



An Evaluation of the Characteristics of Sugarcane Transportation in Western Kenya

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ABSTRACT

Worldwide, sugarcane is the major raw material used in the production of domestic sugar. It accounts for 80% of the sugar consumed. Kakamega and Bungoma Counties account for about 80% of the locally processed sugar. There is evidence of increased investment in the industry as characterized by growth in the number of millers across the country. Information about this growth and challenges on sugarcane transportation is scanty to enable policy makers in making informed decisions on improving efficiency in the sub sector. The study is guided by the objective to evaluate the characteristics of sugarcane transportation in western Kenya sugar belt region. Descriptive survey was carried out to achieve the study objective. The study tool was a pretested orally administered structured questionnaire with questions testing the following variables: characteristics of sugarcane transportation, prevalent livelihoods and strategies that can improve livelihoods. The study involved 384 respondents. Purposive, stratified and simple random sampling were used in determining respondents that were used in the study. Data was analysed using Excel and Statistical Package for Social Scientists (a computer programmes). Presentation was done in tables, graphs and pie charts. Research questions were subjected to Pearson Correlation and Regression coefficients to ascertain their significance. The study revealed that sugarcane transportation may have resulted in wide road network (32%) and improved access to the farms (68%). Tractors is the main means of transportation for sugarcane (67%) in the region. In conclusion, most of the cane growing farms are owned and operated by individual families. It was established that transportation cost was high in the region, which was attributed to poor road networks and frustration from millers. The study recommends improvements on the state of road network; there is need for creating right institutions and mechanisms to carry out road maintenance in the sugar belts of Kenya. The study recommends future research on poor road networks traversing western region sugar belts.

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1.1 Introduction

Eighty percent of the world's sugar production comes from sugarcane and the three big producers are: Brazil, India, and European Union (EU) producing 20.3 million metric tonnes (MT), 19.9 million MT and 15.5 million MT in 2003 respectively (Bisaria & Kondo, 2014). Sugar is produced in more than 100 countries around the world (Clay, 2013; Manyasi & Omusotsi, 2014). It can be grown in any country in the tropics. It is a perennial crop with an economic life usually of one plant crop and three ratoon crops. Apart from sugar, jaggery and by-products such as molasses and bagasse are also produced from the crop (KESREF, 2004). To transport sugarcane from fields to factories, trains, tractors, lorries and trailers are used for the haulage.

Transportation is an essential element of the production and distribution chain of sugarcane. Delays in transportation are of serious concern since they affect production costs, which are eventually reflected in the consumer price. Sugarcane transportation process involves a variety of transportation modes such as road and rail networks.

Australia and Brazil have railway systems that connects sugar mills to the surrounding areas where sugarcane is grown (Pernase & Pekol, 2012). Rail transport accounts for only 2.3% of South African cane and a small amount of Zimbabwe cane. Road Transport Network is predominantly used to transport sugarcane from farms to factories. In this sense, sugar cane transport from the farming site to the factory is an important step in the industrial process and it justifies a study concerning the optimization of truck fleet operations. Increased milling capacity had led to increased distances over which the sugarcane had to be transported, in some cases to over 100 kilometres. In road transport, sugarcane haulage trailers are manufactured for the bulk transportation of loose sugarcane.

The sugar industry in Kenya dates back to 1922, which up to date supports over 6 million Kenyans (KSB, 2008). Sugarcane growing is a major source of income to over 150,000 shareholders. High transport costs affect sugarcane growers and influence negatively on local and national development.

Kenya has serious transportation hitches with regards to localised road networks traversing sugar belts in western region. Poor roads in most sugar belts and rising prices of petroleum products have been majorly blamed for the slow development (KENFAP, 2006; Otti, 2016). Over the last eight years, the average production level has been 430,000 MT against an average domestic demand of 625,000 MT per year (KSB, 2008). In addition, there have been challenges affecting sugarcane transportation which includes: erratic weather patterns, poor road infrastructure, fuel siphoning and cane poaching.

The Kenyan sugarcane industry is a major employer and contributor to the national economy (KENFAP, 2006). Sugarcane is one of the most important crops in the economy alongside tea, coffee, horticulture and maize. The survival of small towns and market places is also dependent on the incomes from the same. The industry is intricately weaved into the rural economies of most areas in western Kenya. Besides the socio-economic contributions, the industry also provides raw materials for other industries such as bagasse for power co-generation and molasses for a wide range of industrial products including ethanol (Domac *et al.*, 2005). Molasses is also a key ingredient in the manufacturing of various industrial products such as beverages, confectionery and pharmaceuticals. The sugar industry in Kenya is the source of livelihood to 6 million people and employed about 500,000, but it faces myriads of problems plus challenges including stiffest competition from low cost producers (KSB, 2011).

Sugarcane being the main cash crop grown in Western Kenya, has a horde of challenges associated with the crops, which reduce the income potential from the crop (Waswa *et al.*, 2012). Most of the cane growing farms are owned and operated by individual families. Nevertheless, transportation expenditure is very high in the region. Moreover, road network is not up to standard thus making most areas inaccessible. Pests (termites and white grub) and diseases (ratoon stunting and smut) attack the plants and lower the yields leading to low income for the farmers. Accidental fires or fire set by arsonists destroy the cane resulting in heavy losses to the farmers. Delays in harvesting reduce the quality on tonnage of the cane reducing the farmer's earnings. Delays in disbursing payments to farmers by the sugar companies reduce the farmers' morale and reduce their capacity in carrying out extensive farming. The study aimed at establishing the strategies that would be used to improve livelihood of the sugarcane farmers in the study areas of Bungoma and Kakamega Counties. Some of the thematic area the study emphasised were as follows: quality of roads, types of vehicles, features of livelihood and strength in the livelihood.

1.2 Statement of the Problem

The sugar industry is a major contributor to the agricultural sector, which is the mainstay of the economy and supports livelihoods of at least 25% of the Kenyan population. The subsector accounts for about 15% of the agricultural Gross Domestic Product (GDP). It is the dominant employer and source of livelihoods for most of the households in Western Kenya. Currently, the industry is facing several challenges including capacity underutilization, lack of regular factory maintenance, poor transportation infrastructure and weak corporate governance. Road transport is used to deliver the raw material to factories making sugarcane transportation a major source of livelihood in the

region's sugar belts. However, in the process of delivering the raw material, the industry still faces same challenges despite the fact that the government allocates huge sums of money on infrastructure development. There is evidence of increased investment in the industry as characterized by growth in the number of millers across the country. Information about this growth and challenges on sugarcane transportation is scanty to enable policy makers in making informed decisions on improving efficiency in the sub sector. The study's objective thus sought to evaluate strategies for improving of livelihoods in the sugar belt regions of Kakamega County and Bungoma County. The study aimed at establishing viable strategies to address these shortcomings in the sugar belt zones.

1.3 Justification of the Study

The current mission of the sugar industry in Kenya is to facilitate a multi-product sugarcane industry that is efficient, diversified and globally competitive. This is to be realized by enhancing industry's competitiveness through cost reduction strategies and efficiency improvements, expanding product base, improving infrastructure and strengthening the regulatory framework. Evaluating strategies for improving livelihoods of people living in sugar belts has a potential of reducing the socio-economic burden due to negative effects subjected to the sector in the area of study. Sugarcane transportation in the sugar belt regions of Kakamega and Bungoma Counties have been undergoing a lot of challenges - poor road networks, overpriced transportation by the third party and delays to pay farmers their dues in time. The study thus intended to establish strategies that would be pursued to address the livelihood challenges in the sugar belt regions of Kakamega County and Bungoma County in Western Kenya.

2.0 Research methodology

The study was carried out in Kakamega and Bungoma Counties of Western Kenya. The area lies within 0.19° N, 34.0° E and 0.19° N, 34.16° E with an elevation of 1,850 M above sea level. The major towns are Kakamega and Bungoma but with smaller ones like Webuye, Chwele, Kimilili, Kapsokwony, Mumias, Butere, Malava and Lumakanda. The study area has an estimated population of 3,301,585 according to (Census, 2009). The poverty level stands at 52.1% compared to the national average of 47.2% (World Bank, 2012). The study site has a bimodal rainfall pattern that run between March and July, then August to October ranging between 1000 mm – 2000 mm per annum. The average land holding capacity is 1.5 acres per family. The temperatures range between 18° C and 29° C. The early months of the year and November are the hottest months with other months having relatively lower similar temperature. The area is host to one of the five major river towers in the country, Mount Elgon. Major rivers running through are Rivers Nzoia, Isukhu, Yala and Lusumu. The main cash crop is sugarcane although maize, tobacco, cotton, tea and coffee are also grown. There are four sugar factories in the study area and they account for 80% of the locally produced sugar - Mumias, West Kenya, Butali and Nzoia Sugar Companies (KSB, 2006). Kenya –Uganda railway passes through the area. It contributes significantly to the area's economy although transport is mainly by road (Census, 2009).

The study's target population was adults residing in Mumias, Nzoia, West Kenya and Butali Sugar belts. Respondents were chosen because they are the most affected in terms of choice and decision making on the effect on livelihood as results sugarcane cultivation and transportation. The study adopted a descriptive survey research design.

It was carried out to determine the influence of sugarcane livelihood among the people of Kakamega and Bungoma Counties. Purposive sampling was used to select the area of the study. The area was divided into sixteen regions based on the geographical locations, which were existing districts as of 2009. The study worked with six districts namely Mumias, Kakamega North, Bungoma South, Bungoma Central, Bungoma East and Kakamega Central. Mumias, Bungoma South and Kakamega North have sugar factories while Kakamega Central and Bungoma Central are county headquarters. Stratum and simple random sampling were used to obtain sample size for famers in the two counties. The sample size required was determined using the standard formula (Andrew Fisher's method, 1994) at 95% confidence level and sampling error of 5%. The target population was more than 10,000.

$$N = \frac{Z^2 (p.q)}{e^2}$$

Where:

N= the required sample size when target population is greater than 10, 000.

Z= the standard normal deviate at the required confidence level set at 1.96

P= the proportion in the target population estimated to have the characteristics being measured.

q = the possibility of failure

q = p-1

e = the level of statistical significance set, 0.05 in this case.

Since p is unknown, we take 50% (0.50).

$$n = \frac{(1.96)^2 (1-0.50) (0.50)}{(0.50)^2}$$

N=384, the minimum number of respondents were interviewed in the study.

3.0 Results and Discussion

This section provides study findings and discussion

3.1 Characteristics of Sugarcane Transportation System

Sugarcane crop cultivation has been important to Kenyan economy since 1922. Quick transportation of sugar from the farm to the factory is of utmost importance. Challenges facing sugarcane growers in Kenya are cheap sugar imports that hampers local markets, high cost of farm inputs, poor management of sugar factories leading to delayed and low payments, delay in harvesting of sugarcane and poor feeder road networks connecting the farmer to the factory. The study aimed at transportation network and their influence to livelihoods of the famers in Bungoma and Kakamega counties.

3.1.1 Sugarcane Transportation Facilities

The study sought to determine how availability of sugarcane transporting in Kakamega and Bungoma Counties.

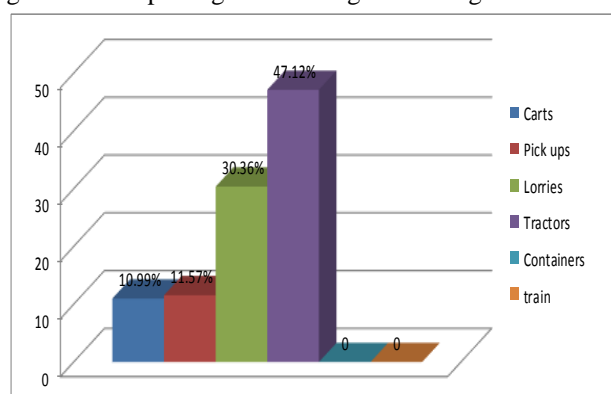


Figure 3.1. Type of Sugarcane Transportation.

Farmers encounter with sugarcane transportation vessels were variable to determine the level to which availability of transportation facilities influenced sugarcane farming. The findings are indicated in Figure 3.1

Tractors were the most available means of sugarcane transportation and had a great influence on sugarcane transportation for both Bungoma and Kakamega Counties. These findings have mirrored those of Davis and Archary (2006) on sugarcane transportation in South Africa where tractors are the most common means of transporting sugarcane. Trailer vehicles (Lorries) have started getting mileage on transportation of sugarcane from far distance to the processing industries as shown in Figure 3.1. The dynamics of sugarcane transportation is changing drastically as competition on sugarcane increases. The road network in both Kakamega and Bungoma Counties, is mostly marrum. "Major type of road network in our sugar zones include; marrum, graded and feeder roads," alluded the transportation manager for Mumias Sugar Company (MSC) during interviews.

3.2 Selected Features of Livelihood Affected by Sugarcane Transportation Sector

The study sought to establish the features of livelihoods resulting from sugarcane transportation in Kakamega and Bungoma Counties. Employment, payment of school fees, construction of permanent houses and access to medical scheme were used as variables to explain the characteristics of livelihoods. A likert scale was used to determine the variables.

3.2.1 Employment

Cane haulers drivers and farmers were required to indicate if sugarcane transportation had increased employment opportunities. Figure 3.2 shows the responses on employment from sugarcane transporting by drivers from the two counties.

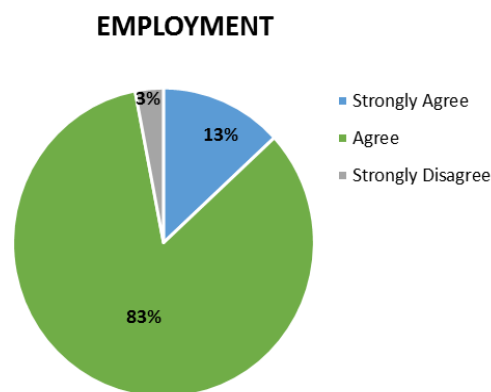


Figure 3.2. Employment Opportunities.

The Figure 3.2 clearly shows that majority of respondents agree that sugarcane farming and related work has provided employments to many in the region. Farmers were receiving their pay from the sugarcane activities, the contractors attached to the sugar industry and the drivers who transport sugarcane from the farm to the industry (Cockburn et al., 2014). Sugarcane since 1922 has been providing farmers with food security and also the proceeds are used to educate their children.

3.2.2 Shelter

Sugar cane in Kenya has created a cycle of poverty that threatens its very own sustainability. To understand the dynamics of such trend, the study sought to establish the type of residential houses owned by sugarcane farmers. Figure 3.3 presents the findings.

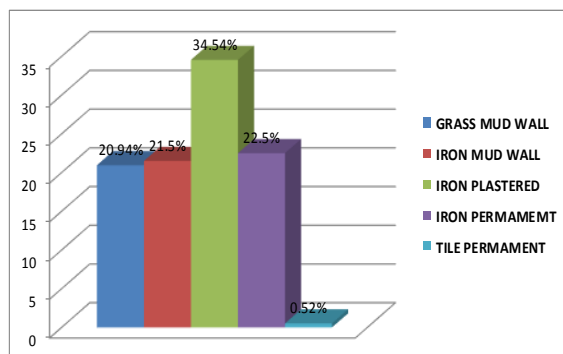


Figure 3.3. Types of Residential House.

Figure 3.3, shows the type of housing that are owned by farmers in sugar belt region of Bungoma and Kakamega Counties. Iron plastered houses were the majority while tiled permanent houses are the minority. The type of shelter is a determinant of economic potential of sugarcane farming.

3.2.3 Education to farmer's children

Farmers were also required to indicate by choosing yes or no response on whether sugarcane farming had enabled them pay school fees for their children or siblings. Figure 3.4 displayed their responses in percentages.

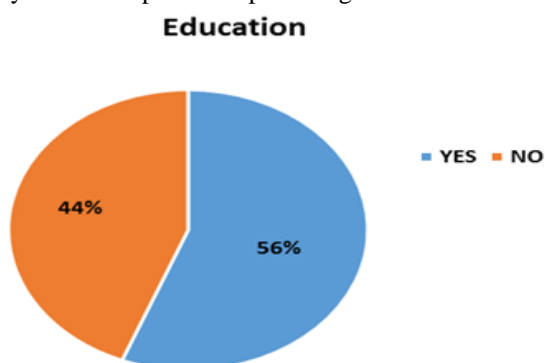


Figure 3.4. Education Acquisition.

From the figure above, it is evident that majority of farmers (56%) used their income from sugarcane farming to meet their school fees burden. A minority used their income to cater for other needs apart from education. The correlation coefficient was positive at 0.314. However, most farmers are small scale, with less than two acres of land but due to high costs of production, the proceeds from sugarcane, which came after a long time, were meagre. Yet some had also leased out their sugarcane to address other challenges. This is also in support with (KSB, 2011) that highlights the challenges that face the sugar industry in Kenya. One contracted farmer for Mumias Sugar Company (MSC) contributing to the FDG narrated that from a gross of KES 250, 000 that his three-acre farm produced, his May 2013 statement showed that he received a net pay of only KES 25, 000. "I cannot afford school fees for my children in high school and colleges. I am now confused. After waiting for almost two years, this is all I get," said a father of six whose name was withheld for personal reasons.

3.3 Challenges Faced in Sugarcane Transportation

According to Nathan (2017), reported that numerous challenges are experienced while delivering sugar cane to milling factories such as accidents, frequent breakdowns, cane poaching, fuel siphoning, police arrests and narrow roads. Transportation of sugar cane in western Kenya have proved over years to being a major challenge. To ascertain the causal factors to sugarcane transportation, a likert scale was developed to assist gather data (Table 3.1)

Table 3.1. Driver's Attitude towards Sugarcane Transportation.

Statement	Percentage				
	SA	A	U	D	SD
Poor road maintenance derails transport	38	33	15	5	12
Roads are properly maintained	3	5	12	36	44
Continuous road maintenance reduces accidents	30	44	15	3	8
Sugarcane transporters are reckless	3	5	12	36	44
Sugarcane transport vessels are overloaded	3	6	21	30	39
Sugarcane poaching denies drivers maximum reap	38	29	24	5	5
Sugarcane spillage is due to overload	3	6	21	30	39
Private millers promotes sugarcane poaching	18	46	27	2	8

SA=Strongly Agree, A= Agree, U=Undecided, D=Disagree, SD=Strongly Disagree

According to the findings in Table 3.1, factors under investigation that had significant influence on drivers' attitude could be ranked as follows: Continuous road maintenance reduces accidents 74%, Poor road maintenance derails transport 72%, Sugarcane poaching denies drivers maximum reap 67% and Private millers promotes sugarcane poaching 64%. Other factors did not show negative influence as indicated: Sugarcane transport vessels are overloaded 9%, Sugarcane spillage is due to overload 9%, Sugarcane transporters are reckless 8% and Roads are properly maintained 8 %.

According to the Key Informant Interviews in both companies, there are quality assurance and standards department that conduct among other duties tractor servicing and road maintenance.

"We observe quality assurance mechanisms as regards sugarcane transportation such as; tractor inspection, route inspection and basic tractor maintenance.

4.0 Discussion

Transportation of sugarcane in Kenya is predominantly dependent on road networks. Tractors are the main form of transportation in Kenya. This is supplemented with lorries, trailers, pick-ups and hand pulled carts. Road transportation accounts for approximately 99 percent of transportation mode in Kenya and western Kenya sugar belt (Marabu, 2012; Porter, 2012). Most sugar cane growers in the region are small farmers operating with their own families. Since most of them do not possess a truck, they have to pay the cost of transportation of the sugar cane from their farm to the mills. Transportation is common problem as the delivery of sugar cane per transaction requires a bulk carrier (Ahmad *et al.*, 2014). They are required to pay for means and hired labourers for cutting of sugarcane and loading the truck. Sugar factories in the country are fleecing farmers by charging them exorbitantly for services and inputs extended to them on credit. It is one of the biggest scandals in the Agriculture sector. Transportation of sugarcane has a serious implication on livelihoods of farmers in the region. Poor road networks play a major role to livelihood determinants in the region.

5.0 Conclusion and Recommendation

5.1 Conclusion

Most of the cane growing farms are owned and operated by individual families. It was established that transportation cost was high in the region. Tractors are the main means of transportation in the region and is supplemented with lorries,

trailers, pick-ups and hand pulled carts. Sugarcane farming is the main cash crop livelihood grown in the area.

5.2 Recommendation

To improve the state of road network, there is need for creating right institutions and mechanisms to carry out road maintenance in the sugar belts of Kenya. These institutions should be the ones tasked with streamlining sugarcane transport logistics since high transport costs affect sugarcane growers and influence negatively on local and national development.

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