial Government (R millions)				18
5.3	Local Government (R millions)				111
6	**Impact on the Balance of Payments (R millions)**				2,208

Table 10: Macro-economic Impact of the Sugar Industry on South African economy in 2010

No.	Macro-Economic Aggregates	Direct Impact	Indirect Impact	Induced Impact	Total Impact
1	**Impact on GDP (R millions)**	2,191	988	840	4,020
2	**Impact on Capital Formation (R millions)**	8,953	2,058	1,905	12,917
3	**Impact on Employment [numbers]:**	93,996	7,441	6,369	107,807
3.1	Impact on Skilled employment [numbers]	4,941	1,072	1,012	7,025
3.2	Impact on Semi-skilled employment [numbers]	63,417	4,593	3,917	71,928
3.3	Impact on Unskilled employment [numbers]	25,638	1,776	1,440	28,855
4	**Impact on Households (R millions) p.a.**				2,040
4.1	Low Income Households (R millions)				381
4.2	Medium Income Households (R millions)				512
4.3	High Income Households (R millions)				1,147
5	**Fiscal Impact (R millions) p.a.**				919
5.1	National Government (R millions) p.a.				847
5.2	Provincial Government (R millions) p.a.				6
5.3	Local Government (R millions) p.a.				66
6	**Impact on the Balance of Payments (R millions)**				1,190

Table 11: Macro-economic Impact of the Sugar Industry on the KZN and Lowveld Economies Combined for 2010

The potential macro-economic impact of the sugar industry over this period was materially reduced due to the declining margin in real terms over the period of evaluation as well as decline in sugarcane supply which in turn was materially impacted by the decline of more than 50% of the small-scale growers. As the future scenario indicates the impact of the sugar industry should be 3.3 times higher.

Even though the main focus of this study is directed at the sugar industry's impact on the South African economy as a whole, the impacts on the KZN and the Lowveld regions as such should also receive attention. This is because the sugar industry *per se* is mainly located in KwaZulu-Natal and the Lowveld of Mpumalanga. In the rest of this section the impact of the Sugar Industry on the KZN and the Lowveld economies will be discussed relative to the impacts on the rest of the South African economy.

Some of the salient features of the macro-economic impact of the sugar industry measured in terms of GDP, capital utilisation, employment creation, impact on Households' income distribution, Fiscal impact and the impact on the Balance of Payments are elaborated on below.

5.1.5.1 Impact on Gross Domestic Product (GDP)

GDP is a good indicator of economic growth and welfare as it contains, among other, remuneration of employees and gross operating surpluses (profits).These are all components of the value added chains at all the levels of the economy.

According to Table 10 the total impact on RSA's GDP is estimated to amount to approximately R5 795 million (in constant, 2010 prices), which translates to approximately 0.32% of the total RSA GDP[9] in 2010. The direct impact is estimated at R2 191 million which is less than half the total amount when compared to the total of R5 795 million. This emphasises the importance of the so-called multiplier effects which the Sugar Industry has on the South African economy.

In Table 11 it is shown that the Sugar Industry ultimately adds a total amount of R4 020 million to the KZN and Lowveld economy in 2010. This amounts to approximately 1.4% of the combined total provincial GDP of the KZN and Lowveld[10].

5.1.5.2 Impact on Capital Utilization

Productive capital assets are required to support or generate any given amount of economic activity (i.e. GDP). These capital assets, together with labour and entrepreneurship, form the core productive factors needed for production. Obviously the effectiveness and efficiency with which these factors are combined will determine the overall level of productivity and profitability of such assets. The aforementioned will in turn depend on a whole array of factors, of which the appropriate technology and skills content of the labour force are important. Tables 10 and 11 indicate the following:

- A capital stock of R15 664million is needed in the rest of the South African economy to sustain the 2010 level of sugar production.

- The overall capital base needed to sustain the 2010 level of sugar production in the KZN and Lowveld areas amounts to R12 917 million, of which, R2 672 million and R9 467 million are directly invested in primary agriculture (growing sugar cane) and the manufacturing process of milling, respectively.

[9]GDP for South Africa = R 1 783 617 million

[10] Provincial GDP for the KZN & Lowveld = R 290 947 million

5.1.5.3 Impact on Employment Creation

Labour input is a key element of the production process. It is one of the main production factors in any economy and employment levels are indicators of the extent that labour is effectively absorbed in the economy.

As is the case throughout the free market economy, capital together with labour and entrepreneurship form the primary productive factors needed for sugar production. The manpower requirements, in terms of people employed in the Sugar Industry are shown in Tables 10 and 11.

From the tables above, as calculated by the SAM based macro-economic model, it can be seen that the Sugar Industry's operations have sustained in total about 113 009 (direct, indirect and induced) jobs in South Africa, of which 93 990 are direct, 7 356 indirect and 11 663 induced. The 93 990 includes 7 000 mill jobs, 1671 industry support jobs, 1 438 large scale farmers, 13871 small scale farmers and 70 010 workers on large scale farms.

About 107 721 of the total are located in KZN and the Mpumalanga Lowveld. Of these , 93 996 are direct, 7 356 indirect and 6 369 induced. This employment impact of113 009 represents about 0.9% of the total employment in South Africa, about 5.1% of the total employment in the KZN and Mpumalanga Lowveld[11] regions and 18% of total agricultural employment in South Africa. It is important to note that these percentages are higher than those of GDP mainly because of the relative labour intensity of the sugar industry, compared to other large agricultural crops like maize and wheat production, or in the livestock production sectors, beef and mutton.

These figures differ from source to source and it is necessary that some relevant figures be highlighted and be discussed. As part of research for the study the industry estimated the direct employment numbers at 113 009. This includes 82 816 employees on large scale farms, 7 000 sugar mill employees, 13 871 small scale farmers, large scale farmers at 1 438 and 1 671 for industry support organisations. The industry also estimated 21 915 indirect and induced employment opportunities, providing a total of 128 711 employment opportunities.

The McCarthy study (2008) estimated the number of indirect and induced jobs at 350 000, using both backward and forward linkages, which together with the industry's direct employment numbers above provides a total of 456 000 employment opportunities.

The Imani – Capricorn Study (2001) mentioned 142 833 direct employees consisting of 1 723 large scale farmers, 51 439 small scale farmers, 73 000 workers on the large scale farms, 15 000 at the sugar mills and 1 671 industry support organisations. The study estimated the number of indirect and induced employment at 118 000, providing a total of 260 833 opportunities.

[11] Total number of jobs in South Africa is 12 364 243 and in the KZN & Lowveld region is 2 185 478.

Data Source: Community Survey 2007, by Province, Population Group and Employment.

The difference between the numbers of this study and numbers provided by the industry is in the direct category (12 806 on the large scale farms), and 2 716 in the indirect and induced categories. The main difference on the direct employment numbers is the use of different multipliers, the industry used the direct multiplier of 0.23 jobs per ha under cane while Conningarth used 0.17 jobs per ha under cane. The 0.17 multiplier was developed using a time allocation per activity and has been applied extensively by Conningarth in different sugar related studies. The industry multiplier can perhaps be further refined by differentiating between irrigation and rain fed production as it appears that they do not use the same number of workers. As far as the indirect and induced numbers are concerned this depends on the macro - economic model used, the NAMC study applied the KZN and Mpumalanga provincial SAM based models, however the difference of 2 716 employment opportunities between the two studies is a relative small number.

As far as the situation around the concept of service towns are concerned that have developed around the sugar mills, we are of the opinion that although the numbers are correct as quoted in other reports and the towns have originally developed because of the sugar mills it will be wrong to count them as part of the sugar industry. They have become entities in their own right and if the sugar mill has to close, they will lose jobs but they will still act as service providing towns to the surrounding population.

However the number of dependents on the sugar industry is as important as the workers themselves in the poverty stricken rural areas of KZN and Mpumalanga Lowveld. The reality is that it is only the sugar industry that has invested extensively in these areas with accompanying large scale industrial investments. If the number of dependents on the sugar industry is calculated, then 4 dependents per employee gives a total of 400 000 dependents on the sugar industry using the NAMC numbers. The number of 4 is in line with the latest census figures as released by Stats SA. However, the sugar industry is mostly situated in the deep rural areas where the KZN figures indicate a dependency of over 5 people per employee which indicate a dependency of nearly 600 000 people. This will be people who will be without any income or food if the industry were to suffer a sudden decline.

Using the industry's number the number of dependents without any income or food can rise as high as 750 000 people if the sugar industry in these areas is terminated.

5.1.5.4 Impact on Households (Poverty Relief)

One of the crucial aspects of any macro-economic impact assessment in South Africa is to determine whether it will have a positive impact on poverty alleviation. The extent to which the Sugar Industry is having a positive impact on poverty alleviation is by measuring its impact on household income, specifically how the low income households will benefit.

This measured impact on low-income households is presented in Tables 10 and 11. It is evident that the total national impact on low-income households in 2010 was on average R683 million

which translates to 18.2% of the total impact on households' income. Similarly, the total impact on low-income households regionally amounts to R381 million per annum and it translates into 18.7% of the total impact on households' income regionally. (To see if this impact is relatively high or low refer to Section 5.2.2.11 Economic Effectiveness Criteria.)

5.1.5.5 Fiscal Impact and Assumed Social Impacts

According to Table 10, additional government revenue (on all three levels) of approximately R1 685 million has been generated through the sugar industry in 2010. The main sources of this tax amount are direct and indirect taxes, where direct tax consists mainly of personal income tax and company tax. Examples of indirect taxes are value added tax (VAT) and customs and excise tax. The amount of VAT generated will arise from household spending made possible by the household incomes derived from the salaries and wages paid out directly and indirectly by the Sugar Industry.

The existence of the Sugar Industry in South Africa ensures the government of a consistent tax revenue source of approximately R1 685 million per annum. This could provide the means to bolster government expenditure on social services. Using the latest information on the functional distribution of government spending on social services, Table 12 contains an illustration of how certain social services can be founded on such a tax income stream.

	South African Economy
1. No of additional educators	2,497
2. No of additional beds serviced	920
3. No of additional doctors	80
4. No of additional houses	941

Table 12: Social Impacts [Numbers]

When undertaking projections of this kind, it is important to realise that the total cost to government to employ one teacher must be taken into account - that is, not only the educator's total remuneration package, but also all the other costs related to supporting the educator standing in front of a class (i.e. furniture, school buildings, administrative support, etc.). Thus, total government expenditure on education is divided between the total number of educators employed. The figures reflected above thus make provision for all direct and indirect costs associated with each of the social services investigated.

5.1.5.6 Impact on Balance of Payments

It is estimated that the historical positive impact of the Sugar Industry on the national and KZN and Lowveld Economies' Balance of Payments amount to approximately R2 208 million and R1 190 million per annum, respectively. The Balance of Payments depicts to what extent the Sugar Industry exports exceed imports required to support the Sugar Industry's total operation. The methodology used for these calculations are relatively crude, but does at least indicate whether

a notable positive or negative impact on the Balance of Payments can be expected. It is important to note that in this context, exports and imports are considered at a national and provincial level, and comprise all transactions across the borders of South Africa and the KZN and Lowveld.

5.1.5.7 Macro-Economic Impact based on the institutional and regional structure of the Sugar Industry

The table below identifies the macro-economic impact in terms of GDP and employment of the main components over the various areas of jurisdiction.

Main Component	RSA National				KwaZulu-Natal & Lowveld			
	GDP (R millions)		Employment (Numbers)		GDP (R millions)		Employment (Numbers)	
	Total	%	Total	%	Total	%	Total	%
Sugar Millers (with by-products)	2,475	43%	22,759	20%	1,707	42%	20,743	19%
Cane Farmers (Growers)	2,424	42%	85,921	76%	1,761	44%	83,793	78%
SASA Industry	896	15%	4,329	4%	552	14%	3,271	3%
Total	**5,795**	**100%**	**113,009**	**100%**	**4,020**	**100%**	**107,807**	**100%**

Table 13: Macro-Economic Impact in 2010 Allocated to the Main Institutions Comprising the Sugar Industry (with by-products)

It is evident from the table above that the major contributor to employment is the Cane Farmers (Growers) followed by the Sugar Millers. The Cane Farmers were responsible for 85 921 employment opportunities nationally in 2010. Sugar Millers and Cane Farmers contribute about the same as far as GDP is concerned.

5.1.5.8 Comparison of Impact between Provinces

The Sugar Industry makes use of various inputs directly and indirectly such as fertilizer, fuel and even consumption by labourers involved in one way or another in the value chain of the Sugar Industry. Some of these inputs will originate from the KZN and Lowveld, but others will be sourced from outside of the KZN and Lowveld areas. This additional demand outside the KZN and Lowveld will prompt economic activity in the various provinces of South Africa. In this section, estimation is done of the provincial impact of the total Sugar Industry.

The table below estimates the impact that the Sugar Industry will have on the various provinces through its backward linkages taking into account all the entities that comprise the Sugar Industry.

Province	GDP		Labour	
	R millions	%	Numbers	%
Eastern Cape	210	3.6%	773	0.7%
Free State	199	3.4%	600	0.5%
Gauteng	939	16.2%	2,610	2.3%
KwaZulu-Natal & Lowveld	-	-	-	-
Limpopo	98	1.7%	273	0.2%
Mpumalanga	149	2.6%	447	0.4%
Northern Cape	78	1.3%	243	0.2%
North-West	45	0.8%	118	0.1%
Western Cape	55	1.0%	139	0.1%
Total excl. KwaZulu-Natal & Lowveld	**1,774**		**5,202**	
KwaZulu-Natal & Lowveld Impact	4,020	69.4%	107,807	95.4%
National Impact	**5,795**	**100.0%**	**113,009**	**100.0%**

Table 14: Provincial Impacts

The above table indicates that, in 2010/11, with regard to the Sugar Industry's impact on the rest of South Africa, Gauteng drew the largest portion, followed by the Eastern Cape. Interesting to note is that the percentage impact on KZN & Lowveld in terms of GDP is 69.4% relative to a much higher 95.4% in terms of labour. This again (see paragraph 5.1.5.3) has to do with the labour intensity of the Sugar Industry.

The provincial impacts were calculated by making use of a gravity model on a commodity basis with regard to the intermediate demand for certain products. A gravity model is based on two variables, namely size of an industry as well as the distance between the origin of the product demanded, and the possible supplier of the product.

5.1.5.9 Magnitude of Linkages (Direct, Indirect and Induced effects)

The figure below represents a proportional breakdown of the Sugar Industry's direct, indirect and induced impacts in terms of national GDP.

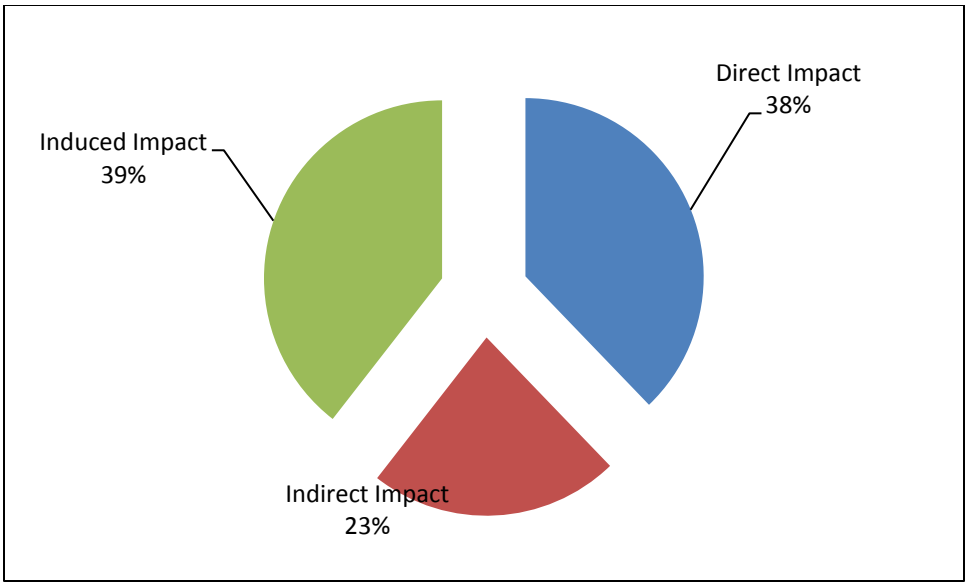

Figure 3: Proportional Level of Total Impact on GDP (2010)

The importance of the multiplier effects through its linkages with other sectors within the economy in terms of the buying of materials, paying of salaries and wages and the resulting expenditure on consumer goods are evident from the above chart. The direct effect constitutes about 38% of its overall contribution relative to the 62% that resulted from the indirect and induced effects combined. The induced impact of 39% refers mainly to the household expenditure impact that emanates from the Sugar Industry due to the salaries and wages paid out directly and indirectly.

5.1.5.10 Sectoral Impact of the Sugar Industry in South Africa

The sectoral impact analysis measures the nature and magnitude of the Sugar Industry's impact on all economic sectors in the South African economy such as the agricultural sector, mining, manufacturing, etc. The charts provided below show the impact in terms of GDP and employment on the nine (9) main sectors of the economy. These charts reflect how the GDP and employment in each sector is impacted upon by production activities stimulated by the Sugar Industry in South Africa.

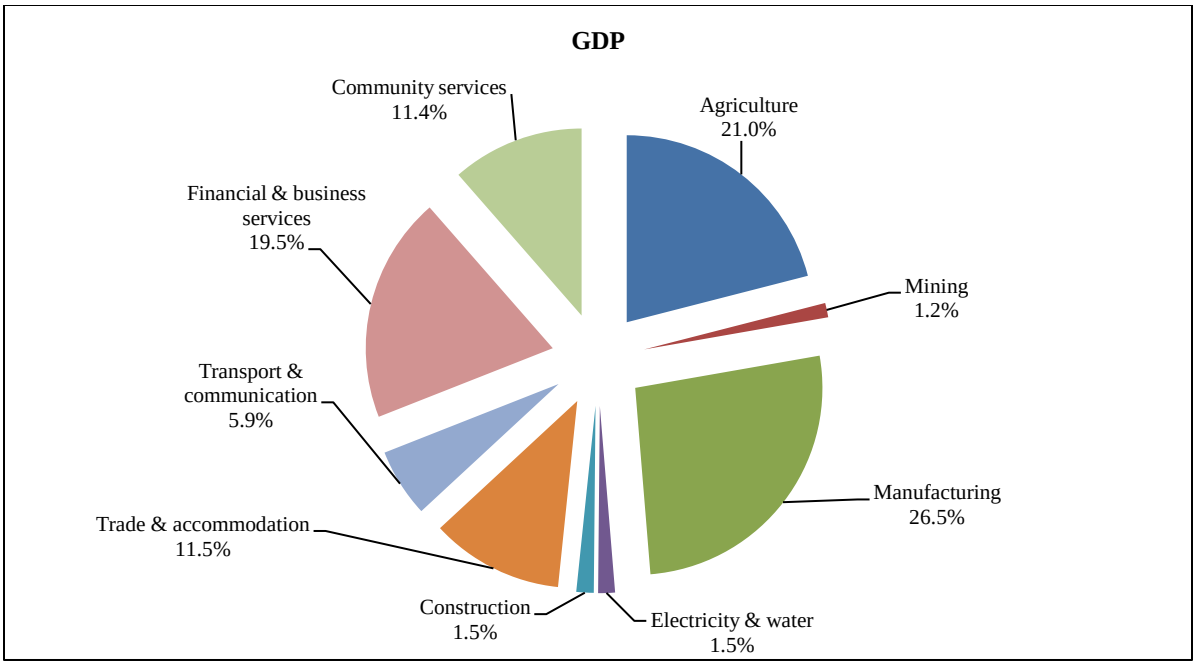

Figure 4: Proportional Sectoral Impact in Terms of GDP [Percentages]

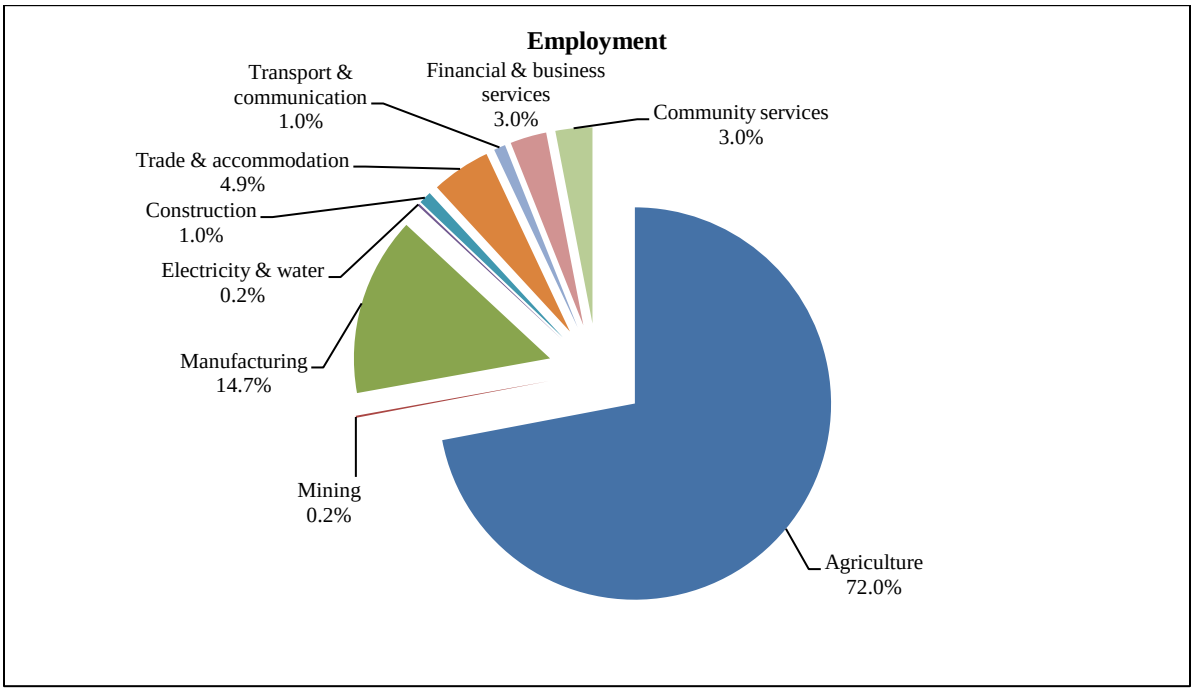

Figure 5: Proportional Sectoral Impact in terms of Employment [Percentages]

In its totality, the Sugar Industry's sectoral impact structure reflects the "weighted average" of all its sub-sectors combined. It is important to note that the GDP impact coefficients make allowance for import "leakages" from overseas. The sectoral impacts therefore only reflect the impacts on the domestic production of the supplying sectors in terms of GDP.

From the above two figures it is evident that the total effect is more profound in the agriculture and manufacturing sectors in terms of GDP and employment. This deduction is quite understandable due to the fact that in this analysis these sectors are stimulating initial productivity as well as further productivity in the other sectors. It is also well known that the agricultural sector is mainly labour intensive.

5.1.5.11 Economic Effectiveness Criteria of the Sugar Industry in South Africa

In order to provide some indication of the efficiency with which the Sugar Industry employs scarce economic resources e.g. capital, the table below provides a number of criteria that can be used to compare the efficiency of its investment with the same amount of money put into other industries. The particular efficiency ratios used are:

- A GDP/Capital ratio, which measures the additional GDP that could be generated from the investment of an additional R1 million in capital in the various sectors.
- A Labour/Capital ratio, which measures the number of additional employment opportunities that can be created from the investment of R1 million in capital in the various sectors.
- A Low Income Households/Total Household ratio, which measures the proportion of total income flowing to all households that will accrue to low income households.

Applying the first two ratios, it is possible to establish the contribution that additional capital employed in the sugar industry will make towards economic growth and job creation. If continuous economic growth in the long-term is considered to be more important than job creation in the short-term, then a favourable GDP/Capital ratio is the more important of the two ratios. However, if job creation has the priority, particularly in the short-term, then the Labour/Capital ratio is the more important one to use in evaluating the project.

The data in the following table indicates that two of the efficiency criteria pertaining to the Sugar Industry exceed that of the average for the total economy and the GDP/Capital ratio reflects a slightly lower outcome for the Sugar Industry when compared to the average of the total economy. The ratio for labour utilization and its contribution to Low-income Households' income notably exceeds the economy's relevant averages. For labour a ratio of 7.21 for the

Sugar Industry is calculated compared to an average 2.94 for the total South African Economy. When compared to the agriculture sector in general, it also compares favourably.

			Low Income Households/
	GDP/Capital	Labour/Capital	Total Households
	Ratio	Ratio	Percentage
Total Sugar Industry in South Africa	0.37	7.21	18.2%
Impact in the event that a similar amount, as invested in the Sugar Industry, is invested in the main sectors below			
Agriculture, Hunting, Forestry and Fishing	0.43	4.54	17.4%
Mining and Quarrying	0.45	2.18	18.7%
Manufacturing	0.47	2.88	16.7%
Electricity, Gas and Water	0.24	1.13	16.7%
Construction	0.59	5.99	17.5%
Wholesale and Retail Trade	0.57	4.52	16.7%
Transport, Storage and Communication	0.35	1.95	16.6%
Financial, Insurance, Real Estate and Business Services	0.44	2.24	15.2%
Community, Social and Personal Services	0.78	4.45	14.9%
Total South African Economy	0.45	2.94	16.2%

Table 15: Economic Effectiveness Criteria

5.2 Conclusions on the Historical Analysis

From the detailed financial and economic analyses (Cost Benefit Analysis) it is evident that over the period 1996 to 2010, the Sugar Industry remained viable despite having had to contend with unfavourable price and cost tendencies. However, the decline in the real sugar price and increase in real operating cost and high proportion of severely affected small-scale growers impacted negatively on the North Coast region in particular, forcing the industry there into loss making territory.

The macro-economic impact analysis showed very clearly the important and sizeable developmental and stabilizing role that the Sugar Industry has played especially in the KZN province and the Lowveld and also to a notable extent in the national economy through its direct and secondary stimulating effects. The Sugar Industry is labour intensive and creates jobs in areas of the country which are extremely poverty stricken. It also lends itself as a starter industry for small emerging farmers due to the fact that it does not entail complex farming practices.

6. A FORECAST OF THE FUTURE FINANCIAL AND ECONOMIC VIABILITY OF THE SUGAR INDUSTRY (2010 – 2030)

In this chapter an analysis is made of the future financial and economic viability of the Sugar Industry. The forecasting period is from 2010 to 2030. Basically the same analytical format as used for the historical analysis will be followed here. Therefore the focus of attention will only be on those aspects which differ from the historical analysis and warrants further elaboration.

It must be kept in mind that the results presented in this section are attained without the possible dramatic impact of the 52% increase in minimum wages for farm labour. The projected impact of the projected increases in electricity prices for the irrigation farmers has been included.

6.1 Assumptions Underlying the Financial and Economic Analysis of Expected Future Developments in the Sugar Industry

In this section the main elements of the approach to and underlying assumptions of the future analysis are briefly discussed. The discussions are divided into two parts *viz* firstly an overview of the general prospects facing the Sugar Industry in terms of trends in the world sugar price and local production is given and secondly, some specific assumptions pertaining to the future production outlook of the Sugar Industry are discussed.

6.1.1 General Prospects

The next discussion relates to the world market price environment, showing both the historical movements in world sugar prices as well as future world price projections. The discussion will also deal with how the exchange rate expectations are embodied in the price levels.

6.1.1.1 The world Sugar Price

World Sugar price in USD cents per pound (historical and future projections) is depicted in the figure below.

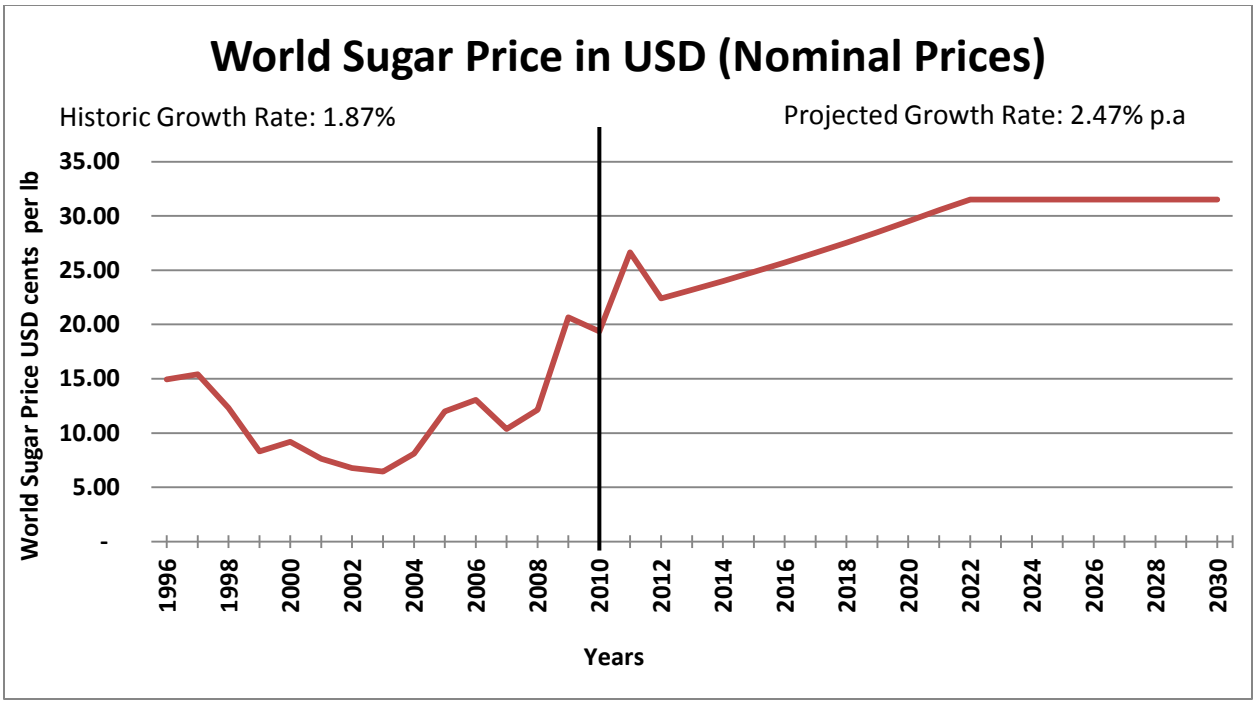

Figure 6: Historical and Projected World Sugar Price per Pound (cents) -USD (Nominal/Current Prices)

Source: Conningarth Economists

As depicted in Figure 6, it is foreseen that over the forecasting period the world sugar price in nominal Dollar terms will increase moderately. In 2010 the average world sugar price was 19.35 US cents per pound. In 2030 it is expected that the average nominal world sugar price could be in the region of 31.50 US cents per pound. The international raw sugar price was assumed to rise from 19.35 c/lb in 2010 to 31.5 /clb in 2030 in nominal/current terms with an average nominal sugar price of 28.2 /clb (and a real average price of 23.5 /clb) over the period. Due to the fact that sugar is increasingly used in the production of ethanol, specifically in Brazil, the price of sugar is now not only dependent on the normal human consumption of sugar, but could also be affected by the variations in the world oil price. Recent international studies have found that Brazil, Japan, Indonesia and the European Union all accepted that biofuels must supply 10% of energy demand for transport by 2020. The USA aspires to meet 30% of such needs from biofuels by 2030. This picture shows clearly that as far as the long term prospects of the international sugar price is concerned the chances are good that it will perform better compared to what had happened over the past 10-15 years.

As a minimum price scenario, future increases in the world sugar price should not be less than the American inflation rate. The American inflation is estimated at 3% over the study period. Therefore it follows that the world sugar price in Dollar terms (nominal) will also increase at 3% per annum for the duration of the programming period. In real terms (inflation adjusted) the world sugar price will increase at 0.5% per annum. This, therefore, means that the world sugar price is a function of both the assumed US inflation rate and the real increase in sugar price.

The figure below shows the world sugar price in South African Rand per ton in nominal and real prices (inflation adjusted), for the historic period and for the projected period.

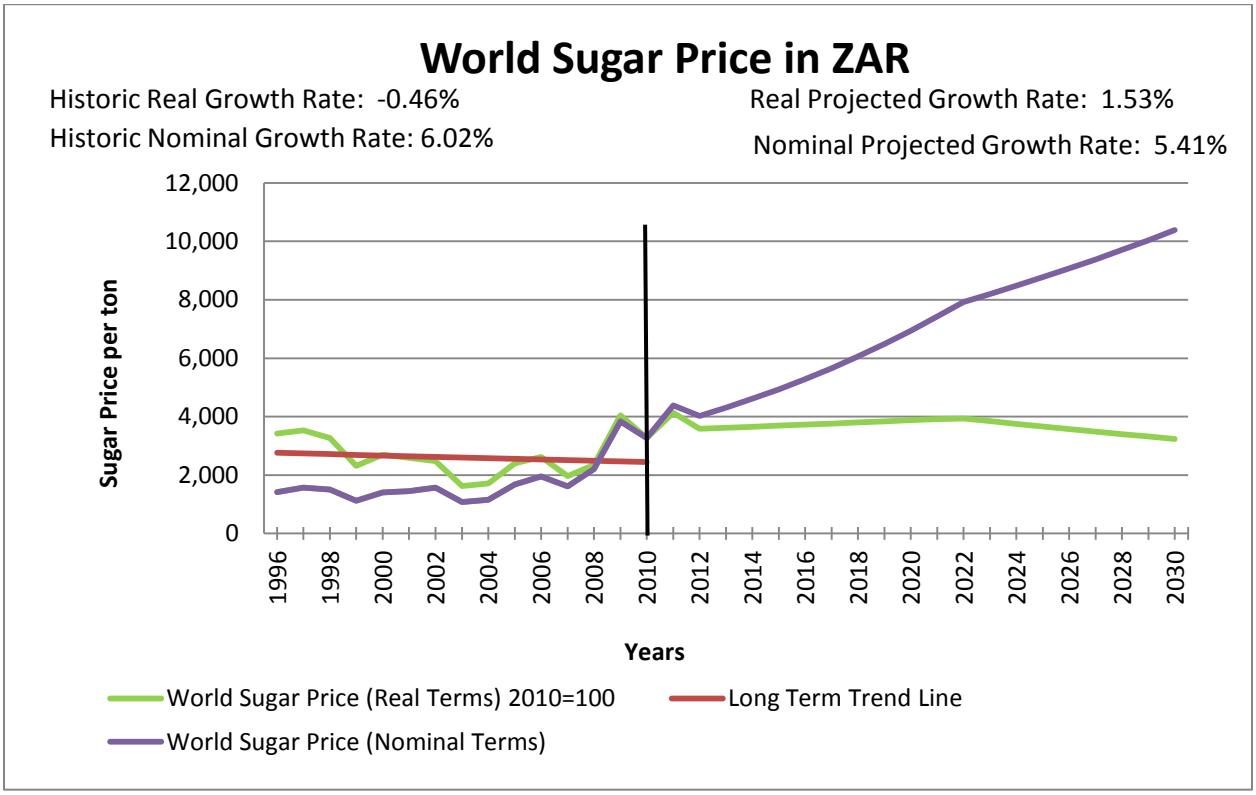

Figure 7: Historic and Projected World Sugar Prices in Rand per Ton (Nominal/Current and Real/Constant Prices)

Source: Conningarth Economists

In 1996, the nominal world sugar price was at R1 415 per ton (2010=100). Taking into account the assumptions in regard to the change in the world sugar price as well as the future assumptions regarding the Rand/USD exchange rate, the nominal price will increase to over R10 000 per ton in 2030 (see assumptions on the exchange rate in the next section). The more important price for the Sugar Industry is, however, the assumption with regard to the real price (inflation adjusted) of sugar. According to the projections, the real price will increase (0.5% real increase) moderately from 2012 but will on average be noticeably higher than the real historic price. The average real price over the historic period was R2 686 per ton whilst the average forecasted real price will be R3 690 per ton. This bodes well for the Sugar Industry in the long term since it will provide more favourable conditions to remain economically viable than was the case in the past.

6.1.1.2 Assumptions on the Exchange rate

To forecast the future course of the nominal price of sugar in Rand, it is compelling to make assumptions on the future USD/ZAR exchange rate. Under normal circumstances the exchange rate is determined by the relative performance of the RSA's productivity growth and the purchasing parity index (PPI) of the Rand. The PPI is derived from measuring the difference between the South African inflation rate and the American inflation rate. The forecasted South African inflation rate is 6% and that of America 3%. So it means a weakening in the PPI of 3 % p.a. It is also expected that South Africa's overall productivity indicator will grow 0.5% per annum slower than that of its trading partners, which will put further pressure on the Rand exchange rate to weaken against the major international currencies over the long term.

However, there are various variables that should also be taken into account, such as time, politics, international commodity prices, international capital flow etc. that play a role in influencing the exchange value of the Rand to the USD, hence the Rand remains volatile but over the longer term the more fundamental factors described above should hold sway.

6.1.2 Production in South Africa

The number of hectares under sugar cane production as well as the yield per hectare measured in tons forms the basis of determining sugar cane supply potential (output). The assumptions underpinning these factors that determine production potential will be discussed in the following two subsections. From this analysis it will become clear to what extent the sugar industry would be able to provide in the expected demand.

6.1.2.1 Hectares

In Figure 8 the actual number of hectares utilized (harvested) in the recent past as well as what is expected to be planted by sugar cane growers in the future are depicted per grower region. From this figure it can be deduced that the North Coast region has experienced a dramatic decline in hectares harvested in comparison to the other four regions. This can be attributed to declining profitability due to higher production costs.

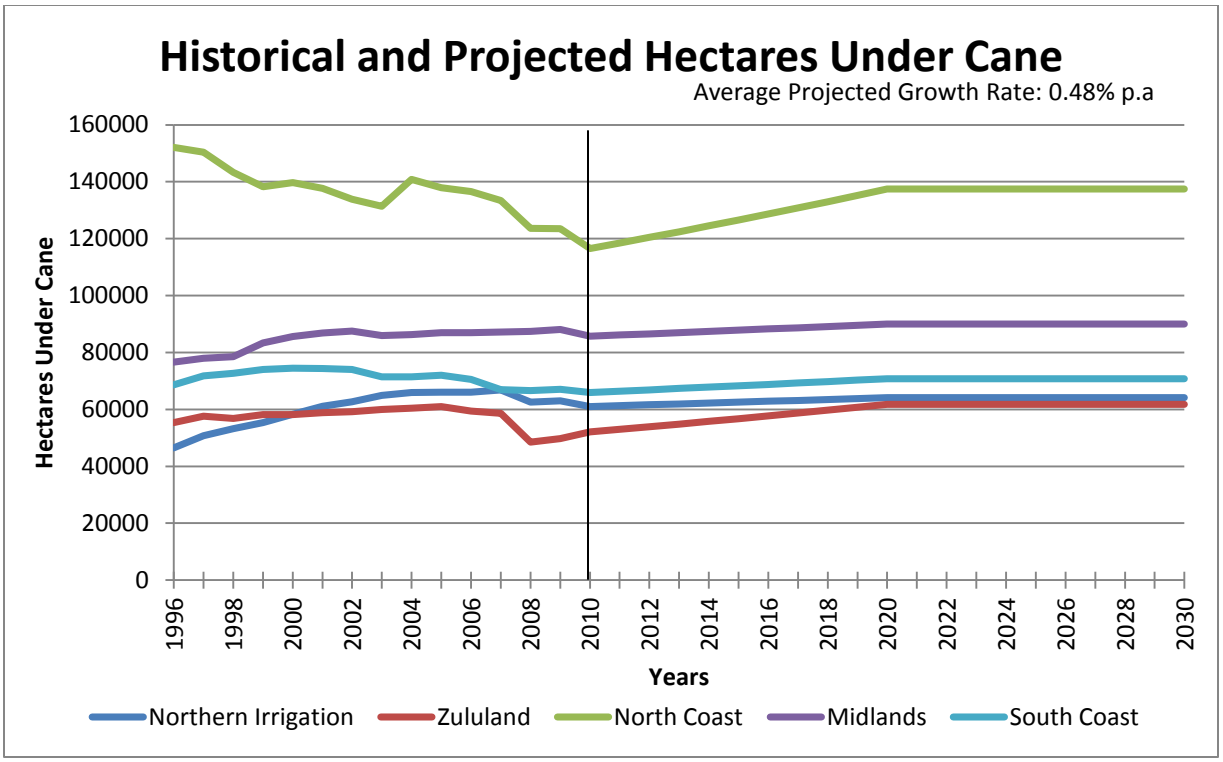

Figure 8: Historic and Projected Hectares under Cane

Source: Conningarth Economists

It is foreseen that hectares harvested will grow moderately up to 2020 and then remain constant for the remainder of the study period (Sugar Cane Growers). The future growth rates up to 2020 are given in Table 16. On average, it is projected that the areas harvested will grow moderately at a rate of 0.48% p.a.

Region	Average Annual Percentage Growth Rate
Northern Irrigation	0.50%
North Zululand	1.72%
North Coast	1.67%
Midlands	0.49%
South Coast	0.71%

Table 16: Average Projected Growth Rates for the Hectares under Cane per Region

6.1.2.2 Sugar Cane Yields

As said before, future sugar cane production estimates are determined by assumptions on the number of hectares expected to be planted and the yield per hectare in sugar cane tons. Sugar cane yields were also provided by sugar cane growers. The projections were done on a regional basis and then added together to give the total for the sugar cane industry.

Given the above assumptions the projected total sugar tons produced is derived from the projected total tons sugar cane produced by multiplying with the average conversion ratio that was assumed the same for all the regions. This gives an estimated average annual growth rate for sugar cane harvested of 2.02% and sugar tons produced of 1.78% over the projection period.

The above assumptions were formulated without making provision for the possibility that the conversion rate from sugarcane to sugar can improve overtime. Inquiries at the SASA research station indicated that this is a very important research issue. Obviously, if this research provides successful results, it will have a significant positive effect on the sugar industry. Historical and projected sugarcane yields are presented in the figure below.

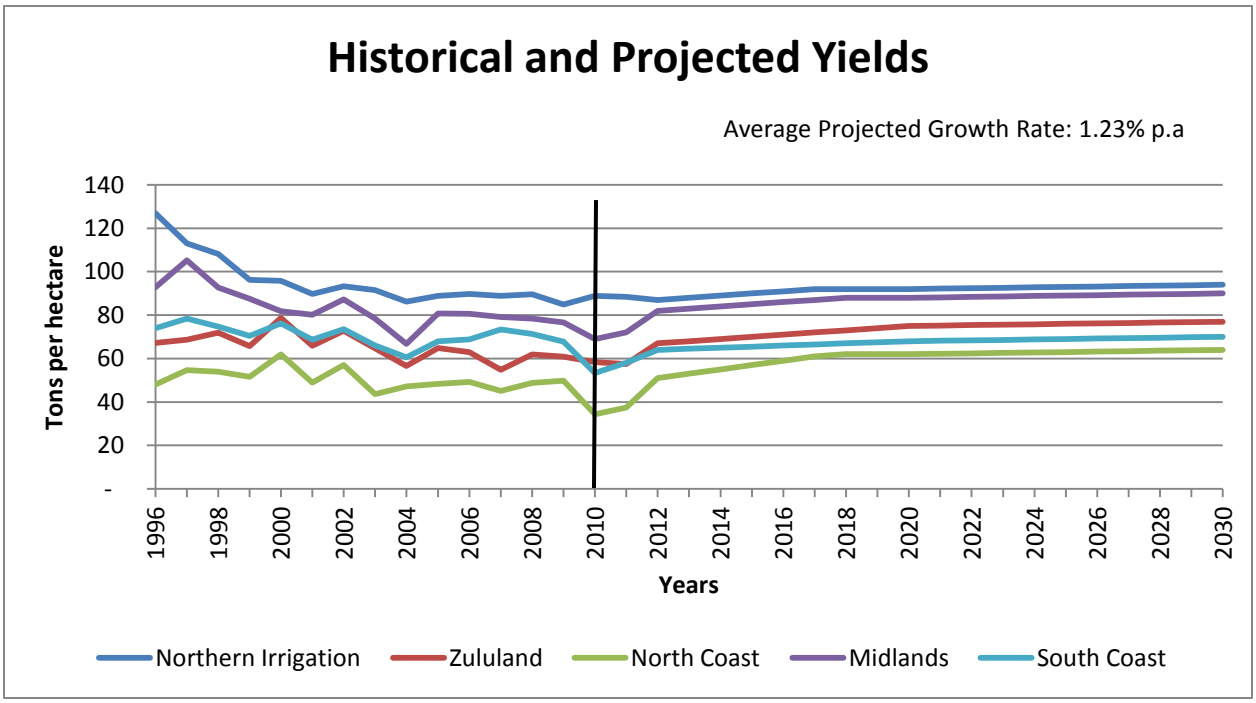

Figure 9: Historic and Projected Yields

6.1.3 Specific Assumptions Regarding the South African Sugar Industry

The future assumptions regarding income, capital cost and operating costs insofar as it affects SASA, the sugar cane Growers and Millers, are similar to what applied to the historical analysis (see section 5.1).

6.1.3.1 Domestic Price Assumptions

The standard domestic price scenario is based on the historic relationship between the domestic price and the export price. Historically, the domestic price has always been demonstrably higher than the export price. In 2010 specifically, the domestic price on average was 39% higher than the export price. This ratio was kept constant for the entire projection period.

6.1.3.2 Division of Proceeds

The division of proceeds ratio is based on the 2010 ratio and is kept constant for the duration of the analysis. The distribution ratio is as follows:

- Millers' share – 35.63%
- Growers' share – 64.37%

6.2 Results of Future CBA and Economic Impact Analysis

The future financial and economic outlook as well as the macro-economic impact of the Sugar Industry is discussed below.

6.2.1 CBA Results

6.2.1.1 Financial CBA Results

Evaluation Criteria	Growers	Millers (with by-products)	Total Industry
NPV (R million)	R 4,591	R 11,911	R 16,502
BCR	1.35	1.52	1.46
IRR	14%	22%	17%

Table 17: Future Financial CBA Results for the Sugar Industry – Including by-products (Nominal Prices)

Evaluation Criteria	Growers	Millers (without by-products)	Total Industry
NPV (R million)	R 4,591	R 5,193	R 9,784
BCR	1.35	1.29	1.31
IRR	14%	17%	15%

Table 18: Future Financial CBA Results for the Sugar Industry – Excluding by-products (Nominal Prices)

Evaluation Criteria	Northern Irrigation	North Zululand	North Coast	Inlands	South Coast	Total
NPV (R million)	R 1,473	R 856	R 1,362	R 658	R 243	R 4,591
BCR	1.32	1.33	1.59	1.34	1.14	1.34
IRR	14%	13%	15%	14%	12%	14%

Table 19: Future Regional Financial CBA Results (Nominal/Current Prices)

The Net Present Value (NPV) in nominal/current prices (including by-products) as in Table 18 shows an acceptable positive value of R16 502 million for the total industry. Millers and sugar cane growers have NPVs of R11 911 (including by-products) and R4 591 million respectively.

The BCR of 1.46 in Table 18 indicates that for each Rand invested in the project there is an expected return of R1.46 for the Sugar Industry which seems quite favourable. Millers and growers have BCRs of 1.52 and 1.35 respectively.

The Internal Rate of Return (IRR) is the discount rate at which present values of both benefits and costs are equal. Projects should have and IRR greater than the discount rate to be considered viable. In this case the IRR is 17% for the total industry, which is well above the 11.3% discount rate.

Table 19 shows industry results when by-products are excluded.

Similar positive results showing financial viability are presented for the regional growers in Table 20, with all the regions meeting the evaluation criteria. Once yields have been re-established in all regions and all hectares under cane and harvested are actually under production, then all regions are viable and represent a fairer picture of the potential of the different regions.

The NPV, BCR and IRR all confirm the future financial viability of the South African Sugar Industry.

For the full financial CBA results refer to Appendix A.

6.2.1.2 Economic CBA Results

Economic results are shown in Tables 21 (with value add products) and 23 for the total industry and the regions respectively. Both results indicate a positive future outlook for the industry; all NPV's are highly positive, BCR greater than 1 and IRR above the discount rate of 8%.

Evaluation Criteria	Growers	Millers (with by-products)	Total Industry
NPV (R million)	R 2,757	R 9,391	R 12,148
BCR	1.19	1.46	1.35
IRR	10%	19%	13%

Table 201: Future Economic CBA Results (Including by-products) for the Sugar Industry (Economic Prices)

Evaluation Criteria	Growers	Millers (without by-products)	Total Industry
NPV (R million)	R 2,757	R 4,598	R 7,355
BCR	1.19	1.28	1.24
IRR	10%	14%	11%

Table 212: Future Economic CBA Results (Excluding by-products) for the Sugar Industry (Economic Prices)

Evaluation Criteria	Northern Irrigation	North Zululand	North Coast	Inlands	South Coast	Total
NPV (R million)	R 734	R 397	R 1,011	R 485	R 129	R 2,757
BCR	1.14	1.14	1.43	1.24	1.07	1.20
IRR	9%	9%	11%	10%	9%	10%

Table 223: Future Regional Economic CBA Results (Economic Prices)

For the full economic CBA results, refer to Appendix A.

6.2.2 Future Macro-Economic Impact of the Sugar Industry on the National Economy

In this section the projected future macro-economic impact of the Sugar Industry on the national economy is presented. On all accounts it would seem that the nature of the impact does not differ materially from what came to the fore in the historical analysis, except of course for the expected level changes. Because of this it was deemed prudent that it will suffice that only the main economic aggregates namely, GDP and Employment, will be compared between the end of the historic period (2010) and the end of the future period (2030). Table 23 depicts the economic developmental impacts in terms of GDP and Employment. The impact on real GDP is significantly higher and it is anticipated that it could grow by nearly 234% in total over

the period (2010 – 2030). This can be attributed to the change in the composition of production from the regional contribution. The more profitable regions will grow faster whilst the less profitable regions will grow marginally although they will remain profitable. Further, it is also expected that there will be a slight real price increase in future as well as a 0.22% growth in sugar cane hectares harvested per annum over the entire period.

As far as the number of employees is concerned, it is foreseen that it will increase by 39% (43 934 workers) up to 2030. It is foreseen that the profitability of the industry as well as the hectares harvested could increase. The job opportunities will only increase if the number of hectares will increase.

	Historic Total Impact	Future/Business as usual Total Impact	Marginal Impact	% Change
Impact on GDP (R millions)	5,795	19,375	13,580	234%
Impact on Employment [numbers]:	113,009	156,943	43,934	39%

Table 234: Historic Macro-Economic Impact Compared with that of Future/Business as usual on the National Economy in terms of GDP and Employment (2010 prices)

6.3 Conclusion on the Future Analysis

From the financial and economic analysis (Cost Benefit Analysis) it is foreseen that the Sugar Industry will perform better over the period 2010 to 2030 compared to the historical period, provided that the underlying assumptions will all hold true. The industry's financial and economic viability would seem to reach quite commendable levels both on national and regional basis.

As far as the macroeconomic impact in the future is concerned, if the baseline scenario is realized, it would seem that the sugar industry would more or less maintain its important share in the country's overall economy, including employment creation, as well as in some regions such as KZN and Lowveld.

7. FINANCIAL AND ECONOMIC IMPACT OF RELAXING THE MARKETING REGULATIONS OF THE SUGAR INDUSTRY

In this section the financial and economic impact of relaxing the marketing regulations of the sugar industry are discussed. The marketing regulations have mostly to do with determining the domestic sugar price.

As already indicated, historically, because of government regulations, the domestic price has always been higher than the export price in Rand terms. In 2010 specifically, the domestic price was 39% higher than the export price. In this section, three scenarios are developed to demonstrate how the industry will be impacted when the marketing regulations which underpin the determination of the domestic price are relaxed.

7.1 Defining the Various Scenarios

The scenarios to be discussed are as follows:

- Domestic price equals import parity price.
- Domestic price equals sugar price on international commodity markets
- Domestic price equals EU preferential price.

7.1.1 Scenario: Domestic Price Equals Import Parity Price

Economic theory postulates that if the domestic price of a commodity is not regulated and left to the free market to determine, the domestic price of an internationally traded commodity would strive towards equality with the import parity price of the commodity concerned. The import parity price estimate for sugar is based on the world market price for sugar and added to that, other import related costs such as freight and insurance costs incurred to transport the product to the South African markets.

7.1.2 Scenario: Domestic Price Equals Sugar Price on International Commodities Markets

In theory, the impact on the domestic price could even be more negative than that of the import parity price when the regulatory environment is relaxed. According to economic theory, if there is no intervention in the workings of the free market and a major portion of a specific product is exported, the domestic price of that product tends to move towards the export price, which is less than the import parity price. The export price is estimated and based on the world sugar price and the exchange rate. (The processes through which these prices are determined are explained in Section 6.1.1 above).

This scenario is theoretical as it will not be possible to sustain the sugarcane supply and area under sugarcane as has happened in the period from 2000 to 2010 under low margins. In

practice the industry would shrink until supply is less than demand and forces the domestic market back to import parity.

7.1.3 Scenario: Domestic Price Equals European Union (EU) Preferential Price

This scenario is similar to that of the export based domestic price scenario although the price will in this case be higher. This scenario is based on the assumption that South Africa gains access to the European Union (EU) preferential market. The relevance of this scenario is due to the fact that such a large volume of SADC produced sugar finds its way to the EU under preferential quotas and prices. The ratio of the EU preferential sugar prices to the non-preferential prices was 1:1.8 in the historic period. This ratio was kept constant for purposes of this study.

Figures 8 and 9 below give the domestic price indices as the outputs of the three scenarios in nominal and real prices. Each one demonstrates the price impact of different (relaxed) regulatory regimes of the sugar industry.

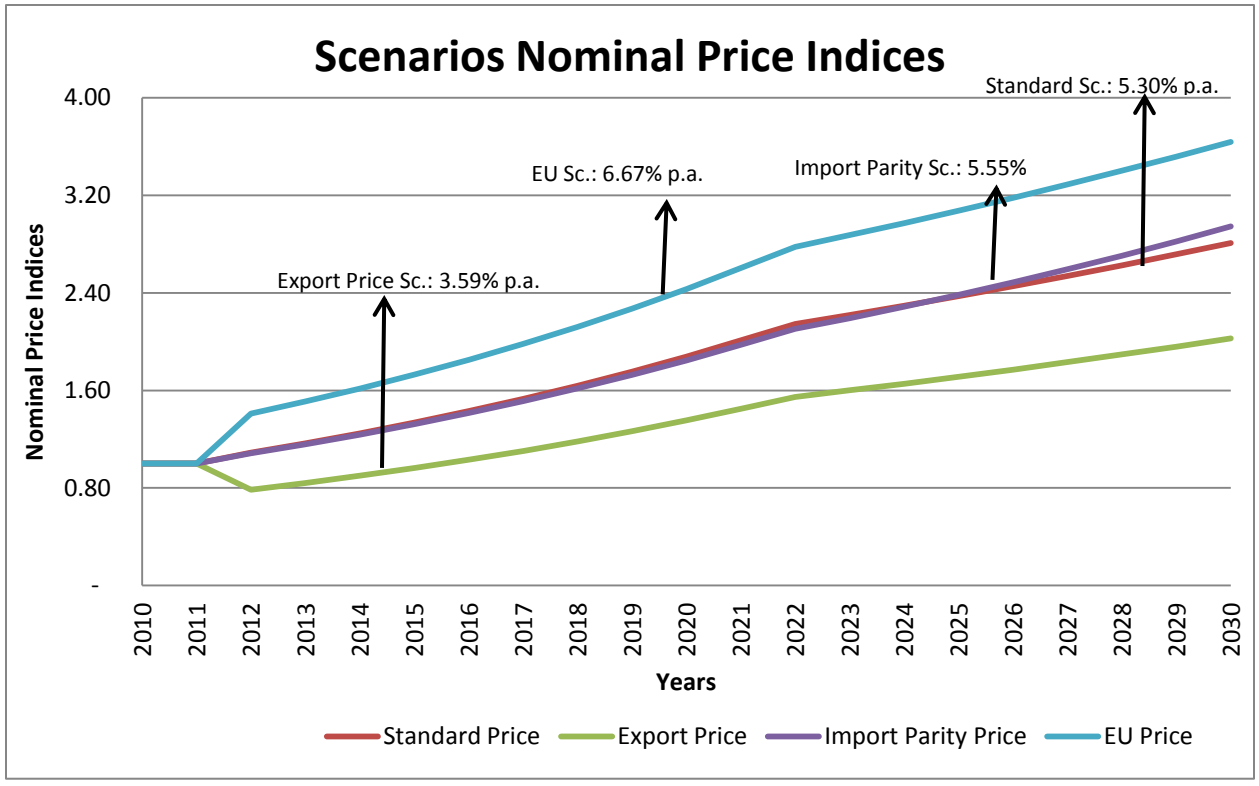

Figure 10: Price Indices for Different Scenarios (Nominal/Current Prices)

From the various scenarios, in nominal terms, it is evident that there is a remarkable decline in domestic sugar prices, except for the EU export based domestic price scenario relative to that

of the standard scenario. However, due to inflationary effects, the 2030 end price is higher than the 2010 base price. The export price is giving the lowest domestic price. The import parity price is marginally below the standard price scenario in the beginning of the study period but grows faster towards the end of the period. It is interesting from the graph that after an initial drop in the export price, it resumed an upward trend more or less at the same rates as the EU-price.

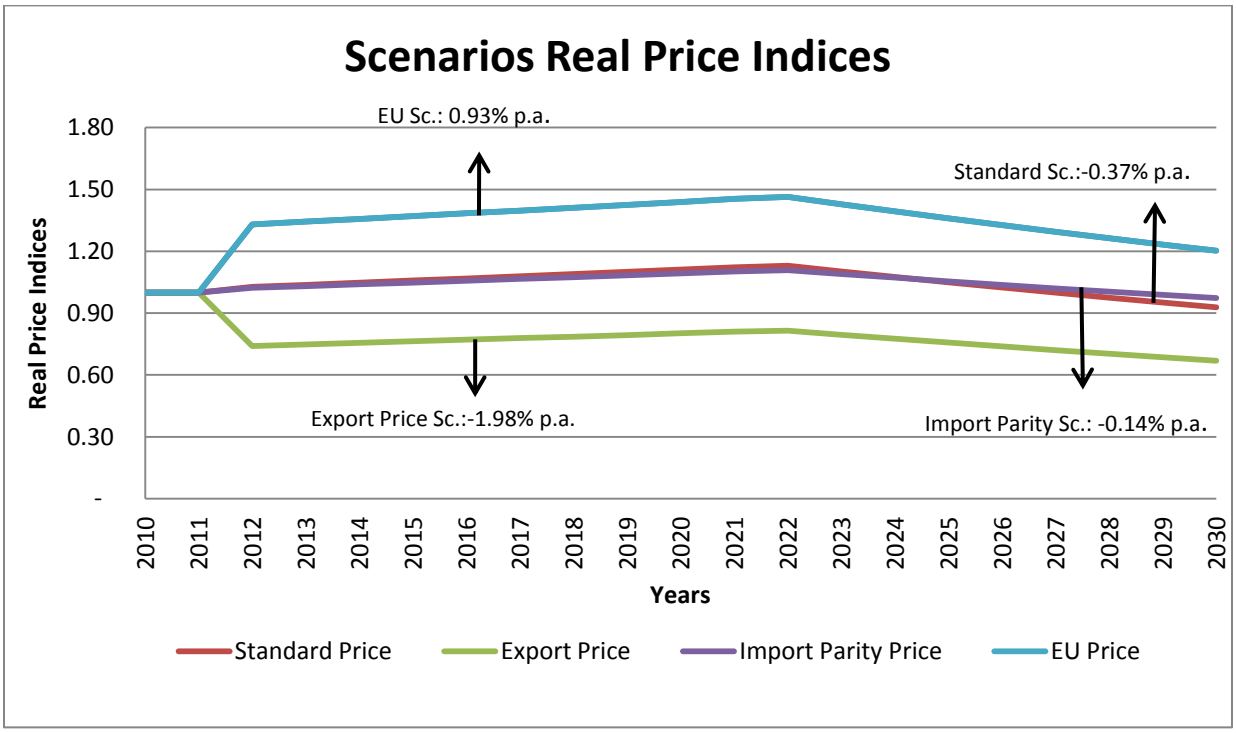

Figure 11: Price Indices for Different Scenarios (Real/Constant Prices)

The real sugar price has a bearing on the profit margins eventually. The export based price shows a substantial drop in real terms.

7.2 Results

7.2.1 CBA Results

The results of only the economic CBA analysis will be discussed below. This is due to the fact that CBAs conducted in both economic and nominal prices will most probably produce the same outcome. The CBA in economic prices is theoretically more reliable than the CBA in nominal prices due to the fact that it corrects the distortions inherent in the market prices and better reflects the opportunity cost of the production inputs. In addition, by relaxing the price controls the sugar prices will move closer to their true market determined levels.

7.2.1.1 CBA Results – Economic Prices

The economic prices CBA results are presented in the form of a comparison with the standard price scenario results. First the results for each scenario are given and then subtracted from the standard scenario to show the deviations. This is done for the NPV, BCR and IRR and is shown in Tables 24, 25 and 26 respectively for the total industry.

	Baseline Scenario	Import Parity Price Scenario		Export Price Scenario		EU Preferential Price Scenario	
R Millions	NPV	NPV	Deviation from Base Scenario	NPV	Deviation from Base Scenario	NPV	Deviation from Base Scenario
Total Industry	12,148	11,734	-413	-15,761	-27,908	41,732	29,584
Millers	9,391	9,225	-166	-1,782	-11,173	21,235	11,844
Growers	2,757	2,509	-248	-13,978	-16,735	20,497	17,740

Table 245: Economic NPV Results (with by-products) for the three Scenarios vs. Standard Scenario (Economic nominal Prices)

	Baseline Scenario	Import Parity Price Scenario		Export Price Scenario		EU Preferential Price Scenario	
	BCR	BCR	Deviation from Base Scenario	BCR	Deviation from Base Scenario	BCR	Deviation from Base Scenario
Total Industry	1.35	1.34	-0.01	0.55	-0.80	2.20	0.85
Millers	1.46	1.45	-0.01	0.91	-0.54	2.03	0.58
Growers	1.19	1.18	-0.02	0.01	-1.18	2.44	1.25

Table 256: Economic BCR Results (with by-products) for the Scenarios (Economic Prices)

	Baseline Scenario	Import Parity Price Scenario		Export Price Scenario		EU Preferential Price Scenario	
	IRR	IRR	Deviation from Base Scenario	IRR	Deviation from Base Scenario	IRR	Deviation from Base Scenario
Total Industry	13%	13%	-0.23%	1%	-12%	23%	10%
Millers	19%	18%	-0.29%	6%	-13%	29%	11%
Growers	10%	10%	-0.18%	N/A	N/A	19%	10%

Table 267: Economic IRR Results (with by-products) for the Scenarios (Economic Prices)

From the above results it is evident that the impact of the export price scenario will be devastating to the sugar industry. In terms of the export price scenario it could even be that the total industry will move into an unsustainable position. The import parity price will to some extent sustain the status quo. If it should happen that South Africa gets access to the EU preferential market Agreement, then the effect will produce the greatest benefit to the industry.

The export scenario is theoretical as it will not be possible to sustain the sugarcane supply and area under sugarcane as has happened in the period from 2000 to 2010 under low margins. In practice the industry would shrink until supply is less than demand and forces the domestic market back to import parity.

It is also evident from the results that the sugar cane growers will suffer the most under the export price scenario and it is expected that some of the regions will suffer big losses. The scenarios reflected in the tables above assume that sugarcane supply is sustained which is not possible under the low grower viability. As the growers go out of business and the sugarcane supply reduces the viability of the millers will be reduced. The impact on the millers is thus materially understated.

	Baseline Scenario	Import Parity Price Scenario		Export Price Scenario		EU Preferential Price Scenario	
	NPV	NPV	Deviation from Base Scenario	NPV	Deviation from Base Scenario	NPV	Deviation from Base Scenario
Northern Irrigation	R 734	R 672	R -62	R -3,322	R -4,056	R 5,034	R 4,300
North Zululand	R 397	R 357	R -40	R -2,387	R -2,784	R 3,348	R 2,951
North Coast	R 1,011	R 944	R -68	R -3,705	R -4,717	R 6,011	R 5,000
Midlands	R 485	R 441	R -44	R -2,416	R -2,901	R 3,560	R 3,075
South Coast	R 129	R 95	R -34	R -2,148	R -2,277	R 2,543	R 2,414

Table 27: Sugarcane Growers' Economic NPV Results for the three Scenarios (Economic Prices) – Regionally Based

	Baseline Scenario	Import Parity Price Scenario		Export Price Scenario		EU Preferential Price Scenario	
	BCR	BCR	Deviation from Base Scenario	BCR	Deviation from Base Scenario	BCR	Deviation from Base Scenario
Northern Irrigation	1.14	1.13	-0.01	0.35	-0.80	1.99	0.85
North Zululand	1.14	1.12	-0.01	0.19	-0.95	2.14	1.00
North Coast	1.43	1.40	-0.03	-0.57	-2.00	3.55	2.12
Midlands	1.24	1.22	-0.02	-0.18	-1.42	2.74	1.51
South Coast	1.07	1.05	-0.02	-0.21	-1.28	2.43	1.36

Table 289: Sugarcane Growers Economic BCR Results for the Scenarios (Economic Prices)

	Baseline Scenario	Import Parity Price Scenario		Export Price Scenario		EU Preferential Price Scenario	
	IRR	IRR	Deviation from Base Scenario	IRR	Deviation from Base Scenario	IRR	Deviation from Base Scenario
Northern Irrigation	9%	9%	-0.13%	1%	-8%	17%	0.08
North Zululand	9%	9%	-0.13%	1%	-9%	17%	0.08
North Coast	11%	11%	-0.24%	N/A	N/A	23%	0.12
Midlands	10%	10%	-0.24%	N/A	N/A	23%	0.12
South Coast	9%	9%	-0.20%	N/A	N/A	21%	0.12

Table 30: Sugarcane Growers Economic IRR Results for the Scenarios (Economic Prices)

The regional results for NPV, BCR and IRR are given in Tables 27, 28 and 29 respectively. Looking at the regional results the following aspects stand out:

- The sugar cane growers are all profitable under the EU and Import parity price scenarios but less profitable under the import parity scenario compared to the baseline sceanrio.
- The export price scenario results show that all regions will not make a profit. The NPV, BCR and IRR for these regions also do not satisfy the evaluation criteria.

7.2.2 Macro-Economic Impact Results on the National Economy

The Cost Benefit Analysis determined the extent to which the alternative domestic price scenarios will impact on financial and economic yields in the Sugar Industry in total as well as for the various Sugar Regions. However, it is important to note that if a region makes a loss or profit, it does not translate into all the farmers in that region making a loss or profit. The reality is that there is a distribution around the average profits or losses.

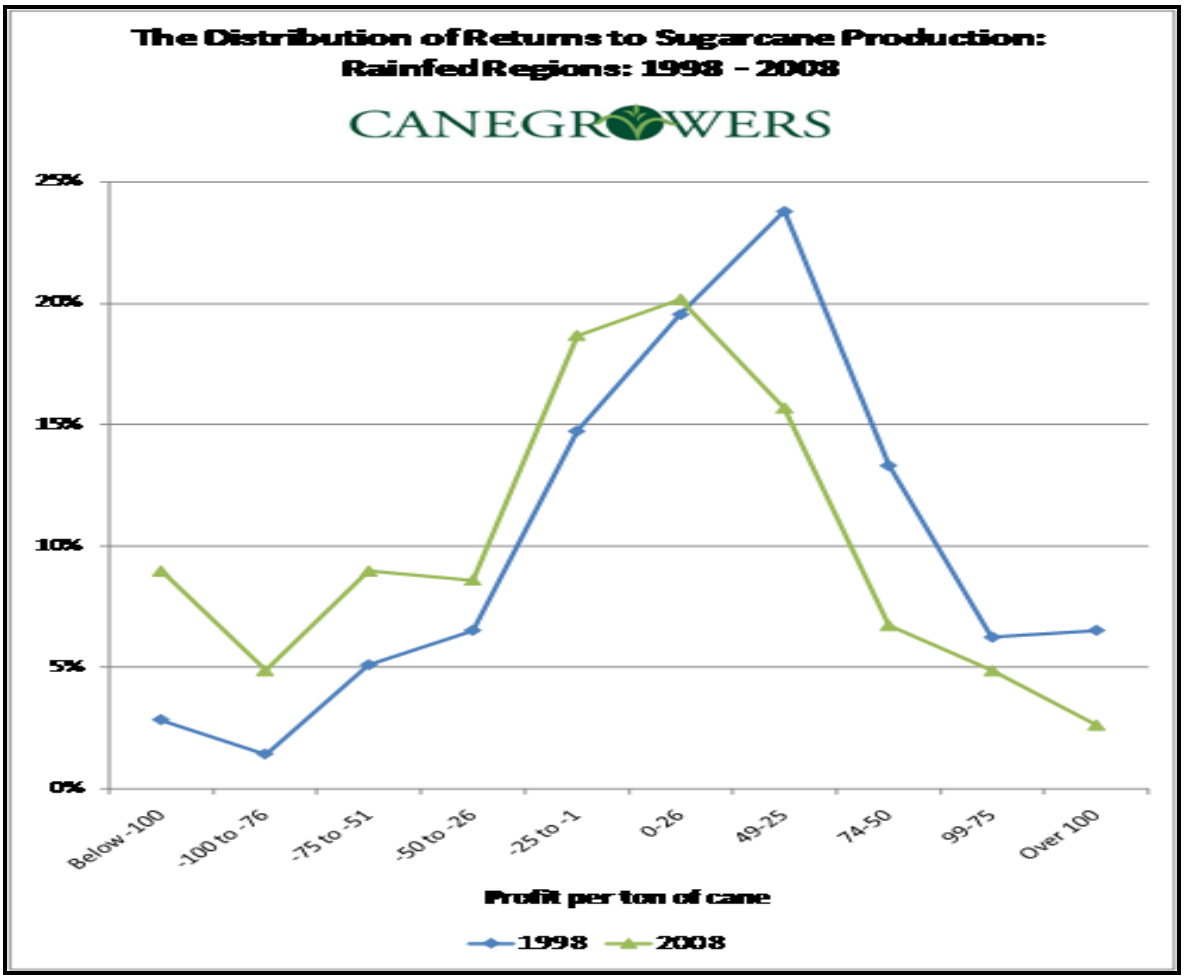

Figure 12: Distribution of Returns to Sugarcane Production

By making use of a deviation frequency distribution of profits and losses of percentage hectares around the average (see the above graph on Distribution of Returns to Sugarcane Production) it was possible to calculate the impact of the various domestic price scenarios on the profitability of growing sugar in the various regions. For purposes of this analysis it was accepted that if a specific number of hectares cannot be used for the production of sugar there will be a switch to alternative crops. For purposes of this analysis, (different crop alternatives were determined for different grower regions) maize will be the alternative crop. The macro-economic impact is therefore a net impact which takes into account the balancing out of losing the effect of sugar and adding the effect of other crops.

Table 31 reflects the results of the analysis providing the estimated sugar cane lost under various domestic price scenarios. It is evident that nearly 54% and 47% of the sugar cane industry can be wiped out under the scenario where domestic prices equals export prices and import parity prices, respectively. For both the North Coast and South Coast it is a possibility that a total switch to alternative crops can take place.

In terms of Scenario 3 where the domestic prices equals EU preferential export prices there will not be an effect but rather business will run as usual.

	Scenario 1: Domestic Prices equal Export Prices	Scenario 2: Domestic Prices equal Import Parity Prices	Scenario 3: Domestic Prices equal EU Preferential Export Prices
Region	**% Lost**	**% Lost**	**% Lost**
Northern Irrigation	0%	0%	0%
North Zululand	-50%	0%	0%
North Coast	-100%	-100%	0%
Midlands	0%	0%	0%
South Coast	-100%	-100%	0%
Total Loss	**-54%**	**-47%**	**0%**

Table 291: Results of Analysis: Projected of Percentage of Sugar Cane Hectares lost

Table 32 below represents the macro-economic impact on GDP as well as Employment with regard to the various scenarios.

Future/Business as Usual Scenario Compared with Domestic Prices Reduced to Export, Import prices and EU Preferential Export Prices. Macro-Economic Impact on the National Economy in Terms of GDP and Employment

Future Scenario Comparison	Impact on GDP (R millions)-2030	Impact on Employment [numbers]-2030
Standard Future - Total Impact	19,375	156,943
Scenario 1 - Export Prices - Total Impact	9,172	78,196
Marginal Impact	-10,203	-78,747
% Change	**-52.7%**	**-50.2%**
Scenario 2 - Import Parity Prices - Total Impact	12,751	95,829
Marginal Impact	-6,624	-61,114
% Change	**-34.2%**	**-38.9%**
Scenario 3 - EU Preferential Export Prices - Total Impact	24,083	171,388
Marginal Impact	4,708	14,446
% Change	**24.3%**	**9.2%**

Table 302: Macro-Economic Impact on the National Economy in Terms of GDP and Employment in 2030:

What is interesting here is that, except for Scenario 3, the percentage impact on GDP and employment does not differ much. The domestic price based on the export price scenario shows that about 50% or more than 78 700 jobs will be lost compared to what the Standard scenario will deliver. Even though the domestic price based on the import parity price is a bit higher than the export price, its outcome is still much below the standard or EU scenarios. In terms of the EU preferential export price scenario there is an increase of about 9% in job opportunities.

7.3 Conclusion

The alternative domestic price scenarios have shown that the Sugar Industry is severely vulnerable if market regulations are relaxed and the price that the local producers receive declines steeply. This will also have a profound negative impact on GDP and employment, especially in those areas that experience high levels of poverty and unemployment, such as the KZN and Lowveld, since in these areas sugar production is most prominent. These areas will be further severely impacted through the loss of sugar production and the related impact on employment if the market price environment tends towards export and import price regimes.

8. OVERALL CONCLUSIONS

From a historical perspective the financial and economic analysis (Cost Benefit Analysis) of the Sugar Industry over the period 1996 to 2010, it is evident that on average the industry showed some remarkable resilience against some serious odds. Indeed, profit margins in the Sugar Industry during these times came under continuous pressure mainly due to the weakening in the real sugar price and increasing real costs that confronted producers and millers. The regional impact of these negative tendencies was mostly concentrated in the North Coast region where many farmers were faced by loss making situations.

The macro-economic impact of the sugar industry that was measured for the calendar year 2010 revealed interesting facts about the role of this industry both nationally and in regional context. It should be borne in mind that the sugar industry has elaborate direct, indirect and induced effects on the national economy, to the extent that it contributed no less than 0,32% of the country's GDP in 2010 and 0.9 % of total employment. The Sugar Industry is a relatively labour intensive industry and creates jobs in areas of the country which are extremely poverty stricken. In the KZN and Lowveld areas it contributed 4,9 % of total employment. The industry also lends itself as a starter industry for small emerging farmers, since it does not entail complex farming practices.

In the second part of the study an industry forecast was done for the period 2010 to 2030, of the financial and economic prospects by way of Cost Benefit Analyses. As one could expect such forecasts would have required assumptions about how various economic variables will behave over the forecast period. Of these, the future course of the international price of sugar and the Rand/Dollar exchange rate are of crucial importance.

As a base scenario it was assumed that the Rand sugar price would follow the same path as in the recent past and will link closely with the GDP growth and inflation rates in the American economy. Coupled with the practice of purchasing parity pricing and no change in government's regulatory regime over this future 30 year period, the analyses showed that the sugar industry on average will be much more viable compared to the previous 14 years or so. Also on a regional basis the situation seems to have improved notably.

Historically, the domestic price has always been higher than the export price. In 2010 specifically, the domestic price was 39% higher than the export price. Accepting the importance that these regulatory measures have always had for the sugar industry's financial and economic status, the Consultant decided to run a number of scenarios depicting possible degrees of relaxing these marketing regulations, which underpin the determination of the domestic price. These scenarios entail:

- Domestic price equals import parity price.
- Domestic price equals export price.

- Domestic price equals EU preferential export price.
- Baseline scenario as yardstick

With the exception of the EU Preferential export price scenario, all the other scenarios showed that the rate of increase in the Rand price of sugar in the domestic market will be much slower than the baseline price forecast. This will have a profound negative impact on GDP and employment due to the sugar industry becoming unprofitable and production to decline. The areas that are presently experiencing high levels of poverty and unemployment, such as KZN and Mpumalanga Lowveld will be severely impacted because of the significant loss of sugar production that can occur there.

As far as the future macro-economic impact is concerned it can be emphasized that if the baseline scenario would materialize, the Sugar Industry will more or less hold its share in the total and regional economies of South Africa. An increase in employment of 49 934 over the forecasting period is in fact possible. As was stated earlier this will, however, be dependent on the performance of the world sugar price as well as whether the regulatory environment of the Sugar Industry will remain intact.

9. APPENDIX A: HISTORIC AND FUTURE FINANCIAL AND ECONOMIC CBA RESULTS

Year	PV	∑	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Costs																	
Total Capital Cost	9,688	-780	7679	442	275	130	760	132	73	96	13408	752	561	67	1140	167	-26463
Total Operating Cost	35,136	77923	2697	3064	3413	3631	3961	4341	4923	4915	5095	5408	5821	6487	8263	8002	7902
Total Costs	44,824	77143	10377	3506	3687	3761	4722	4473	4995	5012	18503	6160	6382	6554	9404	8169	-18561
Benefits																	
Total Income R Millions	46,100	97119	4170	4771	5303	4675	5573	6037	7007	6140	5479	6456	7129	7252	8533	9307	9067
Surplus/Deficit	1,227	19755	-6207	1265	1616	915	852	1564	2012	1128	-13024	296	747	698	-871	1139	27627
Discount Rate	11%	Viability Criteria met?															
Net Present Value	R 1,227	yes															
Benefit-Cost Ratio	1.13	yes															
IRR	13.52%	yes															

Table 31: Historic Financial Cost Benefit Analysis (with by-products) for the Sugar Industry (Nominal Prices, Rand Millions)

Year	PV	∑	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Costs																	
Capital Cost	7,410	5,737	4,210	264	225	-	636	-	-	-	10,055	613	577	-	1,646	-	-12,488
Operating Cost	10,812	22,885	947	1,047	1,189	1,214	1,307	1,361	1,573	1,467	1,387	1,578	1,685	1,840	2,270	2,120	1,900
Total Costs	18,223	28,622	5,157	1,310	1,414	1,214	1,943	1,361	1,573	1,467	11,442	2,191	2,262	1,840	3,916	2,120	-10,588
Benefits																	
Income R Millions	18,743	39,342	1,709	1,944	2,079	1,835	2,325	2,515	2,916	2,568	2,287	2,637	2,901	2,942	3,447	3,719	3,518
Surplus/Deficit	520	10,720	-3,448	634	665	621	382	1,155	1,344	1,101	-9,155	445	640	1,102	-469	1,599	14,106
Discount Rate	11%	Viability Criteria met?															
NPV	R 520	yes															
Benefit-Cost Ratio	1.07	yes															
IRR	12.95%	yes															

Table 32: Historic Financial Cost Benefit Analysis (with by-products) for Millers (Nominal Prices, Rand Millions)

Year	PV	∑	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Costs																	
Capital Cost	2,278	-6518	3469	178	50	130	124	132	73	96	3354	138	-16	67	-506	167	-13975
Operating Cost	22,962	52289	1646	1906	1969	2127	2510	2846	3218	3323	3558	3662	3944	4450	5757	5623	5751
Total Costs	25,240	45771	5115	2084	2019	2257	2633	2979	3290	3419	6912	3800	3929	4517	5251	5790	-8224
Benefits																	
Income R Millions	25,947	54807	2357	2715	2970	2550	3103	3388	3958	3446	3042	3650	4036	4113	4850	5330	5297
Surplus/Deficit	706	9036	-2759	632	951	294	470	409	668	27	-3870	-150	107	-404	-401	-460	13521
Discount Factor	11%	Viability Criteria met?															
NPV	R 706	yes															
Benefit-Cost Ratio	1.31	yes															
IRR	14.28%	yes															

Table 33: Historic Financial Cost Benefit Analysis for Sugar Cane Growers (Nominal Prices, Rand Millions)

Year	PV	∑	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Costs																	
Total Capital Expenditure	10,328	8700	7598	405	242	101	590	83	35	44	7639	424	310	31	508	59	-9369
Total Operating Expenditure	29,984	50139	2683	2827	3034	3231	3311	3178	3266	3210	3443	3518	3469	3705	4208	3714	3345
Total Costs	40,312	58839	10281	3232	3276	3332	3901	3261	3301	3254	11082	3941	3778	3736	4716	3773	-6024
Benefits																	
Total Income R Millions	39,640	63753	4168	4419	4712	4148	4632	4429	4631	3991	3666	4151	4210	4096	4317	4310	3871
Surplus/Deficit	-672	4913	-6113	1187	1436	816	731	1169	1330	737	-7416	210	432	360	-399	537	9896
Discount Rate	8%	Viability Criteria met?															
Net Present Value	R -672	no															
Benefit-Cost Ratio	0.93	no															
IRR	6%	no															

Table 34: Historic Economic Cost Benefit Analysis (with by-products) for the Sugar Industry (Economic Prices, Rand Millions)

Year	PV	∑	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Costs																	
Capital Expenditure	7,090	7479	4165	243	200	0	499	0	0	0	6092	358	317	0	715	0	-5111
Operating Expenditure	8,938	14302	942	972	1064	1032	1031	1003	1022	912	845	927	931	926	992	920	782
Total Costs	16,028	21781	5108	1215	1264	1032	1531	1003	1022	912	6937	1286	1248	926	1707	920	-4329
Benefits																	
Income R Millions	15,606	24820	1709	1814	1869	1567	1844	1862	1905	1605	1400	1557	1611	1488	1513	1621	1455
Surplus/Deficit	-422	3039	-3399	598	605	535	313	860	883	692	-5537	271	363	562	-194	701	5784
Discount Factor	8%	Viability Criteria met?															
NPV	R -422	no															
Benefit-Cost Ratio	0.94	no															
IRR	6.%	yes															

Table 35: Historic Economic Cost Benefit Analysis (with by-products) for Millers (Economic Prices, Rand Millions)

Year	PV	∑	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Costs																	
Capital Expenditure	3,238	1221	3432	162	42	101	91	83	35	44	1547	65	-7	31	-208	59	-4258
Operating Expenditure	18,624	31309	1638	1738	1693	1866	2100	1998	2044	2101	2358	2310	2198	2398	2689	2212	1967
Total Costs	21,862	32531	5071	1899	1735	1967	2191	2080	2080	2145	3905	2376	2191	2429	2481	2271	-2291
Benefits																	
Income R Millions	21,612	34405	2357	2488	2565	2249	2609	2389	2527	2189	2026	2314	2260	2227	2276	2107	1820
Surplus/Deficit	-251	1874	-2714	588	830	281	418	309	447	45	-1879	-61	69	-202	-205	-164	4111
Discount Factor	8%	Viability Criteria met?															
NPV	R -251	no															
Benefit-Cost Ratio	0.92	no															
IRR	6.44%	no															

Table 36: Historic Economic Cost Benefit Analysis for Sugar Cane Growers (Economic Prices, Rand Millions)

Year	PV	∑	2010	2011	2012	2013	2014	2015	2020	2021	2022	2026	2027	2028	2029	2030
Costs																
Total Capital Expenditure	35,809	4,447	26,463	158	134	125	112	147	35,671	11,607	2,290	236	185	149	69	-80,118
Total Operating Cost	119,327	365,177	7,902	8,384	9,364	10,075	10,841	11,666	16,676	17,691	18,768	23,772	25,219	26,754	28,383	30,111
Total Costs	155,136	369,624	34,365	8,542	9,498	10,200	10,954	11,814	52,347	29,298	21,058	24,009	25,404	26,904	28,452	-50,007
Benefits																
Total Income R Millions	171,638	536,593	9,067	10,240	12,594	13,839	15,204	16,702	25,973	27,982	30,049	35,413	36,903	38,460	40,085	41,781
Surplus/Deficit	16,502	166,969	-25,298	1,698	3,097	3,639	4,250	4,888	-26,374	-1,316	8,991	11,404	11,499	11,556	11,633	91,788
Inflation Rate	6%															
Discount Rate	11%	Viability Criteria met?														
Net Present Value	R 16,502	yes														
Benefit-Cost Ratio	1.46	yes														
IRR	16.69%	yes														

Table 37: Future Financial CBA Results (with by-products) for the Sugar Industry (Nominal Prices, Rand Millions)

Year	PV	∑	2010	2011	2012	2013	2014	2015	2020	2021	2022	2026	2027	2028	2029	2030
Costs																
Capital Cost	22,702	22,054	12,488	-	-	-	-	-	26,655	11,260	2,142	-	-	-	16	-36,393
Operating Cost	32,596	102,450	1,900	1,925	2,448	2,671	2,913	3,177	4,719	5,015	5,330	6,801	7,228	7,682	8,165	8,677
Total Costs	55,298	124,503	14,388	1,925	2,448	2,671	2,913	3,177	31,374	16,275	7,472	6,801	7,228	7,682	8,181	-27,716
Benefits																
Income R Millions	67,209	210,336	3,518	3,981	4,919	5,409	5,947	6,538	10,196	10,988	11,802	13,891	14,472	15,077	15,709	16,369
Surplus/Deficit	11,911	85,833	-10,870	2,056	2,470	2,738	3,034	3,361	-21,178	-5,288	4,330	7,090	7,243	7,395	7,528	44,085
Discount Factor	11%															
Inflation Rate	6%	Viability Criteria met?														
NPV	R 11,911	yes														
Benefit-Cost Ratio	1.52	yes														
IRR	22%	yes														

Table 38: Future Financial CBA Results (with by-products) for the Millers (Nominal Prices, Rand Millions)

Year	PV	∑	2010	2011	2012	2013	2014	2015	2020	2021	2022	2026	2027	2028	2029	2030
Costs																
Capital Cost	13,107	-17,607	13,975	158	134	125	112	147	9,016	346	148	236	185	149	52	-43,725
Operating Cost	83,347	252,674	5,751	6,192	6,633	7,105	7,611	8,153	11,507	12,199	12,932	16,332	17,314	18,355	19,458	20,627
Total Costs	96,455	235,067	19,725	6,350	6,767	7,230	7,723	8,301	20,523	12,545	13,080	16,569	17,499	18,504	19,510	-23,097
Benefits																
Income R Millions	101,045	316,203	5,297	5,992	7,393	8,130	8,940	9,828	15,327	16,517	17,741	20,883	21,755	22,665	23,615	24,607
Surplus/Deficit	4,591	81,136	-14,428	-358	626	901	1,216	1,527	-5,196	3,972	4,661	4,314	4,256	4,161	4,105	47,704
Discount Factor	11%															
Inflation Rate	6%	Viability Criteria met?														
NPV	R 4,591	yes														
Benefit-Cost Ratio	1.35	yes														
IRR	14%	yes														

Table 39: Future Financial CBA Results for the Growers (Nominal Prices, Rand Millions)

Year	PV	∑	2010	2011	2012	2013	2014	2015	2020	2021	2022	2026	2027	2028	2029	2030
Costs																
Total Capital Cost	34,752	57,729	26,182	147	118	104	88	109	19,707	6,049	1,126	92	68	52	22	-24,716
Total Operating Cost	94,548	187,920	7,860	7,868	8,290	8,415	8,542	8,672	9,263	9,271	9,279	9,309	9,317	9,324	9,332	9,340
Total Costs	129,300	220,319	34,042	8,015	8,408	8,519	8,630	8,781	28,970	15,320	10,405	9,401	9,385	9,376	9,355	-15,376
Benefits																
Total Income R Millions	141,447	287,912	9,000	10,120	11,748	12,178	12,622	13,080	15,199	15,447	15,649	14,608	14,361	14,119	13,882	13,651
Surplus/Deficit	12,148	14,279	-25,042	2,105	3,341	3,660	3,992	4,299	-13,771	127	5,245	5,206	4,976	4,743	4,528	29,027
Inflation Rate	6%															
Discount Rate	8%	Viability Criteria met?														
Net Present Value	R 12,148	yes														
Benefit-Cost Ratio	1.35	yes														
IRR	13%	yes														

Table 40: Future Economic CBA Results (with by-products) for the Sugar Industry (Economic Prices, Rand Millions)

Year	PV	∑	2010	2011	2012	2013	2014	2015	2020	2021	2022	2026	2027	2028	2029	2030
Costs																
Capital Cost	20,561	25,330	12,356	-	-	-	-	-	14,726	5,869	1,053	-	-	-	5	-11,227
Operating Cost	25,622	52,052	1,891	1,807	2,168	2,232	2,296	2,362	2,622	2,629	2,636	2,664	2,671	2,678	2,685	2,693
Total Costs	46,183	77,381	14,246	1,807	2,168	2,232	2,296	2,362	17,348	8,498	3,689	2,664	2,671	2,678	2,691	-8,535
Benefits																
Income R Millions	55,574	113,206	3,520	3,951	4,604	4,776	4,954	5,138	5,986	6,086	6,167	5,750	5,651	5,554	5,459	5,367
Surplus/Deficit	9,391	35,824	-10,727	2,144	2,436	2,545	2,658	2,775	-11,362	-2,412	2,477	3,085	2,979	2,876	2,768	13,901
Discount Factor	8%															
Inflation Rate	6%	Viability Criteria met?														
NPV	R 9,391	yes														
Benefit-Cost Ratio	1.46	yes														
IRR	19%	yes														

Table 41: Future Economic CBA Results (with by-products) for the Millers (Economic Prices, Rand Millions)

Year	PV	∑	2010	2011	2012	2013	2014	2015	2020	2021	2022	2026	2027	2028	2029	2030
Costs																
Capital Cost	14,191	7,070	13,826	147	118	104	88	109	4,981	180	73	92	68	52	17	-13,489
Operating Cost	66,259	130,690	5,723	5,814	5,875	5,937	6,000	6,063	6,395	6,395	6,396	6,398	6,399	6,399	6,400	6,401
Total Costs	80,450	137,760	19,549	5,961	5,993	6,040	6,088	6,172	11,376	6,576	6,469	6,490	6,467	6,451	6,417	-7,088
Benefits																
Income R Millions	83,206	169,528	5,234	5,922	6,898	7,155	7,421	7,696	8,966	9,115	9,236	8,612	8,463	8,319	8,177	8,038
Surplus/Deficit	2,757	31,768	-14,316	-39	905	1,115	1,334	1,524	-2,409	2,539	2,768	2,121	1,997	1,867	1,759	15,126
Discount Factor	8%															
Inflation Rate	6%	Viability Criteria met?														
NPV	R 2,757	yes														
Benefit-Cost Ratio	1.19	yes														
IRR	10%	yes														

Table 42: Future Economic CBA Results for the Growers (Economic Prices, Rand Millions)

10. APPENDIX B: COST BENEFIT ANALYSIS

10.1 Introduction

The CBA method provides a logical framework for evaluating development programmes, and can serve as an aid in decision-making processes. The following is a brief overview of the theory underlying the CBA method.

The theoretical foundations of CBA are: benefits are defined as increases in human well being (utility) and costs are defined as reduction in human well being. For a project of policy to qualify on cost-benefit grounds, its social benefits must exceed its social costs. "Society" is simply the sum of individuals. The geographical boundary for a CBA is usually the nation, but can be readily extended to wider limits.

10.2 Basic Aggregation Rules

There are two basic aggregation rules. Firstly, aggregating benefits across different social groups or nations involves summing willingness to pay for benefits, its willingness to accept compensation for losses (WTP and WTA, respectively), regardless of the circumstances of the beneficiaries or losers. A second aggregation rule requires that higher weights be given to benefits and costs accruing to disadvantages or low income groups. One rationale for the second rule is that marginal utilities or income will vary, being higher for the low income group.

The notions of WTP and WTA are firmly grounded in the theory of welfare economics and correspond to the notions of compensation and equivalent variations. WTP and WTA should not, according to past theory, diverge very much. In practice they appear to diverge, often substantially, and with WTA > WTP. Hence, the choice of WTP or WTA may be of importance when conducting a CBA.

10.3 Discounting

Aggregating over time involves discounting. Expressing future benefits and costs in present value is known as discounting. Inflation can result in future benefits and costs appearing to be higher than is really the case. Inflation should be netted out to secure constant price estimates.

Costs and benefits that are immediately incurred are judged differently by the community from costs and benefits that materialize over a period of time. Usually a community would prefer receiving a benefit today rather than reaping the benefits in the future, while deferred costs are more attractive than immediate payment. Therefore, the money value of costs and benefits over time cannot simply be added together, and the time preference of the community has to be taken into account through the use of a weighting process. This is done by calculating the net present value by discounting future cash-flows at a rate that reflects the value of a benefit

or cost over time, known as the social discount rate. In other words, at what real interest rate will the community be prepared to forego immediate benefits in exchange for longer term benefits?

Suppose b0, b1, b2, …, bn are the project benefits in years 0, 1, 2, …, n and c0, c1, c2, …, cn are the costs in years 0, 1, 2, …, n, respectively, and i is the social discount rate, then the present value of the benefits is given by

b_0÷ 〖(1+i)〗 ^0 + b_1÷ 〖(1+i)〗 ^1 + … +b_n÷ 〖(1+i)〗 ^n

And the present value of the costs are given by

c_0÷ 〖(1+i)〗 ^0 + c_1÷ 〖(1+i)〗 ^1 + … +c_n÷ 〖(1+i)〗 ^n

These present values are then used to calculate various assessment criteria, while assisting in the evaluation of each development sphere. These criteria are:

- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Benefit Cost Ratio (BCR)

Net Present Value (NPV)

The difference between the benefits and costs (the net benefits) in the specific year is discounted to the present by using the social discount rate. The discounted sum of all these net benefits over the economic project life is defined as the NPV. In terms of terminology set out above:

NPV= ∑b_j ÷ 〖(1+i)〗 ^j-∑c_j ÷ 〖(1+i)〗 ^j

The criteria for the acceptance of a project are that the NPV must be positive; in other words, funds will be voted for a project only if the analysis produces a positive net present value. Where a choice has to be made between mutually exclusive projects, the project with the highest present value will be chosen since it maximizes the net benefits to the community.

Internal Rate of Return (IRR)

The IRR is the discount rate at which the present value of costs and benefits are equal. It is therefore the value of the discount rate, r, which satisfies the following criteria:

$$\sum b_j \div [(1+r)]^j - \sum c_j \div [(1+r)]^{(j)} = 0$$

Only projects with an IRR higher than the social discount rate, which forms a limit, will be considered for funding. The IRR must be handled carefully, because there are situations in which mathematical solution of the above equation is not unique. This happens when the stream of net benefits over the assessment period changes its sign (positive or negative) more than once.

Benefit Cost Ratio (BCR)

The discounted BCR is the ratio of the present value of the benefits to the present value of the costs, i.e.

$$BCR = \{\sum b_j \div (1+r)^j\} \div \{\sum c_j \div (1+r)^{(j)}\}$$

A project will be considered for funding if the BCR is greater than 1.

10.4 Appropriate Discount Rate

When considering an appropriate discount rate, note must be taken of the various points of departure in the economic literature as well as of the rates applied in other countries and by international development institutions.

The points of departure described in the literature can be broadly divided into three schools of thought, namely those who argue that the discount rate should be equal to the marginal return on capital (opportunity cost of capital), those whose arguments rests on long-term real interest rate (cost of funding to the State), and those who advocate a social time preference rate.

The first two schools take an economic view, whilst the third school adopts a multiple-goal approach which includes social aims. There is no consensus which method should be used to determine the social discount rate that would apply for a specific country. Therefore, a relative pragmatic approach takes the following factors into account:

- The discount rate should not be influenced by business cycle conditions and policy, since the preferences that find expression in this rate are aimed at the extension of the long-term welfare structure.

- A low discount rate generally favours projects with a higher capital cost and low future current costs, while the opposite applies to high discount rates. Since labour costs are part of current expenditure, a high discount rate favours the employment of labour in the future. If the real social discount rate is lower than the real implicit discount rate in the private sector, then investment by the public sector will be encouraged at the expense of investment by the private sector. The larger the gap between the two discount rates, the stronger the effect.

10.5 Financial Discount Rate

In the case of public projects, where CBA is being performed for financial purposes, calculations are done at either current price, where inflation is taken into consideration or at constant/real prices, where inflation is excluded.

In terms of the financial analysis, the discount rate used is equal to the market rate, or weighted marginal cost of capital, plus uncertainty and a risk premium. It should be noted that if the calculation is being done in constant/real prices, the discount rate used should be in real terms. For instance, if the discount rate in current prices is 10% and the prospects for inflation over the project appraisal is 5%, then the real discount rate is approximately 5%. It can be calculated as follows:

$((1.10 \div 1.05)-1)\times 100=4.76\%$

Therefore the real discount rate is not exactly 5% but 4.76%.

Due to the fact that projections are made over a long period into the future, and the fact that the future inflation rate is dependent on various economic factors (e.g. worldwide shocks such as oil price, etc.), it is generally difficult to estimate long-term price movements. In this study, the Consultants have used a real discount rate of 5%, and an inflation rate of 6%. Using the methodology described above, this yields a nominal discount rate of 11%.

10.6 Economic Discount Rate

Although the calculation of the social time preference rate (STPR) is very difficult to determine, this has not stopped some analysts attempting empirical estimates. According to Kirkpatrick and Weiss (1996) "… such estimates are normally in the 1 percent to 5 percent range, since per capita consumption growth will rarely exceed 3 percent annually, and the conventional

estimates of the elasticity of the marginal utility of consumption are typically between 1.0 and 1.5." Walshe and Dafferen calculated that the STPR is slightly in excess of the potential growth rate of an economy.

The study uses an economic discount rate of 8%, which is standard to most studies of this nature.

10.7 Market Prices *versus* Shadow Prices

As indicated above, the CBA can be conducted in financial (market) as well as economic (shadow) prices. Market prices are those perceived prices at which products and services are traded in the market place, irrespective of the level of interference in the market, e.g. the market wage rate of labour, the price of 2kg of maize meal, the price of 1 kilowatt-hour of electricity, etc. In theory, market prices are mainly manifestations of consumers' willingness to pay.

Shadow prices (economic prices) are regarded as the opportunity costs of products and services when the market price, for whatever reasons, does not reflect these costs in full. Examples are the shadow wages of labour, where minimum wages are fixed at levels higher than market prices; shadow price for fuel, where taxes and subsidies are excluded; and shadow exchange rates are pegged and/or some kind of exchange control is still in place. The shadow price is therefore nominal (market) price, adjusted for the effect of interventions or other factors that are causing the market not to perform its natural role.

In practice, shadow prices should only be use when the market price of products and services do not reflect their scarcity value or economic contributions. In cases where market prices give an indication of the scarcity of products and services, market prices are used not only for financial analysis, but also for economic analysis.

10.8 Financial and Economic Cost Benefit Analysis

The private and public sectors evaluate projects very differently. The private sector is mostly interested in the profitability of a project and the return on capital that will be achieved. In doing so, the private sector makes use of market prices (i.e. the prices that would be paid in the open market for inputs, labour, etc.) when determining the value of direct project-related costs and financial benefits. Furthermore, a financial CBA evaluated the project using market-determined interest and return rates that reflect the cost of private funds, uncertainties and risk.

In contrast, evaluating a public sector project involves determining a broader range of costs and benefits that will affect the community. Furthermore, when calculating the value of costs and benefits, economic analysis re-evaluates the project by making use of prices that reflect the relative economic scarcity/value of inputs and outputs. As such, in the public sector it is necessary to evaluate and weigh the wider benefits emanating from a project against the capital expenditure and costs associated with a project, using discount and return rates that reflect the time preferences of the community, known as the social discount rate.

The table below summarizes the main differences between a financial and economic CBA.

Attributes	Economic CBA	Financial CBA
Perspective	The broader community	Project shareholders/capital providers
Goal	The most effective application of scarce resources	Maximization of net value
Discount Rate	Social discount rate	Market determined weighted cost of capital
Unit of Valuation	Opportunity costs	Market prices
Scope	All aspects necessary for a rational, economic decision	Limited to aspects that affect profits
Benefits	Additional goods, services, income and/or cost saving	Profit and financial return on capital employed
Costs	Opportunity costs of goods and services foregone	Financial payments and depreciation calculated according to

Table 43: Comparison of financial and economic costs benefit analysis

11. APPENDIX C: SOCIAL ACCOUNTING MATRIX

11.1 The Social Accounting Matrix

A Social Accounting Matrix (SAM) is a comprehensive, economy-wide database, which contains information on the flow of resources that take place between the different economic agents that exist within an economy (i.e. business enterprises, households, government, etc.) during a given period of time – usually one calendar year.

When economic agents in an economy are involved in transactions, financial resources change hands. The SAM provides a complete database of all transactions that take place between these agents in a given period, thereby presenting a "snapshot" of the structure of the economy for that time period. As a system for organising information, a SAM presents a powerful tool in terms of which the economy can be described in a complete and consistent way:

1. Complete in the sense that it provides a comprehensive accounting of all economic transactions for the entity being represented (i.e. country, region/province, city, etc.), and

2. Consistent in that all incomes and expenditures are matched.

Consequently, a SAM can provide a unifying structure within which the statistical authorities can compile and present the national accounts.

Like the traditional Input-Output Table, the SAM reflects the inter-sectoral linkages in terms of sales and purchases of goods and services, as well as the remuneration of production factors that form the essence of any economy's functioning. What is also of importance is that a SAM reflects the economic related activities of households in some detail. Households are responsible for decisions that have a direct and indirect effect on important economic variables such as private consumption expenditures and savings. These economic aggregates are important drivers of the economic growth processes and ultimately the creation of employment opportunities and wealth. Private consumption expenditure, for example, comprises approximately 60 percent of total gross final domestic spending in the economy. By combining households into meaningful categories, such as a range of income levels, the impact on these households' welfare of a changing economic environment is made possible by the SAM.

It is clear from the above that because of the intrinsic characteristics of the SAM, once compiled, it renders itself as a useful tool for analytical purposes. Especially, based on the mathematical traits of the matrix notations that describe its structure, a SAM can be transformed into a powerful econometric tool/model. For example, the model can be used to quantify the probable impact on the economy of a new infrastructural project such as a new power station – both the construction phase and the operational phase will be modelled.

Thus apart from serving as an extension to a country's National Accounts, the SAM in its model form opens up many opportunities for the economic analyst to conduct rigorous policy and

other impact analyses for the purpose of ensuring optimal benefit to the stakeholders concerned.

11.2 Application of the SAM

The development of the SAM is very significant as it provides a framework within the context of the International System of National Accounts (SNA) in which the activities of all economic agents are accentuated and prominently distinguished. By combining these agents into meaningful groups, the SAM makes it possible to clearly distinguish between groups, to research the effects of interaction between groups, and to measure the economic welfare of each group. There are two key reasons for compiling a SAM:

- Firstly, a SAM provides a framework for organising information about the economic and social structure of a particular geographical entity (i.e. a country, region or province) for a particular time period (usually one calendar year), and

- Secondly, to provide a database that can be used by any one of a number of different macro-economic modelling tools for evaluating the impact of different economic decisions and/or economic development programmes.

Because the SAM is a comprehensive, disaggregated, consistent, and complete data system of economic entities that captures the interdependence that exists within a socio-economic system, it can be used as a conceptual framework for exploring the impact of exogenous changes in such variables as exports, certain categories of government expenditure, and investment on the entire interdependent socio-economic system. The SAM, because of its finer disaggregation of private household expenditure into relatively homogenous socio-economic categories that are recognisable for policy purposes, has been used to explore issues related to income distribution.

The SAM's main contribution in the field of economic policy planning and impact analysis is divided into two categories:

a) As a Primary Source of Economic Information

As a detailed and integrated national and regional accounting framework consistent with officially published socio-economic data, a SAM instantly projects a picture of the nature of a country or region's economy. It lends itself to both descriptive and structural analysis.

b) As a Planning Tool

Due to its mathematical/statistical underpinnings it can be transformed into a macro-econometric model that can be used to:

- Conduct economic forecasting exercises/scenario building.
- Conduct economic impact analysis both for policy adjustments at a national and provincial level and for large project evaluation.
- Conduct self-sufficiency analysis i.e. gap analysis to determine, with the help of the inter industry and commodity flows contained in the provincial SAM, where possible investment opportunities exist, and
- Calculate the inflationary impacts on provincial level of price changes instigated at national level (i.e. administered prices, VAT, etc.).

To summarise, the SAM mechanism provides a universally acceptable framework within which the economic impact of development projects and policy adjustments can be reviewed and assessed at both national and provincial/regional levels. It serves as an extension to the official National Accounts of a country's economy and, therefore, provides a wealth of additional information, especially when disaggregated to more detailed levels.

12. APPENDIX D: MAGNITUDE OF LINKAGES

Formally, economists distinguish between direct, indirect and induced economic effects. Indirect and induced effects are sometimes collectively called secondary effects. The total economic impact is the sum of direct, indirect and induced effects within a region. Any of these impacts may be measured in terms of gross output or sales, income, employment or value added.

12.1 Direct Impacts

The direct impacts refer to the effect of the activities that take place in the Sugar Industry. It refers to the income and expenditure that is associated with the everyday operation of each of the components of the Sugar Industry. For instance if the cane growing component is taken as an example the direct impacts refer to the total production/turnover of cane growers; the intermediate goods bought by the cane growers; the salaries and wages paid by the cane growers; the profits generated by the cane growers.

12.2 Indirect Impacts

The indirect impacts refer to economic activities that arise in the sectors that provide inputs to the Sugar Industry components and other backward linked industries. For example, if the primary agriculture sector uses fertilizer, the indirect impacts refer to the activity (paying of salaries and wages; and profit generation) that occurs in the fertilizer sector as well as the sectors that provide materials to the fertilizer sector.

12.3 Induced Impacts

Induced impacts refer, *inter alia*, to the economic impacts that result from the payment of salaries and wages to people who are (directly) employed at the various consecutive stages of production of the Sugar Industry. In addition, the induced impact also includes the salaries and wages paid by businesses operating in the sectors indirectly linked to the Sugar Industry through the supply of inputs. These additional salaries and wages lead to an increased demand for various consumable goods that need to be supplied by other sectors of the economy that then have to raise their productions in tandem with the demand for their products and services.

These induced impacts can then be expressed in terms of their contributions to GDP, employment creation and investment or other useful macro-economic variables.

Added together, the direct, indirect and induced impacts provide the total impact that the Sugar Industry will have on the RSA and KZN & Lowveld economies.

7. APPENDIX E: DEFINITIONS OF MACRO-ECONOMIC AGGREGATES

Impact analysis will be based on a number of standard economic parameters and the results will be presented under the following headings:

- Impact on Gross Domestic Product (GDP).
- Impact on Capital Utilisation.
- Impact on Employment Creation.
    - Skilled labourers.
    - Semi-skilled labourers.
    - Unskilled labourers.
- Impact on Households Income (Income distribution).
- Impact on Government (Fiscal Impact).
- Impact on Balance of Payments, as a result of Imports and Exports.
- Efficiency Criteria.

The following is a brief overview of the definition of each of these economic parameters.

A. Impact on Gross Domestic Product (GDP)

The impact on GDP reflects the magnitude of the values added to the Sugar Industry from activities within the industry. Value added is made up of three elements, namely:

- Remuneration of employees,
- Gross operating surplus (which includes profit and depreciation), and
- Net indirect taxes

B. Impact on Capital Utilisation

For an economy to operate at a specific level of activity, investment in capital assets (i.e. buildings, machinery, equipment, etc.) is needed. Capital, together with labour and entrepreneurship, are the basic factors needed for production in an economy.

The effectiveness and efficiency with which these factors are combined influence the overall level of productivity/profitability processes, bearing in mind that productivity is affected by an

array of factors of which appropriate technology and skill level of the labour force are two important elements.

C. Impact on Employment Creation

Labour is a key element of the production process. The study will determine the number of new employment opportunities that will be created by investment in the Sugar Industry. These employment opportunities will be broken down into those created directly by the project and those indirectly created and induced throughout the broader economy. Furthermore, a distinction will be made between skilled, semi-skilled and unskilled labourers.

D. Impact on Household Income

One of the elements of the additional value added (i.e. GDP) which will result from the proposed expansion is remuneration of employees, which, in turn, affects households income.

The SAM measures the magnitude of changes that will occur to both household income and spending/savings pattern. As such, the study will highlight the impact of the Sugar Industry on the low-income households as this can be used as an indicator of the extent to which the Sugar Industry contributed to poverty alleviation throughout the economy.

E. Fiscal Impact

The government is affected by large projects via either additional expenditure or subsidies, and the collection of direct and indirect tax revenue. Therefore, it is important to calculate the impact that a project has on the government accounts, which is referred to as the fiscal impact.

The national government will not be directly involved in the form of additional government expenditure or subsidies to the project. However, the national fiscus will receive additional income in the form of:

- Property income (in the form of interest, dividends and rent receipts and the surplus or deficits of government business enterprises)
- Direct tax (mainly personal tax and company tax)
- Indirect tax (including VAT that will result from additional household spending and customs and excise tax), and
- Transfers

F. Impact on the Current Account of the Balance of Payments

The Sugar Industry will have direct, indirect and induced impacts on the exports and imports of goods and services that will take place across all of the various economic sectors that are affected by the Sugar Industry. Imports consist of direct and indirect material imports, as well as goods consumed by households that are imported as a result of the induced impact.

G. Effectiveness Criteria

The macro-economic impact of a project is evaluated in terms of effectiveness criteria that measure the extent to which the project utilises resources efficiently. Since capital is a scarce resource in the KZN & Lowveld and South Africa, the effectiveness of the utilisation of capital in terms of labour (i.e. new job opportunities) and GDP creation in relation to the total South African economy, is used as a measure of economic effectiveness. These effectiveness criteria are the most reliable indicators as to whether the Sugar Industry is effective or not.

In order to make these comparisons, two key multipliers/ratios are calculated i.e.

- The Gross Domestic Product (GDP)/Capital ratio and
- The Labour/Capital ratio.

Using these ratios, the contribution towards economic growth and job creation relative to the capital employed in the process can be established. If the decision maker considers continuous, long-term economic growth to be more important than job creation in the short-term, then the GDP/Capital ratio is the more important one of the two measures of macro-economic effectiveness. On the other hand, if job creation, particularly in the short-term, has priority, the Labour/Capital ratio is more important.

8. APPENDIX F: EXOGENOUS VECTOR FOR PRIMARY AGRICULTURE

The table below gives an example of the exogenous vector for the primary agriculture. These figures are used as the inputs for the operational phase of the model.

		Values	Percentages
1.	**Production/Turnover per annum (Rand millions; 2008 prices)**	495.62	
2.	**Number of Labourers (Numbers, 2008)**		
	Skilled Labourers	272	
	Semi-skilled Labourers	2 361	
	Unskilled Labourers	6 989	
3.	**Apportionment of Production**		
	Total Production in terms of:		
	Domestic Sales	29.84	60%
	Exports	19.85	40%
	Total	49.69	100%
4.	**Split of Production between Economic Entities**		
	Intermediate Demand	191.27	39%
	Labour Remuneration	176.65	36%
	Gross Operating Surplus	124.79	25%
	Total	492.71	100%
5.	**Split of Intermediate Demand between Commodities**		
	Agriculture	12.56	7%
	Mining	0.49	0%
	Meat, Fish, Fruit, Vegetables, Oils & Fat Products	0.68	0%
	Dairy Products	0.12	0%
	Grain Mill, Bakery & Animal Feed Products	0.08	0%
	Other Food Products	0.04	0%
	Beverages & Tobacco Products	0.00	0%
	Textiles, Clothing, Leather Products & Footwear	0.39	0%
	Wood & Wood Products	0.40	0%
	Furniture	0.00	0%
	Paper & Paper Products	3.30	2%
	Publishing & Printing	0.21	0%
	Chemicals & Chemical Products (incl. Plastic Products)	86.99	45%
	Rubber Products	0.41	0%
	Non-Metallic Mineral Products	2.24	1%
	Basic Metal Products	0.22	0%
	Structural Metal Products	0.83	0%
	Other Fabricated Metal Products	0.48	0%
	Machinery & Equipment	40.20	21%

	Electrical Machinery & Apparatus	0.00	0%
	Communication, Medical & Other Electronic Equipment	0.00	0%
	Manufacturing of Transport Equipment	1.95	1%
	Other Manufacturing & Recycling	2.09	1%
	Electricity	10.71	6%
	Water	12.03	6%
	Buildings and Other Construction	2.02	1%
	Trade	1.37	1%
	Accommodation	0.00	0%
	Transport Services	2.01	1%
	Communications	0.11	0%
	Insurance	8.59	4%
	Real Estate	0.00	0%
	Business Activities	0.19	0%
	Community, Social and Personal Services	0.54	0%
	Total	191.27	100%
6.	**Split of Labour Remuneration between Labourers**		
	Africans - Skilled	3.57	2%
	Africans - Semi-Skilled	28.64	16%
	Africans - Unskilled	17.60	10%
	Coloureds - Skilled	7.38	4%
	Coloureds - Semi-Skilled	32.93	19%
	Coloureds - Unskilled	31.82	18%
	Asians/Indians - Skilled	0.42	0%
	Asians/Indians - Semi-Skilled	0.52	0%
	Asians/Indians - Unskilled	0.02	0%
	Whites - Skilled	21.46	12%
	Whites - Semi-Skilled	29.56	17%
	Whites - Unskilled	2.72	2%
	Total	176.65	100%

Table 44: Exogenous Vector for Primary Agriculture Sector