



ANALYSIS OF UGANDA'S SUGARCANE VALUE CHAIN

Final Report



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Executive Summary

The sugar industry is one of the oldest in Uganda. It dates back to the early 1920s. The industry's strategic importance arises from its propensity to create employment, generate incomes and earn or save foreign exchange, contribute to government revenues through taxes, and reduce the import bill through sugar and allied products import substitution. Over the last 10 years, sugar production has grown by nearly 20% per annum- about 550,000 tons of sugar were produced in 2019 up from 287,387 tons in 2009. The sugar industry in Uganda involves the growing of sugarcane, it's processing as well as value addition to its products and by-products such as bagasse and molasses resulting in electricity and extra neutral alcohol (ethanol).

Until 2005, the sugar industry was dominated by three sugar millers/processors—Kakira, SCOUT, and Kinyara. They operated nucleus estates whose sugarcane supply was supplemented by that from organized and miller-supported out-growers. However, from 2006, the industry has seen the entry of many small mills, most of which have no nucleus farms and hence relying on only farmers for the cane. By 2020, there were 11 operating sugar millers, and more than 20 licensed but not operating millers. As a result, the competition for sugarcane has increased in the sub-sector, sometimes threatening the stability of the sub-sector by breaking the existing arrangements between growers and the three original millers. This study found that most of the sugarcane growers in the Busoga sub-region, which has had many new mills, are not registered and not aided by the millers. The findings also showed that unregistered and unaided growers had limited access to credit, extension and other productivity-enhancing inputs, which in turn affected productivity.

The study found that many farmers have limited access to markets for their cane, and as a result sugarcane stays in the gardens up to 30 months, far beyond the optimal maturity period of 16-18 months. This significantly reduces the profits of growers. Related to the limited market is the politics of sugarcane sale "permits" by farmers. Many farmers reported that middlemen, who are not necessarily growing sugarcane have emerged and these obtain permits from factories and sell them to farmers, and this eats into farmers profits.

The study also revealed that the price is determined differently across sub-regions and that the mills have higher bargaining power and almost decide on the price to charge. Farmers are poorly organized in groups and have very low bargaining power. The price formula recommended by the sugar law is not used in sugarcane price determination across the country.

The study found that the product space is still shallow and narrow. The main sugarcane product is raw brown sugar and a few by-products such as electricity and ethanol. No processing plant is producing industrial sugar yet and the country imports all its industrial sugar requirements.



This presents an opportunity for technology enhancement to tap into this market. This study provides the following recommendations to address the existing challenges.

There is a need to expedite the establishment of the sugar board to regulate the sugar sub-sector. The board will be key in enforcing contracts between growers and millers, and ensuring that the price formula is used in price determination to reduce grower exploitation.

The government should enhance participation in the sugar sub-sector through investing in research and development (R&D), and supporting cane growers with extension services, credit and other productivity-enhancing inputs to improve cane productivity

The government should support the establishment of more mills with priority on farmer-owned mills to address the challenge of lack of sugarcane market by the out-growers. The study found that sugarcane for many growers stays in the garden for more than 18 months due to limited market availability, which leads to farmer losses. This hurts more people who are renting land for one season and those who obtain loans to grow sugarcane assuming that they will sell in 28 months and repay.

The respective district local governments should regulate sugarcane permit issuance to out-growers who have been captured by the middlemen and those who are not growing cane. There is a need to enforce the issuance of a permit to only those growing cane with clear and predictable criteria to avoid speculative dealings which are affecting small holder farmers.

The government (through the Ministry of East African Community Affairs and the Ministry of Trade) should strongly push for the removal of non-tariff barriers to ease access to export markets in East Africa as well as the COMESA trade area. This will create an incentive for mills to invest and in turn absorb more cane from their gardens.

The government should support mills to deepen and widen the product space into the production of industrial sugar. This is largely imported yet there is surplus sugar that can be processed into industrial sugar.

01 Introduction

Globally, the sugar industry is an important agro-based industry whose value chain encompasses both forward and backward linkages to the domestic, regional and international economies and markets. Sugarcane provides livelihoods for more than 100 million people (ISO 2019)¹ in the world. The industry is crucial for the production of sugar from sugar cane and its by-products and creates a range of jobs. The sub-sector forms an important part of Governments' agricultural, industrial development and trading policies.

In the East African region, the sugar industry is one of the oldest agro-based industries. It produces about 1.6 million metric tons of sugar from 180 million metric tonnes of sugar cane annually. It is an important sub-sector because it generally encompasses several forward and backward linkages to the local economies as well as the domestic and international markets in which it operates.

In 2020, Uganda produced 550,000 metric tons of sugar from active 12 out of 34 licensed sugar millers across the country. The 2021 total production capacity is estimated at 600,000 tons with mills averaging 65% operating capacity. All the sugar millers, except the Atiak Sugar factory are 100% privately owned following government policy of liberalization and privatization since the 1990s. The world sugar market has been highly distorted by protectionism and the provision of subsidies to growers in the respective importing/producing countries.

1.1 BACKGROUND TO THE STUDY

The Government of Uganda through the National Development Plan III (2020/21-2024/25), has intensified its focus on agro-Industrialisation (AI) to achieve structural transformation, economic growth, and poverty reduction. Hence, the government's emphasis on the commercialisation of agriculture and value addition on key locally produced commodities and raw materials can increase competitiveness, create employment and consequently eradicate poverty, especially among the rural population. One of the key AI raw materials of strategic focus is sugarcane.

Sugarcane production in Uganda increased from 1.75 million tonnes in 1970 to 4.89 million tonnes in 2019 growing at an average annual rate of 3.62%. (World Data Atlas, 2020). This multi-billion-shilling sub-sector/industry can generate large scale employment, increase incomes especially for the rural population and reduce poverty. For instance, it is estimated that approximately 70,000 Ugandan farmers are engaged in sugarcane production in the country.

The sugar sub-sector face many challenges. These include lack of a well-defined coordination mechanism, lack of critical agronomic extension services (including inputs) especially to the unaided

¹ For example, the sugar industry supports the livelihoods of 1 million people in Brazil, 1.5 million in Thailand, and about 0.5 million in South Africa, and more than 100,000 in Uganda.

out-growers, and limited access to finance to facilitate the agricultural industrialization agenda. Other constraints hindering this sub-sector and agricultural industrialization include limited market linkages (more so to smallholder farmers), low sugarcane prices, challenges of transporting sugarcane from the farmer to the processing plants (since sugarcane is bulky and perishable), lack of entrepreneurial skills, low sugar extraction rates for processors, limited use of yield-enhancing technologies, and lack of appropriate sugar extraction technology, among others.

The sugar industry is considered one of the most strategic areas to propel the economic and social transformation of the country as espoused in the National Sugar Policy, 2010. The industry's strategic importance arises from its propensity to create employment, generate incomes and earn or save foreign exchange, contribute to government revenues through taxes, and reduce the import bill through import substitution (Hess et al. 2016). Consequently, sugarcane can be relied upon as a suitable perennial commodity to promote the integration of smallholder farmers within commercial agricultural circuits which have the potential to improve rural development and reduce rural poverty (Giuliano and Ricardo, 2019).

The increased expansion of sugar-based agro-industries is envisaged to provide a pathway to inclusive rural transformation through expanded off-farm employment opportunities, and better access to services and infrastructure, according to a 2016 report by IFAD. Some scholars such as Wiggins, Henley and Keats (2015) recognise that engaging in industrial crop markets can benefit farmers by improving access to better markets, hence raising their earnings and improving welfare. They further argue that rural areas chronically lack investment and therefore additional capital from industrial crops (such as sugarcane) often has important benefits in terms of improved physical infrastructure and uplifting the quality of human capital.

Recent research, however, cast doubt on whether agricultural investments and initiatives in sugarcane and sugar production generate quality employment, sustained incomes, enhance rural livelihoods, and promote more vibrant local economies. Giuliano (2017) and Hall, Scoones and Tsikata (2017) argue that the benefits of such investments depend on farming models and local conditions that underpin the unfolding land relations as well as labour regimes.

1.2 PROBLEM STATEMENT

The Busoga sub-region has been grappling with excess and over mature sugar cane since 2019. The existing sugar mills processing capacity cannot readily and timely process all the available mature sugarcane, especially from the out-growers. To help the situation of lack of market in Uganda, the government allowed the out-growers to sell the sugar cane to Kenya. This proved uneconomical due to loss of weight and high transport cost, and technical barriers at the border. These factors increased losses to out-growers. They consequently requested the government to provide a sugar mill for the Busoga Cooperatives Union to soak up excess sugarcane. They also requested two incubation centers to build their capacity. The government promised to provide a sugar mill.

The sugarcane value chain in Uganda (as represented in Busoga and Bunyoro sub-regions) is linked to the national development challenges which emanate from the colonial structures of limiting value addition to a few selected commodities that provide a narrow market base and restricting the rest of the population to producing primary raw materials. This perspective views sugar production from a single product (i.e. sugar) instead of a sugar industry cluster or a value chain that incorporates all the inputs, actors, services, and products.

As it stands now, there is a clear dichotomy between the farmers on one hand and the sugar millers/processors on the other. As a result, the farmers sell off their cane at very low prices to the manufacturers but do not share in the profits that the manufacturing process generates. They feel they are not fully compensated for their input. Having obtained their meagre income from the sale of sugarcane, for example, the farmers go to the market to buy expensive manufactured domestic products for use at home. In the face of reduced sugarcane prices, the farmers in the Busoga sub-region have continued to expand their sugarcane fields in the hope that this will lead them to a reasonable income to sustain their families but this is to no avail.

There is limited commercial sugarcane production by land owners who have hundreds of acres of unused land; instead smallholders with 2-5 acres of land, are the ones heavily involved in sugarcane production at the cost of household food production. This phenomenon has led to food shortage/insecurity, extreme poverty, poor educational outcomes, and poor health indicators particularly among children under five. It has also led to early pregnancies, and child marriages.

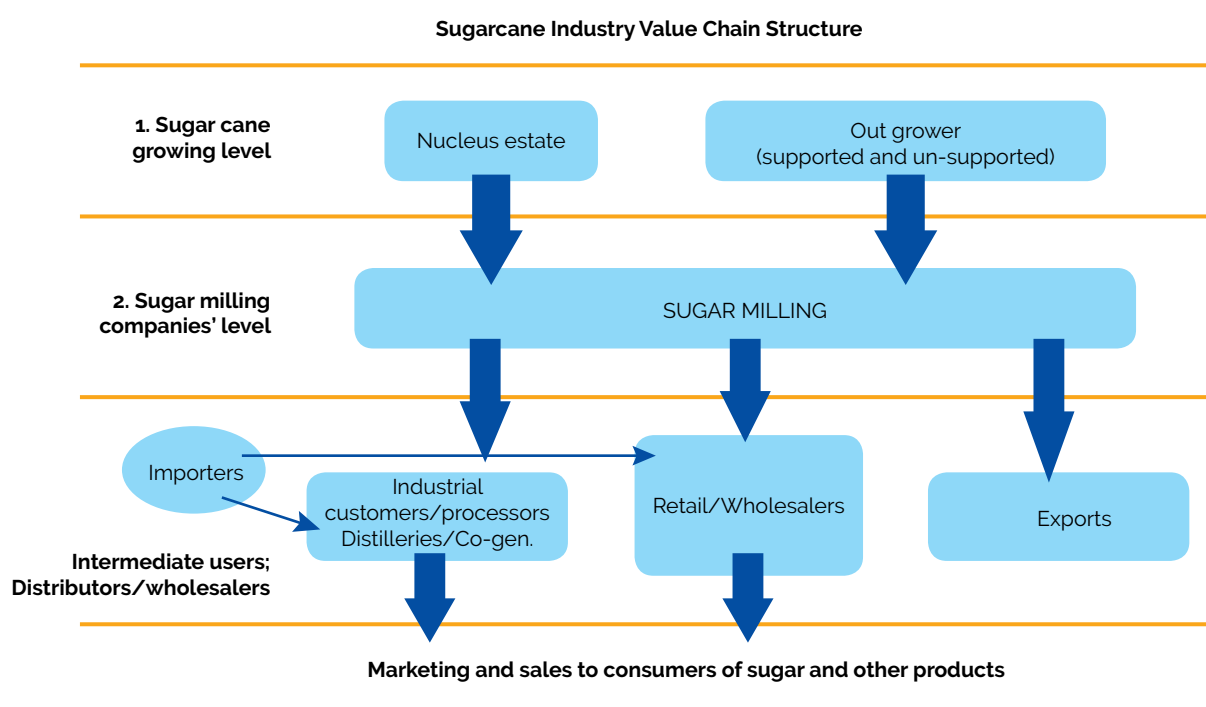
There is no doubt that the small-scale farmers have boosted sugarcane production that has attracted several businesses and investments into Busoga sub-region. The increased number of sugar mills have, however not improved the situation of the small-scale farmer. The investors seem to read from the 'same script': keep farmers to be farmers, pay minimum for the sugarcane; and process it into sugar and leave out the other valuable products.

The sub-sector, however, has the potential for growth, product diversification, and employment creation if only the problems are solved. The problems include limited capital, lack of entrepreneurial skills, lack of appropriate technology and brain drain of the technically competent personnel from the manufacturing sub-sector to trade sub-sector, which has quicker investment returns. Consequently, the industries are operating like trading companies, producing only for tomorrow and not investing in research and development. Furthermore, there is no institutionalised collaborative mechanism for the industry to work with R&D companies as well as academia.

The presence of many sugar mills without clear guidelines and policies has precipitated conflicts in the sugarcane-growing areas. The sugar industry is constrained by a poor structural arrangement that has led to low production capacities, lack of clear harvesting schedules, losses by the farmers, cane poaching, and decreased incomes.

Other constraints in the sugar industry include; the unfair pricing formula for the farmers' cane, which only considers the weight of cane, ignoring all other products like, molasses, bagasse, ethanol, and power supplied to the national grid and other products that are obtained from cane. There is non-operationalisation of the sugar board; non-tariff barriers against the Uganda Sugar exports to the East African Common Market; non-transparency in the issuance of the sugar permits prior delivery to the miller, delayed purchase of cane by the millers from the time of harvest which affects the sucrose content.

1.3 STRUCTURE OF SUGARCANE VALUE CHAIN IN UGANDA



The following actors in the value chain are not included in the above figure:

- (i) Government authorities/regulators, namely, MTIC, MoFPED, MAAIF, MEACA, URA, UNBS
- (ii) Uganda Sugar Manufacturers Association and small millers associations
- (iii) Out grower associations and Cooperatives Unions
- (iv) Traders and consumers associations.

1.4 OBJECTIVES OF THE SUGARCANE VALUE CHAIN ANALYSIS

The main objective of the assignment is to analyse the sugar sub-sector, understand the key challenges and opportunities, and draw recommendations for improving the performance of the sub-sector across the value chain to benefit socio-economic transformation and Uganda's economy at large. Specifically, the study seeks to:

- a) Analyse the structure and performance of the sugar industry.
- b) Examine the existence of supporting infrastructure, technology, skills and support service.
- c) Examine the successes, challenges and opportunities towards the transformation of the sub-sector.
- d) Analyse the Policy, Legal and Regulatory Framework for the Sugar Industry;
- e) Provide recommendations aimed at increasing household incomes for the players in the lower value chain; and alternative value addition facilities/processes that could increase the contribution of the sugar sub-sector to the country's GDP.

02

Research Methodology

2.1 STUDY DESIGN

A participatory cross-sectional survey using both qualitative and quantitative designs was adopted to conduct the sugar value chain analysis across the sugarcane producing regions of Busoga, Buganda and Bunyoro. The value chain approach aids the understanding of the constraints experienced and opportunities available to various players in sugarcane and sugar production, processing, and marketing.

2.2 SCOPE

The study covered the three sub-regions of Buganda, Busoga and Bunyoro. One district in Buganda i.e. Buikwe was selected because it is the major sugarcane growing area in the sub-region. Jinja, Kamuli, Kaliro, Luuka, and Mayuge districts were selected in Busoga, while Masindi and Hoima were selected in Bunyoro. Out of the 8 districts, 16 sub-counties were selected as representative sugarcane growing areas in the districts. 32 villages were selected from 16 sub-counties and eventually, 640 households were selected for the study.

2.3 RESEARCH SAMPLING METHODOLOGY

The study used stratified sampling method to select the targeted respondents. Specifically, from the three sugarcane-growing regions, the districts to study were purposively selected based on the intensity of sugarcane production. From each district, the major sugarcane sub-counties were purposively selected. Within sub-county, all the sugarcane growing parishes were listed and two villages were randomly selected for survey. Finally, households were randomly selected from the lists of all sugarcane growing households. In addition to households, the study also involved key informant interviews with key stakeholders at ministry-, local government-, and community levels, in addition to millers and grower associations.

2.3.1 Sampling of Farmers

A listing of all sugarcane-growing farmers in the enumeration area was compiled. Five districts from the Busoga region were randomly selected, in addition to Buikwe district in Buganda, and Masindi and Hoima districts in Bunyoro.

In each selected district, we listed the sugarcane growing sub-counties from where we randomly selected two sub-counties for the survey, giving us a total of 16 sub-counties. In each sub-county, two villages were selected making a total of 32 villages that were randomly selected for the household

survey. In each village, a list of sugarcane growers was generated and 20 households were selected from each village to participate in the household survey.

In total, 640 households were selected from the 32 villages. The selection of 20 households per village was informed by the Uganda Bureau of Statistics (UBOS)' selection criteria of 10 households per enumeration area (EA). Given that this study had a relatively smaller scope than UBOS', the numbers of households per enumeration area were increased. Where two or fewer sub-counties were found to be growing sugarcane, all of them would be surveyed.

Table 1: Stratified Sample Determination

Location	Sample Size
Sub regions (Busoga, Buganda and Bunyoro)	3
Districts	8
Sub-counties (2 per district)	16
Villages (2 per sub-county)	32
Households (20 per village)	640

Depending on the number of growers in a district, sampling weights were used to correct district level variations in the number of sugarcane growers. In other words, if some districts had fewer sugarcane-growing sub-counties and villages, sampling weights were attached. This means districts with more growers would be oversampled and those with fewer under-sampled.

In each of the surveyed communities, a focus group discussion of 8-12 members who were knowledgeable about sugarcane-growing and processes in the community was conducted. The emphasis was placed on having a good representation of men and women, and youth. Three FGDs were conducted in each district making a total of 24.

2.3.2 Sampling of Value Chain Actors

The support component of the value chain involved agro-input providers (e.g., sugarcane planting materials), extension service providers, R&D, and creditors (financial institutions). The snowball method was used to identify these players. The different value chain actors were identified on recommendation from the farmers. In each sub-county, three agro-input dealers from each category of seed cane distributors, and agro-chemical dealers were randomly selected. In total, the study covered six dealers of fertilizers, pesticides and herbicides, and extension service providers. The overall total was 48 agro-input dealers. In addition, the study covered five financial institutions and up to three key extension service providers per district. A sampling frame of agro-input dealers and other players was generated, from which those to be interviewed was randomly selected.

Sample of agro-input dealers and service providers

Value chain actor	Sample Size
Agro-input dealers (seed cane distributors, agro-chemical dealers e.g dealers of fertilizers, pesticides and herbicides), 3 per sub-county	48
Financial institutions	5
Extension service providers	3

2.3.3 Sampling of Millers/Processors

A census of all processors in the district was conducted, and all millers therein were interviewed. Each district had at least one processor from whom we could generate information needed to highlight the challenges and opportunities in the sugar processing industry.

2.3.4 Sampling of Transporters

The snowballing method was used to sample transporters. The specific interest was to get transporters who link farmers to processors. In each of the 16 sub-counties, three transporters were randomly selected, in addition to six, transporters who link processors to the market. In total, 54 transporters were interviewed.

2.4 DATA COLLECTION AND ANALYSIS

The data was collected using computer assisted personal interviewing (CAPI). Data collection exercise started with the listing of all households in the enumeration areas, followed by sampling of eligible households for interview. The analysis involved document review, and thematic analysis of qualitative data, while the quantitative data was analysed using STATA software.

2.4.1 Key Informant Interviews

A key informant interview (KII) guide was developed. This method of data collection was used partly in identifying and mapping out key players and their roles along the sugarcane value chain. It was also used in addressing specific objectives related to the successes, challenges and opportunities in the sub-sector.

Key informants were purposively selected at national and regional/district and sub-district (sub-county) levels. Respondents were drawn from the following categories;

- i. National level - Members of Parliament, farmers, academia, sugar manufactures, officials of Ministry of trade,
- ii. Regional/district Level - sugarcane growers associations in Busoga, and Bunyoro,
- iii. Officials in MDAs, local governments, (district sub-county/community), and agricultural research institutions.

2.4.2 Desk Review

The study team undertook literature and documents reviews, including but not limited to scholarly articles, distribution models, programme progressive reports, policies, laws, guidelines, financial reports, trade reports, and contract agreements. Document reviews were helpful in answering the objective which sought to analyse the structure and performance of the sugar industry highlighting the actors and their relationships, trends in sugar and sugarcane demand and supply, sugarcane production acreage and volumes, sugar trade, and linkages to other sectors.

Data from document reviews was the initial step to mapping and examining institutions governing the production, processing and marketing arrangements of sugar production. It was also useful in advancing the objective regarding the analysis of the policy, legal and regulatory framework for sugar in Uganda.

2.4.3 Focus Group Discussions

Focus group discussions (FGDs) were conducted among the sampled groups of farmers at the community level. FGDs involved farmers, associations/cooperatives/groups to ascertain general community information on aspects such as market access, access to the provision of extension services, production and marketing, and storage. Information on gender involvement in sugarcane production at a community level was collected. Separate FGDs were conducted for men, women, and youth for good representation.

2.4.4 In-depth Interviews

In-depth Interviews were conducted with agro-input dealers, processors/millers, and transporters to evaluate the entire value chain process.

The agro-input dealers interviewed were those who supply planting materials, fertilizers, pesticides, and herbicides. The study captured data on input prices, and challenges and opportunities in Sugarcane agro-input dealership. At the processing level, information was elicited on the linkages between processors and farmers on one hand and on the other their linkage to the market and other sectors. Data was also captured on processing costs and revenues to determine whether sugarcane processing is a profitable business. In addition, data was captured to ascertain processing plants sugar extraction capacity per tonnage of raw sugarcane.

Finally, in-depth interviews were done with the agents and transporters to examine the challenges facing sugarcane transporters. The study focused on both the transporters from farms to processing plants and those who transport from processing plants to markets. The study sought to understand the quality control measures along with transportation, the modes of transport, transportation costs, and regulation.

2.4.5 Quantitative Data Collection: Household Surveys

The team conducted a household survey at the farmer level. Standard questionnaire design procedures were carefully followed including the scrutiny of questionnaire content to ensure that the key indicators are captured. The sugarcane household survey questionnaire was applied to randomly selected households through face-to-face interviews.

At the household level, information was collected on the following aspects: household owner profile, household demographic characteristics; housing; water and sanitation; socio-economic status, land allocation decision making; land size; decisions on renting land and from who; household sugarcane production arrangements, the forms of support received; pricing; inputs; and support infrastructure. The detailed household questionnaire was administered to households actively engaged in sugarcane production at the time of the survey. Those households that rent out their land for sugarcane production were of particular interest in this study. They were followed to qualitatively collect information on reasons for renting out land for sugarcane production, the impacts it has had on their livelihood strategies, food security and women empowerment, among others.

03

Overview of Uganda's Sugar Industry

3.1 EVOLUTION OF UGANDA'S SUGAR INDUSTRY

The history of Uganda's sugar production can be traced back to colonial times when the cash crop economy was promoted mainly to provide raw materials to foreign industries. The sugar industry is one of the oldest industries in the country, with its history dating back to the early 1920s. By the 1960s, the sector's annual production was about 140,000 tons of which 120,000 tons were for domestic consumption and 20,000 tons for export. However, production declined significantly during the 1970s because of mismanagement and neglect of the estates. After 1986, the industry steadily picked up following rehabilitation and divestiture programmes undertaken jointly by the government and the private sector. Over the last 10 years, the industry has been expanding production by nearly 20% per annum culminating in the production of 500,000 tons of sugar in 2019.

In 1918 Mehta started to grow commercial sugarcane. From 1924 to date SCOUL has been producing sugar and a host of sugar by-products such as; brown sugar as the primary product, molasses, industrial (extra neutral) spirit, food grade carbon dioxide, and bagasse that is being used to produce electricity (currently 9.5MW).

The history of Uganda's sugar production however, uneven. During some periods the country was faced with surplus production and in some instances also faced with deficits in other years. Uganda recorded sugar surplus production from 1955 to 1964 ranging from about 10,000 tons to nearly 50,000 tons (Charles S. Frank, 1966). Uganda also experienced deficit times in the period between 2004 and 2014 was a deficit sugar-producing decade, with net imports equal to about 10% of national production (Westlake, 2014).

Before 2006 sugar production in Uganda was concentrated around the three big sugar millers including Kakira Sugar Works Ltd (KSW), Kinyara Sugar Ltd owned by the Madhivani group and founded in 1920 in Jinja district; the Sugar Corporation of Uganda Ltd (SCOUL), founded by Mehta group of companies in 1924 in the current district of Buikwe; and Kinyara Sugar Works Ltd founded in 1955 as a jaggery in Masindi District by Bunyoro Kitara kingdom. Together these millers were producing 191,561 metric tons of sugar. As a result of increased capacity installation among the big three and the coming on board of more factories, sugar production increased by 129 per cent to 438,360 metric tons in 2014 when compared to 2006 production (Okumu, 2017). More recently (October 2020), the Atiak Sugar Factory in Amuru District was commissioned, bringing the northern region on board as a sugar production area. New sugar manufacturers in the Busoga sub-region include Mayuge Sugar Factory, GM Sugar works Ltd, Kamuli sugar and a SAIL sugar factory in Kaliro (Nakato 2017). Other licensed sugar factories which are either in operation or proposed to take off include Mukwano sugar industry in Masindi, Tirupati Development in Nakasongola, Uganda Crop Industries in Buikwe, Kafu Sugar in Masindi, Kenlon in Namasagali and Bugiri Sugar Company in Bugiri, bringing the total number of licensed sugar factories in the country to 34.

The sugar industry is an important sector not only to the livelihood of a significant number of Ugandans, but to the economy in general. An estimated six million Ugandans derive their livelihood directly or indirectly from the sugar industry. The industry is wholly supported by locally grown raw materials (sugarcane). Moreover, 70 per cent of the cane milled by the sugar companies is supplied by over 10,000 small-scale farmers. Further, the industry employs about 12,500 Ugandans in plantations and factories. Indirectly, the diverse range of products and bi-products¹ across the entire value chain creates unique employment opportunities for the population. In addition, the industry saves the Ugandan economy over US\$200 million in foreign exchange annually. Furthermore, it contributes to the development of rural road infrastructure as well as providing social services such as hospitals, schools, electricity and other community development services upcountry. The importance of the industry increases when other linkages to the economy such as, with other food processing industries, are considered.

“ My jaggery mill had been stopped from operating because it was close/6 km to Kinyara Sugar factory. I remember the Sugar Act was assented to on 23rd April 2020 and on the 24th I resumed production. My crushing capacity is 50MT of cane per day. My Out growers are those whom Kinyara rejected.” - a KII respondent; Distillery owner in Masindi.

Given the sugar industry importance, the government has attempted to establish a conducive investment climate that has facilitated new investments. There is a proliferation of new sugar millers, with 8 of the 12 factories setting up in the last 10 years. In addition to new millers, there is a significant expansion of the crushing capacity of the old millers. Besides, several millers have significantly invested in their nucleus estates and out-grower schemes.

Despite the economic importance of the sugar industry, it is faced with several challenges that are limiting its positive potential on the Ugandan economy and livelihood. For the cane growers, the challenges include: unfavorable compensation which limits productivity; regional price differences affecting morale, varying from low cane prices especially in Masindi district to competitive prices in Busoga and Buganda sub-regions; uncoordinated logistical sequencing of cane lorries to factories; refusal by sugar firms to buy burnt sugarcane yet it is supposed to be given a priority in buying; high percentage (5%) deductions on cane delivered to cater for unclean products which affects farmer income, low sugar recoveries from cane; skewed sharing of revenues accruing from by-products in favor of millers; uncoordinated closure of factories for annual maintenance.

*“ **The matter of transport costs:** “ Transport for cane is a subcontracted service arranged by the miller. The miller gets an arrangement fee charged on every metric ton delivered to the factory. Miller also arranges for other transport related service providers like cane harvesting (cutting & lifting), and loading. In all these situations the farmer is usually overcharged. The farmers do not have capacity to buy own trucks and even where they would pull resources, their level of organization is still very low. Often times their organizations have been polarized by politics. Because of corruption even the level of trust is very low”. - Dr. Lawrence Bategeka, a Sugarcane Out-grower and a representative for Hoima Municipality in the 10th Parliament.*

For the millers, the challenges include unhealthy competition for sugarcane; unregulated selling and buying of underage sugarcane; child labor; decreased sugarcane productivity; and farmers not honouring their production contracts. Also, the government has pointed out increased prices for sugar on the market; and loss of employment due to downsizing by some millers.

1 These by-products include: Bagasse, molasses, electricity, ethanol, gin, furfural for resins and plastic industry, pulp for paper, particle boards and charcoal briquettes (fuel) and Carbon-dioxide.

As a result of these challenges, the sub-sector is faced with several inconsistencies that are causing a policy dilemma. First, the existing high levels of poverty in sugarcane growing areas. Secondly, sugar production is declining amidst increasing demand, with the majority of millers operating below capacity. Thirdly, the Sugar Recovery Rate (efficiency of millers) is among the lowest in the COMESA region. Fourth, the sugarcane varieties available to farmers are late maturing and of inferior quality. And, lastly, there has been a loss of employment due to downsizing by some millers² and reduced revenues by government.

The government has attempted to address these challenges by enacting the National Sugar Policy 2010 and Sugar Act, 2020. The Policy aims to bring harmony among all the key players in the sugar industry to promote and sustain steady industrial growth and transform and diversify development and transformation of the sub-sector to become modern and competitive. To strengthen the policy, the government dissolved the outdated Sugar (control) Act of 1938 and the Sugar Cess Act of 1957 to address the new challenges in the Sugar industry by enacting the Sugar Act 2020 which provides for the development, regulation and promotion of the Sugar industry.

Nevertheless, the proposed legal framework (Sugar Act, 2020) has faced severe criticisms, putting its success into question if criticisms are not adequately handled. The Act did handle the marketing and distribution of sugar, it is silent on sharing the revenue from the by-products of the sugarcane value chain, the Sugarcane pricing formula is not equitable enough and only favours millers as compared to other revenue sharing formulae globally.

3.2 Analysis of the Sugar Industry Structure

The Uganda sugar industry is one of the sectors that is almost 100% controlled by the private sector. The Ministry of Trade, and Industry and Cooperatives has to-date, February 2021, licensed 34 sugar millers out of which 11 are actively producing sugar as well as the by-products like bagasse, molasses, electricity, ethanol in addition to the main product – the brown sugar.

The structure of the sugar industry is not a complex one because it has few nodes in the value chain including but not limited to sugarcane production, sugar milling, sugar marketing and distribution and consumption. The actors the millers, out-growers, transporters, exporters/importers, government/regulator, and finally the consumers. This entire industry structure for Uganda is directly and indirectly influenced/controlled by the millers.

3.2.1 Actors and Linkages

The sugarcane value chain has a few actors that are interlinked including farmers, aggregators, millers, distributors and retailers. Each of these has a role to play in the sugarcane value chain as detailed below.

3.2.2 Farmers (Out-growers)

The Uganda sugarcane out-growers are organized and situated around the licensed millers across the country. The new millers tend to locate themselves strategically near the existing cane growers except in the newly opened up sugarcane growing areas in northern Uganda. All the sugar processors find it convenient to start with cane grown from their nucleus farms. There are 70,565 out-growers for scattered around the 11 established and operating sugar millers. Their combined acreage for 2018 was 135,048 hectares. The average yield is 67 metric tons per hectare.

² The daily Monitor newspaper of 18 October 2017 reported that Kikira Sugar Works was to lay off 4,000 employees due to 50 percent operation under capacity.

Farmers grow 70 per cent of the cane to meet the millers' requirement for sugar processing. On average they own 2-3 acres. There are also cases of people from Buganda who hire land especially in Busoga for sugarcane production. This is one of the causes of food insecurity in the area. They majorly depend on millers for a source of agricultural inputs especially seed, fertilizers and herbicides. The three big millers (Kakira, SCOUL/Mehta, Kinyara) used to advance inputs to farmers before the growing season.

The millers would then deduct their advanced support in form of cash at the end of the season before making payments to farmers. The story changed with the emergence of new small millers who caused unhealthy competition through poaching of sugarcane. Therefore, the big three millers are now very careful with which farmers to advance agricultural inputs. So, in most cases now farmers are freelance and may supply cane to whichever mill they wish. This affects production because farmers need to be supported for maximum production. Sometimes the farmers sell their cane to aggregators who later supply the millers.

3.2.3 Millers

These mainly process sugar and other by-products. They sell sugar to local and regional markets. They also support farmers and aggregators with production inputs. In terms of numbers, there are eleven active sugar milling companies with an installed capacity of 25,350 metric tonnes per day. Three companies – Kakira, SCOUL, and Kinyara – take up 60 per cent of the total installed capacity. The cane crushing capacity is expected to increase as more millers emerge. These new millers will add a combined daily crushing capacity of 40,000 tons of cane. This will potentially address the current outcry of excess cane. The daily excess cane is estimated at 5,000 tons as at end of 2020.

The Uganda sugar industry is highly controlled by the millers because they determine the price with almost no involvement by the out growers. Almost every miller has a nucleus farm close to the processing facilities. In other words, they compete with the Out growers and have an advantage over the cost of transport. Indeed, the nucleus farms are much more efficient than the out growers because their estates are well attended to and they benefit directly from the quality planting materials. The sugar millers control the entire sugarcane value chain from the research laboratories to the soil and finally to the cup/plate/mouth.

3.2.4 Products and By-products

The sugarcane value chain is majorly dominated by raw sugar as the main product. The two Key by-products are extra neutral alcohol (ENA), simply called 96% ethanol, and electricity. Ethanol is obtained from molasses and electricity from bagasse. The other by-products such as carbon dioxide, fertilizers, sweets and paper boards are of minor significance. The sugarcane value chain is also known as the sugar industry because of the main product (sugar). This study emphasizes only raw sugar, electricity and Ethanol (ENA) as the common by-products. The total number of crushing capacity (TCD), Electricity and ENA is 28,700 MT, 107 MW and 245,000 litres respectively as shown in table 2 below.

Table 2: Tons Crushed Daily, Electricity and Ethanol Production by Miller

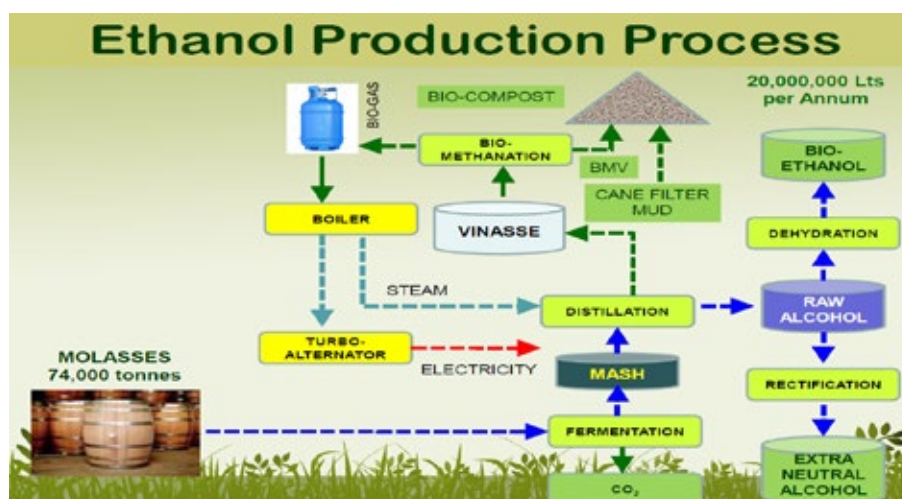
Sn	Factory	TCD (MT)	Electricity (MW)	Ethanol (Litres)
1	Sugar Corporation of Uganda Limited (SCOUL)	4,000	9.5	30,000
2	Kakira Sugar Limited (KSL)	7,500	52	60,000
3	Kinyara Sugar Limited	6,500	14	30,000
4	Uganda Crop Industries Limited (Sezibwa Sugar)	300	1.0	-
5	GM Sugar Limited	1,650	3.8	30,000
6	Mayuge Sugar Limited	2,000	9.2	30,000
7	Sugar Allied Industries Ltd (Kaliro sugar)	1,650	8.0	30,000
8	Kamuli Sugar Limited	1,450	3.0	-
9	Ndiburungi Sugar limited	1,000	1.5	-
10	Seven-star Sugar Limited (Luzinga sugar)	300	-	-
11	Hoima Sugar Limited	2,500	5	30,000
12	Atiak Sugar ltd	1,650	-	-
13	Bwendero Sugar	700	-	30,000
14	Kyenjojo Sugar	-	-	-
15	Smart Start Industries Ltd.	50	n/a	10,000 ¹
	Total	26,800	107	280,000

Source: A compilation from field interviews

3.2.4.1 Ethanol Production

Ethanol (extra neutral alcohol) is produced from molasses that result from the extraction of sugar. Uganda on average produces 245,000 litres of ethanol per day. The ethanol is currently used for making alcoholic spirits and ethanol-based hand sanitisers. It is also used in laboratories. This ethanol is produced by eight companies, with Kakira Sugar Limited (KSL) accounting for the largest quantity (Table 4). Below is an illustration of how KSL manufactures ethanol.

Figure 1: Process of Ethanol Production



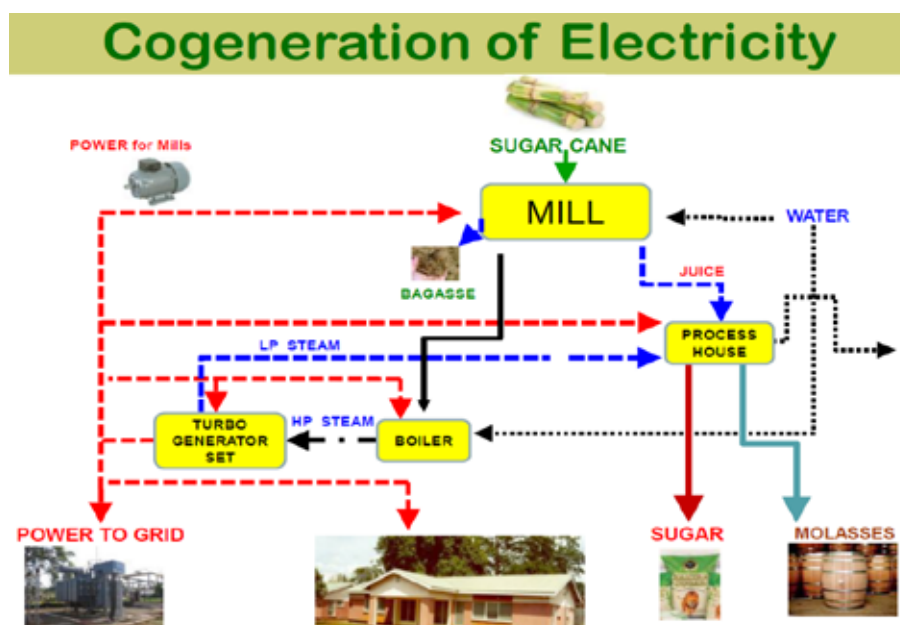
Source: KSL 2009

4 As reported during the Interview between the research team and David Byensi, the proprietor.

3.2.4.2 Co-generation of Electricity Production

In sugar factories, bagasse is burned to generate high-pressure steam which drives turbines to produce electricity. The electricity is used for internal use by factories and the balance pushed to the national grid. Millers in Uganda generate an average total of 107MW.

Figure 2: An illustration of co-generation at KSL



Source: Kakira 2009

3.3 Performance of the Ugandan Sugarcane Industry

The sugar industry in Uganda involves the growing of sugarcane, its processing as well as value addition to its products and by-products such as Bagasse and Molasses resulting in electricity and Extra Neutral Alcohol (Ethanol) respectively. Sugar as the main product of sugarcane dominates the market thus the name 'the sugar industry'. The by-products of main importance are Electricity which is made from molasses and Extra Neutral Alcohol though there are other products such as carbon dioxide, fertilizers, animal feeds, paper board and sweets among others.

3.3.1 Sugarcane Production Geographies

Sugarcane in Uganda is majorly grown in the districts of the Busoga: Mayuge, Luka, Kamuli, Jinja, Iganga and Buyende among others. It is also grown in the Buganda districts of Buikwe, Mukono and Kayunga. The majority of farmers in these areas mainly supply cane to Kakira sugar works and Sugar Corporation of Uganda Limited -Lugazi (SCOUL). The farmers of Masindi grow sugarcane to supply Kinyara Sugar and other emerging factories in the region. There is also sugarcane growing in the northern Uganda districts such as Amuru. The cane is supplied to the newly established Atiak Sugar Factory.

The seed rate is four tons per acre for both nucleus farms and outgrowers though the out-growers usually require more due to wastage and lack of precision. The average yield of sugarcane in Uganda is 67 metric tons per hectare, the lowest in the East Africa mainly due to poor cultivation techniques and poor seed. The varieties predominantly grown are Co-671, Co-945 & CB-3822 which are mostly imported

from Reunion, Mauritius, South Africa, France, Queensland Australia, and Canal Point-Florida. Farmers supply 70% of the cane required for milling requirements in Uganda. The big three millers have a well-established nucleus estate while the small millers largely depend on farmers for raw material.

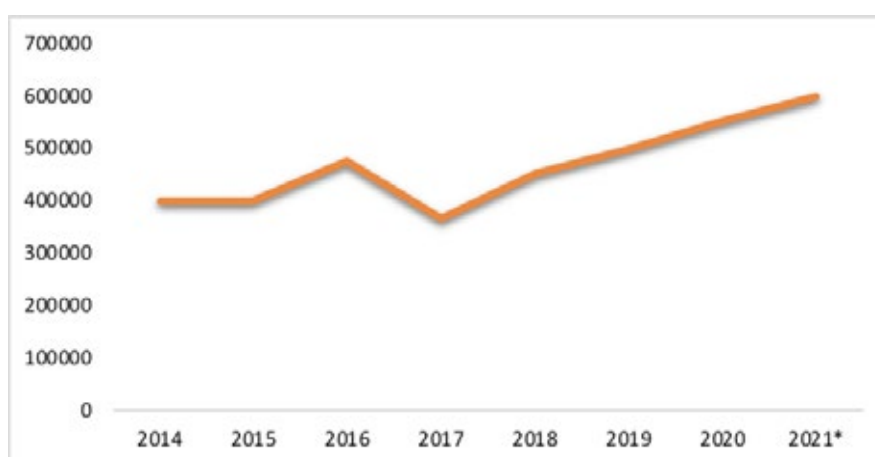
There are no pests and diseases of significant risk in Sugarcane except the sugarcane white scale which is of minor threat. In 2019, sugar cane production for Uganda was 4.89 million tons compared to 1.75 million tons in 1970. This represents a significant increment in production — growing at an average annual rate of 3.62%.

3.3.2 Processed Sugar Production (Costs and Volumes)

Uganda has the lowest sugar production costs in the region, yet, sugar production is not having the expected growth trajectory amidst increasing potential demand. It costs Uganda US\$180 to manufacture a metric ton of sugar compared to Kenya which spends \$500, Mauritius \$450, Sudan \$340, Egypt \$250, Zambia \$230, and Malawi \$200 (Kenya Sugar Directorate and the East African April 25, 2015)¹. The sugar industry in Uganda started in the 1920s when the first sugar factory was established in Lugazi by the Mehta family. Production peaked in 1972, but unfortunately began declining, due to mismanagement. From 1980 onwards, the industry steadily picked up following rehabilitation and divestiture programmes undertaken by both the private sector and the government. In the early 2000s, sugar production increased by nearly 15% annually culminating in a record annual production of about 240,000 tons in 2008, increasing by 20% in 2009. However, sugar production has fluctuated in the last decade. Sugar production stood at 266,910 MT in 2011 and peaked at 400,499 MT in 2014, but drastically fell to 365,452 MT in 2017 (Figure 3). Yet the potential demand is rising, with Uganda's current population of about 44 million and per capita sugar consumption of 12 kg per person per year. Besides, it is projected that the country will need about 915,000 metric tons by 2030 if the estimated per capita consumption increases to 15 kg per person per year.

The fall in production in 2017 was due to unhealthy competition for the cane. Most of the newly licensed mills begun production around 2016 and 2017 without nucleus farms and out-grower development. This led to poaching of cane which farmers took advantage of to sell immature sugarcane. Immature cane affects the rendement subsequently reducing sugar output.

Figure 3: Uganda Sugar Production (Metric Tons) 2014 - 2021



Source: USMA, 2021

Sugar production is not at the expected level due to limited research. This has resulted in low yields—lowest by regional comparison (Table 3). Sugarcane research is at a small scale — currently undertaken

¹ <http://www.theeastafrican.co.ke/news/Duty-free-exports-to-lower-Kenya-sugar-prices/2558-2696736-10ptapc/index.html>

by the sugar mills that import varieties from South Africa, European Union, and India. This research is limited to the productivity of the cane, cane maturity period, resistance to disease, quality of cane, ratooning, optimal quantity of different fertilizers, chemicals. Kawanda Research Station (now Kawanda Agriculture Research Institute) used to undertake sugarcane research but stopped in 1971. Therefore, the lack of comprehensive research and due attention on this crop has led to lower yields and a long gestation period compared to other countries.

Table 3: Sugarcane Productivity for Selected Countries in 2019

Country	Area (Ha) Planted	Cane (Tons) harvested	Tons/Ha
Argentina	426192	19,088,688	44.79
Brazil	10,042,199	746,844,918	74.37
South Africa	285,760	19,486,369	68.19
Uganda	58,766	3,976,810	67.67
Kenya	73,065	5,169,853	70.76
Philippines	437,506	24,656,222	56.36
Cuba	493,901	19,340,640	39.16
Thailand	1,595,732	104,360,867	65.40
Sudan	60,480	6,055,200	100.12
India	5,061,090	405,416,180	80.10
China	1,827,000	126,130,000	69.00

Source: World Data Atlas, 2019

Contrary to worldwide practice, Uganda's sugar is largely produced by the private sector, implying efforts to boost productivity must target and deal with the private sector issues. While sugar factory ownership worldwide is mixed between government and private sector, Uganda's ownership is largely private with the government owning a stake only in Atiak Sugar Factory.

Table 4: Registered Sugar Millers and their Location in Uganda

Miller Name	Year of Registration	Location (Town, District)
Sugar Corporation of Uganda Limited.	1924	Lugazi, Mukono district
Kakira Sugar Limited (KSL)	1930	Kakira, Jinja District
Kinyara Sugar Limited	1965	Masindi District
Uganda Crop Industries Limited	1993	Sezibwa, Lugazi, Mukono District
GM Sugar Limited	2005	Buikwe District
Mayuge Sugar Limited	2007	Mayuge District
Sugar Allied Industries Limited	2010	Kaliro District
Kamuli Sugar Limited	2011	Kamuli District
Ndiburungi Sugar Limited	2011	Luwero District
Seven Star Sugar Limited	2012	Luzinga, Kamuli Road
Hoima Sugar Limited	2012	Hoima District
Atiak Sugar Limited	2016	Amuru District

Source: Uganda Sugar Bill, 2016

The bargaining power of the private sector players in the Sugar industry is disjointed, limiting its success. There are two divergent sugar millers' associations. The Uganda Sugar Manufacturers Association (USMA) unites the three largest sugar producers (Kakira, Kinyara and Lugazi) with Atiak Sugar and Kaliro Sugar as the latest entrants, while the Millers Association of Sugarcane (MAS) has Mayuge Sugar, GM Sugar, Sezibwa Sugar, Ndiburungi Sugar and Seven Star Sugar. For out-growers, their associations are

disjointed and, in some instances, non-existent. The umbrella organization for all the sugarcane farmers, the Uganda National Sugarcane Growers Association, collapsed in 2016. Only out-growers supplying large millers are somehow organized but being interfered with by middlemen. The sugarcane out-growers' organisations also vary from associations to cooperatives. For example, there are, among others, Busoga Sugarcane Out-growers association for suppliers of Kakira sugar factory; Masindi sugarcane out-growers Association for suppliers of Kinyara Sugar factory; the Lugazi sugarcane Growers cooperative that supplies SCOUL. Farmers cannot perform unless they are grouped. Farmers associations enhance collective borrowing and marketing and individual farmers can commit to managing quality since there is some form of ownership (Deniva, 2015).

3.3.3 Sugarcane Pricing Dynamics

Sugarcane payment systems have evolved significantly in different parts of the world to adequately reward both millers and farmers to incentivize them to improve efficiency and productivity (Chinloy, 1972; Saranin, 1975; Brooks, 1982; and Burrows, 1998). Cane pricing is one of the most important instruments of development of the sugar industry in sugar-producing countries, because of its effect on the profitability of both cane and sugar production and equity (a fair division of proceeds between growers and millers). An appropriate cane payment system should reward both the grower and the miller. The grower is rewarded for supplying clean, fresh and mature cane with high sucrose content while the miller should be rewarded for producing the maximum amount of good quality sugar from the cane supplied by farmers.

Uganda's sugarcane pricing formula does not provide incentives and motivation to improve productivity and efficiency in the industry. The country uses a traditional "Flat rate" cane payment system, where cane is paid at a fixed rate per ton. This system is outdated because it does not provide incentives and motivation for the grower to improve the quality of cane and at the same time, the miller has no pressure to improve the milling efficiency. This explains why farmers don't invest much into the production process and why some millers have no concern to replace obsolete technology.

The cane pricing formula is contrary to best practice that motivates and provides incentives for increased productivity and efficiency. The best practice cane pricing formula rewards both millers and farmers to incentivize them to improve efficiency and productivity respectively. FAO (1979 and 1986) described the desirable features of an equitable cane payment system in which the cane price should be linked with the ex-factory price of sugar based on relative asset values and net returns on assets and recovery of sugar. In summary, these are sugar price, factory recovery index (efficiency), cane quality (sucrose content) and split of sugar income between the grower and miller (grower-miller equity). Most sugar-producing countries are using this formula to reward both sugar millers and farmers. Keerthipala & Thomson (1999)² proposed a formula based on fair sharing of proceeds from sugar and its by-products

² Keerthipala and Thomson 1999 were proposing an alternative cane payment system for Sri Lanka. A payment system that would offer incentives for the farmers to produce high-quality cane and for the companies to improve their processing efficiencies and a system that would split proceeds from sugar and by-products between farmers and the companies in proportion to their economic contributions to the overall cane production and manufacturing

THE SUGAR CRISIS OF 2016

In 2016, the price of one kilogram of Sugar in Uganda was approximately 8,500 Uganda Shillings. This was more than 200% the price it used to cost in 2010. There was a massive public outcry to the government to intervene and reduce the unit prices.

The genesis of the Sugar crisis in Uganda can be attributed to the following events.

a) Poor weather in leading Sugar producing countries like Brazil and India which led to a major shortage to the world market by at least a million tonnes.

b) War in neighbouring countries like South Sudan which initially got its Sugar supply from North Sudan but now imported from Uganda.

c) Greedy speculators who took advantage of the Sugar shortage to profit, according to Theafricareport.com.

(including pharmaceutical-grade ethanol, electricity, animal feeds and fertilizers) between growers and millers according to their economic contribution.

3.3.4 Challenges facing the Uganda sugar sub-sector

In addition to the above discussion, the Uganda sugar industry is facing numerous challenges that are summed up as limited research; non-existent and/or non-implemented regulatory framework; uneven compensation for sugar production; low efficiency at the factory; weak bargaining power of farmers; climate change; and sugar price variations. These challenges are discussed below.

Limited research has resulted in a lack of viable cane seed and continuous use of long-time maturing cane that have affected yields.

“ According to Sharma C. Shuresh, the CEO of SCOUL, SCOUL imported 3000 varieties of sugarcane from the French Agricultural Research Centre for International Development (CIRAD) and has selected the best 4 varieties being used currently. Kakira and Kinyara also got their elite materials from the same organization.

First, sugar millers depend on imported cane seedlings varieties to fill the gap of lack of indigenous research. This has limitations because the seedlings do not adequately fit Ugandan conditions. The miller's control 70% of seed multiplication and supply, leaving the remaining 30% uncatered for because seed multiplication is expensive for the ordinary farmer. As a result, access to planting materials remain one of the key challenges, especially for the farmers who are not registered and aided by the millers.

Using underperforming seed leads to low yields and productivity of the sector (Mugabira & Chivaka, 2016). Secondly, the sugarcane planted in Uganda has a long gestation period (18 to 22 months) much higher than the maturity period of 9 months in other countries such Australia and USA. Research is non-existent to improve the existing varieties to create early maturing varieties.

“ According to the coordinator for Busoga Sugarcane growers' Association, seed cane is bought at UGX 138,000 per ton and 4 tons are needed to plant one hectare.

Declining soil fertility, limited use of fertilizers and climate change further lead to low yields (Deniva, 2015). Soil fertility has declined over years due to the continuous monoculture both at nucleus farms and out-grower farms. The soil needs to be replenished to support a higher yield per unit area. Farmers are not having access to critical farm inputs such as fertilizers and small-scale machinery. Less than 10% of the farmers are using fertilizers for sugarcane growing. This has significantly brought the yields down (Deniva, 2015). Further, climate change as manifested in frequent droughts and erratic rains is a major threat to sugarcane-growing. Sugarcane takes 18 months to maturity and this poses a challenge to the crop since it has high moisture requirements and the longer gestation period exposes the crop to longer drought conditions, in the absence of irrigation. Research can also play a role in creating drought tolerant and early maturing varieties (Duli Zhao and Yang-Rui Li, 2015).

process.

3.4 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

The sugarcane Value chain is one of the most important to the economy of Uganda, but has been among the most neglected in the past. When it was established in the early 1920s, the industry fell under the British colonial administration's legal and regulatory regime, which cut across the then three East African States— Uganda, Kenya, and Tanganyika. Country specific regulations were later developed for each of the member states. For Uganda, the first legislation was The Sugar (Control) Act of, 1938 followed by the Sugar Cess Act of 1957. These were enacted after the establishment of the plantations at Lugazi in 1924 and Kakira in 1930. These sugar plantations had their own nucleus estates, thus there was no need to have countrywide legislation at the time.

As more sugar plantations got established because of additional factories³ and the creation of sugarcane out-growers around the old and new factories, more sugarcane and sugar industry stakeholders started to emerge and participate. The increase in factories, out-growers and other participants subsequently increased the challenges, opportunities, competition, and competitive threats characteristic of a growing industry. These threats to national, regional, and international level conflicts, partnerships and cooperation eventually would require institutions and supporting legislations to ensure order and harmony.

3.4.1 The National Sugar Policy 2010

The Ministry of Trade, Industry and Cooperatives (MTIC) developed the National Sugar Policy in 2010 to bring harmony among key players in the sugar industry to promote and sustain steady industrial growth and development, and transform and diversify the sub-sector to become modern and competitive.

The main motivation for the development of the policy was the absence of a regulatory institution to coordinate the sugar industry activities following the entry of many actors. There was an increasing need to harmonise business transactions for all the sugar stakeholders. The absence of a policy undermined business collaboration necessary for the growth of the sub-sector across the value chain. There was, for example, rising suspicion on the pricing of cane, sugar-growing contracts and purchasing agreements.

Motivation for the policy development was also linked to the spikes in the sugar prices, the dropping prices of sugarcane from out-growers, and food insecurity, among others. The policy was, therefore, necessary for more cooperation among the stakeholders especially the millers and the cane farmers. The vision of the National Sugar Policy is "to have a sustainable, diversified, harmonized, modern, and competitive sugar sector to meet domestic, regional and international sugar requirements". The mission of the policy is "to develop and sustain the growth of the sugar industry, through profitable trade at domestic, regional and international levels: With the ultimate aim of creating wealth, employment, and enhancing social transformation"(National Sugar Policy, 2010 page 11).

3.4.2 The Sugar Act 2020

The Sugar Act, 2020, which seeks to provide for the development, regulation and promotion of the sugar industry, repeals the Sugar (Control) Act of 1938 and the Sugar Cess Act of 1957 to address the new challenges in the industry. This new law, however, also falls short in addressing some of the current issues in the industry and the sugarcane value chain.

The Act calls for the establishment of a sugar industry governing body, the Uganda Sugar Board, made up of representation from millers, farmers, and three ministries: Trade, Industry and Cooperatives, Agriculture, Animal Industry and Fisheries; and Finance, Planning and Economic Development.

³ Kinyara, GM, Kamuli, Sango Bay, Amuru, Atiak, Bwendero and other smaller ones.

It also calls for the establishment of the National Sugar Research Institute under NARO that will handle the research and development of sugarcane, especially the development of new varieties that are high-yielding, quick-maturing, resistant to pests and diseases and having a high concentration of sucrose.

It calls for a sugarcane pricing formula that indicates how the sugarcane will be purchased to avoid the exploitation of farmers.

However, the Act doesn't address the entire sugarcane value chain. For example, it is silent on by-products of the sugarcane value chain such as ethanol, electricity, fertilizers and carbon dioxide. It does not also address marketing and distribution of sugar, therefore neglecting how issues of importation and exportation of sugar should be handled.

3.4.3 Institutional Framework

For a long time, the sugar industry has been controlled by the millers because there were no other active institutional arrangements. With the emergence of the Sugar Act, 2020, the story will change because the Act provides for a regulator, which is the Uganda Sugar Board. The law also puts in place a sugar research institute. The following institutions regulate the sector:

Ministry of Agriculture Animal Industry and Fisheries (MAAIF)

The 2020 law gives MAAIF the mandate to establish National Sugar Research Institute under the National Agricultural Research Act 2005. Part of the institute's role is to carry out sugar cane breeding and variety selection research programmes through the National Agricultural Research System and national universities to develop high sucrose and early maturing cane varieties that are suitable for the different agro-ecological zones of Uganda.

MAAIF also ought to play a regulatory role to the sugarcane industry but this has not happened. For instance, the Act ignores that MAAIF has a role to play in regulating sugar cane production, especially primary production. As a result, farmer exploitation by agents is increasing, manifested by the increase sale of permits by agents. However, the Permanent Secretary of MAAIF is supposed to sit on the sugar board as the regulating body of the sugar industry. This has been planned for financial 2021/22..

However, before this law that is also yet to be fully implemented, MAAIF did not have any role in the sugar value chain. Sugarcane is a neglected crop until the research institute is operational.

Ministry of Trade Industry and Cooperatives (MTIC)

The MTIC is the ministry responsible for licensing sugar mills, jageries and farmer cooperatives. The minister is responsible for appointing the chairperson of the Uganda Sugar Board. MTIC is also concerned with the implementation of the National Sugar Policy 2010 whose main objective is to bring harmony among key players in the sugar industry to promote and sustain steady industrial growth and development, and transform and diversify the sub-sector to become modern and competitive.

The Uganda Sugar Board

The Sugar Act 2020 calls for the establishment of a board and indeed MTIC has budgeted for its creation in FY2021/22. Once in operation, the board will be responsible for regulation, development and promotion of the sugar industry. Specifically, it is to coordinate all activities of individuals and organizations in the sugar value chain.

Currently, the sugar sub-sector is weakly regulated which is affecting all the players along the value chain. This challenge has been exacerbated by the emergency of many new mills with no nucleus farms which has increased competition for sugarcane and threatened the out-grower schemes that existed between large mills and growers. In addition, a weak regulatory framework has led to uncoordinated harvesting of cane partly leading to a Low Sugar Recovery Rate. Specifically, lack of regulations on harvesting has in several instances led to harvesting immature or dry or overage sugarcanes. This is because some companies accept immature and dry sugarcanes for milling which compromises the quality of sugar and also reduces the recovery rate (USMA, 2017). This was more prominent in 2017 when Uganda experienced a sharp decline in sugar production from 475,000 to 365,452 MT. Also, in some areas such as Masindi due to lack of competition, low prices for cane and delays caused by millers, farmers sell overgrown sugarcanes which cause loss to the farmers. This caused some farmers to transport cane over long distances to sell to millers in Mukono and Jinja districts (NPA, 2017). These factors combined with inefficiencies caused by obsolete technology have led to a Low Sugar Recovery Rate (RR)⁴, which has gone to as low as 6% compared to the international recommended RR of 14% – 16% (USMA, 2017).

The Farmer Associations

Sugarcane farmers have set up associations although they are majorly weak and disjointed. The umbrella organisation for all the sugarcane farmers, the Uganda National Sugarcane Growers Association, collapsed in 2016. Only out-growers supplying large millers are somehow organised. The organized sugarcane out-growers organizations also vary across associations. For instance; There is Busoga sugarcane out-growers association for suppliers of Kakira Sugar Factory; Masindi sugarcane out-growers association for suppliers of Kinyara Sugar factory; the Lugazi sugarcane growers cooperative that supplies SCOUL.

Farmers cannot perform unless they are grouped. Farmers associations enhance collective borrowing and marketing and individual farmers can commit to managing quality since there is some form of ownership (DENIVA, 2015).

It should be noted that currently, an association can decide on which miller to supply the cane. They are no longer so tied to a specific miller. For example, Atiak Sugar in Amuru District is buying cane from Busoga Sugarcane Out-growers Association.

Sugar Millers' Associations

There are two competing sugar millers' associations. The Uganda Sugar Manufacturers Association (USMA) unites the three largest sugar producers — Kakira, Kinyara and Lugazi. In 2019, however, Atiak Sugar Factory joined. The Millers Association of Sugarcane (MAS) is majorly composed of new and small mills, namely Mayuge Sugar, GM Sugar, Sezibwa Sugar, Ndiburungi Sugar and Seven Star Sugar.

It should be noted that there is no independence of farmer association heads from sugar companies as indicated by Kisamba-Mugerwa, 2011. This compromises the level of decision making and choices made by association heads because of the interference from millers.

4

this is the recovery of sugar (Rendement) from a given quantity of sugarcane usually 100 MT of Sugarcane

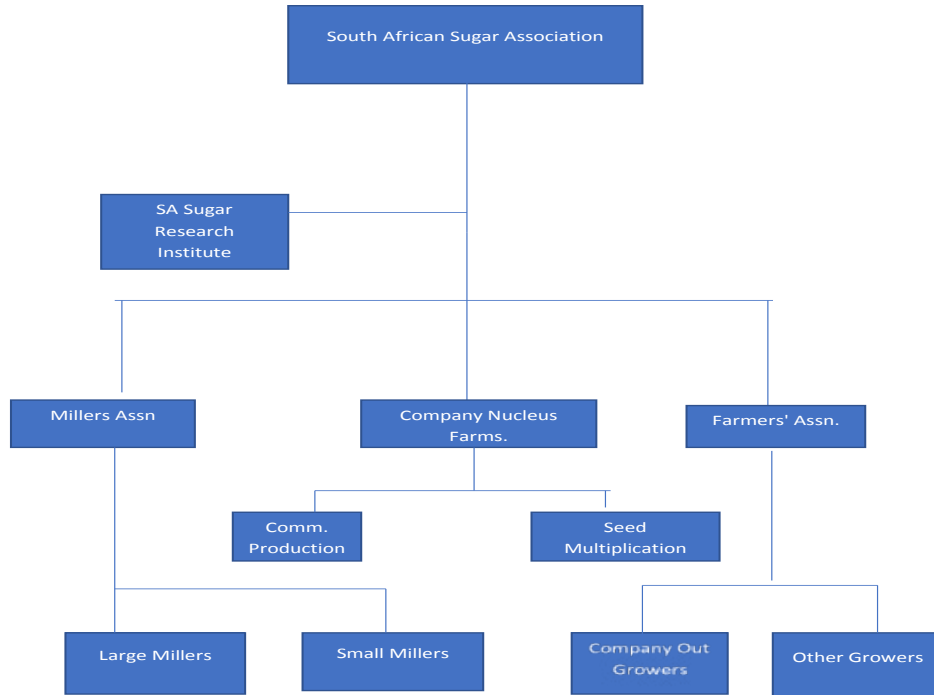
With a weak regulatory environment, the sugarcane industry in Uganda is susceptible to manipulation for personal or monopsony gains as far as the relationship between out-growers and millers are structured and regulated. While the millers seem geographically scattered, their actions are well-coordinated, and they often form cartels as a single big buyer of sugarcane—especially the members of USMA. The growers, however, are largely not coordinated and hence lack bargaining capacity leading to continued decline of cane prices and limited market access. The emergence of new mills have also affected the vertical coordination between growers and millers, where farmers were aided to produce cane that they would sell to the miller that supported them in return.

Case Study: The role of Government and the sugarcane institutional arrangements in South Africa

With a weak regulatory environment, the sugarcane industry in Uganda is susceptible to manipulation for personal or monopsony gains as far as the relationship between out-growers and millers are structured and regulated. While the millers seem scattered, their actions are well-coordinated as a single big buyer of sugarcane. Therefore, the sugar industry in Uganda can be described as unstructured and unregulated with very weak relations between the value chain actors.

Figure 4 (text box) below gives an insight into the structure of the South African sugar industry as a case study. In the organisational structure, the millers are much lower and key decisions are taken by the South African Sugar Association and they are influenced by the out-growers lobby. The structure includes a powerful research institute, South African Sugar Research Institute that directs the knowledge and innovations coming out from the science and technology in the laboratories and research plots. The other actors in the structure include millers who are organised according to the sizes of their operations (Maltitz, et al., 2019).

Figure 4: South African Sugar Industry Structure



SOUTH AFRICAN SUGAR ASSOCIATION (SASA)

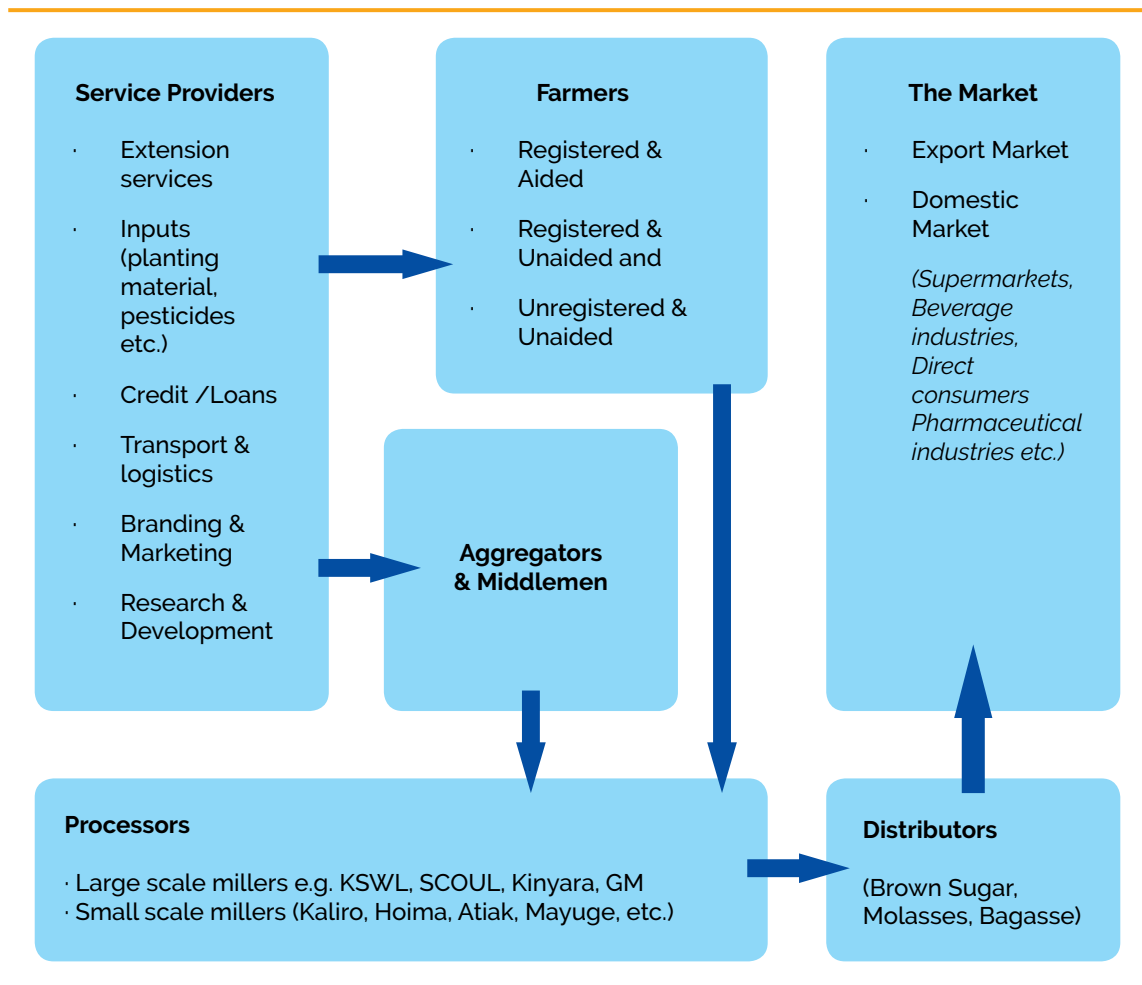
SASA is the highest decision-making authority in the South African sugar industry. It represents and has authority on common issues of interest to both the millers and the growers. The sugar association has been in existence since 1910. SASA is among the top 15 competitive sugar companies in the world. The company has mastered the practice of the three pillars of sustainability: cost recovery, capacity building, and growth of the business. The growers and millers have partnered to ensure the efficiency and sustainability of the business and the industry. 14 millers in SASA produce a combined 3 million tons of sugar per annum. Sugar production technology is ably provided by the able South African Sugar Research Institute that provides research and technology in production, milling and refining. Four of SASA's 14 sugar millers are dedicated to producing refined sugar mainly for export. 75% of the sugarcane is produced on dry land and is dependent on natural rains, while the rest is under irrigation.

04

Organization and Structure of Sugar Value Chain in Uganda

4.1 ANALYSIS OF VALUE CHAIN ACTORS

Figure 5: Sugar Value Chain Actors Flow chart



4.2 ACCESS TO EXTENSION SERVICES

Table 5 below shows the farmers' access to extension services in the regions of Buganda, Busoga and Bunyoro. In Buganda, 54% of the farmers reported having access to extension services while 21% and 70% in Busoga and Bunyoro respectively report the same.

Those who received extension services report receiving training on general agronomic practices, bookkeeping, sugarcane harvesting, food security and others. Of these areas, bookkeeping is the most common at 40% for Buganda, 49% for Busoga, and 52% for Bunyoro.

With regards to the source of extension service providers, the government provides extension services to 9% of the farmers in Buganda, 24% in Busoga and 2% in Bunyoro. Farmer groups provide extension services to approximately 35% of farmers in Buganda, 23% in Busoga, and 16% in Bunyoro.

Private organisations such as processors provide extension services to about 35% of farmers in Buganda, 23% farmers in Busoga and 81% farmers in Bunyoro. NGOs are noted to be among the providers for extension services to only 2% farmers in Buganda, 11% farmers in Busoga, and 3% farmers in Bunyoro. The fact that private organisations such as millers are key providers of extension services, it might be the reason for the very low access to extension services in Busoga where many farmers not registered and aided by the processors.

Table 5: Access to Extension Services

Service Access Type	Buganda N=79	Busoga N=396	Bunyoro N=161	Overall
Households accessing extension services	54%	21%	70%	37%
Good Agronomic Practices	5%	5%	0.0%	3%
Farming Record Services	40%	49%	52%	49%
Sugarcane Harvesting Services	7%	11%	15%	12%
Food Security	48%	28%	33%	34%
Other Services	9%	24%	2%	11%
Source of Extension Services				
From Government	9%	24%	2%	11%
From Farmer Groups & Associations	35%	23%	16%	22%
Private Service Providers	53%	48%	81%	65%
From International NGOs	2%	11%	3%	5%

Source: Computed using Value chain data

4.3 ACCESS TO AGRO-INPUT DEALERS' SERVICES

The input suppliers generally deal in fertilisers, insecticides, and herbicides. They say that they not provide inputs on credit, they also offer support services such as training of sugarcane farmers in best fertiliser application techniques.

Some of the challenges input dealers face include high default rate especially in the Bunyoro sub-region where dealers sell inputs on credit to farmers, limited market, taxes, and high licensing fees.

4.4 EXTENSION SUPPORT FROM GOVERNMENT

Lack of government support for sugarcane R&D affecting production and productivity

The government's agriculture research and development (R&D) institutions such as National Agriculture Research Organization (NARO) do not support sugarcane production. This is unlike other crops and specifically commercial crops such as tea and coffee which are clearly linked and are supported by the zonal agricultural development research institutions (ZARDIs). Instead, sugarcane growers only rely on the big processors for seedlings and other R&D-related support. While this arrangement worked when all farmers were under contract farming, it is increasingly becoming difficult for farmers who are not registered and supported by the processors to access the right planting materials. This challenge has been exacerbated by the increased competition amongst processors due to the emergence of new millers who are not involved in sugar production and hence have no nucleus farms. The new millers do not support farmers with planting materials and other technology they require to improve yield.

There is, thus, a need for government intervention to close the glaring R&D gap. Specifically, in addition to regulation through establishment of the sugar board, the government needs to set up a ZARDI for sugarcane. In addition, sugarcane should be targeted by the local government extension agents and production offices in the districts where the crop is mostly grown such as those in Busoga, Bunyoro, and parts of Acholi and Buganda.

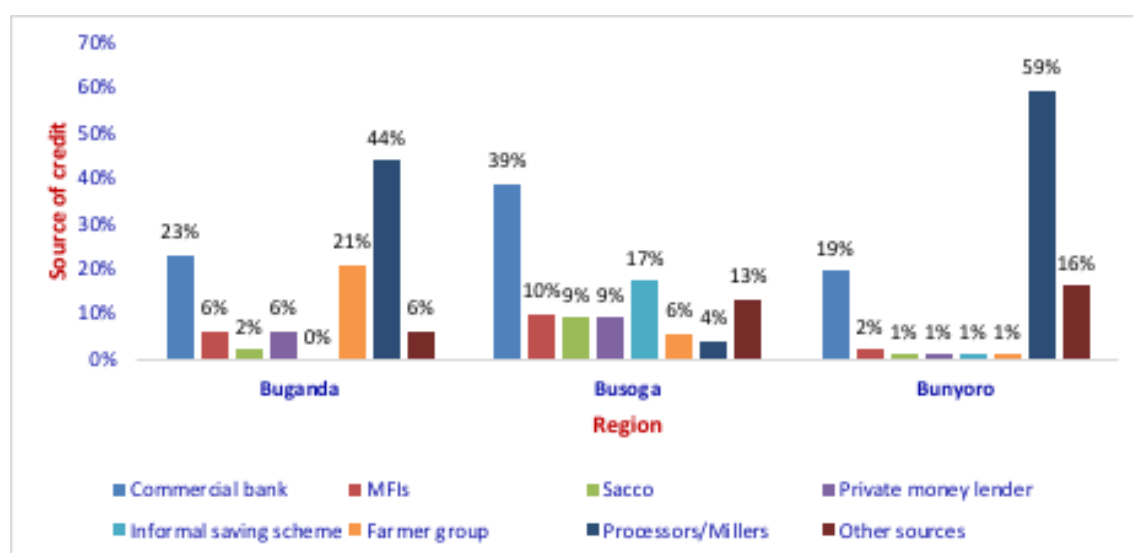
4.5 SOURCES OF CREDIT BY REGION

Figure 6 below shows the different sources of credit obtained by farmers in their respective regions. Overall, processors/millers are the dominant sources of credit to the farmers in the Buganda and Bunyoro areas with proportions of 44% and 59% respectively. Busoga has the least proportion of farmers receiving the credit from processors/millers at 4% which can be attributed to many farmers being unregistered and unaided.

The commercial banks come after processors/millers. Results show that 23%, 39% and 19% of the farmers in Buganda, Busoga, and Bunyoro, obtained credit from commercial banks, respectively. Informal saving schemes are only common in Busoga (17%) and Bunyoro (1%).

Farmer groups are dominant sources of credit in Buganda (21%), marginal in Busoga (6%) and negligible in Bunyoro with only 1%. Other sources of credit include neighbors, fellow farmers, and friends. In Buganda, 6% said they obtained credit from other sources, in Busoga 13%, in Bunyoro 16%.

Figure 6: Source of Agricultural Credit by Region



Source: Computed using value chain data

The average amount of money borrowed by sugarcane farmers is UGX6,036,259, which is slightly above the regional averages in Busoga and Buganda, but lower than Bunyoro. The purpose for which the majority of farmers borrow is sugarcane production, although some borrow for other purposes such as paying school fees, building houses, and investing in other businesses.

Table 6: Access to Credit Services

Access to credit	Buganda N=79	Busoga N=396	Bunyoro N=161	Overall
Total amount borrowed (UGX)	4,994,583	5,475,608	7,158,609	6,036,259
Purpose of the loan				
Sugarcane production	88%	79%	81%	82%
Production of other crops	2%	4%	5%	4%
Buying food	0	2%	1%	1%
Buying other assets	2%	2%	2%	2%
Pay bills	0	2%	1%	1%
Clear another loan	0	1%	0	0
Buy other household items	6%	2%	1%	3%
Other	2%	8%	9%	7%

Source: Computed using value chain data

4.6 CANE CULTIVATION

4.6.1 Characteristics of Sugarcane Producers

Table 7 presents the characteristics of the sugarcane-growing households in Buganda, Bunyoro and Busoga sub-region. In terms of family size, households in the Busoga take the lead with an average of 9.49 members, while Buganda and Bunyoro have an average size of 7.46 and 8.67 members respectively. The implication for big household size is high dependence ratio and threats of food insecurity especially when a significant proportion of land is allocated to producing sugarcane. Accordingly, Busoga has a high likelihood of suffering from food insecurity because of bigger family sizes.

In addition, the size of land allocated to sugarcane-growing in the Buganda region is 5.45 acres on average, while Busoga has an average of 10 acres, and Bunyoro 19 acres. The total average land owned by the household is 9.18 acres in Buganda, while Busoga has 11.36 acres and Bunyoro has 37.96 acres. Comparing the size of land owned by a household across the three regions and the total land allocated to sugarcane growing, Busoga is so disadvantaged because out of the 11.36 acres owned by a household, 10.02 is used for sugarcane growing.

The average age of the household head in the Busoga region is 45 years, while Buganda and Bunyoro have an average age of 49 and 51 years, respectively.

Table 7: Household Characteristics

HH Characteristics	Buganda N=79	Busoga N=396	Bunyoro N=161	Overall
Distance (to a Service Facility) in Kilometers (Kms)				
To the district headquarters	14.72	20.59	22.00	20.22
To the S/County headquarters	9.84	4.17	15.23	7.67
To the nearest Sugar Miller	20.35	28.17	18.05	24.63
To the nearest cane selling facility	18.42	15.19	10.76	14.47
To the nearest trading Centre	2.59	3.14	1.60	2.68
Proportion of Female gender	13%	7%	6%	7%
Age of the household head (years)	49	45	51	48
Family size (persons)	8	10	9	9
Land for sugarcane production (acres)	5.45	10	19	12
Land owned by household (acres)	9.18	11.36	37.96	17.82
Cane yield per (MT/Ha)	72	46	84	67
Education of the HH head				
Below Primary	3%	4%	4%	0.04
Primary (any class)	62%	45%	52%	0.49
Secondary (up to senior six)	30%	40%	30%	0.36
Tertiary	3%	8%	13%	0.09
University	3%	3%	2%	0.02
Main Source of Employment for the HH head	Buganda (n=79)	Busoga (n = 396)	Bunyoro (n = 161)	Overall
Livestock Production	10%	2%	2%	0.03
Crop Production	76%	77%	82%	0.78
Manufacturing Services	0	0	0	0.00
Mining Services	0	1%	0	0.00
Brick Making	0	0	1%	0.00
A Porter on Construction Sites	1%	2%	0	0.01
Boda-Boda Riding	0	0	0	0.00
Water Supply; Sewerage Management & Remediation	6%	3%	4%	0.04
General Merchandise Shop	0	5%	2%	0.04
Domestic Services/House Maid	3%	5%	5%	0.05
Managing Other Family Businesses	4%	5%	4%	0.05
Time Spent on Job (in years)	20.13	18.90	24.97	20.69
Amount spent on Sugarcane Production up to the time of harvesting ('000s of shillings)	7,748	10,900	11,100	10,600
Profitability	7,389,250	7,901,598.4	10,943,639.937	3,652,976.929

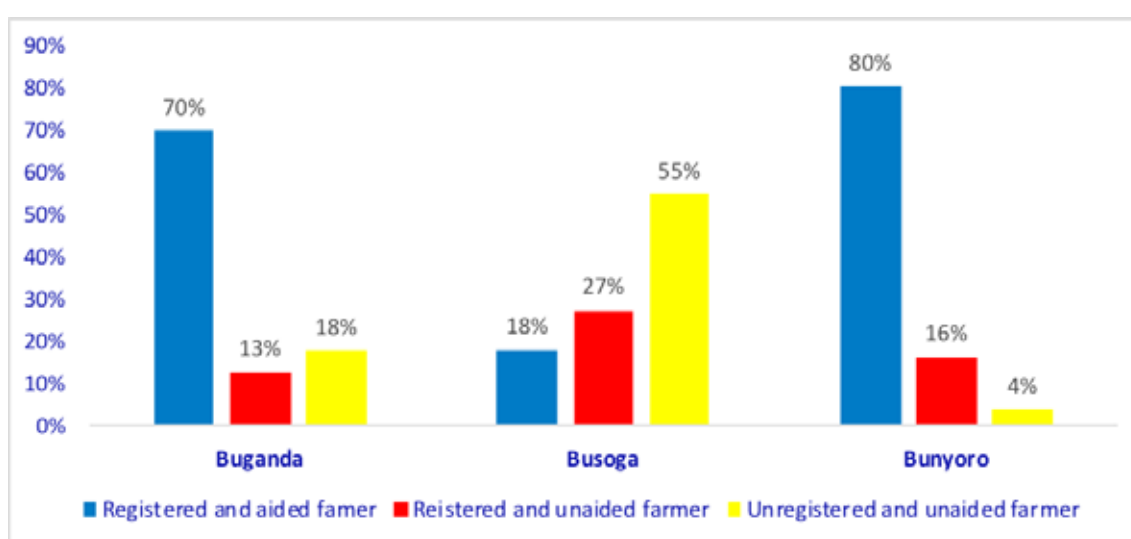
Source: Computed Using Value Chain Data

4.6.2 Production Models on Sugarcane Growing.

Figure 7 below shows the percentage of households that grow sugarcane under different production arrangements in the three study sub-regions of Buganda, Busoga and Bunyoro. Buganda and Bunyoro have the highest percentage of registered and aided farmers while Busoga has the least percentage. The results show that 70% of the sugarcane farmers in Buganda are registered and aided while in Busoga the proportion of registered and aided is only (18%). Bunyoro has the highest percentage of registered and aided farmers at 80%. From the field experiences, the high number of Busoga's unregistered and unaided farmers is attributed to the existence of many small processors.

This gives farmers the freedom to sell to whomever they want at, sometimes, better prices. These results indicate that there is weak vertical coordination between farmers and processors in Busoga which has implications in terms of access to market and other forms of support.

Figure 7: Sugarcane Production Models by Region



Source: Computed using value survey chain data

4.6.3 Farmer Organizations Models

Farmers in the sugarcane-growing sub-regions are inadequately organised in sub-groups or farmer cooperatives. The role of such cooperatives is to aid farmers to have access to markets, extension services, planting materials, lobby for better prices among others. However, farmers in the Busoga reported that farmer cooperatives in the area have been weakened by Kakira Sugar Limited. This is because Kakira owns a big nucleus farm of cane yet the extraction capacity is still small to accommodate the huge harvests from the out-growers.

4.6.4. Land Ownership

The main mode of land acquisition among the sugarcane-growing regions is purchase and the land tenure system is customary, especially in Busoga, suggesting that the land is not registered nor titled. From the field results, across the regions, the overall proportion of land bought by households is 58%, while 50% is inherited and 20% is ancestral land. The Bunyoro and Buganda sub-regions are endowed with a lot of lands owned by households and also the household size is relatively small compared to Busoga, that has a big family size to land ratio. This has resulted in increased food insecurity issues

in the Busoga because food insecurity is associated with big family size and limited landholding by households.

4.6.5 Good Agricultural Practices

Outside policy, legal and regulatory frameworks, there is limited government effort directed towards the sugarcane sub-sector in Uganda. For example, there is lack of a dedicated research institute. Without research on a variety of aspects, the result has been poor sugar yield and consequently poor sugar yield. If sugarcane were taken as seriously as matooke or coffee, perhaps the cane and sugar yields would be high. Also, there is a missing link between cane farmers and the market for their produce. Farmers feel government involvement in price-setting and market search would enable them to fetch better prices and improve their incomes.

4.6.6 Pricing and Sale of Cane

Sugarcane is only ready for sale after 18 months. At this point farmers, especially those under the registered and aided models, have their plantations inspected by the millers/processors and then permits are issued to signal that the sugarcane is ready for crushing. Those farmers out of the processors' models, most especially those in the Busoga, are at liberty to choose whoever it is that is available to buy their cane. Important to note is that farmers outside the registered and aided model are at a disadvantage because they are usually faced with a limited market. Thus, they end up keeping sugarcane on their plantations beyond the necessary period. The price at which cane is bought is determined by the processors. Cane farmers in the Busoga sub-region reported that permits have been taken up by politicians and army officers who always act as agents/middlemen linking farmers to processors. The middlemen buy farmers' cane cheaply hence reducing the incomes of the farmers an act that is demotivating farmers to quit the cane growing business.

4.6.7 Transportation and Marketing of Sugarcane

The existing arrangement between the farmers and the transporters in the Busoga is of a "demand and supply" kind because many farmers are out of the registered and aided production model. Farmers obtain permits from the millers/processor, Kakira Sugar, when their sugarcane plantations are ready for harvesting. Permits are only issued to a farmer once his plantation is inspected and verified by factory supervisors.

However, there is an assertion by farmers that permit-issuance does not follow the right channels in the sense that, people with sugarcane plantations are denied permits and they are instead given to politicians and/or relatives of politicians who do not own even a single acre of cane plantation. Such individuals often pose around as agents, buying sugarcane from farmers at give-away prices hence putting the farmers at a disadvantage along the value chain.

A key informant interviewed in Hoima said that it was difficult for a farmer to get a permit to have his/her cane to be collected/delivered to the sugar processor, Kinyara Sugar, but for the right reasons. He said that Kinyara field staff are very strict with the out growers. Every field has to be verified before the permit is issued. The main challenge in transporting cane was the delay to pick the cane because of bad roads leading to the fields, vehicle breakdowns or congestion at the factory that can last anything from days and sometimes weeks.

After harvesting, the transporters/aggregator's haul the cane to the millers/processors because most farmers are unregistered and unaided. However, the transporters sometimes require that farmers collect sugarcane at an accessible place, especially during the rainy season because of poor road networks. In

the Busoga sub-region, many of the vehicles used for transporting sugarcane to the processing plants are owned by individuals and a small proportion by Kakira Sugar Limited. Once the aggregators reach the sugarcane at the processors', the truck is weighed to determine the at the mill/factory , the track is weighed to determine the tonnage and price of the sugarcane. The farmer meets the transport cost. The millers/processors have designed a payment system that directs money to both the farmer and the aggregators. It takes a week for both the farmers and the aggregators to receive their payments through their bank accounts. In Bunyoro and Buganda, the transport arrangement is largely controlled by the processors because most of the farmers are processor-aided. The transportation system is controlled by Kinyara in Bunyoro and SCOUL in Buganda. These processors hire individually owned trucks for a specified period to do the transportation on the processors' terms, that is the charge per kilometer, tonnage per truck among others. The processor's transport sugarcane from the farm and charge farmers a fee.

Generally, the transport costs are met by the farmers regardless of the production models adopted i.e., registered and aided, registered and unaided, and unregistered and unaided.

The strength in the registered and aided models is that transporting sugarcane is not burdensome to the farmers. The process of transporting sugarcane is quick and does not allow sugarcane to dry in the garden or collection centres. With the unregistered and unaided model, a farmer has to motivate a transporter in a special way to transport cane for him/her. For instance, in Busoga, some farmers reported that transporters are in high demand thus farmers give them more money for fuel outside Kakira's payment arrangement to entice them to transport their sugarcane. This has far-reaching consequences on the farmers' profits. Kakira's transport charges are based on the permit given to the farmer. The permit states the distance from the plantation to the processing plant. The transportation costs are distributed per kilometre as schedule below.

Table 8: Transport Cost Calculation

Chargeable Distance (In Km)	Transport Cost Per Ton (Ugx)
0 - 4	12,000
5 -9	14,500
10 -14	17,000
15 -19	20,000
20 -24	23,000
25 -29	25,000
30 -34	28,000
35 -39	30,000
40 -44	32,000
45 -49	36,000
50 -54	40,000
55 -60	45,000

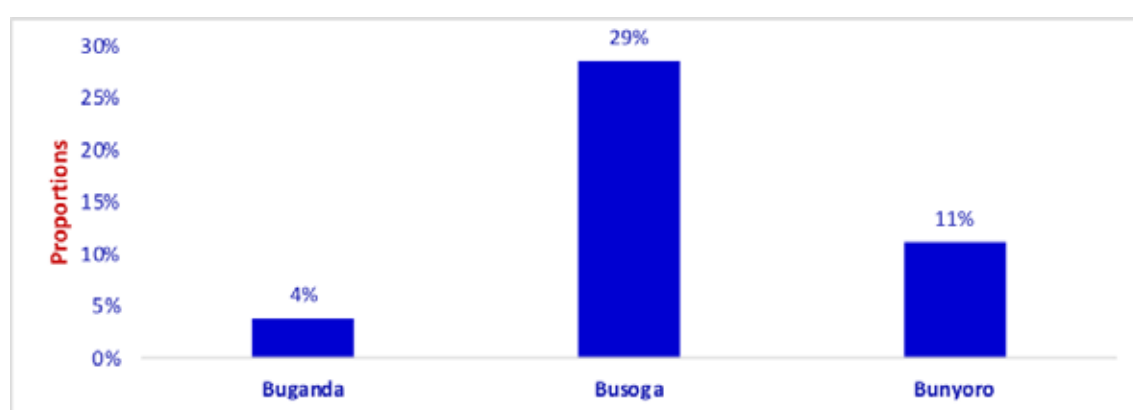
The transporters do not determine the price per truck because Kakira already determined the price based on distance. The distance beyond 60km is negotiated between the farmer and the transporter. For other processors such as Kamuli Sugar Works, GM Sugar Works and Mayuge Sugar Works, transporters negotiate with farmers the transport fees based on the distance and the cost of fuel to make a profit.

In the Busoga, there are no policies or regulations that guide the actions of the transporters. However, in Buganda and Bunyoro, the policies and regulations guiding the transporters are in place because their operations are guided by the processors.

4.6.8 Food Security

Food insecurity is a serious issue of concern among the sugarcane growing sub-regions. This is because much attention and land are allocated to the production of sugarcane which is a traditional cash crop, especially among the Busoga sub-region. Figure (8) below shows the proportion of households that worried about not having enough food per region. Only 4% of the farmers in Buganda were worried about food insecurity in the previous season. Busoga has the highest incidence of food insecurity concerns among the three sugarcane producing regions at 29%. This can be attributed to big family size, too much land allocated to sugarcane production as well smaller landholding by households. In Bunyoro, only 11% of the farmers reported that they worried about not having enough food.

Figure 8: Proportion of Food Insecure households by region



Source: Computed using value survey chain data

4.6.9 Sugarcane Farmers' Challenges and Opportunities

The major challenge experienced by farmers is unpredictable weather conditions. This is because most sugarcane-growing in Uganda is rain-fed. Irrigation is limited to nucleus farms owned by the major sugar companies. There's also a challenge of limited access to extension services in the Busoga. Low cane prices per ton (UGX 90,000 at the time of the study) is a demotivating factor because it is too low to cover all the average costs incurred by the farmers during the process. Market access is also a key challenge to cane production. Farmers reported that mature sugarcane as old as 36 months was still standing in the field, especially in the Busoga area. Recommended harvesting window for sugarcane is between 12 – 18 months. This puts cane farmers at the losing end because too old cane weighs less and is usually paid a low price.

4.7 SUGARCANE MILLING

4.7.1. Licensed Millers Installed Capacity

Table 9: List of Licensed Millers

	Name of Factory	Location (District)	Year Licensed	Installed Capacity ^a
1	Sugar Corporation of Uganda Limited (SCOUL) ²	Lugazi (Buikwe)	1924	4,000
2	Kakira Sugar Limited (KSL)	Kakira (Jinja)	1930	7,500
3	Kinyara Sugar Works Ltd.	Kinyara (Masindi)	1955	3,500 ³
4	GM Sugar Ltd.	Buikwe (Buikwe)	2005	1,500 ⁴
5	Uganda Crop Industries	Buikwe (Buikwe)	1993	1,200 ⁵
6	Sugar and Allied	Kaliro (Kaliro)	2020	1,500 ⁶
7	Bwendero Sugar	Kitoba (Hoima)	2016	750
8	Kamuli Sugar	Kamuli (Kamuli)	2011	1,500 ⁷
9	Bushenyi Sugar	Kyenjojo (Kyenjojo)	2017	750
10	Atiak Sugar	Atiak (Amuru)	2015	1,650 ⁸
11	Hoima Sugar	Hoima (Hoima)	2012	1,500 ⁹
12	Seven Star Sugar LTD	Luzinga (Kamuli)	2012	700
		Sub Total 1		25,350
	Licensed and Not Yet Operational			
	Name of Miller	District Location	Licensed	Planned Capacity
13	Amuru Sugar	Amuru	2010	4,000
14	Kiryandongo Sugar Ltd	Kiryandongo	2018	3,500
15	Mukwano Sugar Ltd	Masindi	2011	1,500
16	Kafu Sugar Ltd	Masindi	2018	1,500
17	Methat II (Nakifuma)	Kayunga	2013	3,500
18	Kidera Sugar Ltd	Buyende	2019	4,500
19	Butebo Sugar Ltd	Palisa	2013	1,500
20	Bugiri Sugar Ltd	Bugiri	2020	1,500
21	SAIMACO ¹⁰	Butaleja	2013	1,500
22	Premier Distilleries Ltd	Kyankwanzi	2018	1,500
23	Bukona Agro-Processors	Nwoya	2014	1,500
24	Kanungu Agro-Industry	Kanungu	2017	1,500
25	Ngabo Sugar Ltd	Namutumba	2013	700
26	Lake Wamala Farm Ltd	Mubende	2018	1,500
27	Victoria Sugar Ltd	Luwero	2019	1,500
28	Balaji Sugar Ltd	Nakaseke	2018	1,500
29	Kikajo Sugar Ltd	Namasagali	2020	1,250
30	Bon Sugar LTD	Bugweri	2020	1,000
31	Modern Agri Infra Ltd	Galilaya, Kayunga	2020	2,000
32	Tyrol Investments Ltd	Luuka	2020	1,000
		Sub Total - 2		38,650

Source: Ministry of Trade Industry & Cooperatives

(Footnotes)

- 1 Metric tonnes of cane per day.
- 2 Sugar Corporation of Uganda Limited (SCOUL)
- 3 Operates at low capacity due to operational issues
- 4 Plans to expand capacity to 2500 MT per day.
- 5 Operates at low-capacity due operational constraints
- 6 Licensed to increase capacity to 3500 MT per day
- 7 Under expansion to capacity of 2500 MT per day
- 8 Planned expansion to 3000MT per day
- 9 Under expansion to 3000 MT per day
- 10 Soroti Agricultural Implements Machinery Company

4.7.2 Miller Capacity Utilization

The study elicited information on the capacity use of the milling plants, the quantity of sugar cane procured per day and the price per ton of sugarcane. The data was collected from 6 factories in the country. Table 10 shows that plants process an average of 3,407 tonnes per day and that they procure 36,906 tons of sugarcane a week. The results also show that factories pay UGX95,700 per ton of sugarcane.

Table 10: Sugar Processing: Quantity and Prices

Daily processing capacity (MT of cane)	3,407
Tons of sugarcane bought per week (MT of sugarcane)	36,906
Price per ton (UGX)	95,700

Source: Survey data from 6 processing factories

Sugarcane varieties: Several varieties of sugarcane are processed in Uganda. These include CG, CO617/Lugazi, R94, CO421, CO885, CRYSTAL, CO945/Nabutana, CO421/Mabuwa, and CB3822. The most processed variety is CO617/Lugazi and it is preferred by farmers because it is resistant to drought. The other varieties are R94, CO885 and Dg. These have a relatively high recovery rate.

Sugar Recovery Rate: Overall the sugar recovery rate for Uganda is lower compared to the major global producers like India, Brazil, China. Uganda's sugar yields averages 8 –9% while the global average is 10 –12%. For this particular parameter, the environment where the cane is growing is a major driving factor. Because of Uganda's location near the equator coupled with moisture and long sunshine hours, the Ugandan canes has continuous vegetative growth. There is a shorter time for adequate sugar accumulation compared to the sugarcane whose vegetative growth is stopped/halted by cold temperatures in India, Brazil and China.¹

The other drivers of low sugar yields include; Variety type (improved varieties have higher recovery rates); Processing machinery/technology employed in juice extraction; and the age of the cane at the time of crushing it (the optimum harvesting time for Uganda is 16 –18 months while in India cane can be harvested at 10 –12 months).

4.7.3 Sugarcane Products and By-products

Figure 9 shows the number of factories producing different sugar products and by-products. All the 6 manufacturing factories produce brown sugar, and 5 of the factories produce bagasse while only 2 factories produce molasses. Only 1 out of the six surveyed factories is licensed to produce industrial sugar.

This indicates that there is limited product deepening into highly valuable and marketable products such as industrial sugar. Uganda imports all its industrial sugar requirement and yet produces excess brown sugar over what can be consumed locally. There is thus a huge potential to enhance revenues by producing industrial sugar.

¹ According to Mr. Sharma, the CEO of SCOUL at Lugazi Uganda

Reasons for not producing industrial sugar: According to Mr. Suresh C. Sharma, the CEO of SCOUL and a member of Uganda Sugar Millers Association, the underlisted are the reasons why Uganda millers are not keen on producing refined/industrial sugar;

To set up the Refined/industrial Sugar plant costs about \$10 million.

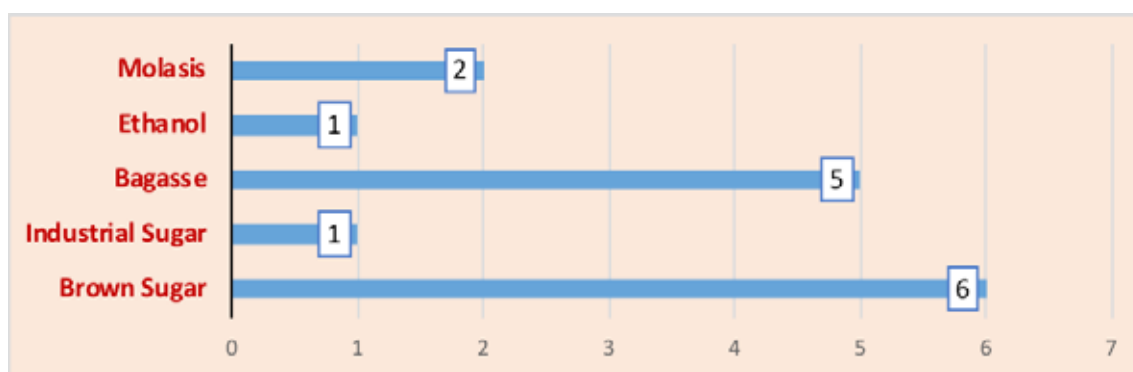
Even when the factory is put in place the internal demand for Industrial Sugar is about 100,000 MT.

The excess/surplus sugar the country produces is still too little to sustain a reasonable output of industrial sugar; especially if the regional market opens up for Uganda sugar.

There is a risk of Uganda continuing to import industrial sugar if our production cost is not competitive. With a small or no market, the investment may not be viable and factory could close unless government imposes heavy duty – something that is not possible.

So, the decision to produce industrial sugar has not been considered yet.

Figure 9: Factories Producing Sugarcane Products



Source: Own computation using survey data from 6 processing factories

4.7.4 Registration and Licensing of Sugar Mills

Permits are issued by the industry regulators to investors to operate a sugar mill/plant and to buy sugarcane from farmers. Additional permits are issued to traders (mainly importers and exporters) of sugar and sugar by-products.

The MTIC has been licensing those who wish to operate a sugar plant or mill. Under the Sugar Act 2020, however, to operate a sugar mill or jaggery one will require a permit obtained from the Sugar Board. For the period decided on by the minister for MTIC, the board shall process an application for a license. The Act further indicates that for one to modify a mill or jaggery he or she must apply to the Sugar Board.

Permits to Deliver Sugarcane to the Miller

To harvest sugarcane, a farmer requires a permit issued by the miller allowing the farmer to harvest his/her sugarcane for delivery to the miller. This is an indication that the miller inspected the cane and it is ready for harvesting. However, due to the abundance of cane, the issuance of harvesting permits is not

a transparent process as permits are first issued to politicians and highly placed farmers (NPA & OWC, 2020). It is now difficult for an ordinary farmer to acquire a harvesting permit. This has consequently led to the emergence of middlemen who exploit farmers by demanding pay of UGX 30,000 per ton to sell on their behalf to millers. The profits that accrue from these predatory activities are then shared between these middlemen and the millers' representatives, especially in the respective millers' harvesting sections. Sugarcane harvesting permits are majorly dominated by politicians in sugarcane-growing areas, especially in Busoga.

There is a denial of farmers to witness weighbridge results. Most of the millers do not have weighbridge display boards from where farmers can observe the results of their sugarcane tonnage upon delivery. Farmers are therefore suspicious of the authenticity of these weighbridge results.

4.7.4 Sugar Production Technology

In Uganda, the sugar production technology (in field production and factory manufacturing) is quite low compared to other sugar-producing countries like Brazil, South Africa, Mauritius, China and India. For example, the Uganda sugar industry is highly dependent on natural rain, with irrigation limited to a few nucleus farms. However, sucrose development depends on mixed climate conditions including rainfall that is above 1500 mm. The limited irrigation coupled with drought conditions limit the recovering rate because of insufficient water supplies. Also, the crushing rate for Uganda's sugar industry is very low. There are only 3 sugar mills that operate at a large-scale capacity of a minimum of 5,000TCD while the rest operate at capacity ranging from 300TCD to 2,500TCD. The annual cane crushing capacity for Uganda is currently about 7 metric tonnes compared to Brazil's 594.734. The difference between the local sugar industry and the rest of the sugar-producing countries is government policy. Elsewhere, the government has created a favourable environment for the sugar industry to thrive hence the development of sugar industries in those regions.

Table 11: Global Comparison of Cane Productivity (Yields per Hectare)

	Country	11Cane Yield (MT/ha)
1	Brazil	74.4
2	China	73.5
3	Kenya	70.7
4	India	70.5
5	South Africa	68.2
6	Uganda	67.7
7	Thailand	65.4
8	Philippines	56.4
9	Argentina	44.7
10	Cuba	39.6

Source: World Data Atlas, 2018

4.7.5. Sugar Product Quality

The experts say that sugar is made in the fields and recovered through processing in the factory. A good overall recovery requires good agricultural practices to grow sugarcane of high quality and good processing technologies in the sugar factories. However, most of the processors have dilapidated machinery that cannot do thorough extraction of sugar and its by-products to match the world leaders in the sugar industry i.e. Brazil, India, China, etc. Generally, sugarcane yields in the field are affected by several factors. They are, among others, cane variety, availability of rainfall, soil fertility, timely weeding, under cane, application of fertilisers, disease/pest controls, sunshine hours per day, and maturity age.

Table 12: Sugar Mills Products Recovery Performance

S/No	Crushing Capacity (TCD)	Area Under Cane (HA)	No. of Out-Growers	Recovery % Cane	Final Molasses % Cane
Kakira Sugar Ltd	7200	38700	9000	8.2	3.6
Mayuge Sugar Ltd	3500	26000	21000	8	3.5
Kaliro & Allied Industries Ltd	1650	1800	5000	8	3.6-3.8
Kamuli Sugar Ltd	1250	8150	2500	7.3	4.5
Seven Star Sugar Ltd	100-200		135	5	6
GM Sugar	1250	1863	3500	8	4.0-4.5
SCOUL	4200	18896	4000	8.55	4
Uganda Farmers Crop Industries Ltd	150	4634	6500	6.5	3.5
Hoima Sugar Ltd	1000	931		6.7	3.5-4.0
Kinyara Sugar Works Ltd	4000	33551	6100	9.2	3.2-3.8
Ndibulungi Sugar Works	200	372.6		5	

Source: Ministry of Trade, Industry & Cooperatives

4.7.6 Sugarcane Delivery Logistics

There is proper protection of sugar industries in EU countries and others such as USA, Pakistan, Brazil, Thailand, China, India. This is provided through favourable government policies like straight government subsidies, tax rebates on inputs, zero taxation on the sugar, tax breaks/holidays on investments. Governments are also fully responsible for the relevant infrastructure. There is as well government support for ethanol and cogeneration policies for ethanol.

Even in Africa, countries such as Swaziland, South Africa and Malawi that grow cane under both under conditions of natural rain and irrigation achieve higher yields because they can practically control field water and moistures conditions effectively during the maturity period. This is unlike Uganda whose sugarcane growth solely depends on natural rainwater. Cane yields are higher by approximately 30%-40% when grown under irrigation and lower when field is 100% natural rain-fed.

4.7.7 Sugar Standards and Regulatory Compliance

The Uganda National Bureau of Standards (UNBS) is the body mandated to set the sugar standards that are in sync with both the East African and the international sugar standards. Uganda has two sugar standards: i) The Refined White Sugar US EAS 5: 2009; and ii) Raw Cane Sugar DUS DEAS 8: 2019 also referred to as Brown Sugar.

Development of the sugar standards has been necessitated by the need to harmonise requirements governing the quality of products and services in East Africa. It is envisaged that through harmonised standardisation, trade barriers that are encountered when goods and services are exchanged will be removed. To meet this objective, the East African partner states enacted The East African Community Standardisation, Quality Assurance, Metrology and Testing Act, 2006 (EAC SQMT Act 2006). The law seeks to ensure standardisation, quality assurance, metrology and testing of products produced or traded in the Community (from a third country) in order to facilitate industrial development and trade as well as ensure protection of the health and safety of society and the environment in the Community.

The Uganda sugar industry is rather at the crossroads with most smallholder farmers making losses mainly caused by limited access to sugar milling facilities. It was very common to find that sugarcane fields as old as 36 months still unharvested. The sugar millers seem to be overwhelmed by the supply. The millers were on the other hand stuck with sugar in their warehouses due to constrained access to the regional market caused by non-tariff barriers imposed on our sugar exports. Below are some of the key findings from the sugar value chain study.

4.8. GENERAL CHALLENGES FACING SUGAR MILLERS AND CANE GROWERS

- There is continued cane-poaching and diversion by some of the small sugar mills as they neither have a nucleus estate nor registered out-growers. Large mills support farmers to grow cane, and small mills offer higher prices to attract cane growers that were hitherto supported by large mills. Many farmers have fallen into the trap and diverted cane to small mills and this is affecting the support they used to receive from large mills.
- Some of the big mills with nucleus estates have also decided to buy additional land to plant their cane. This has reduced the quantity of sugar cane they buy from out-growers.
- There are high sugar stocks in most of the mills due to very low domestic sales and exports to neighbouring countries. Sales are about 50% -60% of daily production and sometimes much less.
- Lack of implementation of the Sugar Act has negatively affected regulation of the sugar sector.
- World sugar prices and trade have direct effects on domestic sugar prices which also determines the price for sugarcane – based on cane payment formula in the Sugar Act 2020.
- Trade and marketing of sugar and sugar products in the country is affected by the geopolitical and economic dynamics in the region.
- The EAC Common Marketing Protocol – which among others provides for free movement of goods and service, and capital across borders— is not being observed by some member states, resulting in an impediment to regional trade.
- There are complaints from the processors on the high duties levied on ethanol and its products, thereby depressing sales.
- There is a need to implement a Bio-fuel policy to boost marketing of Extra Neutral Ethanol (ENA) for blending into motor vehicles' fuel.

4.9 ROLE OF MINISTRIES, DEPARTMENTS AND AGENCIES

- Sugar Bill approved and Sugar Board not established yet due to lack of funds. Supplementary budget to be included in the FY2021/22 Budget Estimates.
- The small millers do work in harmony with the large millers. The big millers are under membership of Uganda Sugar Manufacturers Association and small millers are members of Small Millers Association.

- There is mistrust and information asymmetry among millers, traders and actors across borders of the EAC region regarding declaration of products and services.
- Implementation of Bio-Fuel Bill delayed by finalizing the regulations by Ministry of Energy and Minerals.

4.10 ROLE OF SUPPLIERS AND CUSTOMERS

- Payment delays for goods and services supplied.
- Poor quality of some of the sugar and ethanol products sold on the market by some mills.
- No value for money in products bought by customers.

4.11. SWOT ANALYSIS

STRENGTHS (INTERNAL)	OPPORTUNITIES (EXTERNAL)
<ul style="list-style-type: none"> · <i>fertile soils and good climate</i> · <i>political will and security</i> · <i>growing population to consume more sugar domestically</i> · <i>Demand supply gap of electricity, ethanol and related by-products nationally and in the region.</i> 	<ul style="list-style-type: none"> · <i>Value addition to by-products</i> · <i>Improved product quality to supply regional and international markets</i> · <i>diversification through innovation and adaptation of new technologies</i>
WEAKNESSES	THREATS
<ul style="list-style-type: none"> · <i>lack of a regulatory and institutional framework to effectively manage the sugar industry</i> · <i>high cost of farm inputs as most are imported</i> · <i>lack technical institutions to build capacity in sugar technology</i> · <i>Lack of a Sugarcane Research Institute (supposed to be established by government under NARO)</i> 	<ul style="list-style-type: none"> · <i>changing global demand for quality</i> · <i>protective actions by some countries by slapping new regulations of exports and imports of sugar and its by-products</i> · <i>new products replacing or reducing consumption of sugar because of health concerns (e.g., WHO recommends a reduction of sugar uptake)</i>

05

Access to Market Opportunities

5.1 SUGARCANE MARKETING COST COMPONENTS

Table 13 presents results on sugarcane marketing within the sugarcane producing areas of Uganda. The findings show that farmers mainly hire trucks as a means of transporting sugarcane to the processing plants. In Buganda, the transport is split between hired trucks (used by 49% of the farmers) and processor transport trucks (used by 44% of the farmers).

In Busoga, majority of the farmers (68%) hire trucks to transport their sugarcane, with only 7% using millers/processor transport. This still reflects the production model where many farmers in Busoga are unregistered and unaided, validating why the processor transporter services are very minimal in Busoga. This explains why farmers in Busoga are susceptible to incurring high transport costs and significantly more farmers bearing the burden of transport (56%) compared to Buganda and Bunyoro where the burden largely falls on processors.

Table 13: Sugarcane Selling Mechanisms by Sub-region

Marketing	Buganda N=79	Busoga N=396	Bunyoro N=161	Overall
<i>Sugarcane selling mechanism</i>				
<i>Farm gate (to buyers)</i>	16%	46%	48%	43%
<i>Processing factories</i>	80%	51%	52%	55%
<i>Collection centres</i>	4%	1%	0.0%	1%
<i>Others</i>	0	3%	0	2%
<i>Mode of transporting sugarcane</i>				
<i>Own trucks</i>	4%	4%	0	3%
<i>Hire trucks</i>	49%	68%	2%	48%
<i>Farmer group transport</i>	4%	1%	1%	1%
<i>Processor transport</i>	44%	7%	96%	36%
<i>Others</i>	4%	23%	1%	14%
<i>The burden of transport cost</i>				
<i>Farmer</i>	15%	56%	9%	67%
<i>Buyer</i>	14%	36%	1%	24%
<i>Farmer group</i>	0	0	0	0
<i>Processor</i>	77%	5%	89%	7%
<i>Other</i>	3%	6%	1%	4%
<i>Number of tonnes harvested</i>	150	184	112849	30512

Price per ton (in UGX)	100,915	102,183	97,074	100,339
Government	1%	3%	0	2%
Processor	90%	65%	97%	77%
Agent/middleman	8%	33%	1%	21%
Farmer group	0	0	1%	0
Negotiated between farmers and buyers	1%	12%	1%	8%

Source: Survey data computations

5.2 SUGARCANE PRICE DETERMINATION

The survey elicited information on how the sugarcane price that processors offer farmers is determined. The results show mixed views because 3 of the six surveyed processors reported that price is determined by the market forces (demand and supply); 2 processors reported that price is set by the pricing committee, made up of government representatives, millers, and farmers, among others, using a predetermined formula; while one processor reported that the price is determined by the millers' association.

This information is not consistent with the reports from farmers that price is set by the processors. Nonetheless, the results allude to the need for a clear way of setting prices that are fair to farmers given that there are very few processors, which creates space for collusion against the farmers. This is a clear concern because there is no strong horizontal coordination at production level of the sugar value chain.

The Sugar Act 2020, prescribes the sugarcane pricing formula as explained below:

Sugarcane **Price per ton (P)** = C x R x D

Where;

P = Cane price per ton delivered at the factory

C = Weight in MT of Cane weight at the Factory Weighbridge

R = Rendement factor (MT of Sugar made out of every 100 MT of Cane). This factor varies depending on the efficiency of the producer and for Uganda it ranges from 8.4% for SCOUL and 8.9% for Kakira to 9.6% for Kinyara (USMA 2011).

D = A percentage negotiated by stakeholders in the parties in the **sugarcane growing contract**. This factor is meant to take care of the other benefits that are derived from the sugarcane by-products. The Uganda Sugar Board recommends a minimum of 50%.

5.3 BEST PRACTICE SUGARCANE PRICING DYNAMICS

As a best practice, sugarcane belongs to the farmer because of the investment made in production. Internationally, sugarcane production is detached from sugar processing because the ventures are owned separately by growers/out-growers and millers respectively. Sugar millers depend on growers to supply cane for their milling requirements.

Uganda's sugarcane pricing formula does not provide incentives and motivation to improve productivity and efficiency in the industry. The country uses a traditional "flat rate" cane payment system, where cane is paid at a fixed rate per ton. This system is outdated. It does not provide incentives and motivation for the grower to improve the quality of cane and at the same time, the miller has no pressure to improve

the milling efficiency. This explains why farmers don't invest much into the production process and why some millers have no concern to replace obsolete technology.

The best practice cane pricing formula rewards both millers and farmers to incentivise them to improve efficiency and productivity respectively. FAO (1979 and 1986) described the desirable features of an equitable cane payment system in which the cane price should be linked with the ex-factory price of sugar-based on relative asset values and net returns on assets and recovery of sugar.

In summary, these are; sugar price, Factory Recovery Index (efficiency), cane quality (sucrose content), split of sugar income between the grower and miller (grower-miller equity). Most sugar-producing countries are using this formula to reward both sugar millers and farmers. Keerthipala & Thomson (1999)¹ proposed a formula based on fair sharing of proceeds from sugar and its byproducts (including pharmaceutical-grade ethanol, electricity, animal feeds and fertilizers) between growers and millers according to their economic contribution.

An equitable cane pricing formula is used to appropriately reward both the growers and the millers. Nevertheless, while countries use a different formula, in general, the growers share is greater than 58% of the sugarcane value². South Africa employs the Cane Testing Service (CTS) which provide a specialist service under contract to individual Mill Group Boards to determine the quality of individual grower cane deliveries to the mill for cane payment purposes. Revenue from sugar and other byproducts is shared amongst stakeholders, with farmers taking 64% and millers and transporters sharing 36% (South Africa Sugar Industry Agreement, 2000). For Australia, the Cane Price is determined using a formula that is based on the sugar content of the cane (Commercial Cane Sugar) (CCS) and the value of that sugar on the world commodity market. In Brazil, an innovative cane payment formula is used to ensure a fair and equitable sharing of sugar proceeds. The formula is based on the following fundamental principles: The price paid to cane producers is proportional to their share of industrial revenue. On average, sugarcane growers receive around 60 per cent of the agro-industrial revenue. The money sugarcane growers collect depends on the prices for sugar and ethanol sold by processors in domestic and foreign markets; the industry pays more for sugarcane with higher sucrose content; Price surveys of Brazilian and international markets are conducted by a neutral body; cane growers have the right to monitor mill laboratories 24 hours per day, and the payment system is a dynamic system, it is reevaluated every five years to adapt to new market developments. In Eswatini, the Eswatini Sugar Association (ESA), ESA operates a pooled payment system in which the annual revenue earned from the sale of sugar and other by-products such as molasses is distributed to the millers and growers after deducting the industry obligation costs.

On average, the millers receive 32% of the total revenue for cane processing while the growers receive 68% of the total revenue from the sugar and by-product proceeds for cane production (The Eswatini Sugar Act, 1967). In Kenya, the cane price formula caters for cane payment based on the quality which is the sucrose content. Farmers' share is a fixed part of the net sugar cane price. However, Kenya is yet to fully meet the introduction of a sucrose-content-based cane payment system as it is not yet well implemented (USDA, 2017).

SUGARCANE PRICING POLICY: INDIAN CASE STUDY

In India, the pricing of Sugarcane is based on what they call a 'Fair and Remunerative Price (FRP)'. Every production season they have an agreed-on price figure which is calculated by a task force established according to the Sugar Act. The cane price announced by the Central Government is decided based on the recommendations of the Commission for Agricultural Costs and Prices (CACP) in consultation with the State Governments and after taking feedback from associations of the sugar industry. The amended provisions of the Sugarcane (Control) Order, 1966 provides for fixation of FRP of sugarcane having regard

¹ Keerthipala and Thomson 1999 were proposing an alternative cane payment system for Sri Lanka. A payment system that would offer incentives for the farmers to produce high-quality cane and for the companies to improve their processing efficiencies and a system that would split proceeds from sugar and by-products between farmers and the companies in proportion to their economic contributions to the overall cane production and manufacturing process.

² The sugarcane value here depends on the value of sugar and its by-products which are manufactured by the miller and on the processing efficiencies as well.

to the under listed factors: -

- a) cost of production of sugarcane;
- b) return to the growers from alternative crops and the general trend of prices of agricultural commodities;
- c) availability of sugar to consumers at a fair price;
- d) price at which sugar produced from sugarcane is sold by sugar producers;
- e) recovery of sugar from sugarcane;
- f) the realization made from the sale of by-products viz. molasses, bagasse and press mud or their imputed value;
- g) reasonable margins for the growers of sugarcane on account of risk and profits

Under the FRP system, the farmers are not required to wait for payments till the end of the season or for any announcement of the profits by sugar mills or the Government. The new system also assures margins on account of profit and risk to farmers, irrespective of the fact whether sugar mills generate profit or not and is not dependent on the performance of any individual sugar mill.

To ensure that higher sugar recoveries are adequately rewarded and considering variations amongst sugar mills, the FRP is linked to a basic recovery rate of sugar, with a premium payable to farmers for higher recoveries of sugar from sugarcane.

To protect the interests of the Indian farmer, the government decided that there shall not be any deductions in cases where recovery is below 9.5%.

5.4 SUGAR MARKET DYNAMICS

The sugar commodity is traded at local, regional and international markets as described below

5.4.1 National Sugar Markets

The sugar supply in Uganda is dominated by the big three millers who produce more than 80 per cent of the sugar for the market. Uganda currently produces 550,000 metric tons of sugar. Local consumption is at 380,000 MT, creating a surplus of about 170,000 MT which is for export. The internal local market is hampered by illegal cheap sugar imports from Brazil. It is difficult for the millers to produce sugar cheaper than Brazil.

Even if a new sugar mill is constructed to consume the excess cane, the situation cannot change unless the industry is protected from cheap sugar imports. Some of this sugar is duty-free sugar in Kenya which leaks through the porous borders.

5.4.2 Regional Sugar Markets

Africa accounts for 6% of the global sugar production with COMESA member states accounting for 52 per cent at 5,288,456MT of the total African sugar production of 10,078,610 MT. The COMESA block is a net exporter with close to 45 per cent of the African total exports. The Sugar net exporting countries of the COMESA region are Mauritius, Malawi, Eswatini, Zambia and Zimbabwe (COMESA, 2019). COMESA sugar is majorly exported to the United states, European Union and China. Kenya is one of the countries that is protecting the home sugar factories from international exploitation by applying for a sugar safeguard from COMESA. The COMESA Council of Ministers has granted Kenya a two-year extension of the sugar safeguard from March 2021 to February 2023.

African sugar consumption has grown to more than 70% over the past 15 years, nearly double the annual growth of the rest of the world. Despite this growth, the Africa per capita consumption of 17kg remains below the global average of 23kg. Sub-Saharan Africa holds the greatest potential for sugar consumption growth of any global region.

East Africa is a net importer of sugar with the deficit mainly created by Tanzania and Kenya. Kenya consumes about 1,000,000 metric tons of sugar and yet produces 600,000 metric tons causing a deficit of about 400,000MT. Uganda produces about 550,000MT with local consumption estimated at 380,000 metric tons per annum with a surplus of about 170,000 metric tons, reserved for export to her East African neighbours especially Tanzania and Kenya.

Non-Tariff Barriers in Sugar for East African Community

- Mandatory requirement for all sugar importers to obtain prior permission and costly registration fees by Kenya Sugar Board for any sugar imports.
- Re-introduction by Kenya of a cash bond on vehicles above 2000cc and sugar transiting from Mombasa to Uganda. However, it is important to note that Kenya has abolished the cash bond on vehicles above 2000cc and sugar transiting from Mombasa to Uganda.
- A ban on sugarcane and sugar imports from Uganda to Kenya and Tanzania; however Uganda managed to export 20,000 MT to Tanzania in 2020.

At the regional level, Ugandan sugar exports to Kenya and other EAC countries enjoyed unlimited restriction in 2016. This was mainly after Kenya sent a factory capacity verification team that confirmed Uganda's earlier assertion that it was a sugar surplus producer was proved right. As for Rwanda, sugar imported outside the EAC has continued to be subjected to a tariff of 25%. However, Uganda is still objecting to this arrangement because Rwanda's requirement can easily be fulfilled by Uganda's surplus sugar production. Tanzania instituted new measures that ended the old practice of illegal sugar imports into Tanzania which would later circulate into the entire EAC in general. To minimize the regional challenges, EAC sugar stockholders had proposed the formation of a legal regional body to be called the East African Sugar Industry Association (EASIA) whose mandate would be to try and mitigate the regional sugar trade challenges.

5.4.3 International Sugar Markets

Currently, about 110 countries produce sugar from either cane or beet, and eight countries produce sugar from both cane and beet. Sugarcane, on average, accounts for nearly 80% of global sugar production.

In September/October 2020 season the top 10 producing countries (India, Brazil, Thailand, China, the United States, Mexico, Russia, Pakistan, France, Australia) accounted for nearly 70% of global output.

World sugar trade averages about 64 million tons/year. Raw sugar accounts for around 60% of internationally traded volumes. Although many countries produce sugar, the top five exporters (Brazil, Thailand, EU, Australia, India) were responsible on average for nearly 70% of the world trade in 2016-18. Brazil, as the largest producing and exporting country in the world, dominates world trade, accounting for about 45% of global exports. Indonesia, China the United States were the world's largest importing nations in 2018.

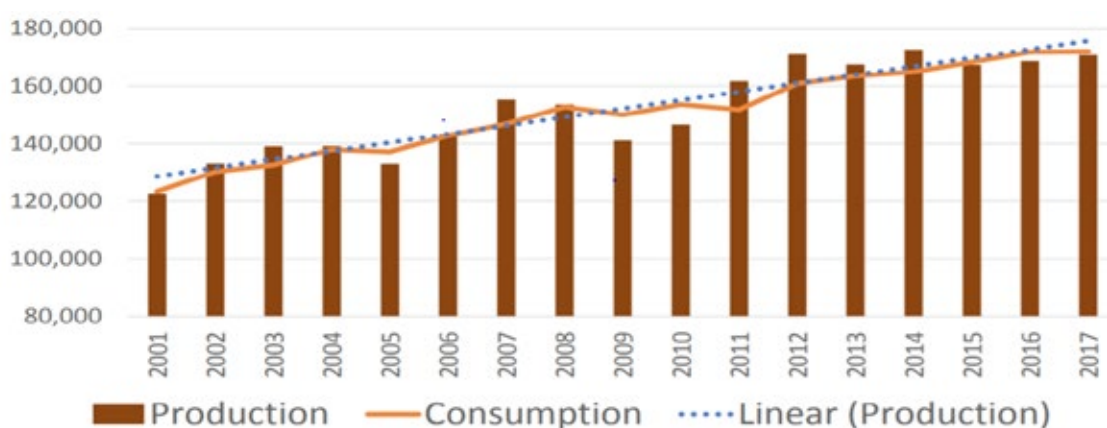
In 2019 the volume of sugar traded internationally decreased for a second year in succession. It reached 57.74 mln tons, down by 4.43 mln tons from the previous year and 7.80 mln tons from two years before. On the export side, the main changes were lower exports from Brazil (-3,371 mln tons), down for a second successive year, and the EU (-1.747 mln tons).

It is recently (2018) that the EU removed the quota system meant to protect EU farmers from cheap sugar imports from the rest of the world especially Africa. When the EU produced surplus sugar from sugar beet, it removed the quota system so that it could export the surplus sugar.

Between 2001 and 2018, world sugar consumption increased from 123.454 mln tons to 172.441 mln tons, the equivalent of average annual growth of 2.01%. However, the second half of the previous decade saw a considerable deceleration in world sugar consumption growth to less than 0.84% per annum (average for 2016-2018), while no growth was seen in 2018.

Major sugar consuming markets include India, the EU, China, Brazil, the US, Indonesia, Russia, Pakistan, Mexico and Egypt. Globally, the most important drivers which influence sugar demand include population growth, per capita incomes, the price of sugar and alternative sweeteners, and health concern debates.

Figure 10: World Sugar Production and Consumption (in 000 tons)



Source: International Sugar Organization (ISO) 2019

5.4.4 Ethanol Market Dynamics

Ethanol is internationally classified as undenatured ethyl alcohol of an alcoholic strength of equal to or more than 80%. It is sometimes referred to as extra neutral alcohol (ENA).

Uganda exports 0.1% of the total global ethanol exported. In 2019 Uganda exported 6,061 tons valued at \$5,689,000. It ranks number 42 on the global map of ethanol exporters. It majorly exported to the Democratic Republic of Congo (2,740 tons), followed by Burundi (1,188 tons), and Kenya (1,054 tons).

In 2019, Uganda imported 3,806 tons of ethanol valued at \$ 3,289,000. It majorly imported from Eswatini 3,791 tons representing 99.6% of the import market. The rest was imported from China (11 tons), and Kenya (2 tons).

Locally ethanol is consumed by companies that blend it to make alcoholic spirits such as East African Breweries, it also used for making alcohol-based hand sanitizers, for example by the Kakira-based Saraya Sanitizer Company using Japanese technology. It is also used by medical and biotechnology laboratories for cleaning and sanitisation.

5.5 UGANDA SUGAR TRADING

In Uganda, 2016 was a troublesome year for the local sugar industry. Sugar production was stable in the first half of the year. However, due to pressures of higher sugarcane demand in the second part of the year, overall sugar production reduced and prices went up. The high sugar demand in the EAC region exerted additional pressure on the local sugar market forces which would have been avoidable if cane poaching, which reduced overall sugar production, had been put under control.

- As it was in 2015, the major challenge encountered by the industry in 2016 was cane poaching by the newly established factories which largely reduced cane availability and thus sugar produced by the old-established factories. While on the surface one can argue that cane poaching could lead to the reduction of sugar production in one mill and an increment in another, the reality is far from that because competition for cane leads to immature cane harvests and crushing of young cane. In Uganda, this has led to a reduction of cane yields from 100 to 65 tons per ha and sugar recoveries from 9.2 to 6 per cent. This resulted in a drop in foreign exchange earnings, loss of the regional market to other developed countries, loss of income to millers and out-growers and Government in form of taxes;
- If Uganda's sugar industry is to remain competitive in the EAC region, the government should address the issue of expansion of new mills located in the zones of the already existing mills. These new mills, although licensed by Uganda Investment Authority, have not developed their nucleus estates or their out-grower farmers. The delay in passing the National Sugar Bill 2016 has led to the expansion of the poorly located new sugar mills, raising the capacities of these mills over the available mature cane for crushing. For instance, there are two sugar mills in Mayuge competing for cane, and given the bulky nature of sugarcane it becomes costly to transport from far places to where the plant is. Secondly, the absence of a law to provide direction to the industry's growth, including arbitrating in the industry challenges, exacerbated cane poaching leading to a national loss in 2016 and as was the case in 2015 led to the payment of penalties to UEDCL by one of the sugar companies for power not supplied as per agreements signed.

5.5.1 Managing the Surplus

As of November 2020, Uganda's sugar mills were estimated to produce an annual total of 550,000 metric tons (MT) with local consumption of 380,000 MT yielding a surplus of approximately 170,000 metric tons. Most of the sugar produced is brown sugar. Little industrial sugar production happens. There is renewed interest in and demand for industrial sugar which could increase brown sugar demand for the industry. It is noted for instance that local demand for industrial sugar is 100,000 MT, and one MT of industrial sugar requires 118 MT of brown sugar implying a surplus that could be absorbed locally without an external market.

Table 14: Installed Capacity and Utilization Scenarios - Operational Millers

S/N	Name of Miller	Installed Capacity (TCD)	Area Under Cane (HA)	No. of Out-Growers	Available Annual Cane (MT)	Installed Annual (MT)	Available Daily (MT)	Installed Daily Capacity	Capacity Difference (MT)
1	Kakira Sugar Works Ltd	7,200	38,700	9,000	2,592,900	2,160,000	8,643	7,200	1,443
2	Mayuge Sugar Ltd	3,500	26,000	21,000	1,742,000	1,050,000	5,807	3,500	2,307
3	Kaliro & Allied Industries Ltd	1,650	1,800	5,000	120,600	495,000	402	1,650	(1,248)
4	Seven Star Sugar Ltd **	1,000	150	135	10,050	300,000	34	1,000	(967)
5	Kamuli Sugar Ltd	1,250	8,150	2,500	546,050	375,000	1,820	1,250	570
6	GM Sugar	1,250	1,863	3,500	124,821	375,000	416	1,250	(834)
7	SCOUL, Lugazi	4,200	18,896	4,000	1,266,032	1,260,000	4,220	4,200	20
8	Uganda Farmers Crop Industries	150	4,634	6,500	310,478	45,000	1,035	150	885
9	Hoima Sugar Ltd	1,000	931	6,415	62,377	300,000	208	1,000	(792)
10	Kinyara Sugar Works Ltd	4,000	33,551	6,100	2,247,917	1,200,000	7,493	4,000	3,493
11	Ndibulungi Sugar Works **	200	373	6,415	24,964	60,000	83	200	(117)
	TOTALS (DAILY AVERAGE)	25,400	135,048	70,565	9,048,189	7,620,000	30,161	25,400	4,761
	TOTALS -ANNUAL	7,620,000	9,048,189						
ASSUMPTIONS									
	1	Factories are working at full capacity							
	2	Yield per hectare is at an average of 67 metric tonnes							
	3	Factory is in operation for 300 days in a year							

Source: First 3 columns from Ministry of Trade. Other columns are computed

5.5.2 Competitiveness of Ugandan Sugar and By-Products

Uganda contributed only 0.2% to the global sugar production amount in 2018 compared to Brazil, the world's largest producer at 39.2% (World Data Atlas, 2020). Production challenges notwithstanding, Uganda has potential regional sugar markets in Kenya, South Sudan, and Tanzania. Regional demand for Uganda's sugar is low in Tanzania, which has raised concerns regarding the relatively expensive Ugandan sugar compared to sugar imported from other countries such as Botswana and Lesotho. The sugar sub-sector has the potential to spur growth and agro-industrial transformation once the myriad of problems have been analysed and addressed.

The sugarcane and sugar industry is an important source of employment and foreign exchange (Hess et al. 2016). Promoting the commercialisation of smallholder farmers is envisaged to increase incomes, reduce poverty, and ignite rural development (Giuliano and Ricardo 2019).

Development along the sugarcane value chain – production, processing, distribution, and marketing/sales – has the potential to foster inclusive rural transformation for Uganda. However, the sub-sector is mired in many problems. The challenges require a thorough understanding of the entire value chain from the farmer to the end market including support services such as credit availability and sources and extension services efficiency, among others

5.5.3 Sugar Trade: Imports and Exports in Uganda

For the last five years, Uganda has been a net producer of brown sugar. The only officially sanctioned sugar imports are those of industrial (refined white) sugar for use in the beverage industry (Coca-Cola and Pepsi-Cola).

Industrial Sugar Imports

Like the majority of African countries, Uganda doesn't manufacture industrial sugar. In 2019, the country imported 90,421.8 metric tons of industrial sugar worth USD \$ 40 million (NPA, 2020). Uganda imports industrial sugar for beverage and pharmaceutical purposes. However, no sugar processing plant has started producing industrial sugar because: it is very costly to set up industrial sugar processing plant; the internal demand capacity for industrial sugar is still low, at 100,000 MT; the surplus brown sugar produced is still little to sustain supply of industrial sugar; among other. To manufacture industrial sugar, Uganda would need to increase production of raw sugar because it is the major raw material required. You require 1.3 kg of raw sugar to process one kilogramme of industrial sugar. That means for Uganda to stop importing refined sugar it would require 117,548.34 MT of raw sugar on top of the surplus it exports. This means if Uganda produces industrial sugar to tube of what is currently imported, it would in the long run have to import raw sugar. Accordingly, government is in negotiations with the private sector especially Kakira Sugar and Mayuge Sugar, to start manufacturing industrial sugar.

Raw/Brown Sugar Imports

Despite Uganda being a net exporter of raw sugar, there are certain sections of people who operate bonded warehouses of imported cheap sugar from Brazil. Due to this some of the East African countries put tariff barriers to Ugandan sugar for example, Tanzania demanded a 25 per cent import duty from Kagera Sugar Ltd in 2018, which had entered into a contract to buy 5,000 tons of sugar from Kakira. Uganda has continuously convinced its neighbors that it doesn't have to import any sugar and manufactures all the officially declared surplus sugar. At the beginning of 2020, Tanzania allowed Uganda to export more than 20,000 MT of raw sugar by May, 2020, and this was to open more market opportunities for Uganda's Sugar in Tanzania which was facing a sugar deficit.

Table 16: Details of East African Protocols in Sugar

S/N	HS CODE	DESCRIPTION	Tariff Barriers
1	1704.90.00	Sugar confectionery (sweets)	Uganda and Tanzania to stay application of the East African Community Common External Tariff (EAC CET) rate of 25% and apply a duty rate of 35% for one year effective 2019
2	1212.91.00	Sugar beet (Kg)	EAC CET rate of 10%
3	1212.93.00	Sugar cane (Kg)	EAC CET rate of 10%
4		Other sugars, including chemically pure lactose, maltose, glucose and fructose, in solid form; sugar syrups not containing added flavouring or colouring matter; artificial honey, whether or not mixed with natural honey; caramel.	
	1702.20.00	Maple sugar and maple syrup	EAC CET rate of 10%
	1702.11.00	Containing by weight 99% or more lactose, expressed as anhydrous lactose, calculated on the dry matter	EAC CET rate of 10%
	1702.50.00	Chemically pure fructose	EAC CET rate of 10%
5	1702.90.00	Other, including invert sugar and other sugar and sugar syrup blends containing in the dry state 50% by weight of fructose	EAC CET rate of 10%
6	1701.99.10	Sugar for industrial use (Kg)	Sensitive Item (S.I)
	17.03	Molasses resulting from the extraction or refining of sugar.	
	1703.10.00	Cane molasses	EAC CET rate of 25%
	1703.90.00	Other	EAC CET rate of 25%
7		Sugar confectionery (including white chocolate), not containing cocoa.	
	1704.10.00	Chewing gum, whether or not sugar-coated (kg)	EAC CET rate of 25%
	1704.90.00	Other	EAC CET rate of 25%

Source: Trade Map 2021

5.5.4 Internal Zoning of Millers

If well-designed to protect farmers from a monopsony, zoning has helped to curb the unhealthy competition for cane that existed due to congested millers that had a huge demand for sugarcane in a relatively small area. In countries such as India and Pakistan, a poor licensing regime led to many millers operating in one area. This caused unhealthy competition among millers for the available cane from out-growers. Due to lack of enough cane, factories closed and others operated below capacity. This constraint was removed with the introduction of a zoning policy. India provides a compelling case: zoning is in Tamil Nadu state not anywhere else. The zoned state has 40% better productivity than the national average. Here, the millers were zoned to a radius of 40km. To protect farmers from monopsony, the government sets a floor for the price of cane to be paid by each mill depending on the recovery rate (rendement) of cane achieved by the mill. Kenya provides a case for the challenges of zoning. Like India, Kenya requires sugar mills to be within a radius of 40km. However, zoning received a lot of resistance from the Kenya Sugar Growers Association who wanted farmers to be free to sell cane to whichever mill they wanted. Zoning has experienced some challenges such as leading to losses due to poor transport facilities, especially in Nyando Sugar Belt.

06

Conclusion and Recommendations

6.1 CONCLUSION

This study takes a value chain approach to examine the players along the sugarcane value chain, their relationships, the challenges they face, and the opportunities available to them. The Uganda sugar industry is one of the oldest in the country. Since its establishment in the 1920s, it has played a significant role in Uganda's industrialisation agenda and economy in general. A key attribute of the sugar sub-sector is that it is private sector-led. All the registered sugar growers and processors, apart from the Atiak Sugar Factory, are currently 100% privately owned. The three old processing factories—Kakira, Kinyara and SCOUL—have gone through a full cycle of ownership models, starting from private, to public, and joint-ownership/private-public, and back to private. They have hence learnt lessons that have enhanced their performance.

The study maps key sugarcane players including out-growers, transporters, millers/processors, distributors, and the regulator/government. The study finds that growers are organised under different sugarcane production models, namely, registered and aided, registered and unaided, and unregistered and unaided. The study reveals that most (55%) of the sugarcane growers in Busoga are not registered and not aided, compared to 18% in Buganda and 4% in Bunyoro. As a result, the level of use of productivity-enhancing inputs is correspondingly lower in Busoga compared to the other sub-regions where the study took place. In addition, yield is much lower in Busoga compared to Bunyoro and Buganda. This suggests that farmers who are not aided find it hard to apply productivity-enhancing technologies because of a lack of support (credit and extension services). The emergence of many mills in Busoga has led to the competition for cane with new mills providing a slightly higher price to "steal" farmers who were hitherto under registered and aided out-growers arrangements with the big mills.

Farmers in Busoga (68%) and Buganda (49%) reported having difficulties in delivering their cane to processing mills. As a result sugarcane stays in the gardens far beyond the optimal maturity period of 16-18 months and even up to 36 months. This significantly reduces the profits of growers. Related to the limited market is the politics of sales permits. Many farmers reported that middlemen/agents, who are not necessarily growing sugarcane, have emerged and these obtain permits from factories and sell them to farmers, and this eats into farmers' profits. The situation in Bunyoro is slightly better because the main buyer, Kinyara Sugar, uses its trucks more to lift out-growers cane than is the situation in Busoga.

The study also found that the cost of transporting sugarcane to mills is borne by farmers, and for the farmers who are registered and aided, the processors subsidise transportation. Most of the transporters are linked to the mills and hence unregistered farmers also find it hard to transport their cane to the mills.

The study found that the cane price is determined differently across sub-regions and that the millers have higher bargaining power and decide single handedly on the price to give to the out-growers. Farmers are weakly organised in groups and have no bargaining power. The price formula in the Sugar Act has not yet been applied in the cane price determination across the country.

The study found that the product space is still shallow and narrow. The main sugarcane product is raw brown sugar and the by-products are electricity and to an extent ethanol. No processing plant is producing industrial sugar yet the country imports approximately 100,000MT (Kil with Suresh C. Sharma, Uganda Sugar Manufacturers Association (USMA)).

The study also found that Uganda is a net producer of sugar but faces limited access to export markets because of the non-tariff barriers among the East African countries such as Kenya. The recent (May 2021) government's intervention has eased the restrictions but market uncertainty remains.

The sugar industry is inadequately regulated mainly because of minimal involvement of the government at the production level in form of extension service provision, research and development and credit access. Further limited involvement is seen at processing and distribution level in terms of price determination and quality assurance. Most of these services are provided by the mills which to-date remain key players in shaping the industry. The government has attempted to regulate prices through the pricing formula embedded in the Sugar Act 2020, but that law is still not yet operational.

6.2 RECOMMENDATIONS

6.2.1 Operationalisation of the Sugar Act 2020

- 1) The Ministry of Trade, Industry and Cooperatives as the lead agency for the Sugar Act, should expedite the establishment of the National Sugar Board that should in turn fast-track the operationalization of the law. A functioning board will make sure the following are activated:

That contracts between out-growers and millers/processors are enforced. Ensure fair price determination for the cane growers by operationalising the cane pricing formula as stipulated in the law.

Regulate the placement of new processing mills. While the law did not consider zoning, the placement of new mills needs to be guided because, given the level of investment, a mill needs assurance of certain cane input to continue operating.

6.2.2 Investment in Sugarcane Research and Development (R&D)

- 2) The government, through the National Agricultural Research Organisation (NARO), should fast-track the establishment of the National Sugar Research Institute. NARO is mandated by the Sugar Act 2020 to create the research institute, recruit and train staff and equip it with the necessary facilities to carry out the required interventions. Once in place the Sugarcane Research Institute will be able to screen the sugarcane germplasm and develop Ugandan varieties. The institute will also carry out other sugarcane research activities and be able to solve the sugarcane production and processing constraints. The developed varieties will be publicly available for every sugarcane grower, unlike the current situation where each company sources for its own germplasm.
- 3) The government should support the establishment of farmer-owned sugar mills to address the challenge of lack of markets for the out-growers cane. Farmer-owned mills would also increase the share of profit from the by-products (molasses, bagasse, co-generation, ethanol, and fertilizers) that they are currently not benefitting from. The study found that sugarcane for many growers stays in the garden for more than 18 months due to limited market outlets, which leads to farmer losses. This hurts a lot those out-growers who are renting land for a single season where the owner of the land wants it back at the end of the season yet the cane is still

unharvested. It also hurts those who obtain loans to grow sugarcane assuming that they will sell in 16-18 months and payback the loans in the due period. It should however be noted that for farmers to invest in cane milling, a number of considerations are met such as adequate supply of cane to ensure full capacity utilization of the plant, and for sustained processing, and better management to ensure value for money.

- 4) The departments of production and marketing in district local governments should convene meetings with all sugarcane stakeholders operating in the district to coordinate cane harvesting and delivery to the millers. There will be need to enforce the issuance of a permit to only those growing cane with clear and predictable criteria to avoid speculation and dealings which are affecting smallholder farmers.
- 5) The government should strongly push for the removal of non-tariff barriers to ease access to export markets in the East African Community and the COMESA regions. This will create an incentive for mills to invest and in turn absorb more cane from the gardens.
- 6) The government should support mills to deepen and widen the product space into the production of industrial sugar which is largely imported yet there is surplus sugar that could be used to manufacture the required quantities of industrial sugar.

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