



Contract sugarcane farming and farmers' incomes in the Lake Victoria basin, Kenya

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ABSTRACT

Objective: This paper reports on one of the findings of a study to establish the relationship between contract sugarcane farming, poverty and environmental management in the Lake Victoria basin.

Methodology: A social survey design was adopted. Primary data were collected using questionnaires from 37, 40 and 40 household heads representing sugarcane farmers from Lurambi, Koyonzo and Chemelil respectively. Data on farmer incomes were obtained from individual farmer payment statements. Descriptive statistics focussing on frequency distributions and step-wise backward regression were used to derive income models as platforms for future decision-making in sugarcane agri-business.

Results: Results from Lurambi, Koyonzo and Chemelil showed that on average farmers retained only 32, 31 and 34% respectively of the gross income from contract sugarcane farming. Although net income was influenced differently by conventional input costs, yield appears to be a key determinant of gross income across the sites. Net income was significantly depressed by company-driven deductions for which farmers had no control. Such skewed sharing of income, where the sugar companies retain at least 60% of the gross income raises sustainability concerns that need to be addressed through a participatory approach involving all key stakeholders.

Implications: To profit from contract sugarcane farming, farmers need to at least double their current mean yields per unit area, assuming that available land devoted to sugarcane excluding land for subsistence farming is at least 5 acres. Where this option is not possible, farmers should be encouraged to diversify their livelihoods to other cash crops through sustainable intensive systems. A more pro-active extension service involving the farmers, companies and ministry of agriculture will be required.

Key words: Contract sugarcane farming, Livelihoods, Western Kenya

INTRODUCTION

Of the key industrial crops grown in Kenya, contract sugarcane farming has put more land into agriculture than the rest. While it was hoped that sugarcane farming would raise farmers' incomes and somehow help reduce poverty, Western and Nyanza provinces are still among the poorest regions in Kenya. For instance out of a population of about 4.3 million people in western province, about 1.8 million are considered poor. On the other

hand, with a population of about 5.4 million, Nyanza province has an estimated rural poor population of 2.4 million people (Kenya National Bureau of Statistics, 2010). Stockbridge (2007) noted that a shift from food crop production to high valued crops like sugarcane can make it harder for women to fulfil their traditional responsibilities because cash crop production often reduces the amount of land available to women for producing

food crops. Further, the additional labour demands for cash crop production may reduce the amount of time women have for subsistence farming and or alternative income generation options. An equitable approach to labour specialization at the farm between men and women could help address this dilemma.

Whilst the revenues from high value cash crops like sugarcane should be more than sufficient to meet the household's basic needs and nutritional requirements, this does not always happen. Reasons for this as summarized by Stockbridge (2007) include the following: (i) Men tend to control the revenues from cash crop production and have different spending priorities from those of women. This can lead to the neglect of women and children and their nutritional needs and to increased spending on alcohol, cigarettes, and other socially less desirable expenditures. (ii) Ensuring that the benefits of household production are shared equitably between members of the household requires new culturally endorsed gender roles and forms of intra-household cooperation; coincidentally these are now captured in the spirit of the 2010 constitution of Kenya, and (iii) Volatility in the output and prices of sugarcane can threaten revenues in unfavourable years and hence the purchasing power needed to buy food. Surprisingly, studies in Sub-Saharan Africa and elsewhere show that the shift from subsistence crops to the production of cash crops has sometimes been linked to an increase in pre-school malnutrition rates (von Braun and Kennedy, 1986). The current research examined determinants of net income in sugarcane farming and also the disparity in net earnings between the companies and farmers in three different sugar belts in western Kenya.

In comparison to the companies' earnings, farmers' incomes are in practice lower because

only the companies benefit from other by-products of sugar processing such as co-generation, sale of molasses, and energy savings through the use of *bagasse* in boilers. This disparity in income distribution appears to be one of the key contributors of poverty among sugarcane farmers, who incidentally find it psychologically difficult to diversify to other potentially viable crops (Waswa et al, 2009a). Farmers' responses on what needs to be done to reverse this trend suggests that the companies need to be more empathetic and shift their ethos from profiteering *per se* to equitable distribution of income with the farmers. While corporate social responsibility (CSR) on the part of the companies may help address this problem, much should not be expected because CSR is voluntary and not a legal obligation (Waswa et al., 2009b).

To date, nine sugar processing factories are officially recognised by the Kenya Sugar Board. Of these, four (i.e. Nzoia, Sony, Muhoroni and Chemelil) are run as public corporations. The other five (i.e. Mumias, Kibos, Butali, Soin, and West Kenya) are private companies (<http://www.kenyasugar.co.ke/>). Total area under sugarcane seems to be increasing among sugar mills run as public corporations. In both management regimes, mean yield seem to be declining. Prices per ton of sugarcane have continued to marginally increase in both cases (Tables 1 and 2). However, high prices per ton of sugarcane delivered do not necessarily translate into more net income to farmers as deductions by companies often vary in nature and amounts. Although Mumias is the biggest and perhaps the most successful sugar processing company, its price per ton of cane delivered seems to undermine its status when compared to the other millers.

Table 1: Comparison of Sugarcane prices per ton among public corporations (2009-2011)

Period	Total area under cane (ha)			Mean yield/ha			Price/ton of sugarcane		
	2009	2010	2011	2009	2010	2011	2009	2010	2011
Nzoia	23,257	25,574	26,234	71.97	71.97	75.09	2,088	2,400	3,800
Sony	16,789	16,765	16,976	82.80	82.54	71.93	2,085	2,385	3,500
Muhoroni	13,838	13,551	14,190	68.08	63.66	48.53	2,132	2,450	4,000
Chemelil	14,131	15,588	16,962	53.57	55.74	48.72	2,923	3,360	4,300

Source: Kenya Sugar Board (KSB); Price in Kenya shillings (KES); 1 USD = KES 80

Table 2: Comparison of Sugarcane prices per ton among private millers (2009-2011)

Period	Total area under cane (ha)			Mean yield/ha			Price/ton of sugarcane		
	2009	2010	2011	2009	2010	2011	2009	2010	2011
Mumias	57,393	56,926	52,530	69.71	63.00	64.89	2,153	2,475	4,186
Kibos	3,322	3,992	4,377	61.51	64.95	60.51	2,175	2,500	4,300
Butali	NA	NA	17,379	NA	NA	57.17	2,132	2,450	4,000
Soin	3,986	1,300	1,351	80.76	82.47	46.96	2,197	2,525	4,350
West-Kenya	18,512	19,720	23,254	NA	NA	NA	2,923	3,360	4,300

Source: Kenya Sugar Board (KSB). NA: Data was not available. (Price in Kenya shillings (KES); 1 USD = KES 80

Renewed growth in African agriculture will require financially sustainable intensification of existing cropland, since most of the high-potential farmland in Africa is already under production. High value cash crops represent one potential avenue of crop intensification. Evidence from other parts of Africa shows that processes of agricultural intensification and productivity growth are often driven by cash crops featuring the development of interlocked credit, input, and output markets (von Braun and Kennedy 1994). Sugarcane is one such valued cash crop as noted by Stockbridge (2007). Using analytical insights from the New Institutional Economics literature, Dorward, *et al.*, (1998) have shown that export-oriented cash crops such as sugarcane may serve to stimulate smallholder crop productivity and income growth, provided that ubiquitous credit market failures can be overcome through institutional innovations in farmer/marketing agent relationships. Economists have long advocated cash crop production as part of a broader strategy of

comparative advantage. The underlying premise is that markets allow households to increase their incomes by producing that which provides the highest returns to land and labour, and then use the cash to buy household consumption items, rather than be constrained to produce all the various goods that the household needs to consume (Timmer 1997; Pingali 1997). While this concept of comparative advantage is well accepted under the assumption of well-functioning markets, the process of commercialization involving non-food cash crops is impeded by risks and high costs in the food marketing system. Market failures give rise to the well-known non-separability of household production and consumption decisions, which account for the potential breakdown of agricultural commercialization strategies based on comparative advantage. The current research reveals such bottlenecks in the market chain involving sugarcane farmers and contracting factories in the three research sites in Western Kenya.

METHODOLOGY

Field surveys were done in the three sites (Lurambi, Koyonzo and Chemelil) (Figure 1) between 2008 and

2009 using social approaches as described by Neeman (1994) and Fink (2003).

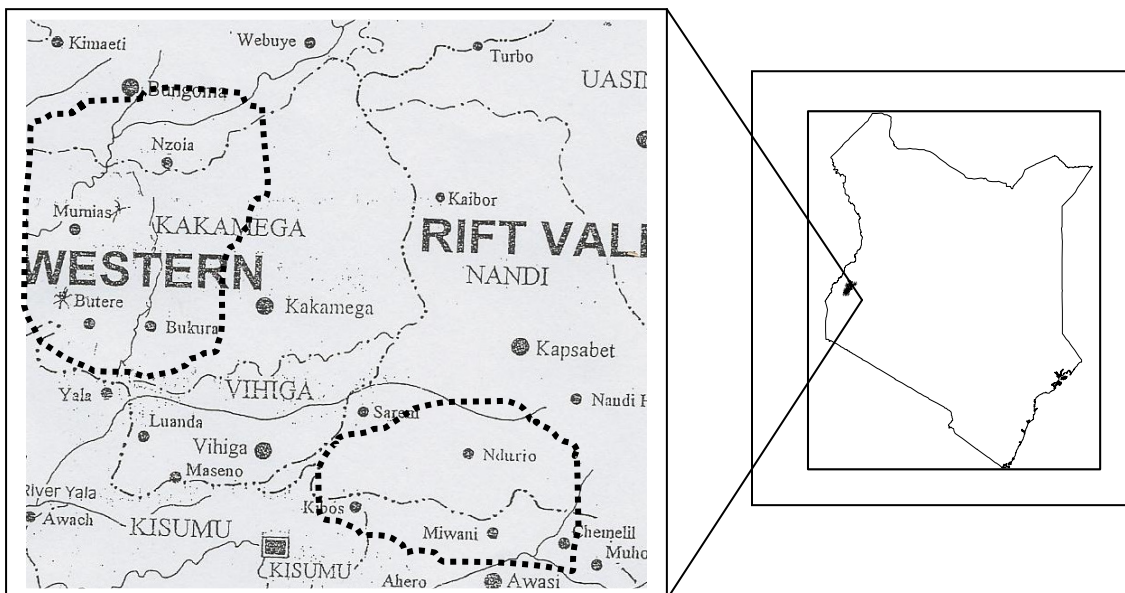


Figure 1: Dotted lines represent the location of study areas (Not to scale)

The three sites lie in the medium to high potential agricultural zones and are suitable for crops like sugarcane, staple cereals and legumes (Jaetzold et al., 2005). Researcher-administered questionnaires were used to obtain data from individual sugarcane farmers. Interviews were used to obtain data from key informants. Discussions in workshops were used to cross-check the validity of responses. These workshops were also used as initial dissemination forum of the research findings. Secondary data were

obtained from individual farmer payment statements. Descriptive statistics using SPSS was used to compare the key variables in terms of means, ranges, modes, and frequency distribution. Step-wise backward regression was used to select the variables that had the greatest influence on net-income. The selected variables were used to model net income so as to form the basis for decision-making on potentially farmer-friendly sugarcane farming.

RESULTS AND DISCUSSION

Benefits from Sugarcane Farming: Overall, most farmers engage in sugarcane farming to raise income for the education of their children, acquisition of additional property notably land and construction of

descent family shelters now that thatching grass has been eliminated though conversion of land to farming (Figure 2).

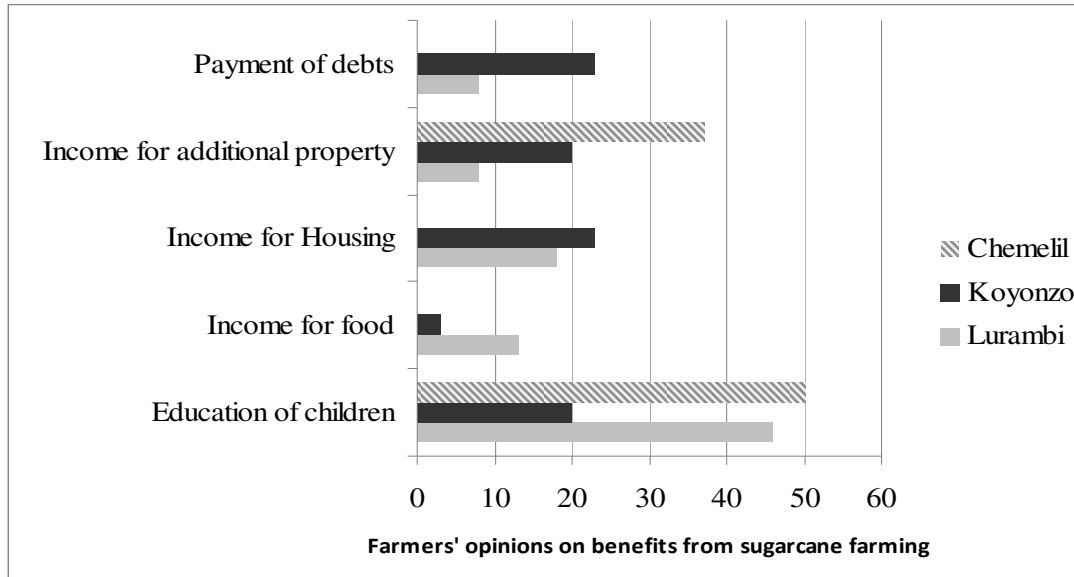


Figure 2: Farmers' opinions on the benefits from sugarcane farming (qualitatively estimated by what farmers spend their money on)

Site-specific differences in the benefits are also a reflection of differences in felt needs, general community cultural orientations and education levels. Such differences should provide unique entry points for decision-making in poverty alleviation endeavours. For instance many farmers earn their income only to exhaust it on re-payment of debts accrued during the more than 24 months of waiting to harvest the sugarcane. The dynamics of this scenario involves exploitative arrangements between poor farmers and money lenders who end up taking advantage of farmers' ignorance. Repayment of debts reduces the farmers' propensity to buy and or grow food for their own subsistence, hence the persistent food insecurity and malnutrition.

Challenges associated with Contract Sugarcane Farming: Overall, a comparison of farmers' income statements showed that their net incomes were 32, 31 and 34% of the gross incomes for Lurambi, Koyonzo

and Chemelil, respectively. By extension the companies retained at least 60% of the gross income per unit ton of sugarcane delivered. Such disparities in income distribution point to ethical, managerial and political factors that need to be addressed. This disparity is also reflected in farmers' opinions on the problems associated with sugarcane farming (Figure 3). It is widely acknowledged that low economic returns, high costs of inputs, poor road infrastructure and delayed responses to cane fires are directly controlled by the company couple to significantly depress farmers' incomes. Conventionally, farmers only receive cheques with depressing income figures and have no idea on the reasons that informed recorded yields and high costs of company-controlled inputs, which are ultimately used to determine farmers' net incomes. Such income disparities will continue for lack of strong farmers' institutions and sugar processing competitors within specific sugar belts.

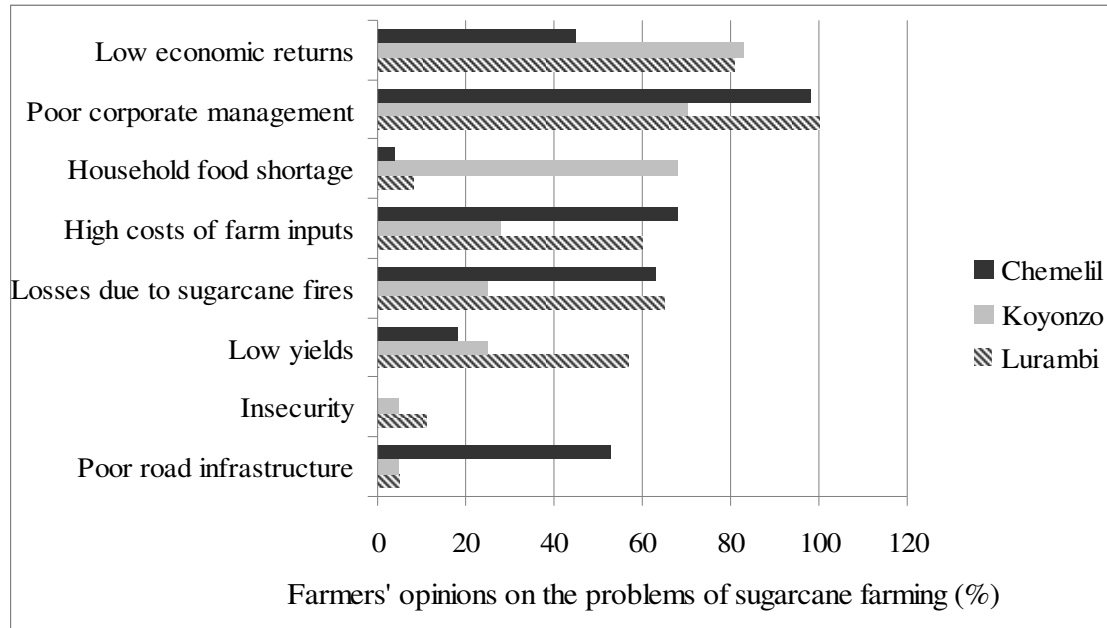


Figure 3: Respondents' opinion on problems associated with sugarcane farming.

In all the sites, farmers attributed depressed earnings to company-related factors such as excessive deductions from the gross income by the company. Differences in what farmers perceived as problems in the three sites are a reflection of the different management regimes and culture of the farming communities in those areas. For instance, Mumias sugar company seems to have invested well in infrastructure (Lurambi and Koyonzo) compared to Chemelil, which however seem to pay

farmers better. The situation in Chemelil may be attributed to farmers having a wider market in Nyanza than in Lurambi and Koyonzo, where Mumias is the main buyer of the sugarcane based on pre-signed contracts. This scenario in Mumias allows monopolistic tendencies that work in favour of the company and at the expense of farmers. The main income depressors across the sites were transport, seedcane, fertiliser and harvesting costs (Table 3).

Table 3: Descriptive statistics on the determinants of net income in sugarcane farming

Net income determinant	Mean Statistics		
	Lurambi	Koyonzo	Chemelil
Land area (ha)	1.91	0.69	2.52
Tillage costs (KES)	9,786.03	5,449.39	64,915.36
Survey costs (KES)	230.00	242.09	-
Seedcane costs (KES)	19,580.26	12,921.75	51,416.13
Harvest costs (KES)	17,872.49	9,753.35	32,286.74
Transport costs (KES)	39,110.03	20,019.83	109,355.10
Fertilisers costs (KES)	15,419.74	8,633.67	60,460.53
Yield (tons/ha)	50.58	86.68	87.51
Education of respondent (Years)*	10.74	5.56	12.00
Gross income (KES)	153,142.80	88,013.00	551,346.15
Net income (KES)	51,422.11	27,385.14	227,018.64
Net as % of Gross	32.25	31.12	38.94
Est. Net income per hectare (KES)	26,922.57	39,688.61	90,086.76

1 ton = 1000 kg; All costs are in Kenya shillings (KES); Prevailing exchange rate was 1 KES: US\$ 80;

* Education based on 8-4-4 system

Licensing more millers would reduce monopolistic tendencies and thus allow farmers to choose where to sell their crop and thus provide them with a platform to negotiate with respective factories as mutually interdependent partners. Currently, sugarcane companies have absolute control of the procurement and supply of key inputs to farmers like fertilisers, tillage operations, harvesting and transportation costs. As such, they determine the costs, which often tend to be higher than the normal retail prices on the market. For instance one bag of DAP on the market costs KES 2,500 and 4,000 (subsidized and non-subsidized respectively). When supplied by the company, farmers pay KES 6,700, which is almost double the cost.

The ultimate remedy for this situation is to empower farmers to procure their own inputs from the liberalised market. For instance tillage operations can be done using draft animal power, while harvesting can be done using local labour available from many unemployed youth. In Thailand for instance, human labour takes 45% of production costs (Sundara, 1998). Since input costs tend to be the same per unit area, the apparent low costs among Koyonzo farmers is attributed to their closer proximity to the factory, which translates into low transportation and spillage costs. In comparison Lurambi is more than 25 km away. However, transportation cost is not entirely dependent on bulk of sugarcane and distance from factory.

Chetthamrongchai et al., (2001) reporting on transportation challenges of sugarcane in Thailand observed that most hired trucks queue at the factory for many days since most cane is harvested and delivered at the same time thus outstretching the capacity the factories can handle at a given time. Ironically, the delay of the trucks at the factory is charged on farmers by middlemen.

Site Specific Net income Models: All the variables measured in Lurambi have a significant effect on net income, and combined they accounted for 99% of the changes in net income (Table 4). There is a direct positive correlation between gross income and net income. The rest of the factors captured by the model resulted into a decrease in income. For example an increase of gross income by one shilling results in an increase in net income by 0.96 shillings. On the other hand, increasing transport costs seem to have the greatest reduction in net income. This is explained by the long distance between Lurambi and the factory (at least 20 km). The effects of seedcane and tillage costs are the most variable since they have the highest standard errors. In practical terms, seedcane and tillage costs are subject to much manipulation and thus are likely to vary more than other input costs. Since farmers do not have much say when it comes to procurement of farm inputs, yield maximization per unit area would be their single most important income booster.

Table 4: Final net income prediction model for Lurambi, Mumias

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	-410.215	498.235		-0.823	0.417
Gross income (GI)	0.957	0.018	2.730	52.784	0.000
Transport cost (TC)	-0.978	0.042	-0.825	-23.557	0.000
Fertiliser cost (FC)	-0.864	0.087	-0.216	-9.951	0.000
Harvest cost (HC)	-0.928	0.074	-0.331	-12.579	0.000
Seedcane cost (SC)	-0.929	0.115	-0.316	-8.067	0.000
Tillage cost (TC)	-0.851	0.111	-0.114	-7.666	0.000
Final regression model (y = mx + c)	Net Income = -410.22 + 0.96GI-0.98TC-0.86FC-0.93HC-0.93SC-0.85TC (R ² = 0.99)				

Model excluded the yield.

In Koyonzo, higher yields resulted in higher net income. An increase in gross income, on the other hand, did not result in a corresponding increase in the net income (Table 5). As such there is a possibility that other costs

that were not considered in Koyonzo depressed the net income.

Table 5: Final Net income prediction model – Koyonzo, Mumias

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	3621.825	3802.942		0.952	0.349
Tillage cost (TC)	-3.384	0.575	-0.456	-5.889	0.000
Yield in tons/ha (TD)	341.105	50.717	0.542	6.726	0.000
Gross income (GI)	0.254	0.039	0.584	6.461	0.000
Final regression model ($y = mx + c$)	Net Income = 3621.83 – 3.38TC + 341.11 YD + 0.25 GI; $R^2 = 0.84$				

The lower R^2 for this model, compared to the Lurambi model suggests that inclusion of more variables in the study would reveal more meaningful effects. Yield maximization remains the single most important pathway to profitable farming. Streamlining fertiliser procurement and outsourcing alternative suppliers are options that could be pursued. Ultimately, farmers should be in control of their input supply chains to avoid

cost distortions when the process is left to brokers and the profit-oriented companies. The trend in Chemelil closely resembles that in Lurambi. Yield had an overwhelming effect on the net income compared to other factors (Table 6). This suggests that although an increase in the cost of farm inputs would depress the net income, any increase in yield would result in increased income.

Table 6: Final net income prediction model output – Chemelil, Nyando Sugar Belt

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	-582.258	329.190		-1.769	0.088
Yield in tons per ha	2508.070	9.134	1.959	274.585	0.000
Transport cost (TC)	-1.006	0.005	-0.393	-191.936	0.000
Seedcane cost (SC)	-1.018	0.009	-0.208	-112.132	0.000
Fertiliser cost (FC)	-1.002	0.005	-0.255	-189.277	0.000
Tillage cost (TC)	-0.980	0.012	-0.216	-79.342	0.000
Harvest cost (HC)	-1.392	0.066	-0.160	-21.041	0.000
Final regression model ($y=mx + c$)	Net income = -582.26 + 2508.07YD – 1.01TC – 1.02SC – 0.98TC – 1.39HC; $R^2 = 1$				

The above outcome also indicates that inherent variability in the land system leads to variation in its potential productivity. As a result, the input-output relationships driving the production system (Tables 4, 5, 6) usually vary, over distances of only a few metres (Bramley et al., 2001; McBratney and Whelan, 1997; 2001). Thus, there is need to consider better production approaches such as the adoption of precision agriculture that aims at maximising economic yield per unit of production inputs. Further, while inputs in Kenya's sugarcane farming are often taken to infer fertilisers and seedcane, they also include irrigation water, labour and the timing of operations such as

harvesting, which should be carefully managed in pursuit of better profits.

Farmers' Opinions on how to make sugarcane farming more profitable: Since farmers are generally rational in decision-making on land use and livelihood dynamics, inclusion of their suggestions in this study is meant to provide policy makers with insights on non-quantitative variables that are easily ignored, yet could play significant roles in enhancing income generation and poverty alleviation at the farm level. In all the three sites, all the farmers interviewed (100%) indicated the need for improved factory management (farmer-centred) as critical in enhancing their incomes (Figure 4). Some aspects in this regard included: honest farmer

representation and involvement in decision-making at the factory management level, companies to provide credit facilities to farmers, insuring farmers against sugarcane fires, abolition of the 15% statutory deductions, more transparency when it comes to

farmers' records, and reduction of spillage and wastage during transportation. Since all these options would depress company incomes, their implementation would need a combination of incentives and coercion from government.

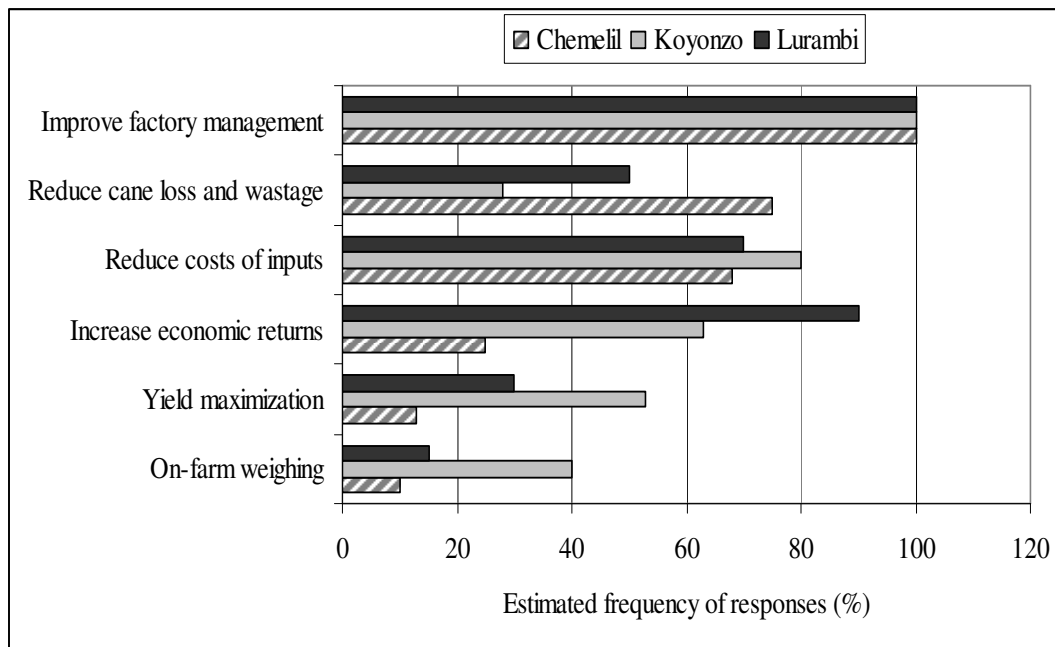


Figure 4: Farmers opinions on how to make sugarcane farming more profitable

Other areas farmers thought needed attention were: the need for clear registration of shares, prompt payments, removal of joint contracts, enhancing appraisal alternatives, better payment per tonnage, accuracy of tonnage at the weighbridge, and paying farmers for sugarcane by-products. Accuracy of tonnage can be guaranteed through on-farm weighing in order to phase-out corruption that farmers thought was rife at factory-based weigh bridges. This however also calls for the use of accurate and standardized weighing bridges. For yield maximization, farmers suggested the need to re-invigorate the agricultural extension service and establishment of field schools to promote better

cane husbandry practices. This option including concomitant payments could work through strategic partnership between the companies and the government extension service. All these options need pro-active backing from government in the spirit of equitable social development as stipulated in Kenya's Vision 2030 and Kenya's 2010 Constitution (Republic of Kenya, 2010). This would include the need to have more accountable management for factories, dynamic and functional farmer associations, strategic partnership between farmer associations and civil society, and de-monopolising commercial sugarcane farming by easing entrance of new competitors.

CONCLUSIONS AND RECOMMENDATIONS

Income distribution between companies and farmers is heavily skewed in favour of the companies and at the expense of farmers. This distribution is mainly effected through cost deductions for which farmers have no control and no idea on the rationalization process. Although such disparities raise concerns that call for further investigations, government intervention through

legalising corporate social responsibility and strong farmer institutions can yield desirable benefits in the short and medium term. Sugar processing companies have absolute control on the procuring, costing and supply of inputs to farmers. To reduce the cost burden on farmers, they should not be compelled to receive inputs from the company. Through strong farmer

institutions, farmers can procure their own seedcane, tillage services, fertiliser and harvesting services at negotiated rates from private service providers. For farmers who must continue with contract sugarcane farming, doubling current yields would be key in bettering income in the short and medium term. This option will however be constrained by unaffordable inputs, declining land sizes due to pressure to accommodate non-farming functions imposed by increasing population, and due to limited extension services for reasons that are beyond their reach. The single most important option left for small-scale

sugarcane farmers is intensive sustainable agriculture through crop diversification. Incidentally, farmers are reluctant to adopt this option despite their being aware that engaging in sugarcane farming on uneconomical plots sizes has neither improved their incomes nor reduced poverty as expected. This calls for changes in attitude on part of the farmers in favour of other livelihood options. Persistent and concerted efforts from multiple stakeholders within the broad theme of agricultural development and community empowerment are needed for such a socio-cultural process.

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