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Their Voice Matter: Storying the Smallholder Sugarcane Farmer Perspectives on Intensification, Diversification, and Mechanization of Sugarcane Farms in the Fijian Sugar Industry

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Abstract

The sugar industry of Fiji had been the economic strength of the country for more than a century. However, its relative importance started to decline in the new millennium because of many traditional unresolved issues and the new challenges arising from both inside and outside the country, rendering the future of the industry grim. As a result, since 2012, the Fijian Government has taken several multi-purposed interventions to re-establish the sugar industry as a viable industry for all its stakeholders. Of these interventions, major focus has been on proposals to intensifying sugarcane crop production, diversification of the industry at the processing and farm levels, and the mechanization of farms to improve the industry's performance. These interventions are anchored in the Sugar Cane Industry Action Plan (SAP) of 2012. The interventions have received the support of many sugar industry stakeholders, majorly those who are positioned strongly in the industry. However, there lies an opportunity to document farmer perspectives on these interventions, not only because they are the largest stakeholder in the industry, but also because they claim that they are weakly positioned in the industry and had limited to no say in the formation of the SAP. Therefore, using a rural development critique, and a mixed research methodological approach with 29 smallholder sugarcane farmers as key research participants, and with

other industry stakeholders, this study discusses farmer perspectives and responses to intensification, diversification, and mechanization of the sugar industry in Fiji.

Keywords: *diversification; Fiji; intensification; mechanization; production; sugarcane*

1. Introduction

The sugar industry of Fiji began as a commercial operating entity in 1879 with indentured workers sourced from Colonial India to work on the sugarcane plantations (Gounder, 2011; Narayan & Prasad, 2003). By 1883, sugar had displaced copra as the main export commodity (Vaniqi, 2012). And since then, the industry had remained the backbone of the country until when in the new millennium the tourism sector took over as the major income earner for the country (Prasad et al., 2011; White, 2003). Today, the industry is beset by an array of adversities from both inside and outside the country, rendering the future of the industry grim (Dean, 2019; Singh, 2018).

Outside the country, one of the major problems coalesce around international sugar markets (Serrano, 2007). The United Kingdom (UK), as part of the European Union (EU), was the biggest importer of raw sugar and was obliged to purchase sugar from Fiji tariff free under the Economic Partnership Agreements (Dearden, 2008). But recently in 2017, the EU terminated the preferential sugar access making its sugar market competitive (Gounder, 2018; Rakotoarisoa & Chang, 2017). This decision of the EU has made the African, Caribbean, and Pacific (ACP) member countries (including Fiji), which have up to now been enjoying free sugar quota access to the UK, to compete globally with other sugar producing nations in search of markets for their sugar produce (Lal, 2019). The issue has further aggravated by Brexit (Höffken, 2018; Razzaque & Vickers, 2016). In addition, Fiji lost over FJ$350 million in EU grants to the sugar industry over the 2006-2014 period because of the military coup of December 2006 (Dean, 2019).

Added to the issues identified above, inside the country, a major challenge is the pending unresolved traditional issue linked to the expiry of some 20,000 leases on native land in the sugarcane areas which has majorly given rise to poverty and household food security implications, particularly for smallholder sugarcane farmers (Kumari & Nakano, 2016; Reddy, 2003-a; Reddy, 2003-b). In addition, decreasing profits from sugarcane production, coupled with cultivation, harvesting, and transportation costs, and the non-renewal of land leases have all led to loss of farmer confidence in the industry (Dean, 2019; Singh, 2018). The sudden increase of fertilizer and weedicides costs, and the purchasing of substitutes for soil fertilization additionally continue to affect farmer incomes (Nasiko, 2021; 2016).

To this end, the Government of Fiji in recognizing the need to re-establish the sugar industry as a viable industry for all its stakeholders established the formation of a Stakeholder Action Group (SAG) whose task was to provide a platform for enhanced collaboration and a stronger connection between strategy, decision-making and action (The Sugar Industry Stakeholder Action Group, 2012). The SAG comprised of representatives of major industrial stakeholders such as the Fiji Sugar Corporation (FSC)[1], the Sugar Research Institute of Fiji (SRIF)[2], the Sugarcane Growers Council (SCGC)[3], the Sugarcane Growers Fund (SCGF)[4], the South Pacific Fertilizer Limited (SPFL)[5], including experts in sugarcane crop and sugar, who were consulted for the interventions and they provided with their inputs that can help lift the industry out of the menace. The SAG then helped craft the Sugar Cane Industry Action Plan (SAP).

In the SAP, the SAG recommended that the commercialization of the sugar industry in Fiji should be major priority, and that the Government-ownership must not be allowed to distract the industry stakeholders from the immediate pressure to respond to market forces and compete as a sugar producing country. The SAG also stated that there was available a narrow window of opportunity for the industry to focus on competitiveness and to take advantage of this opportunity; with the industry stakeholders becoming more pragmatic, action-oriented, and relentless in improving its efficiencies (The Sugar Industry Stakeholder Action Group, 2012: 8).

The SAP includes a framework for progress across six separate action areas (Crop Production; Cane Quality; Harvesting and Transport; Revenue Generation; Milling and Processing; Industry Re-structuring and Legislation) that extend from farmer's field to raw sugar ready for export. It sets priorities, apportions responsibility, and is presented in a manner that is accessible, can be used as an 'action agenda' and is easily updateable. It is cognizant of both internal and external industry drivers and is time bound.

However, a drawback of the SAP is that it does not attempt to provide a detailed economic impact assessment, cost/benefit analyses or feasibility studies for all actions identified (Dean, 2019). The overall objective of the SAP nonetheless has been to strengthen the level of integration and alignment across the entire value chain by setting out industry agreed priorities and actions. It details the approaches to be undertaken for improving the industry's performance, in which the interests of the farmers were majorly represented by the SCGC (The Sugar Industry Stakeholder Action Group, 2012).

Out of the many solutions proposed in the SAP, this study focusses on three major interventions: (i) intensifying sugarcane crop production, (ii) diversification of crops, and (iii) mechanization of farms, and draws on opinions and expressions of the farmers' viewpoints on these interventions and their limitations. The main aim of this paper is to provide voice and promote downwards accountability to people, in this case the smallholder sugarcane farmers of Fiji, who have lived experience of the sugar industry and as well rural life, are mostly engulfed in rural poverty and social contentions, by enabling them to articulate their views into sugar industry plans and within policy processes.

2. Methodology

This paper is based on a component of Doctoral research that drew upon the agronomic, ecological, and social sciences to analyze the current crisis facing the sugar industry in Fiji. A year of ethnographic fieldwork was conducted in 2015, in smallholder sugarcane farms in the four sugarcane producing areas: (i) Sigatoka-Nadi, (ii) Lautoka-Ba, (iii) Tavua-Rakiraki, and (iv) Labasa-Seaqaqa, on the islands of Viti Levu and Vanua

Levu in Fiji. The insights gathered from the Doctoral research were utilized to contend that the present interventions for reforming the sugar industry in Fiji are wedded to the industrial agricultural paradigm and a globalized corporate food regime that is the source of the problems the sugar industry currently faces, and which threatens the future of the smallholder sugarcane farming system along with its local traditional knowledge. A total of 29 smallholder sugarcane farmers participated in the study as key research participants. The 29 farmers comprised of 25 descendants of the *Girmitiya* community of the Indo-Fijian heritage having origins in the Colonial indenture system and 4 *iTaukei* (indigenous) farmers, all of whom were males.

The study utilized mixed methods research methodology to gather information. The qualitative aspects of the research majorly involved the ethnographic methods of participant observation that entailed observing and participating in the daily lives of the 29 smallholder farmers and at times also the members of their households. Taped semi-structured interviews were also conducted with key respondents from other sugar industry stakeholders at the local and national levels such as governmental representatives of the Ministry of Sugar (MoS)[6] and the Ministry of Agriculture (MoA)[7], the employees of the FSC, SRIF, Cane Producer Associations (CPAs)[8], SCGF, and the SCGC. Focus group discussions were conducted with the smallholder sugarcane farmers to gather their opinions and views of the sugar industry crises, specifically on the problems of the sugar industry, and as well to stimulate discussions concerning strategies for food and income security.

Other qualitative methods included taking of field notes daily to record observations and experiences in the sugarcane farm settings. Informal farmer conversations were also administered with these farmers. Photographs and video recordings of farming life and activities in the farm provided a valuable record for future reference. Literature from governmental and non-governmental agencies, the media, and academia were also consulted.

Quantitative information using methods of agroecosystem analysis and livelihood survey was obtained from farmer households. The agroecosystem analysis and the livelihood survey complemented, and to

some extent supplemented the data obtained via the qualitative methods of inquiry. The livelihood survey combined the livelihood portfolio of rural activities and expenditures. It elicited accurate and detailed information, and as well demonstrated and influenced the understanding of rural livelihoods. The agroecosystem analysis and the livelihood survey additionally helped in comprehending and identifying various traditional agroecological approaches for sugarcane farm productivity, stability, sustainability, and equitability.

3. Findings and Discussion

The arguments in this paper are grounded in the framework developed by Professor Robert Chambers, a leading authority in Rural Development, who in his works focusing on rural populations and development argue that rural dwellers face challenges that have in-built systemic problems. These systematic problems he says remain unearthed and are usually hidden in the rural poor's life (Chambers, 2014; 2005; 1997; 1995; 1985; 1983). In his seminal work of 1983, Chambers perceives the rural poor as those at the very bottom of the hierarchy with limited to no voice, those who continue to be further marginalized by the stronger actors in the system (Chambers, 1983: 22).

He contends that there needs reversals to conventional approaches to rural development, which are inevitably biased towards the needs and prejudices of the outsiders - the academics, development practitioners, researchers, aid agency personnel, institutional personnel, Governmental workers, bankers, businessmen, consultants, policy makers, doctors, engineers, journalists, lawyers, politicians, priests, school teachers, staff of training institutes, workers in voluntary agencies, and other professionals, rather than those of the rural poor themselves (Katundu, 2019). Chambers stress that there is a need to fight rural poverty by avoiding rural biases.

In addition, Chambers influential critique of conventional analyses of rural development affirms that the rural poor, as beneficiaries of development efforts, often do not have a voice on the table when discussing and negotiating development, or even if they do have a stake,

their voice is systematically silenced by those who are more powerful, dominant, and influential (Chambers, 1981). He sees the rural poor to be trapped in a web in which poverty, physical weakness and sickness, isolation, vulnerability to contingencies, and powerlessness all mesh and interlock, with their perspectives often systematically excluded from plans and policies, resulting in further marginalization (Chambers, 1997). As a result of these systematic challenges, he argues that decision makers need to put the last first, and in doing so must appreciate the richness and value of rural people's knowledge and the hidden nature of rural poverty (Chambers, 1993; Chambers, 1985).

The key research participants in this study- the smallholder sugarcane farmers are no different to whom Professor Robert Chambers categorize as the rural poor. A majority of these farmers live in the rural interiors of the sugarcane producing areas of Fiji and have been found to be operating their sugarcane farms at breakeven points, and many a times even at losses (Dean, 2019; Carswell, 2000). Also, those smallholders having origins in the Colonial indenture system are indeed a product of colonial dispossession and marginalization and for generations have been searching for a stronger positioning in the sugar industry. In addition, since the inception of the industry, the farmers have accumulated a vast amount of traditional knowledge which continue to be devalued by the outsiders (Dean, 2019).

As far as the SAP of 2012 is concerned, many of the farmers argument is that they have not been constructively consulted for and they claim that they did not play as equal role in the formation of the SAP in comparison to other stakeholders in the industry. This, despite them being the largest stakeholder in the industry and contributing considerable number of personnel, work hours, and energy. The sugar industry in Fiji also garnered some criticisms locally and internationally for failing to incorporate the perspectives of the farmers in the SAP comprehensively.

Therefore, using Chamber's argument of putting the last first, this study focusses on smallholder sugarcane farmers in the rural sectors of the sugarcane producing areas of Fiji, to make overt their perspectives on interventions proposed in the SAP, specifically on (a) intensification of

sugarcane crop production, (b) diversification of crops, and (c) mechanization of farms.

3.1 Intensification of sugarcane crop production

For achieving intensification of crop production, the SAP under section 7 titled 'Core Strategy and Actions to Achieve Targets' identified the following three interventions as urgently needed to help improve industry performance (The Sugar Industry Stakeholder Action Group, 2012: 31).

(i) Modest increase in production - the industry was of the view that increasing the total area under sugarcane production by 9,000 hectares would provide for an additional 510,000 tons of sugarcane if it strictly followed the actions below:

- 3000 hectares of new land to be identified and brought back into production with a target yield of 50 tons sugarcane/hectare between October 2012 and June 2013
- An additional 3000 hectares of the sugarcane should be cultivated to contribute to 2014 crushing season with an average yield of 60 tons sugarcane/hectare for April/May 2013
- An additional 3000 hectares of plant sugarcane (new sugarcane seeds) should be cultivated to contribute to 2015 crushing season with an average yield of 60 tons sugarcane/hectare for April/May 2014

(ii) Increasing yield/hectare on existing crops:

- From the available production area of 41,000 hectares, the balance of 500,000 extra tons should be produced by 2015. This will represent a 12-ton sugarcane/hectare increase over the three-year period

(iii) Increasing milling efficiency

- The milling efficiency will need to be increased from an average of 10 Tonnage Cane to Tonnage Sugar (TCTS) to 9.5 TCTS to

extract 289,474 tons of sugar from 2,750,000 tons of sugarcane in 2015

Expanding total area under sugarcane production

Several problems can be identified with expanding on the area currently under sugarcane production. Firstly, there is much reason to argue that increasing the land area under sugarcane production will plainly result in increase in sugar production. A 2-tailed Pearson correlation analysis using data on the number of farmers and the production of sugarcane for the years 1975-2011 indicated that it is only by increasing the farmer numbers that production of sugar could be increased (Table 1). The analysis indicated that the Significant 2-tailed was 0.01, demonstrating a positive relationship between farmer numbers and production of sugarcane of 65.3 percent, meaning that as one variable, either farmer numbers or production of sugarcane fluctuate, so will the other. It also meant that deviations in farmer numbers will have direct impacts on the volume of sugar produced.

Variables		**Year**	**Farmer Numbers**	**Production of Sugarcane**	**Production of Sugar**
Year	**Pearson Correlation**	1	.002	-.279	-.291
	Sig. (2-tailed)		.992	.095	.081
	N	37	37	37	37
Farmers	**Pearson Correlation**	.002	1	.653**	.257
	Sig. (2-tailed)	.992		.000	.125
	N	37	37	37	37
Production	**Pearson Correlation**	-.279	.653**	1	.246
	Sig. (2-tailed)	.095	.000		.141
	N	37	37	37	37
Sugar	**Pearson Correlation**	-.291	.257	.246	1
	Sig. (2-tailed)	.081	.125	.141	
	N	37	37	37	37

**** Correlation is significant at the 0.01 level (2-tailed).**

Table 1: Correlation of Variables- Year, Time, Production of Sugarcane, and Production of Sugar

Therefore, it can be argued that it is needless to expand the area of land under sugarcane production. By focusing on increasing the number of farmers and using existing farming practices can simply lead to an increase in sugarcane production[9]. To test this argument, using data obtained from SRIF for the years 1975 (1) - 2011 (37) on sugar production, the SPSS 22 Time Series modeler was consequently employed to forecast the production of sugar until the year 2025 (Figure 1).

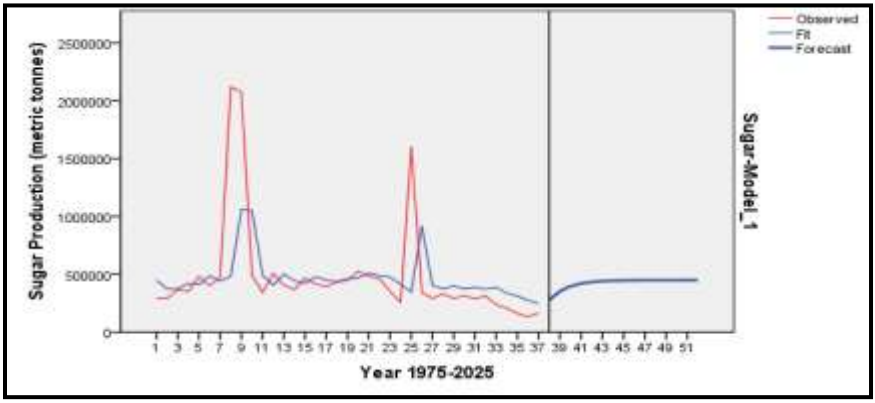

Figure 1: Forecast of sugar production level until the year 2025

Results from the modeler indicated that a sharp decrease in sugar production was expected until 2011, with a slight increase in the production of sugar from 2012 (42) until 2016 (42), and from 2017 (43) onwards, production would remain plateau until 2025 (51). This re-affirmed that increases in production could be achieved without expanding the area of land under production.

Farmer perspectives on expansion of land for increasing sugarcane production

While the farmers agreed that expansion of lands may lead to increased sugarcane productions, however, their main concerns with land expansion coalesced around threats arising majorly from the non-renewal of land leases, something that they had been facing since their 30-year land leases under the Agricultural Landlords Tenant Act (ALTA): (1976) started to expire in 1997 (Lal et al., 2001). The farmers' view is that a

solution needs to be found to increase the security of their land leases. They opine that they should be entrusted with long-term lease extensions of 99 years or more once their initial lease come to an end. It is also vital to note that while the Fijian Government under the leadership of the current Prime Minister, Frank Bainimarama have assisted some farmers with extensions to their land leases (Nasokia, 2016), many farmers still felt that there is an opportunity to further improving this, which will boost farmer confidence in producing more.

The farmers also acknowledged the role of the Government in negotiating with the native landowners for the renewal of the already expired land leases. The Government was successful in achieving this by compensating the landowners with a 4 percent down payment of the total 10 percent of the Unimproved Capital Value of the land being leased under the ALTA: (1976), with the remaining 6 percent to be paid by the farmers themselves. While this has worked to the advantage of the farmers, most of them reported that re-leasing had been on marginal lands having acidic soil conditions often requiring the application of Aglime to improve the soil pH levels. The purchasing of Aglime is an extra expense for the farmers, and at the time of the research, a 40kg bag of Aglime was costing the farmers somewhere between FJ$10-16 (Chaudhary, 2015c).

Other problems of re-leasing on marginal lands were found to include the rough, rugged, hilly, and slopy topographic characteristics, making the cultivation of sugarcane crops almost difficult. In addition, these marginal lands require extensive protection from soil erosion, specifically the topsoil cover containing nutrients and the fertilizers applied by the farmers. To counter the problems of soil erosion, many farmers resort to the planting of vetiver grasses and employing contouring to prevent soil losses on these marginalized lands. Others resort to utilizing massive amounts of fertilizers. At the time of research, a 50kg bag of fertilizer cost the farmers FJ$45.59, with the farmer paying FJ$31.50 and the balance of FJ$14.09 was being subsidized by the Government.

Increasing yield/hectare on existing crops

There are three aspects to land intensification for increasing yield per hectare. First, it requires deviation from the normal practices of traditional

sugarcane farming (including new varieties of sugarcane), and second, the maximum utilization of a unit of land. The third is Amalgamated Farming Systems (AFS), whereby farms will be joined together, and external employees will be hired to cultivate the sugarcane fields intensively. The responsibility to implement these actions lie with the FSC and SRIF, with additional support from the CPAs, the FT, and the EU.

The first, deviation from normal practices of sugarcane farming require a shift from traditional system of single row sugarcane planting to an intensified dual row planting system (Figures 2-6). The advantages of dual row planting are that soil moisture can be controlled, allowing for a better aeration and exposure to sunlight, leading to faster crop growth. In addition, increased spacing between the rows allow the leaves to be more exposed to sunlight permitting high rates of photosynthesis, therefore contributing to transcending sugar contents (Soomro et al., 2009).

Figure 2: Construction of furrows and addition of Aglime to the soil
Source: Author

Figure 3: Sugarcane seedlings are placed in furrows and draped with another layer of Aglime
Source: Author

Figure 4: Sugarcane seedlings are cut into smaller portions
Source: Author

Figure 5: Sugarcane seedlings are sorted
Source: Author

Figure 6: Sugarcane seedlings are then finally covered with soil
Source: Author

The other advantage of dual row planting is that the farmers can also intercrop in the space between the sugarcane crop rows, by planting various other types of crops and vegetables in those empty spaces. These crops and vegetables can be utilized for personal consumption by the farmer households or for income generation, without any depressing

effects on sugarcane yields (Klomsa-Ard et al., 2007). In addition, the (system) can accommodate for example green manure and legume crops for improving land productivity and is best for managing the succeeding ratoon crop.

The second form of intensification requires the introduction of new sugarcane varieties, with the responsibility to achieve this vested in the SRIF, to strengthen sugarcane varieties research and to avail good quality sugarcane seeds to farmers. The SRIF has been focusing on the utilizing of scientific methods to produce promising new sugarcane varieties that can boost farm productivity. Additionally, these new varieties shall be high in sugar content, be flexible enough to adapt to the changing conditions of soil and climate and be resilient to parasites and diseases. To this end, the SRIF has developed two new promising sugarcane varieties: (i) Viwa (LF04-448) and (ii) Qamea (LF94-694) that were released in 2014 (SRIF, 2014-a; SRIF, 2014-b). Viwa can produce high sugarcane yield and sugar contents, whilst Qamea is able to produce high fiber contents that can be used for electricity generation (Chaudhary, 2015b: 30).

The Viwa and Qamea sugarcane varieties have been developed to replace traditional varieties such as Ragnar and Mana that are high in tonnage but according to the FSC low in sugar quantity and quality. The introduction of the new varieties will however have implications for the sugarcane payment system. Up to now, according to the FSC, the farmers have been paid according to the tonnage of sugarcane produced, but the older varieties of sugarcanes had been deficient in the preferred sugar contents. This, according to the FSC had been disadvantageous to them as the miller because they argue that the market price of sugar is determined by the quality of sugar, and not the tonnage. And for this reason, the FSC was contemplating to have the payment system changed, to be based on sugar quality (Silaitoga, 2014). To experiment this, the FSC, with the Government's support, brought in the Near Infrared (NIR) machine to measure the amount of sucrose in a sample of each farmer's harvested crops as they enter the mill. As a result, with the introduction of the NIR system, the farmers overtime has been compelled to adapt to the planting of new sugarcane varieties and be paid a premium in addition to the minimum price for producing high quality sugarcane crops.

The third method of intensification involves changing the current smallholder farming systems to AFS. Under the AFS, there are several approaches on the horizon. Firstly, farms could be joined together and employees to work on the farms would be outsourced. Secondly, all farms could be withdrawn from the current pool of farmers, and then re-contracted using the AFS concept. The other proposal is the 'Farmer Retirement Scheme', whereby farmers can transfer their lands to the SCGF for an interim period. These farmers would then receive monthly instalments, and they can only use their houses, but their farms will be managed by outsiders such as the FSC, the SCGF, or any other individual. In parallel, new entrants will be trained under the MoS and other relevant training providers such as the FSC and SRIF.

Sugarcane farmer perspectives on increasing yield/hectare on existing crops

The proposed methods of increasing yield per hectare received mixed reactions from the farmers. A significant number of farmers from the Nadi, Lautoka, and Ba sugar producing areas felt that intensification of sugarcane production can assist the industry getting out of the difficulties it currently faces. However, these farmers owned several of the small farms and farming machineries, thus they were placed more fortunately among their peers who relied on traditional methods of sugarcane farming.

For some farmers, the dual row planting method meant completely changing their farming practices and the adoption of new sugarcane varieties. This group of farmers relayed that they would prefer to maintain their traditional varieties and traditional methods of sugarcane farming. The group also remained skeptical of the new techniques of intensification proposed in comparison to using traditional farming methods and growing of traditional sugarcane varieties. For them, traditional farming methods ensure maximum utilization of their farms, resulting in high yields of sugarcanes, one that according to the farmers are ecologically sustainable.

The farmers' argument on intensification is that productivity on the farms can be increased, depending on how well the farmer utilizes his skills, soil, agrobiodiversity, and time. As an illustration, they argued that

traditionally leguminous crops such as cow peas that has multiple benefits were intercropped with the sugarcane crops. The roots of the legumes provided the soil with nutrients. The produce from the leguminous crops were used for household consumption and were also bartered in exchange for other useful products, or sold off for additional incomes, whilst the legumes continued to support the growth of sugarcane crops.

The dual row planting technique for intensification was also received weakly by the farmers. While the farmers agreed that the technique can prove to be successful in terms of increasing production, however, it can also decrease the overall health of the sugarcane crops during germination. The problem they note is the amount of expanse between the rows, as the lesser the expanse, the more would be the competition for nutrients and space by the sugarcane crops. In addition, once the sugarcane crops have reached secondary growth stages, it will become difficult for the farmers to manage weeds and pests, completely restricting access to the farmers.

Many farmers were also reluctant to accept new sugarcane varieties. The farmers on Viti Levu consider the traditional Mana variety as superior to any other variety, because for them, the Mana variety can grow anywhere, provides good tonnage, and is able to flourish under any conditions. These farmers contend that traditional varieties such as Mana are resilient to droughts and hurricanes, which helps in difficult times, and it can grow in almost any soil type. Also, this means that the farmer is less burdened to purchase costly fertilizers which the new sugarcane varieties require to grow.

Sugarcane producing areas on the island of Vanua Levu are however devoid of the Mana variety, but other varieties are extensively spread on that island. Some farmers who have been experimenting with the new varieties proposed by the FSC and SRIF however did acknowledge that the new varieties have higher sugar contents, but they also face some serious setbacks. At times the new varieties have failed to grow altogether, or even when they did grow, they kept producing low sugarcane yields (James, 2013). The farmers claimed that these new varieties were proving to be non-resilient to the current changing climate variabilities.

For the AFS, the farmers acknowledged that whilst this intervention may be beneficial at the industry level allowing for an intensive utilization of the sugarcane fields, however for the system to be effective, they argue that it will have to be done equitably, and with the willing participation of the farmers. The farmers are also wary that AFS can lead to degradation of the farms, as their management will be in the hands of completely new pool of young farmers who have no experience or knowledge of sugarcane farming, other than the training that they will be provided. In addition, the farmers are of the view that converting their farms into AFS would involve reviewing the agreements that the farmers currently have in terms of land leases and boundaries, and the investments that they have already made on their farms needs to be brought up for discussion. In general, many other farmers were found to be reluctant to accept the AFS approach and remained protective of the current model of 'one farmer one farm'.

Increasing milling efficiency

The farmers' views on increasing milling efficiency in general is that the FSC must improve on their milling technologies, most of which are more then 100-year-old, requiring continuous upgrading and/or replacement. In addition, many farmers are of the view that the mills should provide facilities that can be utilized for example by the produce transportation drivers while waiting to dump the sugarcane crops. The requests include shelters, space for eating and for prayers as the waiting time to dump the sugarcane harvests can take long unanticipated hours. Also, many farmers claim that the way most of the processes are managed at the mills have overtime aggravated. Therefore, a full overhauling, with emphasis on innovating the systems, processes, and people in the mills will only make them more efficient and effective.

3.2 Diversification of the Industry

Another intervention for reclaiming the sugar industry involves moving towards diversification. The SAP identifies two ways of doing this: by (i) venturing into capital projects at the processing levels and (ii) engaging in cash cropping at the farm levels. At the processing level, capital projects will consist of erecting process centers for converting raw

sugar into other value-added products, to provide additional sources of income, whereas at the farm levels, farmers will be encouraged to undertake intercropping and multi-cropping, as means of diversifying their livelihoods apart from the sale of sugar.

Diversification at Processing Level

If Fiji's aspirations are to retain its international markets, it must diversify its sugar production by generating a range of value-added products, instead of solely focusing on raw sugar (Chaudhary, 2015a), because markets such as the UK demands various categories and types of sugar, such as organic, plantation, white, and brown sugar. For this to happen, Fiji firstly must be competitive enough to do this, and secondly have viable infrastructure. Some of the projects already in the pipeline include the fast tracking of the implementation of sugar packaging plants, co-generation power plants of 35 megawatts capacity in Rarawai- Ba and 10 megawatts in Labasa, an ethanol production plant in Lautoka, and a sugar refinery in Labasa. Such projects according to the SAP and by producing for local consumption was proposed to help cushion the impact of global price volatility and aid in buffering the economic impact arising out of the end of the EU quota access in September 2017, which Fiji had enjoyed being part of the ACP producer countries by receiving three times more the world market price of sugar by the EU.

Packaging plants have been set up whereby Fiji has started to pack and sell their own sugar produce. Fiji made sugar and sugar products sold in the local and regional marketplaces brings in some additional incomes whilst co-generation results in selling of electricity to the national grid, which is believed to be fetching a good revenue. The newly commissioned heat and power plant at the Labasa mill will run on bagasse- dry pulpy residue left after the extraction of the juice. In addition, the co-generation power plant project worth $17 million, financed by the Fiji Development Bank (FDB), is said to benefit the North of Fiji (Vanua Levu) as the mill there will be able to produce electricity not only during the peak crushing seasons but also be able to sell to Fiji Electricity Authority (FEA) during the off seasons (FDB, 2016). Approximately 6-7 megawatts of energy are used in the factory itself, and the rest will be sold to FEA throughout the

year. This will see the Labasa mill earning revenue additional to that from the sale of sugar and molasses.

The ethanol production plant on the other hand will be a source of clean and renewable fuel whilst the refinery will be used to produce refined sugar that tends to fetch prices three times higher than the normal brown sugar. The Food and Agriculture Organization predicts that global sugarcane production will increase by 21 percent, and that the share of global sugarcane production processed for ethanol is set to expand from 20 percent in 2012-14 to 25 percent by 2024 (OECD/FAO, 2016).

Sugarcane farmer perspectives on diversification of sugar industry at processing levels

The major concern of the farmers is the time it will take to get such projects up and running, and how the benefits will be distributed to all the actors including the farmers that have a stake in these projects, will also need to be negotiated. Other concerns raised by the farmers are that the long-term profitability of these projects will require an increased and stable supply of sugarcanes, and this will be possible only if the number of farms is expanded and the farmers remain motivated to increase production.

The profitability of biofuel production is also under pressure from low non-renewable fuel prices. In 2017, some of these projects had been halted as the new FSC administration wanted to prioritize increasing sugarcane production and improving the production of high-quality raw sugar. They were of the view that they will not be wasting valuable resources on diversification plans (Chaudhary, 2017).

Diversification at the farm Level

Traditionally, the smallholder sugarcane farmers in Fiji have been monocrop producers (Lal, 2004). This is because the Colonial Sugar Refinery Company (CSR) of Australia, the historical owners, discouraged diversification and the FSC followed the same mantra when it took over from CSR who ceased its operations and sold its shares to the Fiji Government in 1973. One proposal for diversification at the farm levels

include the dual row planting system that is promoted by the FSC and SRIF, for increasing production levels requiring farmers to simultaneously include intercropping of sugarcane plants with cash crops.

The Government, as identified in the SAP, sees diversified farming as a means of generating additional incomes to help the poor sugarcane farmers, and as well contribute to rural development. However, for diversification to take place in the farms, farmers will have to move from traditional method of single row sugarcane planting to dual row planting that the FSC and SRIF are trying to implement. The SRIF believes that farmers will need to move away from the practice of intra-cropping and move into intercropping. In Fiji, the practice of intra-cropping has been the norm, with farmers engaging in the monocropping of sugarcane only, but with different cultivars.

Another option includes the utilization of existing vacant lands in the sugarcane farms on which other crops, such as those having high value, could be grown (Figures 7-11). However, this is dependent on the availability of the market and the ability of the farmers to do it with continuous supply and the type of produce quality that is required. Some farmers have additionally ventured into dairy production and into honey producing business, as diversification.

Several other methods, for example the program named 'Accompanying Measures for Sugar Protocol Countries Program' (AMSP) to support the development of the supply and marketing of a wide range of Fijian crop and livestock products, and the Improvement of Key Services in Agriculture (IKSA) program for livestock products (2012-2016) was implemented. At the heart of these programs was to support the farmers for diversifying into the planting of horticultural crops. The program encouraged sugarcane farmers and other types of farmers in the sugarcane producing areas to supplement their incomes from growing vegetables and fruits on unused or marginal lands, and through intercropping with the sugarcane crops.

Figure 7: Nadi farm
Source: Author

Figure 8: Ba farm
Source: Author

Figure 9: Tavua farm
Source: Author

Figure 10: Sigatoka farm
Source: Author

Figure 11: Nadi farm
Source: Author

Sugarcane farmer perspectives on diversification of sugar industry at farm levels

The farmers' position on intercropping is that they can only cultivate crops that can be grown and harvested within short time periods (one to three months), between planting sugarcane seedlings and harvesting the mature sugarcane crops. Those farmers who had taken part in the IKSA project were also faced with finding markets for their produce. Apart from this, they face getting cheated by the middlemen who buy their diversified produce. According to the farmers, the middlemen can manipulate the system, and because there are no legal agreements or policies for safeguarding the interests of the farmers, this results in farmers becoming victims of breaches of trust. The farmers' position is that they need legal contracts with the middlemen to protect them from deceitful practices. Legal agreements according to the farmers could also help them access loans from the banks as the contracts can be sighted as legal binding documents.

The other problem associated with diversification is the question of profitability. Many farmers alluded that they make very little to close to no profits at times from their diversified produce. In comparison, they claim that individuals in average occupations earn much better incomes

from their small businesses. In the farms, it was also observed that the sugarcane farmers practiced three different types of cropping techniques: (i) either they designate farm plots in which they intercrop the vegetables separately from each other, or (ii) they keep home gardens away from the sugarcane fields where they intercrop with flowers, or (iii) they may also multi-crop with the sugarcane when the sugarcane crops are in their primary stages of development (refer Figures 12-14).

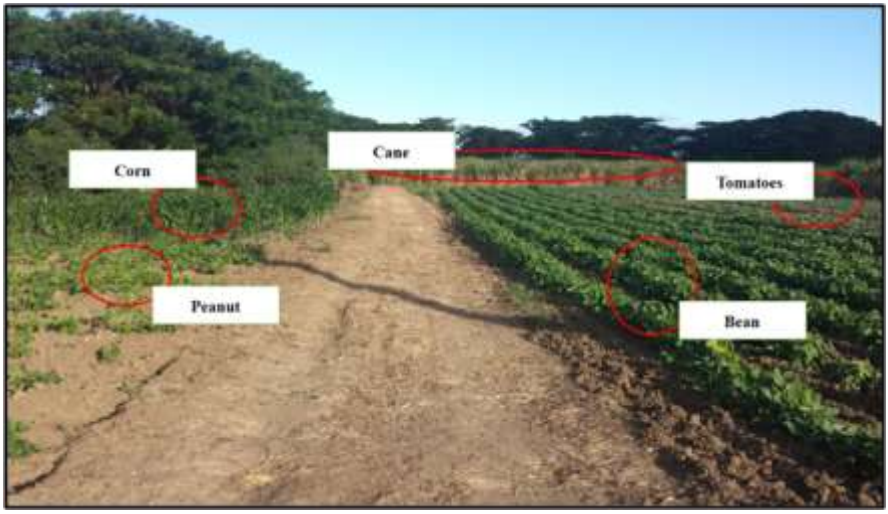

Figure 12: Nadi farm
Source: Author

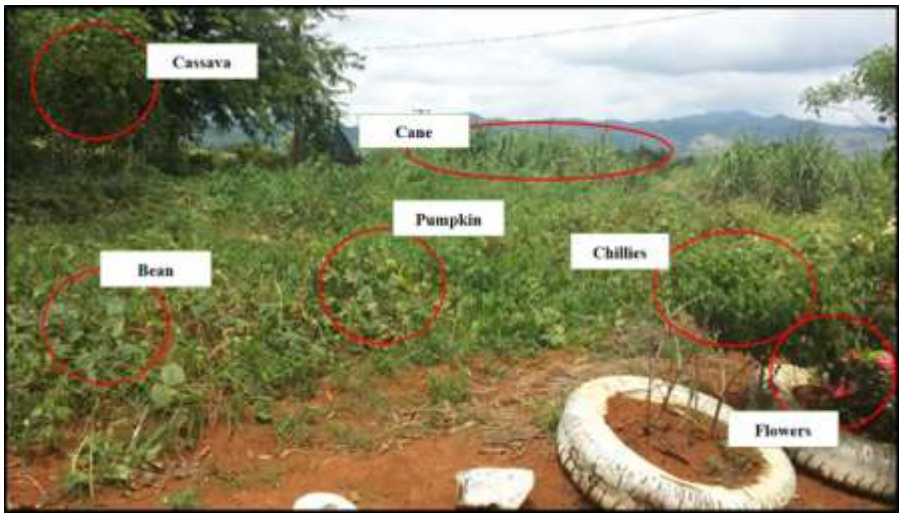

Figure 13: Labasa farm
Source: Author

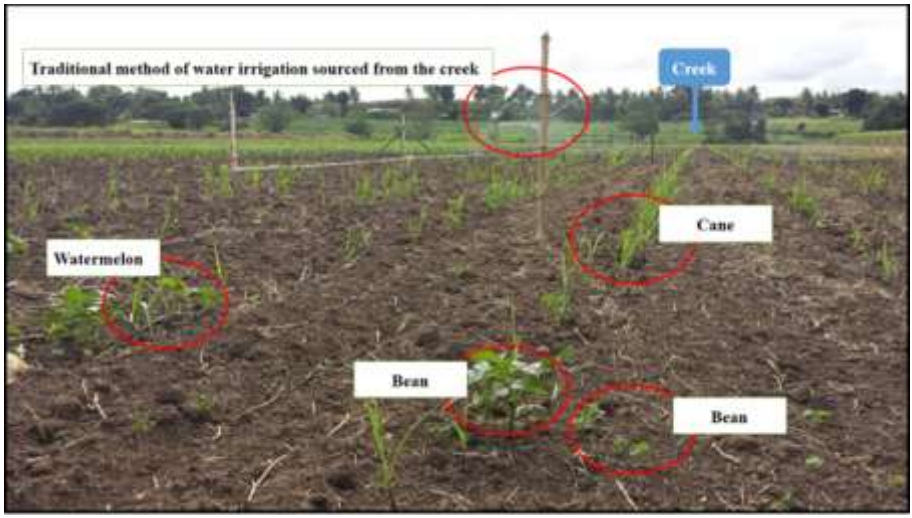

Figure 14: Lautoka farm
Source: Author

Such types of intercropping techniques serve various purposes for the farmers. Apart from cash-cropping, certain crops such as pigeon peas for example used in intercropping helps in improving soil fertility (Figure 15). Other plants such as neem *(Ficus religiosa)* reduced pest infestations. The decision to intercrop and the choice of the crops was found to be highly dependent on the advantages of the crop to the farmer and his farm.

Figure 15: Arhar (pigeon peas) planted around the borders of the field
Source: Author

3.3 Mechanization of sugarcane farms

The SAP established strategies for mechanizing the entire sugar industry in Fiji to improve efficiency in land preparation, harvesting, transportation, and milling. For this to happen, there needs to be increased incorporation of modern technologies and fossil fuels. In the long-term, this may place the farmers at financial risks, as the costs associated with mechanization has often been found to put it out of the reach of the poorest countries and people (Pretty, 2002), and Fiji and many of the smallholder sugarcane farmers in the country are not any different.

For land preparation, the Government is committed to accelerating the adoption of mechanized services by farmers, by improving their affordability and availability. This includes subsidizing the purchase of fertilizers, tractors, and other farming equipment for land preparation. The Government believes that procurement of technologies such as tractors for land preparation can affect the characteristics of farmer households, for instance by decreasing their reliance on outside laborers, and by helping to increase and support farming activities. This in turn leads to increased production of their crops and raises the incomes of smallholder sugarcane farmers. That is, the same tractor can be used for cultivating other crops as well as sugarcane.

To ease the challenges mainly arising from lack of sugarcane cutters in the industry to harvest the produce, mechanical harvesters have also been brought in. The shortage of sugarcane cutters is an annual problem faced by the farmers as many cutters are deterred by the insecurity of their employment. This insecurity is a result of the few months of employment in a sugarcane crop year mainly when sugarcane harvesting season takes place. Because of the lack of cutters left in the industry, the MoS and the FSC have been encouraging the procurement of mechanical harvesters that can be utilized on flat terrains where sugarcane cutters were not readily available (Figure 16). In Labasa, the mechanical harvesters charge somewhere FJ$25.00 to $35.00 for a ton which is somewhat reasonable but the machinery itself has its own disadvantages. For transportation and cartage, the SAP does not include a detailed plan for transport options but supports the FSC's investment in the 20 km zone prioritized for railway networks around each mill.

Figure 16: Mechanical harvester and billet truck ready to harvest the cane, Lautoka Farm
Source: Author

Farmer perspectives on mechanization of farms

At the time of research, some sugarcane producing areas in Fiji were found to be more modernized than others, and some sugarcane farms were more mechanized compared to other farms in the same region, but overall, in the Tavua, Rakiraki, Sigatoka and Seaqaqa areas, many farmers were found to be utilizing non-mechanized traditional practices for farming their sugarcane crops. The farmers informed that there could be many reasons for this difference in levels of mechanization, ranging from their financial position, cultural backgrounds, changing demographics, and environmental factors. Many of the farmers claimed that mechanization of the sugarcane agricultural system will not work because of the geographical topographies of farms in Fiji, whereby most farms are situated on undulating hills and steep terrains.

The 2009 data on the total number of land registrations for sugarcane illustrates that out of the total 114,022 land registrations, 71.5 percent (81,482 land registrations) ranged from undulating-hill to very steep lands (Figure 17). For this reasons, mechanization of the farms, especially the use of mechanical harvesters would prove impossible. Similarly, 20

percent of the total land registrations are for steep - very steep lands under sugarcane cultivation, therefore, the use of machinery such as tractors and mechanical harvesters would also be very difficult. In addition, the supply of technologies for land preparation for example, will lead them to be unevenly distributed across different locations of the sugarcane producing areas.

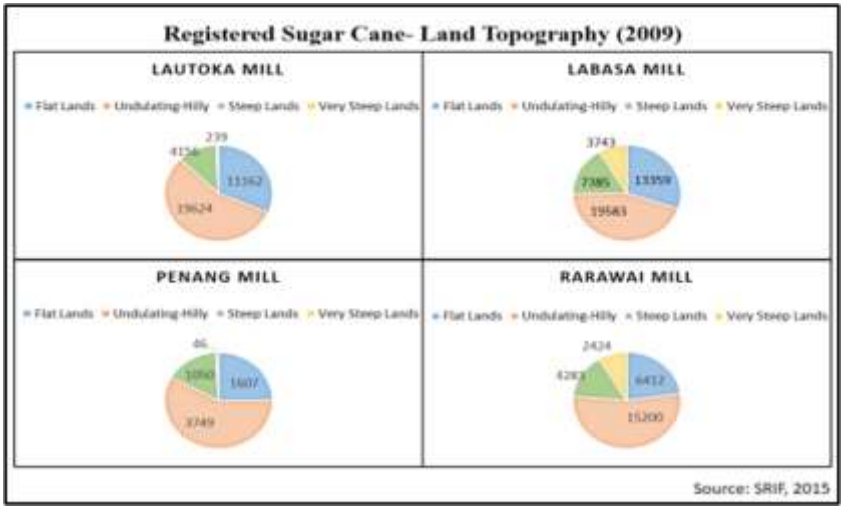

Figure 17: Differences in sugarcane producing areas

Even the sugarcane farmers faming on flat lands were not very keen in adopting new technologies. They were largely happy, at present, with the use of bullocks and their existing machinery, but were concerned about the cost of new machines. Farmers on undulating-hilly terrains who used only bullocks were found to prefer having labor-saving machinery, but they would have to be suitable for use on hilly terrains. They also have several concerns, including those related to the cost of fuel and maintenance of heavy machineries. For example, some harvesters have been found to be needing specific technical expertise from overseas for operating them, including their parts which has to be sourced from outside of the country as they are not locally available.

Other worries were found related to accessing of the equipment by the farmers and their gangs (collection of farmers from the same area, settlement, or village), and the terms and conditions for using them, which the farmers felt will be a cause for community dissolution. Their argument is that even if a 'machinery pool' system for example was to be introduced for accessing the machineries by the farmers, there remained systematic in-built gang politics whereby smaller and poor farmers within a gang will be neglected, and the first choice for equipment utilization would be taken up those farmers who have more power and influence in their gangs. Additionally, while the mechanized harvesting machines can increase the efficiency of harvesting, they also have their limitations. Farmers expanded on the advantages of using a harvester stating that it costs less and takes less time to harvest the produce. But on the other hand, it damages the crops and decreases their productivity. They also mentioned that one of the main disadvantages of the mechanical harvester is that it is not able to fully harvest all the produce, specifically the rows of sugarcanes along the edges of the farms, causing a loss of around 7-10 tons of the produce.

On different occasions, farmers have also demonstrated their dismay at the milling staff of the FSC who tend to favor those farmers who bring in sugarcane that have been harvested mechanically to the mills for processing. The FSCs position is that because the mechanically harvested sugarcanes are billeted, they must be given priority, as the billeted sugarcanes arrive at the mills in small pieces and have a larger surface area exposed, therefore their quality may be affected by any delay. The smallholder farmers' view is that the billeted sugarcanes are mostly brought in by farmers who are not smallholders but by farmers who are prosperous, in which case the priority given to mechanically harvested sugarcane prolongs the time that poorer smallholder farmers must wait at the mill before they can dump their harvests and return to their farms. As a result, the quality of the smallholders' sugarcane harvests is adversely affected.

In addition to this, the farmers are of the view that the SAP will need to re-strategize their plans to maintain the railways. Currently, the railway tracks only assist farmers who are closer and are in a 20 km radius of the mills. The problem is that if one moves beyond the 20 km zoning then

farmers tend to get less interested in intensifying because of the harvesting and transportation related costs, infrastructure problems, challenges related to sugarcane access roads and lastly the sugar price paid to the farmers. The farmers claim that those who live outside the 20 km radius of the mill are the most disadvantaged, as they incur high costs of transporting their produce. To mitigate excess costs related to the transportation of harvested sugarcanes, most farmers argue that the FSC should be taking up the burden of buying the produce from the farm gates. This according to them will lower the transportation costs massively.

Another concern of the farmers coalesces around the building and maintaining of the sugarcane access roads. The farmers pointed that it was the priority of the MoS to build and maintain the sugarcane access roads wherever sugarcane was grown, and the roads in those areas should be well maintained for the transportation of the harvests to the mills. The farmers were also conscious that over the three years (2012-2015), the Government was at times helpless of getting the works on the sugarcane access roads accomplished before the crushing season started because the Ministry could not find contractors who could deliver the service.

4. Conclusion

This paper has dealt with three main sugar industry interventions – intensification, diversification, and mechanization – that are found anchored in the SAP of 2012, the plan that is currently being implemented as part of a national-level industry reform to converting the sugar industry in Fiji as a viable industry for all its stakeholders. In diving deeper into their perspectives, the narrative that has developed in the paper firstly indicates that many of the decisions in the SAP have been made without the inclusion of the smallholder perspectives. The farmers feel ignored and discouraged by the lack of consultation by the stakeholders in crafting the SAP. They are also threatened by being forced to adopt modern methods of sugarcane farming that will disturb the agroecology of their farms, leading to further erosion of their traditional farming knowledge.

In re-visiting the theoretical framework in which the arguments of this paper are grounded, that is, putting the beneficiaries who are at the lower levels of hierarchy at the heart of rural development and providing them

space and voice into planning and policies, and by taking these into consideration, four key learning points has developed in this paper. Firstly, as we have seen from storying smallholder farmer perspectives on the interventions proposed in the SAP, the plans and policy processes tend to be complex, they are not linear or logical, and therefore require a comprehensive inputting from all stakeholders, irrespective of the shape and form they exist in. Secondly, successful deployment of interventions in the sugarcane producing areas of Fiji, especially in the rural interiors, require a nuanced understanding of the agendas of all stakeholders, both local and international, without compromising the voice of those farmers who would mostly be affected by developmental plans, interventions, and policies. Thirdly, communication and networking in the Fijian context are two major ingredients for influencing developmental plans and policy in the sugar industry. Lastly, efforts to give voice to the poor and the marginalized smallholder sugarcane farmers need to be well planned and implemented in a way to avoid inadvertently disempowering them.

To finally conclude, the study has aimed to give voice and promote downwards accountability to the smallholder sugarcane farmers who have lived experience of rural life, often engulfed by rural poverty and social contentions, by enabling them to articulate their views into plans and within policy processes. In sum, through storying, the study has made overt the views and responses of the farmers to the proposed interventions of intensification, diversification, and mechanization found in the SAP of 2012.

5. Notes

1. The FSC is responsible for the manufacture and sale of raw sugar, and molasses as a by-product of sugar. It owns and maintains some 720 km of railway track for the transportation of harvested sugarcanes to the mills and is engaged in developmental and project works through its subsidiaries and related companies, the FSC Project Ltd and Pacific Cogeneration Ltd.
2. The SRIF was established for promoting, by means of research and investigation, the technical advancement, efficiency, and productivity of sugar industry. It is the scientific research branch of the sugar industry in Fiji (SRIF, 2010) and is responsible for the development and

dissemination of technology and information for increasing productivity, profitability, and the sustainability of the Fijian sugar industry.

3. The SCGC was established under the Sugar Industry Act of 1984 to represent the interest of all sugarcane growers in Fiji. Its primary role is to protect and further the interests of all registered sugarcane farmers in the industry. Its main aim is to provide representation, leadership, and services to the cane growers so that they can secure long-term viability in an industry in which they are the largest stakeholders.
4. The SCGF was established by Act No. 9 of the Parliament of Fiji in 1984 as the successor to the earlier Cane Price Support Fund and the Stabilization Fund. The SCGF provides loans to sugarcane growers for the following purposes: (a) increasing production of sugarcane crop; (b) improving efficiency in planting, growing, harvesting and transportation of sugarcane; (c) work necessary or desirable to rehabilitate farms, buildings and other installations damaged, destroyed or affected by floods, cyclones, droughts or other natural disasters; (d) work necessary or desirable to establish sugarcane farms and to construct buildings and other installations on those farms; (e) work necessary for diversification; (f) for personal family needs of growers during periods of financial distress or hardship; and (g) enabling cane growers to participate in commercial ventures which are intended to benefit the cane growing industry.
5. The SPFL imports raw materials for fertilizer, and blends, packs, and distributes them to sugarcane growers and others in the local market. It was originally jointly owned by the FSC, SCGC and SCGF, but in 2009, the Government agreed to the FSC divesting from the SPFL and transferring its shares to the remaining shareholders. At present, the SCGF holds 95 percent of the shares and the SCGC the remaining 5 percent.
6. The Ministry of Sugar (MoS) of the Government of Fiji is responsible for coordinating the activities and functions of the various institutions that make up the sugarcane industry, for the planning, organizing, implementing and evaluation of various policies and programs that aim at boosting sugarcane production, and ensuring the timely, effective, and efficient delivery of services to relevant actors for a 'global, sustainable, vibrant, viable and competitive sugar industry'.

7. The aim of the MoA is to provide customer focused and market driven agriculture in the country. It does this by promoting agricultural activities to reduce poverty and the risks of food insecurity, and through the export of major agricultural products, such as copra, seafood, root crops and vegetables originating from the rural sectors of Fiji, such as the sugarcane producing areas, to contribute to the GDP of the country.
8. The CPAs are responsible for preserving and safeguarding the welfare of the sugarcane growers in their milling areas. They help farmer gangs and their members to develop their potentials to decide on their future through capacity building and adopting the best agricultural practices. The associations also facilitate fairer trading conditions for its members, alleviating poverty and strengthening producer's positions in agriculture.
9. The limitations of the forecast are that it is based on data from 1975-2011 and does not consider any events since 2011, such as negative environmental events, or subsidies/ incentives among others to produce more sugarcane crops, which may have resulted in increased sugar production. Therefore, any single event could have the capacity to change the forecast trend after 2015 (41). On the other hand, taking into consideration the solutions being implemented and the negative shocks that the industry has been absorbing since 2011, it can be argued that the previous data does accurately portray the forecast until 2015, and any further negative events after 2015 may not necessarily impact the trend significantly. This is because the years 2011 to 2015 have faced many negative events.

Disclaimer

This paper represents the views of the author and not that of his present or past employer(s).

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